

TENDER SPECIFICATION BHEL: PSSR: SCT: 1465

FOR

Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Electrostatic Precipitator and its Auxiliaries including Supply and Application of Final Painting for Units-1 & 2 of 2 x 210 MW sets

at

Surana TPS, Raichur District, Karnataka

VOLUME –I BOOK - I

TECHNOCOMMERCIAL BID (Book I & II)

Book-I consists of

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

Book-II consists of

- 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 – Southern Region

690, Anna Salai, Nandanam, Chennai – 600 035.

BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
Power Sector, Southern Region
690, Anna Salai, Nandanam, Chennai – 35

Tender Specification No. BHEL: PSSR: SCT: 1465

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Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Electrostatic Precipitator and its Auxiliaries including Supply and Application of Final Painting for units 1 & 2 of 2x 210 MW sets at Surana TPS, Raichur District, Karnataka.

One set of Tender documents consisting of

- 1) TECHNOCOMMERCIAL BID - 2 copies
- 2) PRICE BID (Vol III) - 2 copies

Book Sl no

Issued to
M/s

Refer NIT for Last date of submission

Please note this tender document is not transferable

For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

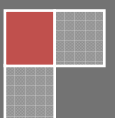
ADDL GENERAL MANAGER / CONTRACTS

Place: Chennai -35
Date:

Rev 00
6th July
2010

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	BHEL PSSR SCT 1465	
ii	Broad Scope of job	Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Electrostatic Precipitator and its Auxiliaries including Supply and Application of Final Painting for units 1 & 2 of 2x 210 MW sets at Surana TPS, Raichur District, Karnataka	
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>	<i>Applicable</i>
b	Volume-IB	<i>Special Conditions of Contract (SCC)</i>	<i>Applicable</i>
c	Volume-IC	<i>General Conditions of Contract (GCC)</i>	<i>Applicable</i>
d	Volume-ID	<i>Forms and Procedures</i>	<i>Applicable</i>
e	Volume-II	<i>Price Schedule (Absolute value).</i>	<i>Applicable</i>

iv	Issue of Tender Documents	<p><u>1.Sale from BHEL PSSR Regional office at :Chennai</u> Start : 30-06-2011 Closes: 20-07-2011 , Time :15.00 Hrs</p> <p>2.From BHEL website (www.bhel.com) Tender documents can however be downloaded from website till due date of submission</p>	Applicable
v	DUE DATE & TIME OF OFFER SUBMISSION	<p>Date : 21 /07/ 2011 , Time :15.00Hrs Place : <u>BHEL PSSR :Chennai</u> Tenders can be submitted through representative / in person at SCT Dept, BHEL PSSR, Chennai.</p>	Applicable
vi	OPENING OF TENDER	<p>Date : 21 /07/ 2011, Time :15.30Hrs 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</p>	Applicable
vii	EMD AMOUNT	Rs 2,00,000/- (Rupees Two Lakhs Only)	Applicable
viii	COST OF TENDER	Rs 2,000/-.	Applicable
ix	LAST DATE FOR SEEKING CLARIFICATION	<p>At least 7 days before the due date of offer submission or two days before the scheduled date of pre-bid meeting whichever is earlier Along with soft version also, addressing to undersigned & to others as per contact address given below</p>	Applicable
x	Schedule of Pre Bid Discussion (PBD)	<p>Date:14/07/2011.Time11.00AM at BHEL:PSSR:Chennai-35</p>	Applicable.
xi	INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)	<p>Bidders shall enter into an Integrity Pact (IP) with BHEL as per format given at Volume 1D Formats of this tender. The bidders are required to return this Integrity Pact (IP) along with Techno Commercial Bid duly signed and stamped by the authorized signatory who signs the bid. It may be noted that only those bidders who have entered into such an IP with BHEL would be competent to participate</p>	Not Applicable

		against this tender .i.e. entering into this pact is a preliminary qualifications for the bidders. The Independent External Monitor against this NIT shall be Shri ...	
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 Chennai issuing the Tender, along with techno-commercial offer. Bidder may also choose to deposit the Tender document cost by cash at the Cash Office as stated above against sl no iv of 1, on any working day; and in such case copy of Cash receipt is to be enclosed with the Techno Commercial offer. Sale of tender Documents shall not take place on National Holidays, holidays declared by Central or State Governments and BHEL PS HQ at Chennai, 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 Chennai. For other details and for 'One Time EMD' please refer General Conditions of Contract.
- 5.0 Procedure for Submission of Tenders: The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:
- PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD/COST of TENDER)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)

- PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)
- One set of each document shall be retained by the bidder for their reference.

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

Sl no	Description	Remarks
	Part-I A	
	<p><u>ENVELOPE – I superscribed as :</u> PART-I (TECHNO COMMERCIAL BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION: 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. Note: a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained. b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding. i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender.</p>	
iii.	<p>Supporting documents/ annexure/ schedules/ drawing etc as required in line with Pre-Qualification criteria. It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph no, FAX no, etc.</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	
vii.	Notice inviting Tender (NIT)	
viii.	Volume – I A : <u>Technical</u> Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc	
ix.	Volume – I B : Special Conditions of Contract (SCC)	
x.	Volume – I C : General Conditions of Contract (GCC)	
xi.	Volume – I D : Forms & Procedures	
xii.	Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item	
xiii.	Any other details preferred by bidder with proper indexing.	

PART-I B		
	<p><u>ENVELOPE – II superscribed as:</u> 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</p> <p style="text-align: center;"><u>OR</u></p> <p>Documentary evidence for 'One Time EMD' with BHEL PSSR Chennai</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><u>ENVELOPE-III</u> superscribed as: PART-II (PRICE BID) TENDER NO : NAME OF WORK : PROJECT: DUE DATE OF SUBMISSION:</p>	

	CONTAINING THE FOLLOWING	
i	Covering letter/Offer forwarding letter of Tenderer enclosed in Part-I	
ii	Volume II – PRICE BID (Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures)	
	OUTER COVER	
	ENVELOPE-IV (MAIN ENVELOPE / OUTER ENVELOPE) superscribed as: TECHNO-COMMERCIAL BID, PRICE BID & EMD TENDER NO: NAME OF WORK: PROJECT: DUE DATE OF SUBMISSION: CONTAINING THE FOLLOWING:	
i	<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: (Shall be applicable for all Bid Evaluation from 1st JUL 2011)
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' = $(X_1 + X_2 + \dots + X_n)$
- b) PS WR's Rating 'Rwr' = $(X_1 + X_2 + \dots + X_n)$
- c) PS SR's Rating 'Rsr' = $(X_1 + X_2 + \dots + X_n)$
- d) PS NR's Rating 'Rnr' = $(X_1 + X_2 + \dots + X_n)$

Over all Power Sector Region Rating ' R_{BHEL} ' = (Rer+ Rwr+ Rsr+ Rnr) divided by (Ner+ Nwr+ Nsr+ Nnr)

(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 as detailed in the scope 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 Auxilliaries) or Synchronisation (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 documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.
- 14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.
- 15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), if applicable, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (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.

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 /SCT

Enclosure

- 01. Annexure-1: Pre Qualifying criteria.
- 02. Annexure-2: Check List.
- 03 Other Tender documents as per this NIT.

PRE QUALIFYING CRITERIA

JOB	Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Electrostatic Precipitator and its Auxiliaries including Supply and Application of Final Painting for units 1 & 2 of 2x 210 MW sets at Surana TPS, Raichur District, Karnataka
TENDER NO	BHEL PSSR SCT 1465

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)	Not applicable	
B	Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)	<u>Shall be applicable for Bid Evaluation from 1st JUL 2011</u>	
C	<u>Technical</u> a) The bidder should have executed erection and commissioning of Boiler and its auxiliaries of minimum one unit of 100MW or above capacity in a Thermal power plant in the last seven years. Note:“Executed means completion of safety valve floating or synchronisation” OR The bidder should have executed erection and commissioning of Electro Static Precipitator and its auxiliaries of minimum one unit of 100MW or above capacity in a Thermal Power plant in the last seven years		

	Note: "Executed means synchronisation" of the unit.		
D 1	Financial TURNOVER Bidders must have achieved an average annual financial turnover (audited) of Rs 118 lakhs or more over last three financial years i.e., 2007-08, 2008-09 & 2009-10		
2	NETWORTH Net worth of the bidder based on the latest audited accounts as furnished for 'D1' above should be positive.		
3	PROFIT Bidders must have earned cash profit in any one of the three financial years in the last three years defined in 'D1' above		
E	Approval of Customer (if applicable) 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.	Not Applicable	
F	Consortium criteria (if applicable)	Not applicable	
	Explanatory Notes for QR 'A' 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		

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 INCLUDING THE AUDITED BALANCE SHEET WITH PROFIT AND LOSS ACCOUNT DETAILS FOR THE THREE YEARS PERIOD SPECIFIED ABOVE.

CHECK LIST

NOTE: - Tenderers are required to either fill in or submit separately the following details

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: email id: Fax No:	Details of alternate Contact person for this Tender Name : Mr/Ms Designation: Telephone No: Mobile No: email id: Fax No:	
4	EMD DETAILS	DD No: Date : Bank : Amount: <u>Please tick (√) whichever applicable:-</u> ONE TIME EMD / ONLY FOR THIS TENDER	
5	Validity of offer	To be valid for six months from due date	
		APPLICABILITY	BIDDER REPLY
6	Whether the format for compliance with PRE QUALIFICATION CRITERIA (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format	Applicable / Not applicable	YES / NO
7	Audited profit and Loss Account for the last three years submitted	Applicable / Not applicable	YES/NO
8	Copy of PAN Card submitted	Applicable / Not applicable	YES/NO
9	Whether all pages of the Tender documents including annexures, appendices etc are read understood and signed	Applicable / Not applicable	YES/NO
10	Integrity Pact	Applicable / Not applicable	YES/NO
11	Declaration by Authorised Signatory	Applicable / Not applicable	YES/NO

12	No Deviation Certificate	Applicable / Not applicable	YES/NO
13	Declaration confirming knowledge about Site Conditions	Applicable / Not applicable	YES/NO
14	Declaration for relation in BHEL	Applicable / Not applicable	YES/NO
15	Non Disclosure Certificate	Applicable / Not applicable	YES/NO
16	Bank Account Details for E-Payment	Applicable / Not applicable	YES/NO
16	Capacity Evaluation of Bidder for current Tender	Applicable / Not applicable	YES/NO
17	Tie Ups/Consortium Agreement are submitted as per format	Applicable / Not applicable	YES/NO
18	Power of Attorney for Submission of Tender/Signing Contract Agreement	Applicable / Not applicable	YES/NO
19	Analysis of Unit rates	Applicable / Not applicable	YES/NO
20	Unquoted price bid submitted or not	Applicable / Not applicable	YES/NO

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

DATE:

AUTHORISED SIGNATORY
(With Name, Designation and Company seal)

Rev 00
6th July
2010

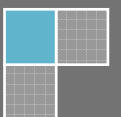
VOLUME – IA

Part I & II

TECHNICAL CONDITIONS OF CONTRACT (TCC)

(Document No PS:MSX:TCC)

BHARAT HEAVY ELECTRICALS LIMITED



TECHNICAL CONDITIONS OF CONTRACT (TCC)

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TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART – I CHAPTER – I PROJECT INFORMATION

