

TENDER SPECIFICATION

BHEL PSSR SCT 1389

**ERECTION, TESTING AND COMMISSIONING OF STEAM
TURBINE, GENERATOR AND ITS AUXILIARIES**

FOR

UNIT 1&2 OF 2 X 600 MW

FOR

**TAMIL NADU ELECTRICITY BOARD
AT
NORTH CHENNAI TPS – STAGE II
ATHIPATTU, TAMIL NADU**

PART - I

TECHNICAL BID

BOOK NO



**BHARAT HEAVY ELECTRICALS LIMITED
(A GOVERNMENT OF INDIA UNDERTAKING)
POWER SECTOR – SOUTHERN REGION
690, ANNA SALAI, NANDANAM, CHENNAI – 600 035**

INDEX SCT : 1389 - NORTH CHENNAI –STG

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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: 1389

Messrs

Date:

Dear Sir,

SUB: Handling at site stores / storage yard, Transportation to site of work, Pre-assembly, Erection, Testing and Commissioning of Steam Turbine, Generator and auxiliaries, Part of CW piping, CW pumps and other BOI Including Supply and Application of Final Painting for Unit 1&2 – 2x600 MW set at North Chennai TPS, Athipattu, Chennai, TamilNadu.

Please find enclosed one set of non-transferable tender documents along with General conditions of contract Booklet for the above work.

You are requested to go through the tender documents, GCC Booklet and offer your most competitive rate and submit the tender documents duly filled in as per procedure indicated in the tender specification along with requisite EMD of **Rs.2,00,000/- (Rupees Two lakhs only)** in the form Demand Draft drawn in favour of M/s.Bharat Heavy Electrical Limited Chennai - 35. Bids with Deviations from the tender conditions will be rejected.

A SEPARATE LETTER SHALL BE FURNISHED INDICATING THAT THERE ARE NO DEVIATIONS FROM THE TENDER CONDITIONS (As in Page x.)

The completed quotations shall reach the office of the under signed on or before **13.05.2010 at 15.00 Hrs**. The Technical bids will be opened on the same day **at 15.30 hrs**. We shall separately intimate the date for opening the price bids only to those parties who are technically qualified. You are requested to depute your authorized representative at the time of opening.

ANY REVISION OF RATES / PRICES WHATSOEVER AFTER THE TIME AND DATE MENTIONED IN TENDER SPECIFICATION FOR SUBMISSION OF COMPLETED QUOTATIONS SHALL NOT BE ENTERTAINED UNLESS CALLED FOR SPECIFICALLY BY BHEL.

Kindly acknowledge the receipt of the tender documents and confirm your participation.

Kindly note that BHEL reserves the right to reject any or all tenders without assigning any reason.

Thanking you,

Yours faithfully,
For and on behalf of
BHARAT HEAVY ELECTRICALS LIMITED

ADDITIONAL GENERAL MANAGER / CONTRACTS

This Tender document is not transferable.
Place: Chennai -35

Encl: One set of Tender documents along with GCC Booklet.

BHARAT HEAVY ELECTRICALS LIMITED
(A government of India undertaking)
Power Sector: Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

SPECIAL INSTRUCTIONS TO BIDDERS

The Bidder must submit their bids as requested in a sealed cover prominently super scribing the Tender Specification number, due date and time of submission as mentioned in the TENDER NOTICE.

The following information shall be furnished by the Bidder along with their offer (Technical Bid cover)

01. Details of previous experience during the last seven years indicating contract value, duration, completion period and present engagement as per G.C.C.
02. Organization structure of the Company as per GCC.
03. Financial status of the firm enclosing balance sheet and profit and loss account for the past 3 years and certificate from the Company's Banker as per G.C.C
04. Turnover of the Company in last 3 financial years.
05. Latest Income Tax clearance certificate.

06. BIO DATA of key personnel presently in the Rolls of the company and proposed site organization for carrying out the work including deployment of Engineers and Supervisors.

07. Declaration sheets as per Appendix of Tender Specification.

08. Checklist and Schedule of General particulars as per Appendix in GCC.

09. T & P owned/deployment details as per G.C.C.

10. Technical manpower deployment details as per G.C.C

11. Other relevant details as per GCC and checklist.

12. These terms and conditions will be read and construed along with General Conditions of contract and in case of any conflict or inconsistency between the General conditions and the Terms and condition the tender specification, the provisions contained in the Term and conditions (NIT, Rate Schedule, Common conditions, Special Conditions including Appendices) shall prevail.

13. THE BIDDERS ARE REQUESTED TO FURNISH THE DOCUMENTS LIKE COPIES OF LOI'S, WORK ORDER'S ETC PERTAINING TO THE EXPERIENCE INDICATED IN QUALIFYING REQUIREMENTS, AS GIVEN BELOW.

14. QUALIFICATION REQUIREMENT:-

- a) The bidders would have executed Steam Turbine, Generator and Auxiliaries of minimum one unit capacity of 195 MW or above in the last seven years.

Note: The term executed in the above QR means “the unit is synchronized”

- b) The bidders should have a minimum average financial turnover of **Rs.153Lakhs** in last three financial years ending on 31st March 2009.
- c) The bidder must have earned profit in any one of the last three financial years ending on 31.03.2009 and should have positive net worth as on 31.03.2009.

Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending on 31.03.2009 in support of above requirement.

- d) Notwithstanding the above, BHEL reserves the right to reject any or all the Tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.
- e) Approval of the agency by customer

LD / Penalty shall be leviable as per the applicable clauses of GCC/SCC.

15. TENDERERS HAVE TO FURNISH A DECLARATION SHEET INDICATING THAT THERE IS NO DEVIATION IN TENDER DOCUMENTS (AS IN PAGE x) TENDERERS MAY FURTHER NOTE THAT THIS DECLARATION IS A PREREQUISITE FOR BHEL TO CONSIDER THEIR BIDS. BIDS SUBMITTED WITHOUT “NO DEVIATION DECLARATION” WILL BE REJECTED BY BHEL.

16. SAFETY PLAN

Bidder may further note that the submission of safety plan is a prerequisite for BHEL to consider their bids.

BHARAT HEAVY ELECTRICALS LIMITED
(A government of India undertaking)
Power Sector : Southern Region
690, Anna Salai, Nandanam, Chennai – 600 035.

PROCEDURE FOR SUBMISSION OF SEALED BIDS

The Tenderers must submit their bids as required in two parts in separate sealed covers prominently super scribed as Part I “Technical Bid” and Part II “Price Bid” and also indicating on each of the covers the tender specification number and due date and time as mentioned in the Tender Notice.

Part I (Technical Bid) Cover I

Excepting Rate Schedule, all other schedules, data sheets and details called for in the specification shall be enclosed, in part I Technical Bid only.

Part II (Price Bid) Cover II

All indications of price shall be given in this part II Price Bid.

Tenderers are requested to quote their rates, only in the price bid (part II) provided by BHEL. Quoting of rates in any other form / formats will not be entertained.

These two separate cover I & II (Part I and Part II) shall together be enclosed in a third envelope (Cover III) along with requisite EMD as indicated and this sealed cover shall be super scribed and submitted to ADDITIONAL GENERAL MANAGER/Contracts at the above mentioned address before the due date as indicated. The Tenderers will be intimated separately in case any clarifications are required.

Clarifications if any are to be sought seven days before the scheduled date of tender (technical) opening. Bidders are hereby informed that, under no circumstances extension of bid submission date will be permitted. The Tenderers will be intimated separately in case any clarifications are sought.

NOTE:

Tenderers are issued with 2 Nos. of Technical Bids, 2 Nos. of Price Bids and 2 Nos. of GCC booklet. Out of which one set of each document shall be retained by them for their reference. Balance one set shall be submitted along with their offer as per procedure indicated above.

EMD amount for this Tender is **Rs.2,00,000/- (Rupees Two Lakhs only)**. This EMD amount shall be submitted in the form of either pay order or demand draft only drawn in favour of M/s. Bharat Heavy Electricals Limited, Chennai – 35.

EMD amount in the form of Bank Guarantee / fixed deposit receipt or in any other form will not be accepted.

ANY REVISION OF RATES / PRICES WHATSOEVER AFTER THE TIME AND DATE MENTIONED IN TENDER SPECIFICATION FOR SUBMISSION OF COMPLETED QUOTATIONS SHALL NOT BE ENTERTAINED UNLESS CALLED FOR SPECIFICALLY BY BHEL.

Additional General Manager/Contracts.

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

TENDER NOTICE

Sealed Tenders are invited from reputed contractors with sufficient previous experience in the under mentioned similar nature of work:

Tender Specification No. BHEL: PSSR: SCT: 1389

Description	EMD
Handling at site stores / storage yard, Transportation to site of work, Pre-assembly, Erection, Testing and Commissioning of Steam Turbine, Generator and auxiliaries, Part of CW piping, CW pumps and other BOI Including Supply and Application of Final Painting for Unit 1&2 – 2x600 MW set at North Chennai TPS, Athipattu, Chennai, TamilNadu	Rs.2,00,000/- (Rupees Two Lakhs only)
Cost of Tender Documents (Including all Taxes) :	Rs.1040/
Sale Starts on :	22.04.2010
Sale closes on :	12.05.2010
Due date and Time for Submission :	13.05.2010 15.00 Hrs
Date and time for opening of Technical Bids :	13.05.2010 15.30 Hrs.

Qualification Requirements

- a) The bidders would have executed Steam Turbine, Generator and Auxiliaries of minimum one unit capacity of 195 MW or above in the last seven years.

Note: The term executed in the above QR means “the unit is synchronized”

- b) The bidders should have a minimum average financial turnover of **Rs.153Lakhs** in last three financial years ending on 31st March 2009.
- c) The bidder must have earned profit in any one of the last three financial years ending on 31.03.2009 and should have positive net worth as on 31.03.2009.

Bidder should submit audited balance sheet and profit & loss account of the company for last three years ending on 31.03.2009 in support of above requirement.

- d) Notwithstanding the above, BHEL reserves the right to reject any or all the Tenders for the reasons whatsoever beyond our control and the decision of BHEL is final.
- e) Approval of the agency by customer

LD / Penalty shall be leviable as per the applicable clauses of GCC/SCC.

Interested parties can get the Tender documents from the office of the Additional General Manager / Contracts on all working days (Between 10.00 AM to 4.30 PM) by remitting the cost of tender documents either by Cash (Cash remittance at BHEL Cash counter to be remitted before 3.30 PM) or A/c Payee Demand Draft drawn in favour of M/s. Bharat Heavy Electricals Limited, Chennai – 600 035. Money order, Cheques and Postal Orders will not be accepted.

Bharat Heavy Electricals Limited takes no responsibility for any delay, loss or non - receipt of tender documents sent by post and also reserves the right to reject any or all the tender without assigning any reason thereof.

TENDER NOT ACCOMPANIED BY THE PRESCRIBED EARNEST MONEY DEPOSIT ARE LIABLE TO BE SUMMARILY REJECTED.

In case, if the bidder downloads the tender document from web site, information on participating may please be sent to the undersigned immediately, to facilitate BHEL to send the addenda / clarifications if any subsequent to the tender floating / hosting in web site.

NOTE:

BHEL reserves the right to adopt the process of **Reverse Auction** (on line bidding) among the bidders who are found to be qualified on the basis of Technical bid. Refer the **Appendix-X** of section VII for procedure for reverse Auction in the special conditions of contract. No extension of time on this account will be entertained for bid submission.

Please visit our web site at “**www. bhel.com**” for Corrigendum, if any, issued after publication of this Tender Notice.

Downloaded Tender documents should be submitted along with demand draft for the requisite amount towards the cost of tender documents

Mode of Award of work for Unit-1 and Unit-2

- (i) There are two units of 600 MW each at North Chennai Thermal Power Project. Tender SCT1389 is for Unit 1 – 600 MW only. The quantity indicated in the price bid is for Unit-1 only and the quantity for Unit -2 is also same.

- (ii) The L1 bidder against this quote will be awarded the contract for unit 1 North Chennai Thermal power project.
- (iii) BHEL reserves the right to award the contract for Unit 2 of North Chennai Thermal Power Project on the same terms and conditions of SCT1389 to the next lowest bidder in the order of competitiveness who should match his rates / price with awarded price / rate for Unit 1.
- (iv) Thus the work for Units 1 and 2 will be awarded to two agencies i.e. Unit-1 work for one agency and Unit 2 work for the other agency.
- (v) In case the other bidders in their order of competitiveness do not accept to match their rates / Price with awarded price / rate of Unit 1, then BHEL reserves the option to consider the L1 bidder, for award of Unit-2 work also at the same rate/Price and at the same Terms & Conditions of Unit-1. This will be solely at the discretion of BHEL and the L1 bidder, who is awarded the work of Unit-1, shall not have any claim for award of Unit-2 work to him, on conditions whatsoever.
- (vi) Incase BHEL, at its discretion opts to go for re-tendering for award of work for Unit-2, then the L1 bidder who is awarded with Unit-1 work shall not be considered for Unit-2 work.
- (vii) Each unit will be treated as a separate contract.
- (viii) Ref Cl 16.19.0 in Special Conditions of Contract for Mode of award of work for unit-1 and unit-2

ADDITIONAL GENERAL MANAGER/CONTRACTS

TENDER SPECIFICATION: BHEL: PSSR: SCT: 1389

CERTIFICATE FOR NO DEVIATION

I, _____ Of M/s.

hereby certify that there is no deviation from the Tender conditions either technical or commercial and I am agreeing to all the terms and conditions mentioned in the Tender Specification.

SIGNATURE OF THE TENDERER

OFFER OF CONTRACTOR

ADDITIONAL GENERAL MANAGER/Contracts
Bharat Heavy Electricals Limited,
Power Sector : Southern Region
690, Anna Salai,
Nandanam,
Chennai – 600 035.

Sir,

I/We hereby offer to carry out the work detailed in Tender Specification **No.BHEL: PSSR: SCT: 1389** issued by Bharat Heavy Electricals Limited, Power Sector: Southern Region, in accordance with the terms and conditions thereof.

I/We have carefully perused the following documents connected with the above work and agree to abide by the same.

1. Instructions to Tenderer
2. General Conditions of Contract
3. Special conditions of Contract
4. Other Section, Appendices and Schedules

I/We have deposited/forwarded herewith the Earnest Money Deposit/a sum of Rs.2, 00,000/- (Rupees Two Lakhs only) vide DD.No. . Dt. which shall be refunded should our offer not be accepted. Should our offer be accepted, I/We further agree to deposit such additional sum which along with the sum of Rs.2, 00,000/- (Rupees Two Lakhs only) mentioned above, to make up the Security Deposit for the work as provided for in the Tender Specification within the stipulated time as may be indicated by BHEL, Power Sector: Southern Region, Chennai – 600 035.

I/We further agree to execute all the works referred to in the said documents upon the terms and conditions obtained or referred to therein and as detailed in the appendices annexed thereto.

DATE:
PLACE:

CONTRACTOR:
ADDRESS:

Witness with their address

Signature

Name

Address

**NORTH CHENNAI TPS STAGE-II- 2 X 600 MW
PROJECT INFORMATION**

1. Project Name : North Chennai Thermal Power Station
2. Project Stage : Stage- II
3. No. of Units x Capacity : 2 x 600 MW
4. Project setting up by : Tamil Nadu Electricity Board (TNEB)
5. LOCATION AND APPROACH: (i) Athipattu Village about 6 KMs from Athipattu Railway Station. From Chennai City about 20 KMs. From Chennai Airport 35 KMs
(ii) District: Thiruvallur
(iii) State : Tamil Nadu
6. Nearest Railway Station : i) Athipattu Pudunagar on Chennai – Howrah route 8 KMs from site
ii) Athipattu 6 Kms
7. Nearest Major Town & Distance: Chennai 20 Kms.
8. Nearest Airport & Distance : Chennai 35 KMs
9. Nearest Highway & Distance : All weather road from Pattamandri on Chennai – Ponneri District Highway / 12 Kms.
10. Temperature : (Dry bulb) : Absolute Max. 45⁰ C (Highest mean monthly Max. 35⁰ C)
: Absolute Min. 15⁰ C (Lowest mean monthly Min. 24⁰ C)
: Average 35⁰ C (Design)
11. Relative Humidity
Maximum : 100 %
Minimum : 36 %
Average : 75 % (Design)
12. Annual Rainfall : Max. 2540.8 mm / Average 1600 mm / Min 1175.7 mm.
13. Wind Load : Basic Wind Speed 50 mm/sec. (Max.) / 11.8 KMPH (Average)
14. Transport:
a) By Rail : Broad Gauge Railway line of Southern Railway
b) Road : District High way
15. Seismic Data : Zone – III as defined in IS :1893 - 2002

**SECTION III
COMMON CONDITIONS OF CONTRACT**

3.1 SCOPE OF CONTRACT

- 3.1.1 The Intent of this specification is to provide erection and commissioning services for execution of projects according to most modern and proven techniques and codes. The omission of specific reference to any method and equipment or material necessary for the proper and efficient services towards installation of the Plant shall not relieve the contractor of the responsibility of providing such services, facilities to complete the project or portion of project awarded to him. The quoted rate shall deem to be inclusive of all such contingencies.
- 3.1.2 The contractor shall carry out the work in accordance with instructions/ drawings/ specification/ standard practices supplied by BHEL from time to time.
- 3.1.3 Provision of all types of labour, Supervisors, Engineers watch and ward as required, tools and tackles as required, consumables as required under various clauses of tender specification for handling transportation, erection, testing and commissioning. Tenderer is liable to arrange all necessary T&Ps except those being supplied by BHEL for use.
- 3.1.4 Proper out-turn as per BHEL plan and commitment.
- 3.1.5 Completion of work in time as per monthly erection plan which will be worked out to adhere to project completion schedule.
- 3.1.6 Good quality and accurate workmanship for proper performance of equipment. BHEL Site Engineer shall be the deciding authority with reference to quality requirement.
- 3.1.7 Preservation of all components at all stages of pre-assembly/erection / testing as per clause **3.15**.

3.2.0 FACILITIES TO BE PROVIDED BY BHEL:

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

3.2.1 WATER:

Water (Raw water) required for construction purposes including testing of Equipments will be provided on chargeable at applicable tariff of TNEB/Metrowater from the nearest storage tank located inside the plant area. The required watermeter for measuring the consumption will be provided by BHEL and the same shall be installed by the contractor. The

required pumps & accessories, pipes for drawing water from the storage tank and further distribution will be arranged by the contractor at their cost. The prevailing water charge is Rs 66.00 per 1000litres which may vary from time to time as per TNEB/Metrowater conditions. Any dispute regarding consumption, the BHEL engineer decision will be final. In case non availability of water, the contractor shall make his own arrangements for uninterrupted work. No separate payment shall be made for any contingency arrangement made by contractor, due to delay / failure for providing water supply

3.2.2 ELECTRICITY:

- 3.2.2.1 The construction power will be provided to the contractor on chargeable at the applicable rate of TNEB under LT tariff V from the nearest substation. For construction purpose electricity will be provided at one single point by BHEL. The required energy meter for measuring power consumption will be provided and installed by BHEL. The contractor shall make his own arrangement for further distribution with necessary isolator / LCB etc. The present LT tariff V rate of TNEB is
- a) Consumption charges at Rs.5.80 per unit
 - b) Fixed charges at Rs. 30 per month
 - c) Electricity Tax at the rate of 5%
- The TNEB tariff may vary from time to time. Any dispute regarding consumption, the BHEL engineer decision is final
- 3.2.2.2 Contractor shall make his own arrangement for alternative source of power supply through deployment of adequate number of DG sets at their cost during the power breakdown / failure and during the initial stages. No separate payment shall be made for this contingency.
- 3.2.2.3 BHEL is not responsible for any loss or damage to the contractor's equipment as a result of variations in voltage / frequency or interruptions in power supply.

3.2.3 CONSUMABLES:

Any special electrodes/ consumables supplied by the manufacturing units for the respective packages will be issued free of cost. All other consumables, filler wires, electrodes, gas etc. are to be arranged by the contractor at his cost.

3.3 FACILITIES TO BE PROVIDED AND DEVELOPED BY THE TENDERER AT HIS COST.

3.3.1 CIVIL CONSTRUCTION:

It shall be the responsibility of the contractor to construct his own office shed, stores shed, with all facilities like electricity, water supply, sanitary arrangements in the area allotted to him for the purpose.

3.3.2 WATER DISTRIBUTION

Distribution of water for construction purpose and as well as drinking purpose to various work-fronts shall be contractor's responsibility at his cost. Necessary meters for recording consumption of water for cost calculation purpose will be issued by BHEL and the same shall be installed by the contractor and maintenance of the same during execution period shall be contractor's responsibility.

3.3.3 ELECTRICITY DISTRIBUTION:

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.

3.3.4 Provision of distribution of electrical power from the given single central common point to the required places with proper distribution boards, approved cables and cable laying including supply of all materials like cables, switch boards, pipes etc., observing the safety rules laid down by electrical authority of the State / BHEL / their customer with appropriate statutory requirements shall be the responsibility of the tenderer / contractor. **Necessary "Capacitor Banks to improve the Power factor as stipulated by customer shall be provided by the contractor at his cost as per customer requirement. Penalty if any levied by customer on this account will be recovered from contractor's bills.**

3.3.5 POSSESSION OF GENERATORS:

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 the State, It shall be the responsibility of the contractor to have at least 4 nos. 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 Bidder. This may also be noted while quoting.

3.3.6 LIGHTING FACILITIES

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

3.3.7 POWER DISTRIBUTION

For the purpose of planning contractor shall furnish along with tender the estimated requirement of power (month wise) for execution of work in terms of maximum KW demand.

3.3.8 CONTRACTOR'S OBLIGATION ON COMPLETION

On completion of work all the temporary buildings, structures, pipelines, cables 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 BHEL will undertake such work and the cost of the same will be recovered from the Contractor including overhead charges. The decision of BHEL Engineer in this regard is final.

3.3.9 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.

3.4.0 GASES :

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

3.4.2 In case of improper arrangement of above gases, BHEL reserves the right to procure the same from any source and for issues made, recover the cost from the contractor's bill at the market value plus BHEL departmental charges. Postponement of recoveries is not permissible.

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

3.4.4 All the integral lube and control oil pipelines required TIG welding operations are to be purged with Nitrogen Gas / Argon Gas for the purpose of creating inert atmosphere in the pipelines during the process of TIG welding. Nitrogen, Argon gas required for this purpose shall have to be arranged by the contractor at his cost.

3.4.5 Monthly gas consumption reports are to be furnished by the Tenderer to BHEL for statistical purposes, every month.

3.5 ELECTRODES

3.5.1 Any special electrodes/ consumables supplied by the manufacturing units for the respective packages will be issued free of cost. All other consumables, filler wires, electrodes, etc. are to be arranged by the contractor at his cost.

3.5.2 All the required electrodes, filler wires as above are to be approved by BHEL. It shall be the responsibility of the contractor to obtain prior approval of BHEL before procurement regarding suppliers, type of electrodes etc. On receipt of the electrodes at site it shall be subject to

inspection and approval by BHEL. The contractor shall inform BHEL details regarding type of electrodes batch No. date of expiry etc.

- 3.5.3 Storage of electrodes shall be done by the contractor in an air conditioned / controlled humidity room as per requirement.
- 3.5.4 All electrodes shall be dried in the electrode drying oven to the temperature and period specified by the BHEL Engineer before they are used in erection work and each HP Welder should be provided with one portable electrode drying oven at the work spot. Electrode drying oven and portable drying ovens shall be provided by the contractor.
- 3.5.5 All filler wires and electrodes shall be preserved by the contractor carefully to prevent deterioration of their properties. Special care shall be taken to preserve alloy steel and other special electrodes/filler wires. Contractor shall exercise maximum care in using these electrodes/filler wires to minimise wastage by maintaining a record of all usages.
- 3.5.6 In case of improper arrangement of procurement of above electrodes BHEL reserve the right to procure the same from any source and recover the cost from the contractor's first, subsequent bill at market value plus departmental charges of BHEL. Postponement of such recovery is not permissible.
- 3.5.7 BHEL reserves the right to reject the use of any electrodes at any stages if found defective because of bad quality, improper storage, date of expiry, unapproved type of electrodes etc. It shall be the responsibility of the contractor to replace at his cost without loss of time.

3.6 TOOLS & TACKLES

- 3.6.1 BHEL will provide the tools and plants indicated in (Appendix IV for "T & P provided by BHEL" in the Tender Specification) free of hire charges. It may be noted that distribution of these equipment will be done by BHEL Engineers and the decision of the Engineer shall be final in this regard.
- 3.6.2 The Contractor shall be responsible for the safe and proper use of the above equipments issued to him. Day-to-day maintenance and operation of the equipment shall be the contractor's responsibility and shall be as per instructions/standard practice of BHEL Engineer. Any consumables / lubricants required for operation and application of the same shall be done by the contractor with his skilled labour at his cost.

- 3.6.3 Any loss/damage to any or part of the above equipment shall be to contractor's account and the expenditures on this account will be recovered from contractor's bills in case contractor fails to make good the loss.
- 3.6.4 Necessary electrical/water/air connection required for operation of any of the above equipment shall be to Contractor's account.
- 3.6.5 Regular utilization report of the above equipment shall be furnished by the contractor for cost analysis purpose.
- 3.6.6 The contractor shall return the T & P issued him to BHEL in good working condition as and when so desired by BHEL (Completion or reduction in work load) for diversion for other work. If such return is delayed by contractor due to his fault without written consent of BHEL, hire charges as applicable according to BHEL policy will be levied from such time it was requisitioned by BHEL to the time of actual return and the amount so decided and arrived at will be recovered from the contractor's bill.
- 3.6.7 Excepting those indicated as BHEL supply, all the other T & P and instruments required for proper and safe handling, transportation, erection, testing and commissioning shall be arranged by the contractor and quoted rates shall deem to include the same.
- 3.6.8 In the event of failure of contractor to bring necessary and sufficient T & P, BHEL may arrange for the same at risk and cost of contractor including transportation of the same from any of BHEL's other site and hire charges as applicable shall be deducted from the bidder's bill. Decision of BHEL in this regard is final.
- 3.6.9 All the T & P arranged by contractor including electrical connections wherein required shall be reliable / proven / tested and necessary test certificates to be submitted as per statutory rules of the State/Central Government in force from time to time.
- 3.6.10 Contractor shall have at all times experienced operators and technicians/ for routine and breakdown maintenance of the equipment. Any delay in rectification of defects will warrant BHEL to rectify the defect on charging the cost to the contractor.
- 3.6.11 If at any time it is noticed that contractor is not using any of the T & P or equipment properly according to the instructions of BHEL, BHEL will have the right to withdraw any and all such equipment and any cost due to this shall be contractor's account.

3.6.12 The T&P would be issued only at stores and it shall be the responsibility of contractor to take the delivery from stores, transport the same to site and return the same in good condition after use.

3.6.13 All the T & P, lifting tackles including wire ropes, slings shackles and electrically operated equipment shall be got approved by Statutory Authority/ BHEL Engineer before they are actually put on use.

3.7 CRANES

3.7.1 EOT crane without operating personnel shall be made available in the T.G. Hall free of charge for erection purposes. The Electric power consumption for the EOT Crane will be charged as per cl. no. 3.2.2.

3.7.2 The contractor has to arrange for trained operators for EOT Cranes round the clock within the quoted lumpsum value. The EOT crane operation capabilities & experience certificate of the Operator to be submitted to BHEL before engaged by the contractor and shall be tested by BHEL before he is allowed to operate the crane.

