

TENDER SPECIFICATION

NO: BHE/PW/PUR/DVRIT-BLR (Vertical Pkg)U-1/824

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE, ERECTION, TESTING & COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES INCLUDING ESP, AIR PREHEATERS, DUCTS AND DAMPERS, FANS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING, CHEMICAL DOZING SYSTEM, LINING & INSULATION, FINAL PAINTING ETC FOR **UNIT - 1** OF

2X600 MW VPL (VISA POWER LIMITED) PROJECT
NEAR VILLAGE DEVERI & DUMARPALI DISTRICT RAIGARH IN
CHHATTISGARH STATE

VOLUME – I

CONSISTING OF:

- **Notice Inviting Tender,**
- **Volume-IA : Technical Conditions of Contract-,**
- **Volume-IB : Special conditions of Contract,**
- **Volume-IC : General conditions of Contract**
- **Volume-ID : Forms & Procedures**



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

CONTENTS			
Volume No	Description	No. of pages	Hosted in website bhel.com as files titled
NIL	Tender Specification Issue Details	1	(Part of Vol-IA-824)
NIL	Notice Inviting Tender	20	(Part of Vol-IA-824)
I-A	Technical Conditions of Contract	114	Vol-IA-824
I-B	Special Conditions of Contract	47	Vol-IBCD-824
I-C	General Conditions of Contract	29	(Part of Vol-IBCD-824)
I-D	Forms & Procedures	54	(Part of Vol-IBCD-824)
II	Price Bid Specification	4	Vol-II-824

Tender Specification Issue Details

Tender Specification No: BHE/PW/PUR/DVRIT-BLR (Vertical Pkg)U-1/824

COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD; TRANSPORTATION TO SITE, ERECTION, TESTING & COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES INCLUDING ESP, AIR PREHEATERS, DUCTS AND DAMPERS, FANS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING, CHEMICAL DOZING SYSTEM, LINING & INSULATION, FINAL PAINTING ETC FOR **UNIT-1 OF**

2X600 MW VPL (VISA POWER LIMITED) PROJECT
NEAR VILLAGE DEVERI & DUMARPALI DISTRICT RAIGARH IN
CHHATTISGARH STATE

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s.

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PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

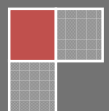
For Bharat Heavy Electricals Limited

AGM (Purchase)
Place: Nagpur
Date:

824

NOTICE INVITING TENDER

Bharat Heavy Electricals Limited



NOTICE INVITING TENDER (NIT)
**NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES
OR
PURCHASE TENDERS FROM THIS OFFICE ALSO**

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To

Dear Sir/Madam

Sub: NOTICE INVITING TENDER

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

1.0 Salient Features of NIT

SL NO	ISSUE	DESCRIPTION
i	TENDER NUMBER	BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824
ii	Broad Scope of job	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD, TRANSPORTATION TO SITE, ERECTION ,TESTING & COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES INCLUDING ESP, AIR PREHEATERS, DUCTS AND DAMPERS, FANS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING, CHEMICAL DOZING SYSTEM, LINING & INSULATION, FINAL PAINTING ETC FOR UNIT-1 OF 2X600 MW VPL (VISA POWER LIMITED) PROJECT NEAR VILLAGES DEVERI & DUMARPALI DISTRICT RAIGARH IN CHHATTISGARH STATE
iii	DETAILS OF TENDER DOCUMENT	
a	Volume-IA	<i>Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc</i> Applicable
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i> Applicable
c	Volume-IC	<i>General Conditions of Contract (GCC)</i> Applicable
d	Volume-ID	<i>Forms and Procedures</i> Applicable
e	Volume-II	<i>Price Schedule (Absolute value).</i> Applicable
iv	Issue of Tender Documents	<ol style="list-style-type: none"> <u>Sale from BHEL PS Regional office at :Nagpur</u> Start : 13/05/2011 Closes: 01/06/2011 , Time :16.00 Hrs From BHEL website (www.bhel.com) Applicable

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 6 of 141

		Tender documents can however be downloaded from website till due date of submission	
v	DUE DATE & TIME OF OFFER SUBMISSION	Date : 02/06/2011 , Time :15.00Hrs Place : <u>BHEL PS Regional office at :Nagpur</u> Tenders being submitted through representative shall be handed over to any of the following BHEL officials after making entry/registration at the reception: SM Borkar/ Sr Manager (Purchase) RK Ranade/ Manager (Purchase) Pratish Gee Varghese/Engineer(Purchase)	Applicable
vi	OPENING OF TENDER	1 hours after the latest due date and time of Offer submission Notes: (1) In case the due date of opening of tender becomes a non-working day, tenders shall be opened on next working day at the same time. (2) Bidder may depute representative to witness the opening of tender	Applicable
vii	EMD AMOUNT	Rs 2,00,000/- (Rupees Two Lakhs Only)	Applicable
viii	COST OF TENDER	Rs 2000/-.	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	Date: Atleast 5 days before the due date of offer submission Along with soft version also, addressing to undersigned & to others as per contact address given below	Applicable
x	SCHEDULE OF Pre Bid Discussion (PBD)	Date : Not applicable.	Not applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	Shri Kanwarjit Singh, IRS(Retd) D-6/12, Ground Floor, Vasant Vihar, New Delhi - 110 05 E-Mail: kanwarfeb@gmail.com	Applicable(Bidders to submit duly filled & signed Annexure III of NIT)
xii	Latest updates	Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com -->Tender Notifications →View Corrigendums) and not in the newspapers . Bidders to keep themselves updated with all such information	

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

3.0 Unless specifically stated otherwise, bidder shall remit cost of tender and courier charges if applicable, in the form of Demand Draft drawn in favour of Bharat Heavy Electricals Ltd, payable at Power Sector Regional HQ at Nagpur issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 7 of 141

Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Nagpur, Sundays and second/ last Saturdays

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

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

- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)
- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)

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

Sl no	Description	Remarks
	Part-I A	
	<p>ENVELOPE – I superscribed as : PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>	
i.	Covering letter/Offer forwarding letter of Tenderer.	
ii.	<p>Duly filled-in 'No Deviation Certificate' as per prescribed format to be placed after document under Sl no (i) above.</p> <p>Note:</p> <p>a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under SL no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained.</p> <p>b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.</p> <p>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL</p> <p>ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria.</p> <p>It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.</p>	
iv.	All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc pertinent to this NIT.	
v.	Integrity Pact Agreement (Duly signed by the authorized signatory)	If applicable
vi.	Duly filled-in annexures, formats etc as required under this Tender Specification/NIT	

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 8 of 141

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

	PART-I B	
	<p>ENVELOPE – II superscribed as: PART-I (EMD/COST of TENDER) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p> <p>CONTAINING THE FOLLOWING:-</p>	
i.	<p>1. Earnest Money Deposit (EMD) in the form as indicated in this Tender OR Documentary evidence for 'One Time EMD' with the Power Sector Region of BHEL floating the Tender</p> <p>2. Cost of Tender (Demand Draft or copy of Cash Receipt as the case may be)</p>	

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

	OUTER COVER	
	<p>ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION:</p>	

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 9 of 141

	CONTAINING THE FOLLOWING:	
i	<ul style="list-style-type: none"> ○ Envelopes I ○ Envelopes II ○ Envelopes III 	

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

7.0 No Deviation with respect to tender clauses and no additional clauses/ suggestions/ in Techno-commercial bid/ Price bid shall normally be considered by BHEL. Bidders are requested to positively comply with the same.

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

9.0 Assessment of Capacity of Bidders:

Bidders capacity for executing the job under tender shall be assessed as per the following:

I. **Assigning Weightages (A) for Similar Jobs Under-Execution:** Weightages shall be worked out and assigned based on the average number of Similar Works under execution including works yet to be commenced by the agency, in the following manner:

i). Number of Similar Jobs

- a) No. of jobs in BHEL, PSER : Say 'J'
- b) No. of jobs in BHEL, PSSR : Say 'K'
- c) No. of jobs in BHEL, PSWR : Say 'L'
- d) No. of jobs in BHEL, PSNR : Say 'M'
- e) No. of jobs with other customers* : Say 'N' (*: Other than BHEL PSER, PSSR, PSWR & PSNR)
- f) Average No. of Jobs is 'P' = (J+K+L+M+N) divided by 5

ii) Weightage "A" assigned to bidders based on Average Number of jobs "P":

- a) If 'P' = 0-1, "A" will be equal to '3'
- b) If 'P' = 2-3, "A" will be equal to '2'
- c) If 'P' = 4-5, "A" will be equal to '1'
- d) If 'P' is Above 5, "A" will be equal to '0'

II. **Weightage "B" for Quarterly Performance Reports of Vendors:** This shall be based on the averages of the net weighted score obtained by the bidder for the jobs under execution (excluding works not commenced) for the quarter previous to the last quarter reckoned from the date of latest due date of submission, in all four Regions i.e. BHEL PSER, PSSR, PSWR & PSNR, in the following manner.

i). Ratings by Power Sector Region:

- a) PS ER's Rating 'Rer' = $(X_1 + X_2 + \dots + X_n)$ divided by n
- b) PS WR's Rating 'Rwr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
- c) PS SR's Rating 'Rsr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + \dots + X_n)$ divided by n
- e) **Over all Power Sector Region Rating 'R_{BHEL}' = (Rer+ Rwr+ Rsr+ Rnr) divided by 4**

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 10 of 141

(where “ $X_1, X_2, X_3, \dots, X_n$ ” is the net weighted score obtained by the bidder as per the “Evaluation of Contractor Performance (Quarterly)” against the various contracts ‘n’ under execution in the respective Region).

ii) Weightage “B” assigned to bidders based on Overall Power Sector Rating (R_{BHEL}):

- a) If R_{BHEL} is 80% and above, “B” will be equal to ‘6’
- b) If R_{BHEL} is $> 70\% < 80\%$, “B” will be equal to ‘5’
- c) If R_{BHEL} is $> 60\% < 70\%$, “B” will be equal to ‘4’
- d) If R_{BHEL} is $= < 60\%$, “B” will be equal to ‘0’

III. Evaluation of Bidders capacity to execute the job under tender: shall be based on the sum of scores obtained in ‘A’ and ‘B’, as below:

- a) **6 or above : Considered ‘Qualified’ for the job under tender**
- b) **Less than 6: Considered ‘NOT Qualified’ for the job under tender**

IV. Explanatory note:

- a) Similar work means Boiler or Turbine or Civil or Electrical or CI, etc irrespective of rating of Plant
- b) Quarter shall be as per the quarter defined in the “Evaluation of Contractor performance (Quarterly)”. For contracts where annexed Quarterly Evaluation performance was not part of the contract, ‘Quarterly Performance Reports’ previous to the last quarter reckoned from the date of latest due date of submission, given by the respective project site against the contract will be the basis for evaluation.
- c) Vendors who are not executing any jobs presently in the Region and first timers to the Region, may be considered subject to satisfying all other tender conditions
- d) ‘Under execution’ shall mean works in progress upto Boiler Steam Blowing (for Boiler and Auxiliaries) or Synchronization (for all other jobs including Civil) shall be considered.

- 10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation 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. No additional claim shall be entertained by BHEL in future, on account of non-acquaintance of above.
- 11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.
- 12.0 BHEL may decide holding pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.
- 13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 11 of 141

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documents, noticed must be pointed out before pre-bid meeting/submission of offer; else BHEL's interpretation shall prevail.

- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall be deemed to be in compliance with tender including PBD.
- 15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (xi) of 1 above.**
- 16.0 The Bidder has to satisfy the Pre Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of pre-qualification evaluation/ techno-commercial bids, approval/ acceptance of customer (as applicable), etc. and date of opening of price bids shall be intimated to only such bidders.
- 17.0 In case BHEL decides on a 'Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorised representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.
- 18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) or specified otherwise in SCC of tender.
- 19.0 BHEL reserves the right to decide the successful bidder on the basis of Reverse Auction process. In such case all qualified bidders will be intimated regarding procedure/ modality for Reverse Auction process prior to Reverse Auction and price will be decided as per the rules for Reverse Auction. .
- However, if reverse auction process is unsuccessful as defined in the RA rules/procedures, or for whatsoever reason, then the sealed 'PRICE BIDS' will be opened for deciding the successful bidder. BHEL's decision in this regard will be final and binding on bidder.
- 20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.
- 21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.
- 22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.
- 23.0 In case Consortium Bidding is allowed as per Pre Qualifying Requirement, then Prime Bidder and Consortium Partner shall enter into Consortium Agreement. Validity period of Consortium Agreement shall be 6 months after which the same can be re validated.
- 'Stand alone' bidder cannot become a '**prime bidder**' or a '**consortium bidder**' in a consortium bidding. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non compliance, consortium bids of such Prime bidders will be rejected. .
- 24.0 The bidder shall submit documents in support of possession of 'Qualifying Requirements' duly self certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 12 of 141

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

26.0 Order of Precedence

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

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

For BHARAT HEAVY ELECTRICALS LTD

(AGM (Purchase))

Enclosure

01. Annexure-1: Pre Qualifying criteria.
02. Annexure-2: Check List .
03. Annexure-3: Integrity Pact.
04. Annexure -4: Important Informations

ANNEXURE - 1

PRE QUALIFYING CRITERIA

JOB	COLLECTION OF MATERIALS FROM BHEL/CLIENT'S STORES/STORAGE YARD, TRANSPORTATION TO SITE, ERECTION ,TESTING & COMMISSIONING, TRIAL OPERATION AND HANDING OVER OF BOILER AND ITS AUXILIARIES INCLUDING ESP, AIR PREHEATERS, DUCTS AND DAMPERS, FANS, FUEL PIPING, BOILER INTEGRAL PIPING, POWER CYCLE PIPING, CHEMICAL DOZING SYSTEM, LINING & INSULATION, FINAL PAINTING ETC FOR UNIT-1 OF 2X600 MW VPL (VISA POWER LIMITED) PROJECT NEAR VILLAGES DEVERI & DUMARPALI DISTRICT RAIGARH IN CHHATTISGARH STATE
TENDER NO	BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

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
A	Submission of Integrity Pact duly signed (if applicable)	APPLICABLE	
B	Assessment of Capacity of Bidder to execute the work as per Sl no 9 of NIT	APPLICABLE	
C	<p><u>Technical</u></p> <p>c) Bidder must have, achieved any one of the following:</p> <p>c.1) Bidder must have, in last seven years as on 30/04/2011, executed Erection, Testing and Commissioning (Upto Boiler Light-up of the Unit or beyond) of atleast One Unit of Coal Fired Boiler of 190 MW or higher rating</p> <p>c.2) Bidder should have been Techno Commercially Qualified for Erection, Testing and Commissioning works of 500 MW or higher rating Coal Fired Boiler in last 3 years as on 30/04/2011 by any power sector region of BHEL:</p> <p>c.3) Bidder should be empanelled with BHEL-PSWR for M-VP-3 (Boiler Vertical Package Rating above 300 MW) category.</p>		
D 1	<p><u>Financial</u></p> <p><u>TURNOVER</u></p> <p>Bidders must have achieved an average annual financial turnover (Audited) of Rs 1680 Lakhs or more over last three Financial Years (FY) i.e. 2008-2009, 2009-2010, 2010-2011 if Annual Accounts for FY 2010-11 are audited or for, 2007-2008 and 2008-2009, 2009-2010 if not audited</p>		
2	<p>NETWORTH</p> <p>Net worth of bidder based on latest Audited Accounts as furnished for 'D.1' above should be positive</p>		

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 14 of 141

3	PROFIT Bidder must have earned cash profit in any one of the three Financial Years as applicable in the last three years defined in 'D1' above based on latest Audited Accounts.		
E	Approval of Customer Note: Names of bidders who stand qualified after compliance of criteria A to D shall be forwarded to customer for their approval. Price bid of only those bidders shall be opened who are approved by customer.	APPLICABLE	
F	Consortium criteria (if applicable)	NOT APPLICABLE	
<p>Explanatory Notes for QR 'A'</p> <ol style="list-style-type: none"> 1. The word 'executed' means the bidder should have achieved the criteria specified in the QR even if the total contract has not been completed or closed 2. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as given above along with all annexures <ol style="list-style-type: none"> (a) The word 'executing' means _____ 			

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

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 15 of 141

ANNEXURE - 2

CHECK LIST

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

1	Name and Address of the Tenderer		
2	Details about type of the Firm/Company		
3	Details of Contact person for this Tender	Name : Mr./Ms Designation: Telephone No: Mobile No: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: Please tick (√) whichever applicable:- ONE TIME EMD / ONLY FOR THIS TENDER	
		APPLICABILITY	BIDDER REPLY
5	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable	YES / NO
6	Whether Audited profit and Loss Account for the last three years submitted	Applicable	YES/NO
7	Whether Copy of PAN Card submitted	Applicable	YES/NO
8	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable	YES/NO
9	Whether duly filed & Signed Integrity Pact (Annexure III of NIT) submitted	Applicable	YES/NO
10	Declaration by Authorised Signatory	Applicable	YES/NO
11	Whether No Deviation Certificate submitted	Applicable	YES/NO
12	Whether Declaration confirming knowledge about Site Conditions submitted	Applicable	YES/NO
13	Whether Declaration for relation in BHEL submitted	Applicable	YES/NO
14	Whether Non Disclosure Certificate submitted	Applicable	YES/NO
15	Whether Bank Account Details for E-Payment submitted	Applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Refer SI 9 of NIT	
17	Tie Ups/Consortium Agreement are submitted as per format	Not Applicable	Not Applicable
18	Whether Power of Attorney for Submission of Tender/Signing Contract Agreement submitted	Applicable	YES/NO
19	Whether Analysis of Unit rates submitted	Applicable	YES/NO

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

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

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

INTEGRITY PACT

Between

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

And

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

Preamble

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

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

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

Section 1 - Commitments of the Principal

- 1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:-
 - 1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or

accept, for itself or third person, any material or immaterial benefit which the person is not legally entitled to.

- 1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential / additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.
- 1.1.3 The Principal will exclude from the process all known prejudiced persons.
- 1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

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

- 2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. He commits himself to observe the following principles during his participation in the tender process and during the contract execution.
- 2.1.1 the Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he / she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.
- 2.1.2 The bidder(s)/ Contractors(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.
- 2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant IPC/PC Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

- 2.1.4 The Bidders (s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.
- 2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

Section 3 – Disqualification from tender process and execution from future contracts

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

Section 4 – Compensation for Damages

- 4.1 If the Principal has disqualified the Bidder from the tender process prior to the award according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.
- 4.2 If the Principal has terminated the contract according to Section 3, or if the Principal is entitled to terminate the contract according to Section 3, the Principal shall be entitled to demand and recover from the Contractor liquidated damages equivalent to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee, whichever is higher.

Section 5 – Previous Transgression

- 5.1 The Bidder declares that no previous transgressions occurred in the last 3 years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.
- 5.2 If the Bidder makes incorrect statement on his subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason.

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

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

- 6.2 The Principal will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 6.3 The Principal will disqualify from the tender process all bidders who do not sign this pact or violate its provisions.

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

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

Section – 8 Independent External Monitor(s)

- 8.1 The Principal appoints competent and credible Independent External Monitor for this Pact. The task of the Monitor is to review independently and objectively, whether and to what extent the parties comply with the obligations under this agreement.
- 8.2 The Monitor is not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.
- 8.3 The Bidder(s)/ 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)/ Sib-contractor(s) with confidentiality.
- 8.4 The Principal will provide to the Monitor sufficient information about all meetings among the parties related to the contract provided such meeting could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the Monitor the option to participate in such meetings.
- 8.5 As soon as the Monitor notices, or believes to notice, a violation of this agreement, he will so inform the Management of the Principal and request the Management to discontinue or take corrective action, or heal the situation, or to take other relevant action. The Monitor can in this regard submit non-binding recommendations. Beyond this, the Monitor has no right to demand from the parties that they act in a specific manner, refrain from action or tolerate action.

- 8.6 The Monitor will submit a written report to the CMD, BHEL within 8 to 10 weeks from the date of reference or intimation to him by the Principal and, should the occasion arise, submit proposals for correcting problematic situations.
- 8.7 The CMD, BHEL shall decide the compensation to be paid to the Monitor and its terms and conditions.
- 8.8 If the Monitor has reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant IPC/PC Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the Monitor may also transmit this information directly to the Central Vigilance Commissioner, Government of India.
- 8.9 The number of Independent External Monitor(s) shall be decided by the CMD, BHEL.
- 8.10 The word 'Monitor' would include both singular and plural.

Section 9 – Pact Duration

- 9.1 This Pact begins and shall be binding on and from the submission of bid(s) by bidder(s). It expires for the Contractor 12 months after the last payment under the respective contract and for all other Bidders 6 months after the contract has been awarded.
- 9.2 If any claim is made/ lodged during this time, the same shall be binding and continue to be valid despite the lapse of this pact as specified as above, unless it is discharged/ determined by the CMD, BHEL.

Section 10 – Other Provisions

- 10.1 This agreement is subject to Indian Laws and jurisdiction shall be registered office of the Principal, i.e. New Delhi.
- 10.2 Changes and supplements as well as termination notices need to be made in writing. Side agreements have not been made.
- 10.3 If the contractor is a partnership or a consortium, this agreement must be signed by all partners or consortium members.
- 10.4 Should one or several provisions of this agreement turn out to be invalid, the remainder of this agreement remains valid. In this case, the parties will strive to come to an agreement to their original intentions.