SURANA TPS 2x210 MW

- 1.0 Owner : Surana Power Limited
- 2.0 Consultant : M/s TCE Consulting Engineers Limited
- 3.0 Project Title : 2x210 MW SPL TPS at Raichur, Karnataka.
- 4.0 Location : Vadlur Village
Raichur Dist
Karnataka State, INDIA.
It is situated at about 1.3 Kms on the Raichur-Hyderabad State Highway-13.
- 5.0 Nearest Railway : Yermarus Railway Station at a distance of 3.5 kms from site.
- 6.0 Nearest Airport : Bellary
- 7.0 Nearest Port : Chennai
- 8.0 Latitude and Longitude : Latitude - 16°18' 38"& 16°18' 27"N
Longitude- 77°21' 38"&77° 22' 5" E
- 9.0 Elevation above mean sea level : 360 meters
- 10.0 Metrological Data
- (a) Temperature
- i. Annual Mean Max temperature : 42.3° C

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- ii. Annual Mean Min temperature : 13.9° C
- iii. Highest Max Temp : 45.6° C
- iv. Lowest Min Temp : 10° C
- v. Design ambient Temperature for performance guarantee : 50° C
- vi. Temperature to be considered for design of electrical equipment/devices : 50° C

(b) Relative Humidity

- i. Maximum during monsoon : 79
- ii. Minimum : 25
- iii. Annual average : 65

(c) Rainfall

- Annual variation : 0.5 mm to 170.7 mm
- Average annual rain fall : 760.5 mm

(d) Wind Data

- i. Basic wind speed : 39m/s
- ii. K1 : 1.06(Power plant)
- iii. K2 : 1.14(Terrain 1,50 m ht,'c' class of structure)
- iv. K3 : 1.0

11.0 Seismic data (as per IS: 1893-2002)

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- (a) Zone : Zone II
 - (b) Zone factor-Z : 0.1
 - (c) Importance factor (I) : 1.5
- 14.0 Auxiliary power supply : Auxiliary electrical equipment to be supplied against this specification shall be suitable for operation on the following supply system.
- (a) For motors rated above 200 kW : 6600V, 3 phase, 3 wire, 50Hz (medium resistance earthed)
 - (b) For motors rated below 200KW. : 415V,3 phase,3 wire solidly earthed AC
 - (c) For motor rated 110 KW to 200 KW : 415 V, ACB operated modules
 - (d) For motors rated below 110 KW : 415 V,Contactors operated modules
 - (e) DC. Motor starters, DC alarm, control and protections, trip valves, solenoid valves and DC emergency lighting : 220 V DC, 2 wire, unearthed DC
 - (f) AC control & protective devices : 110 V 1 phase, 50Hz, 2 wire AC supply. The single-phase 110V AC supply shall be derived by Contractor by providing 415V/110V control transformers of adequate rating in respective motor modules. The incomer, outgoing and bus coupler ACB feeders shall be provided with 220 V DC supply.
 - (g) Uninterrupted power supply : 240 V, 1 phase, 50Hz, 3 wire AC supply

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- (h) Space heaters(for motors rated 30KW and above)and panel illumination : 240V 1 phase, 3 wires, 50Hz AC system with effectively earthed neutral. The power supply shall be derived by CONTRACTOR by providing 415V/ 240V transformer of adequate rating in respective switchgears and MCC's.
- (i) Solid state controls (including solenoid valves) : 24 V DC, 2 wire, supply from (24 V DC supply derived from power supply units provided in DCS I/O Modules).
- (j) Lighting fixtures : 240 V, 1 phase, 3 wire, 50Hz earthed AC system.This voltage shall be derived from 415V/415 V lighting transformer provided in respective MLDB.
- (k) The above voltages may vary as follows :

All devices shall be suitable for continuous operation over the entire range of voltage and frequency indicated below without any change in their performance.

- i. AC supply : Voltage variation $\pm 10\%$
Frequency variation $\pm 5\%$
Combined voltage & frequency variation $\pm 10\%$
- ii. DC supply : Voltage variation +10%
-15%

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PART – I CHAPTER – II SCOPE OF WORKS

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

- 1.2.1 The scope of work includes Handling at Site Stores / Storage yard, Transportation to Site of Work, Erection, Testing and Commissioning of Electrostatic Precipitator and its Auxiliaries including Supply and Application of Final Painting for units 1 & 2 of 2x 210 MW sets at Surana TPS, Raichur District, Karnataka.
 - 1.2.1.1 Receipt of materials / component to be erected by the contractor, loading and transportation from the storage yard to the project site, stacking, storage and preservation.
 - 1.2.1.2 Preassembly, Erection, Testing, Commissioning, Trial operation and reliability operation of equipment.
 - 1.2.1.3 Final painting including supply of paints.
 - 1.2.1.4 Providing commissioning assistance to BHEL during commissioning of the equipment at site.
- 1.2.2 **INSULATION:**

With respect to insulation, it shall be limited to only the application of insulation for the inner roof of ESP including fixing components. The insulation materials will be supplied by BHEL.
- 1.2.3 **PAINTING**

The scope of work shall include supply and application of final painting for all the components under the scope of work.

Note:

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

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

Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
1.3.1.1.0	ESTABLISHMENT			
1.3.1.1.1	FOR CONSTRUCTION PURPOSE:			
A	Open space for office	Yes		
B	Open space for storage	Yes		
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	
1.3.1.1.2	FOR LIVING PURPOSES OF THE BIDDER			
A	Open space		Yes	
B	Living accommodation		Yes	
1.3.1.2.0	ELECTRICITY			Free of charges
1.3.1.2.1	Electricity For construction purposes (to be specified whether chargeable or free)			
1.3.1.2.1.1	Single point source	Yes		
1.3.1.2.1.2	Further distribution for the work to be done which include supply of materials and execution		Yes	

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Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART I			
1.3.1.2.2	Electricity for the office, stores, canteen etc of the bidder which include:	Yes		
1.3.1.2.2.1	Distribution from single point including supply of materials and service		Yes	
1.3.1.2.2.2	Supply, installation and connection of material of energy meter including operation and maintenance		yes	
1.3.1.2.2.3	Duties and deposits including statutory clearances for the above		Yes	
1.3.1.2.2.4	Living facilities for office use including charges		Yes	
1.3.1.2.2.5	Demobilization of the facilities after completion of works		Yes	
1.3.1.2.3	Electricity for living accommodation of the bidder's staff, engineers, supervisors etc on the above lines.(in case BHEL provides this facility, the scope should be given without ambiguity)		Yes	
1.3.1.3.0	WATER SUPPLY			FREE of charges
1.3.1.3.1	For construction purposes:	yes		
1.3.1.3.1.1	Making the water available at single point	Yes		
1.3.1.3.1.2	Further distribution as per the requirement of work including supply of materials and execution		Yes	
1.3.1.3.2	Water supply for bidder's office, stores, canteen etc			
1.3.1.3.2.1	Making the water available at single point		Yes	

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

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Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART II			
	ERECTION FACILITIES			
1.3.2.1.0	Engineering works for construction			
1.3.2.1.1	Providing the erection drawings for all the equipments covered under this scope	Yes		
1.3.2.1.2	Drawings for construction methods		Yes	In consultation with BHEL
1.3.2.1.3	As-built drawings – wherever deviations observed and executed and also based on the decisions taken at site- example – routing of small bore pipes	Yes	Yes	”
1.3.2.1.4	Shipping lists etc for reference and planning the activities	Yes	Yes	”
1.3.2.1.5	Preparation of site erection schedules and other input requirements		Yes	”
1.3.2.1.6	Review of performance and revision of site erection schedules in order to achieve the end dates and other commitments		Yes	
1.3.2.1.7	Weekly erection schedules based on SI No 2.1.5		Yes	
1.3.2.1.8	Daily erection / work plan based on SI No 2.1.7		Yes	For daily monitoring meeting at site
1.3.2.1.9	Periodic visit of the senior official of the bidder to site to review the progress so that works are completed as per schedule. It is suggested this review by the senior official of the bidder should be done		Yes	

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Sl.No	Description	Scope to be taken care by		Remarks
		BHEL	Bidder	
	PART II			
	once in every two months.			
1.3.2.1.10	Preparation of preassembly bay		Yes	
1.3.2.1.11	Laying of racks for gantry crane if provided by BHEL or brought by the contractor/bidder himself		Yes	

1.3.3 OPEN SPACE:

Open space for building of temporary office shed, contractor's stores shed(s) will be provided free of hire charges. Contractor has to make his own arrangements for labour colony.

1.3.4 ELECTRICITY:

1.3.4.1 For construction purpose and for contractors office and stores shed electricity will be provided free of charges at one single point. Further distribution shall be arranged by the contractor at his cost.

1.3.4.2 Any duty, deposit involved in getting the Electricity shall be borne by the bidder. As regards contractor's office shed also all such expenditure shall be borne by the contractor.

1.3.4.3 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor.

1.3.4.4 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

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1.3.5 WATER:

Water for construction purpose shall be provided by BHEL free of charge at one single point. Further distribution shall be arranged by the contractor at his cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART – I CHAPTER – IV T&PS and MMEs TO BE DEPLOYED BY CONTRACTOR

The following minimum Tools & Plants shall be deployed by the contractor:

S no	Description	Capacity	Minimum quantity	Remarks
1	Mobile Crane	18 T	01	
2	Mobile Crane	8 T	01	
3	Trailer	10T/20T	01	

NOTE:

1. As there are bound to be interruptions in regular power supply, power cut/ load shedding in any construction site due to inherent power shortage in state; it shall be the responsibility of the contractor to have minimum numbers of diesel operated welding generator sets to get urgent and important work to go on without interruptions. The consumables required to operate the generators are to be provided by the bidders at their cost. No separate payment shall be made for this contingency.
2. Depending upon the nature of work and availability of facilities locally, contractor may have to arrange for a temporary workshop for facilitating uninterrupted progress of work
3. All the T&Ps required for this scope of work, except the T&Ps provided by BHEL are to be arranged by the contractor within the quoted rates.

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PART – I CHAPTER - V

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

List of T&Ps to be made available by BHEL to contractor free of hire charges on sharable basis.

Sl. No	Description	Qty
1	Suitable higher capacity crane 75T and above capacity on need basis	As per site requirement.
2	Huck bolting Machine	As per site requirement.
3	Air blowers for Gas Tightness test (ESP and Duct)	2 Nos

Note:

1. BHEL Crane will be available to contractor only after the contractor deploys all of the minimum T& Ps mentioned in sl no 1 & 2 of the table in chapter IV.
2. BHEL may provide either BHEL owned cranes or hired cranes at the discretion of BHEL. Crane operators will be provided by BHEL for the BHEL supplied cranes.

In the event of providing BHEL Cranes:

Fuel has to be arranged by the bidder.

In the event of providing hired cranes:

The fuel charges shall be recovered as given below:

For 75 T crane: Rs. 120/hr

For 100T to150 T crane: Rs 200 /hr

For Heavy duty crane (above 150T): Rs 250 /hr

3. Besides the T & P mentioned above, which is being made available to the contractor on free of hire charges, any additional crane and other T & P which may be required for successful and timely execution of the work covered within the scope of this tender shall be arranged and provided at site by the contractor at his cost.

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4. All the distribution boards, connecting cables, hoses etc., and temporary connection work including electrical connections shall have to be arranged by the contractor at his cost.
5. Cranes are only for erection purpose and shall not be available for material handling or transportation purpose. Contractor shall make their own arrangements for material transportation to erection site.
6. The contractor at his cost shall arrange for grouting of anchor points of T & Ps issued to him. Necessary grout materials are to be arranged by the contractor at his cost.
7. In respect of T&Ps issued by BHEL, the electrical/water connection wherever required for smooth operation of the equipments shall be carried out by the contractor as part of this work without any extra charges.

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PART – I CHAPTER-VI TIME SCHEDULE Time Schedule

1.6.1 TIME SCHEDULE & MOBILIZATION

1.6.1.1 The contractor is required to refer Form F15 in Volume 1 Book -2 for all the instructions to be taken immediately after receipt of fax LOI.