3.7.3 As the above crane is likely to be deployed sometimes for various contractors the decision of BHEL engineers will be final with regard to allotment of crane for this period.

3.7.4 Maintenance of EOT Crane (daily / preventive / breakdown) with greasing, lubricants & etc and trailing cable necessary free movement arrangement are included in the scope of this contract. The major spares required will be arranged by BHEL.

3.7.5 The availability of crane is likely to be hampered from time to time due to routine preventive maintenance or breakdown maintenance. Contractor has to make alternative arrangement or plan / modify / alter his activities to suit the above conditions and the contractor will not be liable for any compensation or extension of time due to this non availability, for maintaining the schedule.

3.7.6 In the event of the crane not available for longer duration due to major breakdown or any other reasons, BHEL will reschedule the work in consultation with tenderer and direct the tenderer to concentrate on other areas till such time the cranes are made available.

3.7.7 It shall be the responsibility of the contractor to arrange for all other lifting equipments / plant and machineries other tools and tackles required for satisfactory completion of work. The contractor shall indicate the list of T&Ps proposes to use in the work along with his offer.

3.7.8 For the movement of cranes & trailer etc. of contractor during material handling 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.

- 3.7.9 BHEL shall provide higher capacity crane (150T/ 180T/ 250T/ OR the suitable crane available at site) on free of charge only for lifting and placement of FST and Deaerator. The charges towards Operator, Fuel & Lubricants will be as stipulated in Appendix- IV of Section- VII.
- 3.7.10 BHEL shall provide Portal Gantry Crane of 360 T capacity for handling of Generator stator on free of hire charge. Providing Operator and the charges towards Electricity, Fuel & Lubricants will be as stipulated in Appendix- IV of Section- VII.

3.8 SUPERVISORY STAFF AND WORKMEN

- 3.8.1 The Contractor shall deploy experienced Engineers, Supervisors all the skilled workmen like High Pressure Welders (gas, TIG and arc) Carbon, alloy steel welders, Gas cutters, electricians, Riggers, Serangs, Erectors, carpenters, fitters etc. in addition to other skilled, semi-skilled and unskilled workmen required for all the works of handling and transportation from site storage to erection site, transportation, erection, testing and commissioning contemplated under this specification. Only fully trained and competent men with previous experience of the job shall be employed. They shall hold valid certificates wherever necessary. BHEL reserves the right to decide on the suitability of the workers and other personnel who will be employed by the contractor, BHEL reserves right to insist on removal of any employee of the contractor at any time, if they find him unsuitable and the contractor shall forthwith remove him.
- 3.8.2 The supervisory staff employed by the contractor shall be qualified (Engineers – Graduates in Engineering and Supervisors – Diploma Holders) and experienced in the area of work. They shall ensure proper out-turn of work and discipline on the part of labour put on the job by the contractor and in general see that the works are carried out in safe and proper manner and in coordination with other labour and staff employed directly by BHEL or BHEL's client.
- 3.8.3 The Tenderer shall also furnish DAILY & MONTHLY report showing the number of employees engaged in various categories of work and a progress report of work as required by BHEL Engineer.
- 3.8.4 The work shall be executed under the usual conditions existing in major power plant construction and in conjunction with numerous other operations at site. The bidder and his personnel shall co-operate with other personnel other contractor coordinating his work with others and proceed in a manner that shall not delay or hinder the progress of work as a whole.
- 3.8.5 The contractor's supervisory staff shall execute the work in the most substantial and workman like manner in the stipulated time. Accuracy of work, good workmanship and aesthetic finish are essential part of this contract. The contractor shall be responsible to ensure that assembly and

workmanship conform to the dimensions and tolerances given in the drawings/instructions given by BHEL Engineers from time to time.

- 3.8.6 The contractor shall employ the necessary number of qualified and approved full time electricians at his cost to maintain his temporary electrical installation till the completion of work.
- 3.8.7 It is the responsibility of the bidder to carryout the work for achieving the target set by BHEL by working for 12 hours a day including holiday during erection and 24 hours continuously in shifts during commissioning and testing periods.
- 3.8.8 If the contractor or his workmen or employees shall break, deface, injure or destroy any part of a building, road, kerb, fence, enclosure, water pipes, cables, drains, electric or telephone posts or wires, trees or any other property or to any part of erected components etc. The contractor shall make the same good at his own expense or in default, BHEL may cause the same to be made good by other workmen or by other means and deduct the expenses (of which BHEL's decision is final) from any money due to the contractor.

3.9.0 CIVIL WORKS

- 3.9.1 Foundations of all equipments and plants and necessary civil works shall be provided by customer. The dimensions of the foundations and anchor bolt pits shall be checked by the contractor for their correctness as per drawings. Further top elevation of foundations shall be checked with respect to bench mark etc. All minor adjustments upto 25 mm of foundation level, dressing, chipping of foundation surface enlarging the pockets in foundations and grouting of equipments etc. as may be required for the erection of equipments / plants shall be carried out by the Contractor. All the materials like cement and cleaning consumables shall also be arranged by the contractor at his cost. The required special cement like PAGA, CONBEXTRA – GP2 and SHRINKOMP etc or its equivalent grade cement for grouting of turbine, generator shall also be arranged by the contractor including the required nos. of mixing machines and vibrators at their cost.
- 3.9.2 The contractor shall ensure perfect matching of packer plates with foundation by dressing the foundation and between the packer plates and the base plate of structural column / equipment to the satisfaction of BHEL Engineer. Machining / matching of packer shall be carried out by the Contractor at his cost.
- 3.9.3 The contractor shall arrange for grouting of foundation bolt holes of equipment and final grouting of equipment as per the drawings / specification as advised by the Engineer or BHEL after preparing the foundation surface for grouting. The contractor has to arrange, a representative from the supplier of special cement for witnessing the grouting and other works at their cost including any miscellaneous

expenditure for this activity. BHEL will not pay any service and incidental charges for arranging the supplier representative. The contractor to take note of this aspect and quote accordingly.

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

3.10.0 SCOPE OF MATERIAL HANDLING

- 3.10.1 While BHEL will endeavor to store/stack/identify materials properly in their open/closed storage yard/shed it shall be contractor's responsibility to assist BHEL in identifying materials well in time for erection, taking delivery of the same in time following the procedure indicated by BHEL and transport the material safely to pre-assembly yard/erection site in time according to programme.
- 3.10.2 The contractor shall identify necessary supervisor/labour for the above work in sufficient quantity as may be needed by BHEL for areas covering their scope.
- 3.10.3 It shall be contractor's responsibility to arrange necessary cranes/tractors, trailor or trucks/slings/tools and tackles/labour including operators and on to transport equipment, move it to erection site/pre-assembly yard and unload the same at pre-assembly yard/ erection site and the quoted rate shall include the same.
- 3.10.4 In the event of Contractor's inability to arrange in time any of the above equipment / T & P etc., BHEL shall provide the same on specific written request from contractor subject to availability of equipment of the normal hire charges of BHEL / Customer applicable from time to time and recoverable from contractor's subsequent months running bills.
- 3.10.5 All equipment so used by contractor shall be of proven quality and safe in operation as approved by the statutory authorities as per the law in force.
- 3.10.6 Any loss/damage to materials issued to contractor shall be made good by him or BHEL will arrange for replacement at cost recovery basis and decision of BHEL shall be final. Any loss/damage must be intimated to SITE in charge of BHEL in writing within 24 hours of the occurrence.
- 3.10.7 All the surplus damaged, unused materials, package materials / containers/special transporting frames, gunny bags etc. supplied by BHEL shall be returned to the BHEL Stores by the contractor immediately.
- 3.10.8 The contractor shall take delivery of the components and equipments and special consumables from the storage area after getting the approval of the BHEL Engineer on standard indent forms to be specified by BHEL. At periodic/intervals of work, complete and detailed account of the equipment so erected and electrodes used shall be submitted to the BHEL Engineer.

3.11 OTHER RESPONSIBILITIES OF THE CONTRACTOR

- 3.11.1 BHEL Engineers shall make out a plan for erection and the contractor shall arrange for labour force and tools and plants and consumables to suit the above plan and execute the work accordingly.
- 3.11.2 The contractor shall have total responsibility for all equipment and materials in his custody, stores, loose, semi-assembled, assembled or erected by him at site.
- 3.11.3 The contractor shall make suitable security arrangement including employment of security personnel to ensure the protection of all materials/equipments and works from theft, fire, pilferage and any other damage and loss.
- 3.11.4 The contractor shall ensure that the packing materials and protection devices used for the various equipments during transit and storage are removed before these equipments are installed.
- 3.11.5 All equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc. shall be used for unloading and/or handling of the equipments without the specific written permission of the Engineer. The equipments from the storage yard shall be moved to the actual site of erection/location at the appropriate time as per the direction of BHEL Engineer so as to avoid damage for such equipments at site.
- 3.11.6 The work covered under this scope of work is of highly sophisticated nature requiring best quality, proven workmanship engineering and construction management. It should also ensure successful and timely commercial operation of equipment installed. The contractor must have adequate quantity of precision tools, construction aids in possession. Contractor must also have adequate trained qualified and experienced supervisory staff and skilled personnel.
- 3.11.7 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.
- 3.11.8 The Contractor shall take all reasonable care to protect the materials and work till such time the erected equipment has been taken over by BHEL/their client. Necessary suitable temporary fencing and lighting shall be provided by the contractor as a safety measure against accident and damage of property of BHEL. Suitable caution notices shall be displayed where access to any part may be deemed to be unsafe and hazardous.
- 3.11.9 The contractor shall be responsible for taking all safety precautions during the construction and leaving the site safe at all items. When the work is temporarily suspended he shall protect all construction materials, equipments and facilities from causing damage to existing property interfering with the operation of the station when it goes into service. The contractor shall comply with all applicable provisions of the safety

regulations clean-up programme and other precautionary measures which the BHEL has in effect at the site.

- 3.11.10 The contractor shall be responsible for good house-keeping, neat stacking and arrangement of materials on the floors. The contractor shall also be responsible for periodic regressing, reconsevation of components like bearings and machined surfaces etc.
- 3.11.11 Contractor shall provide at his cost watch and ward staff round the clock for the safety of the equipment under erection/in his stores at site.
- 3.11.12 All lifting tackles including wire ropes, slings, shackles etc. used by the contractor shall be got approved by BHEL Engineer at site before they are actually put on the work. It will be the responsibility of the contractor to ensure safe lifting of the equipment taking due precautions to avoid any accidents and damage to other equipments and personnel. All piping shall be adequately supported and protected to prevent damage during handling and erection.
- 3.11.13 The contractor shall take delivery of equipment from storage yard / stores sheds. He shall also make arrangements for verification of equipment maintain records and keep safe custody watch and ward of equipment after it has been handed over to him till these are fully erected, tested and commissioned and taken over by BHEL's client. The stolen/lost/ damaged goods shall have to be made good by the contractor at his own cost. Contractor should assist in claiming from the insurance to minimize his liability for the above.
- 3.11.14 The contractor shall carry out scrapping wherever required and matching of all the matching parts of Turbine, Generator and other equipments. The chipping of concrete surface to achieve the true contact as per specification between packers and the concrete is also covered in this scope of work. While on job, care is essential to avoid too much of chipping and lowering of level.
- 3.11.15 All hangers, supports and anchors (Including concreting or welding) shall be installed as per drawing to obtain safe reliable and complete pipe installation as per instructions of BHEL Engineers.

3.12.0 DRAWINGS AND DOCUMENTS

- 3.12.1 The detailed drawings specifications available with BHEL Engineer will form part of this tender specification. These documents will be made available to the contractor during execution of work at site.
- 3.12.2 One set of necessary drawings to carry out the erection work will be furnished to the contractor by BHEL on loan which shall be returned to BHEL Engineer at site after completion of work. Contractor's personnel shall take care of these documents given to them.

3.12.3 The data furnished in various appendices with this Tender Specification, describes the equipment to be installed, tested and commissioned under this specification briefly. However, the changes in the design and in the quantity may be expected to occur as is usual in any such large scales of work.

3.12.4 Deviation from design dimensions should not exceed permissible limit. The contractor shall not correct or alter any dimensions/details without specific approval of BHEL.

3.13.0 SITE CLEANLINES AND SAFETY REUIREMENTS

3.13.1 Contractor shall strictly follow all safety regulations/conditions as per clause 2.27 and its sub clauses of general conditions of contract booklet enclosed with this tender.

3.13.2 Non-conformity of safety rules and safety appliances will be viewed seriously and the BHEL has right to impose fines on the contractors as under. The fine rates are subject to change time to time and the same will be intimated.

SI.No.	Safety	Fine (Rs.)
01	Not wearing safety helmet	50/-
02	Not wearing safety belt	100/-
03	Grinding without goggles	50/-
04	Not using 24V supply for internal work	500/-
05	Electrical plugs not used for hand machines	100/-
06	Not slinging properly	200/-
07	Using damaged sling	200/-
08	Lifting cylinders without cage	500/-
09	Not using proper welding cable with lot of joints and not insulated properly	200/-
10	Not removing small scrap from platforms	200/-
11	Gas cutting without taking proper precaution or not using sheet below gas cutting	200/-
12	Not maintaining elec. Winches which are being operated dangerously	500/-
13	Improper earthing of electrical T & Ps	500/-

3.13.3 Contractor shall necessarily fill up the safety plan format available in general conditions of contract booklet enclosed with this tender and submit along with their offer.

3.13.4 CONTRACTOR SHALL DEPLOY A SAFETY OFFICER EXCLUSIVELY TO HANDLE SAFETY REQUIREMENT.

3.14.0 PROGRESS OF WORK

3.14.1 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 etc. employed are not sufficient, BHEL will induct required additional workmen to improve the progress or take over a part of the job and get it done on risk and cost of the contractor and recover from contractor's bill, all charges incurred on this account including all expenses together with BHEL overheads.

3.14.2 The progress reports shall indicate the progress achieved against planned with reasons indicating delays if any and shall give remedial action which the contractor intends to make good the slippage or lost time so that further works can proceed as per the original programme and the slippage do not accumulate and affect the overall programme.

3.14.3 The contractor shall submit daily, weekly and monthly progress reports, manpower reports, material reports, consumables reports and other reports considered necessary by the BHEL Engineer.

3.14.4 The manpower reports shall clearly indicate the manpower deployed category wise daily specifying also the activities in which they are engaged. The periodicity of the reports will be decided by BHEL Engineer at site.

3.14.5 The contractor shall arrange for weekly progress review meeting with the "Engineers" at site during which actual progress during the week vis-a-vis scheduled programme shall be discussed for action to be taken for achieving targets. The programme for subsequent work shall also be presented by contractor for discussion. The contractor shall constantly update/revise his work programme to meet the overall requirements and suit the material availability.

3.14.6 The contractor shall submit detailed advance monthly plan and the same has to be forwarded by the first week of each month for discussion and finalization by 15th of the month which shall be basic document to be followed for the next month erection plan.

3.15.0 PRESERVATION OF COMPONENTS

3.15.1 It shall be the responsibility of the contractor to apply touch up painting on all equipments before erection. All Paint and thinner shall be arranged by the bidder and it shall be contractor's responsibility to arrange for required labour, brush etc. for carrying out touch up painting. The quoted rates shall be inclusive of above work.

- 3.15.2 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.
- 3.15.3 Any failure on the part of contractor to carry out work according to above clauses will entail BHEL to carry out the job from any other party and recover the cost from contractor.
- 3.15.4 Due to atmospheric conditions erected materials are likely to get rusted more frequently. It is the responsibility of the contractor to preserve the erection materials drawn from stores for erection till these are commissioned and handed over to customer. The required consumables for this purpose like paint, thinner, rust converter compound (Ruskill or Ferropro) or any other equivalent shall be arranged by bidder. However, the contractor should also arrange other consumables like wire brushes, emery paper, cotton waste, cloth etc. at their cost. The contractor should ensure that the materials are not rusted on any account till they are handed over to customer. The decision of the BHEL Engineer is final with regard to frequency of application of paint and rust converter compound.

SPECIFIC REQUIREMENTS FOR ISO 9001 - 2000

3.16.0 IMPORTANT NOTE

Contractors shall ensure that all their Staff/Employees are exposed to periodical training programme conducted by qualified agencies/ personnel on ISO 9001 - 2000 Standards.

Contractors shall ensure that the Quality is maintained in all the works connected with this contract at all stages of the requirement of BHEL.

Contractor shall ensure that all Inspection, Measuring and Testing equipment that are used, whether owned by the contractors or used on loan, are calibrated by the authorized agencies and the valid calibration certificate will be available with them for verification by BHEL. A list of such instruments possessed by contractor at site with its calibration status is to be submitted to BHEL Engineer for control.

Contractors shall arrange for the inspection of the works at various stages as required by BHEL. Immediate corrective action shall be taken by the contractors for the non-conformances if any, observed and pointed out by BHEL.

3.17.0 INSPECTION / QUALITY ASSURANCE / QUALITY CONTROL STATUSTORY INSPECTION

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

Preparation of quality assurance log sheets and protocols with customer's Engineers, welding logs and other quality control and quality assurance documentation as per BHEL Engineer's Instructions, is within the scope of work / specification.

The protocols between contractor and customer/BHEL shall be made prior to installation for correctness of foundations, materials, procedures, at each stage of Installation, generally as per the requirement of Customer/BHEL. This is necessary to ensure elimination of errors or keeping them within tolerable limits and to avoid accumulation and multiplication of errors.

A Daily log Book should be maintained by every supervisor/Engineer of contractor on the job in Duplicate (One for BHEL and one for Contractor) for detailing and incorporating Alignment/clearance/centering / Leveling Readings and Inspection details.

High pressure welding details like number of joints, Welder's Name, Date of welding, Details of Repair, Heat Treatment, Etc. will be documented in welding Logs as per BHEL Engineer's Instructions.

Record of radiography containing details like serial number of weld joints date of radiography repairs if any reshots etc. shall also be maintained as per BHEL Engineer's instructions.

Heat Treatment details of HP Welds indicating minimum, Temperature Recorded, Heating Rate, Cooling Rate, soaking Time, Etc., shall also be Recorded and Documented by Contractor as per BHEL Engineer's Instructions. High pressure Welder's Performance Record shall be furnished every month. The performance Report of Welders shall indicate the percentage of Repair for each welder.

All the Electrical/Technical Measuring and Testing Instruments/Gauges, Feeler Gauges, Highest Gauges Dial Gauges, Micrometers, Levels Spirit Levels, Surface plates, straight Edges, vernier calipers and all measuring instruments shall be provided by the contractor for checking, leveling, Alignment, Centering etc of Erected Equipments at various stages. The Instruments / gauges / Tools etc. provided should be of Brand, Quality and Accuracy, Specified by BHEL Engineer and should have necessary Calibration and other Certificates as per the Requirements BHEL Engineer.

In the course of erection it may be necessary to recheck or counter check or finally check the work with instruments recently calibrated recalibrated or of inspection grade gauge / tools or special measuring instruments such instruments whenever necessary will be provided by BHEL on specific authorization by BHEL Engineer.

The instrument mentioned above shall be drawn by the contractor from BHEL Stores on the specific authorization and use the same on the

specific job for the purpose of inspection / rechecking / counter checking / finally checking of the work and shall be returned to BHEL Stores immediately on completion of the inspection.

Vibration indicators / vibration recorders / vibration analysers will be provided by BHEL for checking and analyzing vibration levels of rotating equipments with necessary operators. Contractor shall provide necessary labour for carrying out such tests.

Total Quality is the Watch Ward of the work and standards, Procedures laid down by BHEL. We shall follow all the Instructions as per BHEL Drawings and Quality / Standards. Contractor shall provide for the services of quality Assurance Engineer.

The welders performance will be reviewed from time to time as per the BHEL / IBR standards and any welder not performing the standards set by BHEL / IBR standards will be removed from working, Contractor shall arrange for the alternate welders immediately.

All the welders including the HP welders shall carry identity cards as per the proforma prescribed by BHEL. Only Welders duly authorised by BHEL / Boiler Inspector / Consultant shall be engaged on the work.

Contractor shall ensure speedy alignment and welding of all equipment erected by him after placement. Also all alignments, welding, NDT Tests required for stage Inspection shall be completed as per Quality Assurance procedures.

All the Quality Assurance Procedures have to be compiled with before effecting column erection, ceiling beams erection, Ceiling Beams erection, drum lifting, further structural work, Hydraulic Test, Trial run of Equipment, Pre-commissioning and post commissioning any other tests required to be conducted for completing erection and commissioning.

STAGE INSPECTION BY FES / QA ENGINEERS:

Apart from Day-to-Day Inspection by BHEL Engineers Stationed at site and also by Customer's Engineers, Stage Inspection of Equipment under Erection and commissioning at various stages of Erection and commissioning by TEAMS of Engineers from Field Engineering Services of BHEL's manufacturing units and Quality Assurance Teams from Field Quality Assurance Unit/ Factory Quality Assurance and commissioning Engineers. Contract shall arrange all labour, Tools and Tackles, etc. for such stage inspections free of cost.

Any modifications suggested by FES and QA Engineers Team shall be carried out. Claims of Contractor, if any shall be dealt as applicable.

Any minor rectifications of minor repairs of defective work found out during stage Inspection shall be rectified free of cost, by the contractor.

Any major rectification or major repairs of defective work found out during stage inspection verification / checking but not attributable to contractor shall also be carried out. Claims of contractor, if any, shall be dealt as applicable.

HSE SPECIFIC REQUIREMENT

OCCUPATIONAL HEALTH & SAFETY MANAGEMENT SYSTEM

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING HEALTH RELATED POINTS

01. Sub-contractor to identify nearest hospital for Health check up of his staff and workers and intimate BHEL site office & PSSR HQ.
02. To arrange for occupational health check up / screening of contractor's staff and workers engaged in sub contracting activities. In this, category of workmen such as welders, gas cutters, grinders, radiographers, crane operators are to be given exclusive attention in respect of health screening.
03. Sub-contractor to arrange an ambulance vehicle or emergency vehicle on a continuous basis to meet any emergency situation arising at site work in which his staff and workers are engaged.
04. To provide appropriate facilities for prompt first aid treatment of injuries and illness at work. One first Aider for each sub contractor to be provided. First Aider should undergo training on first aid.
05. To provide filtered drinking water at selected place in a clean container.

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING SAFETY RELATED POINTS

01. Personnel protective equipment (PPES): Required number of following PPES (Confirming to Relevant is Standards) to be made available to workmen at site and ensured that they are used .
 - ❑ Helmet
 - ❑ Safety goggles
 - ❑ Welding face shields
 - ❑ Safety belts for working at heights
 - ❑ Safety shoes
 - ❑ Ear plugs
 - ❑ Rubber gloves and mats for low tension (I.T) electrical works
 - ❑ Gum boots & aprons
 - ❑ Other items as required by BHEL site
02. Sub contractor to liase with nearest fire station and inform contact telephone number and contact person to meet any emergency.
03. To provide appropriate fire fighting equipment at designated work place and to provide fire fighting training to selected persons in his group of workmen to meet emergencies.

04. To provide adequate number of 24 V power supply points to work in a constrained and enclosed space.
05. All power tapping points / switch boards /power & control cabling should fulfill required electrical safety aspects as per relevant is standard.
06. ELCH's (Earth leak circuit breakers) at all electrical distribution points to be provided.
07. Red and white caution tape of proper width (1.5 to 2 inch) to be used for cordoning unsafe area such as open trench, excavated area, etc.
08. To provide sub-contractors company logo or clothing to all staff and workers for identification including identity cards with photographs approved by BHEL.
09. High pressure and structural welders to be identified with colour clothing and to display copy of welders certificate with photographs of welder at the work place. They also should be in possession of valid welding procedure.
10. To display safe handling procedure for all chemicals such as lube oil, grease, sealing compound, kerosene, diesel etc. At stores & respective work place.
11. Contractor should authorize a person at site to stop work if there is a unsafe work noticed as per his knowledge.
12. Fitness for use of erected scaffolding to be certified by the contractors approved scaffolder and the certificate should be displayed on the scaffolding itself. If the scaffolding is unsafe, the same will not be used. the certificate to be updated daily. The scaffolding to be made as per the relevant is standard.
13. For making platform on the scaffolding , proper thickness and size of the plank of required quality wood to be used. The safe working load of the platform to be displayed on the scaffolding itself. Proper use of platform to be explained to the user.
14. All plant equipment should have inspection report before put in to use.
15. All T&Ps should be of reputed brand and having quality certificates.
16. All imtes should have valid calibration certificate from recommended institution / testing lab and these should be in place.
17. All lifting tackle and plant equipment should have safe working load certificate.

18. The right worker should be deployed for right job and the resume of site incharge, supervisors, and key workers to be submitted before commencement of work..
19. Sub-contractor should submit inspection / testing matrix of all T&Ps and to be approved by BHEL.
20. Sub-contractor to display safety slogan, safety board, caution boards wherever required in consultation with BHEL.
21. Sub-contractor to provide gas detectors of reputed make at desired locations.
22. Sub-contractor to conduct emergency mock drills. One drill per 6 month and submit report to BHEL.
23. Safe handling and storing of all equipment with adequate space to be ensured.
24. Sub contractor to deploy safety supervisor till the completion of the project.
25. Sub contractor to comply the safety reporting procedure of BHEL as practiced at present and also additional requirements that may arise out of future improvements in the safety management system. This includes computation of safety indices such as frequency rate, severity rate & incident rate.
26. Sub contractor to identify probable emergency situations such as electric shocks to workmen, caving in of shored earth, fall from height, collapse of scaffolding fire etc., and should have clear action plan to overcome them. Sub contractor to take required guidance from BHEL in this regard.
27. Sub contractor to identify hazardous activities which he may carryout and should train his workmen in those activities with the relevant operation control procedures. Sub contractor to take required guidance from BHEL in this regard.
28. Safe work permit system to be followed while working in confined space / near electric systems.

SUB CONTRACTOR TO ENSURE COMPLIANCE OF THE FOLLOWING ENVIRONMENT RELATED POINTS

1. HOUSE KEEPING: Sub contractor to carry out daily house keeping of work areas / stores through a check list prepared in consultation with BHEL.
2. Sub contractor shall adopt pollution prevention / reduce /control approach in all his site activities. this shall include:
 - a. Transporting of oil / chemicals from stores to site safely without causing spillage. In case of any spillage, the area shall be cleaned and the remanant spilled oil disposed off to a safe place, identified for such disposal.

- b. To use required containers / cans / safety gadgets / appliances for transporting and for usage of oil / chemicals at site.
3. Sub contractor shall arrange for segregation / collection of scraps and dispose off to the identified place meant for scrap collection.
4. Sub contractor to adopt good erection practices / procedures with the objective of reduction of waste generation / rework

OTHER HSE REQUIREMENTS TO BE COMPLIED BY SUB CONTRACTOR

1. Sub contractor to clearly understand and accept the HCE policy of PSSR with a commitment to comply the requirements of the policy.
2. Sub contractors to arrange for daily meeting of their supervisors and work force before they disperse for their daily planned activities where in the relevant health , safety and environment aspects of the job and use of PPES are explained
3. Sub contractor to conduct monthly HSE meeting (internal) and submit the report to BHEL.
4. HSE slogans to be displayed in a proper board – hoarding at designated places in consultation with BHEL.
5. Sub contractor to submit a structured programme for training & occupational Health Screening of their work force at site after the Award of LOI.