**BHEL PSWR
Notice Inviting Tender**

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(VERTICAL PKG) U-1/824

Page 21 of 141

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

For & On Behalf of the Principal
(Office Seal)

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

IMPORTANT INFORMATION

1. PRICE VARIATION COMPENSATION

Refer Clause 2.17 of Volume I C 'General Conditions of Contract' (Price Variation Compensation): For the purpose of calculating PVC, following 'Commodities shall be reckoned for the respective categories:

Category	Commodity to be Used for PVC Calculation
Electrode	Welding Rod (Individual Commodity)
High Speed Diesel	High Speed Diesel (Individual Commodity)
Cement	Grey cement (Individual Commodity)
Structural & Reinforcement Steel	a1. Iron & semis (Group Item)
Materials (Other than Cement & Steel)	All Commodities (Group Item)

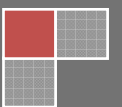
2. INTEREST BEARING RECOVERABLE ADVANCE

Refer Clause 2.13 of Volume I C 'General Conditions of Contract' (Interest Bearing Recoverable Advance): Following additional points shall be noted:

- Bank Guarantee towards 'Interest Bearing Advance' shall be atleast 110% of the advance so as to enable recovery of not only principle amount but also the interest portion, if so required.
- 'Interest Bearing Recoverable Advance' shall not be paid in less than two installments. Contractor shall establish the utilization of advance drawn before the release of next installment.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

BHARAT HEAVY ELECTRICALS
LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC) CONTENTS

SI No	DESCRIPTION	Chapter	No. OF PAGES
Volume-IA	Part-I: Contract specific details		
1	Project Information	Chapter-I	2
2	Scope of Works	Chapter-II	2
3	Facilities in the scope of Contractor/BHEL (Scope Matrix)	Chapter-III	7
4	T&Ps and MMEs to be deployed by Contractor	Chapter-IV	5
5	T&Ps and MMEs to be deployed by BHEL on sharing basis	Chapter-V	2
6	Time Schedule	Chapter-VI	2
7	Terms of Payment	Chapter-VII	5
8	Taxes and other Duties	Chapter-VIII	3
9	Specific Inclusion	Chapter-IX	1
10	Specific Exclusion	Chapter-X	1
11	Annexures		
	Estimated Weights of Various Systems in Scope of Work	Annexure I	26
	List of IBR Weld Joints	Annexure II	1
	Painting Scheme	Annexure III	20
Volume-IA	Part-II : Technical Specifications		
1	General	Chapter-I	6
2	Boiler, Auxiliaries and Piping	Chapter-II	10
3	Foundation & Groutings	Chapter-III	2
4	Welding, Radiography, NDT, Heat Treatment	Chapter-IV	5

TECHNICAL CONDITIONS OF CONTRACT (TCC) CONTENTS

5	Lining & Insulation	Chapter-V	4
6	Painting	Chapter-VI	3
7	Testing, Pre-Commissioning, Commissioning	Chapter-VII	4
8	Preservation & Protection of Components	Chapter-VIII	1

Following Drawings are uploaded separately:

1. 0-00-022-75772
2. 0-00-022-75771

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - I: Project Information

1.0	Project Information
1.1	INTRODUCTION VISA POWER LTD (VPL) is going to install 2X600MW Coal Based Thermal Power Plant near village Deveri & Dumarpali District Raigarh in Chhattisgarh state, India. BHEL have been awarded BTG Package comprising of Design, Engineering, Manufacturing, Testing at works, Supply, Transportation, Storage and Handling at site, Erection, Testing, Commissioning, and Performance Guarantee Testing alongwith comprehensive MCE insurance (Transit, Storage, Erection, Testing and Commissioning) of Both Units and handing over of the project within 42 months from zero date / 09.08.2010. Site information a) Location : Near Village Deveri & Dumarpali Dist : Raigarh State : Chhattisgarh b) Longitude : 21°57' 15.74" N c) Latitude : 83°16' 52.89" E d) Nearest Railway Station : Bhupdeopur (5 Kms from project site on howrah – Mumbai railway line) Raigarh (23 Kms from project site) e) Nearest Village : Deveri & Dumarpali Dist : Raigarh State : Chhattisgarh f) Nearest Seaport : Paradip (525 Kms) g) Nearest Airport : Raipur 250 km (Chhattisgarh) h) Access Road : The Site is well connected with the National Highway no. 200 (around 2 Kms away)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - I: Project Information

1.2	<u>CLIMATIC CONDITIONS</u> 1. <u>Seismic data</u> a. Seismic Intensity : As per IS: 1893-2002 b. Zone : III c. Importance Factor : 1.75 2. Ambient Air Temperature Design ambient dry bulb temperature : 35° C 3. Relative Humidity : 62%(Average) 4. Cooling water temperature : 33° C 5. Wind data Basic wind speed : 0.28 m/s – 2 m/s
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The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the CONTRACT. All costs for and associated with site visits shall be borne by the bidder.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

2.0 SCOPE OF WORK

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

- 1) Collection of materials from BHEL/Client's stores/storage yard; transportation to site, Erection ,Testing & Assistance for commissioning, Trial Operation and handing over of Boiler and its Auxiliaries, Air Preheaters, Ducts and Dampers, Fuel Piping, Boiler Integral Piping, Electrostatic Precipitator, Fans, Power Cycle Piping, Coal Mills and Coal Feeders, Chemical Dozing System, Insulation, Final Painting etc. of Unit - 1 of 2X600 MW VPL (Visa Power Limited) project near villages Deveri & Dumarpali District Raigarh in Chhattisgarh State.
- 2) Erection, alignment and welding, bolting, fastening, grouting as applicable of:
 - ✓ Boiler Supporting Structures
 - ✓ Boiler Pressure Parts
 - ✓ Boiler Trim & Integral Piping and Mountings
 - ✓ Fuel Oil Piping
 - ✓ Non-Pressure Parts, Ducts, Dampers
 - ✓ Rotating Machines (e.g. Air Heaters, Coal Mills, Coal Feeders, Fans, Blowers etc. with their drives & Lube Oil System etc.)
 - ✓ Pulverized Fuel Piping
 - ✓ External structures (e.g. Duct supporting, pipe rack structures etc.) Including elevator structure.
 - ✓ Handling arrangements for Rotating Machines
 - ✓ Power Cycle Piping (Main Steam, HRH, CRH etc) and valves including HP/LP Bypass
 - ✓ Electrostatic Precipitator and Stairways & Galleries
 - ✓ Chemical Dozing System
 - ✓ Entire piping supplied by PC Chennai (SG piping, TG piping, LP piping)
 - ✓ Deareator along with their structure.
- 3) Pre-assembly, if any, Pre-erection checks as applicable
- 4) Transportation / Dragging of boiler drum from unloading bay to inside boiler structures and positioning on ground, erection using Strand Jack Method including final alignment.
- 5) Non-Destructive Examination & post weld heat treatment.
- 6) Insulation of all exposed metal parts of the equipments including piping, structures etc.
- 7) Pre-commissioning checks/tests, Trial Runs/Testing and Commissioning
- 8) Final Painting of erected items

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter - II: Scope of Works

- 9) Trial Operation and associated tests
- 10) Making unit ready for PG test and assistance for conductance.
- 11) Completion of all facilities/systems
- 12) Handing over of the unit

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
3.1	ESTABLISHMENT			
3.1.1	FOR CONSTRUCTION PURPOSE:			
a	Open space for office (as per availability)	Yes		Location will be finalized after joint survey with owner
b	Open space for storage (as per availability)	Yes		Location will be finalized after joint survey with owner
c	Construction of bidder's office, canteen and storage building including supply of materials and other services		Yes	
d	Bidder's all office equipments, office / store / canteen consumables		Yes	
e	Canteen facilities for the bidder's staff, supervisors and engineers etc		Yes	
f	Fire fighting equipments like buckets, extinguishers etc		Yes	
g	Fencing of storage area, office, canteen etc of the bidder		Yes	
3.1.2	FOR LIVING PURPOSES OF THE BIDDER			
a	Open space for labour colony (as per availability)	Yes		Location will be finalized after joint survey with owner

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Labour Colony with internal roads, sanitation, complying with statutory requirements		Yes	
3.2.0	ELECTRICITY			
3.2.1	Electricity For construction purposes of Voltage 415/440 V			FREE
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.2	Electricity for the office, stores, canteen etc of the bidder			Chargable
a	Single point source	Yes		At a distance of 500 M from site (Distance is only estimated, it may vary upto an extent depending on site condition)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc			
a	Single point source		Yes	
b	Further distribution including all materials, Energy Meter, Protection devices and its service		Yes	
c	Duties and deposits including statutory clearances if applicable		Yes	
3.3.0	WATER SUPPLY			
3.3.1	For construction purposes:			FREE
a	Making the water available at single point	Yes		In case of inadequate supply / non-availability of construction water from customer, contractor shall have to arrange construction water at his own expenses.
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
3.3.2	Water supply for bidder's office, stores, canteen etc.			Chargable
a	Making the water available at single point	Yes		
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.3.3	<u>Water supply for Living Purpose</u>			
a	Making the water available at single point		Yes	
b	Further distribution as per the requirement of work including supply of materials and execution		Yes	
3.4.0	LIGHTING			
a	For construction work (supply of all the necessary materials) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	
b	For construction work (execution of the lighting work/ arrangements) 1. At office/storage area 2. At the preassembly area 3. At the construction site /area		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART I	Scope / to be taken care by		Remarks
		BHEL	Bidder	
c	Providing the necessary consumables like bulbs, switches, etc during the course of project work		Yes	
d	Lighting for the living purposes of the bidder at the colony / quarters		Yes	
3.5.0	COMMUNICATION FACILITIES FOR SITE OPERATIONS OF THE BIDDER			
a	Telephone, fax, internet, intranet, e-mail etc.		Yes	
3.6.0	COMPRESSED AIR wherever required for the work			
3.7.0	Demobilization of all the above facilities		YES	
3.8.0	TRANSPORTATION			
a	For site personnel of the bidder		Yes	
b	For bidder's equipments and consumables (T&P, Consumables etc)		Yes	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

SI. No	Description	Scope / to be taken care by		Remarks
		BHEL	Bidder	
	PART II 3.9.0 ERECTION FACILITIES			
3.9.1	Engineering works for construction:			
a	Providing the erection drawings for all the equipments covered under this scope	Yes		
b	Drawings for construction methods	Yes	Yes	In consultation with BHEL
c	As-built drawings – where ever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes		YES	"
d	Shipping lists etc for reference and planning the activities	Yes		"
e	Preparation of site erection schedules and other input requirements		Yes	"
f	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments	Yes	Yes	"
g	Weekly erection schedules based on SL No. e		Yes	"

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – III: Facilities in the scope of Contractor/BHEL

Sl. No	Description PART II 3.9.0 ERECTION FACILITIES	Scope / to be taken care by		Remarks
		BHEL	Bidder	
h	Daily erection / work plan based on SL No. g		Yes	"
i	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done once in every two months.		Yes	
j	Preparation of preassembly bay		Yes	
k	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	
L	Arranging the materials required for preassembly		YES	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
1	CRAWLER CRANE	75 MT	1	01 No. - FROM TWO MONTH BRFORE BES TO TRIAL RUN
2	MOBILE CRANE	18 MT	1	BES TO TRIAL RUN
3	PICK & CARRY CRANE	12 MT	1	BES TO TRIAL RUN
4	PICK & CARRY CRANE	10 MT	1	BES TO TRIAL RUN
5	TRAILER WITH PRIME MOVER	40 MT	2	1 NO. FROM START AND 1 MORE FROM START+2 MONTHS BOTH TILL TRIAL RUN
6	AIR COMPRESSOR (ELECTRIC/DIESEL OPERATED)	140 CFM, 7 KG/CM2	1	
7	TIG WELDING SET	AS REQUIRED	12 NOS.	
8	PLASMA CUTTING M/C	FOR CUTTING UP TO 10 MM THICK STAINLESS STEEL	AS REQUIRED	
9	3-PHASE DISTRIBUTION BOARD WITH COMPLETE SET UP FOR DRAWL OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	
10	POWER CABLE FOR DRAWL OF CONSTRUCTION POWER	AS REQUIRED	AS REQUIRED	
11	PRE HEATING / STRESS RELIEVING SET (HEATING CONTROL PANEL, CABLES, HEATING ELEMENTS, THERMOMETERS ETC.)	AS REQUIRED	AS REQUIRED	
12	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	IRIDIUM-192	2 SETS	
13	RADIOGRAPHY ARRANGEMENT WITH RADIOACTIVE ISOTOPE SOURCE	COBALT-60	1 SET	

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
14	THEODOLITE OF REQUIRED ACCURACY	TO ENSURE VERTICALITY OF STRUCTURAL COLUMNS	1	
15	SELF DRILLING CUM TAPPING MACHINE FOR SCREWS OF BOILER ROOF SHEETS	AS REQUIRED	4	
16	CHEMICAL CIRCULATION PUMPS TO HANDLE ACID SOLUTION, OPR TEMP 80 DEG CEL, WITH DRIVE MOTORS, STARTER PANEL, CABLE, SWITCH FUSE UNIT ETC. SUGGESTED RATING: 200 M ³ , 120 – 150M WC, WITH COMPATIBLE ELECTRIC DRIVE MOTOR. HOWEVER, CONTRACTOR SHALL DEPLOY THE REQUIRED CAPACITY PUMP WITH ACCESSORIES AFTER OBTAINING WRITTEN APPROVAL OF BHEL.	AS REQUIRED	4 SETS	
17	ARRANGEMENT FOR UT OF HIGHER THICKNESS JOINTS WITH RECORDING FACILITY	TYPE USN 50 OR EQUIVALENT/UPGRADED TYPE	1 SET	
18	ELECTRO-HYDRAULIC PIPE BENDING MACHINE	UP TO 2" NB AND 12 MM THICK PIPES	3 SETS	
19	WELDING GENERATOR (ELECTRICAL)	300 AMPERE RATING	AS REQUIRED	
20	WELDING GENERATOR (DIESEL OPERATED)	300 AMPERE RATING	4 SETS	
21	RADIOGRAPHY FILM VIEWER	AS REQUIRED	AS REQUIRED	

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
22	HYDRAULIC PIPE BENDING MACHINE (MANUAL)	FOR BENDING OF PIPES UP TO 50 MM NB SIZE	4 SETS	
23	BAKING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR WELDING ELECTRODES	AS REQUIRED	1	
24	HOLDING OVEN WITH THERMOSTAT AND TEMPERATURE GAUGE FOR WELDING ELECTRODES	AS REQUIRED	2	
25	PORTABLE OVEN FOR WELDING ELECTRODES	AS REQUIRED	35	
26	ELECTRIC WINCH	3 TON CAPACITY	5	
27	ELECTRIC WINCH	1 TON CAPACITY	5	
28	HYDRAULIC TEST/PRESSURIZING PUMP	600 , 450 & 250 KG PER CM ²	01 NO EACH	FOR HYDRAULIC TEST OF BOILER AND HP PIPELINES.
29	FURNACE MAINTENANCE PLATFORM (SKY CLIMBER)	ADEQUATE CAPACITY	2	TO COVER ONE LENGTH AND ONE WIDTH OF FURNACE
30	HAND WINCH	0.5 TON CAPACITY	3	
31	SCAFFOLDING MATERIALS	SUITABLE FOR WORKING AT VARIOUS HEIGHTS	10,000 Nos.	
32	PROFILE MAKING M/C	FOR ALUMINIUM SHEET CLADDING WORK	AS REQUIRED	
33	NIBBLING M/C	FOR REFRACTORY AND OTHER REQUIRED ACTIVITIES	AS REQUIRED	
34	SHEARING M/C		AS REQUIRED	
35	WATER PUMP TO LIFT WATER TO TOP OF BOILER		1 SET	

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – IV: T&Ps and MMEs to be deployed by Contractor

SN	DESCRIPTION	CAPACITY (MINIMUM)	MINIMUM QUANTITY PER UNIT	REMARKS
36	PORTABLE GRINDING M/C	AS REQUIRED	AS REQUIRED	
37	PORTABLE DRILLING M/C	AS REQUIRED	AS REQUIRED	
38	CHAIN PULLEY BLOCKS	Assorted capacities	AS REQUIRED	
39	FIRE RETARDANT TARPAULINS	AS REQUIRED	AS REQUIRED	
40	FIRE EXTINGUISHER	AS REQUIRED	AS REQUIRED	

PASSENGER CUM GOODS ELEVATOR

Contractor, as part of his T&P, shall arrange, install, operate and maintain 1.5 MT capacity passenger-cum-goods elevator in each boiler to facilitate access to various platform elevations upto top floor/boiler drum floor. The elevator shall conform to the national standard and industrial safety code as applicable. These shall be deployed at the time of Boiler Drum erection in consultation with BHEL site engineer.

The probable suppliers for the elevator are:

1. M/s Avon cranes pvt ltd, Gurgaon
2. M/s Mekaster engineering & equipment pvt ltd, Halol

Laying of sleepers and rails and routine maintenance of the dip trolley system including assembly and dismantling are in Contractor's scope.

B: MEASURING AND MONITORING DEVICES (MMD):

AS PER REQUIREMENT TO BE FINALIZED AT SITE, SHALL MEET THE REQUIREMENTS AS PER FIELD QUALITY PLAN AND OTHER ERECTION, TESTING RELATED ACTIVITIES.

NOTE:

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – IV: T&Ps and MMEs to be deployed by Contractor

- 1) ALL THE TOOLS AND PLANTS REQUIRED FOR THIS SCOPE OF WORK, EXCEPT THE TOOLS & PLANTS PROVIDED BY BHEL ARE TO BE ARRANGED BY CONTRACTOR WITHIN THE QUOTED RATES. THE LIST IS SUGGESTIVE IN NATURE. ANY ADDITIONAL T&P REQUIRED TO BE ARRANGED BY THE CONTRACTOR.
- 2) IF ABOVE MENTIONED T & P ARE NOT DEPLOYED IN SPECIFIED TIME BHEL WILL CHARGE TO CONTRACTOR CURRENT MARKET RATE + 30 % OVERHEADS FOR NON AVAILABILITY T&P OR LEVY A DAY WISE PENALTY FOR NON DEPLOYMENT OR DELAYED DEPLOYMENT.
- 3) IF THE WORKS GET DELAYED DUE TO NON-AVAILABILITY OF T&P, BHEL RESERVES THE RIGHT TO GET THE WORK DONE AT THE RISK AND COST OF CONTRACTOR WITHIN PREJUDICE TO RIGHTS OF BHEL AS IN GCC.
- 4) THE MANUFACTURING YEAR OF ALL MAJOR T&PS DEPLOYED BY THE CONTRACTOR (75 MT, CRAWLER CRANE, 18 MT MOBILE CRANE AND 12/10 MT PICK & CARRY CRANE) SHOULD NOT BE MORE THAN 10 YEARS AS ON THE DATE OF DEPLOYMENT. IF AT ANY MOMENT OF TIME DURING THE EXECUTION OF WORK, ANY CRANE IS FOUND TO BE NOT IN A GOOD WORKING CONDITION AND NON-PERFORMING AT DESIRED MINIMUM CAPACITY, AS CERTIFIED BY BHEL ENGINEER, THE CONTRACTOR SHALL DEPLOY ANOTHER CRANE IN GOOD WORKING CONDITION WITH MINIMUM DESIRED CAPACITY. IF CONTRACTOR FAILS TO DEPLOY THE SAME WITH IN 10 DAYS, BHEL WILL RECOVER NON-REFUNDABLE PENALTY PER DAY OF DELAY IN THE FOLLOWING MANNER -
 1. IN RESPECT OF 75 MT CRANE: @ RS. 5,000 / -
 2. IN RESPECT OF 18 MT CRANE: @ RS. 3,000 / -
 3. IN RESPECT OF 12 MT CRANE: @ RS. 1,000 / -
 4. IN RESPECT OF 12 MT CRANE: @ RS. 1,000 / -

BES = BOILER ERECTION START, CF = COAL FIRING, BLU = BOILER LIGHT UP, FL = FULL LOAD,

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter – V: T&Ps and MMEs to be deployed by BHEL on
sharing basis

SL.NO.	DESCRIPTION & CAPACITY OF T&P	QUANTITY	REMARKS
01	HEAVY LIFT-HIGH REACH CRANE (HLHR)	01 NO.	THIS WILL BE HIRED BY BHEL. REFER NOTE 1-9 BELOW FOR UTILIZATION.
02	250 MT CAP CRANE	01 NO.	-DO-
03	120 MT CAP CRANE	02 NOS.	-DO-
04	STRAND AND JACK ARRANGEMENT	1 SET	FOR BOILER DRUM ERECTION
05	INDUCTION HEATING M/C	04 SET	FOR WELDING OF P-91 PIPELINE
06	HUCK BOLTING MACHINE COMPLETE SET	02 SET	FOR HUCK BOLTING OF SHOCK BARS AND SHOCK PADS.
07	AIR LEAK TEST EQUIPMENTS WITH ALL AUXILIARIES	01 SET	FOR AIR LEAK TEST OF ESP AND DUCTING ETC.
08	FURNACE MAINTENANCE PLATFORM SET	FOR 2 WALLS	

NOTE:

1. HLHR CRANE IS TO BE USED FOR ERECTION OF BOILER CEILING STRUCTURES AND EQUIPMENT/ COMPONENTS ABOVE BOILER CEILING STRUCTURE THAT REQUIRE SERVICES OF THIS CRANE AS DECIDED BY BHEL. THIS CRANE WILL ACCORDINGLY BE DEPLOYED AT APPROPRIATE TIME AS DECIDED BY BHEL FOR SUITABLE DURATION AND INTENDED PURPOSE.
2. ONE NO. OF 120 T CRAWLER CRANE WILL BE PROVIDED AT THE TIME OF START OF BOILER ERECTION. ANOTHER 120 T AND 250 T CRAWLER CRANES WILL BE PROVIDED PROGRESSIVELY IN A PHASED MANNER SO AS TO SUIT THE ERECTION REQUIREMENTS AS DECIDED BY BHEL ENGINEER.
3. STRAND AND JACK ARRANGEMENT FOR BOILER DRUM ERECTION WILL BE PROVIDED BY BHEL. CONTRACTOR WILL ARRANGE FOR COLLECTION / TRANSPORTATION / HANDLING INCLUDING PROVIDING ALL NECESSARY LIFTING AND SHIFTING TRANSPORTATION ARRANGEMENT AND NECESSARY MANPOWER. IT WILL ALSO REQUIRE THE CLEANING; TRIAL ASSEMBLY AND FINAL ASSEMBLY ETC OF STRAND JACK ARRANGEMENT AND THE SAME SHALL BE IN THE SCOPE OF CONTRACTOR UNDER THE SUPERVISION OF BHEL. ALL ARRANGEMENTS SHALL BE DISMANTLED AND TO BE RETURNED TO BHEL STORE IN DULLY PACKED AND SAFE CONDITION IMMEDIATELY AFTER COMPLETION OF WORK AS PER INSTRUCTION OF BHEL.

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – V: T&Ps and MMEs to be deployed by BHEL on sharing basis

4. THESE CRANES ARE OWNED OR HIRED BY BHEL. OPERATOR FOR BHEL OWNED CRANE WILL BE ARRANGED BY BHEL
5. CONTRACTOR SHALL MAKE NECESSARY ARRANGEMENTS LIKE LYING OF SPECIAL SLEEPER BEDS AND STEEL PLATES (ALL ARRANGED BY CONTRACTOR), ASSEMBLY AND DISMANTLING OF HEAVY LIFT ATTACHMENT, BOOM, JIB ETC FOR MOVEMENT AND OPERATION OF THE CRANE
6. BHEL MAY OBTAIN THESE CRANES ON HIRING BASIS INCLUDING OPERATING AND MAINTENANCE CREW.
7. OPERATORS FOR HIRED CRANE WILL BE PROVIDED BY THE HIRING AGENCY.
8. CONTRACTOR SHALL PROVIDE THE FUEL FOR BHEL PROVIDED CRANES FOR HIS USE.
9. CRANES PROVIDED BY BHEL WILL BE ON SHARING BASIS WITH OTHER AGENCIES / CONTRACTORS OF BHEL. THE ALLOCATION OF CRANES SHALL BE THE DISCRETION OF BHEL ENGINEER, WHICH SHALL BE BINDING ON THE CONTRACTOR. CRANES WILL BE DEPLOYED AT APPROPRIATE TIME AS DECIDED BY BHEL FOR SUITABLE DURATION AND INTENDED PURPOSE.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – VI: Time Schedule

6.1 TIME SCHEDULE & MOBILIZATION

6.1.1 INITIAL MOBILIZATION

After receipt of fax LOI, Contractor shall discuss with Project Manager / Construction Manager regarding initial mobilization. Contractor shall mobilize necessary resources within 2 weeks of issue of fax letter of intent or as per the directive of Project Manager / Construction Manager. Such resources shall be progressively augmented to match the schedule of milestones and commissioning.

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

The activities for erection, testing etc. shall be started as per directions of Construction Manager of BHEL. Contractor shall mobilize further resources (in addition to those required for activities under clause no. 6.1.1) as per requirement to commence the work of erection, testing etc. of boiler and auxiliaries and progressively augment the resources to match schedule of the project.

6.1.3 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

Erection/placement on its designated foundation / location, of the first major permanent equipment / component / column covered in the scope of these specifications shall be recognized as “start of contract period”. Smaller items like packer plates, shims, anchors, inserts etc. will not be considered as start of contract period.

The Contractor has to subsequently augment his resources in such a manner that following major milestones of erection & commission are achieved on specified schedules:
According to the contract between BHEL and Owner the schedule of important milestones is as follows:

SL No.	Milestones	UNIT - 1
	Zero Date	09-Aug-10
1	Boiler Erection Start	20-May-11
2	Boiler Drum Lifting (17% MT Tonnage completion)	10-Oct-11
3	Boiler Hydro Test (61% MT tonnage completion)	25-Feb-13
4	Boiler Light Up (BLU) - (81% MT Tonnage Completion)	19-Mar-13
5	Safety Valve Floating	01-June-13
6	Synchronization with oil	23-June-13
7	Synchronization with coal firing (95%) MT tonnage Completion	8-July-13
8	Completion of trial run	8-Oct-13
9	PG Test	8-Nov-13

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

6.1.4 CONTRACT PERIOD

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter – VI: Time Schedule

The contract period for completion of entire work under scope shall be **30 (Thirty months)** from the “start of contract period” as specified earlier.