1.6.2 COMMENCEMENT OF CONTRACT PERIOD AND TENTATIVE SCHEDULE

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

1.6.3 MOBILIZATION

The activities for erection, testing etc shall be started as per directions of BHEL Engineer.

The Contractor has to augment his resources in such a manner that the following tentative major milestones of erection & commission are achieved on specified schedules:

Milestone Activity	Duration from Commencement of work
Boiler Light up	17th month
Synchronisation	19th month
Trial operation	21st month

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

1.6.4 CONTRACT PERIOD

The contract period is 21 Months for completion of the entire work from the date of commencement of unit-1. Unit-2 shall be commenced with a phase shift of maximum three months from the date of commencement of unit-1.

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PART – I CHAPTER-VII TERMS OF PAYMENT

1.7 Terms of payment :

1.7.1 Progressive Payment against monthly running bills will be made upto 85 % of the value of the erected tonnage Pro rata as per CI no 1.7.1.1 to 1.7.1.8 of the following table.

1.7.2 Further 15% payment on pro-rata basis common to all PG shall be released on achievement of the following stage / milestones events (as per CI no1.7. 2.1 to1.7.2.11 of the following table) for the tonnage erected.

CI No:	Description	ESP (rate schedule ID- 1.1)	Non Pressure Parts (rate schedule ID -1.2)
	PRO RATA PAYMENTS (85%)	%	%
1.7.1.1	ON PRE-ASSEMBLY WHEREVER APPLICABLE (IF NOT APPLICABLE, THIS PORTION SHALL BE CLUBBED WITH PLACEMENT IN POSITION)	15	15
1.7.1.2	PLACEMENT IN POSITION	20	10
1.7.1.3	ALIGNMENT	15	15
1.7.1.4	WELDING/BOLTING/FIXING	20	30
1.7.1.5	HANGERS & SUPPORTS ETC WHEREVER NECESSARY AS PER DRG	--	15
1.7.1.6	COMPLETION OF HOPPERS ALONG WITH ALL DOORS, HEATING ELEMENTS, POKING DOORS, ETC	5	--
1.7.1.7	COMPLETION OF INNER, OUTER ROOF INSULATOR HOUSING, RECTIFIER TRANSFORMERS, PENT HOUSE MONO RAILS, HOISTS ETC	5	--
1.7.1.8	ERECTION OF EMITTING AND COLLECTING RAPPING SYSTEM WITH ALL DRIVES	5	--
	TOTAL FOR PRO RATA PAYMENTS (TOTAL 85%)	85	85
	STAGE/MILESTONE PAYMENTS (15%)		

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1.7.2.1	AIR & GAS TIGHTNESS TEST	1	5
1.7.2.2	GAS DISTRIBUTION TEST	1	--
1.7.2.3	CHARGING OF ESP FIELDS	4	--
1.7.2.4	Alkali Boil Out	--	1
1.7.2.5	Coal Firing	2	2
1.7.2.6	Trial Operation of Unit	1	2
1.7.2.7	Painting	2	1
1.7.2.8	Area cleaning, temporary structures cutting/removal and return of scrap	1	1
1.7.2.9	Punch List points/pending points liquidation	1	1
1.7.2.10	Material Reconciliation	1	1
1.7.2.11	Completion of Contractual Obligation	1	1
	TOTAL FOR STAGE / MILESTONE PAYMENTS (15%)	15	15
	TOTAL I + II	100	100

Note:

1. Recovery of Retention amount as per Cl. 2.22 of GCC.
2. RA bill payments as per Chapter-X of SCC
3. Payment for the first running bill will be released only on production of the following.
 - i. PF Regn. No.
 - ii. Labour License No.
 - iii. Workmen Insurance Policy No.
 - iv. Unqualified Acceptance for Detailed L.O.I.
 - v. Initial 50% Security Deposit.
 - vi. Rs 100 /- Stamp Paper for Preparation of Contract agreement.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART – I CHAPTER VIII TAXES AND OTHER DUTIES

1.8.0 TAXES

1.8.1 Value Added Tax (VAT) for the works

1.8.1.1 Price quoted shall be inclusive of VAT except service tax.

1.8.1.2 Notwithstanding the fact that this is only an erection service contract not involving any transfer of materials whatsoever and not attracting VAT liability, being labour oriented job work, for the purpose of VAT the contractor has to maintain the complete data relating to the expenditure incurred towards wages etc. in respect of the staff/workers employed for this work as also details of purchase of materials like consumables, spares etc., inter alia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases, etc

1.8.1.3 The bidder shall get registered with State VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case the bidder had already registered under respective State VAT, they must quote their registration Number and forward copy of Registration Certificate while submitting this tender.

1.8.1.4 The monthly/quarterly VAT return, duly incorporating the erection income from BHEL as turnover, should be submitted to BHEL at regular intervals with all annexure and details of payment of VAT (WCT).

1.8.1.5 You have to obtain VAT Clearance Certificate from the on concerned authorities as per the provisions of local VAT act, on completion of the project and submit along with the final bill.

1.8.1.6 The bidder shall quote very competitive price after taking into consideration of above points.

1.8.2.0 Service Tax

1.8.2.1. Price quoted shall be exclusive of Service Tax. The service tax as statutorily leviable and payable by the bidder under the provisions of service tax Law / Act shall be paid by BHEL as per bidder claim through various running bills. The bidder shall furnish proof of service tax registration with Central Excise Department specifying the name of services covered under this contract. Registration Certificate should also bear the endorsement for the premises from where the billing shall be done by the bidder on BHEL for this project. The bidder shall obtain prior consent of BHEL before billing the service tax amount.

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1.8.3.0 Other Taxes & Levies

1.8.3.1 Any other taxes and duties (except VAT & Service Tax) if any, as applicable, viz. Entry Tax, Octroi, Licenses, Deposits, Royalty, Stamp Duty, other charges / levies, etc. prevailing / applicable on the date of opening of technical bids and any variation thereof during the tenure of the contract are in the scope of bidder. In case BHEL is forced to pay any such taxes, BHEL shall have the right to recover the same from the bidder either from running bills or otherwise as deemed fit.

1.8.4.0 New Levies / Taxes

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

1.8.5.0 Statutory variations

1.8.5.1 Statutory variations are applicable only in the cases of Value Added Tax and Service Tax. The changes implemented by the Central / State Government in the VAT Act / Service Tax during the tenure of the contract viz. increase / decrease in the rate of taxes, applicability, etc. and its impact on upward revision / downward revision are to be suitably paid/ adjusted from the date of respective variation. The bidder shall give the benefit of downward revision in favour of BHEL. No other variations shall be allowed during the tenure of the contract.

1.8.6.0 Direct Tax

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

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PART – I CHAPTER - IX WEIGHT SCHEDULE

SURANA TPS UNIT-1&2 OF 2 X 210 MW - ESP PACKAGE

1.9.1 WEIGHT SCHEDULE SUMMARY:-

SL.NO	DESCRIPTION	APPROX. WT IN MT FOR 2 UNITS	RATE SCH ID
1	ESP	5422.0	1.1
2	ESP GALLERIES,HAND RAILS etc	103.0	1.2
3	ID DUCT EXTERNAL SUPPORTING STRUCTURES	671.0	1.2
4	DUCTS , GATES & DAMPERS	510.0	1.2
	TOTAL WEIGHT(for two units)	6706.0	

WEIGHT SCHEDULE - PGMA WISE

PGMA	DESCRIPTION	PGMA WT IN MT	PG WISE WT IN MT	RATE SCH ID	CAT
ELECTROSTATIC PRECIPITATOR					
78501	ROLL/SLIDE SUPPORTS	8.73		1.1	ESP
78505	ESP-SUB-DELIVERY COMPO	0.26		1.1	ESP
78506	INSULATOR HOUSING ASSY.	20.67		1.1	ESP
78508	GAS DIST. ASSY	39.33		1.1	ESP
78509	GD-RAPPING MECHANISM	6.79		1.1	ESP
78510	GD_DRIVE ARRANGEMENT	0.46		1.1	ESP
78511	GAS SCREEN-EP	3.12		1.1	ESP

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78513	EMIT SYST SUSPENSION	7.76		1.1	ESP
78514	SUPPORT INSULATORS	3.36		1.1	ESP
78515	EMITTING ELECTRODES	12.01		1.1	ESP
78516	EMIT ELECT RAPP MECH	16.29		1.1	ESP
78517	DRIVE ARG. FOR EMIT.	14.77		1.1	ESP
78519	COL ELEC SUSPENSION	54.45		1.1	ESP
78520	COLLECTING ELECTRODE	551.15		1.1	ESP
78521	EMIT SYS FRAME-TOP	49.10		1.1	ESP
78522	EMIT SYS FRAME BOTOM	72.30		1.1	ESP
78523	INSPECTION DOORS	6.05		1.1	ESP
78524	SHOCK BARS	43.88		1.1	ESP
78525	COLL ELECT RAPP MECH	41.06		1.1	ESP
78526	COLL ELEC RAPP DRIVE	3.21		1.1	ESP
78528	ESP ROOF PANELS	79.43		1.1	ESP
78530	ELECTRICAL SD COMPTS	6.45		1.1	ESP
78531	GEARED MOTORS FOR RAPP	10.00		1.1	ESP
78532	EMIT SYS FRAME-MIDLE	101.62		1.1	ESP
78542	OUTER ROOF-EP	114.41		1.1	ESP
78543	HOPPER RIDGES	33.81		1.1	ESP
78544	HOPPER UPPER PART	162.00		1.1	ESP
78545	HOP MLD&LOWER PART	185.00		1.1	ESP
78546	INSULATOR SUPP PANEL	50.15		1.1	ESP

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78547	ROOF PANEL ASSY	67.20		1.1	ESP
78548	CASING STRUCTURE	158.00		1.1	ESP
78549	CASING SHELL/PANEL	250.38		1.1	ESP
78550	INLET-OUTLET FUNNEL	90.00		1.1	ESP
78555	PENT HOUSE FOR E P	95.00		1.1	ESP
78557	SPLITTER&GUIDE VANES	10.00		1.1	ESP
78565	APP PLATFORM-HOPPER	75.00		1.1	ESP
78566	WATER WASHING SYSTEM	3.25		1.1	ESP
78567	MIN WOOL FOR ESP INSUL	20.00		1.1	ESP(PARTLY)
78568	FIXING COMP. FOR ESP I	10.00		1.1	ESP(PARTLY)
78572	INTERLOCKS-EP	0.94		1.1	ESP
78573	ELECTRICALLY OPERTD HOIST	3.00		1.1	ESP
78580	FOUNDATION MATLS FOR E	4.90		1.1	ESP
78581	SUPPOTING STRUCTURES F	163.86		1.1	ESP
78590	HEATING ELEMENTS	1.72		1.1	ESP
78996	TOOLS & TACKLES	0.10		1.1	ESP
	ESP HIGH VOLTAGE RECTIFIER TRANSFORMER (APPROX. WEIGHT)	60.00		1.1	ESP
	PG 78 TOTAL FOR 1 UNIT		2711.0		
	PG 78 TOTAL FOR 2 UNITS		5422.0		
89610	EP GALLERIES&STAIRS	47.35		1.2	ESP
89611	ESP ROOF HANDRAILS	4.11		1.2	ESP