SECTION – VI

SPECIAL CONDITIONS OF THE CONTRACT

- 6.0.0 The scope of work under this specification covers, but not limited to the following:
- 6.1.0 Handling at stores transporting to site, inspection, preparation of foundation, erection, leveling, centering, alignment, grouting & final alignment of Steam turbine, Turbo generator and auxiliaries including BOI identified, pre-assembly, erection, alignment, welding, NDT, fixing hangers & supports, chemical cleaning/pickling, oil flushing, water flushing, hydro testing, & steam blowing of integral piping/oil piping, H₂/CO₂/Water cooling system, Pre assembly, erection, welding, NDT of water cooled Condenser, feed water storage tank, de-aerator, LP/HP heaters, GSC & other coolers, flash tanks etc., CW piping near condenser upto “A” row column puddle flange, erection and commissioning of Motor Driven & Turbo Driven Boiler feed pumps, Motor driven Condensate Extraction Pumps, surface finish, supply & application of primer & finish paints / Anti corrosive epoxy resin based / chlorinated rubber based / Glass Fiber Reinforced epoxy film / steam wash paints including labeling, on equipments, & piping, pre-commissioning, commissioning, trial operation & handing over of Units 1&2 of 2x600 MW North Chennai TPS - Steam Turbine, Generator and Auxiliaries.
- 6.1.1 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.
- 6.1.2 Contractor shall erect all the equipments as per the sequence prescribed by BHEL at site. The sequence of erection and methodology will be decided by the BHEL Engineers depending upon the availability of materials, fronts and other inputs etc., No claim for extra payment from contractor will be entertained on the grounds of deviation from the methods of erection adopted in erection of similar STG set in other places.
- 6.1.3 The work covered under this specification is of highly sophisticated nature, requiring the best quality workmanship, engineering and construction management. The contractor should ensure successful and timely operation of equipment installed. The contractor must have adequate quantity of tools, construction aids, equipments etc., in his possession. He must also have on his rolls adequate trained, qualified and experienced supervisory staff and skilled personnel.

6.2.0 **TRANSPORTATION FROM STORES/ STORAGE YARD**

6.2.1 Loading at 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. Required cranes for loading & unloading of materials will be in the scope of contractor. The contractor shall provide any fixtures, concrete blocks & wooden sleepers, which are required for temporary supporting of the components at site.

6.2.2 Contractor shall take delivery of the components and equipments from the storage area after getting the approval of BHEL Engineer on standard indent forms as specified by BHEL. Complete and detailed account of the equipments erected as well as the progress shall be submitted to the Engineer as directed.

6.2.3 All the equipments shall be handled very carefully to prevent any damage or loss. No bare wire ropes, slings etc., shall be used for unloading and/or handling of equipments with out the specific permission of BHEL Engineer. The equipment from the storage yard shall be moved 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.

6.2.4 Contractor shall plan and transport equipments, components from storage yard to erection site and erect them in such a manner and sequence that material accumulation at site does not lead to congestion at site of work. 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.

6.2.5 **Field Quality Assurance Formats**

It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets of BHEL and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL and customer in token of their acceptance. Payment to the contractor will be linked with submission of these FQA Log sheets.

6.3.0 **ERECTION**

6.3.1 Preparation of foundation: Providing necessary skilled and other labour to BHEL/Customer for checking of dimensional accuracy, axis, elevation, levels etc., with reference to bench marks of foundations and anchor bolts pits. Also adjustments of foundation level, dressing and chipping of foundation surfaces of all equipments, up to 25mm depth, as per BHEL Engineers instructions, should be done by the contractor as a part of work. Contractor should log before taking over the foundations for erection.

- 6.3.2 Contractor shall carry out scrapping and blue matching of embedment plates/packers of rotating equipments so as to achieve prescribed percentage of contact. Chipping and bedding of concrete surfaces, finely dressing up to the extent required to obtain contact between packer and concrete, is also covered in the scope of the work. The fine dressing of concrete shall be with blue matching checks.
- 6.3.3 BHEL will provide only shims and packer plates (either machined or plain), which will go as permanent parts of the equipment at free of cost. Certain packer plates and shims over and above the quantity received as part of supplies have to be cut out from steel plates/sheets at site to meet site requirement. Contractor shall cut and prepare packers and shims by chiseling, grinding, machining and filing the burr in the packers. Machining of Packers to meet the requirement is in their scope of the contractor. Raw materials required for the above will be arranged by BHEL free of cost.
- 6.3.4 Packer plates are to be blue matched with foundation, with foundation frame and inter-packers contact surfaces & etc., by Blue match checks and required percentage contact shall be achieved by chipping and scrapping as per BHEL Engineers instructions. Shims and packer plates required for temporary use are to be arranged by the contractor within the quoted rate.
- 6.3.5 **Bolt stretching fixtures** for TG anchor bolts are to be arranged by the contractor.
- 6.3.6 Grouting of equipments is included in the scope of contractor. 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. All grouting materials like cement, including special cements such as non-shrinkable free flow cements etc. (as recommended by BHEL), sand, gravel etc., shall be arranged by the contractor at his quoted rate.
- 6.3.7 Brief list of equipments/sub-assemblies to be erected by the contractor & approximate weight and size of individual heavy components are given in the appendices and is meant for giving general idea to the tender only about magnitude of the work involved. The components are sent in parts for convenient transportation. They are to be cleaned, assembled in stage by stage, fastened/welded, erected and aligned as per the drawing dimensions/tolerance and instructions of BHEL Engineers.
- 6.3.8 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. Surface Grinder and Lathe m/c required for the above works are to be made available at TG Floor by the contractor at their cost.

- 6.3.9 Normally weld neck valves will have prepared edges for welding. It may be occasionally necessary to prepare new edges, re-prepare the edges to suit site conditions, which shall be done by the contractor at no extra cost. All fittings like elbows, tees, reducers, flanges, inserts etc., shall be matched with pipes for welding which may require re-edge preparation, grinding etc., The valves will have to be checked, lapped or overhauled in full or in parts before erection/after chemical cleaning/during commissioning. Experienced technicians for the same shall be arranged by the contractor at his own cost.
- 6.3.10 AOP / JOP/ EOP etc., and their motors will be supplied in loose parts, contractor shall have to match / assemble and align at site as per instructions of BHEL Engineer including placement on foundation.
- 6.3.11 For skid mounted equipment, dismantling if any, for the convenience of erection/commissioning, checking and re-alignment required at site is in the scope of work.
- 6.3.12 All rotating machineries and equipments shall be cleaned, lubricated checked for their smooth rotation, if necessary by dismantling and re-fitting before erection by the contractor. In the opinion of the BHEL engineer, the equipment is to be further checked at any stage of the work, contractor shall provide necessary skilled manpower, complete facilities like T&Ps and consumables etc., for dismantling, cleaning & refitting within the quoted rate.
- 6.3.13 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.
- 6.3.14 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 assembly and other components as per instruction of BHEL Engineer during erection. The Contractor has to arrange necessary paints within the quoted rates.
- 6.3.15 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. Lubricants will however be supplied by BHEL at free of cost.

- 6.3.16 The contractor shall take necessary measures to see that all the machined surfaces are preserved and covered.
- 6.3.17 Sand / shot blasting of condenser / turbine components is to be carried out by the contractor wherever necessary as instructed by BHEL Engineer. Contractor has to arrange Sand / shot blasting machine, compressor required consumables, etc. at his cost.
- 6.3.18 Certain instruments like pressure switches, gauges, air filters, regulators, filters, junction boxes, power cylinders, dial gauges, thermometers, flow meters, valve actuators, flow indicators etc., are received in assembled conditions as integral part of equipments. Contractor shall dismantle such instruments and re-erect whenever required prior to commissioning. Some time this may have to be handed over to store or instrumentation contractor.
- 6.3.19 All the motors/pumps shall be 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.
- 6.3.20 All the oil & gas piping flanges, wherever provided are to be blue matched using surface plates for at least 80% contact area to attain leak proof of joints.
- 6.3.21 For gas tightness test of gas system of stator the contractor has to arrange Mercury Mono-meter at his cost.
- 6.3.22 All the lubricant oil for flushing and during trial run of the equipment including first fill up, chemicals for detergent flushing, acid pickling/cleaning/trial run etc., will be arranged by BHEL at free of cost. Required manpower shall be provided by the contractor for handling, filling, emptying and re-filling etc., as part of the work without any extra cost, till the unit is handed over. Transportation of all the above shall be arranged by the contractor from BHEL store/yard to work site and returning of the empty barrels/drums to stores at their cost. Care should be taken to avoid any spillage/wastage.
- 6.3.23 The contractor shall also carry out erection, testing, and commissioning of the oil centrifuge within their quoted rate.
- 6.3.24 Transportation of CO₂ & H₂ cylinders from the store and filling of Gas in the generator stator cooling systems, etc., as and when required till the unit is commissioned and handed over shall be the responsibility of the contractor.

6.3.25 **Generator Stator Lifting:** Generator stator will be transported from HARIDWAR works to site on special wagon/Trailer. This will be received at site nearer to the lifting point of Portal Gantry Crane (near 'A' row columns). Unloading of Gen. Stator from wagon/trailer, lifting of stator and shifting it to TG Deck foundation, assembling the terminal box & cooler housing and placing in position using portal gantry crane is in the scope of this specification. Portal Gantry crane will be issued by BHEL on free of hire charges. It will be in parts/ components and the same shall be transported from BHEL store, assembled, erected, commissioned and on completion of stator lifting work, dismantling the same & returning to BHEL as per the instructions of BHEL Engineer are in the scope of the Bidder at his cost. Providing skilled operator for the operation of portal crane is by the contractor at his cost. The Electric power consumption for the operation of Portal Crane will be charged as per cl. no. 3.2.2 in this specification

The following will also be provided by BHEL on free of hire charges for this operation.

- i. Suitable Slings for Stator lifting
- ii. Suitable Mobile Crane for Erection & Dismantling of portal gantry. However Operator, fuel and lubricants are to be arranged by the contractor at his cost for mobile crane.
- iii. Lubricants for Drives.

6.3.26 Erection, testing & commissioning of BFP along with mechanical seal, end chambers cooling lines, lube oil & working oil lines are also included in the scope of contractor.

6.3.27 All the filters in the system are to be cleaned, as and when required during flushing / commissioning till the unit is handed over to customer is within the scope this contract.

6.3.28 The Contractor shall carry out the reaming and honing of coupling holes with his own reamers, honing machine and honing accessories etc. at his own cost.

6.3.29 BFP drive turbines & its auxiliaries will be supplied in parts consists of turbine assy, governing valve assy, lube oil console, oil pumps, gear box, couplings, coolers etc., which are to be assembled at site and erected.

6.3.30 Wherever equipment 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.

6.3.31 The condenser will be supplied in components / parts and contractor shall have to carry out assembly and erect on the condenser foundation. This includes complete fabrication of shell out of steel plates, welding of hot well with bottom plates, assembly of water chambers and welding with side walls, bottom plates and dome wall, assembly of water chambers,

assembly of support plates, baffles and stiffening structures etc.. While carrying out the assembly stitch welding shall be done only after the due approval from BHEL Engineer. Final welding shall have to be carried out by step back seam method to ensure minimum deformation within acceptable limits of the welding parts.

- 6.3.32 The condenser will be dispatched to site from works with surface protection. Wherever the surfaces damaged/ rusted and primer got removed / peeled off, the same shall be made good suitably by Sand / shot blasting or with steam mixed with caustic soda and coated with same paint as per the instructions of the BHEL Engineer before erecting the same.
- 6.3.33 All the weld seams shall be properly ground and subjected to radiographic examination as per manufacturer's recommendation. If any paint or rust (other than steam washable paints) noted in the steam side of the condenser parts, are to be removed either by Sand / shot blasting or buffing method.
- 6.3.34 The contractor shall have to carry out the condenser tubes insertion and expansion at site after the installation of condenser on their foundation. Before insertion of tubes the contractor shall check for absence of any dents, mechanical damages or any other defects of tubes caused during storage or transportation. Tube should be thoroughly cleaned. Only fine emery paper shall be used for cleaning the tubes at the ends where expansion has to be carried out.
- 6.3.35 Before insertion of tubes the contractor shall clean the surface of the holes in the tube plates and tube support plates for paint / corrosion spots, oxide scales etc., using chemical cleaning agent like carbon tetra chloride.
- 6.3.36 The tube shall be inserted such that it shall project 2 to 3 mm beyond the tube plate outer surface. The tube shall be expanded using an automatic electronic torque control tube expanding unit or pneumatic tube expander so as to get the % thinning of the tube walls and elongation of tube ends as recommended by the supplier/ Drg./ Tube expansion procedure. The length of expansion in no case shall exceed a length of 70 to 80% of the tube plate thickness. Finally, proper trimming of the excess length of the tube shall be carried out and flare-up / bell mouthing has to be done by the contractor at his cost.
- 6.3.37 The contractor shall carry out the condenser neck welding with LP casing. It shall be ensured that all spring supports are evenly loaded and the gap between the condenser and the different spring supports is within 1.0 mm. The clearance between the condenser neck and the LP exhaust hood should be within 3 mm by suitably lifting the condenser. Machined packers of suitable thickness are to be used under the spring supports and condenser load is to be gradually transferred on these packers. The neck welding shall be subjected to non-destructive testing.

- 6.3.38 The hydrostatic testing of steam space with the condenser vacuum system and hydraulic testing of water space with the circulating water lines after assembly of water boxes are also included in the scope of the contractor.
- 6.3.39 Water boxes inside Carbon steel surfaces are to be Sand / shot blasted before hydraulic testing. After hydraulic testing of CW side the water boxes and the water chambers are to be thoroughly cleaned for removal of all traces of dirt, grease, oil, rust etc., it shall be dry and free from burns and shall have a metallic surface. The (Sand/shot) Blasting machine and accessories and also the required consumables shall be arranged by the contractor within the quoted rate.
- 6.3.40 Condenser handling equipment & Structures shall be erected by the contractor within the quoted rate.
- 6.3.41 The condenser steam space shall be surface protected at least two coats of suitable steam washable paint. Before the painting is taken up, the contractor shall clean the surfaces thoroughly by sand / shot blasting or with steam mixed with caustic soda. Painting should be carried out by the contractor before tube insertion.
- 6.3.42 Supply & application of paints & required consumables etc. are in the scope of contractor and is to be within the quoted rate.
- 6.3.43 Floating of foundation of BFP & Condenser and readjusting of spring is covered in this scope of work.
- 6.3.44 The contractor shall carryout the erection of rubber expansion bellows, stretching bolt assembly and connected joints within the quoted rate.
- 6.3.45 The feed water storage tank will be supplied in three sections with feed pipe, heating steam header, spray nozzles, supports etc., in loose components. These are to be erected, aligned & welded in position. Welding, NDT & heat treatment if required shall be carried out by the contractor within quoted rate. IBR / statutory requirements, if any, shall be in the scope of contractor and necessary drawing/ details only will be given by BHEL.
- 6.3.46 Erection of platform and supporting structures around FST / De-aerator is covered in the scope of contract and shall be erected by the contractor with in the quoted rate.
- 6.3.47 LP Heater No. 1 is to be erected inside the condenser in rear side, for which contractor has to cut open the condenser dome plate already erected. After erection, condenser plates have to be strengthened / stiffened as per the instruction of BHEL Engineer.

- 6.3.48 The foundation deck of BFP's is supported with Imported Vibration Isolation Springs, which will be erected by the civil contractor. The final adjustments of springs and floating of springs to be done by the contractor within quoted rate by providing required man power, T & P's etc.,
- 6.3.49 For other agencies, such as Power Cycle Piping, Cabling, instrumentation 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.
- 6.3.50 All dimensions/elevations refers to centerline of pipe unless otherwise specified, the pipe routing shall be carried out as per the drawing. Wherever the dimensions are not specified / shown as approximate the same may be routed as per site requirement / convenience as per site engineer's advice. For pipes nominal size 2" and below routing shall not be shown in piping layouts or in isometrics and the same to be routed / connected as shown in schematics. For the above size if the routing is shown in layouts it is only for guidance and the same shall be routed and supported as per site requirement / convenience as per site engineer's advice.
- 6.3.51 Slope of 1:500 shall be maintained towards drain point unless otherwise specified.
- 6.3.52 All site-fabricated pipes will be issued in running meters as straight. These are to be cut and edge prepared at site to required length to suit layout as given in the erection drawing. 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, miter bends, reducers, flanges etc., will be supplied as loose items.
- 6.3.53 Erection of all the piping systems supplied along with turbine, generator, pumps and other auxiliaries covered in this contract, is to be erected by the contractor with in the quoted rate.
- 6.3.54 Carrying out piping as per the specification between equipments constituting terminal points, whether the terminal equipments fall with in the scope of work/specification or not, contractor shall carry out the terminal joints at either end. Also where the piping connection to the terminal points involve flanged joints, matching of flanges, welding, fixing gaskets, bolting and tightening as per BHEL Engineers instructions is in the scope of work. In case piping connected to equipment, matching of flanges for achieving the parallelism and alignment at the equipment end, by suitably resorting to heat correction or other method as instructed by BHEL Engineer, within the quoted rate. IBR/ statutory requirements, if any, shall be in the scope of contractor and necessary drawing/details only will be given by BHEL.

- 6.3.55 Contractor should fabricate bends of ≤ 2 " diameter size from running meters of pipe.
- 6.3.56 Certain adjustments in length may be necessary while erecting pipelines of STG & Auxiliaries and the contractor should remove the extra lengths/add extra lengths to suit the final layout after preparing edges afresh and adopting specified NDT, Heat Treatment procedure, are in the scope of work.
- 6.3.57 Minor adjustment like removal of ovalities in pipes and opening or closing of the fabricated bends by process of heat correction or any other method approved by BHEL Engineer to suit the layout, with specified heat treatment procedure with in the quoted rate.
- 6.3.58 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.
- 6.3.59 Contractor shall arrange all the equipments, alignment bolts, tools, consumables like welding electrodes (all type), TIG wires (all type) and argon gas cylinders etc. for welding of pipes at his cost. Consumables like jute, cotton waste, hacksaw blades, petrol, Kerosene oil etc. are in contractor's scope.
- 6.3.60 Contractor shall use only bolted clamps for achieving alignment of piping. Wherever "L" shaped stoppers and wedges are to be used for aligning piping and equipments, the same shall be subject to the approval of BHEL Engineer. Contractor shall remove the bridge, stopper etc., by gouging/ grinding and not by hammering. Any burrs left on the equipments/piping, after welding, shall be ground off or any scar or cavity made good by welding and grinding. NDT tests shall be carried out if necessary to detect surface and sub-surface cracks in these ground areas.
- 6.3.61 All the weld joints on equipments and piping shall be ground or filed on completion of welding and before radiography as per instructions of BHEL Engineer so as to achieve smooth surface to avoid of ripples, undulations etc.,
- 6.3.62 Pipelines shall be cleaned off welding slag and burrs by hand files, wire brushes and flexible grinders wherever required and using cloth.
- 6.3.63 Flame cutting of piping shall be strictly done as per BHEL Engineer's instructions and in his presence only.
- 6.3.64 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.

- 6.3.65 Wherever elbows of 45 deg or any other angle. (> 2" dia pipe) are required, the same shall be cut from 90 deg. elbow supplied and used. No extra cost shall be paid.
- 6.3.66 The work on piping systems (air, water, oil, steam, gas etc.) will include laying, edge preparation, fixing and welding of the elbows / fittings / valves etc. welded on the lines, fixing and adjustment of supports / hangers / shock absorbers and carrying out all other activities / works to complete the erection and also carrying out all pre-commissioning / commissioning operations mentioned in the specification as per BHEL Engineer's instructions and / or as per approved drawings/documents.
- 6.3.67 Flow nozzles, orifice, spray nozzles forming part of the system irrespective of the supplier shall be mounted / erected after chemical and / or steam blowing/ oil flushing at site.
- 6.3.68 Erection of flow switches, steam traps, filters, flow meters, other metering elements, flow orifices, flow indicators, control valves supplied either by BHEL or customer forming part of the system is in the scope of work. This will include collecting from BHEL / Customer stores, transport to site, suitably cutting the erected piping, cleaning, erection, welding, radiography and stress relieving and commissioning.
- 6.3.69 Contractor shall also weld small length of piping with root valve for pressure, temperature, flow and level tapping points on piping or flow nozzles/orifices/ metering elements fixed on piping as per the instructions of BHEL Engineer.
- 6.3.70 All drains/ vents/ relief / escape / safety valve piping to various tanks / sewage / drain canal / flash box / flash tank / condenser / sump / atmosphere etc. from the stubs on the piping and equipments erected by the contractor is completely covered in the scope of work.
- 6.3.71 Contractor should fabricate bends at site from running meters of piping for the above and cut, edge prepare and lay the piping as per BHEL Engineer's instructions.
- 6.3.72 Fixing / fitting / welding of thermo wells, stubs, hoses, tapping points, root valves and instruments etc. (including PG Test requirements) forming part of the system irrespective of the supplier on different lines / equipments are within the scope of this contract. Fixing of Pick-Ups, Probes & Accessories for vibration monitoring system is within the scope of this specification.
- 6.3.73 The contractor shall conduct non-destructive tests like Radiography, Ultrasonic, Dye penetrant, Magnetic particle tests, etc. on welds, castings, valve bodies & other equipments etc. and Ultrasonic test for finding thickness of materials as per BHEL Engineer's instructions.

- 6.3.74 Plate / Pipe shoes for piping supports shall be fabricated at site by the contractor. Other supports namely Hangers, U-clamps etc. shall be supplied by BHEL duly bent and threaded. Assembly and necessarily cutting work etc. shall be carried out at site by contractor within the quoted rate.
- 6.3.75 Contractor shall arrange the necessary clearance from the statutory authorities (IBR, Electrical Inspectorate, etc..) as required for installation of the plant and equipment and render all assistance, service required in this regard. Inspection fee and any statutory fees will be paid by BHEL.
- 6.3.76 Wherever hanger and support materials of piping are not received from manufacturing unit in time, to suit the erection schedule contractor shall erect the piping system on temporary supports to ensure the progress of work. The required structural steel materials will be issued on free of charges by BHEL, either from scrap/spare materials. The same shall be removed and returned to BHEL store after erection of permanent supports. The above work is within the scope of this contract.
- 6.3.77 All Operating/ Approach platforms, cross over, canopies, ladders etc., shall have to be fabricated from raw materials supplied by BHEL and are to be erected as per instruction of BHEL, by the contractor within the quoted rate.
- 6.3.78 Contractor shall be supplied with two extra blue prints of the layout & isometrics. Contractor to incorporate in one of the blue prints with red ink all the changes/deviations/alterations etc. carried out at site due to various reasons, with site engineer's endorsement. Marked up drawings shall be submitted to BHEL for approval.

6.4.0 HYDRAULIC TEST, PRE-COMMISSIONING & COMMISSIONING:

- 6.4.1 Hydraulic testing pumps for HP lines shall be provided by BHEL free of hire charges. The servicing, installation, electrical connection, erection, testing and dismantling and returning to BHEL Stores, etc., shall be carried out by the contractor as part of this work without any extra charges. For LP lines contractor has to arrange Hydraulic Test pump / Hand Pump for HT at his cost. The Electric power consumption for the operation of HT Pumps will be charged as per cl. no. 3.2.2.
- 6.4.2 All pressure parts and some of the Low Pressure parts shall be subjected to hydraulic test as per the Standard / statutory requirements. The contractor shall supply necessary labour and other services and make necessary arrangements to carry out the required tests as per the instructions and directions of the BHEL Engineers.
- 6.4.3 Contractor at his cost shall lay all necessary temporary piping, install the pumps, blanks, valves required for the test, pressure gauges etc. Required pipes, valves, plates etc., will be given by BHEL. Temporary piping,

pumps, valves, flanges, blanks etc shall be removed by him and returned to BHEL.

- 6.4.4 The hydraulic testing of the equipment and piping, covered under this scope of work including vacuum system testing by water filling has to be carried out by the contractor as per instructions of BHEL Engineer. The contractor shall provide all facilities required for hydraulic testing. Filling pump shall be arranged by the contractor at his cost.
- 6.4.5 All the above tests shall be repeated till all the equipment satisfy the requirement of BHEL to their customer. As far as the hydraulic pressure test is concerned and same shall be conducted to the satisfaction of Boiler Inspector wherever applicable. Any rectifications required shall have to be done / redone by the contractor at his cost.
- 6.4.6 Lube oil, seal oil, governing oil, pipelines to ST, STG, Pumps, etc. shall be oil flushed. Contractor will have to lay temporary piping to connect the entire system irrespective of whether the equipment/system connected has been erected by the contractor or not. Decisions of BHEL Engineer in this regard will be final and binding on the contractor.
- 6.4.7 Cleaning of oil tank by sand/shot blasting or other method as per instructions of BHEL Engineer before and after oil flushing is the responsibility of the contractor.
- 6.4.8 Replacing/changing of mechanical seal/other seals and removal, cleaning or replacing of filters etc. during pre-commissioning / commissioning stage is within the scope of work.
- 6.4.9 Overhauling, Cleaning, Servicing of tanks, pumps, equipments, barring gear, valves, governing system during erection and commissioning stages are in the scope of work. Gaskets, packing for replacement will be provided by BHEL free of cost.
- 6.4.10 Contractor shall lay the temporary pipelines with fittings, accessories and erection & commission of pumps, tanks and other installations as instructed by BHEL Engineer for the purpose of chemical cleaning/alkali flushing/steam blowing/ steam washing/ steam flushing/water flushing/ water washing/oil flushing etc., of piping and other equipments are within the scope of work. Necessary materials for this will be provided by BHEL. Overhauling / cleaning / revisioning /servicing of valves, fittings in temporary system and acid cleaning tanks for re-commissioning activities / operation like water flushing / steam blowing / washing / flushing / passivation / chemical cleaning etc. and also over hauling / revisioning of the pumps & equipments and also to carry out the repairs to attend leaks etc. in the temporary piping & equipments, prior & while carrying out the above operations/activities. All the above works are within the scope of work. All the chemicals will be supplied by BHEL free of cost.

- 6.4.11 Chemical cleaning (Acid cleaning of piping/alkali flushing) will involve the installation of temporary piping, valves, cutting of some of the existing valves, placing the rubber, wedges in the valves, gagging of valves, and installation of temporary tanks for chemical and for mixing. Necessary temporary access platforms to mixing tank are to be made by the contractor. The dissolving tank, neutralizing tank etc. required for acid pickling will have to be carried out by the contractor. Required materials will be provided by BHEL free of cost. Chemicals for chemical Cleaning will be provided by BHEL. All other consumable are to be provided by the contractor.
- 6.4.12 Pre commissioning of oil lines includes oil flushing of the pipelines till the entire system and the pipelines are accepted as satisfactorily cleaned after inspection of centrifuge bowl for sediments and laboratory tests of the oil samples taken from the system. After declaration of complete oil flushing of system, oil tank, coolers & the system shall be completely drained, thoroughly cleaned and refilled with fresh oil for putting the system in operation. The contractor shall provide requisite Man-power like skilled/semi skilled workmen in three shifts during oil flushing as a part of this contract without any extra charges. Before commissioning of oil system the pipelines should be hydraulically tested using the hydraulic test pump to the required pressure.
- 6.4.13 Contractor shall lay all necessary electric cables, switches, etc. required for the hydraulic tests and other tests, flushing etc., and maintain the system till the tests are completed satisfactorily.
- 6.4.14 Steam blowing of system piping if required will involve laying of temporary pipe lines, valves, etc and dismantling & restoration of piping. The required steam shall be provided at a central point by BHEL.
- 6.4.15 During the initial stages of work, trenches for draining water may not be available after Leak test, Hydro test, Flushing or mass flushing. For discharging/ emptying the equipment, system and piping, necessary low point drains and temporary piping upto safe location are to be erected by the contractor at his cost. The materials will be provided by BHEL.
- 6.4.16 After acid cleaning / pickling of lubricating system (including oil piping, oil tank and other fittings) of rotating machines, oil flushing of lubricating systems as per instructions of BHEL Engineer shall be carried out. Cleaning of all tanks of lubricating oil system of ST, STG and rotating machineries before and after oil flushing is in the scope of work.
- 6.4.17 After the chemical cleaning has been successfully completed, removing all temporary piping, fittings of tanks etc. Checking all the valves for any accumulation of foreign materials, welding the valves & pipes which were cut and cleaning & re-fixing as per BHEL Engineer's instructions is within the scope of work/ specification.