The period from the commencement of preparatory work for erection till the actual “start of contract period” shall not be reckoned for the above purpose.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

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

TERMS OF PAYMENT FOR STEAM GENERATOR

SL NO	Contract (Main Package) Identification ---->	Boiler				Rotating Machine	ESP		PIPING			INSULATION
	Rate schedule Identification ----->	Structure	Pressure Parts	Non Pressure Parts (upto ESP inlet Funnel)	Air Pre Heaters	1) RM 2) Handling Eqpts	ESP	NPP (ESP outlet Funnel to Chimney)	1)P-91 2) AS 3) CS (HP) 4) CS (LP) 5) SS	Hangers & Supports	Temporary Piping 1) Steam Blowing 2) Chemical Cleaning	1) Castable & Pourable 2) Iron Components 3) Wool mattresses 4) Aluminium sheeting
I	PRO RATA PAYMENTS (85%)											
1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	20	20	25		15	15	15	20	15		--
1.2	PLACEMENT IN POSITION	15	10	10		20	20	10	20	25		50
1.3	ALIGNMENT	15	15	10		20	15	15	10	15		15
1.4	WELDING/BOLTING/FIXING	15	20	15		20	20	30	15	30		20
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	--		--	--	--	5			--
1.6	On Drum Lifting	0										
1.7	COMPLETION OF ATTACHMENT WELDING, FIN WELDING, SUPPORTS		5									

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

1.8	COMPLETION OF ROOF SKIN CASING		5									
1.9	INSTALLATION OF TEMPORARY PIPING										60	
1.10	DISMANTLING OF TEMPORARY PIPING, EDGE PREPARATION AND RETURN TO BHEL STORES, AREA CLEANING										25	
1.11	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG		--	25		--	--	15	10			--
1.12	COMPLETION OF FURNACE ALIGNMENT AND FIRE BALL CHECKING	5										
1.13	COMPLETION OF BACK PASS ALIGNMENT	5										
1.14	COMPLETION OF VIBRATION SNUBBERS, MECHANICAL SPACERS, CASSETTE BAFFLES, STEAM COOLED SPACERS	5										
1.15	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC		--	0		--	5		--			--
1.16	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC		--	--		--	5	--	--			--
1.17	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES		--	--		--	5	--	--			--
1.18	EQUIPMENT TRIAL OPERATION					10						
1.19	HYDRAULIC TEST OR PNEUMATIC TEST								3			

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

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)									2			
1.21	AIR PRE HEATERS (PG 52)From the total amount payable for the PGMA weight at tonnage rates, payment will be regulated as under:												
1.21.1	Completion of Support steel squareness and levelling, Expansion arrangement, Housing panel erection and alignment, Erection, alignment and welding of pedestals				11								
1.21.2	Completion of Erection, alignment and welding of Support Bearing, Guide Bearing, Rotor post, Bottom and Top centre sections, Hot and cold end connecting plates				14								
1.21.3	Completion of erection and alignment of modules				15								
1.21.4	Completion of erection, alignment and welding of Pin Rack assembly and Drive assembly				12								
1.21.5	Completion of seals setting				17								
1.21.6	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								
1.21.7	Completion of PGMA				1								
1.21.8	Air preheater Trial Run				2								

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85	85	85	85	85	85	85	85	85	85	85	85
II	STAGE/MILESTONE PAYMENTS (15%)												
2.1	AIR & GAS TIGHTNESS TEST		--	5		--	1	5	--				--
2.2	GAS DISTRIBUTION TEST		--	--		--	1	--	--				--
2.3	CHARGING OF ESP FIELDS		--	--		--	4	--	--				--
2.4	COMPLETION OF AIR & GAS TIGHTNESS TEST FOR FURNACE			2									
2.5	BOILER HYDRAULIC TEST (DRAINABLE)	0		2									
2.6	BOILER HYDRAULIC TEST (NON DRAINABLE)			1									
2.7	Reheater Coils Hydraulic Test			2									
2.8	Clean Air Flow test						1						
2.9	Boiler Light Up	0		1		2	1			1	1		1
2.10	ABO			1	1	2	1		1	1	1		1
2.11	Steam Blowing	0			2	1	1			1	1		1
2.12.	SVF			2		2				1	1		1

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-VII: Terms of Payment

2.13	Oil Flushing (TG)											
2.14	Barring Gear (TG)											
2.15	Rolling and Synchronization	0								1		
2.16	Coal Firing			2	2	2	2	2		1		1
2.17	Full Load					1			1	1		1
2.18	Trial Operation of Unit					2	1	2	2	2		2
2.19	Completion of sheet covering for Boiler roof, burner roof, lift shaft cladding, completion of gutters	3										
2.20	Completion of all drains and vents to respective locations and placement of instrument sensors after steam blowing								2			
2.21	Painting	6	0	1	1	2	2	1	2	1		0
2.22	Area cleaning, temporary structures cutting/removal and return of scrap	1	1	1	1	1	1	1	1	2		3
2.23	Punch List points/pending points liquidation	2	1	1	2	1	1	1	1	1		1
2.24	Submission of 'As Built Drawings'											
2.25	Material Reconciliation	2	1	1	1	1	1	1	1	1	15	2
2.26	Completion of Contractual Obligation	1	1	1	1	1	1	1	1	1		1
	TOTAL FOR STAGE/MILESTONE PAYMENTS (15%)	15	15	15	15	15	15	15	15	15	15	15

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII: Terms of Payment

	TOTAL I + II	100	100	100	100	100	100	100	100	100	100	100
	*INCLUDING NDE AND SR/HT WHERE EVER APPLICABLE (IF APPLICABLE, WEIGHTAGE OF 10%)											

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

8.0 TAXES, DUTIES, LEVIES (Rev 01 dated 15/03/2011)

8.1.1

The contractor shall pay all (save the specific exclusions as enumerated in this contract) taxes, fees, license charges, deposits, duties, tools, royalty, commissions or other charges which may be levied on the input goods & services consumed and output goods & services delivered in course of his operations in executing the contract. In case BHEL is forced to pay any of such taxes, BHEL shall have the right to recover the same from his bills or otherwise as deemed fit.

However, provisions regarding Service Tax and Value Added Tax (VAT) on output services and goods shall be as per following clauses.

8.1.2 Service Tax & Cess on Service Tax

Service Tax and Cess on Service Tax as applicable on Services are excluded from contractor's scope; therefore contractor's price/rates shall be **exclusive** of Service Tax and Cess on Services. In case, it becomes mandatory for the contractor under provisions of relevant act/law to collect the Service Tax & Cess from BHEL and pay the same to the concerned tax authorities, such applicable amount will be paid by BHEL at the prevailing Service Tax Rate (presently 10.3 %) on the admitted bill value.

Contractor shall submit to BHEL documentary evidence of Service Tax registration certificate specifying name of services covered under this contract. Contractor shall submit serially numbered Service Tax and Cess Invoice, signed by him or a person authorized by him in respect of taxable service provided, and shall contain the following, namely,

- I. The name, address and the registration number of the contractor,
- II. The name and address of the party receiving taxable service,
- III. Description, classification and value of taxable service provided and,
- IV. The service tax payable thereon.

All the Four conditions shall be fulfilled in the invoice before release of service tax payment.

Wherever, more than one route/option are available for discharge of service tax liability under a particular service, (e.g. "works contract Service"), contractor shall obtain prior written consent from BHEL site before billing the amount towards Service Tax.

8.1.3 VAT (Sales Tax /WCT)

As regards Value Added Tax (VAT) on transfer of property in goods involved in Works Contract (previously known as Works Contract Tax) applicable as per local laws, the price quoted by the contractor shall be **exclusive** of the same. Where such taxes are required to be paid by the contractor, this will be reimbursed on production of proof of payment made to the authorities by the Contractor. In any case the Contractor shall register himself with the respective Sales Tax authorities of the state and submit proof of such registration to BHEL along with the first RA bill. The contractor has to take all necessary steps to **minimize tax on input goods** by purchasing the materials from any registered dealer of the concerned state only. In case contractor opts for composition, it will be with the prior express consent of BHEL. Deduction of tax at source shall be made as per the provisions of law unless otherwise found exempted. In case tax is

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

deducted at source as per the provisions of law, this is to be construed as an advance tax paid by the contractor and no reimbursement thereof will be made unless specifically agreed to.

8.1.4 Modalities of Tax Incidence on BHEL

Wherever the relevant tax laws permit more than one option or methodology for discharging the liability of tax/levy/duty, BHEL will have the right to adopt the appropriate one considering the amount of tax liability on BHEL/Client as well as procedural simplicity with regard to assessment of the liability. The option chosen by BHEL shall be binding on the Contractor for discharging the obligation of BHEL in respect of the tax liability to the Contractor.

8.1.5 New Taxes/Levies

In case the Government imposes any new levy/tax on the output service/ goods/work after award of the contract, the same shall be reimbursed by BHEL at actual.

In case any new tax/levy/duty etc. becomes applicable after the date of Bidder's offer, the Bidder/Contractor must convey its impact on his price duly substantiated by documentary evidence in support of the same **before opening of Price Bid**. Claim for any such impact after opening the Price Bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

No reimbursement/recovery on account of increase/reduction in the rate of taxes, levies, duties etc. on input goods/services/work shall be made. Such impact shall be taken care of by the Price Variation/Adjustment Clause (PVC) if any. In case PVC is not applicable for the contract, Bidder has to make his own assessment of the impact of future variation if any, in rates of taxes/duties/ levies etc. in his price bid.

8.1.6 Submission of Periodical Reports

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

- 1) Consumption of welding electrodes and gases
- 2) Consumption of construction power
- 3) Manpower reports
- 4) Daily and Monthly Progress reports
- 5) Field calibration reports

BHEL at site will inform formats for these reports.

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

8.2 BUILDING & OTHER CONSTRUCTION WORKERS (REGULATION OF EMPLOYMENT AND CONDITIONS OF SERVICE) ACT, 1996 (BOCW Act) AND RULES OF 1998 READ WITH BUILDING & OTHER CONSTRUCTION WORKERS CESS Act, 1996 & CESS RULES, 1998.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII: Taxes and Other Duties

In case any portion of work involves execution through building or construction workers, then compliance to the above titled Acts shall be ensured by the contractor and contractor shall obtain license and deposit the cess under the Act. In the circumstances it may be ensured as under:-

- i. It shall be the sole responsibility of the contractor in the capacity of employer to forthwith (within a period of 15 days from the award of work) apply for a licence to the Competent Authority under the BOCW Act and obtain proper certificate thereof by specifying the scope of its work. It shall also be responsibility of the contractor to furnish a copy of such certificate of licence / permission to BHEL within a period of one month from the date of award of contract.
- ii. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under these act and rules including that of payment / deposit of 1% cess on the extant of work involving building or construction workers engaged by the contractor within a period of one month from the receipt of payment.
- iii. It shall be the responsibility of the sub-contractor to furnish the receipts / challans towards deposit of the cess together with the number, name and other details of beneficiaries (building workers) engaged by the sub-contractor during the preceding month.
- iv. It shall be the absolute responsibility of the sub-contractor to make payment of all statutory payments & compensations to its workers including that is provided under the Workmen's Compensation Act, 1923.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Chapter-IX: SPECIFIC INCLUSIONS

SPECIFIC INCLUSIONS

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-X : SPECIFIC EXCLUSIONS

10.0 EXCLUSIONS

The following works are specific exclusions from the scope of work under erection, testing & commissioning of tender specification-

- i) Sub-delivery items and electrical components such as push-buttons, junction boxes etc.
- ii) E&C work of cable trays, cables and earthing etc
- iii) Control panels, EPMS, MCC etc.
- iv) Electrical & C&I items of handling system (PG 99)
- v) All electrical and control & instrumentation items except those specified elsewhere in these specifications.
- vi) Civil works except to the extent specifically indicated elsewhere in this tender.
- vii) Supply of primer and paints for final painting
- viii) Pneumatic copper tubing and fittings thereof.
- ix) Testing and commissioning of heating elements, thermostats, HV rectifier transformers.
- x) Electrical and C&I items of Variable Frequency Drives as provided elsewhere in these specifications.

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

APPENDIX -1
LIST OF APPLICABLE PGMA'S FOR UNIT 1

TRICHY SUPPLY

SI No.	PGMA	Description	Weight (in Kg)
Structures (Rate Schedule Identifier SI No. 1.1 of Rate Schedule)			
1	35010	Foundation Materials-Boiler	16,875
2	35111	Main Columns Left 1st Pass	440,190
3	35112	Main Columns Left 2nd Pass	181,260
4	35121	Main columns Right 1st Pass	440,190
5	35122	Main Columns Right 2nd Pass	181,260
6	35130	Main Columns Middle	248,580
7	35140	Auxiliary Columns-Left Side	293,490
8	35150	Auxiliary Columns-Right side	293,490
9	35190	Girder Pin Connections	15,120
10	35211	Ceiling Structure main Girders 1st Pass	325,150
11	35212	Ceiling Structure main Girders 2nd Pass	194,750
12	35213	Ceil Struct -Cross Welded Beams 1st Pass	142,425
13	35214	Ceil Struct -Cross Welded Beams 2nd Pass	95,850
14	35221	Ceiling Structure Rolled Beam 1st Pass	103,590
15	35222	Ceiling Structure Rolled Beam 2nd Pass	38,880
16	35231	Ceiling Structure Horbracing 1st Pass	16,830
17	35232	Ceiling Structure Horibracing 2nd Pass	9,900
18	35311	Horizontal Bracing I Pass I Mbl	27,180
19	35312	Horiz Bracing li Pass Imbl	20,700
20	35321	Horiz Bracing I Pass li Mbl	20,700
21	35322	Horiz Bracing li Pass li Mbl	20,700
22	35331	Horiz Bracing I Pass lii Mbl	19,710
23	35332	Horiz Bracing li Pass lii Mbl	29,790
24	35341	Horiz Bracing I Pass Iv Mbl	19,845
25	35342	Horiz Bracing li Pass Iv Mbl	28,935
26	35351	Horiz Bracing I Pass V Mbl	22,005
27	35352	Horiz Bracing li Pass V Mbl	15,975
28	35361	Horiz Bracing I Pass Vi Mbl	41,400
29	35362	Horiz Bracing li Pass Vi Mbl	41,400
30	35381	Land Platform Lower	33,210

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

31	35382	Land Platform Middle	21,600
32	35383	Land Platform Upper	31,500
33	35390	Platform At Drum Floor Level	64,710
SI No.	PGMA	Description	Weight (in Kg)
34	35441	Horizontal Beams-Lower	155,700
35	35442	Horizontal Beams Middle	103,590
36	35443	Horizontal Beams-Upper	94,950
37	35451	Horizontal Beams - Lower 2nd Pass	79,830
38	35452	Horizontal Beams - Middle - 2nd Pass	78,570
39	35453	Horizontal Beams - Upper - 2nd Pass	54,315
40	35511	Front Bracing-Lower	39,150
41	35512	Front Bracing Middle	25,020
42	35513	Front Bracing-Upper	15,300
43	35521	Side Bracing-Lower	120,870
44	35522	Side Bracing Middle	66,465
45	35523	Side Bracing-Upper	84,600
46	35531	Rear Bracing-Lower	77,715
47	35532	Rear Bracing- Middle	46,800
48	35533	Rear Bracing-Upper	88,875
49	35700	Hsfg Fasteners For Pg 35	27,900
50	35811	Floor Grills And Guard Plate	250,335
51	35821	Stairs - Lower	8,235
52	35822	Stairs - Middle	6,075
53	35823	Stairs - Upper	9,045
54	35851	Hand Rails And Posts	31,185
55	35993	Consumables and erection materials	12,600
56	35995	Chute Pipe And Ladders	27,675
57	36110	Columns Near Air Pre Heaters	111,465
58	36130	Middle Columns In Boiler	69,300
59	36150	Beams and bracings Near Air Pre Heater	207,990
60	36311	Main Floor I Mbl 1st Pass	57,015
61	36312	Main Floor I Mbl 2nd Pass	62,415
62	36313	Non-Mbl Floor Between Mbl landii	55,485
63	36314	Non-Mbl Floor Between Mbl landii	29,565
64	36315	Non-Mbl Floor Between Mbl landii	38,655
65	36316	Non-Mbl Floor Between Mbl landii	53,910
66	36321	Main Floor li Mbl Ist Pass	123,300

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

67	36322	Main Floor li Mbl 2nd Pass	46,845
68	36323	Non-Mbl Floor Between Mbl liandiii	60,075
69	36324	Non-Mbl Floor Between Mbl liandiii	52,065
70	36325	Non-Mbl Floor Between Mbl liandiii	97,380
71	36326	Non-Mbl Floor Between Mbl liandiii	64,035
SI No.	PGMA	Description	Weight (in Kg)
72	36327	Non-Mbl Floor Between Mbl liandiii	127,845
73	36331	Main Floor lii Mbl 1st Pass	42,390
74	36332	Main Floor lii Mbl 2nd Pass	138,690
75	36333	Non-Mbl Floor Between Mbl liiandiv	59,310
76	36334	Non-Mbl Floor Between Mbl liiandiv	46,170
77	36335	Non-Mbl Floor Between Mbl liiandiv	73,935
78	36341	Main Floor Iv Mbl 1st Pass	71,640
79	36342	Main Floor Iv Mbl 2nd Pass	21,600
80	36343	Non-Mbl Floor Between Mbl Ivandv	29,340
81	36344	Non-Mbl Floor Between Mbl Ivandv	34,650
82	36345	Non-Mbl Floor Between Mbl Ivandv	101,700
83	36346	Non-Mbl Floor Between Mbl Ivandv	23,895
84	36347	Non-Mbl Floor Between Mbl Ivandv	29,295
85	36348	Non-Mbl Floor Between Mbl Ivandv	121,680
86	36351	Main Floor V Mbl 1st Pass	27,720
87	36352	Main Floor V Mbl li Nd Pass	10,800
88	36353	Non-Mbl Floor Between Mbl Vandvi	72,405
89	36354	Non-Mbl Floor Between Mbl Vandvi	33,930
90	36355	Non-Mbl Floor Between Mbl Vandvi	47,790
91	36361	Main Floor Vi Mbl 1st Pass	43,200
92	36362	Main Floor Vi Mbl 2ndpass	29,295
93	36363	Non_Mbl Floor Above Mbl Vi	31,500
94	36391	Miscellaneous Platforms-Part I	112,500
95	36392	Miscellaneous Platforms-Part li	117,810
96	36393	Miscellaneous Platforms Part lii	100,170
97	36394	Miscellaneous Platforms Part Iv	30,825
98	36395	Miscellaneous Platforms Part V	13,860
99	36610	Boiler Roof Structure	147,060
100	36611	Boiler Roof Sheeting	33,975
101	36613	Rain Water Pipes And Gutter	36,900
102	36620	Boiler Side Cladding Structure	107,820

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

103	36621	Boiler Side Cladding Sheeting	27,765
104	36740	Posts And Hangers	103,185
105	36811	Floor grills and guard plates-Lower	122,805
106	36812	Floor grills and guard plate Middle	231,075
107	36813	Floor grills and guard plates-Upper	231,075
108	36814	Floor grills and guard plate Miscellaneous	132,525
109	36820	Stairs And Ladders	46,935
SI No.	PGMA	Description	Weight (in Kg)
110	36851	Handrails And Posts Lower	24,165
111	36852	Handrails And Posts Middle	24,165
112	36853	Handrails And Posts Upper	76,995
113	36993	Consumables and erection Materials	25,110
114	37010	Blr Outer Casing Components	36,000
115	37810	Blr Outer Casing	37,800
116	38210	Inter Conn Platforms betn Boiler/Elevat	65,655
117	38299	Mill Handling Monorails	156,780
118	38310	Conn Platforms To Mill Deaerator Bay	30,555
119	38410	Mill Maintenance Platforms	226,530
120	38810	Floorgrills And Guard Plate	132,750
121	38820	Stairs And Ladders	6,120
122	38850	Hand Rails And Hand Rail Posts	11,610
SUB TOTAL (STRUCTURES - TRY SUPPLY)			9,800,790

Pressure Parts (Rate Schedule Identifier SI No. 1.2 of Rate Schedule)			
SI No.	PGMA	Description	Weight (in KG)
1	04126	Upper Drum Without Intl Id 61-71	250,000
2	04136	Upper Drum Internals Only For Id 61-71	10,881
3	04146	Upper Drum Sspn Id 61-71	16,757
4	04196	Upper Drum Trans Strr Id 61-71	6,120
5	04988	Drum-Commissioning Spares	9
6	05138	Water Wall Inlet Front Lower Header	43,363
7	05139	Lower Inlet Header Internals	96
8	05148	Water Wall Inlet Rear Lower Header	41,254
9	05158	Inlet Side Water wall Header (Left)	36,649
10	05159	Inlet Side Water Wall Header (Right)	36,649
11	05227	Water wall Rear Hanger Outlet Header	4,680

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

12	05229	Water wall Rear Screen tube Outlet Heade	6,716
13	05231	Outlet Front Upper Ww Header	6,300
14	05251	Outlet Side Upper Ww Header	14,850
15	06400	Unclassified Burner Panel	22,704
16	06631	Front Upper Ww Pnl	59,893
17	06633	Front Upper Inter Ww Pnl	56,299
18	06634	Front Intermediate Ww Pnl	26,300
19	06637	Water wall Lower Front Panel	30,717
20	06641	Rear Upper Ww Pnl	31,140
21	06643	Rear Upper Inter Ww Pnl	56,812
SI No.	PGMA	Description	Weight (in Kg)
22	06644	Rear Intermediate Ww Pnl	26,280
23	06647	Rear Lower Ww Pnl	54,000
24	06651	Side Upper Ww Pnl	80,550
25	06653	Side Intermediate Ww Pnl	86,398
26	06655	Side Lower Ww Pnl	66,674
27	06670	Extended Side Ww Pnl	20,070
28	07102	Downcomer Piping-Controlled Circulation	82,721
29	07104	Discharge Line	26,432
30	07106	Suction Manifold	20,880
31	07107	Suction Spools	7,491
32	07215	Relief Tubes From Side Wall Outlet Hea	44,411
33	07216	Relief Tubes From Rear Hanger Header	5,243
34	07217	Screen Relief Tubes Header	30,177
35	07218	Relief Tubes From Front Outlet Header	9,524
36	07223	Furnace Screen Tubes	29,001
37	07225	Furnace Rear Hanger Tubes	18,406
38	07226	Furnace Rear Arch Tubes	10,800
39	07231	Lower Corner Transition Tubes	5,243
40	07232	Upper Corner Transition Tubes	856
41	07402	Ww Front Header Suspension	19,980
42	07403	Ww Side Header Suspension	19,800
43	07404	Ww Hanger Header Suspension	28,980
44	07405	Ww Screen Header Suspension	900
45	07420	Downcomer Guides	6,742
46	07431	Riser Tube Support	3,103
47	07500	Misc Components - Pressure Parts	536

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

48	07601	Pressure Seals	3,210
49	07992	Imported Electrodes	214
50	07993	Consumables & Erection Materials	1,080
51	08001	Furnace Upper Buckstay-Frontand Rear	78,210
52	08003	Furnace Upp.Inter Buckstay- Side	125,100
53	08006	Furnace Inter.Buckstay	96,570
54	08007	Furnace Lower Buckstays	86,400
55	08111	Furnace Rear Arch Buckstay	40,500
56	08380	Furnace Bottom Support	50,580
57	08382	Furnace Bottom Support Rear	50,580
58	08400	Furnace Guide	7,065
59	08501	Furnace Back pass buckstay front and Rear	82,125
SI No.	PGMA	Description	Weight (in Kg)
60	08503	Furnace Back Pass Buckstayside	94,635
61	08901	Furnace Key Buckstay Upper	4,950
62	08907	Furnace Key Buckstay Lower	2,205
63	08910	Ex. Movement Measurement Components.	1,080
64	09001	Seal Boxes For Furnace Opening	10,318
65	09002	Seal Boxes For Instrument Inserts	2,604
66	09003	Material For Instrument Inserts	579
67	10135	Horizontal Spaced Shinlet Header	4,987
68	10178	Vertical Platen Sh Inlet Header	20,134
69	10182	Sh Rear Wall Inlet Header	4,775
70	10183	Sh Frontwall Inlet Header	10,800
71	10185	Sh Rear Roof Inlet Header	9,020
72	10191	Sh Radiant Wall Roof Inlet Hdr	6,300
73	10195	Sh Division Panel Inlet Header	15,750
74	10218	Rear Lower Sh Outlet Hdr	2,335
75	10235	Horizntl Spaced Sh Outlet Header	23,490
76	10278	Vertical Platen Sh Outlet Header	34,200
77	10283	Sh Frontwall Outlet Header	7,785
78	10291	Sh Radiant Wall Roof Outlet Hdr	10,800
79	10295	Sh Division Panel Outlet Header	12,223
80	10315	Sh Rear Intermediate Header	12,510
81	10687	Sh Radiant Wall Junction Header	6,300
82	11036	Sh Rear Hori Spaced Coil Upper Left	77,400
83	11037	Sh Rear Hori Spaced Coil Inter Left	84,150

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

84	11038	Sh Rear Hori Spaced Coil Lower Left	110,025
85	11077	Sh Rear Vertical Spaced Coil Left	86,400
86	11078	Sh VerticII Platen Coil Left	63,000
87	11095	Sh Division Panel Coil Left	75,330
88	11337	Sh Hor Spaced Inter Coil + Hdr	81,900
89	11338	Sh Hor Spaced Lower Coil + Hdr	99,450
90	11377	Sh Vertical Spaced Rear Coil + Header	49,109
91	11378	Sh Vertical Platen Coil + Header	53,090
92	11395	Sh Division Panel Coil Right	63,000
93	11606	Sh Front Upper Panels	13,050
94	11608	Sh Front Lower Panels	17,144
95	11716	Sh Rear Upper Pnl + Atch	8,074
96	11717	Sh Rear Inter Pnl + Atch	6,747
97	11718	Sh Rear Lower Pnl + Atch	7,079
SI No.	PGMA	Description	Weight (in Kg)
98	11767	Sh Stm Cool Side Wall Panel Upper Left	59,727
99	11768	Sh Stm Cool Side Wall Panel Inter Left	10,286
100	11769	Sh Stm Cool Side Wall PoneL Lower Left	15,485
101	11787	Sh Rear Roof Panel + Attachment	9,450
102	11791	Sh Radiant Wall Roof Panel + Attachmen	22,500
103	11916	Sh Stm Cool Rear Wall Panel Upper Ri7h	7,650
104	11917	Sh Stm Cool Rear Wall Panel Inter Righ	6,083
105	11918	Sh Stm Cool Rear Wall Panel Lower Righ	9,401
106	11967	Sh Stm Cool Side Wall Panel Upper Righ	14,047
107	11968	Sh Stm Cool Side Wall Panel Inter Righ	10,397
108	11969	Sh Stm Cool Side Wall Panel Lower Righ	15,595
109	11987	Sh Stm Cool Rear Roof Panel Right	10,508
110	11991	Sh Radiant Roof Panel Right	21,150
111	12178	Sh Vertical Platen Inlet Pipe	46,800
112	12395	Sh Division Panel Inlet Tubes	12,534
113	12495	Sh Div9sion Panel Outlet Tubes	11,723
114	12515	Sh Rear Hanger Tube	55,709
115	12619	Sh Horizontal Support Tubes	11,476
116	12803	Sh Steam Cooled Spacer Tubes	4,062
117	12805	Super Heater Hanger Tubes	13,231
118	12850	Sh Conn Pipes-Saturated	10,350
119	12852	Sh Desh Links	43,200