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	PG 89 TOTAL FOR 1 UNIT		51.5		
	PG 89 TOTAL FOR 2 UNITS		103.0		
EXTER NAL SUPPO RT STRUC TURES					
39012	FOUNDATION MATERIALS ID DUCT SUPPORTS	4.40		1.2	ID - DUCT STRU EXT
39140	COLS FRAMES NEAR I.D	79.80		1.2	ID - DUCT STRU EXT
39150	COL FRAMES BETN I.D. FAN & CHIMNEY	129.40		1.2	ID - DUCT STRU EXT
39300	PLATFORMS - EXTERNAL	38.80		1.2	ID - DUCT STRU EXT
39301	STRUC AND PLATFORM FOR FANS	1.70		1.2	ID - DUCT STRU EXT
39302	STRUC FOR MOTOR HOOD COVERING	4.40		1.2	ID - DUCT STRU EXT
39303	MONORAIL BEAMS FOR FANS	61.50		1.2	ID - DUCT STRU EXT
39700	HSFG FASTENERS FOR PG 39	0.20		1.2	ID - DUCT STRU EXT
39810	FLOOR GRILL	10.50		1.2	ID - DUCT STRU EXT
39820	STAIRS	2.50		1.2	ID - DUCT STRU

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					EXT
39850	HAND RAIL AND HAND RAIL POSTS	2.30		1.2	ID - DUCT STRU EXT
	PG 39 TOTAL FOR 1 UNIT		335.5		
	PG 39 TOTAL FOR 2 UNITS		671.0		
DUCTS, GATES & DAMPERS					
48482	SQ.DUCT-EP/MP-IDFAN	67.69		1.2	DUCT - DAM P
48484	EXPNPCS EP/MP-IDFAN	7.62		1.2	DUCT - DAM P
48485	SUPPORT EP/MP-IDFAN	7.73		1.2	DUCT - DAM P
48492	SQ.DUCT IDFAN-CHIMNY	65.78		1.2	DUCT - DAM P
48494	EXPNPCS IDFAN-CHIMNY	5.12		1.2	DUCT - DAM P
48495	SUPPORTS IDFAN-CHIMNEY	7.03		1.2	DUCT - DAM P
	PG 48 TOTAL FOR 1 UNIT		161.0		
	PG 48 TOTAL FOR 2 UNITS		322.0		
57460	GUILLOTENE GATE EP INLET	16.50		1.2	DUCT - DAM P
57466	PLATFORMS AND LADDERS	20.00		1.2	DUCT - DAM

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					P
57470	EP OUTLET GATE	16.50		1.2	DUCT - DAM P
57480	ID FAN INLET GATE	16.00		1.2	DUCT - DAM P
57490	GUILLOTENE GATE ID FAN	16.00		1.2	DUCT - DAM P
57491	BLOWER WITH MOTOR	0.50		1.2	DUCT - DAM P
57577	ELECT ACTUATOR FOR GAT	8.50		1.2	DUCT - DAM P
57988	DUCTS COMMISSIONING SPARES	0.01		1.2	DUCT - DAM P
	PG 57 TOTAL FOR 1 UNIT		94.0		
	PG 57 TOTAL FOR 2 UNITS		188.0		

TOTAL WEIGHT FOR 1 UNIT IN MT	3353.0
TOTAL WEIGHT FOR 2 UNITS IN MT	6706.0

NOTE FOR WEIGHT SCHEDULE:

1. The weights given are only approximate and for general guidance and they are subject to variation as per design consideration.
2. The information furnished is only a description regarding the items to be erected by the contractor. BHEL reserves the right to add or exclude any components / items / system according to the site requirements / customer requirements to complete the systems in all respects.

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3. Any other systems / Components which are integral to ESP & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lumpsum value.
4. Insulation: With respect to insulation, it shall be limited to only the application of insulation for the inner roof of ESP including fixing components
5. Erection & dismantling of air blowers and connecting pipes & ducts, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out with in the quoted price.
6. The Erection & Alignment of HV rectifier transformer is in the scope of the contractor. However dry out, testing and commissioning is not in the scope of this contract.

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PART –I CHAPTER -X GENERAL

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

- 1.10.1 All the works such as cleaning, leveling, aligning, trial assembly, dismantling of certain components for checking and cleaning, surface preparation, fabrication of sheets, tubes and pipes as per general engineering practice and as per BHEL Engineer's instructions at site, cutting, weld depositing, grinding, straightening, chamfering, filing, chipping, drilling, reaming, scrapping, lapping, fitting-up etc., as may be applicable in such erection works and are necessary to complete the work satisfactorily, shall be carried out by the contractor as part of the work with in the quoted rate. Major machining work, which is only to be carried out in workshops, will be arranged by BHEL.
- 1.10.2 The work shall conform to dimensions and tolerances given in various drawings and quality manuals provided by BHEL. If any portion of work is found to be defective in workmanship not conforming to drawings or other stipulations, the contractor shall dismantle and redo the work duly replacing the defective materials at his cost, failing which the job will be carried out by BHEL by engaging other agencies and recoveries will be effected from contractor's bill towards expenditure incurred including BHEL's overhead charges.
- 1.10.3 Contractor shall execute the work as per sequence and procedure prescribed by BHEL at site. The applicable erection manuals which are available with BHEL site office are to be referred for compliance and guidance before taking up the work. Any rework on this failure to comply with will be to account contractor only. BHEL engineer, depending upon the availability of materials, fronts etc, will decide the sequence of erection and methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the method of erection adopted in erection of similar jobs or for any reason whatsoever.
- 1.10.4 Contractor has to work in close co-ordination with other erection agency at site. BHEL engineer will co-ordinate area clearance. In a project of such magnitude, it is possible that the area clearance may be less/more at a particular given time. Activities and erection program have to be planned in such a way that the milestones are achieved as per schedule/ plans. Contractor shall arrange & augment the resources accordingly.

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- 1.10.5 The contractor is strictly prohibited from using BHEL's regular components like angles, channels, beams, plates, pipe/tubes, and handrails etc for any temporary supporting or scaffolding works. Contractor shall arrange himself all such materials. In case of such misuse of BHEL materials, a sum as determined by BHEL engineer will be recovered from the contractor's bill. The decision of BHEL engineer is final and binding on the contractor.
- 1.10.6 The contractor will be responsible for the safe custody and proper accounting of all materials in connection with the work. If the contractor has drawn materials in excess of design requirements, recoveries will be effected for such excess draws at the rate prescribed by manufacturing units.
- 1.10.7 No member of the already erected structure/ platform, pipes, grills, platform, other component and auxiliaries should be cut without specific approval of BHEL engineer.
- 1.10.8 Contractors shall ensure that all their Staff/Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 – 2000 Standards.
- 1.10.9 For other agencies, such as piping, cabling, instrumentation, insulation etc., to commence their work from/on the equipments coming under this scope, Contractor has to clear the front, expeditiously and promptly as instructed by BHEL Engineer. Some time it may be required to re-schedule the activities to enable other agencies to commence/continue the work so as to keep the over all project schedule.
- 1.10.10 The terminal points decided by BHEL are final and binding on the contractor for deciding the scope of work and effecting the payment for the work done up to the terminals.
- 1.10.11 For the purpose of planning, contractor shall furnish the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

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- 1.10.12 On Completion of work, all the temporary buildings, structures, pipe lines, cable etc. shall be dismantled and leveled and debris shall be removed as per instruction of BHEL by the contractor at his cost. In the event of his failure to do so, the expenditure towards clearance of the same will be recovered from the contractor. The decision of BHEL Engineer in this regard is final.
- 1.10.13 All the necessary certificates and licenses required to carry out this scope of work are to be arranged by the contractor then and there at no extra cost.
- 1.10.14 For the movement of cranes it may become necessary to lay sleeper bed for obtaining safe approach for usage of equipment. It shall be the contractor's responsibility to lay necessary sleepers. Necessary sleepers shall be arranged by the contractor at his cost.
- 1.10.15 The contractor must obtain the signature and permission of the security personnel of the customer for bringing any of their materials inside the site premises. Without the Entry in Gate Pass these materials will not be allowed to be taken outside.
- 1.10.16 **SITE INSPECTION**

The owner/employer or his authorized agents may inspect various stages of work during the currency of the contract awarded to him. The contractor shall make necessary arrangements for such inspection and carry out the rectification pointed out by the owner/employer without any extra cost to the owner / employer. No cost whatsoever such duplication of inspection of work be entertained.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART –I CHAPTER -XI

FOUNDATIONS AND GROUTING

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

- 1.11.1 Foundation for the equipments to be erected shall be provided by BHEL/ clients of BHEL. The dimension of the foundation and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further, top elevation of foundations shall be checked with respect to bench mark etc. All adjustments of foundations surfaces, enlarging the pockets in foundations etc. as may be required for the erection of equipments plants shall be carried out by the contractor.
- 1.11.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work.
- 1.11.3 It shall be contractor's responsibility to check the various equipment foundations for their correctness with respect to level, orientation, dimensions etc., and ascertained dimensions shall be measured and submitted to BHEL for approval before erection. Also minor chipping, dressing of foundations up to 30 mm for obtaining proper face for packer plates/shims, and may be required for the erection of the equipment/plants will have to be carried out by the contractor without extra cost.
- 1.11.4 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipments
- 1.11.5 Foundation pockets are to be cleaned thoroughly before placing the columns / equipments. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required cleaning of the threads to be done with proper dies.
- 1.11.6 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned and the packers placed with suitable mortar prior to

TECHNICAL CONDITIONS OF CONTRACT (TCC)

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

- 1.11.7 The certificates of the grout are to be submitted to BHEL. If necessary test cubes are to be made and tested at site to ensure the quality of the grout as per relevant IS standards. In case grouting with Portland cement is approved, necessary cement, sand etc to be arranged by the contractor including the fine aggregates.
- 1.11.8 All the materials required for grouting including special cements like Conbextra GPI,GP2, ACC- Shrinkkomb-N20, Sika Anckor, NSG/ NSG - 1, CICO Excem GP, or its equivalent as approved by BHEL and other materials like Portland cement, sand etc., are to be arranged by the contractor at his cost. It shall be the responsibility of the contractor to obtain prior approval of BHEL, regarding suppliers, type of grouting cements before procurement of grouting cements.
- 1.11.9 Certain packer plates and shims over and above the quantity received as part of supplies from manufacturing units of BHEL will have to be cut out from steel plates/sheets at site by the contractor to meet site requirement. However machining of the packers, wherever necessary, will be arranged by BHEL at free of cost.
- 1.11.10 PROCEDURE FOR GROUTING :

Contractor has to carryout the grouting as per the work instructions for grouting available at site.

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PART –I CHAPTER -XII

MATERIAL HANDLING AND SITE STORAGE

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

- 1.12.1 Loading at BHEL/Customer stores and storage yard, transport to site, unloading at site/working area of equipment placement on respective foundation/location, fabrication yard, pre-assembly bay or at working area are in the scope of work. The scope includes taking materials / Equipments from customer stores / storage yard also. Contractors Quoted / Accepted rate shall be inclusive of the same. Required cranes, tractors, trailer or trucks / slings / tools and tackles / labour including operators Fuel lubricants etc for loading & unloading of materials will be in the scope of contractor.
- 1.12.2 The equipments / materials from the storage yard shall be moved in sequence to the actual site of erection /location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage/loss of such equipment at site.
- 1.12.3 Sometimes it may become necessary for the contractor to handle certain unrequired components in order to take out the required materials. The contractor has to take this contingency also into account. No extra payment is payable for such contingencies.
- 1.12.4 Materials shall be stacked neatly, preserved and stored in the contractor's shed/work area in an orderly manner. In case it is necessary to shift and re-stack the materials kept at work area/site to enable other agencies to carry out their work, same shall be done by the contractor at no extra cost.
- 1.12.5 All pipe and tube ends shall be covered with plastic caps or will be closed with wooden plugs as the case may be.
- 1.12.6 The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.
- 1.12.7 Contractor has to arrange required fire proof tarpaulins to protect the machined components / assembled parts drawn from BHEL before and after erection at their cost.