- 6.4.18 The contractor as per BHEL requirements will suitably make preservation of cleaned surfaces. All shaft journals and bearings of ST, STG, motor and other rotating machines shall be periodically inspected and preserved as per BHEL Engineer's instructions/BHEL quality instruction manuals.
- 6.4.19 Raw materials for all temporary piping necessary for conducting Hydraulic test, Chemical cleaning, Steam blowing, Flushing, effluent disposal, etc. will be provided by BHEL free of cost. However, fabrication, servicing, erection and dismantling the same and return of the temporary piping, flanges, valves etc. to BHEL stores is the responsibility of the contractor without any extra charges.
- 6.4.20 The contractor shall carryout the required tests on the equipments & pipelines, such as gas tightness test/air tightness test, kerosene test, hydrostatic test and rectify all the defects caused due to contractor's fault at his own cost. Contractor may have to replace old/damaged gaskets / packing etc. of equipments and the same shall be carried out by contractor as per requirement. Compressed air for pneumatic testing is to be arranged by contractor. The contractor shall carry out the trial run of motors including checking the direction of rotation in the uncoupled condition, checking, aligning and coupling the motor to the respective driven equipment. Before starting the motor IR values of insulation shall be recorded and if found necessary dry out to be done by the contractor to improve the IR value at no extra cost.
- 6.4.21 In case any erection defect is detected during various tests / operations, trial runs as detailed above, such as loose components, undue noises, vibration, strain on connected equipment, steam/oil/water leakage, etc. the contractor shall immediately attend these defects and take necessary corrective measures. If any readjustment and 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.
- 6.4.22 Welding and stress relieving of temporary blanks or suitably fixing temporary blank flanges with gaskets and fasteners and welding and providing suitable de-aeration / venting / draining points with valves as per BHEL Engineer's instructions, for performing hydro-test of piping and other equipments is within the scope of work. Gaskets, valves, fasteners will be provided free of cost by BHEL. Contractor shall cut steel blanks from steel provided without charging extra. After completion of hydraulic test, welded blanks shall be cut and removed and weld burrs ground finished and cavities/scars of cutting weld filled and ground as per BHEL Engineer's instructions.
- 6.4.23 Necessary scaffolding and approaches for conducting the above shall also be within the scope of the contract.

- 6.4.24 Main Steam Line & Hot Reheat Line Strainers bodies are erected first before steam blowing of the lines. After Hydraulic Test, the strainer elements are fixed. During trial operation, if required the strainers are removed for inspection of derbies & cleaning. Contractor has to carry out the work as part of his work without any extra cost.
- 6.4.25 For conducting Hydro test of MSL, HRH, LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are to be removed, Hydro Test devices are to be fixed and after Hydro Test the internals are to be re-assembled by the contractor as instructed by BHEL without any additional cost.
- 6.4.26 For steam blowing of MSL, HRH, LP BP & CRH Lines, ESV, IV & LP BP Valves & CRH NRV internals are removed and Hydro Test devices are fixed by the contractor. After Hydro Test the internals are to re assembled as instructed by BHEL without any additional cost.
- 6.4.27 The Contractor shall carry out the air tightness test on generator stator to the satisfaction of BHEL Engineers. The necessary arrangements for testing with dry clean air shall be made by the contractor. Also the contractor has to arrange the mercury manometer and mercury at his cost.
- 6.4.28 The contractor shall assist to carryout the following tests in generator within the quoted value:
- a. High voltage test of bushings
 - b. Measurement of DC resistance of rotor and stator.
 - c. Impedance test of rotor.
 - d. Measurement of IR values of stator – rotor – RTD Thermocouples etc.
- 6.4.29 The contractor shall carryout kerosene test of all the bearing housing of turbine, generator, pumps & other equipments and do the repair work if any. The contractor at his cost shall also arrange kerosene.
- 6.4.30 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.
- 6.4.31 Temporary blinds/lugs/caps of piping and associated equipments like tanks, pumps etc required for oil flushing / alkali cleaning / acid cleaning of piping & other equipments during erection & pre-commissioning shall be erected by contractor within the quoted rate.
- 6.4.32 In case any malfunctioning and/or defect is found during tests/trials runs such as loose components, undue noise or vibrations, strains etc. on equipment, the contractor shall immediately attend to these defects/malfunctioning and take necessary corrective measures. If any

readjustment and re-alignment are necessary the same shall be done as per BHEL Engineer's instructions as part of work at no extra cost.

- 6.4.33 During the stages of pre-commissioning / commissioning / post commissioning, if any part of the ST, STG, and auxiliaries need repair/rectification/rework/replacement, the same shall be done expeditiously and promptly by the contractor.
- 6.4.34 During this period, though BHEL's and customer's staff also be associated in the work, it is the contractor's responsibility to make available the resources in his scope till such time the commissioned units are taken over by the customer/BHEL.
- 6.4.35 Contractor shall cut open the works if needed, as per BHEL Engineer's instructions during commissioning for inspection, checking and make good the works after inspection is over. This contingency shall be included within the quoted value. 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.
- 6.4.36 Contractor to provide necessary commissioning assistance from pre-commissioning stage onwards and up to continuous operation of Steam turbine, STG and Auxiliaries. The category of personnel to be deployed shall be as per site requirement and to meet the various pre-commissioning and commissioning program made to achieve the schedule agreed with customer.
- 6.4.37 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 for a period of six months or till handing over of sets to customer, which ever is earlier.
- 6.4.38 After rolling of turbine, the commissioning activities and trial operations will continue upto handing over. It shall be the responsibility of the contractor to provide various categories of workers in sufficient numbers as per the work requirement along with supervisors including necessary consumables, tools, etc. during this period. The rate quoted shall include all these contingencies also. The various categories of workers required for pre-commissioning, commissioning and post-commissioning activities are as follows.
- a. Pipe fitters
 - b. Mill Wright Fitters
 - c. HP / Structural welders
 - d. Riggers
 - e. Unskilled workers

- f. Supervisors
- g. Electricians
- h. Any other category of workers as may be required

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

1. One supervisor per shift for three shifts
2. Two fitters per shift for three shifts
3. Two helpers per shift for three shifts.

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

6.4.39 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.

6.4.40 It is the responsibility of the contractor to provide necessary manpower, tools, tackles and consumable till the completion of work under these specifications including for trial operation, commissioning of STG and the other equipments, even though the delay reasons are not attributable to the contractor.

6.5.0 FINAL PAINTING

6.5.1 The scope of work shall include supply and application of final painting as required and specified for the components of TG and its auxiliaries, TG Integral piping and CW piping erected under your scope.

6.5.2 For details, refer Painting scheme/schedule enclosed.

6.5.3 Support tube plates, shell internals, dome internals, steam throw off device (steam side), air extraction piping etc., inside the condenser shall be painted with steam washable paints if required.

6.5.4 The interior surfaces of water boxes & water side surface of water chambers excluding tube plates are to be painted as per the procedure /approved painting schedule given by BHEL Engineer/ Mfg. unit.

6.5.5 Required paints, thinner other consumable such as wire brush, brush etc shall have to be arranged by the contractor at their own cost.

- 6.5.6 In the case of steel fabricated items, raw steel after fabrication has to be cleaned by Sand / shot blasting by and subsequent painting to be carried out. Sand / shot blasting equipment as required has to be arranged by the contractor at his cost.
- 6.5.7 All the exposed metal parts of the equipments including piping, structures, hangers etc., wherever applicable after installation unless otherwise specified the surface to be protected, are to be first painted with at least one coat of suitable primer, 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 painted with intermittent and final coating as specified in the Painting Specification **Section VII, Appendix VI** and as per the instructions of BHEL / Customer official. If needed and insisted either by BHEL engineer or the BHEL client, in certain cases, spray painting has to be done wherever brush painting is not accessible, by the contractor, within the quoted rates. Contractor has to carryout painting as per the procedure lay down by the customer.
- 6.5.8 Before applying the subsequent coats as per specification the thickness of each coat shall be measured and recorded with BHEL/Customer. The instrument for checking the thickness of coat is to be procured by the contractor and should be calibrated after periodical intervals.
- 6.5.9 The quality of the finish paint shall be as per the standards of ISI or equivalent and the colors as approved by BHEL/Customer.
- 6.5.10 The actual color to be applied shall be intimated to the contractor before starting of actual painting work. The quoted rate shall include final painting also. The scope of painting includes application of color bands, lettering the names of the systems/ equipments, tag nos of valves, marking the directions of flow and other data required by BHEL within the quoted rate.
- 6.5.11 Primer & finish coat shall be of reputed paint supplier approved by BHEL/Customer. The batch certificates of paints to be submitted to BHEL Engineer before using the same.
- 6.5.12 GI, Stainless steel, brass, aluminum, copper and other non-ferrous materials shall not be painted unless otherwise specified.
- 6.5.13 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 un-coated spots. Each coat (Primer, intermediate, finish) shall have a minimum thickness of 70, 70 & 60 microns respectively and total thickness of 200 microns unless otherwise specified. 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%.

6.6.0 WELDING, HEAT TREATMENT, RADIOGRAPHY AND NON-DESTRUCTIVE TESTING

- 6.6.1 All necessary preheating, post heating of welds and stress relieving operation of welds are part of the erection work and shall be performed by the contractor in accordance with the relevant regulations and standards of BHEL practice and to the satisfaction of BHEL Engineer and in accordance with the drawings and specifications.
- 6.6.2 Erection of equipment involves good quality of Welding, Heat treatment and Non Destructive Testing. Wherever required, 100% dye penetration tests have to be carried out as per instructions of BHEL Engineer. Contractor's Engineers, Supervisors, Technicians and workers engaged should have adequate knowledge on the above works.
- 6.6.3 The pressure parts piping's shall be erected in conformity with the provision of Indian Boiler Regulations and as may be directed as per any other standard/specification in practice in BHEL. The method of welding (viz.) Arc, Gas, TIG or other methods are indicated in the detailed drawings. BHEL Engineer will have the option of changing the method of welding as per site requirements.
- 6.6.4 Welding of high pressure parts shall be done by certified High Pressure Welders who possess valid certificate of CIB of the State in which the equipment is erected as per provision of IBR. The high pressure welders who possess necessary certificate shall appear well in advance before the expiry of the validity of their certificate for re-qualification test as per relevant provision of IBR and keep the certificate valid till the completion of work. The services of such welders, the validity of whose certificates has expired shall have to be suspended forthwith.
- 6.6.5 All welders deployed on this work shall be tested and approved by BHEL Engineer before they are actually engaged on work though they may possess the IBR certificate. BHEL reserves the right to reject any welders without assigning any reason.
- 6.6.6 BHEL Engineer is entitled to stop any welder from the work, if his work is unsatisfactory for any technical reasons or there is a high percentage of rejection of joints welded by him, which in the option of the BHEL Engineer will adversely affect the quality of the welding, though the welder has earlier passed the tests prescribed by BHEL Engineer. The welders having passed qualification tests does not relieve the contractor of a contractual obligation to check on the welder's performance.
- 6.6.7 All charges towards testing of welders for destructive and non-destructive testing and approval of welders for engaging in the erection work shall be borne by the contractor.

- 6.6.8 All radiographs shall be free from mechanical / chemical process marks to the extent they shall not confuse the radiographic image and defect finding penetrometer. As per ASME / SI shall be used for all exposures.
- 6.6.9 All welded joints shall subject to acceptance by BHEL Engineer.
- 6.6.10 Preheating, post weld heating and stress relieving after welding are part of erectors work and shall be performed by the contractor in accordance with the instructions of BHEL Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the contractor shall have to arrange for labour, all heating elements thermocouples etc. insulating materials like mineral wool, asbestos, clothes, ceramic beads, asbestos ropes etc., required for heat treatment and stress relieving works.
- 6.6.11 The contractor shall maintain a record in the format as prescribed by BHEL of all operations carried out on each weld and maintain a record indicating the number of welds, the names of welders who welded the same, date and time of start and completion, preheat temperature, radiographic results, rejection if any, percentage of rejection etc. and submit copies of the same to the BHEL Engineer as required. Interpretation of the BHEL Engineer regarding acceptability or otherwise of the welds shall be final. All site welds shall be subject to acceptance of BHEL / Customer Engineers.
- 6.6.12 The contractor shall carry out the edge preparation of weld joints at site in accordance with details acceptable to BHEL Engineer. Wherever possible machining or automatic flame cutting will be allowed only for edge preparation. Some extra lengths in various fabricated pipes given as erection allowance shall have to be cut and edges prepared to suit the site conditions at no extra cost.
- 6.6.13 Lead numbers, letters (Generally of 6 mm size) are to be used for identification of radiographs. Contract number, joint identification, source used, welders identification, SFD used are to be noted down on the paper cover of radiograph. Lead intensifying screens for front and back of the film shall be used as per the instruction of BHEL Engineer.
- 6.6.14 The weld joint is to be marked with permanent mark A, B, C, etc. to identify the segments. For this a low stress stamp shall be used to stamp the pipe on the down stream side of the weld. For multiple exposures on pipes an overlap of about 25 mm of film shall be provided.
- 6.6.15 Heat treatment may be required to be carried out at any time (day and night) to ensure the continuity of the progress. The contractor shall make all arrangements including labour required for the work as per directions of BHEL.

- 6.6.16 All the data such as heating temperatures, heating rate, soaking time, maximum temperature reached during heat treatment shall be properly recorded and documented which will be property of BHEL.
- 6.6.17 Oxy-acetylene flame heating or exo-thermic chemical heating for stress relieving is not permitted. Heating shall be by means of Electric Induction coil or Electric resistance coil. Potentiometric type recorders shall only be used for temperature recording purposes.
- 6.6.18 Radiography work of the welds connected with this contract shall be arranged by the contractor including provisions of services of technicians and necessary equipment and consumables like Isotope camera, X-Ray films, chemicals and other dark room facilities etc. Also contractor has to provide necessary labour required such as Riggers, Helpers etc. to assist the technicians for carrying the above radiography work and making other arrangements. Such as providing scaffolding, approaches, platform lighting arrangements at his cost as per the instructions of BHEL. It may please be noted that invariably the radiography will be carried out after the normal working hours only.
- 6.6.19 Radiography inspection of welds shall be performed in accordance with the requirements and recommendation of BHEL Engineer. The Minimum extent of radiographic inspection shall be as per BHEL Drgs./ provision of IBR Regulations. They may however be increased depending upon the performance of the individual welder at the discretion of BHEL Engineer/Boiler inspection authority. Kindly refer Welding specification for Piping system Booklet enclosed with the tender for further informations.
- 6.6.20 If the contractor does not carry out radiography work in time due to non-availability of film, chemicals etc. BHEL shall get the work done departmentally or through some other agency at the risk and cost of the contractor.
- 6.6.21 Wherever radiographs are not accepted on account of exposure, joints shall be re-radiographed and new films submitted for evaluation. Radiographs shall be taken again on joints after carrying out repairs. However, if the defects persist after first repair as per radiograph, carrying out radiography shall be repeated till the joint is made acceptable. In case the joint is not repairable the same shall be cut, re-welded and re-radiographed at contractors cost.
- 6.6.22 Contractor has to make his own arrangements for air conditioned dark room to process the radiographs.
- 6.6.23 Quantum of radiography (percentage of joints) shall be enforced as per specifications and as per the drawings.

- 6.6.24 BHEL Engineer reserves the right to alter the quantum of radiography of joints. The decision of the BHEL Engineer in this regard is fixed and final and binding on the contractor. Any defects as pointed out by BHEL Engineer shall have to be rectified by the contractor at his cost. All X-Ray films of joints radiographed at site in connection with work shall be properly preserved in air-conditioned rooms and shall become the property of BHEL.
- 6.6.25 All field joints shall be subjected to dye penetrant examination as specified in the respective drawings and shall have to be accepted by BHEL Engineer. Any rectifications required shall have to be done by the contractor at his cost.
- 6.6.26 For carrying out ultrasonic testing of welds including large size tubes and pipes it will be necessary to prepare the surface by grinding to a smooth finish and contour as desired by BHEL Engineer. The contractor's scope of work includes such preparation and no extra charges are payable to this.
- 6.6.27 It may also become necessary to adopt inter layer Radiography / MPT/ UT depending upon the site / technical / requirement necessitating interruptions in continuity of the work and making necessary arrangements for carrying out the above work. The tenderers shall take all this into account and quote the price inclusive of all such work and radiography.
- 6.6.28 The welded surface irrespective of place of welding shall be cleaned of slag and painted with primer paint to prevent corrosion at no extra cost towards this.
- 6.6.29 The contractor shall have to do root run by TIG process, wherever required as per the instruction of BHEL Engineer.
- 6.6.30 Welding of Hangers, supports, stubs and impulse pipings to be carried out by the contractor as per drawing specification and as per BHEL Engineer's instructions. According to drawing specifications and as per BHEL Engineer's instructions preheating, post-heating, stress relieving, etc. have to be carried out by the contractor wherever necessary.

6.7 TIME SCHEDULE

- 6.7.1 The contractor has to commence the work within 15 days from the date of issue of Fax LOI.
- 6.7.2 The entire work of erection, testing and commissioning as detailed in the Tender Specification shall be completed within **Eighteen (18)** months from the date of commencement of work for the respective Units.
- 6.7.3 During the total period of contract, the contractor has to carry out the activities in a phased manner as required by BHEL Engineer and as per the programme of events / targets fixed by BHEL / Customer.

- 6.7.4 For the above purpose, the erection work shall be commenced as may be stipulated in the letter of intent and shall be deemed to have been completed in all respects only when all the components / equipments are erected and trial runs, testing and commissioning of all the equipments are completed and the unit is operated successfully under full load condition and completion of trial operation. The decision of BHEL in this regard shall be final and binding of the contractor.
- 6.7.5 During the tenure of contract, if BHEL is not satisfied with the progress of work, BHEL have the right to withdraw any portion of work, balance work and get the same done either employing their own men or through other agency at your own risk and cost. You shall not be entitled for any compensation whatsoever in this regard.
- 6.7.6 BHEL, owing to its commitment to their customer, may ask contractor to compress the total completion schedule. Contractor shall plan his activities and mobilise additional resources accordingly to the satisfaction of BHEL engineer within the quoted rates.
- 6.7.7 The entire work of erection, testing and commissioning of Steam Turbine & Generator with associated auxiliaries, turbine integral piping as detailed under this tender specifications shall be carried out and completed as per erection and completion schedule as indicated below.

Sl.No	Mile stone	From Start of Erection
01	Commencement of Condenser erection	Within 15 days from the date of LOI issued
02	Commencement of TG erection	Within One Month
03	Turbine Box-up	10 Months
04	Generator Boxing-up	11 Months
05	Completion of Oil Flushing	12 Months
06	Barring Gear	13 Months
07	Rolling & Synchronization	15 Months
08	Trail Operation	17 Months
09	Handing over	18 Months

6.8.0 TERMS OF PAYMENT

6.8.1 CONDENSER 2 nos (16%)

- 6.8.1.1 Preparation of foundation for condenser erection 0.5%
- 6.8.1.2 Assembly welding and placement of bottom plates sole plates hot well and spring elements 1.5%
- 6.8.1.3 Assembly and welding of side plates water chambers And water boxes 2.0%

6.8.1.4	Installation and welding of tube support plates air evacuation piping and internals	3.0%
6.8.1.5	Assembly and welding of Dome walls and stiffening structure & Placement of LPH 1	2.0%
6.8.1.6	Installation, expansion and end milling and flaring of condenser tubes	4.0%
6.8.1.7	UV Lamp test of steam space and hydraulic testing	1.0%
6.8.1.8	Floating of condenser and welding of condenser with Turbine exhaust hood	2.0%
	Total percentage for Condenser	16.0%
6.8.2	TURBINE –HP,IP&2nos of LP Cylinders(18%)	
6.8.2.1	Matching leveling alignment of base plates and bearing pedestal and longitudinal girders and grouting	2.0%
6.8.2.2	Assembly of bottom half of LP cylinder leveling and Alignment-2nos	3.0%
6.8.2.3	Placing of LP rotor leveling and centering-2nos	3.0%
6.8.2.4	Placing of HP & IP modules centering and leveling	1.0%
6.8.2.5	Alignment of HP/IP/LP rotors honing and coupling	2.0%
6.8.2.6	Assembly welding of LP outer casing-2nos	3.0%
6.8.2.7	Erection of ESV, IV, LP & HP Bypass valves and assembly of regulation system	2.0%
6.8.2.8	Fixing of permanent keys revision of main oil pump and alignment box up of front bearing pedestal	2.0%
	Total percentage for Turbine	18%
6.8.3.0	TURBOGENERATOR (10%)	
6.8.3.1	Preparation of foundation and frames for stator	0.5%
6.8.3.2	Erection of Portal Gantry, Lifting, Positioning and centering of stator on Foundation & Dismantling & Returning of Portal Gantry	2.0%
6.8.3.3	Threading of rotor after completion of all electrical and other tests	2.0%

6.8.3.4	Grouting of Generator Bearing pedestal and Exciter	1.0%
6.8.3.5	Final alignment Reaming honing and coupling of generator with turbine rotor	1.0%
6.8.3.6	Boxing up of Generator	2.0%
6.8.3.7	Gas tightness test of stator with total system	1.0%
6.8.3.8	Completion of Generator Testing	0.5%
	Total percentage of Generator	10%

6.8.4 HEATERS & DEAERATOR (9%)

6.8.4.1	Erection, Alignment, Welding & NDT of FST & Deaerator	2.5%
6.8.4.2	Erection & Welding of Internals & Hyd.Test	2.5%
6.8.4.3	Main Oil Tank Oil coolers & CF Coolers	1.0%
6.8.4.4.	Erection of HP heaters (5 (A&B), 6 (A&B))	1.0%
6.8.4.5	Erection of LP 2 & 3 Heaters	0.5%
6.8.4.6	Erection of GSC & Drain Cooler	0.5%
6.8.4.7	Generator Cooling System Coolers	1.0%
	Total Percentage for Heaters & Deaerator	9.0%

6.8.5 PUMPS (13%)

6.8.5.1	Erection of One No. Boiler feed pump, Hydraulic couplings, motor and booster pumps along with Lube oil and other systems	2.0%
6.8.5.2	Erection of Condensate pumps and Motors along with it accessories (3Nos)	1.5%
6.8.5.3	Erection of Two Turbo Drives and BFP with complete system	4.5%
6.8.5.4	Erection of JOP, AOP, EOP & Other Pumps	1.0%
6.8.5.5	Erection of DM/ACW Pumps with motors	1.0%
6.8.5.6	Erection of CW pumps with Motors	3.0%
	Total percentage for Pumps	13%

6.8.6	PIPING (17%)	
6.8.6.1	Erection, welding, NDT and completion of IP inlet pipe assy	0.5%
6.8.6.2	MS&HRH Line Strainer Erection and Fixing Internal after steam blowing	1.0%
6.8.6.3	Extraction inside condenser and Steam Throw Device	1.0%
6.8.6.4	Aux steam Gland seals	0.5%
6.8.6.5	All Drain Lines and vent lines	2.0%
6.8.6.6	Turbine Lube oil piping & supports	2.0%
6.8.6.7	Seal steam system	1.0%
6.8.6.8	Turbine water drainage piping	1.0%
6.8.6.9	Control oil piping	1.0%
6.8.6.10	Cross around piping	1.0%
6.8.6.11	Generator seal oil piping	1.0%
6.8.6.12	Generator Gas system	1.0%
6.8.6.13	Balance Misc Piping – C.W Pipe, ACW Piping for H2 cooler, Overhead DM Tank, Plate HE etc.	2.0%
6.8.6.14	COLT and SCS E&C	1.0%
6.8.6.15	Fixing of Pick-Ups, probes & accessories for verification Monitoring etc., & Thermowell Etc.	1.0%
	Total percentage for piping	17%
6.8.7	MISCELLANEOUS WORKS (6%)	
6.8.7.1	Flash tanks, steam traps, overhead storage tanks AT, nozzles, Debris filters, RE Joints, Cranes , etc. and other miscellaneous items	1.0%
6.8.7.2	E&C of LP dosing & Ammonia dosing system	1.0%
6.8.7.3	CO2 & H2 Cylinder Racks & Cylinders	1.0%
6.8.7.4	Supply and Application of Final paint	3.0%
	Total percentage for misc. works	6%
6.8.8	COMMISSIONING (4%)	
6.8.8.1	Oil flushing	1.0%
6.8.8.2	Barring gear	1.0%
6.8.8.3	Rolling, Dumping & Synchronisation	1.0%
6.8.8.4	Full load & Trial Operation	1.0%
	Total Percentage for commissioning	4%

- 6.8.9 Completion of all works including submission of protocols / FQA checks and materials reconciliation , work completion certificate by BHEL and on submission of final bill. 2.0%

The final bill will be sent to BHEL-HQ, Chennai for scrutiny and payment will be made afterwards only.

- 6.8.10 The balance amount of 5% of the executed value will be paid after the guarantee period of 12 months of the respective for units 1&2 separately. The guarantee period shall commence from the date of completion of trial run of unit or six months from the date of first synchronization whichever is earlier for each unit. However the above 5% payment can be released against submission of a matching Bank guarantee from a nationalized /schedule Bank in the prescribed Proforma of BHEL valid for one year from the date of commencement of guarantee period.

NOTE:

1. You have the option to claim 5% of the executed value for the respective unit (1&2 separately), after fulfilling the condition stipulated above.
2. However 2% of the executed value of respective unit 1&2 will be released after material reconciliation and submission of final bill of respective unit. Refer CL.6.8.9

- 6.8.11 Field Quality assurance formats: It is the responsibility of the contractor to collect and fill up the relevant FQA log sheets/welding logs & Heat treatment charts and present the same to BHEL after carrying out the necessary checks as per the log sheets and obtaining the signature of BHEL/Customer in token of their acceptance. Monthly RB Payment to the contractor will be linked with the submission of these log sheets.

- 6.8.12 No levy or payment or charge made or imposed shall be impeached by reasons for any clerical error or demanded or charged.

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

- 6.8.14 Contractor shall note that the final bill shall be released only on production of a certificate issued by site in charge that the contractor has fulfilled all the contractual/statutory requirement.

6.9.0 EXTRA CHARGES FOR MODIFICATION AND RECTIFICATION WORK

- a) BHEL may consider payment for extra works on man day basis for such of those works which require major revamping / rework/rectification/modification which is totally unusual to normal erection or commissioning work which is not due to contractor's faulty erection.

b) The decision of BHEL in this regard shall be final and binding on the contractor. The contractor may submit his work claim bills (Specifically agreed by BHEL Engineer) along with the labour sheet duly certified by BHEL Engineer at site. But BHEL also got the option to get these work done through other agencies if they so desire.