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

120	12900	Sh Desh	8,124
121	12903	5h Miscl Components	63,000
122	12906	Sh Suprts For Lines & Links	5,400
123	12914	Suspension Of Sh Radiant Roof Headers	2,790
124	12917	Suspension Of Radiant Roof	12,690
125	12924	Suspension Of Sh Back Pass Headers	22,500
126	12927	Suspension Of Rear Roof	1,980
127	12928	Suspension Of Sh Rear Wall	58,500
128	12944	Suspension Of Sh Platen Headers	2,250
129	12948	Suspension Of Vertical Spaced Assembly	46,350
130	12954	Suspension Of Vertical Spaced Headers	11,340
131	12968	Suspension Of Platen Assembly	32,850
132	12991	Indegenous Electrodes	116
133	12992	Imported Electrodes	116
134	12993	Consumables & Erection Materials	450
135	12994	Port Inst For Insitu Tube Thick Measrmt	116
Sl No.	PGMA	Description	Weight (in Kg)
136	15174	Reheater Vert Spaced Inlet Header Rhh1	17,798
137	15279	Rh Vertical Platen Front Outlet Header	36,201
138	16077	Rh Ver Spaced Rear Coil Asy Left	122,461
139	16079	Rh Ver Platen Front Coil Asy Left	111,546
140	16377	Rh Vertical Spaced Rear Coil + Header	122,447
141	16379	Rh Ver Platen Front Coil Asy Right	111,546
142	17776	Rh Ver Spaced Centre Cross Over Tube	10,800
143	17807	Rh Steam Cooled Spacers	1,468
144	17904	Rh Hdr Suprts & Suspensions Above Roof	9,000
145	17919	Rh Front Suspension	45,000
146	17929	Rh Rear Suspension	73,800
147	17991	Indegenous Electrodes	122
148	17992	Rh Site Electrodes Imported	117
149	18002	First Pass Roof Skin Casing	17,182
150	18003	Second Pass Roof Sk9n Casing	3,579
151	18010	Pr Pts Attachmnts In Furn Roof Skn Cas	1,432
152	18020	Vibration Snubbers	307
153	19701	Inlet Eco Headers	11,765
154	19702	Outlet Eco Headers	13,500
155	19814	Economiser coil Assy Upper Left	85,050

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

156	19824	Economiser Coil Assy Lower Left	102,150
157	19850	Eco Feed Pipe	3,137
158	19851	Eco Links To Drum	5,490
159	19884	Eco.Coil Assy Intermediate Left	163,350
160	19903	Eco. Miscellaneous Components	784
161	19905	Eco Suprts & Suspensions Below Roof	471
162	19906	Eco Suprts For Lines & Links	2,510
163	19907	Eco Supports/Feed Pipe Suspension	1,569
164	19914	Econ-Miser Coil Assy Upper Right	86,850
165	19924	Economiser Coil Assy Lower Right	112,050
166	19984	Economiser Coil Middle Right	159,930
167	19991	Indegenous Electrodes	45
168	19992	Imported Electrodes	78
169	21600	Soot Blower Piping And Fittings	12,600
170	21601	Soot blower Piping Supports	8,478
171	21700	Bulked Bps Components For Sb Piping	810
172	21800	Sb Valves (Bhel)	1,800
173	21825	Sb Valves (Sub Delivery)	1,440
SI No.	PGMA	Description	Weight (in Kg)
174	21850	Soot Blower Safety Valve (Bhel)	50
175	21992	Imported Electrodes	59
176	24355	Circulating Pump Components(Sd)	27,900
177	24360	Valves (Bhel) Cc Rh Blr	61,200
178	24365	Valves & Fittings (Sd) Cc Rh Blr	5,940
179	24373	Direct Water Level Gauge-Lp	270
180	24374	Cooler & Strainer Assy For Bwcp	1,890
181	24375	Headers For Trim Piping	2,520
182	24380	Erv And Safety Valves(Bhel)	7,830
183	24385	Safety Valve/Erv Silencers(Bhel)	61,200
184	24700	Bulked Bps Components For Trim Pipes	1,080
185	24992	Imported Electrodes	95
186	24993	Consumables & Erection Materials	99
187	24994	Name Plates	288
188	28220	Doors	10,800
189	28700	Bps Fasteners	900
190	31010	Skin Casing Comps Welded To Pressure P	7,650
191	31102	Furnace Bottom Skin Casing	900

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

192	31104	Furnace Rear Arch Skin Casing	5,400
193	31105	Second Pass Skin Casing	450
194	31993	Erection Materials	900
195	32010	Fixing Comp For Blr Pr Parts Insul	7,200
196	32110	Fixing Comp For Blr Mountings Insul	3,150
197	32120	Fixing Comp For Sb Pipes Insul	900
198	32310	Fixing Comp For Air Ducts Insul	63,000
199	32410	Fixing Comp For Ah And Gas Ducts Insul	18,000
200	32510	Fixing Comp For Id Ducts Insul	99,000
201	32710	Fixing Comp For Oil System Insul	2,250
202	42001	Pneumatic Fittings	270
203	42002	Steam Blow Materials	2,700
204	42005	Instrument Fittings	855
205	42010	Lfo Pump Set	13,500
206	42070	Burner Station Skid Assembly	5,400
207	42120	Piping, Pump House-Fuel Oil	10,935
208	42152	Piping,Opr'G Floor Lfo	5,130
209	42157	Piping,Opr'G Floor Atm Air	1,440
210	42200	Sub delivery Fuel Oil System	3,420
211	42300	Bhel Valve F.O. System	2,475
SI No.	PGMA	Description	Weight (in Kg)
212	42700	Bps Fasteners	1,080
213	42992	Imported Electrodes	34
214	45321	Wind Box Support 32-In Width	10,800
215	45325	Wind box For One And Three Corners	65,520
216	45326	Wind box For Two And Four Corners	65,520
217	97297	Mtm Clamps And Pads	45
SUB TOTAL (Pressure Parts -TRY SUPPLY)			6,006,387

Non Pressure Parts (Upto ESP Inlet Funnel) (Rate Schedule Identifier SI No. 1.3 of Rate Schedule)

1	20051	Long Retractable Soot Blower T30 Mk li	59,891
2	20054	Wall Box Non Pressurised For Lrsb Mk I	1,169
3	20201	Wall Deslagger Rw5e	13,531
4	20204	Wall Box Non Pressurised For Rw5e	1,566
5	20794	Wall Box Non 7ressurised For Temp Prob	57

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

6	20962	Temp Probe Duplex With Power Trcack&Ac	1,882
7	30103	Seal Plate Assy	3,600
8	30105	Furnace Bottom Enclosure Framing	9,900
9	30211	Furnace Rear Arch Enclosure Framing	5,400
10	30212	Furnace Extd Side Bottom Enclosure Fra	4,500
11	30215	Main Boiler	15,300
12	30219	Vertical Roof Enclosure Framing	72,000
13	30220	Deck Support And Seals	54,000
14	30235	Enclosure Support Steel	27,000
15	41350	Air Cooled Oil Gun Assy,	1,125
16	41390	Oil Gun Vice Assy And Rack	1,080
17	41500	High Energy Arc Igniter	540
18	43004	Assy Comp Scanner & Gun Air System	2,520
19	43005	Assy Comp Mill Seal Air System	15,507
20	43104	M/C Comp Scanner & Gun Air System	19,800
21	43105	M/C Comp Mill Seal Air System	33,930
22	43200	Subdel,Ignitor&Scanner Air System	7,200
23	47281	Fuel Pipe Supports	33,300
24	47283	Fuel Pipe Coupling Coller & Orifice	41,580
25	47286	Fuel Pipe St Pipes For Mill A & B	105,732
26	47287	Fuel Pipe St Pipes For Mill C & D	105,732
27	47288	Fuel Pipe St Pipes For Mill E & F	105,732
28	47289	Fuel Pipe St Pipes For Mill G & H	52,866
Sl No.	PGMA	Description	Weight (in Kg)
29	48012	Rect Duct Bet F.D Fan And Airheater	121,127
30	48014	Expn Piecesbet F.D Fan And Airheater	6,656
31	48015	Supportsetcbet F.D Fan And Airheater	12,101
32	48019	Foundation Materials	5,082
33	48022	Rect Duct Sec.Air Interconnection	16,638
34	48032	Rect Duct A.H Bypass Sec Air Side	56,570
35	48112	Rect Ducts Pri Fan To Airheater Prisd	75,072
36	48114	Expn Piecespri Fan To Airheater Prisd	6,051
37	48115	Supportsetcpri Fan To Airheater Prisd	29,041
38	48132	Rect Duct Pri Air Fan To Coldairbusdu	40,198
39	48141	Seal Air Hag And Id Fan Outgate	7,260
40	48142	Rect Duct Coldairbus(Temp Air To Mill	51,912
41	48144	Expn Piecescoldairbus(Temp Air To Mill	4,840

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

42	48145	Supportsetccoldairbus(Temp Air To Mill	7,260
43	48152	Rect Duct Pri Air Fan Interconnection	56,970
44	48200	Instrument Tappings On Ducting	4,840
45	48202	Rect Ducts air heater To Wind box duct	287,774
46	48204	Expn Pieces air heater To Windbox duct	12,101
47	48205	Supportsetcairheater To Windboxduct	23,960
48	48207	Flow meters For Secondary Air Flow	32,672
49	48212	Wind Box Connecting Ducts - Rectangula	66,552
50	48214	Expn Pieces windbox Connecting Duct	6,051
51	48222	Rect Duct-Airheater Prside to hotair B	139,761
52	48224	Expn Pieces air heater Prside to hotair B	14,521
53	48225	Supports For Hot P.A (Ah To Hot Bus)	13,311
54	48232	Rect Ducts Hot Air Bus duct(Hotair to mil	165,174
55	48234	Expn Pieces hot Air Bus duct(Hot air to mil	7,138
56	48235	Support Hot Air Bus	2,662
57	48382	Rect Duct Economiser To Airheater2nop	119,783
58	48384	Expn Pieces economiser To Airheater2nop	29,041
59	48385	Supportsetceconomiser To Airheater2nop	44,046
60	48386	Duct Below Diverter	124,394
61	48388	Sq Duct, Economiser-Pri Ah	150,530
62	48432	Rect Duct Airheater Boiler Outlet-Gas	97,844
63	48434	Expn Pieces air heater Boiler Outlet-Gas	15,731
64	48435	Supportsetcairheater Boiler Outlet-Gas	22,023
65	48438	Sq Duct, Pri Ah-Blr Outlet Flange	36,544
66	48439	Sq Duct,Sec Ah-Blr Outlet Flange	48,524
SI No.	PGMA	Description	Weight (in Kg)
67	48462	Rect Duct Boiler Outlet To Elec Precp	357,205
68	48464	Expn Pieces boiler Outlet To Elec Precp	24,201
69	48465	Bof To Ep Ducting Supports	5,688
70	48468	Sq Duct,Blr Outlet Flange-Ep,Right	165,535
71	48662	Rect Duct Hot Air Bus To Mills	100,869
72	48664	Expn Pieces hot Air Bus To Mills	12,101
73	48665	Supports For Hot Pa To Mills	18,878
74	48667	Venturi-Primary Air Flow	23,718
75	48700	Bulked Bps Components	5,126
76	48993	Erection Materials	19,507
77	99100	Fan Handling Equipment	20,700

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

78	99300	Cir.Pump,Feed Pump, Handling Equipment	8,100
79	99400	Airheater,Steamcoil Airheater Handlg E	5,850
80	99512	Furnace Cradle 2 Wall Coverage Electr	2,250
81	99600	Fo System Handling Equipment	1,350
SUB TOTAL (Non Pressure Parts (Upto ESP Inlet Funnel)- TRY SUPPLY)			3,529,268

Rotating Machine (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	65736	36 Inch Gravimetric Feeder	45,000
2	67204	Raw Coal Gates Needle Type	3,195
3	67272	Coal Valve-36 Inch Motor Operated	6,840
4	67276	Raw Coal Gate Chain Op 36" Circular	7,299
5	67283	Feeder Outlet Isolation Gate	8,784
6	67801	Down Spout	27,450
7	67802	Bunker Emptying Chute	19,080
8	67803	Feed Pipe To Mill	13,950
SUB TOTAL (Rotating Machines - TRY SUPPLY)			131,598

Handling Equipment of Rotating Machines (Rate Schedule Identifier SI No. 2.2 of Rate Schedule)			
1	99099	Misc Chain Pulley Blocks	90
2	99100	Fan Handling Equipment	20,700
SUB TOTAL (Handling Equipment of Rotating Machines - TRY SUPPLY)			20,790

Non Pressure Parts (ESP Outlet funnel to chimney)(Rate Schedule Identifier SI No. 3.2 of Rate Schedule)			
1	39012	Foundation Materials I.D.Duct Supports	23,490
2	39101	Columns Frames Before Esp- Left	117,450
SI No.	PGMA	Description	Weight (in Kg)
3	39102	Columns Frames Before Esp -Right	281,880
4	39141	Cols Frames Near Id Fan-Left	151,470
5	39142	Cols Frames Near Id Fan - Right	305,370
6	39150	Col Frames Betn I.D.Fan And Chimney	58,725
7	39300	Platforms - External Structure	187,875
8	39301	Struc And Platform For Fans	7,650
9	39302	Struc For Motor Hood Covering	7,650
10	39304	Fan Handling Structure For Fd Fan	17,640

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

11	39305	Fan Handling Structure For Pa Fan	12,915
12	39306	Fan Handling Structure For Id Fan	58,725
13	39700	Hsfg Fasteners For Pg 39	1,305
14	39810	Floor Grill	58,725
15	39820	Stairs	25,200
16	39850	Hand Rail And Hand Rail Posts	33,930
18	48482	Rect Ducts-Elec Prptr/M.S To Inddraftf	119,783
19	48484	Expn Pieceelec Prptr/M.S To Inddraftf	24,201
20	48485	Supportsetelec Prptr/M.S To Inddraftf	39,690
21	48489	Sq Duct,Ep Interconn-Id Fan	78,532
22	48492	Rect Duct Ind Draft Fan To Chimney	412,844
23	48494	Expn Piecesind Draft Fan To Chimney	7,260
24	48495	I.D.System Duct Supports	81,316
25	48499	Chimney Wall Frame For Embedding	24,201
SUB TOTAL (Non Pressure Parts (ESP Outlet funnel to chimney)- TRY SUPPLY)			2,137,827

Piping - AS (Rate Schedule Identifier SI No. 4.2 of Rate Schedule)			
1	24300	Boiler Trim Piping And Fittings	73,260
2	24315	Spray Water System Cc Rh Blr	5,670
SUB TOTAL (Piping - AS - TRY SUPPLY)			78,930

Piping - CS (LP) (Rate Schedule Identifier SI No. 4.4 of Rate Schedule)			
1	24320	Safety Valve Esc Pipe&Drain - Cc Rh Bl	41,040
2	24325	Silencer Support-Safety Valves	21,330
3	24335	Slncr&Suprt-Starting Vent - Cc Rh Blr	3,150
4	24340	Sample Cooler And Supports	765
5	24350	Boiler Filling Piping	2,295
SUB TOTAL (Piping - CS (LP) - TRY SUPPLY)			68,580

SI No.	PGMA	Description	Weight (in Kg)
Piping-Hangers and Supports (Rate Schedule Identifier SI No. 4.6 of Rate Schedule)			
1	24301	Boiler Trim Piping Supports	13,950
2	24351	Hangers And Supports Of Blr Filling Pipe	482
SUB TOTAL (Piping-Hangers and Supports - TRY SUPPLY)			14,432

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

Insulation - Insulation (Rate Schedule Identifier SI No. 5.1 of Rate Schedule)			
1	33924	Misc Eqpts Asbestos Materials	180
2	33975	Misc Eqpts Sealing Compound	270
SUB TOTAL (Insulation - Insulation - TRY SUPPLY)			450

Insulation - Pourable and Castable (Rate Schedule Identifier SI No. 5.2 of Rate Schedule)			
1	33201	Main Blr Formed Refractory Is8	900
2	33210	Main Blr Castable Refractory Gr A	157,500
3	33230	Main Blr Pourable Insulation	324,000
SUB TOTAL (Insulation - Pourable and Castable - TRY SUPPLY)			482,400

Insulation - Iron Parts (Rate Schedule Identifier SI No. 5.3 of Rate Schedule)			
1	33970	Misc Eqpts Expanded Metal	7,200
2	33971	Misc Eqpts Woven Wire Cloth	900
SUB TOTAL (Insulation - Iron Parts - TRY SUPPLY)			8,100

Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)			
1	33021	Blr Pr Parts Mineral Wool	234,000
2	33121	Blr Mountings Mineral Wool	9,000
3	33126	Sb Pipes Mineral Wool	2,700
4	33321	Air Ducts Mineral Wool	270,000
5	33421	Air Heater And Gas Ducts Mineral Wool	72,000
6	33521	Id Ducts Mineral Wool	90,000
7	33721	Oil System Mineral Wool	5,400
SUB TOTAL (Insulation - Wool mattress - TRY SUPPLY)			683,100

TOTAL TRICHY SUPPLY			22,962,652
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BAP RANIPET SUPPLY

SI No.	PGMA	Description	Weight (in Kg)
Pressure Parts (Rate Schedule Identifier SI No. 1.2 of Rate Schedule)			

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

1	50510	STEAM COIL A P H	13000
2	52000	SPECIAL TOOLS/CONTRA	1172
3	52010	LARG AH-ROTOR ASSY	932400
4	52011	LARG AH-ROTOR POST	45920
5	52012	LARG AH-ROTORPINRACK	6620
6	52013	LARG AH-ROTORSEALS	14960
7	52030	LARG AH-ROTORHOUSING	58520
8	52041	HOT END CONN PLATE	105710
9	52042	COLD END CONN PLATE	163140
10	52054	LARG AH-AXIAL SEAL	1226
11	52055	LARG AH-BY PASS SEAL	1490
12	52100	LARGE AH ROTOR DRIVE	12750
13	52211	LARG AH-AIRSEAL PIPE	890
14	52220	LARG AH-GENS DETAILS	14400
15	52261	LARG AH-GUIDE BEARNG	8020
16	52262	LARG AH-SUPRT BEARNG	16350
17	52271	OIL PIPING GUIDE BRG	525
18	52272	OIL PIPING SUPRT BRG	540
19	52274	LUB OIL CIRCULATION UN	1102
20	52301	WASH MANIFLD GAS INL	1975
21	52302	WASH MANIFLD GAS OUT	1895
22	52340	LARG AH-CLEANINGEQPT	4500
23	52988	LARG AH COMMISSIONING	860
SUB TOTAL (Pressure Parts - BAP RANIPET SUPPLY)			1407965

Non Pressure Parts (Upto ESP Inlet Funnel) (Rate Schedule Identifier SI No. 1.3 of Rate Schedule)

1	57010	GATE FAN OUTLET	17300
2	57013	DAMPERS BET FD FAN & A	12500
3	57033	SA SCAPH INLET DAMPER	9250
4	57063	SA SCAPH OUTLET DAMPER	9250
5	57110	GUILLOTENE GATE PA FAN	21400
6	57113	DAMPERS BETWEEN PAFAN	13500
7	57141	SEAL AIR HAG AND ID FA	15000
8	57143	DAMPER COLD AIR BUS(TE	4000
9	57160	COLD AIRGATE, AIRBUS T	15500
SI No.	PGMA	Description	Weight (in Kg)

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

10	57203	DAMP APH TO WINDBOX DU	21500
11	57209	MTG BKT FOR CL DAMPER	6000
12	57223	DAMP APH PRIMARY SIDE	15000
13	57270	GUILLOTENE GATE DUCT T	30500
14	57273	DAMPER BOILER OUTLET	11100
15	57383	FLUE GAS SAH INLET DAM	50500
16	57433	DAMPER APH BOILER OUTL	36500
17	57460	GUILLOTENE GATE EP INL	44000
18	57466	PLATFORMS AND LADDERS	40000
19	57491	BLOWER WITH MOTOR	6000
20	57497	KNIFE GATE VALVE	1500
21	57577	ELECT ACTUATOR FOR GAT	25000
22	57988	DUCTS COMMISSIONING SP	20
SUB TOTAL (Non Pressure Parts (Upto ESP Inlet Funnel) - BAP RANIPET SUPPLY)			405320

Rotating Machine (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	55011	FD FAN FOUNDATION MATL	1800
2	55017	FD FAN C&I ITEMS	10
3	55031	PA FAN FOUNDATION MATL	1800
4	55037	PA FAN C&I ITEMS	10
5	55091	FISRT FILL LUBRICANTS	3500
6	55215	1 REACT FD FAN	29000
7	55334	2 REACT PA FAN	26500
8	55810	AXIAL FDFAN COUPLING	800
9	55830	AXL PAFAN COUPLING	1500
10	55910	AXL FDFAN ACCESSORY	3000
11	55911	AXIAL FDFAN SILENCER	62500
12	55930	AXL PAFAN ACCESSORY	3000
13	55931	PA FAN SILENCER	56500
14	56000	TOOLS & FIXTURE/CONT	900
15	56021	ID FAN FOUNDATION MATL	5800
16	56027	ID FAN C&I ITEMS	10
17	56077	SEAL AIR FAN C&I ITEMS	10
18	56161	BAC 1 SUC SA FAN	1600
19	56173	BAC 1 SUC IGNTR FAN	8000
20	56228	BAC 2 SUC ID FAN	192000

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

SI No.	PGMA	Description	Weight (in Kg)
21	56671	IGNITR FAN MOTOR	1900
22	56820	RADL IDFAN COUPLING	200
23	56870	SEAL AIR FAN COUPLING(100
24	56920	RAD IDFAN ACCESSORY	4000
25	56988	RADIAL FAN COMMG SPA	10
SUB TOTAL (Rotating Machine - BAP RANIPET SUPPLY)			404450

ESP (Rate Schedule Identifier SI No. 3.1 of Rate Schedule)			
1	79401	ROLL/SLIDE SUPPORTS	32448
2	79405	ESP-SUB-DELIVERY COMPO	800
3	79406	INSULATOR HOUSING AS	62000
4	79408	GAS DIST. ASSY	97000
5	79409	GD-RAPPING MECHANISM	16641.064
6	79410	GD_DRIVE ARRANGEMENT	915.392
7	79411	GAS SCREEN-EP	52000
8	79413	EMIT SYST SUSPENSION	22000
9	79414	SUPPORT INSULATORS	9600
10	79415	EMITTING ELECTRODES	36000
11	79416	EMIT ELECT RAPP MECH	60000
12	79417	DRIVE ARG. FOR EMIT.	42000
13	79419	COL ELEC SUSPENSION	160000
14	79420	COLLECTING ELECTRODE	815000
15	79421	EMIT SYS FRAME-TOP	222000
16	79422	EMIT SYS FRAME BOTOM	263000
17	79423	INSPECTION DOORS	24000
18	79424	SHOCK BARS	134000
19	79425	COLL ELECT RAPP MECH	145000
20	79426	COLL ELEC RAPP DRIVE	9153.92
21	79428	ESP ROOF PANELS	254665.984
22	79430	ELECTRICAL SD COMPTS	18400
23	79431	GEARED MOTORS FOR RAPP	30000
24	79432	EMIT SYS FRAME-MIDLE	225000
25	79437	JUNCTION BOX & PUSH BU	2000
26	79442	OUTER ROOF-EP	358000
27	79443	HOPPER RIDGES	103000
28	79444	HOPPER UPPER PART	450000

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

29	79445	HOP MLD&LOWER PART	650000
30	79446	INSULATOR SUPP PANEL	170000
SI No.	PGMA	Description	Weight (in Kg)
31	79447	ROOF PANEL ASSY	190000
32	79448	CASING STRUCTURE	540000
33	79449	CASING SHELL/PANEL	663452.099
34	79450	INLET-OUTLET FUNNEL	220000
35	79455	PENT HOUSE FOR E P	280000
36	79457	SPLITTER&GUIDE VANES	30000
37	79459	CONTROL ROOM-INSERTS	38000
38	79461	EP PERF TEST EQUIPT	1000
39	79463	ASH LEVEL INDICATOR	3100
40	79465	APP PLATFORM-HOPPER	235000
41	79466	WATER WASHING SYSTEM	6500
42	79472	INTERLOCKS-EP	3000
43	79473	ELECTRICALLY OPERTD HO	7000
44	79474	OPACITY MONITOR & ACCE	2000
45	79477	LT SWITCH BOARD/ESP SW	32000
46	79478	BAPCON & ACCESSORIES	2000
47	79480	FOUNDATION MATLS FOR E	20264.452
48	79481	SUPPOTING STRUCTURES F	730000
49	79490	HEATING ELEMENTS	5000
50	79492	AUXILIARY CONTROL PANE	34000
51	79493	RAPPER CONTROL PANEL	1200
52	79494	STATCON PANEL	1000
53	79988	COMMISSIONING SPARES	1000
54	79996	TOOLS & TACKLES	400
SUB TOTAL (ESP - BAP RANIPET SUPPLY)			7510541