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PART – I CHAPTER- XIII ERECTION

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

- 1.13.1 Ducts / expansion pieces are dispatched to site in loose walls / plates and these are to be assembled at site before erection.
- 1.13.2 All the dampers, valves, lifting equipments, power cylinders, etc., shall be serviced and lubricated to the satisfaction of BHEL engineer before erecting the same and also during pre commissioning. The bearings of dampers shall be properly cleaned, serviced and lubricated before commissioning at no extra cost. Even after commissioning in the equipments, if there are problems in the operation they have to be attended by the contractor during the tenure of the contract.
- 1.13.3 In the case of structural members / ducts in certain cases, the raw material will be supplied in random lengths and the contractor will have to make up the length / prepare the edges to suit the matching profiles, weld / bolt connect the joints at no extra cost.
- 1.13.4 Any other systems / Components which are integral to ESP & auxiliaries, supplied by BHEL manufacturing units are also to be erected and commissioned by the contractor within the quoted / accepted tonnage rate / lumpsum value.
- 1.13.5 Insulation: With respect to insulation, it shall be limited to only the application of insulation for the inner roof of ESP including fixing components.
- 1.13.6 The Erection & Alignment of HV rectifier transformer is in the scope of contractor. However, dry out, testing and commissioning is not in the scope of this contract.
- 1.13.7 Erection & dismantling of air blowers and connecting pipes & ducts, providing blanks/ dummies at the required locations and conducting gas-tightness test is in the scope contract and shall be carried out with in the quoted rate.

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- 1.13.8 Fine fittings and other small bore piping have to be routed according to site conditions and hence shall be done only in position as per the site requirement. Necessary sketch for routing these lines should be got approved from BHEL by the contractor. There is a possibility of slight change in routing the above pipelines when after completion, to suit the site conditions. The contractor should absorb this cost in his quoted rate.
- 1.13.9 All welded joints should be painted with anti corrosive paint, once NDE works are over.
- 1.13.10 It shall be the responsibility of the contractor to provide ladders on column for initial works till such time stairways are completed. For this the ladder should not be welded on the column and should be pre-fabricated clamping type ladders. No temporary welding on any structural member is permitted except under special circumstances with the approval of BHEL.
- 1.13.11 Work such as minor rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc. are covered in the scope of work.
- 1.13.12 Certain extra lengths of various tubes/pipes and fabricated ducts are provided as erection allowance and the same have to be cut/adjusted to suit the site conditions and layouts or certain small lengths may have to be added for adjustments to suit the site conditions. For any mismatch while matching the joints in tubes, the cutting, adjusting, re welding, addition spool pieces should be done by the contractor to match site conditions without any extra payment.
- 1.13.13 All hangers, supports and anchors (including concreting or welding) shall be installed as per drawing to obtain are reliable and complete installation as per instructions of BHEL Engineer. Normally supports are issued in running meters. Any additional supports as called for by BHEL Engineer shall be fabricated by the contractor and provided at no extra cost. However, the raw material required for fabrication of such supports shall be supplied by BHEL free of cost. (Any machining or threading is involved will only be done by BHEL).
- 1.13.14 HSFG Bolts are to be tightened by turn of nut method/Torque Wrench, as per the instruction of BHEL Engineer. The bolted joints shall be jointly checked by BHEL/ Customer and contractors personnel for the required tightness and retightened wherever necessary. The tightened bolts shall be identified by color paints. Facility for random checking with calibrated Torque Wrench shall also be provided by contractor.

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- 1.13.15 All Rotating machineries and equipment shall be cleaned, lubricated, checked for their smooth rotation, if necessary dismantling and refitting before erection. If in the opinion of BHEL Engineer, the equipment is to be checked for clearance, tolerance at any stage of work or during commissioning period, all such works are to be carried out by contractor at his cost.
- 1.13.16 D.S.L / equivalent system for hoisting equipments are also to be erected and commissioned including load testing by the contractor within the quoted rates. Required manpower including electricians are to be arranged by the contractor for carrying out commissioning of electrical hoist and load testing of the above electrical hoist. Required loads will be provided by BHEL free of cost.
- 1.13.17 The temporary structures/items welded to permanent members/pipes are to be cut and removed without any damage. Any damage so to be made good by the contractor at his cost.
- 1.13.18 Before lifting the heavy components, soft materials like gunny bags to be used while lashing the rope to avoid dents, rubbing marks etc. The capacity, number of sheave pulleys, size of the rope, guide pulley locations are to be decided at site with respect to the capacity and positioning of the winch. The end caps provided at shop for various stubs are to be removed during final fit up only.
- 1.13.19 Prior to erection of any components inspection to be done for any foreign materials and damages and they are to be removed / attended as per BHEL engineer. Fixing, welding of necessary instrumentation tapping points, to be provided on auxiliaries covered within the scope of this specification will also be the responsibility of the contractor and will be done as per the instructions of BHEL Engineer. The fixing / welding of all the above items will be contractor's responsibility even if the
- i) Product groups under which these items are not specifically indicated in the Tender Specification.
 - ii) Items are supplied by an agency other than BHEL

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- 1.13.20 For skid mounted equipment, the checking and re-alignment required at site is in the scope of work.
- 1.13.21 All the shafts of rotating equipment shall have to be properly aligned to those of matching equipment to perfection, accuracy as required and the equipment shall be free from excessive vibration so as to avoid overheating of bearings or other conditions which may tend to shorten the life of the equipment.
- 1.13.22 All the equipments /material to be taken inside the plant building shall be cleaned thoroughly before taking them inside and erect. The contractor shall clean, wherever necessary and paint inside surfaces of the equipments like coolers, oil tanks, Rubber expansion joints assemble and other components as per instruction of BHEL Engineer during erection at the quoted rate.
- 1.13.23 Wherever equipments are supplied in pre-fabricated assembled packages, there may be necessity to make minor changes, including strengthening by additional welds. This shall be treated as part of the contractor's scope.
- 1.13.24 All the bearings, Gearboxes etc., of the equipment and electrical motors to be erected are provided with protective greases only. Contractor shall arrange as and when required by the engineer for cleaning the bearing/gear boxes etc., with kerosene or some other agent if necessary by dismantling some of the parts of the equipment during erection and shall arrange for re-greasing/lubricating them with recommended lubricants and assembling back.
- 1.13.25 Certain instruments like pressure switches, gauges, air sets, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Some time this may have to be handed over to store or instrumentation contractor.
- 1.13.26 Attachment, welding of necessary instrumentation tapping points, both for regular measurements and performance testing to be provided on E.S.P / its auxiliaries or pipelines covered within the scope of this tender will also be the responsibility of the contractor and the same will be done as per the instruction of BHEL Engineer.

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- 1.13.27 All the motors/pumps shall be stripped opened, thoroughly serviced with proper care and re-assembled properly before erection by the contractor. During servicing, pre-commissioning & commissioning, if any deficiency is observed the same should be taken up with BHEL Engineer at site and rectified at site without any delay.
- 1.13.28 All site-fabricated pipes will be issued in running metres as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. All the attachments like lugs, stoppers, cleats etc., will be supplied as loose items and to be cut and welded to the pipes at site as per erection drawing necessary drilling of holes on main pipe for welding stubs shall also be done at site by the contractor. Fittings like bends, tees, elbow, mitre bends, reducers, flanges etc., will be supplied as loose items.
- 1.13.29 ESP collecting Electrodes may require straightening and repair due to minor transport damages before erection and spot heating in position to get correct alignment which shall be done by contractor with in the quoted price.
- 1.13.30 Additional platforms of permanent nature for approaching different equipments, as per site requirement which may not be indicated in drawings shall be fabricated and installed by the contractor. However the contractor will be paid for this work on accepted tonnage rate applicable for supporting structures erection. The material required for platform will be supplied by BHEL free of cost.
- 1.13.31 One layer of insulation mattress on roof top of E.S.P roof (inner) shall be applied before outer roof is placed. The scope shall also include the above work even though the materials are supplied under some other product group and the erected materials shall be paid at the accepted tonnage rate for ESP.
- 1.13.32 Pipes above 2" diameter have to be cleaned by means of wire brush as per the instruction of BHEL Engineer and subsequently flushed with air before lifting them into position. For pipes below 2" diameter, shall be sponge cleaned with air flushing.
- 1.13.33 Incase of piping connected to equipment, matching of flanges for achieving the parallelism and alignment at equipment end by suitably resorting to heat correction or other method as instructed by BHEL Engineer is within scope of work.

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- 1.13.34 All piping items including pipes, valves, flanges, fittings etc. shall be supplied as commercially available. Hence Fit-ups, edge preparation including welding of stubs, shall be included in the contractor's scope.
- 1.13.35 Wherever elbows of 45 deg or any other angle are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.
- 1.13.36 Erection of flow switches, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL/Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 1.13.37 Contractor shall also weld small length of piping with root valve to the pressure, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.
- 1.13.38 Welding of all thermo wells, draft, pressure and temperature instrumentation points and all other instrumentation points on piping and auxiliaries and welding of thermocouple pads for permanent system as well as for performance guarantee test is in the scope of work.
- 1.13.39 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor at no extra cost. Other supports namely Hangers, U-clamps etc., shall be supplied by BHEL duly bent and threaded. Assembly and necessary cutting work etc., shall be carried out at site by contractor within the quoted rate.
- 1.13.40 Wherever hanger and support materials are not received from manufacturing unit in time to suit the erection schedule, contractor shall erect the system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports.

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- 1.13.41 No separate payment will be made for the edge preparation of pipes, Standard fittings such as bends, Tees etc.,
- 1.13.42 Contractors has to carryout fabrication works such as welding of stubs / nipples, attachments etc., preparation of surface for rust preventive coating and application of rust preventive is within the quoted / accepted rate.
- 1.13.43 Adjustments like removal of ovalities in pipes and opening or closing the fabricated bends piping to suit the layout shall be considered part of work and the contractor is required to carry out such work free of cost, as per instructions of BHEL.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART – I CHAPTER - XIV

PROGRESS OF WORK

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

- 1.14.1 Refer forms F -14 to F-18 of volume I D of volume -I book-II. Plan and review will be done as per the formats.
- 1.14.2 Contractor is required to draw mutually agreed monthly erection programs in consultation with BHEL well in advance. Contractor shall ensure achievement of agreed program and shall also timely arrange additional resources considered necessary at no extra cost to BHEL.
- 1.14.3. Progress review meetings will be held at site during which actual progress during the week vis-a-vis scheduled program shall be discussed for actions to be taken for achieving targets. Contractor shall also present the program for subsequent week. The contractor shall constantly update / revise his work program to meet the overall requirement. All quality problems shall also be discussed during above review meetings. Necessary preventive and corrective action shall be discussed and decided upon in such review meetings and shall be implemented by the contractor in time bound manner so as to eliminate the cause of nonconformities.
- 1.14.4. The contractor shall submit daily, weekly and monthly progress reports, manpower reports, materials reports, consumables (gases / electrodes) report, cranes availability report and other reports as per Performa considered necessary by the Engineer as per the format enclosed with this tender document.
- 1.14.5. The contractor shall submit weekly / fortnightly / monthly statement report regarding consumption of all consumables for cost analysis purposes.
- 1.14.6. The monthly report ending on 24th of every month shall be submitted as a booklet and shall contain the following details :-
 - a) Colour Progress photographs to accompany the report should be submitted.
 - b) Erection progress in terms of tonnage, welding joints, radiography, stress relieving, etc., completed as relevant to the respective work areas against planned.