6.9.1 All the extra work, if any, carried out should be done by a separate gang which should be identified prior to start of work for certification, of man hours. Daily labour sheets should be maintained and should be signed by contractor's representative and BHEL Engineer. Signing of the labour sheets does not necessarily mean the acceptance of extra works. Only those works which are identified as not usual to normal erection and certified so by the Project Manager, and accepted by designer/supplier or competent authority only will be considered for payment.

6.9.2 The decision of BHEL in this regard shall be final and binding on the contractor.

6.9.3 The following man hour rates will be applicable for modification/rectification work.

6.9.4 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals, including consumables for carrying out any rework, re-vamping as may arise during the course of erection Rs.40/- man hour.

6.9.5 Average single man hour rate including overtime if any, supervision, use of tools and tackles and other site expenses and incidentals excluding consumables for carrying out any rework/revamping as may arise during the course of erection Rs.25/- per man hour.

6.10.0 EXTRA WORK DOES NOT INCLUDE

6.10.1 Nominal dressing of foundations, holes, bases, nuts and bolts, in case of abnormal conditions, this can be mutually discussed before starting of such work.

6.11.0 Extra works are broadly defined as below:

Design changes which will be intimated to the contractor after the start of erection and same refers to dismantling of erected components rectification of components which have been received in damaged conditions during transit, rectification of components wrongly manufactured at work, any other works which do not fall in the scope of this contract.

6.11.1 The decision of BHEL in this regard shall be final and binding on the contractor.

6.12.0 OVER RUN CHARGES

6.12.1 In case due to reasons not attributable to the contractor, the work gets delayed and completion time gets extended beyond **EIGHTEEN (18) months** from the date of commencement of the work, the contractor shall be considered for ORC. In case of ORC arises, the same will apply at **Rs.1,00,000/- (Rupees One Lakh only)** per month for extension to the completion period beyond **18 months** for the total scope of work as stated above duly taking into account the balance work at the end of that period.

6.12.2 The period of overrun will have to be ascertained before the completion of contract period.

6.12.3 During the period of over run targets will be fixed on month to month basis, which have to be adhered. In case of any shortfall due to the reasons attributable to the contractor, ORC amount will be proportionately reduced.

6.12.4 The payment of over run charges for the extended stay for reasons not attributable to the contractor will be subject to achieving the monthly programme of work as mutually agreed upon during extended stay.

6.13.0 PRICE ESCALATION

6.13.1 PVC applicable with the base index for the scheduled date of bid opening

$$P1 = 0.75 \times PO \frac{(F1-FO)}{FO}$$

Applicable even when F1 is lesser than FO. (Price reduction as applicable).

FO = New all India average consumer price index published by Labour Bureau, Simla, Government of India for Industrial workers (Base 2001 = 100) applicable for the schedule date of bid opening.

F1 = All India average consumer price Index published by labour Bureau, Simla, Government of India, for Industrial workers (Base 2001 = 100) applicable for the months under consideration.

P1 = Increase in the billing amount as per the escalation formulae for the particular month of billing.

PO = Billing amount calculated on the accepted contract rate.

6.13.2 Price escalation as per above formula will be calculated and paid (excluding payments towards extra works and overrun, if any) on month to month basis. BHEL however, reserves the right to freeze escalation for that such of duration of delays, from time to time which are entirely attributable to the contractor.

6.13.3 With the provision of price escalation as per the above no claim / compensation on account of any increase whatsoever, (irrespective of whether escalation are steep / unanticipated or not compensated by the above escalation provisions in full towards minimum wages, consumables, electrodes, gases or any other item / reasons) will be payable during the entire period of execution.

6.14.0 TAXES

6.14.1 Value Added Tax (VAT) for the works

Price quoted shall be inclusive of ALL TAXES except service tax.

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., interalia indicating the name of the supplier, address and VAT Registration No. and VAT paid for the purchases etc.

The bidder shall get registered with **TamilNadu** VAT authorities and the registration certificate shall be forwarded to BHEL immediately after commencement of work. In case , the bidder had already registered under **TamilNadu** VAT, they must quote their registration number and forward copy of Registration Certificate while submitting this tender. The bidder has to obtain VAT clearance certificate from the concerned authorities on completion of work and submit along with the final bill as one of the document for contract closure.

In case the Bidder decides to include any VAT element along with the quoted price, they shall specify in the price bid,(1) The value of VAT included in the quote, (2) The rate of VAT adopted and (3) On what value, etc. as additional information. If no VAT element is included in the price, the same shall be indicated in the quote.

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

6.14.2 SERVICE TAX

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.

6.14.3 OTHER TAXES

Any other taxes and duties (except VAT & Service Tax) viz. Entry Tax, Octroi, Seigniorage, 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.

6.14.4 NEW LEVIES & TAXES

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 actuals on submission of documentary proof of payment subject to the satisfaction of BHEL that such new levy / tax is applicable to this contract.

6.14.5 STATUTORY VARIATIONS

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 shall be 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 including extended period, if any.

6.14.6 DIRECT TAXES

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/Rules.

6.15.0 IMPORTANT CONDITIONS FOR PAYMENT

It may be noted that 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. Un Qualified Acceptance for Detailed L.O.I.
- v. Initial 50% Security Deposit.
- vi. Rs 100 /- Stamp Paper for Preparation of Contract agreement.

6.16.0 PROVIDEND FUND & MINIMUM WAGES

You are required to extent the benefit of Provident Fund to the labour employed by you in connection with this contract as per the Employees Provident Fund and Miscellaneous Provisions Act 1952. For due implementation of the same, you are hereby required to get yourself registered with the Provident Fund authorities for the purpose of reconciliation of PF dues and furnish to us the code number allotted to you by the Provident Fund authorities within one month from the date of issue of this letter of intent. Incase you are exempted from such remittance an attested copy of authority for such exemption is to be furnished. Please note that in the event of your failure to comply with the provisions of said Act, if recoveries therefore are enforced from payments due to us by the customer or paid to statutory authorities by us, such amount will be recovered from payments due to you.

The contractor shall ensure the payments of minimum labour wages to the workmen under him as per the rules applicable from time to time in the state.

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

6.17.0 OTHER STATUTORY REQUIREMENTS

1. The Contractor shall submit a copy of Labour License obtained from the Licensing Officer (Form VI) u/r25 read with u/s 12 of Contract Labour (R&A) Act 1970 & rules and Valid WC Insurance copy or ESI Code (if applicable) and PF code no alongwith the first running bill.
2. The Contractor should ensure compliance of Sec 21 of Contract Labour (R&A) Act 1970 regarding responsibility for payment of

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

3. The contractor shall submit monthly running bills along with the copies of monthly wages (of the preceding month) u/r 78 (1) (a)(1) of Contract Labour Rules, copies of monthly return of PF contribution with remittance Challans under Employees Provident Fund

Act 1952 and copy of renewed WC Insurance policy or copies of monthly return of ESI contribution with challans under ESI Act 1948 (if applicable) in respect of the workmen engaged by them.

4. The Contractor shall submit copies of Final Settlement statement of disbursement of retrenchment benefits on retrenchment of each workmen under I D Act 1948, copies of Form 6-A(Annual Return of PF Contribution) along with Copies of PF Contribution Card of each member under PF Act and copies of monthly return on ESI Contribution – Form 6 under ESI Act 1948 (If applicable) to BHEL along with the Final Bill.
5. In case of any dispute pending before the Appropriate authority under I D act 1948, WC Act 1923 or ESI Act 1948 and PF Act 1952, BHEL reserve the right to hold such amounts from the final bills of the Contractor which will be released on submission of proof of settlement of issues from the appropriate authority under the act.
6. In case of any dispute prolonged/pending before the authority for the reasons not attributable to the contractor, BHEL reserves the right to release the final bill of the contractor on submission of Indemnity bond by the contractor indemnifying BHEL against any claims that may arise at a later date without prejudice to the rights of BHEL.

6.18.0 FINAL SITE INSPECTION & TEST

The employer / owner shall maintain at site a joint protocol for recording actual measurement of work carried out at site, inspection and witnessing of various tests conducted by the contractor. 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. The contractor shall take this into consideration

while quoting his rates for various items/works. No cost whatsoever such duplication of inspection of work be entertained .

Note: All the payments including release of EMD will be made through E-remittance only, for which the bidder is requested to fill in the E-payment Format below.

Form to be filled by vendors for registering for e-payment

BHEL : PSSR : CHENNAI

DETAILS OF CONTRACTOR/SUPPLIER FOR E- REMITTANCE OF PAYMENTS BY BHEL/PSSR

- 1 NAME & ADDRESS OF THE CONTRACTOR/SUPPLIER**
- 2 BANK A/C NO**
- 3 TYPE OF A/C (CC / CURRENT)**
- 4 NAME OF THE BANK**
- 5 NAME OF THE BRANCH**
- 6 BRANCH CODE**
- 7 BANKER'S ADDRESS (BRANCH)**

- 8 MICR NO**
- 9 IFSC CODE**

NOTE : THE ABOVE DETAILS ARE TO BE FURNISHED IN THEIR LETTER HEAD BY THE CONTRACTOR /SUPPLIER ,DULY ATTESTED BY THEIR BANKERS

6.19.0 Mode of Award of work for Unit-1 and Unit-2

- (i) There are two units of 600 MW each at North Chennai Thermal Power Project. Tender SCT1389 is for Unit 1 – 600 MW only. The quantity indicated in the price bid is for Unit 1 only and the quantity for Unit 2 is also same.
- (ii) The L1 bidder against this quote will be awarded the contract for unit 1 North Chennai Thermal power project.
- (iii) BHEL reserves the right to award the contract for Unit 2 of North Chennai Thermal Power Project on the same terms and conditions of SCT1389 to the next lowest bidder in the order of competitiveness who should match his rates / price with awarded price / rate for Unit 1.
- (iv) Thus the work for Units 1 and 2 will be awarded to two agencies i.e. Unit-1 work for one agency and Unit 2 work for the other agency.
- (v) In case the other bidders in their order of competitiveness do not accept to match their rates / Price with awarded price / rate of Unit 1, then BHEL reserves the option to consider the L1 bidder, for award of Unit-2 work also at the same rate/Price and at the same Terms & Conditions of Unit-1. This will be solely at the discretion of BHEL and the L1 bidder, who is awarded the work of Unit-1, shall not have any claim for award of Unit-2 work to him, on conditions whatsoever.
- (vi) In case BHEL, at its discretion opts to go for re-tendering for award of work for Unit-2, then the L1 bidder who is awarded with Unit-1 work shall not be considered for Unit-2 work.
- (vii) Each unit will be treated as a separate contract.

SECTION – VII APPENDIX – I

BRIFE LIST OF EQUIPMENTS/COMPONANTS TO BE ERECTED IN EACH UNIT

1. STEAM TURBINE:

- Steam Turbine Consisting of 4 cylinders (HP/IP/LP-2) including the following
- Base plates, Anchor plates and Foundation Holding Bolts with Nuts.
- Bearing Pedestals
- ESV&CV, IV&CV, LPBP Valves with servomotors & Suspensions
- LP BP water injection Valves
- Steam Strainer Housing & Strainer Elements for Main Steam & Re-Heat Steam Lines
- Hydraulic Turning Gear
- Electro-Hydraulic Governing System backed-up with mechanical System
- Governing Rack, LP By-Pass racks and solenoid, test Valve racks & Pr transducers rack.
- Cross around Piping between IP&LP Casing
- Blanking Device/Fixtures for ESVs, IVs LPBP, CRH NRVs etc., for hydraulic testing and steam blowing
- Oil Supply Units & Oil piping for HPBP Valves & Spray valve (Trichy Supply Under PG 22)
- Lube Oil System consists of oil tanks, injector assy, centrifuge, AOP, JOP, EOP, Leak & Dirty oil tank with pumps, Duplex Filter, vapour fans and auxiliaries, clean oil tank, oil unloading tank, connected oil piping, valves, H&S etc.,
- Control Fluid tank, Oil equipment, piping, Valves, H&S etc.,

2. TURBO GENERATOR:

- Hydrogen Cooled Main Generator Consisting of the following
 - Stator
 - Rotor
 - End Shields & Bearing
 - Exciter
 - Seal Oil System
 - Primary Water System
 - H₂ Cooling System
 - CO₂ System
 - Seal Oil Tank
 - PW Tank & Alkaliser Unit
 - Generator package piping
 - Other Accessories

3. HEAT EXCHANGERS:

- Condenser 2 nos. mainly comprising of the following parts
 - Bottom Plate
 - Hot Well
 - Turbine & generator End side plate
 - Dome Walls
 - Front & Rear Water Chambers with Tube Plates of titanium lining
 - Support Plates
 - Springs
 - Steam Through device
 - Air Extraction Pipe & Baffle
 - Stiffening/Support Pipes/Rods, Bars etc.,
 - Misc Fittings & Loose items
 - Instruments
 - Titanium Tubes 35000 nos. in total
 - Weight of 600 MT (300 + 300)
 - LBTP = 6800 mm

- Gland Steam Cooler
- LP Heater 1, 2 &3
- HP Heaters 5(A&B), 6(A&B) & 7(A&B)
- Drain Coolers
- FST & Deareators
(FST in Sections)
- Lube Oil & Seal Oil Coolers
- Primary Water Coolers
- Hydrogen Coolers
- Exciter Air Coolers
- CF Coolers

4. PUMPS & MOTORS:

- Boiler Feed Pumps (1 Motor Driven & 2 Turbo Driven)
- 2 Drive Turbine for TD BFP Consists of
 - Turbine Assembly
 - Governing Valve Assembly
 - Oil Pumps
 - Lube Oil Console
 - Gear Box
 - Connecting Couplings
 - Oil Coolers etc.,

- Motor for MD BFP
- Booster Pumps for BFP

- Lube Oil Piping, Cooling Systems & other Accessories for BFP, Drive Turbine & Motor-2nos
- Condensate Extraction Pump-3nos
- Motors for CEP-3nos
- CW Pumps with motors and accessories

5. BOUGHT OUT ITEMS:

- Turbine Integral Piping Consists of
 - Lube Oil Piping
 - Control Oil Piping
 - Seal Oil Piping
 - Gland Seal Piping
 - Equipment Drains & Vents
 - Cross Around Piping
 - Air & Gas System Piping
 - ACW piping for H₂ Coolers
 - Other Misc System Piping Etc.,
- Condenser Tubes
- Vacuum Pumps & Air evacuation System
- Condenser Water Box Handling Equipment
- Handling Equipments for the system under this scope
- Oil Centrifuge & Associated System
- CF Purification Unit with pumps, Vapour exhauster etc.,
- 3 Way Control Valves
- Drain Valves
- Hangers & Supports
- Pumps with Accessories (JOP, AOP, EOP)
- Springs & Hanger supports
- Dampers(Vacuum Breaking Device)
- H₂ & CO₂ Cylinders, N₂ Cylinders
- Fixing of Pick-Ups, Probes & Accessories for Vibration Monitoring System
- Dynamic Shaft Grounding Device
- Bearing Vapour Exhauster
- Coupling Covers
- RE Joints & Stretching Bolt Assembly
- Flash Tanks
- Butterfly Valves
- ME Bellows
- DM Cooling Water Pumps
- ACW Pumps
- DM(ECW) Over Head Tank
- LP dosing sys for ECW
- Plate Heat Exchangers
- Self Cleaning Filter
- Portable Lube Oil Purification Unit
- Condenser On Load Tube Cleaning System(COLT)
- Misc cranes

- Hoists
- Chain pulley blocks
- Misc pumps
- Control valves
- Rota meter
- Debris filter

6. CW Piping:

CW piping between 1.7 M from 'A' row col. outside and condenser including RE joints, butterfly valves and associated equipments.

- CS Pipe – Approx. Size NB 2800/2000 mm with about 70 Joint(approx).

Note:

1. The Information furnished in this section is only a description regarding the item to be erected by the contractor. BHEL reserves the right of adding or excluding any components/ items / systems according to the site requirements/ customer requirements to complete various systems in all respects.
2. Any other systems / components which are the integral to equipment supplied by the manufacturing units shall also be erected and commissioned by the contractor within the quoted /accepted rate.

SECTION VII

APPENDIX –II

WEIGHT SCHEDULE FOR ONE UNIT

SNo	EQUIPMENT/PACKAGE	APPROX. WT (in MT)
01	Steam Turbine & Aux.	1002.0
02	Turbo Generator & Aux	526.0
03	Condenser & Heat Exchangers	1047.0
04	BFP, Booster Pumps, Turbo drive & Motors	176.0
05	CEP with Motors & Frames	52.0
06	Deaerator, FST & Drain Cooler	150.0
07	Piping & Bought out items etc.,	525.0
08	CW Piping & Fittings	265.0
09	CW Pumps – 6 nos.	254.0
	TOTAL	3997.0

Note:

1. The weight indicated above is approximate and there may be a variation in weight of equipment/Package.
2. Puddle flanges/ welded end pipe of CW piping (80-468) are already erected at site by the civil contractor. Scope of this specification not only covers to match the line with puddle flange/ weld end pipe but also any activities connected with these are to be carried out by the contractor with in the quoted rate.

SECTION VII APPENDIX - III
LIST OF PACKAGES & WEIGHTS ETC.,

Annexure attached



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P12901)

Workorder Number	10580P12901	WO Rev. Date	28.07.2009
Project	N.CHENNAI TPS ST-II:600MW	CCN	MS1070043
Rating	600MW	Std	HW0232899 :: Standard Packing

SNO	PKGNO	NETWT	GROSSWT	TYP	PKGDRG	PRGR	PGMA	ASY. DRG	DESCRIPTION	PKG SIZE	REMARK
1	601	7450	7800	Q				138	FOUNDATION PLATES	5950X1230X800	
2	602	760	1480	Q				138	FOUNDATION BOLTS	2540X655X600	
3	603	1000	1500	Q	11393801024 00			138	FOUNDATION ITEMS	5800X1120X520	
4	604	800	1000	Q				138	EMBEDDED PARTS	1000X800X400	
5	605	301000	304000	Q				135	GENERATOR STATOR	9860X4440X3870	
6	606	75090	84300	Q	01393801101 00			136	GENERATOR ROTOR WITH SKIDPLATE	14125X1790X1750	
7	607	8250	8350	Q				139	END SHIELD LOWER HALF (TE)	3900X1500X2150	
8	608	7250	7350	Q				139	END SHIELD UPPER HALF (TE)	3900X1500X2150	
9	609	8300	8400	Q				139	END SHIELD LOWER HALF (EE)	3900X1650X2150	
10	610	7300	7400	Q				139	END SHIELD UPPER HALF (EE)	3900X1650X2150	
11	611	1700	1930	Q				139	GENERATOR BEARING (EE & TE)	1390X1130X1015	
12	612	882	1100	Q				139	BAFFLE RING CARRIER & AIR GAP SEAL ASSY.	1930X1920X1160	
13	613	1062	1427	Q	11393801038 00			139	TERMINAL BUSHINGS	2200X1830X610	
14	614	5302	7300	Q				139	TERMINAL BUSHING BOX	3500X2800X1800	
15	615	1108	1530	Q				139	SHAFT SEALS (EE & TE) & OIL CATCHER (INNER & OUTER)	2110X1125X900	
16	616	600	1100	Q				139	BAFFLE RING ASSY.	1750X1750X1140	
17	617	1100	1700	Q	11393801040 00			135	GENERATOR ACCESSORIES	2140X2140X1240	
18	618	372	472	Q				139	FLEXIBLE TERMINAL CONNECTIONS	1350X850X300	
19	619	1200	1600	Q	11393801051 00			139	GENERATOR ACCESSORIES	2240X940X1220	
20	620	2471	2781	Q	11393801023 00			139	GENERATOR ACCESSORIES	1640X1140X1240	
21	621	85	140	Q				139	GENERATOR ACCESSORIES	1700X1200X250	
22	622	2400	2600	Q				153	PRIMARY WATER TANK	10500X2400X1200	
23	623	460	860	Q				150	PW TANK PIPE LINES	6800X2100X1000	

Total Net Weight:	526424	Rev. Date:	28.07.2009
Total Gross Weight:	570104	Approved By:	tgeag



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P12901)

24	624	354	454	Q		150	PW TANK PIPE LINES	3000X600X500
25	625	574	974	Q		139	PLATFORM FOR PW TANK	10500X1200X500
26	626	19992	21300	Q		135	COOLER HOUSING FRAME	4290X4450X1450
27	627	65	90	Q		139	SEAL RINGS	750X750X200
28	628	712	862	Q		139	CONNECTION PIECE ASSLY	1600X1050X400
29	629	26	51	Q		139	COOLER AIR VENT ASSEMBLY	8300X150X100
30	630	600	870	Q		139	SEALING FOR STORAGE	3950X2420X150
31	631	52	80	Q		139	DRY AIR BLOWER	1100X1000X700
32	632	5500	5900	Q		139	ERECTION PEDESTALS	5300X1500X940
33	633	2500	3000	Q	11393801033 00	136	ROTOR INSERTION AND OTHER ERECTION DEVICES	2460X1170X1240
34	634	250	330	Q		136	WIRE ROPES FOR ROTOR	1800X1800X400
35	635	1174	1649	Q		139	GENERATOR ERECTION DEVICES	3300X1555X1140
36	636	80	130	Q		139	SPECIAL TOOLS AND TACKLES	800X700X300
37	637	29928	32928	Q	11393801053 00	145	BRUSHLESS EXCITER SET	5750X2350X3400
38	638	1663	4478	Q	11393801054 00	144	BRUSHLESS EXCITER FRONT COVER	4400X3400X3100
39	639	2150	4978	Q	11393801055 00	144	BRUSHLESS EXCITER REAR COVER	4400X3400X3100
40	640	860	1741	Q	11393801056 00	144	EXCITER BED PLATE ACCESSORIES AND RACK ASSEMBLY	3900X1250X1150
41	641	1815	2925	Q	11393801057 00	137	EXCITER BED PLATE ACCESSORIES (NON TEST BED)	5800X1140X1240
42	642	611	1111	Q	11393801058 00	145	EXCITER ACCESSORIES	2200X1100X1000
43	643	695	775	Q		137	EXCITER BED PLATE ACCESSORIES (NON TEST BED ITEMS)	1000X800X800
44	644	872	1572	Q		145	RR WHEEL AIR GUIDE COVER	2800X1500X2000
45	645	1940	2500	Q		149	SEAL OIL STORAGE TANK	5000X1800X1700
46	646	4550	7065	Q		153	PW PUMP & FILTER UNIT	4000X4000X3000
47	647	458	875	Q		149	PW INSTRUMENT RACK	1550X900X1715
48	648	7825	10000	Q		149	SEAL OIL UNIT	6200X2500X3400
49	649	460	660	Q		149	LIQUID DETECTOR RACK	2000X1000X2100
50	650	630	1205	Q	11393801020 00	149	GAS UNIT	1980X1640X2420

Total Net Weight:	526424	Rev. Date:	28.07.2009
Total Gross Weight:	570104	Approved By:	tgeag



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P12901)

51	651	170	250	Q	11393801019 00	149	CO2 VAPOURISER	1520X840X840
52	652	150	333	Q	11393801018 01	149	H2 DISTRIBUTOR	3480X1540X440
53	653	163	353	Q	11393801018 00	149	CO2 DISTRIBUTOR	4860X1240X440
54	654	60	143	Q	11393801018 04	149	N2 DISTRIBUTOR	1400X1240X440
55	655	127	267	Q	11393801120 00	153	ALKALYSER UNIT	1150X780X1900
56	656	56	100	Q		153	RESINS	1200X600X600
57	657	3300	3800	Q			TG SYSTEM INTEGRAL PIPING (VALVES)	2750X1400X1400
58	658	80	180	Q			TG SYSTEM INTEGRAL PIPING (INSTRUMENTS)	1000X940X900
59	659	40	55	Q			CONSUMABLES	800X400X200

Total Net Weight:	526424	Rev. Date:	28.07.2009
Total Gross Weight:	570104	Approved By:	tgeag



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P11101)

Workorder Number	10580P11101	WO Rev. Date	28.07.2009
Project	N.CHENNAI TPS ST-II:600MW	CCN	MS1070043
Rating	600MW	Std	HW0232899 :: Standard Packing

SNO	PKGNO	NETWT	GROSSWT	TYP	PKGDRG	PRGR	PGMA	ASY. DRG	DESCRIPTION	PKG SIZE	REMARK
1	75001	4388	5447	R	HW0232899 00	019			EMBEDMENT FOR ANCHOR POINTS	4400X1600X1000	
2	75003	5920	6673	Q	HW0232899	025			COMPONENTS FOR BASE PLATE ASSEMBLY	4900X1200X600	
3	75004	3058	3635	Q	HW0232899	025			COMPONENTS OF BASE PLATE	2800X1700X600	
4	75101	8640	9437	R	HW0232899	005			BASE PLATE FOR LP CASING	1850X1400X500	
5	75102/1	8070	8085	R	01000100185 00	005			LP OUTER CASING PARTS	7060X1480X2760	
6	75102/2	8070	8085	R	01000100185 00	005			LP OUTER CASING PARTS	7060X1480X2760	
7	75103/1	8070	8085	R	01000100185	005			LP OUTER CASING PARTS	7060X1480X2760	
8	75103/2	8070	8085	R	01000100185	005			LP OUTER CASING PARTS	7060X1480X2760	
9	75104/1	2455	2500	R	OPEN	005			LPC OUTER CASING PARTS	4570X3230X980	
10	75104/2	2455	2500	R	OPEN	005			LPC OUTER CASING PARTS	4570X3230X980	
11	75105/1	2455	2500	R	OPEN	005			LPC OUTER CASING PARTS	4570X3230X980	
12	75105/2	2455	2500	R	OPEN	005			LPC OUTER CASING PARTS	4570X3230X980	
13	75106/1	405	495	R	HW0232899	005			COMPONENTS OF LP CASING UPPER PART	3500X300X300	
14	75106/2	405	495	R	HW0232899	005			COMPONENTS OF LP CASING UPPER PART	3500X300X300	
15	75106/3	478	900	R	HW0232899	005			L.P OUTER CASING PARTS	3450X1000X1100	
16	75106/4	478	900	R	HW0232899	005			L.P OUTER CASING PARTS	3450X1000X1100	
17	75107/1	15107	15182	Q	HW0232899 00	005			LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	
18	75107/2	15107	15182	Q	HW0232899 00	005			LONGITUDINAL GIRDER (LEFT)	6800X1820X1570	
19	75108/1	15107	15182	Q	HW0232899 00	005			LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	
20	75108/2	15107	15182	Q	HW0232899 00	005			LONGITUDINAL GIRDER (RIGHT)	6800X1820X1570	
21	75109/1	9878	10053	R	HW0232899	005			LP FRONT WALL (TS)	6820X3750X910	
22	75109/2	9878	10053	R	HW0232899	005			LP FRONT WALL (TS)	6820X3750X910	
23	75110/1	9878	10053	R	HW0232899	005			LP FRONT WALL (GS)	6820X3750X910	

Total Net Weight:	1002290	Rev. Date:	28.07.2009
Total Gross Weight:	1099816	Approved By:	stegcm



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P11101)