Non Pressure Parts (ESP Outlet funnel to chimney)(Rate Schedule Identifier SI No. 3.2 of Rate Schedule)			
1	57470	EP OUTLET GATE	44000
2	57480	ID FAN INLET GATE	60300
3	57490	GUILLOTENE GATE ID FAN	59000
4	89610	EP GALLERIES&STAIRS	110000
5	89611	ESP ROOF HANDRAILS	10000

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

SUB TOTAL (Non Pressure Parts (ESP Outlet funnel to chimney) - BAP RANIPET)	283300
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SI No.	PGMA	Description	Weight (in Kg)
Insulation - Aluminium Cladding Sheets (Rate Schedule Identifier SI No. 5.4 of Rate Schedule)			
1	79468	FIXING COMP. FOR ESP I	195000
SUB TOTAL (Insulation -Aluminium Cladding Sheets - BAP RANIPET SUPPLY)			195000
Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)			
1	79467	MIN WOOL FOR ESP INSUL	220000
SUB TOTAL (Insulation - Wool mattress - BAP RANIPET SUPPLY)			220000
TOTAL RANIPET SUPPLY			10426576

PC CHENNAI SUPPLY

Piping - P91 (Rate Schedule Identifier SI No. 4.1 of Rate Schedule)				IBR
1	80300	MS FROM SUPERHEATER TO BOILER STOP VALVE	36,000	I
2	80301	MS FROM BOILER STOP VALVE TO ESV	130,500	I
3	80304	MS HEADER TO HPBP VALVE	22,500	I
4	80310	HRH FROM REHEATER TO INTERCEPTOR VALVE	198,000	I
5	80311	HRH FROM INTERCEPTOR VALVE TO TURBINE	19,800	I
6	80312	LPBP VALVE UPSTREAM & DOWNSTREAM	63,720	I
7	80320	CRH FROM TURBINE TO REHEATER	81,000	I
SUB TOTAL (Piping - P91 - PC CHENNAI SUPPLY)			551,520	

Piping - AS (Rate Schedule Identifier SI No. 4.2 of Rate Schedule)				IBR
1	I	MS HEADER TO AUX PRDS	12,420	I
2	80307	HP & LP BYPASS WARM UP	1,710	I
3	80320	CRH FROM TURBINE TO REHEATER	81,000	I
4	80321	HPBP VALVE TO CRH PIPING	14,400	I
5	80329	EXTRACTION STEAM TO BFP DRIVE TURBINE	7,020	I
6	80336	EXTRACTION STEAM TO HP HEATER NO.1	6,120	I

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

7	80339	AUX STEAM TO BFD TURBINE	1,530	I
8	80901	SUB DELIVERY VALVES FOR LIGHT UP	4,500	N
9	80992	IMPORTED ELECTRODES	1,600	N
SUB TOTAL (Piping - AS - PC CHENNAI SUPPLY)			130,300	

SI No.	PGM A	Description	Weight (in Kg)	IBR
Piping - CS (HP) (Rate Schedule Identifier SI No. 4.3 of Rate Schedule)				
1	80322	CRH PIPING TO DEAERATING HEATER	7,380	I
2	80323	STEAM TO BFP DRIVE TURBINE	2,610	I
3	80324	CRH HEADER TO AUX.PRDS	990	I
4	80331	EXTRACTION STEAM TO LP HEATER-2	5,130	I
5	80332	EXTRACTION STEAM TO LP HEATER-3	3,690	I
6	80335	EXTRACTION STEAM TO DEAERATING HEATER	16,560	I
7	80337	EXTRACTION STEAM TO HP HEATER-2	4,050	I
8	80338	EXTRACTION STEAM TO HP HEATER-3	4,770	I
9	80340	AUX STEAM HEADER	4,320	I
10	80341	AUX STEAM HEADER INTERCONN BETWEEN UNITS	40,500	I
11	8034 2	AUX STEAM TO SCAPH	4,320	I
12	8034 3	AUX STEAM TO AH SOOT BLOWERS	1,440	I
13	8034 4	AUX STEAM TO FO SYSTEM TP	29,700	I
14	80345	AUX STEAM TO DEAERATING HEATER	3,150	I
15	80349	AUX STEAM TO GLAND SEALS - TG SCOPE	1,350	I
16	8035 1	AUX STEAM TO UNLISTED USERS - SG SCOPE	8,640	I
17	8035 5	STEAM TRACING PIPING	5,040	I
18	8039 5	AUX STEAM TO FUEL OIL ATOMISING	810	I
19	80418	ERECTION MATERIALS FOR INSTRUMENTS	1,350	N
20	80420	BOILER FEED PUMP SUCTION	19,710	N
21	80421	BOILER FEED PUMP RECIRCULATION	32,130	I
22	80423	BOILER FEED PUMP TO HPH INCLUDING BYPASS	100,800	I

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

23	80424	BFD BETWEEN HTRS & GROUP PROTECTION VLV	37,800	I
24	80425	BFD FROM FINAL HPH TO SG TP	176,400	I
25	80430	SPRAY WATER TO HPBP	4,320	I
26	80431	SPRAY WATER TO AUX PRDS	2,340	I
27	80432	SPRAY WATER TO BOILER DESH UPTO SG TP	16,560	I
28	80433	SPRAY WATER FROM BFP INTERSTAGE	4,680	I
29	80450	CBD AND EMERGENCY DRUM DRAIN	1,800	I
30	80451	BOILER INTEGRAL PIPING DRAINS	15,660	I
31	80452	HP PIPING DRAINS - SG SCOPE	11,790	I
32	80454	SCAPH DRAINS	2,160	N
33	80992	IMPORTED ELECTRODES	1,100	N
34	81128	HIGH PRESSURE DOSING SYSTEM	1,620	N
35	81411	DIRECT GAUGES FOR STEAM LINES	630	N
SUB TOTAL (Piping - CS (HP) - PC CHENNAI SUPPLY)			575,300	
SI No.	PGM A	Description	Weight (in Kg)	IBR
Piping - CS (LP) (Rate Schedule Identifier SI No. 4.4 of Rate Schedule)				
1	80363	EXHAUST STEAM FROM PRIME MOVERS-TG SCOPE	22,770	N
2	80364	CBD TANK VENT TO SYSTEM	1,440	I
3	80365	CBD TANK VENT/SV EXHAUST TO ATMOSPHERE	720	N
4	80366	IBD TANK VENT TO ATMOSPHERE	9,990	N
5	80371	DRAIN FLASH TANK VENT TO CONDENSER	10,170	N
6	80373	AUX STEAM HEADER SV EXHAUST	4,410	N
7	80375	UNLISTED SV EXHAUSTS - TG SCOPE	1,710	N
8	80379	HPH SV EXHAUST TO FLASH TANK	3,960	N
9	80381	HP HEATER VENTS - TG SCOPE	2,880	N
10	80382	LP HEATER VENTS	1,350	N
11	80385	VENT FROM UNLISTED PPG/EQPT TO COND	9,360	N
12	80388	CONDENSER AIR EVACUATION PIPING	3,150	N
13	80400	CONDENSATE SUCTION	6,660	N
14	80401	CD FROM PUMP TO LPH1/DC INLET TEE&RECIR	28,980	N
15	80402	CD FROM LPH1/DC INLET TEE TO TG TP	19,710	N

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

16	80403	CD FROM TG TP TO DEAERATING HEATER	10,080	N
17	80407	CONDENSATE FOR SEALING OF VACUUM	2,250	N
18	80408	CONDENSATE DUMP FROM HEADER	900	N
19	80412	CONDENSATE TRANSFER	1,620	N
20	80419	DEAERATOR SAFETY VALVE EXHAUST TO ATM	3,600	N
21	80436	SPRAY WATER TO LPBP DESH	5,490	N
22	80439	TURBINE FLASH TANK DRAIN TO CONDENSER	810	N
23	80442	GLAND STEAM COOLER DRAINS	360	N
24	80443	LP HEATER-1 TO CONDENSER	3,780	N
25	80444	LP HEATER-2/3/4/5 DRAINS&DRIP PUMP INCL	6,210	N
26	80446	DEAERATING HEATER OVER FLOW AND DRAIN	4,500	N
27	80447	HP HEATER DRAINS	14,490	N
28	80448	DRAIN FROM UNLISTED EQPT/VESSEL-TG SCOPE	9,180	N
29	80449	TG CYCLE PIPING DRAINS & VENTS	9,540	N
30	8045 3	LP PIPING DRAINS - SG SCOPE	4,230	I
31	8045 5	DRAIN FROM UNLISTED EQPT/VESSEL-SG SCOPE	3,690	N
32	80457	MANIFOLDS FOR HP FLASH BOX & CONDENSER	1,710	N
33	80459	HP FLASH TANK DRAIN TO CONDENSER	1,620	N
34	8046 0	SG AUX COOLING WATER UNIT SYSTEM	39,600	N
35	80463	TG AUX COOLING WATER	50,760	N
36	80468	MAIN CIRCULATION WATER PIPING	158,715	N
37	80473	DEMINERALISED WATER SYSTEM	3,780	N
SI No.	PGM A	Description	Weight (in Kg)	IBR
38	80477	SERVICE WATER PIPING	5,850	N
39	8048 0	FIRE WATER-OTHER AREAS	7,290	N
40	80493	HP FLASH TANK VENT TO CONDENSER	3,240	N
41	80494	LP FLASH TANK VENT TO CONDENSER	2,700	N
42	80495	LP FLASH TANK DRAIN TO COND	2,250	N
43	8061 0	SERVICE AIR-COMP SUCT & DIS TO RECEIVER	2,430	N
44	8061 2	SERVICE AIR FOR INDIVIDUAL UNITS	8,190	N
45	8061 4	INST AIR COMP SUC & DIS TO RECEIVER	3,600	N
46	8061	INSTRUMENT AIR FOR INDIVIDUAL UNIT	37,530	N

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

	6			
47	8065 0	FUEL OIL SUPPLY AND RETURN PIPING	72,450	N
48	80673	LUBE OIL PIPING SYSTEM	14,400	N
49	80901	SUB DELIVERY VALVES FOR LIGHT UP	9,000	N
50	8111 0	COOLING WATER PUMP	270	N
51	8141 2	DIRECT GAUGES FOR NON-STEAM LINES	810	N
52	8141 4	LOCAL CONTROL EQPT FOR NON-STEAM LINES	360	N
53	81415	TEST THERMOWELLS	360	N
54	81416	PERFORMANCE GUARANTEE TEST MATERIALS	1,080	N
SUB TOTAL (Piping - CS (LP) - CHENNAI SUPPLY)			635,985	

Piping - SS (Rate Schedule Identifier SI No. 4.5 of Rate Schedule)				IBR
1	8060 0	HIGH PRESSURE DOSING PIPING	900	N
2	80601	LOW PRESSURE DOSING PIPING	900	N
SUB TOTAL (Piping - SS - PC CHENNAI SUPPLY)			1,800	

Piping- Hangers and Supports (Rate Schedule Identifier SI No. 4.6 of Rate Schedule)				IBR
1	8083 0	H&S FOR CRITICAL PIPING - STEAM LINES	157,500	N
2	8084 0	AUX STR FOR MAIN STEAM PIPING FOR SB	180,000	N
3	80920	H&S FOR HYDRO TEST	9,000	N
4	80921	H&S FOR LIGHT UP STEAM LINE	60,300	N
5	80928	H&S FOR BOILER LIGHT UP - TG	135,000	N
6	80930	H&S FOR SYNCHRONISATION - TG	27,000	N
7	80933	H & S FOR LP PIPING	13,500	N
8	80993	MISC ERECTION MATLS	900	N
9	8100 3	CONTINUOUS BLOW DOWN EXPANDER-D1500 MM	3,960	I
10	8100 9	INTERMITTENT BLOW DOWN EXPANDER-D2500 MM	6,210	N
11	8103 6	CW STORAGE TANK 16-25 CUM	6,210	N
12	8143 2	CONSUMABLES AND ERECTION MATERIALS	9	N

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

SUB TOTAL (Piping- Hangers and Supports - PC CHENNAI SUPPLY)	599,589
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Insulation - Insulation (Rate Schedule Identifier SI No. 5.1 of Rate Schedule)				IBR
1	8134 1	SEALING COMPOUND FOR INSL	540	N
SUB TOTAL (Insulation - Insulation - PC CHENNAI SUPPLY)			540	

SI No.	PGM A	Description	Weight (in Kg)	IBR
Insulation - Iron Parts (Rate Schedule Identifier SI No. 5.3 of Rate Schedule)				
1	8131 8	FIX COM FOR MISCELLANEOUS PPG INSULATION	13,500	N
SUB TOTAL (Insulation - Iron Parts - PC CHENNAI SUPPLY)			13,500	

Insulation -Aluminium Cladding Sheets (Rate Schedule Identifier SI No. 5.4 of Rate Schedule)				IBR
1	8135 0	ALUMINIUM CLADDING FOR INSULATION	27,000	N
SUB TOTAL (Insulation -Aluminium Cladding Sheets - PC CHENNAI SUPPLY)			27,000	

Insulation - Wool mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)				IBR
1	8132 5	MINERAL WOOL MATTRESS	54,000	N
SUB TOTAL (Insulation - Wool mattress - PC CHENNAI SUPPLY)			54,000	

TOTAL CHENNAI SUPPLY	2,589,534
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HYDERABAD SUPPLY

Rotating Machines (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	6100 4	Journal Assembly	312960
2	6110 4	Mill Drive and Bowl Assembly	288160
3	6120 4	Mill Side and Liner Assembly	204592
4	6130 4	Classifier Assembly	414000

BHEL-PSWR

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

5	6140 4	MDV Assembly	53520
6	6170 4	Mill Motor Coupling	1440
7	6180 4	Mill Handling System (per Unit)	50000
8	6198 8	Commissioning Spares (per Unit)	600
9	6180 4	Lubricating Oil	14746
SUB TOTAL (Rotating Machines - HYDERABAD SUPPLY)			1340018
TOTAL HYDERABAD SUPPLY			1340018

HERP VARANASI SUPPLY

Rotating Machines (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)			
1	6190 4	Foundation Fastener Assembly	52000
2	6740 0	Seal Air Header Assembly	24000
3	6180 4	Tools and Accessories (per Unit)	2220
SUB TOTAL (Rotating Machines - HERP VARANASI SUPPLY)			78220
TOTAL - HERP VARANASI SUPPLY			78220

CBU BANGALORE SUPPLY

Non Pressure Parts (Upto ESP Inlet Funnel) (Rate Schedule Identifier SI No. 1.3 of Rate Schedule)		
SI no.	Description	Weight (in KG)
1	Ceramic Lined Coal Pipe Bends and Pipes under CBU, Bangalore	275000

JHANSI SUPPLY

ESP (Rate Schedule Identifier SI No. 3.1 of Rate Schedule)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

1	HVR 95KVp 1200mA	144000
2	ELECTRONIC CONTROLLERS	25200
TOTAL JHANSI SUPPLY		169200

IS-MOTOR SUPPLY

Rotating Machines (Rate Schedule Identifier SI No. 2.1 of Rate Schedule)		
1	ID Fan Motor	62000
2	FD Fan Motor	18000
3	PA Fan Motor	16000
4	Mill Motors	48000
TOTAL - IS MOTOR SUPPLY		144000

PEM SUPPLY

SI no.	Item	Weight (in KG)
Insulation - Wool Mattress (Rate Schedule Identifier SI No. 5.5 of Rate Schedule)		
1	Bonded mineral (Rock) wool mattresses Tonnage	550000
Insulation - Aluminium Cladding Sheets (Rate Schedule Identifier SI No. 5.4 of Rate Schedule)		
1	Al sheets Tonnage	75000
Insulation - Iron Parts (Rate Schedule Identifier SI No. 5.3 of Rate Schedule)		
1	Ancillary Material Tonnage	40000
TOTAL PEM SUPPLY		665000

*** Rate Schedule Identified for PGMAs of Piping and Insulation are Indicative only and based on envisaged material specification. Payment shall be made on the basis of material specification of actual material received and erected at site.**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

Estimated Weight (In KG) of Various System in The Scope of Work for Unit # 1

SN	Package	Trichy	PC - Chennai	BAP - RPT	Hyderabad	HERP - Varanasi	CBU	Jhansi	IS - Motor	PEM	Total
1.1	Structure	9800790									9,800,790
1.2	Pressure Parts	6006387		1407965							7414352
1.3	Non Pressure Parts (Upto ESP Inlet Funnel)	3529268		405320			275000				4209588
2.1	Rotating Machines	131598		404450	1340018	78220			144000		2098286
2.2	Handling Equipment of Rotating Machines	20790									20790
3.1	ESP			7510541				169200			7679741
3.2	Non Pressure Parts (ESP Outlet Funnel to Chimney)	2137827		283300							2421127
4.1	Piping - P91		551520								551520
4.2	Piping - AS	78930	130300								209230
4.3	Piping - CS		575300								575300

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-I ESTIMATED WEIGHT FOR VARIOUS SYSTEMS IN
SCOPE OF WORK

	(HP)										
4.4	Piping - CS (LP)	68580	635985								704565
4.5	Piping - SS		1800								1800
4.6	Piping - Hangers and Support	14432	599589								614021
4.7	Piping - Temporary (Steam Blowing)										75000
4.8	Piping - Temporary (Chemical Cleaning)										50000
5.1	Insulation	450	540								990
5.2	Pourable and Castable	482400									482400
5.3	Iron Parts	8100	13500						40000		61600
5.4	Aluminium Cladding Sheets		27000	195000					75000		297000
5.5	Wool Mattress	683100	54000	220000					550000		1507100
	Total =	22962652	2589534	10426576	1340018	78220	275000	169200	144000	665000	38650200

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-II LIST OF IBR WELD JOINTS

(Will be issued during Execution)

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirappalli - 620 014



PAINTING SCHEME FOR
M/s. VISA POWER LIMITED
VPL RAIGARH -2 X 600 MW-UNIT 1 & 2
DEVERI & DUMARPALI
CHHATTISGARH
CUSTOMER NO: U6/ 1617 &U6/ 1618

Prepared by	L. Gragori Manager / P. Lab		Document No: PL: C3 - PS /1617
Reviewed by	S.Dhanabal SDGM / PE / FB		Revision No: 00 Dated: 28-09-2010
Approved by	Dr.G.Ravichandra n AGM /P. Lab		Sheet No. : 1 of 11

N/ CHEM/CONTRACTS 10/VISA POWER LTD-_00.DOC.

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	28-09-2010	<p>NEW</p> <p>DCPL's Comments: The requirements for the dry film thickness (DFT) of paints shall be as per the followings:</p> <p>a) Surfaces Subject To Weathering All surfaces shall have a minimum of four coats of paint made up as follows: Primer coat : 35 micron DFT Tie coat : 35 micron DFT Finishing coat (2 nos) : 35 micron DFT per coat The total minimum DFT shall be 140 micron.</p> <p>b) Surfaces Inside Buildings All surfaces shall have a minimum of three coats of paint made up as follows: Primer coat : 35 micron DFT Tie coat : 35 micron DFT Finishing coat (2 nos) : 25 micron DFT per coat The total minimum DFT shall be 120 micron.</p>	<p>Prepared in line with accepted painting scheme for DAINIK BHASKAR contract - cust.No. 1615 & 1616.</p>

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μm (min)
				Paint	No. of Coats / DFT	Paint	No. of coats	Paint	No. of coats	Shade	
1.1	1AC	Drum (Except Internals) 04 – 114, 116, 118, 124, 126, 128, 210, 212, 214, 270	SSPC-SP3/ Power Tool Cleaning	(Alkyd Base) to IS 12744	1 / DFT= 30 μm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20 μm per coat	International Orange Shade No: 592 of IS 5	70
1.2	1AC	Drum Suspension 04 -142, 144, 146, 148	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1/ DFT= 30 μm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT = 20 μm per coat	International Orange Shade No: 592 of IS 5	70
1.3	5	Drum Internals 04 – 134, 136, 138 Other Machined Components: 43 – 101, 102, 103, 104, 105, 106, 107	SSPC-SP1 or SP3 Solvent / Power Tool Cleaning	Rust Preventive Fluid to PR: CHEM: 09 – 04	1 DFT=25 μm per coat	--	--	--	--	--	25

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

1.4	1AE	Drum Transport Structures 04 - 194, 196, 35 - 391, 810	g	SSPC-SP3/ Power Tool Cleanin g	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Yellow Shade No: 356 of IS 5	70
2.1	11	Foundation Materials and Pin: 35 - 010, 011, 012, 013, 020, 030, 190 38 - 010 39 - 010, 011, 012, 020, 030, 040 48 - 019 & Columns below " 0 " level of PG 35,36, 38 & 39	--	No Paint	--	--	--	No Paint	--	--	--	--

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μ m (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.2	1A	<p>Buck Stays and Structural Items: Buck stays 08 – 001, 003, 006, 007, 101, 104, 107, 111, 380, 382, 400, 500, 501, 503, 700, 900, 901, 904, 907, 910 Boiler Supporting Structures 35 – 100, 110, 111, 112, 120, 121, 122, 130, 131, 132, 133, 134, 135, 136, 140, 141, 142, 143, 144, 150, 151, 152, 153, 160, 161, 162, 171, 172, 173, 174, 181, 182, 183, 184, 185, 186, 191, 192, 193, 194, 195, 196, 210, 211, 212, 213, 214, 220, 221, 222, 230, 231, 232, 240, 250, 310, 311, 312, 320, 321, 322, 330, 331, 332, 340, 341, 342, 350, 351, 352, 360, 361, 362, 380, 381, 382, 383, 390, 392, 410, 420, 430, 440, 441, 442, 443, 451, 452, 453, 461, 462, 463, 471, 472, 473, 481, 482, 483, 500, 510, 511, 512, 513, 514, 520, 521, 522, 523, 524, 530, 531, 532, 533, 540, 541, 542, 550, 551, 552, 561, 562, 563, 571, 572, 573, 581, 582, 583, 591, 592, 593, 594, 595, 596, 597, 598, 599, 610, 612, 613, 710, 711, 712, 713, 715</p> <p>36 – 110, 120, 130, 150, 200, 210, 211, 212, 220, 221, 222, 230, 231, 232, 240, 241, 242, 250, 251, 252, 260, 261, 262, 270, 271, 272, 280, 281, 282, 290, 291, 292, 300, 301, 302, 310, 311, 312, 313, 314, 315, 316, 320, 321, 322, 323, 324, 325, 326, 327, 330, 331, 332, 333, 334, 335, 340, 341, 342, 343, 344, 345, 346, 347, 348, 350, 351, 352, 353, 354, 355, 360, 361, 362, 363, 370, 371, 372, 380, 381, 382, 383, 390, 391, 392, 393, 394, 395, 396, 397, 410, 420, 430, 490, 491, 492, 510,</p>	SSPC-SP3/ Power Tool Cleaning Abrasive blast cleaning to Sa 2½ 30- 50 microns	(Alkyd Base to IS 12744	1 DFT= 30 μ m per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT = 20	Smoke Grey Shade No: 692 of IS 5	70

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

	<p>520, 610, 612, 620, 621, 630, 631, 632</p> <p>38 – 110, 120, 130, 210, 211, 299, 310, 311, 380, 381, 390, 410, 510, 511, 512, 513, 521, 522, 610, 611, 612, 620, 710, 712, 720, 730</p> <p>39 - 100, 101, 102, 110, 120, 121, 130, 140, 141, 142, 143, 150, 160, 200, 210, 300, 301, 303, 304, 305, 306, 311, 312, 323, 390, 391, 392, 393, 901</p> <p>Duct Supports</p> <p>48 – 005, 015, 025, 045, 055, 065, 085, 105, 115, 125, 145, 155, 185, 195, 200, 205, 215, 225, 235, 245, 255, 265, 275, 295, 305, 315, 325, 335, 345, 355, 365, 375, 385, 415, 425, 435, 445, 455, 465, 475, 485, 495, 665, 805, 815, 825, 845, 855, 865, 875, 885, 995</p> <p>Piping Centre: 80-800 to 882, 920 to 933, 940</p>									
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
2.3	1A	Hangers: 36 - 740, 741, 742, 743, 744	SSPC-SP3/ Power Tool Cleaning Abrasive blast cleaning to Sa 2 1/2 35- 50 microns	(Alkyd Base) to IS 12744 Epoxy zinc rich primer to IS 14589 Gr. II %VS=35 (min)	4 DFT=30 μm per coat 1 DFT=40 μm / coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932 Aliphatic acrylic Poly-urethane paint %VS=40 (min)	2 DFT=20 μm per coat 1 DFT=30 μm per coat	Smoke Grey Shade No: 692 of IS-5 Phirozi Blue Shade No. 176 of IS5	70
2.4	1AB	Hand Rails & Posts 35 - 850, 851 36 - 850, 851, 852, 853 38 - 850, 851 39 - 850, 851	SSPC-SP3/ Power Tool Cleaning		1 DFT=30 μm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd)	2 DFT=20 μm per coat	Black Dark admiralty Grey (IS 5- 632)	70