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- c) Site Organization chart of engineers & supervisors as on 24th of the month with further mobilization plan
 - d) Category- wise man hours engaged during the previous month under the categories of fitters, welders, riggers, khalasis, grinder-men, gas-cutters, electricians, crane operations and helpers. Data will be spilt up under the work area of Boiler
 - e) Consumables report giving consumption of all types of gases and electrodes during the previous month.
 - f) Availability report of cranes
 - g) Safety implementation report in the format
 - h) Pending material and any other inputs required from BHEL for activities planned during the subsequent month.
- 1.14.7 The manpower reports shall clearly indicate the manpower deployed, category wise specifying also the activities in which they are engaged.
- 1.14.8. During the course of erection, if the progress is found unsatisfactory, or if the target dates fixed from time to time for every milestone are to be advanced, or in the opinion of BHEL, if it is found that the skilled workmen like fitters, operators, technicians employed are not sufficient BHEL will induct required additional workmen to improve the progress and recover all charges incurred on this account including all expenses together with BHEL overheads from contractor's bills.

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PART – I CHAPTER - XV WELDING

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

- 1.15.1 All welders including tack welders, structural and high pressure welder shall be tested and approved by BHEL Engineer before they are actually engaged on work even though they may possess a valid certificate. BHEL reserves the right to reject any welder if the welder's performance is not found to be satisfactory. The contractor shall maintain the records of qualification and performance of welders. BHEL Engineer will issue all the welders qualified for the work, an identity card. The welder will keep the same with him at work place at all times. He may be stopped from work if he is not found in possession of the same.
- 1.15.2 Engineer may stop any welder from the work if his performance is unsatisfactory for any technical reason or if there is a high percentage of rejection in the joints welded by him. The welders having passed qualification tests does not absolve the contractor of contractual obligation to continuously check the welder's performance.
- 1.15.3 Faulty welds caused by the poor workmanship shall be cut and re-welded at the contractor's expense. The Engineer prior to any repair being made shall approve the procedure for the repair of defective welds. After the repair has been carried out, the compliance shall be submitted to the quality engineer.
- 1.15.4 All expenses for testing of contractor's welders including destructive and Non- destructive tests conducted by BHEL at site or at laboratory shall have to be borne by the contractor only. Limited quantity of tube and pipe material required for making test pieces will be supplied by BHEL free of cost.
- 1.15.5 Only BHEL approved electrodes and filler wire will be used. All electrodes shall be baked and dried in the electric electrode-drying oven to the required temperature for the period specified by the Engineer before these are used in erection work. All welders shall have electrodes drying portable oven at the work spot.
- 1.15.6 The contractor shall also be equipped for carrying out other NDT like LPI /MPI / Hardness test etc. as required as per welding schedules / drawings within the finally accepted price / rates.

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PART - I CHAPTER- XVI TESTING AND COMMISSIONING

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

1.16 TESTING , PRE – COMMISSIONING & COMMISSIONING AND POST COMMISSIONING

(All the works mentioned hereunder shall be carried out within the quoted and accepted rate)

- 1.16.1 Contractor to provide necessary commissioning assistance from pre-commissioning state onwards and up to continuous operation of the unit & handing over to customer.
- 1.16.2 The contractor shall carry out all the required tests on the equipments erected such as gas tightness test for ducts, kerosene leak test, air flow test, etc., using contractor's own consumables, labour and scaffoldings.
- 1.16.3 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable within the quoted price to carryout the Gas Distribution test of ESP.
- 1.16.4 All required tests (Mechanical and electrical) indicated by BHEL and their clients for successful commissioning are included in the scope of these specifications. These tests / activities may not have been listed in these specifications. All the tests should be repeated till all the equipments satisfy the requirement / obligation of BHEL to their customer. All the repairs (shop welded or site welded) arising out of the failures during testing shall be done by the contractor as part of the work.
- 1.16.5 For conducting gas tightness test, it may be required to erect the blowers and connecting ducts and commission the same for tightness test. It is the responsibility of the contractor to erect the blowers & dismantle once the test is over. Contractor shall carry out the work with in the quoted rate and BHEL will provide only the required materials, like Blowers and materials for making dummies free of hire charges for conducting the test.
- 1.16.6 Fixing dummy plates at required locations for conducting tightness test and normalising after the test is over, is also covered in the scope of contract and shall be carried out with in the quoted rate. BHEL will provide raw materials for the dummy plates.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.7 The contractor shall carryout any other test as desired by BHEL Engineer on erected equipment covered under the scope of this contract during testing, pre-commissioning, commissioning, and operation, to demonstrate the completion of any part or whole work performed by the contractor.
- 1.16.8 The ESP rectifier transformers are to be only erected by the contractor. Testing, commissioning and oil filtering is not in the scope of this contract.
- 1.16.9 In case, any rework is required because of contractor's faulty erection, which is noticed during pre-commissioning and commissioning, the same has to be rectified by the contractor at his cost. If any equipment / part is required to be inspected during pre-commissioning and commissioning, the contractor will dismantle / open up the equipment / part and reassemble / redo the work without any extra claim.
- 1.16.10 During commissioning, opening / closing of valves, changing of gaskets, Re-alignment of rotating and other equipment, attending to leakage and adjustments of erected equipment may arise. The finally accepted price /rates shall also include all such work.
- 1.16.11 Commissioning of the equipments will involve, trial runs of all the equipments erected, blowing through the lines, flushing of all the lines by air, oil or steam as the case may be, trial run of the equipment and any other works incidental to commissioning.
- 1.16.12 The valves will have to be checked, cleaned or overhauled in full or in part before erection, after acid cleaning, steam blowing and during commissioning as may be necessary.
- 1.16.13 In case any erection defect is detected during various tests / operations trial runs such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and realignments are necessary the same shall be done as per BHEL Engineer's instructions. If any part needs repairs rectification and replacement the same shall be done by the contractor at no extra cost. The parts to be replaced shall be provided by BHEL free of cost if insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.14 The contractor shall carry out cleaning and servicing of valves and dampers / gates actuators prior to pre-commissioning tests and / or trial operations of the plant. A system for recording of such servicing operations shall be developed and maintained in a manner acceptable to BHEL Engineer to ensure that no valves and actuators are left un-serviced.
- 1.16.15 Replacing / Cleaning and servicing of all the filters of the erected equipments during pre-commissioning / commissioning stage shall be done by the contractor within the accepted price.
- 1.16.16 Contractor may have to replace old / damaged gaskets / packing etc. in the erected equipments and the same shall be carried out by contractor as per requirement. Materials will be given by BHEL.
- 1.16.17 In case any erection defect is detected during various tests / operations trial runs, such as loose components undue noises or vibration strain on connected equipment steam or oil or water leakage etc. the contractor shall immediately attend these defects and take necessary corrective measures. The parts to be replaced shall be provided by BHEL free of cost. If the insulation is to be removed to attend any of the defects the cost of removal and reapplication of insulation should be borne by the contractor.
- 1.16.18 Contractor shall cut / open works if needed, as per BHEL engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. During commissioning opening of valves, changing of gaskets, attending to leakages, minor modification / rectification works may arise. The contractor has to carry out these works at his cost by providing required manpower in all the three shifts. In case any rework is required because of contractor's faulty erection and which is noticed during commissioning the same has to be rectified by the contractor at his cost.
- 1.16.19 After synchronization, the commissioning activities will continue. It shall be the responsibility of the contractor to provide manpower including necessary consumables, hand tools and supervision as part of commissioning assistance.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.20 It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers along with Supervisors during pre commissioning, commissioning and post commissioning of equipment and attending any problem in the equipment erected by the contractor till handing over. The contractor will provide necessary consumables, T&Ps, IMTEs etc., and any other assistance required during this period. Association of BHEL's / Client's staff during above period will not absolve contractor from above responsibilities.
- 1.16.21 It shall be specifically noted that the contractor and employees of the contractor may have to work round the clock during the pre-commissioning, commissioning and post-commissioning period along with BHEL Engineers / customer officials. Hence contractor's quoted rate shall take into consideration of all expenses that will be incurred for such arrangement of personnel including engineers/supervisors.
- 1.16.22 During commissioning, any improvement / repair / rework / rectification / fabrication / modification due to design improvement / requirement is involved, the same shall be carried out by the contractor promptly and expeditiously.
- 1.16.23 Contractor shall lay all necessary electric cables and switches etc. required for the tests and maintain the system till the tests are completed satisfactorily.
- 1.16.24 Transportation of oil drums from customer's / BHEL's stores. Filling of lubricants and filling of oil for flushing and first filling and subsequent topping up during commissioning and post commissioning is included in the scope of this contract. The contractor shall have to return all the empty drums to the customer/BHEL stores. Similarly transport of chemicals for various pre-commissioning, commissioning activities and related processes and returning of remaining and/or the empty containers of the chemicals to customer/BHEL stores is the responsibility of the contractor.
- 1.16.25 The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition checking aligning and coupling the motor to the respective driven equipment. Before starting the motor, IR values of insulation shall be recorded and if found necessary the contractor shall dry out to improve the IR value at no extra cost.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.16.26 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.
- 1.16.27 Assistance for calibrating / testing the power cylinders / actuators / valves, gauges, instruments, etc. and setting to actuators shall be provided by contractor within the quoted rates.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART- I CHAPTER-XVII PAINTING

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

1.17.0 FINAL PAINTING

- 1.17.1 The scope of work shall also include supply and application of final painting of all the erected equipments as required and specified for the components of boiler and its auxiliaries.
- 1.17.2 In the case of steel fabricated items, raw steel after fabrication has to be cleaned and subsequent painting to be carried out.
- 1.17.3 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface protected, are to be first painted with at least one coat of suitable primer and required number of finish coats as per the customer approved Painting Specification which matches the shop primer paint used, after thoroughly cleaning the dust, rust, scales, grease oil, and other foreign materials by wire brushing scrapping and chemical cleaning and the same being inspected and approved by BHEL engineers for painting. Afterwards the above parts shall be finished with as per the instructions of BHEL/Customer official.
- 1.17.4 Paint shall be applied by brushing or by spray painting as per the instruction of BHEL Engineer. Spray painting gun and compressed air arrangement has to be made by the contractor himself. It shall be ensured that brush marks are minimum.
- 1.17.5 Before applying the subsequent coats the thickness of each coat shall be measured and recorded with BHEL / Customer.
- 1.17.6 Paint used shall be stirred frequently to keep the pigment in suspension. Paint shall be of the ready mix type in original sealed containers as packed by the paint manufacturer. No thinners shall be permitted. Paint manufacturers instructions shall be followed in method of application, handling, drying time etc.,
- 1.17.7 The scope of painting includes application of colour bands, lettering the names of the systems equipments; tag Nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

- 1.17.8 All surfaces shall be thoroughly cleaned, free from scales, dirt and other foreign matter. Each coat shall be applied in an even & uniform film free from lumps, streaks, runs, sags and uncoated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of dry film thickness (DFT) in microns and the DFT of finish paint shall not be less than the specified. Necessary instrument for measuring the thickness of paint applied is to be arranged by the contractor.
- 1.17.9 Finish coat paint, No of coat and DFT shall be as indicated in the painting specification enclosed in this tender / relevant BHEL document/ customer's specifications. The painting specification which is forming part of this tender as in TCC shall be used as guidelines to be followed.
- 1.17.10 The actual colour to be applied shall be approved by the customer before starting of actual painting work.
- 1.17.11 Primer & finish paint shall be of reputed paint supplier approved by BHEL / Customer. Contractor has to procure paints from the BHEL / Customer approved agencies only, and the paints should be as per the customer painting specification. The quality of the finish paint shall be as per the standards of IS or equivalent as approved by BHEL / Customer. Before procurement of paint the contractor has to obtain the clearance from BHEL authorities.
- 1.17.12 No paint shall be applied when the surface temp is above 55 deg. Centigrade or below 10 deg. Centigrade, and when the humidity is greater than 90% to cause condensation on the surface or frost / foggy weather.
- 1.17.13 If needed and insisted either by BHEL / Customer in certain cases, spray painting has to be carried out within the Quoted rates.
- 1.17.14 Before commencement of final painting, contractor has to obtain written clearance from BHEL / Customer for effective completion of surface preparation.
- 1.17.15 Before applying the subsequent coats, the thickness of each coat shall be measured and recorded with BHEL/ Customer.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

1.17.16 PRESERVATION / TOUCH UP PAINTING

- 1.17.16.1 Contractor shall carryout cleaning and preservation / touch up painting for the materials / equipments under this tender specification right from pre- assembly stage to till the equipment is cleared for final painting.
- 1.17.16.2 The contractor shall effectively protect the finished work from action of weather and from damage or defacement and shall cover the finished parts, then and there, for their protection.
- 1.17.16.3 Any equipment which has been given the shop coat of primer shall be carefully examined after its erection in the field and shall be treated with touch up coat of red oxide primer wherever the shop coat has been abraded, removed or damaged during transit / erection, or defaced during welding.
- 1.17.16.4 Mostly the equipment / items/ components will be supplied with one coat of primer paint and one coat of finish paint. However during storage and handling, the same may get peeled off / deteriorate. All such surfaces are to be thoroughly cleaned and to be touch up painted with suitable approved primer and finish paint matching with shop paint / approved final colour.

TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART – II CHAPTER - 1 REVERSE AUCTION PROCEDURE

GENERAL TERMS AND CONDITIONS OF REVERSE AUCTION

Against this NIT for the subject work, tender shall be processed through “REVERSE AUCTION PROCEDURE” i.e. ON LINE BIDDING on INTERNET.


1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.
2. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on Internet.
3. BHEL will inform the vendor in writing in case reverse auction, the details of service provider to enable them to contact and get trained.
4. Business rules like event date, time, start price, bid decrement, extensions, etc. also will be communicated through service provider for compliance.
5. Vendors have to fax the compliance form in the prescribed (provided by service provider) before start of Reverse auction. Without this the vendor will not be eligible to participate in the event.
6. BHEL will provide the calculation sheet (e.g.: EXCEL sheet) which will help to arrive at “Total Cost to BHEL”.
7. Reverse auction will be conducted on schedule date & time.
8. At the end of reverse auction event, the lowest bidder value will be known on the network.
9. The lowest bidder has to fax the duly signed filled-in prescribed format as provided on case-to-case basis to BHEL through service provider within 24 hours of action without fail.
10. During Reverse Auction, the process of reverse auction is unsuccessful then BHEL at its discretion may decide to call the L1 bidder of reverse auction for further negotiation.
11. Sealed bid reverse auction: The opening bid (in the initial auction) of the bidders shall be same as that quoted in their final sealed price submitted to BHEL. The bidder shall confirm in writing to BHEL that their opening bid in both cases shall be same as that quoted in their final sealed price bids submitted to BHEL against this NIT along with Technical bid.

TECHNICAL CONDITIONS OF CONTRACT (TCC)


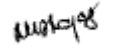
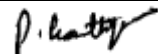
12. BHEL reserves the right to cancel Reverse Auction (RA) without assigning any reasons and resort to considering the sealed bids submitted by vendor for processing and finalizing the tender.
13. Any variation between the on-line bid value and signed document will be considered as sabotaging the tender process and will invite disqualification of vender to conduct business with BHEL as per prevailing procedure.
14. In case BHEL decides not to go for Reverse auction procedure for this tender enquiry, the price bids and price impacts, if any already submitted and available with BHEL shall be opened as per BHEL standard practice.
15. Bids given by the bidders during the reverse auction process will be taken as an offer to execute the work. Bids once made by the bidder, cannot be cancelled/withdrawn and bidders shall be bound to execute the work as mentioned above at the final bid price. BHEL shall take appropriate action as the lowest bidder do not execute the contract as per the rates quoted by him.


TECHNICAL CONDITIONS OF CONTRACT (TCC)

PART II CHAPTER 2 PAINTING SCHEME

 Ranipet	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP RANIPET TAMIL NADU-632 406	MANUFACTURING QUALITY PLAN			PROJECT: SURANA POWER LTD RAICHUR TPS, KARNATAKA CUSTOMER : M/S SURANA POWER LTD.	CUST No R214, R215 (2X210MW) CONTRACTOR M/S. BHEL, RANIPET-6			
		Item/subsystem: Air pre heater (Modular type)	QP: No: SURA: 101 Rev No: 00 Date: 200710 Page: 1 Of 2	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8	Agency 9 M B	REMARKS 10	
SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	6	7	8	9	10

1.0 MATERIAL 1.1 Trunion Forgings (*)	Chemical, Mechanical properties Soundness	Chemical & Tensile test UT	Each heat Each heat	Respective Material Specification. ASTM A 388	TC TC	P P	V V	(*) Typical TCs will be submitted to customer for verification.
2.0 In Process Control 2.1 Welding 2.2 Weld Inspection (For Clause 3.1 & 3.5)	Weld Quality & Size Soundness	Visual & measurement LPI	100% 10%	AWS D1.1 ASME Sex V	- Report	P P	W W	
3.0 Final Inspection 3.1 Rotor Post Assy. 3.2 Guide bearing Assy. 3.3 Support bearing Assy. 3.4 Rotor Drive Assy.	Assy. Dimensions. a) Over all Height . b) Bearing clearance Over all Height & I D (w.r.to Bearing seating area) Run test	Measurement Measurement Measurement Pinion wobbling	100% 100% 100% 100 %	Drawing Drawing Drawing Drawing	DR DR DR DR	P P P P	W W W W	

LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports, W - Witness, TC - Test certificate, DR - Dimensional report.	Prepared By 	 Approved By
	Reviewed By 	

 Ranipet	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP RANIPET TAMIL NADU-632 406	MANUFACTURING QUALITY PLAN			PROJECT: SURANA POWER LTD RAICHUR TPS, KARNATAKA CUSTOMER : M/S SURANA POWER LTD.		CUST No R214, R215 (2X210MW)		CONTRACTOR M/S. BHEL, RANIPET-6		
		Item/subsystem: Air pre heater (Modular type)	QP: No: SURA: 101 Rev No: 00 Date: 200710 Page: 2 Of 2	SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8

3.5	Connecting Plate Assy. (Hot/Cold End)	Trial Assy. Dimensions (Duct opening width, Length, Height and Diagonal)	Measurement	100%	Drawing	DR	P	W	
3.6	Painting and Preservation	Cleanliness & Paint Finish	Visual	10%	Note 2	--	P	V	

Note 1

All **Other** Items of APH like Rotor Housing, Heating elements, Seals, Access Door and etc. which are of general fabricated items, and bought outs which are not covered under QAP are Manufactured/procured and Inspected by BHEL /BHEL Authorized Inspection Agency as per the relevant drawings, AWS D1.1 and BHEL standards and dispatched.

Note 2

Surface preparation: Power tool cleaning

Painting:

(a) Surfaces exposed to Atmosphere

- Primer coat: One coat of Red oxide zinc phosphate primer to IS 12744 to a DFT of 30 µm.
- Finish Coat: Two coats of Synthetic enamel to IS 2932 smoke grey(shade no 692 of IS 5) to a DFT of 40 µm. Total DFT 70 µm.(min)


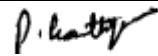
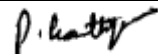
(b) Surfaces Under insulation and Flue Gas path


Two coats of Red oxide zinc phosphate primer to IS 12744 to a DFT of 60 µm.

(c) Machined components are protected with rust preventive.


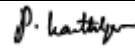
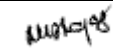
(d) Heating elements are dipped in rust preventive


Record of revision	Rev 00 / DT 200710	Original issue
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LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports, W - Witness, TC - Test certificate, DR - Dimensional report.	Prepared By 	 Approved By
	Reviewed By 	

 बी एच ई एल BHEL RANIPET	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP: RANIPET TAMIL NADU-632 406	MANUFACTURING QUALITY PLAN			PROJECT: SURANA POWER LTD., RAICHUR TPS, KARNATAKA CUST. NAME: M/s. SURANA POWER LTD CUST. NO.: R214, R215 (2X210 MW) CONTRACTOR: M /s. BHEL, RANIPET – 6.				
		Item/subsystem Emitting Electrode Of ESP	QP: No: SURA : 201 Rev: No: 00 Date: 20 07 10 Page: 01 Of 02	Reference Documents 6	Acceptance Norms 7	Format Of Records 8	Agency M B 9		Remarks 10
Sl No 1	Component & operation 2	Characteristics 3	Type of Check 4	Quantum of Check 5	Reference Documents 6	Acceptance Norms 7	Format Of Records 8	Agency M B 9	Remarks 10

1.0	Raw Material								
1.1	Wire:	Chemical	Analysis	Each Heat	Respective Material Spec.		TC	P	V
		Ultimate Tensile Strength	Tensile Test	Each Heat	-do-		TC	P	V
2.0	In-process Control								
2.1	Dimension	No of turns & End Construction	Measurement and checking with template	Random	Drawing		R	P	W
2.2	Spring back retention Force, Initial Tension	Spring back Test, retention Force, initial Tension test	Measurement	One electrode Per heat	Drawing & BHEL specification		R	P	W
3.0	Final inspection of above	Cleanliness, painting, preservation, identification & verification completeness	Visual	100%	Note: 2-2		-	P	W

LEGENDS: M – MANUFACTURER / SUBCONTRACTOR, B - BHEL / AUTHORISED INSPECTION AGENCY. P - PERFORMED, V - VERIFICATION, W - WITNESS, R - REPORT T C - TEST CERTIFICATE ,			
	Prepared by	Reviewed by	Approved by

 MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP: RANIPET TAMIL NADU-632 406		MANUFACTURING QUALITY PLAN				PROJECT: SURANA POWER LTD., RAICHUR TPS, KARNATAKA				
		Item/subsystem Emitting Electrode Of ESP		QP: No: SURA : 201 Rev: No: 00 Date: 20 07 10 Page: 02 Of 02		CUST. NAME: M/s. SURANA POWER LTD CUST. NO.: R214, R215 (2X210 MW) CONTRACTOR: M /s. BHEL, RANIPET – 6.				
Sl No	Component & operation	Characteristics	Type of Check	Quantum of Check	Reference Documents	Acceptance Norms	Format Of Records	Agency		Remarks
								M	B	
1	2	3	4	5	6	7	8	9		10


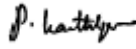

Note 1 : All other items of ESP, like, Columns, Bracings, Roof Beams, Panels, Casing Shells, Hoppers, collecting electrode, Funnels and etc., which are of general fabricated items from rolled sections, plates & sheets, which are not covered under QAP will be manufactured, inspected by BHEL / BHEL Authorized Inspection Agency as per the relevant drawings, AWS D1.1 and BHEL standards and dispatched.


Note-2

Painting Scheme for ESP Components:


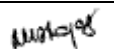
1. Surface Preparation: Power Tool Cleaning to St3
 - a) Surface exposed to Atmosphere :
 - Primer: One coat of Red Oxide Zinc phosphate primer to IS: 12744 to a DFT of 30µm.(min)
 - Finish : Two coats of Synthetic Enamel to IS: 2932 smoke grey (shade no 692 of IS 5) to a DFT of 2x 20=40 µm.(min) Total DFT :70µm.(min)
 - b) Other surfaces (Insulated & Flue gas path)
 - Primer: Two coats of Red Oxide zinc phosphate primer to IS 12744 to a DFT of 2x30 =60µm.(min)
2. Emitting Electrode hook, machined components and foundation bolts are applied with rust preventive fluid and min DFT = 20µm
3. Collecting Electrodes are dipped in Rust Preventive fluid and min DFT = 20 µm
4. Stainless steel, Aluminum and Galvanized items are not painted.