24	75110/2	9878	10053	R	HW0232899	005	LP FRONT WALL (GS)	6820X3750X910
25	75111/1	1801	2260	R	HW0232899	005	LP SHAFT SEALING FRONT	1800X1700X740
26	75111/2	1801	2260	R	HW0232899	005	LP SHAFT SEALING FRONT	1800X1700X740
27	75112/1	1801	2260	R	HW0232899	005	LP SHAFT SEALING (REAR)	1800X1700X740
28	75112/2	1801	2260	R	HW0232899	005	LP SHAFT SEALING (REAR)	1800X1700X740
29	75113/1	1351	1456	Q	HW0232899	005	LP SHAFT SEAL COMPENSATOR ASSLY.(TS)	1440X1420X520
30	75113/2	1351	1456	Q	HW0232899	005	LP SHAFT SEAL COMPENSATOR ASSLY.(TS)	1440X1420X520
31	75114/1	1351	1456	Q	HW0232899	005	LP SHAFT SEAL COMPENSATOR ASSLY.(GS)	1440X1420X520
32	75114/2	1351	1456	Q	HW0232899	005	LP SHAFT SEAL COMPENSATOR ASSLY.(GS)	1440X1420X520
33	75115/1	841	1041	R	HW0232899	018	LP JOINT COVERING	2300X1800X940
34	75115/2	841	1041	R	HW0232899	018	LP JOINT COVERING	2300X1800X940
35	75201	12100	13275	Q	HW0232899	008	HP/IP BRG.PED.ASSLY.	4080X2005X2126
36	75202	300	400	Q	HW0232899	008	HP/IP BRG.PED.PARTS	1000X600X600
37	75301	210	300	Q	HW0232899	018	ASSEMBLY DEVICES	1000X750X750
38	75302	1130	1430	Q	HW0232899	018	INSPECTION SHAFT FOR IPC	4050X600X900
39	75304	6395	6860	Q	HW0232899	018	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	3800X2500X1300
40	75305	1510	1800	Q	HW0232899	018	COMPONENTS OF ASSEMBLY FIXTURE FOR HPT	2300X2100X900
41	75306	2852	3350	Q	HW0232899	018	COMPONENTS OF ASSLY FIXTURE FOR HPT	3300X1800X1300
42	75307	2566	3400	Q	HW0232899	018	COMPONENTS FOR ASSLY FIXTURE FOR HPT	5450X4050X400
43	75308/1	1710	2100	R	HW0232899	018	AUXILIARIES OF LP TURBINE	3000X1300X1000
44	75308/2	1710	2100	R	HW0232899	018	AUXILIARIES OF LP TURBINE	3000X1300X1000
45	75309/1	1142	1142	R	OPEN	018	AUXILIARIES OF LP TURBINE	2000X1000X1825
46	75309/2	1142	1142	R	OPEN	018	AUXILIARIES OF LP TURBINE	2000X1000X1825
47	75310/1	1142	1142	R	OPEN	018	AUXILIARIES OF LP TURBINE	2000X1000X1825

Total Net Weight:	1002290	Rev. Date:	28.07.2009
Total Gross Weight:	1099816	Approved By:	stegcm



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P11101)

48	75310/2	1142	1142	R	OPEN	018	AUXILIARIES OF LP TURBINE	2000X1000X1825
49	75311	580	1020	Q	HW0232899	018	ASSEMBLY TOOLS	1700X800X400
50	75312	205	260	Q	HW0232899	018	AUXILIARIES OF IP TURBINE	1200X500X550
51	75313	205	210	R	OPEN	018	AUXILIARIES OF IP TURBINE	1100X500X650
52	75314	205	210	R	OPEN	018	AUXILIARIES OF IP TURBINE	1100X500X650
53	75315	90	150	Q	HW0232899	018	BOLT HEATING EQUIPMENT AND BREECH NUT HEATING DEVICE	1700X900X700
54	75316	548	625	R	HW0232899	018	GROMMET SLINGS	1700X1700X300
55	75318	150	250	Q	HW0232899	018	OIL FLUSHING AND PRESSURE TEST DEVICE	750X550X400
56	75319	3910	4650	Q	TYPE III-1 00	018	STEAM BLOWING & HYDRAULIC TEST DEVICES	2900X2100X1200
57	75320	900	1500	Q	TYPE II-1	018	TOOLS FOR GOV.SYST.&VALVES	1750X1200X1000
58	75321	705	905	R	HW0232899	018	VALVE SUPPORT FOR HPT OVERHALL	1500X750X750
59	75401	13500	14500	Q	0452.002	009	IP-LP BEARING PEDESTAL ASSLY	3700X1860X2100
60	75501	8276	9168	Q	0452.002	010	LP/GEN. PEDESTAL ASSEMBLY	3200X2280X2070
61	75502	1030	1150	Q	HW0232899	010	BEARING PEDESTAL (PARTS)	1600X800X600
62	75503	8478	9370	Q	0452.002	010	LP/LP. PEDESTAL ASSEMBLY	3200X2280X2070
63	75504	150	250	Q	HW0232899	018	OIL FLUSHING AND PRESSURE TEST DEVICE	750X550X400
64	75505	462	542	Q	HW0232899	010	LP LP BEARING PEDESTAL (PARTS)	800X800X600
65	75601/1	11058	12386	Q	11000100200 00	007	FRONT BEARING PEDESTAL	3140X3140X2050
66	75601/2	630	750	Q	HW0232899	007	HYDRAULIC TURNING GEAR	2100X1000X600
67	75601/3	380	550	Q	HW0232899 00	007	MAIN OIL PUMP ASSEMBLY.	1400X1200X1000
68	75704/1	2190	2653	Q	HW0232899	004	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740
69	75704/2	2190	2653	Q	HW0232899	004	LP CASING ASSEMBLY (FASTENERS)	1800X1700X740
70	75704/3	4511	4900	R	HW0232899	004	LP CASING ASSEMBLY (PARTS)	3760X2060X860
71	75704/4	4511	4900	R	HW0232899	004	LP CASING ASSEMBLY (PARTS)	3760X2060X860
72	75705/1	772	1262	R	HW0232899	004	LP EXTRACTION A1	5000X1100X700
73	75705/2	772	1262	R	HW0232899	004	LP EXTRACTION A1	5000X1100X700
74	75706/1	772	1262	R	HW0232899	004	LP EXTRACTION A1	5000X1100X700

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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P11101)

75	75706/2	772	1262	R	HW0232899	004	LP EXTRACTION A1	5000X1100X700
76	75707/1	790	1286	R	HW0232899	004	LP EXTRACTION A1	3420X1620X870
77	75707/2	144	330	R	HW0232899	004	LP EXTRACTION A1	1400X1300X700
78	75707/3	144	330	R	HW0232899	004	LP EXTRACTION A1	1400X1300X700
79	75707/4	144	330	R	HW0232899	004	LP EXTRACTION A1	1400X1300X700
80	75707/5	320	470	R	HW0232899	004	EXTRACTION PIPE LINE (LPC)	1650X800X450
81	75707/6	320	470	R	HW0232899	004	EXTRACTION PIPE LINE (LPC)	1650X800X450
82	75708/1	375	575	R	HW0232899	004	LP EXTRACTION A2	2700X1200X750
83	75708/2	375	575	R	HW0232899	004	LP EXTRACTION A2	2700X1200X750
84	75709/1	226	307	R	HW0232899	004	LP EXTRACTION A2	1100X850X850
85	75709/2	226	307	R	HW0232899	004	LP EXTRACTION A2	1100X850X850
86	75710/1	440	1006	R	HW0232899	004	EXTRACTION PIPE LINE (LPC)	3300X1750X1100
87	75710/2	440	1006	R	HW0232899	004	LP EXTRACTION A2	3300X1750X1100
88	75711/1	200	302	R	HW0232899	004	LP EXTRACTION A3	1400X600X600
89	75711/2	200	302	R	HW0232899	004	LP EXTRACTION A3	1400X600X600
90	75711/3	223	346	R	HW0232899	004	LP EXTRACTION A3	1400X700X700
91	75711/4	223	346	R	HW0232899	004	LP EXTRACTION A3	1400X700X700
92	75711/5	235	373	R	HW0232899	004	LP EXTRACTION A3	2000X600X600
93	75711/6	235	373	R	HW0232899	004	LP EXTRACTION A3	2000X600X600
94	75716/1	889	1290	R	HW0232899	004	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400
95	75716/2	889	1290	R	HW0232899	004	L.P. EXTRACTION PIPE SHEATHING	2600X2000X1400
96	75717/1	1334	2118	R	HW0232899	004	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400X1000
97	75717/2	1334	2118	R	HW0232899	004	INNER GUIDE PLATE OF DIFFUSER (TS)	2600X2400X1000
98	75718/1	3630	3640	R	OPEN	004	DIFFUSER (TS)	4880X1730X2340
99	75718/2	3630	3640	R	OPEN	004	DIFFUSER (TS)	4880X1730X2340
100	75719/1	3630	3640	R	OPEN	004	DIFFUSER (GS)	4880X1730X2340
101	75719/2	3630	3640	R	OPEN	004	DIFFUSER (GS)	4880X1730X2340
102	75720/1	20800	21750	R	01000100191	004	LP INNER OUTER CASING (U/H)	6720X3150X2325
103	75720/2	20800	21750	R	01000100191	004	LP INNER OUTER CASING (U/H)	6720X3150X2325

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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P11101)

104	75721/1	29207	30907	Q	01000100188 00	004	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350
105	75721/2	29207	30907	Q	01000100188 00	004	LP INNER OUTER CASING (L/H) & LP INNER INNER CASING (L/H)	6750X3500X2350
106	75722/1	1300	1760	Q	HW0232899	004	LP INNER CASING ASSY.FASTENERS	1800X1700X740
107	75722/2	1300	1760	Q	HW0232899	004	LP INNER CASING ASSY.FASTENERS	1800X1700X740
108	75723/1	65	140	Q	HW0232899	004	LP CASING ASSEMBLY (PARTS)	450X450X250
109	75723/2	65	140	Q	HW0232899	004	LP CASING ASSEMBLY (PARTS)	450X450X250
110	75724/1	10800	11722	Q	HW0232899	004	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000
111	75724/2	10800	11722	Q	HW0232899	004	LP INNER-INNER CASING (U/H) PARTIAL	4000X1570X2000
112	75725/1	1334	2118	R	HW0232899	004	INNER GUIDE PLATE OF DIFFUSER (GS)	2600X2400X1000
113	75725/2	1334	2118	R	HW0232899	004	INNER GUIDE PLATE OF DIFFUSER (GS)	2600X2400X1000
114	75728/1	512	840	Q	HW0232899	004	STEAM INLET PIPE (LPT)	2700X1300X900
115	75728/2	512	840	Q	HW0232899	004	STEAM INLET PIPE (LPT)	2700X1300X900
116	75801/1	58277	62049	Q	01000100255 00	003	L.P. ROTOR	7210X3300X3350
117	75801/2	58277	62049	Q	01000100255 00	003	L.P. ROTOR	7210X3300X3350
118	75901	21765	23132	Q	01000100237 00	002	IP ROTOR	4800X2120X1995
119	75902	25450	25850	Q	01000100221 00	002	IP OUTER CASING (U/H)	4050X3800X2650
120	75903	25450	25870	Q	01000100219 00	002	IP OUTER CASING (L/H)	3400X5250X2600
121	75904	14150	15200	Q	HW0232899	002	IP INNER CASING (U/H)	2900X3200X1850
122	75905	14150	15200	Q	HW0232899	002	IP INNER CASING (L/H)	2900X3200X1850
123	75906	13500	13550	Q	OPEN	002	IP INLET ASSEMBLY	4500X3725X1300
124	75907	765	950	Q	HW0232899	002	IP SHAFT SEALING	1400X1200X900
125	75908	2750	3125	Q	HW0232899	002	IP TURBINE (PARTS)	2000X1900X1000
126	75909	365	475	Q	HW0232899	002	I.P. TURBINE PARTS	1000X1000X750
127	76001/1	86350	88650	Q	01000100103 00	001	HP TURBINE	5675X3400X2900
128	76001/2	48	57	Q		001	EMERGENCY GOVERNOR	495X395X695
129	76002	35	80	Q	HW0232899	001	HP INLET ASSLY. & HP EXHAUST ASSLY. (PARTS)	1200X1200X500
130	76003	1810	2000	Q	HW0232899	001	HP EXHAUST ASSEMBLY	1650X1400X900
131	76004	120	200	Q	HW0232899	001	HPT RELATED PARTS	1300X1300X700

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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P11101)

132	76104	20276	23146	Q	01000100138	011	ESV & CV CASING WITH VALVES	3600X3600X2500
133	76105/1	3849	4250	Q	TYPE III-1 0	011	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300X1200X1200
134	76105/2	3849	4250	Q	TYPE III-1 0	011	ESV SERVOMOTOR WITH LIMIT SWITCHES	2300X1200X1200
135	76107	2680	3280	Q	TYPE III-1 0	011	HP CONTROL VALVE SERVOMOTOR	2800X1200X2100
136	76108	20276	23146	Q	01000100138	011	ESV & CV CASING WITH VALVES	3600X3600X2500
137	76112	2688	3288	Q	TYPE III-1 0	011	HP CONTROL VALVE SERVOMOTOR	2800X1200X2100
138	76201	6618	8078	Q	TYPE III-1 00	012	SUSPENSION OF VALVE (IV)	4250X2640X750
139	76202	28276	33276	Q	11000100137 00	012	IV & CV CASING WITH VALVES	5040X4690X2770
140	76203/1	3385	3965	Q	TYPE III-1 0	012	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700X1450X1400
141	76203/2	3385	3965	Q	TYPE III-1 0	012	IV SERVOMOTOR WITH LIMIT SW. MOUNTIGS	2700X1450X1400
142	76204	2403	3019	Q	TYPE -II-I	012	IP CONTROL VALVE SERVOMOTOR	3240X1240X1950
143	76205/1	2026	2026	Q	00	012	FRAME FOR SUSPENSION (IV)	3400X3150X750
144	76205/2	2026	2026	Q	00	012	FRAME FOR SUSPENSION (IV)	3400X3150X750
145	76205/3	17	20	Q	00	012	LOOSE ITEMS FOR FRAME FOR SUSPENSION(IV)	300X200X200
146	76206	28276	33276	Q	11000100137 00	012	IV & CV CASING WITH VALVES	5040X4690X2770
147	76210	2387	3003	Q	TYPE -II-I	012	IP CONTROL VALVE SERVOMOTOR	3240X1240X1950
148	76301/1	986	1836	Q	TYPE III-1 00	013	SUSPENSION OF LPBP VALVE	3600X1700X800
149	76301/2	986	1836	Q	TYPE III-1 00	013	SUSPENSION OF LPBP VALVE	3600X1700X800
150	76402	338	588	R	0452.002 00	020	INJECTOR FOR SUC. PIPE NB 350	3300X800X800
151	76403	499	999	R	0452.002	020	INJECTOR FOR SUC. PIPE NB 300	3300X1750X1200
152	76404	9981	9981	R	WITHOUT BOX 00	020	MAIN OIL TANK & NOZZLE ARRGT. ASSY.	6180X3260X2650
153	76405	327	402	R		020	MAIN OIL TANK & NOZZLE ARRGT. ASSY.	4200X1200X900
154	76406	168	228	R	0452.002 00	020	OIL STRAINERS	1500X1000X1200
155	76407	168	228	R	0452.002 00	020	OIL STRAINERS	1500X1000X1200
156	76409	170	470	R	0452.002	020	OIL STRAINERS	2050X1200X1410

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SUMMARY LIST OF PACKAGES (10580P11101)

157	76412	515	515	R	WITHOUT BOX	020	DIRTY/LEAKAGE OIL TANK	1000X1000X3000
158	76413	515	515	R	WITHOUT BOX	020	WASTE OIL TANK	1000X1000X3000
159	76414	165	255	Q	0452.002	020	VAR.ORIFICES THR.VALV.&FLUSH.P ARTS	1700X700X760
160	76415	30	50	Q	PETTY BOX 00	020	VARIABLE ORIFICE 125	400X300X200
161	76601	686	750			006	OBLIQUE REDUCER ASSLY. (CAP)	XX
162	76602	686	750			006	OBLIQUE REDUCER ASSLY. (CAP)	XX
163	76603	1725	1900			006	MANHOLE ASSLY. (CAP)	XX
164	76604	1725	1900			006	MANHOLE ASSLY. (CAP)	XX
165	76605	1650	1850			006	MITRE BEND ASSLY. (CAP)	XX
166	76606	1650	1850			006	MITRE BEND ASSLY. (CAP)	XX
167	76607	13139	14500			006	PIPE ASSLY. LPT1 (CAP)	XX
168	76608	13139	14500			006	PIPE ASSLY. LPT1 (CAP)	XX
169	76609	8500	10000			006	PIPE ASSLY. LPT2 (CAP)	XX
170	76610	8500	10000			006	PIPE ASSLY. LPT2 (CAP)	XX
171	76611	897	1050			006	SUPPORTS (CAP)	XX
172	76612	897	1050			006	SUPPORTS (CAP)	XX
173	76613	683	750			006	MANHOLE INLET ASSLY. (CAP)	XX
174	76614	683	750			006	MANHOLE INLET ASSLY. (CAP)	XX
175	76701	77	97	Q	TYPE II-1	016	CHANGE OVER VALVE	800X500X200
176	76702/1	8990	10528	Q	TYPE III-1	016	CRH NRV WITH SERVOMOTOR	3200X2300X2600
177	76702/2	2600	5600	Q	TYPE II-1	018	STEAM BLOWING DEV.FOR NRV CRH LINE	2500X1600X1200
178	76801	36	55	Q	HW0232899	024	RATING,COLLABORATION&COMPANY'S MONOGRAM PLATE	850X550X200
179	76901	83	133	R	0452.002	020	OIL STRIPPER	600X600X850
180	76902	83	133	R	0452.002	020	OIL STRIPPER	600X600X850
181	76903	2370	2370	R	OPEN-BOX 00	021	HOUSING FOR M.S STRAINER	1725X1250X730
182	76904	2370	2370	R	OPEN-BOX 00	021	HOUSING FOR M.S STRAINER	1725X1250X730
183	76908	4480	4480	R	OPEN-BOX 00	021	HOUSING FOR HRH STEAM STRAINER	2275X1650X1100
184	76909	4480	4480	R	OPEN-BOX 00	021	HOUSING FOR HRH STEAM STRAINER	2275X1650X1100

Total Net Weight:	1002290	Rev. Date:	28.07.2009
Total Gross Weight:	1099816	Approved By:	stegcm



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P11101)

185	76912/1	823	948			021	BLANKING ARRANGEMENT FOR MS STRAINER HOUSING	1000X900X800
186	76912/2	2220	2535			021	BLANKING ARRANGEMENT FOR HRH STEAM STRAINER HOUSING	1600X1200X1000
187	76913	17	37	R	PETTY-BOX 00	021	GASKETS FOR MS & HRH STRAINER HOUSINGS	1000X1000X600
188	76914	27	50	R	0452.002	021	COMPENSATOR	600X600X900
189	76915	464	564	R	PETTY-BOX	021	ASSY. & DISASSY. DEVICES FOR MS & HRH STEAM STRAINERS	2140X1400X500
190	76917	282	350	R	0452.002	021	STEAM STRAINER (MS)	1200X900X500
191	76918	686	750	R	0452.002	021	STEAM STRAINER (HRH)	1800X1500X800
192	76919	282	350	R	0452.002	021	STEAM STRAINER (MS)	1200X900X500
193	76920	686	750	R	0452.002	021	STEAM STRAINER (HRH)	1800X1500X800
194	77001	1300	1847	Q	TYPE III-1 00	014	GOV.SYSTEM CONTROL RACK ASSLY. & TRANSPORT DEVICE	2800X1360X2750
195	77002	767	1797	Q	TYPE III-1 00	014	SUPPLY RACK HP VALVE-2 (RIGHT)	2300X1400X2550
196	77003	767	1797	Q	TYPE III-1 00	014	SUPPLY RACK HP VALVE-1 (LEFT)	2300X1400X2550
197	77004	1050	2080	Q	TYPE III-1	014	SUPPLY RACK FOR IP VALVES 1 & 2	2300X1400X2550
198	77006	1182	1622	Q	TYPE III-1 00	014	GOVERNING SYSTEM PROTECTION RACK & TRANSPORT DEVICE	2450X1300X2250
199	77201	2250	2600	Q	0452.002 01	017	TURBINE INSTRUMENTS RACKS (FRAMES)	2750X1500X800
200	77202	600	750	Q	0452.002 01	017	TEMP. AND PRESSURE CONNECTIONS	1700X750X750
201	77203	1025	1225	Q	0452.002 01	017	IMPLUSE PIPES (CARBON STEEL)	6900X650X500
202	77204	785	1035	Q	0452.002 01	017	GAUGES AND SENSORS	2800X1250X1250
203	77205	68	118	Q	0452.002 01	017	TRANSMITTERS & J.B.OF BEARINGS	500X300X200
204	77206	986	1136	Q	0452.002 00	017	IMPULSE PIPES (ALLOY STEEL AND S.S.)	6900X500X500

Total Net Weight:	1002290	Rev. Date:	28.07.2009
Total Gross Weight:	1099816	Approved By:	stegcm



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P16901)

Workorder Number	10580P16901	WO Rev. Date	28.07.2009
Project	N.CHENNAI TPS ST-II:600MW	CCN	MS1070043
Rating	600MW	Std	HW0232899 :: Standard Packing

SNO	PKGNO	NETWT	GROSSWT	TYP	PKGDRG	PRGR	PGMA	ASY. DRG	DESCRIPTION	PKG SIZE	REMARK
1	78001/1	8703	8703	R		022	1604500	01604570042 00	CONDENSER (HOTWALL-TS))	13000X2100X1200	
2	78001/2	11980	11980	R		022	1604500	01604570042 00	CONDENSER(HOTWALL-GS))	13000X2100X1200	
3	78004/1	8703	8703	R		--	022	1601100	01601170027 00	BOTTOM PLATE-TS	7150X3450X625
4	78004/2	4576	4576	R		--	022	1601100	01601170027 00	BOTTOM PLATE-TS	7150X3450X625
5	78005/1	8703	8703	R		022	1601101	01601170027 00	BOTTOM PLATE-GS	7150X3450X625	
6	78005/2	4576	4576	R		022	1601101	01601170027 00	BOTTOM PLATE-GS	7150X3450X625	
7	78010	500	550	R		022	1601100	01601170027 00	BOTTOM PLATE (LOOSE ITEMS)	1900X700X300	
8	78012	15347	15592	R	11709970028	022	1607100	11607170029 00	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	
9	78013	15347	15592	R	11709970028	022	1607101	11607170029 00	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	
10	78014	15347	15592	R	11709970028	022	1607102	11607170029 00	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	
11	78015	3580	3785	R	11709970028	022	1607103	11607170029 00	CONDENSER SUPPORT(TS/GS)	2000X1000X1250	
12	78018	1450	1640	R	11709970028	022	1607100	11607170029 00	CONDENSER SUPPORT (LOOSE ITEM)	1600X950X950	
13	78020/1	7530	7530	R	21709970032	022	1601800	01601870033 00	FRONT WATER CHAMBER (GS)	5224X3610X360	
14	78020/2	7530	7530	R	21709970032	022	1601800	01601870033 00	FRONT WATER CHAMBER (GS)	5224X3610X360	
15	78022/1	15425	15571	R	21709970034	022	1603200	01603270038 00	FRONT WATER BOX GEN SIDE)	5950X3610X2585	
16	78022/2	15432	15578	R	21709970034	022	1603200	01603270038 00	FRONT WATER BOX (GEN SIDE)	5950X3610X2585	
17	78023/1	7530	7615	R	21709970032	022	1602300	01603270038 00	FRONT WATER CHAMBER (TS)	5224X3610X360	
18	78023/2	7530	7615	R	21709970032	022	1602300	01602370028 00	FRONT WATER CHAMBER (TS)	5224X3610X360	
19	78025/1	15425	15571	R	21709970034	022	1603100	01603170048 00	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	
20	78025/2	15425	15571	R	21709970034	022	1603100	01603170048 00	FRONT WATER BOX (TUR SIDE)	5950X3610X2485	
21	78026/1	7530	7630	R	21709970032	022	1602300	01602370028 00	REAR WATER CHAMBER (GSI	5224X3610X360	
22	78026/2	7530	7630	R		022	1602300	01602370028 00	REAR WATER CHAMBER (GSI	5224X3610X360	
23	78028/1	10050	10250	R	21709970035	022	1603400	01603470035 00	REAR WATER BOX (GEN SIDE)	4760X3610X2025	
24	78028/2	10050	10250	R	21709970035	022	1603400	01603470035 00	REAR WATER BOX (GEN SIDE)	4760X3610X2025	
25	78029/1	7530	7730	R	21709970032	022	1601800	01601870033 00	REAR WATER CHAMBER (TS)	5224X3610X360	

Total Net Weight:	638763	Rev. Date:	28.07.2009
Total Gross Weight:	649712	Approved By:	hxedk



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P16901)

26	78029/2	7530	7730	R	21709970032	022	1601800	01601870033 00	REAR WATER CHAMBER (TS)	5224X3610X360
27	78031/1	10050	10250	R	21709970035	022	1603500	01603570028 00	REAR WATER BOX (TUR SIDE)	4760X3610X2025
28	78031/2	10050	10250	R	21709970035	022	1603500	01603570028 00	REAR WATER BOX (TUR SIDE)	4760X3610X2025
29	78032/1	2367	2367	R	00	022	1601400	11601470023 00	SIDE WALL (TUR.END)	7800X2000X20
30	78032/2	3027	3027	R	00	022	1601400	11601470023 00	SIDE WALL (TUR.END)	7800X2500X20
31	78033/1	2599	2599	R	00	022	1601401	11601470023 00	SIDE WALL (TUR.END)	7800X2200X20
32	78033/2	2367	2367	R	00	022	1601401	11601470023 00	SIDE WALL (TUR.END)	7800X2000X20
33	78034/1	3027	3027	R	00	022	1601402	11601470023 00	SIDE WALL (TUR.END)	7800X2500X20
34	78034/2	2599	2599	R	00	022	1601402	11601470023 00	SIDE WALL (TUR.END)	7800X2200X20
35	78041/1	2367	2367	R		022			SIDE WALL (GEN.END)	7800X2000X20
36	78041/2	3027	3027	R		022			SIDE WALL (GEN.END)	7800X2500X20
37	78042/1	2599	2599	R		022			SIDE WALL (GEN.END)	7800X2200X20
38	78042/2	2367	2367	R		022			SIDE WALL (GEN.END)	7800X2000X20
39	78046	3027	3027	R	00	022			SIDE WALL(GEN.END)	7800X2500X20
40	78047	2599	2599	R	00	022			SIDE WALL(GEN.END)	7800X2200X20
41	78048	12134	12532	R	11709970041 00	022			SHELL INTERNAL DETAILS	3250X850X650
42	78049	6572	7072	R	11709970041 00	022			SHELL INTERNAL DETAILS	3250X850X650
43	78050	1110	1410	R	11709970041 00	022			SHELL INTERNAL DETAILS	3250X850X650
44	78051	6950	7200	R	11709970041 00	022			SHELL INTERNAL DETAILS	3250X850X650
45	78055	615	695	R		022			SHELL INTERNAL DETAILS	1000X750X350
46	78056	4350	4500	R		022			SHELL INTERNAL DETAILS	4350X900X500
47	78058	1400	1535	R		022			AIR EXTRACTION PIPING	6460X990X410
48	78059	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
49	78060	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
50	78061	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
51	78062	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
52	78063	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
53	78064	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
54	78065	9248	9248	Q	21709970033 00	022			SHELL INTERNAL DETAILS	4700X3426X348
55	78069	9248	9248	Q	11709970028 00	022			SHELL INTERNAL DETAILS	5500X940X630