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

									to IS 2932			
				(Alkyd Base) to IS 12744								
2.5	6	Floor grills, Guard plate** 35 – 811 36 - 010, 810, 811, 812, 813, 814, 815, 816, 840 38 - 810, 811 39 – 810, 811, 840, 841										
			Floor Grills : Hot dip Galvanizing to a coating weight of 610 gm per sq.m (minimum) and to a coating thickness of 85.0 microns (minimum).									
			** Guard plates will be painted as given in Sl. No. 2.2.									
2.6	1AB	Ladders & Stairs 35 – 820, 821, 822, 823 36 – 820, 821, 822, 823 38 – 820, 821 39 – 820, 830, 831 48 - 466	SSPC- SP3/ Power Tool Cleaning	(Alkyd Base to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20µm per coat	Black Dark admiralty Grey (IS 5- 632)	70	

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
3.1	10	Components >95° C <u>Un-insulated</u> other than components coming in Gas Path 09 - 001, 002, 003 21 - 800, 850, 875, 997 24 - 120, 160, 173, 180, 185, 190, 195, 220, 260, 273, 280, 285, 290, 320, 345, 360, 373, 380, 385, 390, 395, 420, 460, 480, 485, 490, 495, 520, 560, 573, 580, 585, 590, 660, 680, 685, 690, 820, 860, 880, 885 28 - 220 42 - 300, 318, 328, 348, 358 48 - 380	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Grade-I	1 (DFT =20 microns)	--	--	Heat Resistant Aluminium Paint to IS 13183 Grade-I	1 (DFT =20 μm per coat)	Aluminium	40
3.2	3	Components >95° C <u>Insulated</u> 05 - 137, 139, 147, 153, 154, 155, 158, 159, 175, 188, 195, 220, 227, 229, 231, 236, 241, 246, 251, 265, 281, 283, 296, 330, 340, 341, 350, 493, 879, 900 07 - 101, 102, 104, 106, 107, 108, 109, 200, 201, 202, 203, 204, 211, 212, 214, 215, 216, 217, 218, 221, 222, 223, 225, 226, 229, 231, 232 10 - 100, 120, 122, 135, 136, 140, 141, 151, 170, 174, 178, 179, 180, 191, 195, 218, 220, 222, 235, 236, 240, 241, 251, 270, 274, 278, 279, 280, 283, 284, 291, 295, 315, 687 15 - 136, 138, 147, 174, 177, 192, 193, 236, 238, 274, 279, 292, 293, 999 17 - 138, 177, 776, 807, 900, 903 18 - 001, 002, 003, 010, 020 19 - 701, 702, 753, 903	SSPC-SP3/ Power Tool Cleaning		2 DFT = 30 μm per coat	-	--	--	--	Red Oxide	60

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

	<p>21 – 600 24 – 100, 115, 175, 200, 215, 275, 295, 300, 315, 375, 475, 500, 568, 600, 620, 675, 42 - 020, 021, 025, 030, 031, 032, 033, 036, 037, 038, 128, 150, 153, 158, 159, 48 –032,034,035,132,135,202, 204, 207, 208, 212, 214, 217, 221, 222, 224, 227, 228, 229, 232, 234, 242, 244, 252, 254, 261, 262, 264, 267, 272, 274, 276, 282, 284, 292, 294, 302, 304, 307,308, 309, 311, 312, 314, 318, 319, 322, 324, 332, 334, 342, 352, 362, 364, 372, 374, 381, 382, 384, 386, 388, 389, 392, 412, 414, 422, 424, 426, 432, 434, 438, 439, 442, 444, 452, 454, 462, 464, 467, 468, 469, 472, 474, 482, 484, 486, 487, 488, 489, 491, 492, 494, 496, 497, 498, 499, 602, 612, 622, 632, 646, 652, 654, 656, 662, 664, 666, 667, 668, 669, 676, 686, 696</p>	(Alkyd Base) to IS 12744							
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TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
3.3	2	Heat Exchanger Coils: (SH, RH & Economiser Coils) 11 - 036, 037, 038, 074, 077, 078, 095, 135, 136, 138, 170, 174, 175, 178, 179, 235, 236, 237, 238, 248, 250, 251, 271, 272, 274, 275, 277, 278, 279, 280, 336, 337, 338, 340, 342, 356, 358, 370, 374, 377, 378, 395, 585, 587, 591, 606, 608, 616, 618, 682, 683, 684, 685, 686, 687, 688, 691, 694, 716, 717, 718, 767, 768, 769, 787, 791, 882, 883, 884, 885, 887, 916, 917, 918, 967, 968, 969, 986, 987, 988, 991, 994, 999 12 – 135, 136, 170, 174, 178, 184, 187, 335, 395, 495, 515, 535, 551, 619, 800, 803, 805, 850, 851, 852, 900, 901, 903, 906, 914, 917, 924, 927, 928, 944, 948, 954, 968, 988, 999 16 – 077, 079, 132, 235, 236, 237, 238, 256, 275, 277, 279, 281, 377, 379 19 - 001, 104, 105, 114, 124, 184, 802, 814, 824, 884, 914, 924, 984	SSPC – SP2 or SSPC – SP3 Hand tool / Power tool cleaning	Red Oxide Zinc Phosphate Dip coat primer to PR: CHEM: 09 – 03	1 DFT= 35 μm per coat	--	--	--	--	--	35
3.4	3	Components coming in Gas Path other than Coils 06 - 033, 036, 037, 041, 043, 046, 047, 052, 054, 089, 090, 091, 092, 093, 094, 130, 133, 136, 137, 141, 143, 146, 147, 152, 154, 189, 190, 191, 192, 193, 194, 231, 331, 350, 400, 430, 466, 467, 500, 530, 609, 611, 613, 614, 616, 620, 621, 623, 624, 630, 631, 633, 634, 636, 637, 639, 640, 641, 643, 644, 646, 647, 649, 650, 651, 652, 653, 654, 655, 657, 658, 659, 670, 689, 690, 691, 692, 693, 694, 695, 709, 713, 714, 715, 716, 720, 723, 730, 731, 733, 734, 737, 740, 741, 743, 744, 747, 749, 750, 751, 753, 755, 789, 790, 830, 840, 850, 851, 857, 895, 896,	SSPC-SP3/ Power Tool Cleaning		2 DFT= 30 μm per coat	- -	--	--	--	Red Oxide	60

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

		897 10 – 182, 183, 184, 185 16 – 988, 999 19 – 703, 704, 708, 763, 783, 850, 851, 900, 988, 999 30 – 010, 104, 105, 211, 212, 216, 217, 218, 219, 220, 223, 227, 228, 233, 235, 993, 31 – 010,101, 102, 103, 104, 105, 108, 301, 993 32 – 001, 002, 005, 006, 007, 008, 009, 011, 012, 021, 022, 023, 024, 025, 026, 027, 031, 033, 041, 042, 043, 044, 050, 055, 061, 073, 110, 120, 210, 620, 720, 810, 910, 993 42 - 129		(Alkyd Base) to IS 12744							
3.5	8A	Uninsulated Fuel Pipes 47 – 229, 265, 266, 267, 268, 269 Duct for Tube Mill: 48 – 802, 804, 812, 814, 817, 822, 824, 832, 834, 842, 844, 852, 854, 857, 862, 864, 867, 872, 874, 882, 884,	SSPC-SP3/ Power Tool Cleaning	General purpose Aluminium paint to IS 2339	2	--	--	--	--	Alumunum	40
Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT μ m (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

4	15	Constant Load and Variable Load Hangers (CLH / VLH) (See NOTE 14) 07 - 400, 401, 402, 403, 404, 405, 410, 420, 431 10 - 200 17 - 904, 906, 919, 929 19 - 901, 904, 905, 906, 907 24 - 346, 351	Abrasive blast cleaning to Sa 2 ½ 35- 50 microns	Epoxy zinc rich primer to IS 14589 Gr. II %VS=35 (min)	1 DFT= 40 µm / coat	--	--	Aliphatic acrylic Poly-urethane paint %VS=40 (min) t	1 DFT=30µm per coat	Phirozi Blue Shade No. 176 of IS5	70
5.1	1A	Miscellaneous and Casing Sheets: 07 -500, 501, 600, 601, 997, 999, 19 - 101, 102, 21 - 601, 987, 24 - 101, 125, 130, 135, 140, 201, 225, 230, 235, 240, 301, 325, 335, 340, 350, 370, 374, 400, 401, 425, 430, 435, 440, 470, 471, 473, 501, 525, 535, 540, 570, 601, 625, 635, 640, 800, 801, 815, 825, 987, 989, 996, 998 35 - 994, 995, 36 - 613, 903, 999, 37 - 010, 110, 210, 310, 410, 510, 610, 39 - 302, 924 Fuel Firing: 41 - 100, 110, 200, 310, 320, 330, 340, 350, 390, 410, 420, 430, 450, 460, 470, 997 Steam Blowing Piping: 42 - 002, 003, 005, 010 42 - 040, 045, 050, 055, 060, 065, 070, 111, 112, 113, 114, 118, 119, 120, 121, 122, 123, 124, 130, 131, 132, 151, 152, 154, 155, 156, 157, 160, 165, 170, 176, 180, 195, 196, 989, 997, 998 43 - 000, 001, 002, 003, 004, 005, 006, 007, 008, 997, 999 45 - 050, 120, 160, 161, 180, 181, 220, 221, 260, 261, 321, 325, 326, 401 47 - 121, 122, 123, 124, 125, 129, 140, 141, 142, 143, 144, 145, 146, 149, 161, 162, 163, 164, 165, 169, 180, 181, 182, 183, 184, 185, 189, 200, 201, 202, 203, 204, 205, 209, 221, 222, 223, 224, 225, 241, 242, 243, 244, 245, 246, 247, 248, 249, 261, 262, 263, 264, 647, 648, 649, 650, 746, 953, 959, 963 Duct Plates and Expansion Joints:	SSPC-SP3/ Power Tool Cleaning	(Alkyd Base) to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20	Smoke Grey Shade No: 692 of IS 5	70

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

		<p>48 – 002, 004, 007, 011, 012, 014, 017, 018, 022, 024, 028, 032, 034, 040, 042, 044, 052, 054, 062, 064, 066, 072, 074, 082, 084, 092, 094, 102, 104, 107, 112, 114, 116, 122, 124, 132, 142, 144, 152, 154, 162, 172, 182, 184, 192, 194</p> <p>Coal Handling: 65 – 051, 060, 070, 260, 402, 403, 460, 724, 736, 738, 786 67 – 204, 251, 256, 261, 266, 271, 272, 276, 277, 283, 286, 400, 801, 802, 803, 804, 999 99 – 201, 299</p>									
5.2	3	<p>Erection Materials and Commissioning Components: 04 - 988, 05-993, 06-993, 07 – 988, 993, 12-993, 24 – 993, 28 – 993, 35 – 993, 36 – 993, 37 – 993, 38 – 993, 39 – 993, 48 – 988, 993, 65 – 988, 97-585, 99 – 045, 099, 501, 502</p>	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30µm / coat	--	--	--	--	Red Oxide	60
Sl. No.	Scheme No.	PGMA / Description	Surface Preparation & Surface Profile	Primer coat		Intermediate Coat		Finish coat			Total DFT µm (min)
				Paint	No. of coats	Paint	No. of coats	Paint	No. of coats	Shade	
6.1	10	<p>Cast carbon steel valves (Conventional) Cast alloy steel valves (Conventional) All API valves, QCNRV, SV & SRV Silencers, Water Level gauge HP / LP system 22-101,889</p>	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	--	40

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

6.2	--	Forged valves	Phosphating	Coating weight of 1500 mg per sq.ft.	--	--	--	--	--	--	--
6.3	1AS	Soot Blower components 20-001,003,004,021,051,054,201,204,301,304,331,511,794,801,821,831,962,972	SSPC-SP3/ Power Tool Cleaning	(Alkyd Base to IS 12744	1 DFT= 30µm per coat	--	--	Synthetic Enamel paint (Long Oil Alkyd) to IS 2932	2 DFT= 20	Verdigris Green Shade No. 280 of IS5	70
6.4	36	On Shore OFE Components	SSPC-SP3/ Power Tool Cleaning	HB Chlorinated Rubber based Zinc Phosphate Primer DFT= 50µm per coat	2	--	--	Chlorinated Rubber Based Finish Paint DFT= 30µm per coat	2	French Blue Shade No: 166 of IS 5	160
6.5	35	Off Shore Components	SSPC-SP3/ Power Tool Cleaning		1 DFT= 100µm per coat	--	--	Aliphatic acrylic Polyurethane paint %VS=40 (min) IS 13213	1 DFT=30µm per coat	French Blue Shade No: 166 of IS 5	130

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

6.6	8A	Hand Wheels	SSPC- SP3/ Power Tool Cleaning		2 DFT= 100μ m per coat	--	--	--	--	--	40

PS for Arrows shall be as per valves and the final shade will be 'Post Office Red-Shade No. 538 of IS 5

BHEL-PSWR

Tender Specification No: **BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Annexure-III PAINTING SCHEME

NOTES:

- 1. This painting scheme covers a comprehensive list of PGMA s being used in 125 / 210 / 250 / 500/600 MW and Industrial Boilers under Fossil Boilers working in normal environment, in an effort to standardise the painting scheme. Therefore, the entire list of PGMA s will not be applicable for any specific project and only those PGMA s applicable for the project may be used, while choosing the painting scheme applicable.**
2. Rust Preventive coating should be given on HSFG Bolt & Nut threads.
3. All threaded & machined surfaces and all retainers 'A' & 'C' types are to be applied with a coating of Temporary Rust Preventive oil.
4. All surfaces of foundation materials, insulation pins, Anchor channels, Sleeves shall be coated with Temporary Rust Preventive Fluid and during execution of civil works; the dried film of coating shall be removed using organic solvents.
5. PGMA s under Sub-Vendor items are not indicated. Please refer respective Engineering Document for all sub-vendor items. Wherever it is not specified, it shall be as per the painting scheme of the applicable PGMA.
6. No painting is required for Aluminium, Stainless Steel components and galvanized items. Abrasive blast cleaning to SSPC-SP6 (Sa 2) grade shall be done to prepare the surface of hot worked pipes prior to application of primer.
7. Wherever **inside surfaces** of components under PGMA 48 – XXX, need protection till erection, and all running meter items for spares and main item two coats of Red-oxide zinc phosphate primer paint to IS12744 to a DFT of 60 microns shall be applied, after power tool cleaning. For items meant for Spares and subcontracting where no further processing is involved, the painting scheme selected shall be the same as that of similar product configuration/ description.
8. The Temporary Rust Preventive coating that has already been applied on any component, tubes, pipes etc., shall be visually inspected for good adherence. If the coating is intact, direct coating of alkyd based red oxide paints over the coating is permitted. In case, the coating has peeled off over a large area, then the coating is to be removed by suitable solvents / heating to 350 –400 °C for an hour before primer paint application – but, in this case, it should be ensured that the minimum surface cleanliness required for primer paint application shall be SSPC – SP2 (equivalent – Hand Tool cleaning).
- 9. All currently active PGMA s are covered. Requirements for Missing / new PGMA s will be included under the relevant section, following the appropriate paint logic.**

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Annexure-III PAINTING SCHEME

10. Ground shade/colour finish paints & identification tag/ band for equipments, piping, pipe service, boiler supporting structures and other boiler components shall be followed as per tender.

11. In components, wherever plates/sheets of thickness less than or equal to 5 mm, tubes/ rods of <25mm/ drain pipe are used, power tool /hand tool cleaning to SSPC-SP3/ SSPC-SP-2 shall be followed and the painting shall be done as described in SI no: 5.1.

Sl. No	Material Code of Paint	Generic nature of paint	Theoretical Covering Capacity Sq. m per Litre	No. of pack	Volume solids, % (min) **	DFT in microns (min) per coat	Shade	Shade No. to IS5	Mode of appln	Over coating interval, Hrs.
1	120016131800	Heat Resistant Aluminium paint to IS 13183 Grade I	10	1	-	-	Aluminium	--	Brush / Spray	24
2	120011111900	Red oxide Zinc Phosphate primer paint to IS 12744	10	1	--	--	Red Oxide	--	Brush / Spray	12
3	120011121900	Red oxide Zinc Phosphate Dip coat primer paint to PR: CHEM: 09-03	10	1	--	--	Red Oxide	---	Dip	12
4	120011311200	Long oil alkyd synthetic enamel finish paint to IS2932	10	1	--	--	Reqd shade	Corrpdg. Shade no.	Brush / Spray	12
5	120011140000	Temporary Rust preventive fluid to PR: CHE: 09 – 04	10	1	--	--	Amber	--	Brush / Spray	12

BHEL-PSWR

Tender Specification No: BHE/PW/PUR/DVRIT-BLR(Vertical Pkg) U-1/824

TECHNICAL CONDITIONS OF CONTRACT (TCC)
Annexure-III PAINTING SCHEME

6	120012141700	Epoxy Zinc rich primer to IS14589 Gr. II	8	2	35	40	Grey	--	Spray	24
7	120013310200	Aliphatic acrylic polyurethane paint to IS13213	10	2	40	30	Phirozi – Blue./French Blue	176/166	Spray	24
8	120017101800	De Oxy Aluminate Weldable Primer-Colour Aluminium	10	1	--	--	Aluminium	--	Brush / Spray	24
9	120014111700	HB CR Based Zinc Phosphate Primer	10	1	40	50	Grey	--	Brush / Spray	12
10	120014300100	CR Based Finish Paint	10	1	30	30	French Blue	166	Brush / Spray	12
11	12001213800	High Build Epoxy Mastic Aluminium Primer-	8	2	80	100	Aluminium	---	Spray	24

12. Touch-up painting of damaged areas shall be carried out as per clause applicable painting scheme.

13. Only weldable primer shall be applied on surfaces, which require to be welded subsequently at site. At those locations no other paint shall be applied.

14. DUs coming under Constant Load Hangers (CLH) shall be painted as per the system - **PS 15** indicated in Sl. No. 4 of the table. However, for DUs coming under Variable Load Hangers (VLH) & other Dus, the painting shall be as per Painting Scheme PS 1A indicated in Sl. No. 5.1 of the table. (i.e., one coat of Red Oxide Zinc Phosphate Primer followed by two coats of Synthetic Enamel Paint –shade smoke grey, total DFT – 70 microns)

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Annexure-III PAINTING SCHEME

15. For internal protection of Pipes, tubes, headers and other pressure parts, Volatile Corrosion Inhibitor (VCI) pellets shall be put (after sponge testing/ draining/ or drying) and subsequently end capped. The dosage of VCI pellets shall be approximately 100 gm/ Cu..m. For tubes typically 4 – 5 tablets per end are to be put. For C & I items the dosage of self indicating Silica Gel (colourless) shall be 250 gm/ cu.m. (About 2 to 3 bags weighing approximately 100 grams each) . **VCI pellets shall not be used for stainless steel components and its composite associates.**
16. All threaded components of spring assemblies and turnbuckles shall be galvanized and achromatized to 15 microns minimum thickness.
17. Painting scheme for all temporary structures shall be PS 1AE i.e. 1 coat of Red oxide Zinc Phosphate primer (Alkyd Base) to IS 12744-DFT-30 μ and 2 coats of Synthetic Enamel paint (Long Oil Alkyd) to IS 2932-DFT-2X20 μ Shade Yellow –Shade No. 356 of IS 5- Total DFT 70 μ .

Painting Scheme – Details for procurement & application purposes

The covering capacity of paints specified is only approximate. The paints and Rust Preventive fluid shall be procured from BHEL's approved suppliers. ** Values are indicative.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

GENERAL REQUIREMENTS – COMMON TO ALL WORK

11.1

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

11.2

The terminal points decided by BHEL shall be final and binding on the Contractor for deciding the scope of work and effecting payment for the work done.

11.3

The work shall be executed under the usual conditions affecting major power plant construction and in conjunction with numerous other operations at site. The Contractor and his personnel shall cooperate with personnel of BHEL, BHEL'S Customer, Customer's consultants and other Contractors, coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work of the project as a whole.

11.4

The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, supervision, engineering and construction management. The Contractor should ensure proper planning and successful & timely completion of the work to meet the overall project schedule. The Contractor must deploy adequate quantity of tools & plants, modern / latest construction aids etc. He must also deploy adequate trained, qualified and experienced supervisory staff and skilled personnel.

11.5

Contractor shall erect and commission all the equipments and auxiliaries as per the sequence & methodology prescribed by BHEL depending upon the technical requirements. Availability of materials and fronts will decide this. BHEL Engineer's decision regarding correctness of the work and method of working shall be final and binding on the Contractor. No claims for extra payment from the Contractor will be entertained on the ground of deviation from the methods / sequence adopted in erection of similar sets elsewhere.

11.6

All necessary certificates and licenses, permits & clearances required to carry out this work from the respective statutory/ local authorities are to be arranged by the Contractor at his cost in time to ensure smooth progress of work.

11.7

The boiler shall be erected as per relevant provisions of latest Indian Boiler Regulations (IBR) and amendments/addendums thereof, if any.

11.8

The work shall conform to dimensions and tolerances specified in the various drawings / documents that will be provided during various stages of erection. If any portion of work is found to be defective in workmanship, not conforming to drawings or other stipulations due to Contractor's fault, the Contractor shall dismantle and re-do the work duly replacing the defective

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

materials at his cost, failing which the work will be got done by BHEL and recoveries will be effected from the Contractor's bills towards expenditure incurred including cost of materials and departmental overheads of BHEL.

11.9

The Contractor shall perform any services, tests etc, which may not be specified but nevertheless, required for the completion of work within quoted rates.

11.10

All necessary certificates and licenses required for carrying out this work are to be arranged by the Contractor expeditiously.

11.11

The Contractor shall execute the work in the most substantial and workman like manner. The stores shall be handled with care and diligence.

11.12

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

11.13

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

11.14

During the course of erection, testing and commissioning certain rework / modification / rectification / repair / fabrication etc may become necessary on account of feed back / revision of drawing etc. This will also include modifications / re-works suggested by BHEL / customer / other inspection group. Contractor shall carry out such rework / modification / rectification / fabrication / repair etc promptly and expeditiously. Daily log sheets signed by BHEL engineer and indicating the details of work carried out, man-hours etc shall be maintained by the Contractor for such reworks. Claim of Contractor if any, for such works will be governed by relevant clauses of 'General Conditions of Contract'.

11.15

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

11.16

The Contractor shall make all fixtures, temporary supports, steel structures required for jigs & fixtures, anchors for load and guide pulleys required for the work. Contractor shall arrange necessary steel for such usage. Only the steel for making temporary structure (cat head) for drum lifting will be provided by BHEL in random sizes materials available at site.

11.17

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

11.18

The distance between storage area and erection site is approx 1 KM. Contractor shall plan and transport equipments, components from storage to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. Materials shall be stacked neatly, preserved and stored in the Contractor's shed and at work areas in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work areas/ site to enable other agencies to carry out their work or for any other reason, same shall be done by Contractor most expeditiously as incidental to work.

11.19

Plant materials should not be used for any temporary supports / scaffolding/ preparing pre-assembly bed etc.

11.20

The details of equipments to be erected under this contract are generally as per the schedule given in relevant appendices. These details are approximate and meant only to give a general idea to the tenderer about the magnitude of the work involved. Actual quantum and type of equipments will be based on the relevant erection documents which will be furnished to the Contractor in due course of erection and the weight and quantity as per the relevant engineering documents will only be admissible for the billing purpose.

11.21

Hangers & suspensions, supports etc for tubes, piping, & ducts etc will be supplied in running / random lengths / sizes which shall be cut to suitable sizes and adjusted as required.

11.22

Spring suspension / constant load hangers may have to be pre-assembled for required load and erection carried out as per instructions of BHEL. Adjustments, removal of temporary arrests/locks, cutting of excess thread length of hanger tie-rod etc have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents/instructions, during various stages of erection & testing and after floating of piping/ducting during cold and hot condition will have to be done as part of work. This exercise may have to be repeated till satisfactory results are achieved.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

11.23

Layout of field routed/ small bore piping shall be done as per site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the Contractor. There is a possibility of slight change in routing the above pipe lines even after completion of erection.

11.24

Welding of necessary instrumentation tapping points, thermowell, thermocouple pad, metal temp pad and clamps, root valve, condensing vessel, flow metering & measurement devices, and control valves to be provided on boiler & its auxiliaries and piping are covered within the scope of this specification. The installation of all the above items will be Contractor's responsibility even if:

- a) Items are not specifically indicated under the respective product groups as given in the technical specifications.
- b) Items are supplied by an agency other than BHEL.

Pre-heating, NDE, and Post weld heat treatment for above shall be done as per the specifications as part of work.