Record of revision	Rev 00/ DTD 20 07 2010	Original Issue
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	Prepared by	Reviewed by	Approved by

 kanipet	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP: RANIPET TAMIL NADU-632 406	MANUFACTURING QUALITY PLAN			PROJECT : SURANA POWER LTD., RAICHUR TPS, KARNATAKA					
		Item/subsystem: FANS (ID, FD & PA FANS)	QP: No: SURN 301 Rev No: 00 Date : 12 05 10 Page : 1 Of 2	CUSTOMER: M/s. SURANA POWER LTD CUST NO : R214, R215 (2X210 MW) CONTRACTOR M/S BHEL Ranipet-6						
SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8	Agency 9 M B		REMAR KS 10

1.0	RAW MATERIALS									
1.1	SHAFT FORGINGS IMPELLER PLATES	CHEMICAL & MECHANICAL PROPERTIES	CHEM & TENSILE	Each heat	RESPECTIVE MATERIAL SPEC	TC	P	V		
2.0	INPROCESS INSPECTION									
2.1	IMPELLER WELDS	SOUNDNESS	MT / PT	100%	ASME SEC V	REPORT	P	W		
2.2	SHAFT WELDS (if applicable)	SOUNDNESS	MT / PT	100%	-DO-	REPORT	P	W		
2.4	DYNAMIC BALANCING									
2.4.1	IMPELLER ASSY	RESIDUAL UNBALANCEMENT	UNBALANCE COMPENSATION	100%	DRAWING	REPORT	P	W		
2.4.2	SHAFT (If applicable)	-DO-	-DO-	100%	-DO-	REPORT	P	W		

M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports W - Witness, TC - Test certificate DR - Dimensional report.	Prepared BY	Reviewed & approved by
		

 kanipet	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP: RANIPET TAMIL NADU-632 406		MANUFACTURING QUALITY PLAN			PROJECT : SURANA POWER LTD., RAICHUR TPS, KARNATAKA				
			Item/subsystem: FANS (ID, FD & PA FANS)	QP: No: SURN 301 Rev No: 00 Date : 12 05 10 Page : 2 Of 2	CUSTOMER: M/s. SURANA POWER LTD CUST NO : R214, R215 (2X210 MW) CONTRACTOR M/S BHEL Ranipet-6					
SL NO	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	Agency		REMAR KS
1	2	3	4	5	6	7	8	M	B	10

4.0	FINAL INSPECTION									
4.1	IDENTIFICATION, PAINTING & PRESRVATION	COMPLIANCE TO COMPANY STANDARD	VISUAL	100%	Note-2	--		P	W	

Note 1 : All other items of FAN, like, Casings, Pedestals etc., which are of general fabricated items from rolled sections, plates & sheets and bought out items , which are not covered under QAP will be manufacture /procured, inspected by BHEL / BHEL Authorized Inspection Agency as per the relevant drawings, AWS D1.1 and BHEL standards and dispatched.

Note 2:

Surface Preparation: Power Tool Cleaning

A. Surfaces which are exposed at atmosphere


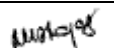
1. Primer : one coat of Red Oxide Zinc phosphate primer to IS: 12744 , DFT = 30 μm.(Min)
2. Finish Paint: Two coat of synthetic enamel to IS 2932 (DFTx 20 Microns)
3. Total DFT :70 microns


B. Surfaces which are insulated & Gas path

1. Primer : Two coat of Red Oxide Zinc phosphate primer to IS: 12744 , Total DFT 60 μm.(Min)

C. Machined components and foundation bolts are applied with rust preventive


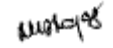
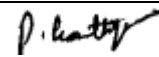
D. Stainless steel, Aluminum and Galvanized items are not painted.


M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports W - Witness, TC - Test certificate DR - Dimensional report.	Prepared BY	Reviewed & approved by
		

 बी एच डी एल BHEL Ranipet	MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP RANIPET TAMIL NADU-632 406	MANUFACTURING QUALITY PLAN		PROJECT	2X210 MW, RAICHURTPS					
		Item/subsystem: Gates and Damper	QP: No: SURA 401 Rev No: 00 Date: 200710 Page: 1 Of 2	CUSTOMER	M/S SURANA POWER LTD.					
				CUST No	R214, R215					
				CONTRACTOR	BHEL, RANIPET					
SL NO	COMPONENT & OPERATION	CHARACTERISTICS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENTS	ACCEPTANCE NORMS	FORMAT OF RECORD	Agency		REMARKS
1	2	3	4	5	6	7	8	M	B	10

1.0	Materials (*) Seals, Rounds	Chemical and Mechanical Properties	Chemical and Tensile Test	Each Heat	As per Respective material spec.	TC	P	V	(*) Typical TCs will be submitted to customer for verification.	
		Rounds > 63 mm	UT	DO	ASTM A 388 (##)	TC	P	V		
2.0	In process Inspection	Welders are Qualified to AWS D1.1 & Procedures are Pre Qualified as per AWS D1.1						P		V
2.1	Weld Quality	Soundness #	LPI	100%	Company standard	NDT Report	P	W		
2.2	Gates/Dampers assy.	Overall dimensions.	Measurement	100%	Drawing	DR	P	W		
2.3	Trial operation	Free movement of blade/Flap	Full Open and close	100%	Drawing	DR	P	W		
4.0	Final Inspection	Seal tightness check (Dampers)	Check with feeler gauge	100%	Drawing	DR	P	W		
4.1	Painting and preservation	Paint Finish	Visual	100%	Note 2	--	P	V		

(#)-Frame welds, mounting bracket welds.

LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports, W - Witness, TC - Test certificate, DR - Dimensional report. CC -Compliance certificate	Prepared By		 Approved By
	Reviewed By		

 Ranipet		MANUFACTURER'S NAME & ADDRESS M/S BHEL: BAP RANIPET TAMIL NADU-632 406		MANUFACTURING QUALITY PLAN		PROJECT 2X210 MW, RAICHURTPS			
		Item/subsystem: Gates and Damper	QP: No: SURA 401 Rev No: 00 Date: 200710 Page: 2 Of 2		CUSTOMER M/S SURANA POWER LTD.		CUST No R214, R215		CONTRACTOR BHEL, RANIPET
SL NO 1	COMPONENT & OPERATION 2	CHARACTERISTICS 3	TYPE OF CHECK 4	QUANTUM OF CHECK 5	REFERENCE DOCUMENTS 6	ACCEPTANCE NORMS 7	FORMAT OF RECORD 8	Agency 9 M B	REMARKS 10

Note 1

All Other General fabricated Items of Gates and dampers and bought out items which are not covered under QAP are Manufactured/procured and Inspected by BHEL /BHEL Authorized Inspection Agency as per the relevant drawings, AWS D1.1 and BHEL standards and dispatched.

Note 2

Surface preparation: Power tool cleaning

Painting:

(a) Surfaces exposed to Atmosphere


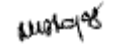
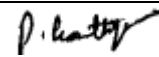
- Primer coat: One coat of Red oxide zinc phosphate primer to IS 12744 to a DFT of 30 μm .
- Finish Coat: Two coats of Synthetic enamel to IS 2932 smoke grey shade no 692 of IS 5 to a DFT of 40 μm . Total DFT 70 μm .(min)

(b) Surfaces Under insulation and Flue Gas path (including gate frames)

- Two coats of Red oxide zinc phosphate primer to IS 12744 to a DFT of 60 μm .

(c) Machined components and Gate blades are protected with rust preventive.

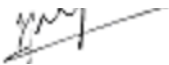

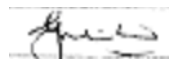
Record of revision	Rev 00 / DT 200710	Original issue
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LEGENDS: M - Manufacturer / Subcontractor, B - BHEL /BHEL Authorized Inspection Agency, P - perform, V - Verification of reports, W - Witness, TC - Test certificate, DR - Dimensional report. CC - Compliance certificate	Prepared By 	 Approved By
	Reviewed By 	

BHARAT HEAVY ELECTRICALS LIMITED
Tiruchirappalli - 620 014



PAINTING SCHEME FOR
M/s. SURANA POWER LTD
RAICHUR THERMAL POWER PLANT
RAICHUR DIST-KARNATAKA
2 X 210 MW
CUSTOMER NO: U2/ 1236 TO U2/ 1237

Prepared by	L. Gragori Manager / P. Lab		Document No: Q: PL: C3 - PS /1236
Reviewed by	S.Dhanabal DGM/PE / FB		Revision No: 00 Dated: 27-04-2010
Approved by	Dr.G.Ravichandran SDGM /P. Lab		Sheet No. : 1 of 11

N/ CHEM/CONTRACTS 09/SURANA POWER LTD-2 X210 MW_00.DOC.

APPROVED BY TCE VIDE TCE's TRANSMITTAL REF.No:TCE.5834A-ME-BHEL (TRY)-510-VDT-022 DT.26-04-2011

RECORD OF REVISIONS

Rev. No	Date	Details of revision	Remarks
00	27-04-2010	NEW	BHEL STD Painting scheme for Normal Atmosphere.

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	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
1.2	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
1.4	1AE	Drum Transport Structures 04 - 194, 196, 35 - 391, 810	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	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	--	--	--

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	
2.2	1A	<p>Buck Stays and Structural Items:</p> <p>Buck stays 08 – 001, 003, 006, 007, 101, 104, 107, 111, 380, 382, 400, 500, 501, 503, 700, 900, 901, 904, 907, 910</p> <p>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, 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 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>	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	Smoke Grey Shade No: 692 of IS 5	70

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	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	Smoke Grey Shade No: 692 of IS 5	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	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	Black	70
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	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	Black	70

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 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	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30 μm per 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	
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, 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	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30 μm per coat	- -	--	--	--	Red Oxide	60
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	--	--	--	--	Aluminum	40

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	
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 1/2 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=30 μm 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: 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 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	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	Smoke Grey Shade No: 692 of IS 5	70
5.2	3	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	SSPC-SP3/ Power Tool Cleaning	Red Oxide Zinc phosphate Primer (Alkyd Base) to IS 12744	2 DFT= 30 μm / 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	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	SSPC-SP3/ Power Tool Cleaning	Heat Resistant Aluminium Paint to IS 13183 Gr.I	2	--	--	--	--	--	40
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	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	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= 50 μm per coat	2	--	--	Chlorinated Rubber Based Finish Paint DFT= 30 μm per coat	2	French Blue Shade No: 166 of IS 5	160
6.5	35	Off Shore Components	SSPC-SP3/ Power Tool Cleaning	High Build Epoxy Mastic Aluminium Primer-	1 DFT= 100 μm per coat	--	--	Aliphatic acrylic Poly-urethane paint %VS=40 (min) IS 13213	1 DFT=30 μm per coat	French Blue Shade No: 166 of IS 5	130
6.6	8A	Hand Wheels	SSPC-SP3/ Power Tool Cleaning	General Purpose Aluminium Paint to IS 2339	2 DFT= 100 μm 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

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 HSTG 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.**
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/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.
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 SI. No. 4 of the table. However, for DUs coming under Variable Load Hangers (VLH), the painting shall be as per Painting Scheme PS 1A indicated in SI. 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)
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 Bse) to IS 12744-DFT-30 μ and 2 coats of Synthetic Enamel paint (Long Oil Alkyd) to IS 2932-DFT-2X20μ Shade Yellow –Shade No. 356 of IS 5- Total DFT 70μ.

Painting Scheme – Details for procurement & application purposes

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
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

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.