Total Net Weight:	638763	Rev. Date:	28.07.2009
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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P16901)

56	78070	400	416	R		022	SHELL INTERNAL DETAILS	4440X260X100	
57	78071	6000	6300	Q	11709970028 00	022	SHELL INTERNAL DETAILS	3000X1500X500	
58	78072	8000	8250	Q	21709970033 00	022	SHELL INTERNAL DETAILS	4700X3426X348	
59	78075/1	3168	3168	R		022	LOWER DOME WALL (TUR.END)	13000X3950X910	
60	78075/2	3261	3261	R		022	LOWER DOME WALL (TUR.END)	13000X3950X910	
61	78076/1	2980	2980	R		022	LOWER DOME WALL(TUR.END)LOOSE	4000X800X100	
62	78076/2	3261	3261			022	LOWER DOME WALL(TUR.END)LOOSE	4000X800X100	
63	78077/1	3455	3455	R		022	LOWER DOME WALL(TUR.END.)	13000X3950X100	
64	78077/2	2415	2415	R		022	LOWER DOME WALL(TUR.END)	13000X3950X500	
65	78078	300	325	R	00	022	LOWER DOME WALL (TUR.END) LOOSE ITEMS	900X300X300	
66	78103/1	10000	10000	R		022	LOWER DOME WALL (GEN.SIDE)	13000X3950X910	
67	78103/2	10000	10000	R		022	LOWER DOME WALL (GEN.SIDE)	13000X3950X910	
68	78104/1	850	872	R		022	LOWER DOME WALL (GEN.END)	4000X800X100	
69	78104/2	850	872	R		022	LOWER DOME WALL (GEN.END)	4000X800X100	
70	78105/1	850	872	R		022	LOWER DOME WALL(GEN.END)	4000X800X100	
71	78105/2	850	872	R		022	LOWER DOME WALL (GEN.END)0	4000X800X100	
72	78106	300	325	R	00	022	DOME WALL (GEN.END) LOOSE ITEMS	900X300X300	
73	78109/1	8050	8050	R		022	LOWER DOME WALL (F.W/B SIDE)	7502X4446X545	
74	78109/2	8050	8050	R		022	LOWER DOME WALL (F.W./B SIDE)	7502X4446X545	
75	78110/1	1850	1850	R		022	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	
76	78110/2	1850	1850	R		022	LOWER DOME WALL (F.W/B SIDE)	6238X934X1155	
77	78112	650	689	R	00	022	LOWER DOME WALL (F.W/B SIDE)	1325X1150X500	
78	78115/1	9650	9650	R		022	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	
79	78115/2	9650	9650	R		022	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	
80	78116/1	1900	1900	R		022	DOME WALL (R.W/B SIDE)	6236X1200X1160	
81	78116/2	1900	1900	R		022	DOME WALL (R.W/B SIDE)	6236X1200X1160	
82	78117/1	1900	1900	R		022	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	
83	78117/2	1900	0	R		022	LOWER DOME WALL (R.W/B SIDE)	6236X1200X1160	
84	78118	300	323	R	00	022	LOWER DOME WALL (R.W/B SIDE) LOOSE ITEMS	1300X1065X305	
Total Net Weight:							638763	Rev. Date:	28.07.2009
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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P16901)

85	78121/1	1963	1963	R		022	DOME INTERNAL STIFFENING	6016X200X200
86	78121/2	163	163	R		022	DOME INTERNAL STIFFENING	6016X200X200
87	78122/1	1963	1963	R		022	DOME INTERNAL STIFFENING	6016X200X200
88	78122/2	1963	1963	R		022	DOME INTERNAL STIFFENING	6016X200X200
89	78123	900	900	R		022	DOME INTERNAL STIFFENING	6016X200X200
90	78123/1	900	900	R		022	DOME INTERNAL STIFFENING	6016X200X200
91	78123/2	900	900	R		022	DOME INTERNAL STIFFENING	6016X200X200
92	78124/1	900	900	R		022	DOME INTERNAL STIFFENING	6016X200X200
93	78124/2	900	900	R		022	DOME INTERNAL STIFFENING	6016X200X200
94	78125/1	500	500	R		022	DOME INTERNAL STIFFENING	3400X200X200
95	78125/2	500	500	R		022	DOME INTERNAL STIFFENING	3400X200X200
96	78126/1	500	500	R		022	DOME INTERNAL STIFFENING	3400X200X200
97	78126/2	500	500	R		022	DOME INTERNAL STIFFENING	3400X200X200
98	78129/1	2565	2965	Q	11709970025	022	LP HEATER NO-1 SUPPORT ARRANGEMENT	2250X1700X1070
99	78129/2	3370	3665	Q	11709970023	022	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	7125X1125X580
100	78130/1	2565	2965	Q	11709970025	022	LP HEATER NO-1 SUPPORT ARRANGEMENT	2250X1700X1070
101	78130/2	3370	3665	Q	11709970023	022	LP HEATER SUPPORT ARRANGEMENT LOOSE ITEMS	7125X1125X580
102	78132/1	1350	1350	R		022	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310
103	78132/2	1350	1350	R		022	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310
104	78133/1	1350	1350	R		022	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310
105	78133/2	1350	1350	R		022	UPPER DOME WALL (TUR/GEN.SIDE)	6800X460X310
106	78136/1	3900	3900	R		022	UPPER DOME WALL (F/W/B.SIDE)	5880X1930X380
107	78136/2	3900	3900	R		022	UPPER DOME WALL (TUR/GEN.SIDE)	5880X1930X360
108	78137	600	600	R		022	UPPER DOME WALL,(LOOSE ITEMS)	5400X350X32
109	78139/1	4000	4000	R		022	UPPER DOME WALL (RWB SIDE)	5880X1930X448
110	78139/2	4000	4000	R		022	UPPER DOME WALL (RWB SIDE)	5880X1930X448
111	78142/1	3000	3148	Q		022	W/BOX REMOVAL DEVICE	2500X1000X750

Total Net Weight:	638763	Rev. Date:	28.07.2009
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BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR

SUMMARY LIST OF PACKAGES (10580P16901)

112	78142/2	3000	3148	Q		022	W/BOX REMOVAL DEVICE	2500X1000X750
113	78143/1	2400	2535	Q		022	W/BOX REMOVAL DEVICE (CONDE	2000X1500X500
114	78143/2	2400	2535	Q		022	W/BOX REMOVAL DEVICE	2000X1500X500
115	78150/1	750	805	Q		022	FRAME	1850X840X230
116	78150/2	750	805	Q		022	FRAME	1850X840X230
117	78151/1	750	805	Q		022	FRAME	1850X840X230
118	78151/2	750	805	Q		022	FRAME	1850X840X230
119	78154/1	1250	1261	Q		022	STEAM THROW DEVICE	1450X900X700
120	78154/2	1250	1261	Q		022	STEAM THROW DEVICE	1450X900X700
121	78155/1	1250	1261	Q		022	STEAM THROW DEVICE	1450X900X700
122	78155/2	1250	1261	Q		022	STEAM THROW DEVICE	1450X900X700
123	78157/1	30	36	Q		022	CONDENSER (LOOSE ITEMS)	850X250X250
124	78157/2	30	36	Q		022	CONDENSER (LOOSE ITEMS)	850X250X250
125	78158/1	500	500	R		022	CONDENSER	2900X956X406
126	78158/2	500	500	R		022	CONDENSER	2900X956X406
127	78159/1	300	350	Q		022	CONDENSER LOOSE ITEMS	1000X500X500
128	78159/2	300	350	Q		022	CONDENSER LOOSE ITEMS	1000X500X500
129	78165	25	30	Q	00	022	LOOSE ITEMS (TOOLS & TACKLES)	1000X600X500
130	78166/1	100	110	Q		022	STAND PIPE NO.1	2750X420X400
131	78166/2	100	110	Q		022	STAND PIPE NO.1	2750X420X400
132	78167	200	216	Q		022	CONDENSER STAND PIPE	3150X350X330
133	78169/1	100	110	Q		022	STAND PIPE NO.2	2750X420X390
134	78169/2	100	110	Q		022	STAND PIPE NO.2	2750X420X390
135	78175	900	950	Q	00	022	CONDENSER INSTRUMENTRATION	1500X1000X1000
136	78176	100	140	P		022	CONDENSER INSTRUMENTATION	1000X500X500
137	78177	80	96	P		022	CONDENSER INSTRUMENTATION	1400X800X700
138	78301	1000	1040	R	21709970020 00	023	GLAND STEAM CONDENSER	1015X1180X1400
139	78304	70	120	Q		023	LOOSE ITEMS OF GSC (FRAGILE)	600X800X400
140	78305	250	360	Q	SUITABLE 00	023	LOOSE ITEMS GSC(NON FRAGILE)	1500X650X450
141	78315/1	14500	15000	Q		023	LP.HEATER NO.1	11650X1250X1750

Total Net Weight:	638763	Rev. Date:	28.07.2009
Total Gross Weight:	649712	Approved By:	hxedk



BHARAT HEAVY ELECTRICALS LIMITED,RANIPUR,HARIDWAR
SUMMARY LIST OF PACKAGES (10580P16901)

142	78315/2	14500	15000	Q		023	LP.HEATER NO.1	11650X1250X1750
143	78316/1	250	300	Q	00	023	LOOSE ITEMS OF LPH-1	500X400X400
144	78316/2	250	300	Q	00	023	LOOSE ITEMS OF LPH-1	500X400X400
145	78317/1	60	65	Q	00	023	LP HEATER NO.1 STAND PIPE	2200X700X500
146	78317/2	60	65	Q	00	023	LP HEATER NO.1 STAND PIPE	2200X700X500
147	78318/1	50	80	Q		023	LPH1 PANAL MOUNTED INSTRUMENT	2600X500X400
148	78318/2	50	80	Q		023	LPH1 PANAL MOUNTED INSTRUMENT	2600X500X400
149	78319/1	150	200	Q		023	LOOSE ITEMS LP HEATER NO.1	700X500X500
150	78319/2	150	200	Q		023	LOOSE ITEMS LP HEATER NO.1	700X500X500
151	78320/1	400	400	Q		023	TROLLEY FOR LP HEATER NO.1	1150X1050X250
152	78320/2	400	400	Q		023	TROLLEY FOR LP HEATER NO.1	1150X1050X250
153	78401	8900	9100	R	SEE NOTE	020	TUBRINE OIL COOLER	4650X1650X1980
154	78405	8900	9100	R	SEE NOTE	020	TUBRINE OIL COOLER	4650X1650X1980
155	78406	80	98	Q	00	020	TOC (LOOSE ITEMS)	750X500X200
156	78407	50	70	Q		020	TOC (LOOSE ITEMS)	800X600X600
157	78424	2700	3135	Q		166	HYDROGEN COOLER	4600X1450X800
158	78425	2700	3135	Q		166	HYDROGEN COOLER	4600X1450X800
159	78428	2350	2550	Q		166	LOOSE ITEMS (HYDROGEN COOLERS)	1300X1000X600
160	78431	1750	2280	Q		166	EXCITER AIR COOLER	3780X920X830
161	78432	1750	2280	Q		166	EXCITER AIR COOLER	3780X920X830
162	78436	2710	2901	R		020	CONTROL FLUID COOLER	3300X850X1030
163	78437	1600	1791	R		020	CONTROL FLUID COOLER	3300X850X1030
164	78438	110	127	Q		020	LOOSE ITEM (CFC)	600X600X500

Total Net Weight:	638763	Rev. Date:	28.07.2009
Total Gross Weight:	649712	Approved By:	hxedk

Tentative Weight schedule of main equipment of HYD-Pumps & Heaters

Project: North Chennai 2x600MW

Sno	Equipment	length(mm)	breadth(mm)	height(mm)	Gross wt(Kg)
1	Drive turbine for BFP	4760	4480	3500	46000
2	Booster pump	2500	2400	2000	
3	BFP	3000	2900	2120	92865
4	MD BFP Motor	4500	4700	3000	25000
5	CEP with Motors & Frames	9980	1800	1800	51850
6	LPHEATER-2	14060	1950	2600	27500
7	LPHEATER-3	12100	1950	2380	27500
8	HPHEATER-5A	10800	1700	2500	49000
9	HPHEATER-6A	12800	1750	2500	64000
10	HPHEATER-5B	10800	1700	2500	49000
11	HPHEATER-6B	12800	1750	2500	64000
12	HPHEATER-7A	11200	1750	2500	64000
13	HPHEATER-7B	11200	1750	2500	64000
14	DEA HEADER	10800	3350	3750	29500
15	FST-I	13850	3700	4320	27000
16	FST-II	9550	3700	4320	26600
17	FST-III	13850	3700	4320	26550
18	DRAIN COOLER	6240	1000	1750	5800
19	BFPDT Twin Oil Cooler	Dia. 508		5000	11400

751565

SIZE & WEIGHT SCHEDULE OF COOLING WATER PUMPS

Sl. No.	DESCRIPTION OF ITEM	QTY/ Pump	WT/ Pump	Total Wt. of 12 pumps	Packing Size (LxBxH)
1	SUCTION CASING	1	1650	19800	2300x2300x1000
2	IMPELLER CASING ASSEMBLY	1	800	9600	1800x1800x500
3	PUMP CASING ASSEMBLY	1	3100	37200	1800x1800x1250
4	IMPELLER ASSEMBLY	1	650	7800	1500x1500x650
5	ELEMENT-1 ASSEMBLY	1	1720	20640	1700x1700x1650
6	ELEMENT-2 ASSEMBLY	1	2280	27360	1950x1950x1750
7	ELEMENT-3 ASSEMBLY	1	2540	30480	1950x1950x1800
8	ELEMENT-4 ASSEMBLY	1	2540	30480	1950x1950x1800
9	ELEMENT-5 ASSEMBLY	1	4100	49200	2700x2700x1850
10	ASSEMBLY	1	4620	55440	2200x2200x2500
11	DISTANCE PIECE-I ASSEMBLY	1	3900	46800	3000x3000x650
12	DISTANCE PIECE-II ASSEMBLY	1	800	9600	1700x1700x1650
13	MOTOR STOOL ASSEMBLY	1	2200	26400	2100x2100x1800
14	INTER FOUNDATION RING	1	1500	18000	3200x3200x300
15	MOTOR FOUNDATION PLATE	4	2300	27600	550x550x3150
16	THRUST BLOCK ASSEMBLY	1	500	6000	1500x650x350
17	SHAFTS	5	3500	42000	1100x1100x3500
18	THRUST BEARING	1	800	9600	900x900x550
19	CONNECTING COUPLING	1	250	3000	350x350x850
20	COUNTER FLANGE	1	480	5760	2050x2050x75
21	MISCILLANEOUS	1 SET	2000	24000	1500x1500x1500
			42230	506760	

C.W. Pumps with accessories / Unit (6 pumps)

253380 Kgs.

SIZE & WEIGHT SCHEDULE FOR PUMPS

PROJECT: NORTH CHENNAI 2X600MW

(A) BOILER FEED PUMP (MD & TD)

Sl. No.	DESCRIPTION	QTY./UNIT		APPROX. WT. (KGS)	PACKING SIZE (mm)	Total Wt. in Kgs
		TD BFP- 2NOS	MD BFP- 1NO		(L x W x H)	
1	Motor Driven Boiler Feed Pump (MD BFP) with Base Plate & Tubing	NA	1	11500	3200 x 2000 x 3100	11500
2	Turbine Driven Boiler Feed Pump (TD BFP) with Base Plate & Tubing	2	NA	11100	3200 x 2000 x 3450	22200
3	Motor Driven Boiler Feed Booster Pump (MD BP) with Base Plate & Tubing	NA	1	4600	2200 x 1900 x 3000	4600
4	Turbine Driven Boiler Feed Booster Pump (TD BP) with Base Plate & Tubing	2	NA	4710	2200 x 1900 x 3000	9420
5	BFP + Booster Pump Mech.seal skid	2 + 2	1 + 1	1000	1600 x 1300 x 1700	6000
6	MD BFP + Hydraulic Coupling Grillage	NA	1	3800	6400 x 2700 x 400	3800
7	MD BFP Motor + BP Grillage	NA	1	3710	6100 x 2700 x 400	3710
8	Hydraulic Coupling	NA	1	11000	3700 x 2800 x 3900	11000
9	HC L.O & W.O Oil Coolers & accessorie	NA	1 SET	3285	3900 x 2000 x 2150	3285
10	Recirculation Valve	2	1	900	1000 x 1000 x 2800	2700
11	Conical Suction Strainer at BFP suction	2	1	1200	3100 x 1000 x 1000	3600
12	Basket type Suction Strainer at BP suction	2	1	2350	1500 x 1500 x 1600	7050
13	Local Gauge Rack (LGB)-1,2&3	6	3	400(EACH)	1100 x 900 x 2200	3600
14	Local instrument Transmitter Rack(LIR)	1(For 2 BFPs)	NA	250	2000 x 650 x 2150	250
15	Local instrument Transmitter Rack(LIR)	NA	1	150	1050 x 650 x 1500	150
16	MD BFP MOTOR 12000KW		1	25000	4500 x 4700 x 3000	25000
						117865

**PROJECT: NORTH CHENNAI 2X600MW
SIZE & WEIGHT SCHEDULE FOR PUMPS**

(B) CONDENSATE EXTRACTION PUMP

SL. No.	DESCRIPTION	QTY./UNIT	APPROX. WT.	PACKING SIZE (mm)	Total Wt. in Kgs.
				(L x W x H)	
1	Condensate Extraction Pump	3	6220	10,000 x 1700 x 1800	18660
2	Foundation Frame	3	580	1600 x 1600 x 300	1740
3	Canister	3	2700	7600 x 1300 x 1300	8100
4	Basket type Suction Strainer at CEP suction	3	1350	1600 x 1600 x 1700	4050
5	Local Gauge Rack	3	300	1300 x 900 x 2000	900
6	LIR Rack for Pr.Transmitters	1 (Common for 3 pumps)	250	2000 x 650 x 2150	250
7	LIR Rack for Diff.Pr.Transmitters	1 (Common for 3 pumps)	150	1050 x 650 x 1500	150
16	CEP MOTOR 1000KW	3	6000	2600 (H) X DIA 2100	18000
					51850

SECTION VII

APPENDIX – IV

LIST OF TOOLS&PLANTS BY BHEL TO CONTRACTOR

List of Tools & Plants by BHEL to contractor on free of hire charges on sharable basis

S.No	Description	Qty
01	EOT Cranes at TG Hall 105 T / 15 T and BC bay ~ 50T	01 each
02	Portal Gantry Crane 360T (For Generator Stator Placement)	01*
03	Higher capacity crane (520T/250T/180T/150T/135T) for FST/ Deaerator	01**
04	Suitable crane for erection & dismantling of Portal crane	01 *
05	Slings for Stator Lifting	As required
06	Hydro Test pumps(400/600Kg/Cm ² for HP lines)	01

* - Ref Note No 5

** - For Lifting FST/De-aerator and other heavy items out side TG Hall

Note –

1. All the above T&Ps shall be issued on free of hire charges on need basis for erection/pre-commissioning activities only and to be shared with other contractors. Allotment will be made by BHEL Site I/c depending on the requirement
2. For handling at store and transportation, contractor shall make his own arrangement
3. EOT Crane – Allotment will be made only on need basis. Trained operators are to be arranged by the contractor within the quoted rates. Contractor has to plan the activities on item wise where the EOT crane is required to be used and submit to BHEL site for approval. In case the erection can be carried out by using other T&Ps, contractor shall make his own arrangement. The decision of BHEL Site I/c on this will be final and binding.
4. Higher capacity crawler crane will be provided for Pre-assy. & Erection of FST & Deaerator

BHEL may provide either BHEL owned cranes or hired cranes at the discretion of BHEL. Bidder to note the following :-

In the event of providing BHEL Cranes :

- a) For cranes upto 100 T capacity Operator, Fuel & lubricants for the crane are to be arranged by the bidder at his cost.

- b) For higher capacity cranes (100 T and above), BHEL will provide Operator. Fuel has to be arranged by the bidder.

In the event of providing hired cranes:

Operator will be provided by BHEL through hiring agency free of charges for higher capacity cranes.

The fuel charges shall be recovered as given below:

- For 75 T/ 80 T crane : Rs 120 /hr
- For above 80T & below 150T crane : Rs 200 /hr
- For crane capacity 150T and above : Rs 250 /hr

5. Portal Gantry Crane will be issued in parts/components and are to be assembled at site by the contractor as per the instruction of the BHEL Engineers/Installation manual. The scope includes receipt of the materials from BHEL store, transporting to site, servicing of components/ drives/ pulleys etc., checking, lubricating wire ropes/drives, assembly, preparation of foundation & erection, cabling, pre commissioning and commissioning of drives, load testing/overload protection, etc., It is also the responsibility of the contractor to provide a qualified/experienced operator with in the quoted rate. The Electric power consumption for the Portal Crane will be charged as mentioned in cl. no. 3.2.2. As soon as the erection of Generator Stator is over, the crane has to be dismantled by the contractor, in the sequence as instructed by BHEL, apply preservatives/touch-up paints wherever required and return the same to store in a good condition. Required consumables, T&Ps including gas, welding M/c shall be provided by the contractor. The following facilities only will be provided by BHEL.
- a) A suitable mobile crane for erection & dismantling of the portal crane on free of hire charges(Operator, Fuel & lubricants for the crane are to be arranged by the contractor at his cost)
 - b) Lubricants for drives & wire rope.
 - c) Supervision for servicing / assy./ commissioning
 - d) Required Loads for testing
6. Fill pump shall be arranged by the contractor, wherever required. For testing LP lines necessary Hydraulic Test pumps/ Hand pumps are to be arranged by the contractor
7. Any Loss/Damage of tools by the contractor, the same shall have to be replaced by the contractor or otherwise cost thereof shall be recovered from the contractor.
8. Apart from the above mentioned tools, any other tools and plants required for satisfactory completion of the work has to be arranged by the contractor.

SECTION – VII APPENDIX – V

CONSTRUCTION POWER SUPPLY CLEARANCE/ PERIODIC INSPECTION CHECK LIST

SL.NO	CHECKS TO BE CARRIED OUT	OBSERVATIONS
01	Whether switch fuse isolators and other accessories are of suitable rating to match the connected load	YES/ NO
02	Whether suitable earthing is provided	YES/ NO
03	Whether double earthing is provided for DB, Motor, Motorstarter, welding machine etc.	YES/ NO
04	Whether surrounding area of the installation is clear and easily accessible	YES/ NO
05	Whether the installation is covered properly with a shed or canopy	YES/ NO
06	IR value of cable	SATISFACTORY/ UNSATISFACTORY
07	Operation of ELCB	SATISFACTORY/ UNSATISFACTORY
08	Operation of Isolators	SATISFACTORY/ UNSATISFACTORY
09	Whether any live part is exposed	YES/ NO
10	Whether all cable entry holes/openings are plugged	YES/ NO
11	Whether Neutral link is provided	YES/ NO
12	Whether industrial plug and sockets are used wherever applicable	YES/ NO
13	Whether the cable is of proper size and without any cuts in insulations	YES/ NO
14	Whether the proper cable termination is done using suitable lugs.	YES/ NO
15	Whether the cable termination is done using suitable lugs.	YES/ NO
16	Is Earth resistance of the earth pit is within permissible limit	YES/ NO
17	Whether danger tag is provided	YES/ NO
18	Whether HRC fuses are provided	YES/ NO
19	Whether ELCB's of suitable ratings are provided in outgoing feeders.	YES/ NO

CONSTRUCTION POWER SUPPLY SYSTEM DO'S AND DON'TS

DO's

- i. Use Personal Protective equipments like Helmet, Safety Belt, hand gloves, Rubber boots etc. while working on electrical installation.
- ii. Check yourself that the installation on which you are going to work is electrically isolated.
- iii. Use proper tools for carrying out the work. Ensure that the tools and measuring equipments are of good quality.
- iv. Check the healthiness of T & P and test equipments regularly.
- v. Use protective devices like fuse, MCB, ELCB of proper rating.
- vi. Use 24 v supply for carrying out work in enclosed area.
- vii. Use 3-pin plug and socket for power hand tool.
- viii. Ensure double earthing of all the installations.
- ix. Cover the installation properly to avoid ingress of water.
- x. Identify the source of supply clearly.
- xi. Use appropriate starters for starting and stopping motors.
- xii. Insulate joints properly with good quality insulation tapes.
- xiii. Allow only qualified electrician to carry out maintenance work.
- xiv. Educate the people about the electrical hazards.
- xv. Use only insulated cables for supply extension.
- xvi. Use only wooden bullies for fixing the light fixtures.
- xvii. Electrically operated mixture machine to be earthed locally by driving earthing spikes.
- xviii. Cables shall be either buried or supported on bullies/other suitable structures above ground.
- xix. Only industrial type plug top and socket shall be used in the system.

DON'T'S

- xx. No cable should be laid on the surface.
- xxi. Don't use wires for extension of supply.
- xxii. Do not keep live wires/ joints open.
- xxiii. Do not use copper wires as fuse wires.
- xxiv. Don't fix any light fixture on scaffolding pipe / reinforcement rod.

SECTION VII
APPENDIX - VI
PAINING SCHEME

सामग्री सूची संख्या को अधिकृतित करता है INVENTORY NO.	BASED ON BHEL EXPERIENCE
--	--------------------------

INSTRUCTIONS FOR PAINTING AND PRESERVATION


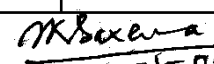
OF

CONDENSERS

(KWU DESIGN)

AT

HARDWAR

सामग्री सूची संख्या INVENTORY NO.	हस्ताक्षर एवं दिनांक SIGN & DATE						
P-5550	 27/11/04						
Rev No. 01				स्वीकृति : APPROVED :	 22-1-04 V.K.SAXENA / AGM (HXE)	HE	6.20
24-01-04				निर्माण : PREPARED	जारी : ISSUED	दिनांक : DATE	
				HXE	HXE, HARDWAR	04-12-01	

स्वाधिकार एवं गोपनीय

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सामग्री सूची संख्या को अधिकाधिक करता है
SUPERSEDES INVENTORY NO.