11.25

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

11.26

Fixing and seal welding of thermowells & plugs before Hydro test/ steam blowing of equipment or other piping system is within the scope of work. Contractor shall also remove the seal welded plugs by process of grinding and fix and seal weld thermowells after hydro test/steam blowing of lines as part of work.

11.27

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

11.28

All electrical motors have to be tested for IR & PI values prior to the trial run. Where required, dry out may have to be carried out by using external heating source. Contractor shall make all arrangements in this regard and complete the work as instructed. BHEL will provide the motorized insulation testers.

11.29

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

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

11.30

The work shall be carried out strictly in accordance to the "Field Quality Plan" approved by BHEL/client. Contractor, jointly with BHEL, shall prepare all necessary records of measurements/readings/ protocols etc.

11.31

All works such as cleaning, levelling, aligning, trial assembly, dismantling of certain equipments / components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per the general engineering practice and as per BHEL engineers instructions at site, cutting, weld desposing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scraping, lapping, fitting up etc as may be applicable in such erection works and which are treated incidental to the erection work and necessary to complete the work satisfactorily shall be carried out by the Contractor as part of the work.

11.32

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

11.33

Contractor shall regulate flow of material to and from site in such a manner and sequence that material accumulation at site does not lead to congestion at site. In case it is necessary to shift and restack the materials kept at work areas / site to enable other agencies to carry out their work or further any other reason, it shall be done by the Contractor most expeditiously. No claim for extra payment for such work will be entertained.

11.34

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

11.35

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

11.36

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-I General

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

In the event the computerized SOMS is inoperative for any reasons, the Contractor shall take delivery of materials from the storage area/sheds of BHEL/customer after getting the approval of the engineer/customer on standard indent forms to be specified by BHEL/customer. All these records however shall be updated in the SOMS as and when the soms is reactivated/normalized.

11.37

Gases like argon, oxygen, acetylene etc that are required for erection related activities shall be arranged by the Contractor at his cost. For T-91 material site weld joints argon as per grade-3 of is 5760: 1998 with oxygen and water vapour restricted to max 6 ppm each and with argon purity level of minimum 99.99% shall be arranged and used by the Contractor. The supply should accompany test certificate for the batch indicating individual element 'ppm' level and overall purity level.

11.38

Nitrogen gas, if required, for preservation of boiler and nitrogen capping during chemical cleaning process, will be provided by BHEL free of charge. Contractor shall arrange necessary connector, nipple, regulator, header and piping for usage of such gas from cylinders.

11.39

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

12 DETAILS OF SCOPE OF WORK FOR BOILER & AUXILIARIES & PIPING

The scope of work is further detailed in the specifications hereinafter.

12.1 PRESSURE PARTS

- A) Installation of temporary structure for drum lifting is in the scope of the Contractor's work. The required steel for the purpose will be provided in random sizes by BHEL free of charge. These shall be fabricated to suit the requirement, erected and welded as part of work. NDT has to be carried out as per instructions. These structures have to be dismantled at appropriate stage and returned to BHEL as per the instructions of BHEL engineer. Also, the relevant areas of permanent structures have to be finished as instructed/ as per relevant codes of practice. Payment for above will be made at the rate accepted for structures; no separate payment will be made for fabrication, dismantling and finishing work and return of materials.
- B) Pressure parts components like headers, panels, coils, loose tubes etc have to be flushed/blown with compressed air, checked for dimensional accuracy and configuration and minor rectifications, if necessary will have to be done before erection. This will involve making appropriate bed of steel structures over the concrete blocks/ steel pedestals. Necessary steel, concrete blocks shall be arranged by the Contractor. bed shall be fabricated as per BHEL requirement.
- C) 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. No gas cutting will be permitted. All fittings like "T" pieces, weld neck flanges, reducers, etc shall be suitably matched with pipes for welding (This is applicable to piping work also).
- D) Welding of all attachments on pressure parts including those required for insulation work is in the scope of work.
- E) Surfaces inside seal box and other areas that are to be applied with castable refractory lining shall be painted with black bitumen paint before boxing up and application of refractory. Seal boxes need to be partially cut open in order to pour refractory. Contractor shall carry out necessary cutting and seal welding of such cutouts. Contractor shall provide the black bitumen paint of required specification for such applications.
- F) Furnace area and heat recovery area of flue gas passage has to be made leak proof by seal welding. Air leak test by pressurization has to be conducted to prove effectiveness of the seal weld and soap bubble or any other similar test will have to be carried out for the entire seal welds to ascertain the effective sealing is achieved. The tests may have to be repeated till satisfactory result is achieved.
- G) If required, the pressure parts, after initial erection and tests, will have to be preserved by either dry or wet preservation procedure. Contractor shall erect the piping & valves and provide necessary assistance for the same. Required piping, valves and preservative (gas / chemicals) will be provided by BHEL as free issue.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

- H) The drum internals, if already installed, may have to be removed to facilitate inspection by statutory authorities and chemical cleaning. The drum internals are to be preserved properly and re-fitted at appropriate stage as part of work.
- I) Superheater and/or reheater system will have HP butt weld joints of T-91 material. Welding of these HP joints shall involve pre-heating and post heating by resistance heating, argon purging of joints during welding process and full TIG weld. Contractor should follow required procedure for T91 welding NDT, etc.
- J) **BOILER DRUM:** Boiler drum may need to be led from the point of unloading to the cavity of boiler. The same is in the Contractor's scope and shall make all arrangements, including fabrication of saddle if required. Structural materials required for the same will be provided by BHEL on free-returnable basis.
- Boiler drum is to be lifted using **strand jack method**. BHEL will provide Strand Jack arrangement for Drum Lifting only. Contractor has to engage services of all other resources and arrangements well in time to suit the milestone requirement.
- K) Corrections in the profiles of scalloped plates/bars, skin casing, seal plates etc. for proper matching with mating parts, wherever required, shall be done as incidental to the work.

12.2 TRIM & INTEGRAL PIPING OF BOILER AND POWER CYCLE PIPING

12.2.1

The work on various piping systems will include cutting to required length, edge preparation, laying, fixing & welding of the pipes / elbows / fittings/ valves etc. in the pipeline, fixing & adjustment of supports / anchors / shock absorbers and carrying out all other activities / work to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineers instructions and / or as per approved drawings / documents.

12.2.2

Tubes or pipes wherever deemed convenient, will be sent in random lengths. These shall be cut and edge prepared to suit the site conditions and the layouts. Fittings like bends tees, elbows, reducers, flanges etc will be supplied as loose items. However, bends of tube size up to NB. 65 mm will have to be formed at site as incidental to work.

12.2.3

All drains / vents / relief/ escape / safety valve exhaust piping etc to various tanks / sewage / drain canal / flash box / sump / atmosphere etc from the stubs on the piping and equipments are covered in the scope of work.

12.2.4

Connection (either flanged, bolted or welded) of piping to the terminal points/equipments etc is in the scope of work even though such terminal point/equipment may not form part of this work. All NDE including radiography of joints so made, post-weld-heat-treatment if any, are also within

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

the scope of work/specification. The terminal points work is inclusive of cutting of existing lines, if required, edge preparation, welding/blanking and hook up work.

12.2.5

It should be ensured that all the terminal point connections are done without transferring any undue load or strain to the other equipments. Necessary protocols have to be prepared for such fit-up alongwith BHEL/customer representative before connecting. All NDE including radiography of joints so made, post weld heat treatment if any, is also within the scope of work/specification.

12.2.6

Mechanical freeness of valves has to be ensured prior to erection.

12.2.7

The above provisions shall be applicable, mutatis - mutandis, to other piping systems e.g. Fuel oil piping, Lub oil piping of rotating M/c ACW lines etc.

12.2.8

Main steam piping upto turbine stop valve released in PG 80 is included in the scope of work. The material will be SA-335 P-91. Bidder shall follow BHEL approved procedure for welding, pre heating, PWHT & NDT of SA-335 P-91 material. Detailed procedure will be issued to the Contractor.

12.2.9 Following items of work shall also form part of piping erection:

- a. Installation & removal of isolating devices/ NRVS and removal & re-fixing of internals required for hydraulic testing, pre-commissioning and commissioning activities. Required gaskets will be supplied by BHEL free of cost.
- b. Matching of flanges for achieving parallelism and alignment resorting to heat correction or other suitable methods as per instructions of BHEL Engineers.
- c. To locate the cause of vibrations in pumps or other auxiliaries and to carry out necessary corrections in piping and its supports. This may involve cutting, fresh edge preparation, welding, radiography, stress relieving, etc., of suction, discharge, re-circulating and other connected piping and its supports at a number of places.
- d. Fabrication and erection of racks and steel supports for all the piping including critical piping. Steel for this purpose will be supplied by BHEL.
- e. Erection, welding, NDE and stress relieving of certain equipments, e.g. flow nozzles, control valves etc, after completion of certain activities e.g. chemical cleaning, steam blowing etc is part of work. This may involve removal of portions from the already erected pipelines in order to introduce these equipments and resultant edge preparation etc shall be incidental to work. No separate/ additional payment is envisaged for cutting, welding and edge preparation in this regard.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

The removed pieces of pipes shall be returned to BHEL stores with proper cleaning, dressing and identification marking.

- f. Welding of root valves with small length of piping to the pressure, flow and level tapping points on piping or flow nozzles / orifices / metering elements fixed on piping.
- g. Opening of valve actuators, dismantling of actuators from the valves, refitting and rendering assistance connected with the electrical and mechanical problems.
- h. Fixing and welding including due NDE & PWHT etc of carrier plates on to the pipes.

12.2.10

As far as possible pre-assy of piping on ground is to be done. The erection of various piping may have to be started from any random reference instead of the terminal points in order to meet certain completion commitments.

12.2.11

The location of drain headers, valves, stations, steam traps of piping as indicated in the BHEL drawings are suggestive only. The final location and routings shall be decided to suit the site conditions. While routing such lines and fixing the stations, it has to be erected so as to provide easy accessibility and free path for the purpose of easy operation and maintenance. These locations shall be acceptable to the client. Sometimes, the locations of stations and routing of lines may have to be changed as per the site conditions. All such works shall be carried out expeditiously as per the instructions of BHEL Engineer. The decision of BHEL Engineer is final and binding on the Contractor.

12.2.12

The rate quoted in rate schedule is also inclusive of pre-heating, welding, post heating, post weld heat treatment/ stress relieving and NDE of piping.

12.2.13

Erection of piping systems shall involve co-ordination with the erection of the turbine, turbo-generator, condenser, boiler, boiler feed pumps and other major equipments. Wherever required, approval of concerned BHEL Engineer/other erection agency must be obtained prior to making piping interface connections to such equipments. Sequence of work shall be carefully planned to minimize interference with other groups working in the same area. Actual sequence to be followed shall be subject to the approval of BHEL Engineer and BHEL Engineer may direct the Contractor to reschedule his work to suit the status of the site work.

12.2.14

While erecting the field run pipes, the Contractor shall check the accessibility of valves, instruments tapping points and maintain minimum head room requirement and other necessary clearance from the adjoining work areas to avoid interferences.

12.2.15

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

All pipelines shall be given proper slope towards the drain points during erection. For maintaining the slopes as given in the drawings for larger thickness and larger dia pipelines, edge preparation for welding may have to be altered suitably to achieve the slope.

12.2.16

All pipelines shall be provided, as per the instructions of BHEL Engineer, with suitable Vent and the drain points with valve (s) on the highest and lower points of the pipe run although may not be specifically mentioned in the drawing.

12.2.17

It may become necessary to make & install temporary spool pieces for certain process requirements. Contractor's scope shall include preparation, erection, fit-up, welding, NDE etc and dismantling of such spool pieces at appropriate stage without any additional payment.

12.2.18

In pipelines like CRH lines, extraction lines, etc., the NRVS, strainers etc will be erected by other erection agency. Alignment of these valves to match the pipe ends (both sides), welding, heat treatment and NDE etc is in the scope as incidental to work.

12.2.19

Normally, hangers setting in cold condition are done by simulation adding additional temporary weight, which will be roughly equal to the weight of the insulation. Attachment of temporary weights and floating of the joints in the simulation test to be treated as part of job. Hanger settings have to be repeated for achieving free-floating joints. Hanger adjustments to be repeated for steam blowing by resetting hot and cold values if required. This may have to be repeated several times after steam blowing and synchronization. The weights will be supplied by BHEL. Contractor has to transport from BHEL stores and return the same after completion of work. No extra claim on this account will be entertained.

12.3 ROTATING MACHINERY

- a Specifications covered under the following para and also other relevant specifications contained in other paras elsewhere in this tender document will be applicable for rotating machines like FD / ID / PA fans, Air pre heaters, Seal air fans, Blowers, Coal mills, Fuel Feeders, HP & LP dosing pump skids and other similar auxiliaries.
- b All lubricants for testing, preservation and lubricants for Trial runs of the equipments shall be supplied by BHEL as free issue. All services including labour shall be provided by the Contractor for drawing these from BHEL / customer's stores, transporting, handling, filling, emptying, re-filling, accounting and return of surplus lubricants / empty containers / old & used lubricants after draining etc. Contractor should clean the spilled / leaking lubricants thoroughly, consumables for such cleaning will be in Contractor's scope.
- c All rotating machinery and equipments shall be cleaned, lubricated, checked for their smooth rotation, if necessary, by dismantling and re-fitting before erection. Also, the equipments may have to be checked for clearances, tolerances at any stage of the work

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

including during testing, commissioning etc. shaft of the rotating machines shall be rotated periodically to avoid damages. All these shall be part of work.

- d Trial run of the drives in un-coupled state and then coupled with equipment has to be done after necessary alignment.
- e Forced lube oil systems including lube oil piping of drives, rotating equipments etc form part of the work under these specifications. Hydraulic test of oil coolers, oil piping etc are in the scope of work. Where required cooler may have to be dismantled for hydraulic test and re-erected thereafter as part of work.
- f Certain rotating machinery, after testing, pre-commissioning may have to be re-aligned/hot aligned and vital clearances re-set. This may necessitate disconnection of cabling, removal of certain instruments etc and restoration thereafter.
- g Protective lubricant coats / fill provided on / in the critical area of equipments have to be removed at appropriate stage and regular lubricants, after removal / cleaning of protective coat / fill, as per specifications should be filled / applied. Cleaning / flushing agents / oils will be provided by BHEL.
- h Chemical cleaning, steam blowing and air drying of the connecting pipes for the lube oil system has to be carried out wherever required as per instruction manuals / drawings. Chemicals, suiting BHEL specification, for such chemical cleaning is in the scope of Contractor.
- i Eventhough rotating machines may be grouted to foundation using non-shrink grout mix, blue matching of packer plates / shims with foundation / between packers / equipment base should be done as incidental to work wherever instructed by BHEL Engineer.
- j) Skid mounted equipments may need checking, re-setting due to various reasons as incidental to work.
- k) There are 8 nos of XRP 1043 Mills per Unit with Planetary Gear Box

12.4 ERECTION OF ELECTROSTATIC PRECIPITATOR

12.4.1

Wherever called for, pre-assembly of supporting structures, casing walls, inlet outlet funnels, hoppers etc have to be done, on ground.

12.12

Loading of collecting electrodes either from top or bottom, to be decided suiting site conditions, shall be done with due care as per instructions.

12.4.3

Straightness of all collecting electrodes has to be checked on ground prior to loading in to the field.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

12.4.4

Bundle of collecting electrodes should be handled only with special lifting beam and slings supplied for the purpose.

12.4.5

BHEL will supply Huck bolting M/c with necessary auxiliaries free of charges. However, electrical connections, operation etc shall be arranged by the Contractor.

12.4.6

Clearances as prescribed amongst collecting electrodes and with casing walls have to be maintained. spot heating of collecting electrodes, wherever called for, shall be done as part of work to achieve the required clearances.

12.4.7

Erection, alignment/ fixing in final position, of high voltage rectifiers of ESP is in the scope of work. However testing & commissioning will be done by other agency.

12.4.8

Installation of high voltage interlocks (excepting rotary switch interlock of switchgear panels) is in the scope of work.

12.4.9

Complete erection, alignment, testing, pre-commissioning and commission etc for drive motors of collecting electrodes and emitting electrode rapping mechanism is in the scope of work.

12.4.10 **AIR LEAK TEST**

After erection of ESP and before clearing for insulation, air leak test has to be carried out. Necessary equipment like, air blower, ventury and instrumentation etc. will be provided by BHEL free of charges. Handling at stores, transport, erection, commissioning and carrying out the leakage test, attending to the leakages till satisfactory sealing / leak proofness shall be in scope of the work. Contractor shall dismantle the test equipments and return to BHEL stores in good condition after due reconciliation, cleaning and servicing. No separate/ additional payment is envisaged for the above.

12.5 MAIN SUPPORTING STRUCTURES, EXTERNAL STRUCTURES, ELEVATOR STRUCTURES, STAIRWAYS, GALLERIES & PLATFORMS & HANDLING ARRANGEMENT

12.5.1

Contractor shall supply and erect one number passenger cum goods elevator of 1.5 MT capacity to reach upto the boiler drum level to facilitate erection, movement of person and goods etc. the arrangement shall conform to applicable safety norms. Contractor shall dismantle and take the elevator back after completion of work. The elevator shall be made ready at the time of drum lifting.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

12.5.2

Boiler main supporting structures have to be erected in a sequential manner.

12.5.3

Quality norms with regard to verticality of column, inter-alia, have to be adhered to strictly, at various stages of erection.

12.5.4

Stiffening / strengthening of main supporting structure, if any, due to deviation in verticality of columns post drum lifting, shall be carried out, including fabrication, if any. Necessary steel for this will be provided in random sizes by BHEL as free issue. Payment for such stiffening/ strengthening shall be made for weight certified by BHEL engineer at the item rate applicable to structures, provided the deviation has occurred for the reasons not attributable to the Contractor.

If the deviations are attributable to Contractor, the materials required for Rectification / Stiffening / Strengthening, fabrication, erection of the same shall be to the Contractors account.

12.5.5

Each of the ceiling girders will be sent in 2 to 3 pieces and will have to be assembled, welded and NDE & PWHT (SR) done on ground prior to their erection in position.

12.5.6

It is likely that, in deviation from prescribed sequence, erection of certain elements of structure may be deferred for later stage, to facilitate, say crane boom reach to higher elevation, passage of drum during drum lifting etc. this may necessitate temporary installation of some structural steels at appropriate locations to keep the stability of structure intact. such temporary installations shall be removed subsequently and returned to BHEL stores/ storage yard. Finishing work in the related permanent structures shall be done as per the instruction of BHEL engineer. BHEL will provide necessary steels on free issue basis in random sizes for such installations, which shall be fabricated by the Contractor to suit the requirement.

Payment for such installations shall be made on the accepted tonnage rate of structures. No separate payment will be made for fabrication, removal & return of the materials to BHEL stores.

12.5.7

In some cases, the structural material will be supplied in random lengths, which have to be fabricated to suit the requirement as incidental to work. Also, it may sometimes be necessary to remove some of the erected members to facilitate erection of bigger/ pre-assembled equipments. In such cases, the removal and re-erection of such members as agreed by the BHEL Engineer, will have to be done by the Contractor as incidental to work.

12.5.8

Contractor shall arrange materials required for temporary cat ladders & working platforms during erection of columns, platforms and other structural components. Such

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

arrangements shall, as far as possible, be only of clamping & bolting type, as welding on columns etc will not be permitted. After the completion of work these shall be removed.

12.5.9

All the hand rails and toe guards shall be provided as per drawings and site requirement. hand rails supplied in running lengths shall be suitably cut, edge prepared and welded. Also, hand rails/ guards may have to be provided from the safety point of view in certain places though not indicated in the erection drawings. The weld joints of hand rails shall be ground smooth to flush finish.

12.5.10

Electroforged floor grills will be supplied for this project. These may have to be cut to suit requirement. Cutting shall be done only by mechanical cutters **and not by gas cutting**. Cold galvanizing compound is to be applied on the cut surface/edge. Cold galvanizing paint will be supplied by BHEL free of cost.

Fixing of floor grills shall be done by self-tapping screws **and not by weldable studs**. Special purpose electrically operated hand tools are available in the market for this, which drills, taps and fixes the screws in a single operation. BHEL will supply the necessary self-drilling-cum-tapping screws and fixing clips. Contractor shall deploy the **drilling cum fixing machine** required for this purpose as a regular scope of work.

12.5.11

The Contractor shall also install additional platforms of permanent nature for approaching different equipment as per the site requirement and to meet O&M requirements, though these may not be indicated in the erection drawings. Materials required for such platforms will be supplied by BHEL in random sizes on free issue basis. These have to be fabricated to suit the requirement. Payment only for erected weight as certified by BHEL engineer shall be made at the rate applicable for structures. No payment is envisaged for fabrication of structures.

12.5.12

All relevant provisions as above shall apply, mutatis-mutandis, to the work of external structures, interconnecting structures, elevator structures, ESP stairways and galleries & equipment handling system etc.

12.6 OTHER PRODUCTS AND SYSTEMS AND COMMON REQUIREMENTS

- a) The ducting covered under this scope of work is flue gas ducting up to boiler outlet flange, boiler outlet flange to ESP, ESP to ID fans to chimney, hot and cold secondary air ducting from FD fans outlet to wind box, hot and cold primary air ducting from PA fans to mills including interconnections, flowmeters, dampers/gates and their drives, supports and suspensions etc for these systems.
- b) Ducts / expansion bellows (metallic & non-metallic) are normally supplied in loose components / segments and these are to be assembled and welded/ jointed at site before erection. The fabric portion of non-metallic expansion joints (NMEJ) namely

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-II BOILER, AUXILIARIES & PIPING

bolster, fabric belt and canopy shall be installed by Contractor under supervision/guidence of equipment supplier/BHEL for the first few cases. Contractor shall ensure that all subsequent NMEJ are assembled with due care and proper procedure. In simillar manner all joints, connecting ducts, expansion pieces and dampers shall be seal welded. These welds have to be made leak proof and tested as per technical instruction / requirement.

- c) Certain structural items like silencer supports, roof cladding structure, platform etc will be supplied in running lengths which shall be cut to required suitable sizes and adjusted/trimmed as part of work.
- d) Contractor has to make canopies for motors, actuators, lub oil units, control valves, etc. material for this will be supplied in random lengths / sizes. No separate payment for fabrication is envisaged. Only the erection tonnage rate applicable for structure will be paid for this work.
- e) Boiler roof sheets shall be erected on boiler roof structure. Payment shall be made as per the tonnage rate quoted for boiler non pressure part.
- f) ID fans are provided with variable frequency drives. Contractor has to erect & commission the only the motor and other mechanical components like coupling etc. Panels, transformers, cabling etc are not in this work specification.
- g) Actuator / drives of dampers, gates etc may have to be serviced, lubricated before erection, during precommissioning and commissioning, including carrying out adjustments required as incidental of the work.
- h) All welded joints should be painted with anticorrosive paint / primer immediately after completion of all work. Necessary paints and other consumables for the above work are in the scope of the Contractor.
- i) Spring suspension / constant load hangers may have to be preassembled for required load and erection carried out as per instruction of BHEL adjustments, removal of temporary arrests / locks, cutting of excess thread length of hanger, tie rod etc, have to be carried out as and when required. Load setting of spring hangers, as per BHEL's documents / instructions, during various stages of erection and testing and after floating of piping / ducting during cold and hot condition will have to be done. This exercise may have to be repeated till satisfactory results are achieved.
- j) Hangers and suspensions, support steels for ducts and other equipments, piping etc will be supplied in running/random lengths/ sizes, which shall be cut to suitable sizes and adjusted as required.
- k) Touch up and preservative painting of all components issued to and/or erected by Contractor shall form part of scope of work. The Contractor shall arrange all paints, primer and consumables, T&P and facilities.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III FOUNDATIONS & GROUTINGS

13 PREPARATION OF FOUNDATIONS, AND GROUTING OF EQUIPMENT OF BOILER & AUXILIARIES

13.1

Building foundations and other necessary civil works for supporting structures, equipments etc will be provided by BHEL / Customer. The checking of dimensional accuracy, axes, elevation, levels etc, with reference to bench marks of foundations and anchor bolt pits have to be checked and logged by the Contractor. The permanent benchmark / reference marks will have to be transferred to new locations with sufficient care to maintain the accuracy and protected / preserved with adequate care (to enable rechecking at later dates) as per BHEL instruction.

Minor adjustment of foundation level, dressing and chipping of foundation surfaces and blue-matching (wherever required) for of all equipments as per BHEL Engineers instructions, should be done by the Contractor as part of the work. Contractor/BHEL shall prepare protocols before taking over the foundations. Dressing and chipping of foundations upto 35mm for achieving proper levels will be within the scope of work/specification.

13.2

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

Neutralisation pit for EDTA cleaning is to be made by the Contractor. After completion of job pit has to be dismantled and area is to be levelled before handing over of area to owner.

Effluent has to be disposed off safely from neutralising pit to a safe area as per instruction of BHEL Engineer.

13.3

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

13.4

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

13.5

Complete grouting of structures equipments, including anchor/ foundation bolts, beneath base, base hollows etc, as may be applicable, is included in the scope of Contractor. Arranging all

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-III FOUNDATIONS & GROUTINGS

labour, building materials including cement, ordinary portland as well as quick setting – free flow - non-shrink grout mix (e.g. conbextra gp1/gp2), form work, shuttering, and any other requirements is in the Contractor's scope. Contractor shall obtain approval of BHEL for cement (Ordinary Portland as-well-as quick setting – free flow- non-shrink grout mix) prior to use. Cleaning of foundation surfaces, pocket holes and anchor bolt pits and de-watering and making them free of oil, grease, sand and other foreign materials by soda washing, water washing, compressed air and other approved methods are within the scope of this specification/ work.

13.6

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

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14 WELDING, RADIOGRAPHY AND OTHER NON-DESTRUCTIVE TESTING, POST WELD HEAT TREATMENT

14.1 WELDING

14.1.1

Installation of equipment involves good quality welding, NDE checks, post weld heat treatment etc. Contractor's personnel engaged should have adequate qualification on the above works.

14.1.2

The method of welding (viz) arc, TIG or other method will be indicated in the detailed drawing/documents. BHEL Engineer will have the option of changing the method of welding as per site requirement.

14.1.3

Welding of high pressure joints shall be done by IBR certified high pressure welders who have been permitted by CIB of state concerned for deployment at the site of work.

14.1.4

Welding of all attachments to pressure parts, piping shall be done only by the qualified and approved welders.

14.1.5

Before any welder is engaged on work, he shall be tested and qualified by BHEL/ customer, though they may possess the IBR/other certificate. BHEL reserves the right to reject any welder without assigning any reason. All the expenditure in testing/qualification of the Contractor's welder shall be borne by Contractor.

14.1.6

Unsatisfactory and continuous poor performance may result in discontinuation of concerned welder.

14.1.7

The welded surface shall be cleaned of slag and painted with primer paint to prevent rusting, corrosion. For this consumables like paint /primer etc will be in the Contractor's scope.

14.1.8

HP joint fit-up, should be protected, where required, by use of tapes/protective paint as may be prescribed by BHEL. The Contractor shall arrange consumables like protective paints/tapes etc.

14.1.9

The Contractor shall maintain welding records in the form as prescribed by BHEL containing all necessary details, and submit the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability of the welds shall be final.

14.1.10

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

In the case of P-91 pipe welding, Contractor shall deploy welders having experience in welding of P-91 material. The welders engaged by Contractor if not qualified for P-91 welding will be trained by BHEL at BHEL welding research institute (WRI) trichy and allowed to work only after passing the required test arranged by BHEL. All the expenditure towards such qualification including cost of training, traveling expenses, stay etc., shall be borne by the Contractor.

14.1.11

Joint fit up will be a stage of inspection. Where required, joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.

14.1.12 SOCKET WELDING

In execution of this work, considerable number of socket weld joints is involved. The exact quantity of such socket welds or probable variation in the quantum cannot be furnished. The tenderer shall take notice of this while quoting as no extra claim on this account will be entertained. The socket welding on HP parts/ HP piping shall be done by the IBR qualified welders. Contractor has to adhere to the procedures/specification as indicated in the drawing for socket welding.

14.1.13

Welding electrodes have to be stored in enclosures having temperature and humidity control arrangements. This enclosure shall meet BHEL specifications.

14.1.14

Welding electrodes, prior to their use, call for baking for specified period and will have to be held at specified temperature for specified period. Also, during execution, the welding electrodes have to be carried in portable ovens.

14.2 HEAT TREATMENT:

14.2.1

For the purpose of temperature recording of stress relieving process, thermocouples have to be attached to the weld joint. The number of temperature measuring points and locations shall be as per the standards of BHEL. Thermocouples have to be attached using capacitor discharge type portable thermocouple attachment unit. Contractor shall arrange sufficient number of thermocouple attachment units.

14.2.2

Contractor should provide temperature indicator / temperature recorder for measuring temperature during pre-heating for welding or for controlling temperature of metal for hot correction etc. The temperature recorders should be preferably of solid state type.

14.2.3

Heat treatment may be required to be carried out at any time (day or night) to ensure the continuity of the process. The Contractor shall make all necessary arrangements including labourer required for the same as per directions of BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14.2.4

In certain cases only the pre-heating of weld joints may be called for.

14.2.5

For weld joints of heavy structural sections, if heat treatment is required, the same shall be carried out as part of the work.

14.2.6

Checking effectiveness of stress relieving by hardness tests (by digital hardness tester or other approved test methods as per BHEL Engineer's instruction) including necessary testing equipments is within the scope of the work / specification.

14.2.7

Preheating, inter-pass heating, post weld heating and stress relieving after welding are part of erection work and shall be performed by the Contractor in accordance with BHEL engineer's instructions. Where the electric resistance heating method is adopted Contractor shall make all arrangement including heating equipment with automatic recording devices, all heating elements, thermocouples and attachment units, graph sheets, thermal chinks, & insulating materials like mineral wool, asbestos cloth, ceramic beads, asbestos ropes etc, required for all heating and stress relieving works.

BHEL will provide the induction heating equipment set for SA 335 P-91 materials piping only. The set will comprise of following:

- (i) Main panel
- (ii) Capacitor panel
- (iii) Interconnection power & control cables between above panels
- (iv) 185 sq mm special connecting cable from capacitor panel output – 5m length.

Contractor shall provide the input electrical power connection including arrangements such as DB, cables etc, thermocouple pads, thermocouples and compensating cables, induction heating annealing cables (from the capacitor panel to joint and for wrapping around the weld joint) (spec: single core 240 sq mm, 1200a, 3khz), ceramic wool and other consumables etc as may be required. Quantum of annealing cable requirement will depend on many parameters e.g. weld joint size, heat input, type of connection i.e. series or parallel etc.

Likely supplier: Mansfield Cable Co. Noida (UP).

14.2.8

All the recorded graphs for heat treatment shall be handed over to BHEL/ IBR authorities and due clearances obtained.

14.2.9

During welding & post weld heat treatment of main steam piping (P-91 material), the induction heating process shall continue un-interrupted. Therefore, contractor shall arrange back-up DG set to take care of power interruptions during the process.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14.2.10

Results of these processes shall be verified/ validated as per requirements of BHEL/client.

14.3 NON DESTRUCTIVE EXAMINATION:

14.3.1

Contractor shall provide all resources and make all arrangements for the radiographic examination of welds for this work. For reasons of safety, invariably the radiography work will be carried out after the normal working hours and close of other site activities only. In this regard, the Contractor has to adhere to the safety rules / regulations laid by barc authorities from time to time.

14.3.2

Radiography inspection of welds shall be performed in accordance with requirements and recommendation of BHEL Engineer. The minimum quantum of radiographic inspection shall be as per provision of IBR/BHEL's erection documents. They may, however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspecting authority. Bidder shall also arrange the UT equipment with recording facility at his own cost. Usage of UT equipment shall be as per direction of BHEL engineer. Records of UT shall be produced as per site requirement.

14.3.3

All X-Ray / Gamma Ray films of weld joints shall be preserved properly and be handed over to BHEL/ IBR authorities and requisite clearances shall be obtained by the Contractor.

14.3.4

The field welded joints shall be subject to Dye-penetrant/MPT/RT/ other non-destructive examination as specified in the respective engineering documents/ as instructed by BHEL.

14.3.5

Wherever required, surface preparation, like smooth grinding of welded area, prior to Radiography shall be done. 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 in his offer. The required NDT method/procedure will be decided by BHEL engineer at site.

14.3.6

Tenderer shall note that 100% radiography shall be taken on all high pressure welding till such time the welders' performance is found by BHEL Engineers to be satisfactory. Subsequently, subject to consistency in welder's performance, the percentage of radiography will be based on BHEL's standard practice/code requirement. The defects shall be rectified immediately and to the satisfaction of BHEL engineer. The decision of BHEL engineer regarding acceptance / rejecting the joints will be final and binding on the Contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-IV WELDING, RADIOGRAPHY, NDT, PWHT

14.3.7

100% radiograph of certain sizes in piping have to be taken as per BHEL standards/ drawings.

14.3.8

For carrying out ultrasonic testing of welding joints of large size tubes and pipes, it will be necessary to prepare surface by grinding and buffing a smooth finish and contour as necessary. The Contractor's scope of work includes such preparation as incidental to work.

14.3.9

After stress relieving 5% of UT for all critical lines and 2% of UT for other alloy steel lines to be taken to ensure soundness of joints particularly stress relieving cracks. No separate payment will be made.

14.3.10

Contractor may have to undertake radiography with cobalt-60 isotope camera in certain cases. However, for any reason if use of Cobalt-60 is not possible then these joints shall be checked by radiography after completion of welding up to suitable part of thickness with IR-192 other suitable source subsequently after completing the joint UT to be done. For this Contractor has to deploy level-II operator certified by BARC.

14.3.11

In the case of P-91 piping wherever radiography is not possible, alternatively ultrasonic test has to be carried out apart from other nde checks.

14.3.12

For piping of thickness less than 25 mm no radiography plugs will be provided radiography shots to be taken by double wall technique or any other method to be adopted in consultation with BHEL engineer at site.

14.3.13

No separate payment for any NDE activities (including radiography) will be made.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V LINING & INSULATION

15 LINING AND INSULATION

Application of insulation, finishing, cladding and outer casing etc of the following:

1. Main boiler
2. Boiler auxiliaries including, but not limited to, ESP, ducts, fuel oil Equipments, fans etc
3. Boiler integral piping and tanks & vessels
4. Power cycle piping and critical piping including vessels and tanks & other equipments
5. LP piping and other equipments
6. Other equipments including BOIs, though not listed above but required for completion

15.1

The work shall conform to dimension and tolerances specified in the various drawing and documents that will be provided during the execution. If any portion of the work is found to be defective in workmanship or not conforming to drawings or other specifications, the Contractor shall dismantle and re-do the work duly replacing the defective materials at his cost, failing which the work will be got done by engaging other agencies or departmentally and recoveries will be deducted from Contractor's bills towards expenditure incurred including 30% departmental charges.

15.2

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

15.3

All insulation and refractory materials including iron components and outer sheet casing materials, cladding sheets etc required will be supplied by BHEL and the same have to be erected/ applied as per the drawings and specifications of BHEL by the Contractor.

15.4

The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during all stages of work. Scaffolding materials (poles, gratings etc) shall be of light weight construction. Contractor shall arrange steel pipes & clamps with accessories like base plate attachment, fixing pins, struts etc for scaffolding required for this work. However, BHEL's decision in this regard shall be final and binding. Contractor shall arrange the scaffolding materials in sufficient quantity.

The Contractor shall provide the required quantity of wire, nails, and planks for formwork and other materials for shuttering and curing works.

15.5

Contractor shall observe all precaution for laying, curing etc of pourable insulation. The Contractor at his own cost shall redo any defective works found.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V LINING & INSULATION

15.6

Wool insulation is received at site as loose bonded mattresses in standard sizes. These are to be dressed/cut to suite the equipments. Multiple layers of wool have to be applied as directed and as per drawings and specifications for all equipments/ systems covered under the scope of work.

15.6

Cutting & dressing of insulation bricks to suit the site area of application is incidental to work.

15.7

Removable type of insulation has to be provided for valves fittings, expansion joints etc as per drawing or as directed by BHEL Engineer.

15.8

The cladding and outer casing are aluminium sheets. All relevant specifications and procedures with regards to beading, sealing etc for aluminium sheets have to be adhered to.

15.9

Cladding/outer casing shall be fixed expeditiously, so as to avoid damage to the insulation from the weather.

15.10

The overlapping surface of outer casing/cladding sheet shall be coated with sealing compound, which will be supplied by BHEL free of cost.

15.11

To take care of bimetal corrosion due to variety of metals in contact of each other viz retainer to support, support to outer casing/cladding, cladding-to-cladding etc, suitable paints specified by BHEL, to be applied and/or neoprene rubber packing/strips or any other insert may have to be fixed as required.

15.12

The Contractor shall leave certain gaps and openings while doing the work as per the instructions of BHEL Engineer to facilitate inspection by boiler inspector or during commissioning to fix gauges, fittings, instruments etc. these gaps will have to be finished as per drawings at later date by the Contractor at his cost.

Contractor shall cut open works in needed as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over without any extra payment.

15.13

A log book shall be maintained by the Contractor for the clearance of the area for application of refractory and insulation. Where the Contractor does the work on his own accord without prior permission, the work should be re-done, at his own cost, where necessitated.

15.14

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-V LINING & INSULATION

Wastage allowances for the material issued are envisaged as follows:

➤ a	Pourable & castable insulation	-	2%
➤ b	Insulation bricks and mortar	-	2%
➤ c	Wool mattresses	-	2%
➤ d	Cladding sheets	-	2%

The wastage allowance will be applicable on the net issued quantity i.e. total quantity issued reduced by the quantity returned to stores as unused/fresh item. Contractor shall reconcile the material issues periodically as prescribed by BHEL site.

15.15

The following works are also included in the scope of this contract.

Cutting of cladding sheets as per the profile of the equipment and painting on inner surface two coats of bituminous paint. Paint will be supplied by Contractor.

Cutting of the wool mattresses in the required shape and application of finishing cement of required thickness wherever required.

15.16

Insulation work of temporary piping for alkali boil out, steam blowing and chemical cleaning has to be carried out at site. The same have to be removed and returned to the BHEL stores after the completion of activity. Rates quoted for application of wool for boiler and auxiliaries will be applicable for this work also. No separate payment will be made for removal of temporary insulation and return of the same to BHEL stores/yard.

15.17

In certain instances, co-ordinated/phased application of castable refractory/ insulation on pressure parts etc may be necessitated in consideration of sequence of activities of other erection agencies. Contractor shall do such phased work as may be directed by BHEL.

15.18

Prior to application of refractory bituminous painting on the pressure parts and other area is under Contractor scope. The bituminous paint will be supplied by Contractor. No separate payment will be made for application of paint.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

16 PAINTING

16.1

All exposed metal parts of the equipment including piping, structures, railings etc. wherever applicable, after installation unless otherwise surface protected, shall be first painted with at least one coat of suitable primer which matches the shop primer paint used, after thoroughly cleaning all such parts of all dirt, rust, scales, greases, oils and other foreign materials by wire brushing, scraping or sand blasting, and the same being inspected and approved by BHEL engineer for painting. Afterwards, the above parts shall be finished with two coats of alloyed resin machinery enamel paints.

16.2 Touch-up painting on damaged areas -

- a) For coatings damaged up to metal surface

Surface preparation shall be carried out by manual cleaning. minimum 6 inches adjoining area with existing coating shall be roughened by wire brushing, emery paper rubbing etc., for best adhesion of patch primer.

Primer coat of touch-up primer to be applied by brush immediately after the surface preparation.

Over this primer coat, finish coat and final finish coat shall be applied as covered above by brush within maximum seven (7) days of application of touch up primer.

Tentative Painting scheme is enclosed for information at **Annexure-III**. However, for execution only the latest document shall be applicable and no claim whatsoever shall be entertained in case of any variance between such documents. Similarly, documents as provided progressively during the execution of work for all other products/ equipments etc shall be applicable.

16.3

Painting of welded areas / painting of areas exposed after removal of temporary supports / touch-up painting on damaged areas of employer's structures, where inter-connection, welding / modification etc. has been carried out by the bidder.

- (a.) clean the surface to remove flux spatters and loose rust, loose coatings in the adjoining areas of weld seams by wire brush and emery paper.
- (b.) painting procedure to be followed as mentioned above for touch-up painting on damaged areas.

16.4

The scope of work includes painting of colour bands, lettering, marking and signs for direction of flow/rotation, names etc of approved colours as per the standard colour codes and specifications specified in tender specification or as advised by BHEL/customer engineer at site

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

for the equipments/ components covered in these specifications. Applicable paints and primer shall be supplied by BHEL.

16.5

All exposed metal parts of the equipment including piping, structures, hand railing, grating etc shall be thoroughly cleaned off dust, rust, scales and other foreign materials by manual or mechanised wire brushing, scrapping, sand blasting etc and the same being inspected and approved by BHEL/customer engineer before application of primer. Afterwards, the above parts shall be finish painted with specified number of coats as per specification.

16.6

In certain isolated instances where it is not possible to clean the equipments as explained above, cleaning by grinding might have to be resorted to. No damage to the equipment/components should be caused.

16.7

Surface to be painted should be free of oil and grease. It should be removed by using suitable cleaning agents including permitted solvents. Surface cleaned by chemical agent, if required, shall be treated further as prescribed in use of such cleaning agents. The Contractor at his own cost shall provide all the consumables and application implements.

16.8

During the preparation of surface, if the shop coat is damage by chemical cleaning or by mechanical means, Contractor shall repair the same free of cost to BHEL. BHEL will make available only the primer and paints free of any charge to Contractor.

16.9

Specified drying time shall be permitted from one to another coat.

16.10

This work requires working at higher altitudes from ground level to as high as 90 m and more. The work spread is also substantial involving substantial run of structures and piping. Contractor shall take sufficient precautions to avoid any accident and hazard in all respects. The ropes, ladders, scaffolding materials, clamps etc and climber used should be of standard quality for safe and smooth execution of work.

16.11

Contractor shall carry out the work in such a way that other erected equipment, structure, civil foundations and other property are not damaged. For damages in any of such cases due to lapses by Contractor, BHEL shall have the right to recover the cost of such damages from the Contractor.

16.12

Contractor shall take due care to cover/protect the equipment which are already painted while carrying out the painting of other adjacent equipment. If so happens, it shall be cleaned and repainted by the Contractor without any extra charges.

16.13

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VI PAINTING

In general, painting of structural parts and colour bands, lettering, marking of direction of flow/rotation etc will be carried out by brush painting. However, areas/equipments inaccessible for manual painting have to be painted by spray painting. The decision of BHEL engineer, in this regard, shall be final and binding on the Contractor. For the purpose of spray painting, air at one point will be made available by BHEL free. Laying of air hose pipe and any other line required shall be done by Contractor at his cost. The Contractor shall provide spray equipment set.

16.14

The Contractor shall provide all the necessary scaffolding materials, temporary structures and necessary safety devices etc, during execution of the work.

16.15

Final painting work shall be started after obtaining clearance from BHEL engineers and as per his instructions.

16.16 PRIMER AND PAINTS FOR FINAL PAINTING

All primer and paints required for final painting shall be supplied by BHEL free of charges.

The Contractor, however, shall provide account of all the items issued to him and return all primer, paints etc remaining extra over the normal requirement with proper identification tags in a packed condition to BHEL stores. In case of any misuse or excess use over the normal requirement, BHEL reserves the right to recover the cost of such misuse/ excess use. Decision of BHEL Engineer in this regard will be final and binding on the Contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

17.1

Testing, pre-commissioning, & commissioning will involve, though not limited to these, various testing e.g. hydro-static pressure, pressure decay tests, leak test, trial runs of equipments; flushing by air, water, oil, steam as applicable; checking/setting various clearances/ parameters, ensuring operation of various equipments free of undue restrictions, chemical (**EDTA**) cleaning & alkali boil out of boiler, steam blowing of the boiler and the critical piping, floating of safety valves, coal firing, trial operation and loading etc are some of these activities. All the activities for commissioning of the set, as informed by BHEL from time to time shall be completed.

17.2

All these tests should be repeated till all the equipments satisfy the requirement / obligations of BHEL to their client and also the relevant statutory authority.

17.3

Contractor shall lay / install necessary temporary piping, pumps, valves, blanks, gauges, cables, switches etc for conduct of hydraulic / pressure test, chemical cleaning, steam / air blowing etc. this may involve cutting of some portion of existing piping / valves, placing of rubber wedges / blanks in the valves and other openings, fabrication and installation of temporary tanks for chemical mixing, temporary access platforms to mixing tanks etc. Where required, bends have to be fabricated / formed at site from random length / size of pipes / structural steel. Temporary installation itself has to be tested, tried, and subject to non-destructive examinations as per the instructions of BHEL as part of work.

No payment will be made for temporary installations made for hydraulic testing of various systems & piping. Similarly no payment will be made for electrical installations made for any temporary system.

17.4

All materials, equipments necessary for installation of temporary system as above will be supplied by BHEL as free returnable issue in random sizes / lengths. However, servicing, fabrication, erection, dismantling of the same after completion of the process, and handing over back to BHEL stores will be the responsibility of the Contractor.

In accounting of materials following wastage allowances are provided:

1. Structural items	:	5%
2. Pipes	:	3%

No wastage allowance for valves & other equipments.

17.5

Fabrication, fit-up, pre-heating, welding, post-weld heating and post-weld-heat treatment if any, of requisite blanks for conduct of hydraulic test / leakage test is part of work. Similarly, removal

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

of blanks, restoration and normalization of the concerned system / line is to be done as part of work. BHEL will provide the material for blanks free of charge. No separate payment is envisaged for these activities.

17.6

Overhauling, cleaning, servicing of tanks, pumps, equipments, valves, during erection and commissioning stages are in the scope of work. Gaskets, packing & spares for replacement will be provided free of charges by BHEL.

17.7

After chemical cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing for lubricating systems as per instructions of BHEL engineer shall be carried out. Cleaning of oil tank of lubricating oil system of rotating machinery before and after oil flushing is in the scope of work.

17.8

Transportation of oil drums from customer's / BHEL's stores, filling of oil for flushing, first fill of lubricants and subsequent topping up during trials, tests and 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, for various pre-commissioning / commissioning activities / processes mentioned in various clauses, transport of chemicals from BHEL / customer's stores, charging of chemicals into the system and returning of remaining chemicals and the empty containers of the chemicals to customer / BHEL stores is the responsibility of the Contractor.

17.9

During trial runs/ tests, pre-commissioning / commissioning, replacing / changing mechanical / other seals of equipments like pumps, removal and cleaning / replacing of filters etc is within the scope of work. Replacement spares for this purpose will be provided by BHEL.

17.10

In case any defect is noticed during tests, trial runs of all equipments and their auxiliaries, such as interferences, rubbing, loose components, abnormal noise or vibration, strain on connected equipment etc the Contractor shall immediately attend to these defects and take necessary corrective measures. Readjustment and/or realignment, if necessary, shall be done as per BHEL engineer's instructions. Claim, if any, for these works shall be governed by relevant clauses of 'General Conditions of Contract provided the cause of such work is not attributable to the Contractor.

17.11

- ✓ Contractor shall cut / open / dismantle work, if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over.
- ✓ Similarly, during the course of erection, if certain portion of equipments erected by the Contractor has to be undone for enabling other Contractors / agencies of BHEL / customer to carry out their work, Contractor shall carry out such jobs expeditiously and

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

promptly and make good the job after completion of work by other Contractors / agencies of BHEL / customer as per BHEL engineer's / agencies of BHEL / customers instructions. Claims, if any, in this regard shall be governed as relevant clauses of 'General Conditions of Contract

17.12

During this period, though BHEL/ client's staff will also be associated in the work, the Contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc till such time the commissioned unit undergoes trial operations.

17.13

Commissioning activities will continue till the completion of trial operation. During this period Contractor shall make available the services of separate dedicated workforce comprising of suitable skilled and semi-skilled / un-skilled workmen and supervisory staff alongwith necessary tools and plants, consumables etc.

17.14

It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period alongwith BHEL Engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

17.15

The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

17.16

At various stages of completion boiler has to be preserved against corrosion either by wet preservation or by dry preservation as per the requirement of BHEL Engineer. Contractor shall carry out the entire incidental jobs like filling up of water, dozing of chemicals and pressurizing the system to the required pressure, change of gas refills etc. The boilers have a permanent N₂ blanketing arrangement.

During this period, though BHEL/ client's staff will also be associated in the work, the Contractor's responsibility will be to arrange for complete requirement of men and required tools and plants, consumables, scaffolding and approaches etc., till such time the commissioned unit is taken over.

17.17

Commissioning activities will continue till the completion of trial run, trial operation. During this period Contractor shall make available the services of separate dedicated labor force comprising of suitable skilled and semi/un-skilled hands along with necessary tools and plants, consumables etc.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VII TESTING, PRE-COMMISSIONING, COMMISSIONING

17.18

It shall be specifically noted that the Contractor may have to work round the clock during the pre-commissioning and commissioning period along with BHEL engineers and hence considerable overtime payment is involved. The Contractor's quoted rates shall be inclusive of all these factors.

17.19

Conducting of performance guarantee test is in the scope of work. Contractor shall install all necessary tapping points; instruments etc and provide necessary assistance in this regard.

In case PG test is getting delayed beyond the contract period (normal plus extension if any) due to reasons not attributable to the Contractor, PG test issue will be mutually discussed and decided. However installation of necessary tapping points, impulse pipes, approaches etc are to be completed by the Contractor.

17.20

The Contractor shall carry out any other tests as desired by BHEL engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning and commissioning, to demonstrate the completion of any part or whole of work performed by the Contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

Chapter-VIII PRESERVATION & PROTECTION OF COMPONENTS

18.1 PRESERVATION & PROTECTION OF COMPONENTS

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

18.2

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

18.3

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

18.4

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

18.5

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

18.6

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