INSTRUCTIONS FOR PAINTING AND PRESERVATION OF CONDENSERS (KWU DESIGN)

CONTENTS

<u>SL. NO.</u>	<u>TOPIC</u>	<u>SHEET NO.</u>
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स्वाधिकार एवं गोपनीय

एक प्रतिलिपि को भी स्वयं कृपया भारत भारती इलेक्ट्रिकल्स की संपत्ति है प्रयोग करना एवं आसानी से किसी को देना नहीं चाहिए, जो कि कंपनी के हित में प्रतिस्पर्धा से है किताब बना ।

हस्ताक्षर एवं दिनांक
SIGN & DATE
27/11/04

सामग्री सूची संख्या
INVENTORY NO.
P-5550

Rev No. 01		निर्माणकर्ता Worked by R.RAWAT	<i>Rawat</i>	12/01/09
		जांचकर्ता Checked by K.N.MEHTA	<i>Mehta</i>	14/01/09

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD HEAT EXCHANGER ENGINEERING	HE 77001 पृष्ठ 13 का 03 Page 03 of 13
सामग्री सूची संख्या को अधिकाधिक करना है SUPERSEDES INVENTORY NO.	<p>1.0 General : These instructions provide standard guidelines towards painting and preservation of all components / assemblies of KWU design condensers manufactured in the shops or by sub-contractors.</p> <p>The treatment prescribed shall be adopted as normal practice and in case where customers desire specific deviations, these shall be done as per the instructions of Engineering.</p> <p>1.1 The final painting of the condenser and its assemblies is to be done after its complete erection at site.</p> <p>2.0 Preservation materials: The list of preservatives and other materials to be used for condenser in HEEP are given as under:</p> <p>2.1 Anti corrosive priming paint as per AA56101. Code no's : Primer - AA 5610001013 ; Thinner – AA 5670001001/AA 56701</p> <p>2.2 Temporary rust preventive paint as per AA 55151 (Steam washable paint) (HE 1712) Code no's : HW 5510051000 .</p> <p>2.3 Mobilux Grease – 2 from M/S IOC Code no. : HW 5740099005</p> <p>2.4 Waxed paper as per AA 51407 Code no.: HW 5141507998</p> <p>2.5 Mineral turpentine oil as per IS: 1745 Code no. : HW 5670095014</p> <p>2.6 Water proof abrasive paper grit 220</p> <p>2.7 Cellulose stopper as per AA 55306 Code no. : AA 5530006000</p> <p>2.8 DTE Medium oil as per AA 5710004006/ AA 57104</p> <p>2.9 Epoxy based Zinc rich primer paint as per AA 56114 Code no. : HW 5610014000</p> <p>2.10 High Build Intermediate epoxy paint as per AA 56112 Code no. : HW 5610012996</p> <p>2.11 Polyurethane finishing paint as per AA 56142 Code no. : HW 5610042992</p> <p>2.12 High build black coal tar epoxy paint as per AA 5610035554 Code no. : Base - AA 5610035554 Accelerator - AA 5610035600 Thinner - AA 5670008006 / AA 56708</p>		
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दिनांक एवं हस्ताक्षर SIGN & DATE 20/07/11/04	सामग्री सूची संख्या को अधिकाधिक करना है SUPERSEDES INVENTORY NO.		
सामग्री सूची संख्या INVENTORY NO. P-5550	Rev No. 01	निर्माणकर्ता Worked by R.RAWAT जांचकर्ता Checked by K.N.MEHTA	12/01/09 14/01/09

सामग्री सूची संख्या
INVENTORY NO.

SUPERSEDES
INVENTORY NO.

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स्वामित्विकार एवं गोपनीय
 इस दस्तावेज में दी गई सूचना भारत भारी बिजलीघरों की संपत्ति है। इसका प्रयोग एवं प्रसारण बिना भारत भारी बिजलीघरों की लिखित अनुमति के बिना न किया जाए।

दिनांक
SIGN & DATE
 P-5550



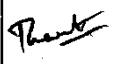
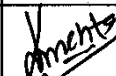
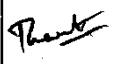
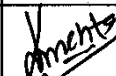
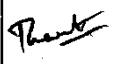
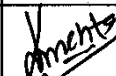
3.0 Tools and equipments: For operations on these instructions the following tools and equipments are required:


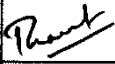
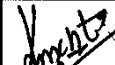
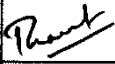
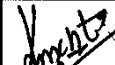
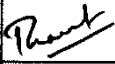
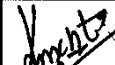
- 3.1 Shot blasting equipment.
- 3.2 Hoses for blowing the air.
- 3.3 Steel brushes, files, portable grinder.
- 3.4 Hand lamp
- 3.5 Viscosity- meter
- 3.6 Stop watch
- 3.7 Spray gun
- 3.8 Metallic or rubber knife for filling putty
- 3.9 Different brushes
- 3.10 Gloves
- 3.11 Gas mask
- 3.12 Containers and buckets
- 3.13 Sieve (metallic or nylon)
- 3.14 Funnels
- 3.15 Thickness meter/ coat gauge



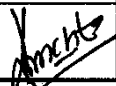
4.0 Painting and preservation:

- 4.1 Proper painting and preservation of sub-assemblies and parts of condenser and heat exchangers is very much essential to protect the surfaces against corrosion.
- 4.2 Proper preparation of the surfaces before applying the coating is of vital importance in order to have effective protection of parts against corrosion. The surface of the part to be painted should be uniform, clean from corrosion, oil, and dirt. It should be dry and free from burns. Even the slight dirt left over the surface may later on cause destruction of the coating fills and subsequent corrosion of metals.
- 4.3 The surface of the parts prepared for painting should be prevented from the atmospheric action of moisture and dirt etc. and shall have metallic shine.
- 4.4 Painting or preservation of parts must be done not later than 8-10 hrs after cleaning and degreasing.
- 4.5 The parts to be painted should be at room temperature and painting should be done in well ventilated room.

Rev No.	01	निर्माणकर्ता Worked by	R.RAWAT	[Signature]	12.01.09
		जांचकर्ता Checked by	K.N.MEHTA	[Signature]	14.01.09

दिनांक एवं हस्ताक्षर SIGN & DATE		<p align="center">उत्पाद मानक</p> <p align="center">PRODUCT STANDARD</p> <p align="center">HEAT EXCHANGER ENGINEERING</p>	HE 77001												
सामग्री सूची संख्या को अतिरिक्तित्व करता है SUPERSEDES INVENTORY NO.			पृष्ठ 13 का 05 Page 05 of 13												
<p align="center">COPYRIGHT AND CONFIDENTIAL</p> <p align="center">The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.</p>	<p align="center">स्वाभाविक एवं गोपनीय</p> <p align="center">यह प्रस्ताव मे को संश्लेषण करता है। इस दस्तावेज को स्वामित्व है भारत भारती एल. सी. प्रस्ताव प्रमाण एवं आभारक रूप से लिखी भी प्रमाण प्रमाण, जो कि कंपनी के हित में अधिकतम हो न किया जाए।</p>	<p>4.6 The paints and primer should be diluted to working viscosity with the thinner as given in the suppliers catalogues or as mentioned under clause 6.2.</p> <p>4.7 Surfaces can be coated with paint/ varnish by spray gun, brush or by dipping.</p> <p>4.8 Conservation grease can be put on the surface either in cold or hot condition by hair brush or spatula.</p> <p>4.9 The parts conserved by grease should be additionally protected by waxed paper.</p> <p>4.10 The protective surface coat must be applied very carefully so as to have a uniform layer thickness without any pores. Discontinuity or break in layer and air inclusions are not permitted.</p> <p>4.11 Each individual coating will be well dried before applying the next coat. Before applying the second/ subsequent coat it should be ensured that the surface is free from paint cracks, molten pearls and other foreign impurities.</p> <p>4.12 Quality of painted surfaces should be checked by visual inspection. Any observed defect should be immediately rectified. Special attention should be paid for painting of those parts which are inaccessible.</p> <p>4.13 All anticorrosive materials (paints, varnishes, grease etc.) are inflammable and therefore it is necessary to store them in special places which are reliably fire-proof.</p> <p>4.14 Freshly painted parts should not be stored immediately before drying. These should not press against the floor and in no case rain water is allowed to drop.</p> <p>4.15 All the paints prepared should be consumed before the expiry of its pot life. Outaged paints should never be applied. The primer is to be utilised within the time specified in the container by the manufacturer of the primer.</p> <p>4.16 All pipes which can not be painted from inside should be thoroughly cleaned and dried from inside and blanked by plastic or wooden plugs.</p> <p>5.0 Special instructions:</p> <p>5.1 Machined surfaces as well as threads are not to be painted. These are to be given a coat of Mobilux grease.</p> <p>5.2 Edges requiring welding later are to be left unpainted upto 80 mm from the edges.</p> <p>5.3 Surfaces damaged during the storage and handling in plant should be checked immediately and coated with the same paint after preparation of the damaged surface.</p>													
हस्ताक्षर एवं दिनांक SIGN & DATE	 20/11/04														
सामग्री सूची संख्या INVENTORY NO.	P-5550	<table border="1"> <tr> <td>Rev No.</td> <td></td> <td>निर्माणकर्ता Worked by</td> <td>R.RAWAT</td> <td></td> <td>12/01/09</td> </tr> <tr> <td>01</td> <td></td> <td>जांचकर्ता Checked by</td> <td>K.N.MEHTA</td> <td></td> <td>14/01/09</td> </tr> </table>	Rev No.		निर्माणकर्ता Worked by	R.RAWAT		12/01/09	01		जांचकर्ता Checked by	K.N.MEHTA		14/01/09	
Rev No.		निर्माणकर्ता Worked by	R.RAWAT		12/01/09										
01		जांचकर्ता Checked by	K.N.MEHTA		14/01/09										

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक PRODUCT STANDARD HEAT EXCHANGER ENGINEERING	HE 77001								
सामग्री सूची संख्या INVENTORY NO	SUPERSEDES INVENTORY NO	5.4 Loose items of the assemblies/ sub-assemblies mentioned in table-1 are to be painted as per the instructions given on the respective drawings. 5.5 Both the primer and its thinner should be compatible to each other. 6.0 Technological process of painting:	पृष्ठ 13 का 06 Page 06 of 13								
COPYRIGHT AND CONFIDENTIAL The information on this documents is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.	6.1 Surface preparation: It is necessary that the surface to be painted is free from loose dust, mill scale, rust, grease, oil, old film etc. Surface cleaning and preparation is to be done as per CS AA 0674101. 6.2 Preparation of paint (AA 56101) : Before application, any skin formed on the paint in the tin shall be carefully removed and any settled pigment broken up and loosened. The paint shall be thoroughly stirred to ensure complete and uniform mixing of the constituents. Care shall be taken to avoid entraining air into the paint while stirring. The priming paint (AA 56101) shall be used at the consistency given below if not specified by the paint supplier.	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;"><u>Process</u></th> <th style="text-align: left;"><u>Flow time of the paints in Ford Cup no. 4 (IS: 101)</u></th> </tr> </thead> <tbody> <tr> <td>Spraying</td> <td>30 ± 2 sec.</td> </tr> <tr> <td>Brushing</td> <td>60 – 70 sec</td> </tr> </tbody> </table> <p>These consistencies shall be adjusted using thinner and these flow times shall be maintained independently of temperature within normal shop variations.</p>	<u>Process</u>	<u>Flow time of the paints in Ford Cup no. 4 (IS: 101)</u>	Spraying	30 ± 2 sec.	Brushing	60 – 70 sec	6.3 Application of paints: 6.3.1 <u>Application of first coat AA 56101:</u> Over the cleaned surface one coat of Anticorrosive priming paint to AA 56101 at the appropriate consistency shall be applied by spraying or brushing as specified. 6.3.2 <u>Drying:</u> The painted surface shall be allowed to air dry for a minimum period of 12 hours. 6.3.3 <u>Repair of damage to the first coat:</u> Any local damage which has been caused to the first primer coat shall be repaired by cleaning with water proof abrasive paper and then by applying a coat of primer AA 56101 and allow it to dry for a minimum period of 12 hours.		
<u>Process</u>	<u>Flow time of the paints in Ford Cup no. 4 (IS: 101)</u>										
Spraying	30 ± 2 sec.										
Brushing	60 – 70 sec										
हस्ताक्षर एवं दिनांक SIGN & DATE	07/10/24	Rev No. 01	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 20%;">निर्माणकर्ता Worked by</td> <td style="width: 20%;">R.RAWAT</td> <td style="width: 20%; text-align: center;"></td> <td style="width: 40%; text-align: center;">22/10/24</td> </tr> <tr> <td>जांचकर्ता Checked by</td> <td>K.N.MEHTA</td> <td style="text-align: center;"></td> <td style="text-align: center;">22/10/24</td> </tr> </table>	निर्माणकर्ता Worked by	R.RAWAT		22/10/24	जांचकर्ता Checked by	K.N.MEHTA		22/10/24
निर्माणकर्ता Worked by	R.RAWAT		22/10/24								
जांचकर्ता Checked by	K.N.MEHTA		22/10/24								
सामग्री सूची संख्या INVENTORY NO	P-5550										

दिनांक एवं हस्ताक्षर SIGN & DATE		उत्पाद मानक		HE 77001	
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सामग्री सूची संख्या INVENTORY NO.	6.3.4 <u>Application of cellulose stopper</u> : Cellulose stopper shall be applied if required, to fill up dents and scratches and allowed to air dry for a period of 4 to 5 hours. The cellulose surface shall then be rubbed down with water proof abrasive paper no. 220. Loose dust shall be washed with water where ever possible and the surfaces allowed to dry completely. Usually this takes about 2 to 3 hours. Where water washing is not possible the loose dust shall be wiped off by a blast of air or dry clean cloth.		6.3.5 <u>Application of second primer coat AA56101</u> : Immediately before the application of second coat, the surface shall be cleaned with mineral turpentine oil where necessary. The priming paint AA 56101 shall be then applied over the surface in accordance with clause 6.3.1 .		Page 07 of 13
सामग्री सूची संख्या INVENTORY NO.	6.3.6 <u>Application of High Build Black Coal Tar Epoxide paint AA56135</u> : Process of application of this primer shall conform to AA 0674104.		6.3.7 <u>Application of Priming Paint AA 56114</u> : Process of application of this primer shall conform to AA 0674123.		
सामग्री सूची संख्या INVENTORY NO.	6.3.8 <u>Application of High Build Intermediate Epoxy paint AA56112</u> : Process of application of this primer shall conform to AA 0674123.		6.3.9 <u>Application of Polyurethane finish paint AA56142</u> : Process of application of this primer shall conform to AA 0674123		
सामग्री सूची संख्या INVENTORY NO.	6.3.10 <u>Drying</u> : The painted surface shall be allowed to air dry for a minimum period of 12 hours.		7.0 <u>Quality checks:</u>		
सामग्री सूची संख्या INVENTORY NO.	7.1 Quality control should inspect the various paints and putties received in stores according to relevant specifications.		7.2 The QC/shop should ensure that complete technological process of painting is followed and all the operations are carried out fully.		
सामग्री सूची संख्या INVENTORY NO.	7.3 The viscosity of the paints/ primers should be checked after adding the solvent/ thinner for each mixture in viscosity meter.				
सामग्री सूची संख्या INVENTORY NO.	Rev No.		निर्माणकर्ता Worked by	R.RAWAT	 12/01/04
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सत्वाधिकार एवं गोपनीय

युक्त प्रलेख में दी गई सूचना भारत भारती इंजीनियरिंग को संपत्ति है। इसका प्रयोग या अनुवाद या किसी भी तरह से, जो कि कंपनी के हित में अहितकर हो न बिना जाए।

हस्ताक्षर एवं दिनांक

SIGN & DATE
22/1/04

सामग्री सूची संख्या

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उत्पाद मानक

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- 7.4 The QC department shall visually inspect the finished component for various paint film defects such as gloss, uniformity of shade, wrinkles, orange peel effect, blistering etc.
- 7.5 The thickness of the dried painted film, when measured by using suitable instruments for the non-destructive measurement of the coats as detailed in IS: 6012, shall be as follows:

<u>Paint (coat)</u>	<u>No. of coats</u>	<u>Dry Film thickness</u>
Primer as per AA 56114	2	70 microns
Intermediate as per AA 56112	1	70 microns
Final as per AA 56142	2	60 microns
Primer as per AA 56101	2	70 microns
Final as per AA 56135	2	200 microns

8.0 List of cross referred specifications/standards :

AA 56101, AA 55151, AA 56112, AA 56114, AA 56135, AA 56708, AA 57104,
AA 55306, AA 0674101, AA 0674104, AA 0674123, IS 101, IS 6012

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स्वत्वधिकार एवं गोपनीय

यस दस्तावेज में दी गई सूचना भारत भारती इलेक्ट्रिकल्स लिमिटेड की संपत्ति है। इसका प्रयोग एवं प्रसारण बिना लिखित अनुमति के कठिनाई का कारण बनेगा, जो कि भारत भारती इलेक्ट्रिकल्स लिमिटेड के हितों में संभव है।

हस्ताक्षर एवं दिनांक
SIGN & DATE

20/11/04


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निर्माणकर्ता Worked by	R.RAWAT	<i>RR</i>	12.01.04
जांचकर्ता Checked by	K.N.MEHTA	<i>KN</i>	14-01-04

सामग्री सूची संख्या INVENTORY NO. P-5550		हस्ताक्षर एवं तिनांक SIGN & DATE 20/11/04		COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company				सामग्री सूची संख्या को अतिरिक्त करता है SUPERSEDES INVENTORY NO.		दिनांक एवं हस्ताक्षर SIGN & DATE	
Rev No. 01		निर्माणकर्ता Worked by R.RAWAT		जांचकर्ता Checked by K.N.MEHTA		Page 09 of 13		उत्पाद मानक PRODUCT STANDARD HEAT EXCHANGER ENGINEERING		HE 77001 पृष्ठ 13 का 09	
Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks				
1	2	3	4	5	6	7	8				
1.0	Bottom Plate, Dome walls, Side walls, Hot well				160-11 to 160-17 160-21 160-22 160-25 160-26 160-45	Spray or Brush	Edges subjected to welding after painting should be left uncoated (Approx. 80 mm)				
1.1	Outer Surface Priming paint coat Intermediate paint coat Finish paint coat	- Epoxy based Zinc rich primer paint - High build intermediate epoxy paint - Polyurethane finish paint (Total DFT of primer, intermediate & finish paint shall be at least 180 microns)	AA56114 AA56112 AA56142	2 1 2			Process application AA0674123 Finish paint coat to be done at site.				
1.2	Inner Surface (steam space)	Steam washable paint	AA55151	2	-- do --	--do --					
2.0	Main tube plate blanks (before drilling). All over	DTE Medium oil & covered with polythene sheet	AA57104	1	160-18 160-19 160-23 160-24	--do --	DTE Medium Oil to be sprayed after shot blasting.				
3.0	Support tube plate blanks (before drilling) All over	DTE Medium oil & covered with polythene sheet	AA57104	1	160-28	--do --	DTE Medium Oil to be sprayed after shot blasting.				

सामग्री सूची संख्या INVENTORY NO. P-5550		हस्ताक्षर एवं दिनांक SIGN & DATE 20/11/04		सत्याधिकार एवं गोपनीय COPYRIGHT AND CONFIDENTIAL The information on this document is the property of Bharat Heavy Electricals Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.			सामग्री सूची संख्या को अधिष्ठापित करना है SUPERSEDES INVENTORY NO.		दिनांक एवं हस्ताक्षर SIGN & DATE	
Rev No.	01								 <p style="text-align: center;">उत्पाद मानक PRODUCT STANDARD HEAT EXCHANGER ENGINEERING</p>	
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Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks			
1	2	3	4	5	6	7	8			
4.0	Support tube plate blanks (after drilling) All over	Steam washable paint	AA55151	2	160-28	Spray or Brush	Paint should cover all tube holes			
5.0	Front and Rear water chambers (end sections)	- Epoxy based Zinc rich primer paint	AA56114	2	160-18	--do--	Process of application AA0674123			
5.1	Outer surfaces Priming paint coat Intermediate paint coat Finish paint coat	- High build intermediate epoxy paint - Polyurethane finish paint (Total DFT of primer, intermediate & finish paint shall be at least 180 micron)	AA56112	1	160-24 160-29	--do--	Finish paint coat to be done at site			
5.2	Inner surfaces (steam space side) including tube plate on both sides	Steam washable paint	AA55151	2		--do--	Steam washable paint should cover tube holes also.			
5.3	Inner surface (Cooling water side) excluding tube plate	Anti corrosive Priming paint	AA56101	2		--do--	Specific instructions to be given in the drawing for sea water application.			
5.3.1	Sea water applications		AA56114	2		--do--	Process of application AA0674123			
5.3.2	Inland water	- Epoxy based zinc rich primer paint	AA56135	2		Brush	Process of application AA0674104			
5.4	Machined flanges	- High build black coal tar epoxide paint. (Total DFT of the primer & final paint shall be at least 250 microns) Mobilux grease -2 with waxed paper	M/s IOC HW57400 99005							
								निर्माणकर्ता Worked by R.RAWAT		20/11/04
								जांचकर्ता Checked by K.N.MEHTA		14/11/04

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SIGN & DATE

सामग्री सूची संख्या
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सामग्री सूची संख्या
SUPERSEDES

को अधिकृतित करना है
INVENTORY NO

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SIGN & DATE

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उत्पाद मानक
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Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks
1	2	3	4	5	6	7	8
9.0	Dome internals. (outer surfaces)	Steam washable paint	AA55151	2	160-29	Spray or Brush	
10.0	LP Heater support structure. (All over)	Steam washable paint	AA55151	2	160-38	--do--	
11.0	Steam throw device.						
11.1	Outer surfaces Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-49	--do--	Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1			
	Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
11.2	Inner surfaces.	(Total DFT of primer, intermediate & finish paint shall be at least 180 micron)					
12.0	Hinge and Hinge support assembly.	Steam washable paint	AA55151	2	--do--	--do--	
12.1	Unmachined surfaces Priming paint coat	- Epoxy based Zinc rich primer paint	AA56114	2	160-51	--do--	Process of application AA0674123
	Intermediate paint coat	- High build intermediate epoxy paint	AA56112	1	160-37		
	Finish paint coat	- Polyurethane finish paint	AA56142	2			Finish paint coat to be done at site.
12.2	Machined surfaces	(Total DFT of primer, intermediate & finish paint shall be at least 180 micron)					
		Mobilux grease-2 with waxed paper	M/s IOC HW57400 99005				


Rev No.
01

निर्माणकर्ता
Worked by
जांचकर्ता
Checked by

R.RAWAT
K.N.MEHTA

Rawat
Mehta

12/1/24
19/1/24

सामग्री सूची संख्या INVENTORY NO. P-5550		हस्ताक्षर एवं दिनांक SIGN & DATE [Signature] 11/04		स्वातंत्र्यकार एवं गोपनीय The information on this document is the property of Bharat Heavy Electrical Limited. It must not be used directly or indirectly in any way detrimental to the interest of the company.		सामग्री सूची संख्या SUPERSEDES INVENTORY NO.		दिनांक एवं हस्ताक्षर SIGN & DATE	
Rev No. 01								<div style="text-align: center;">  <p>उत्पाद मानक</p> <p>PRODUCT STANDARD</p> <p>HEAT EXCHANGER ENGINEERING</p> </div>	
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Item No.	Assemblies/Sub assemblies/Surface	Paints/preservatives required	BHEL Sp. No.	No. of coats	PGMA No.	Mode	Remarks		
1	2	3	4	5	6	7	8		
13.0	Sole plate and packers for spring assemblies. All over	Stream washable paint	AA55151	2	160-71	Spray or Brush	Process of application AA0674123		
14.0	Springs . All over	--	--	--	160-71	--	Finish paint coat to be done at site.		
15.0	Springs cages. All over. Priming paint coat Intermediate paint coat Finish paint coat	- Epoxy based Zinc rich primer paint - High build intermediate epoxy paint - Polyurethane finish paint (Total DFT of primer, intermediate & finish paint shall be at least 180 microns)	AA56114 AA56112 AA56142	2 1 2	160-71	Spray or Brush	Process of application AA0674123		
16.0	Stand pipes. Outer surfaces Priming paint coat Intermediate paint coat Finish paint coat	- Epoxy based Zinc rich primer paint - High build intermediate epoxy paint - Polyurethane finish paint (Total DFT of primer, intermediate & finish paint shall be at least 180 microns)	AA56114 AA56112 AA56142	2 1 2	160-72	--do	Process of application AA0674123		
17.0	Stay rods and similar other components. All over.	Stream washable paint	AA55151	2	160-51 160-28	--do	Finish paint coat to be done at site.		
								निर्माणकर्ता Worked by R.RAWAT [Signature] 12/01/04 जांचकर्ता Checked by K.N.MEHTA [Signature] 12/01/04	

SECTION VII
APPENDIX – VII
DECLARATION SHEET

I, _____ hereby certify that, all the information and data furnished by me with regard to this Tender Specification No.BHEL: PSSR: SCT: 1389 are true and complete to the best of my knowledge. I have gone through the specifications, conditions, stipulations in detail and agree to comply which the requirements and intent specifications.

I further certify that I am duly authorized representative of the under mentioned tenderer and a valid power of Attorney to this effect is also enclosed.

TENDERER'S NAME & ADDRESS

**AUTHORISED REPRESENTATIVE'S
SIGNATURE WITH NAME & ADDRESS**

SECTION VII

APPENDIX – VIII

TENDER SPECIFICATION NO BHEL: PSSR: SCT: 1389

**CERTIFICATE OF DECLARATION FOR CONFIRMING
KNOWLEDGE ON SITE CONDITIONS**

We,

hereby declare and confirm that we have visited the project site under subject, namely and acquired full knowledge and information about the site conditions. We further confirm that the above information is true and correct and we will not raise any claim of any nature due to lack of knowledge of site conditions.

TENDERER'S NAME AND ADDRESS

Place:

Date :

**SIGNATURE OF AUTHORISED
REPRESENTATIVE WITH NAME & ADDRESS:**

OFFICE SEAL



Bharat Heavy Electricals Limited
(A Govt. of India Undertaking)
Power Sector – Southern Region
EVR Periyar Building
690 , Anna Salai, Nandanam, Chennai – 600 035.

SECTION VII
APPENDIX - IX
CHECK LIST

TENDER SPECTFICATION NO, BHEL: PSSR: SCT: 1389

Tenderers are required to fill in the following details:

1. a) Name of the Tenderer with address : YES/NO
b) Telegraphic/Telex address : YES/NO
c) Phone (Office/Residence) : YES/NO
d) Management Structure of firm (Pvt. Ltd./Public Ltd./Partnership/Sole Proprietorship) Documentary proof For the same enclosed) : YES/NO
2. Whether EMD submitted as per Tender specifications terms and Conditions : YES/NO
3. Validity of offer (offer shall be kept open for acceptance for minimum six months) : YES/NO
4. Whether tenderer visited the erection site and acquainted with the site conditions before quoting : YES/NO

SIGNATURE OF THE TENDERER

5. Whether the following details are furnished : YES/NO
- a) Previous Experience : YES/NO
 - b) Present assignments : YES/NO
 - c) organization chart of the company : YES/NO
 - d) Company financial statue : YES/NO
 - e) Incase of company, proof of Registration of the company : YES/NO
 - f) Memorandum & Articles of Association of company/copy of Partnership deed : YES/NO
 - g) Profit & Loss account for the Last 3 years : YES/NO
 - h) Audited Balance sheet for the Last 3 years : YES/NO
 - i) Income Tax clearance certificate (latest) : YES/NO
 - j) Solvency Certificate from a Nationalised Bank : YES/NO
 - k) Power of Attorney of the person Signing the tender duly attested By a Notary Public : YES/NO
 - l) Manpower organization chart With deployment plan at site For posting of Engineers/super Visitors and workers/labourers For satisfactory completion of Work under this specification : YES/NO

SIGNATURE OF THE TENDERER

6. Whether the Tenderer is conversant with local labour laws & conditions : YES/NO
7. Whether the tenderer is aware of all safety rules and codes : YES/NO
8. Whether the Declaration sheet (as per appendix enclosed) : YES/NO
9. Time required for mobilization of site organization and start of work : YES/NO
10. Whether list of tools and Plants available with the contractor and proposed to be deployed for this work enclosed : YES/NO
11. Whether all the Pages are read understood and signed. : YES/NO
12. Deviations, if any Pointed out :
13. Whether PF exemption No. is allotted by RPFC of your area if so, indicate number : YES/NO

SIGNATURE OF THE TENDERER

Section VII Appendix X

REVERSE AUCTION PROCEDURE BHEL PSSR SCT 1389 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.

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 vendor 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.