

The Owner shall pay to the Contractor in accordance with the Contract, such amount as has been ascertained by Owner as payable for such Change Order pending the resolution of the dispute. Contractor's performance of the Work as changed shall not prejudice either party's position regarding the effects of such change.

#### 4.4.6 Variations in Contract Price

Except as otherwise provided in the Contract any increase or reduction of the Contract Price resulting from any Change Order shall be for the account of Owner, provided that no increase in the Contract Price shall be granted with respect to a change if:

- (1) The providing of the additional services is necessary in order for Contractor to satisfy its responsibility to make the Plant operable and capable of performing as contemplated under the Contract and to ensure that the Plant when completed and the Work is performed in accordance with the Contract;
- (2) The additional services are required because of delays attributable to Contractor, to late deliveries of Equipment or Contractor's Equipment or to labour shortages or relate to any rectification or remedy of defects or deficiencies required under the Contract;
- (3) The additional services are required because of a breach of any of the Guaranteed Commercial Operation Date and Performance Guarantees or Warranties under the Contract; or
- (4) The change relates to re-performance of any of the Work because of Contractor's failure to follow Owner's Specifications.

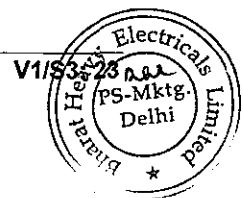
It is clarified that any adjustments in the Contract Price shall be made only in accordance with this Clause 4.4.

#### 4.4.7 Not Considered Changes

Without prejudice to any other provision of the Contract, the following shall not be considered under any circumstances as changes in or within the Work, nor shall any of the following be taken into account when calculating the effect upon the Contract Price of changes in or within the Work nor shall any of the following of themselves be considered the basis for any adjustment of the Contract Price:

- (1) Any escalation in the cost of Equipment or labour;
- (2) Any increase in manpower hourly rates;
- (3) Currency fluctuations in respect of costs included within the Contract Price; and
- (4) Any change in the sourcing of Equipment.

4.4.8 The Work shall be subject to further detailing by the Parties from time to time and that, such detailing shall not be considered as a change in Work. In addition, a request by Owner that Contractor perform services or provide Equipment or Contractor's Equipment not specifically included within the Scope of Work shall not be considered a request for a change in the Work if it is required to make the Plant operable and capable of performing as specified in the Contract.



5.0 **TIME : THE ESSENCE OF CONTRACT**

The time and date of completion of the Work as stipulated in the Contract Document and the Guaranteed Commercial Operation Date shall be deemed to be the essence of the Contract. The Contractor shall so organize his resources and perform so as to complete the Work not later than the aforesaid date.

The Contractor shall submit a PERT network showing various key phases of the Work such as design, procurement, manufacturing, shipment, and field erection and construction activities within thirty (30) days after the date of receipt of Notice to Proceed. This network where applicable shall indicate the interface facilities to be provided by the Owner and the dates by which such facilities are needed by the Contractor and also the programme for phase wise release of Work Site for erection work as may be needed by Contractor.

The Contractor shall discuss the network so submitted with the Owner and the same shall be finalized pursuant to such discussions. The agreed network may be in the form as submitted or in revised form in line with the outcome of discussions and shall form part of the Contract Document.

The above PERT network shall be reviewed and periodic review reports shall be submitted by the Contractor to the Owner as directed by him.

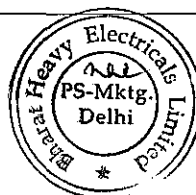
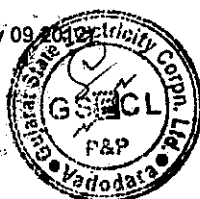
The Contractor shall make available to the Owner detailed manufacturing, delivery, erection, testing and commissioning programmes in line with the agreed PERT network in the form of PERT or Bar Chart as desired by the Owner within ninety (90) days from the date of receipt of Notice to Proceed. During performance of the Contract, such programmes shall be renewed, updated and submitted to the Owner as and when needed by him or periodically as specified by him. If in the opinion of the Owner/Engineer proper progress is not maintained, suitable changes shall be made in the Contractor's operation to ensure proper progress.

5.0A **TRANSFER OF TITLE AND RISK**

5.0A1 The legal title (but not risk which shall be transferred on the Risk Transfer Date) of the Equipment dispatched from any country outside India, shall be passed on to the Owner on the point of embarkation. However, the physical possession of such goods will remain in the hands of the Contractor for performance of the balance Scope of Work. The Contractor shall submit, in such form and within such time as required by the Owner, an indemnity bond indemnifying the Owner from any loss or damage to the equipment/material for the period between point and embarkation and the Taking Over the Plant by the Owner.

The transfer of title of goods shall take place when the goods in deliverable country/state are placed on board vessel for onward transmission to the Owner. The clean Bill of Lading issued by the Master of the Vessel shall be indicative of such deliverable country/state. Risk shall however continue to be that of the Consignor/Contractor upto the Taking Over of the Plant.

5.0A2 The Contractor shall remain responsible for, and shall bear the risk of loss or damage to, the Equipment in its possession and the Plant from the Commencement Date until the Risk Transfer Date. Provided that the transfer of risk shall be without prejudice to the obligation of the Contractor under the Contract.



6.0 **PERFORMANCE BANK GUARANTEE FOR DUE PERFORMANCE OF THE WORK**

6.1 The Contractor, upon receipt of Notice to Proceed from Owner shall furnish a Performance Bank Guarantee in the form specified as per Annexure-D as the performance security, for an amount equal to 17.5% of the total Contract Price under the Contract for diligent and due fulfillment by the Contractor of all obligations under the terms and conditions of the Contract. The initial Performance Bank Guarantee of 17.5% will be permitted to be reduced to 10% on completion of Reliability Run, completion of Performance Guarantee Test, and /payment of liquidated damages,(if applicable ) whichever is later.

6.2 The Performance Bank Guarantee shall be liable to be invoked towards and claims and/or damages due to the Owner for failure of the Contractor to meet his obligations under the Contract. The Bank Guarantee shall be valid until it is released at the end of Warranty Period as stipulated in Clause 21 of this Section.

6.3 However, the amount of the Performance Bank Guarantee, after expiry of the Warranty Period, may be reduced in proportion to the Work released from Warranty obligations at the discretion of the Owner.

The Performance Bank Guarantee amount in case of divisible Contract shall be 17.5% of the total value of the Contract for the faithful performance of the Contract in accordance with the Contract Document. The guarantee amount shall be payable to the Owner in the currency of the consideration of the Contract without any condition whatsoever and their Guarantee shall be irrevocable.

6.4 In addition to the grounds specified above, The Performance Bank Guarantee is shall be liable to be invoked in the event:

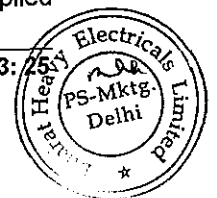
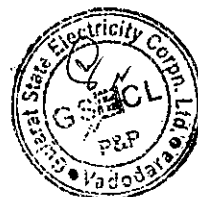
- a) The Owner has obtained an award in arbitration and the amount awarded has not been paid within thirty (30) days after the award, or
- b) The Contractor has gone into liquidation or has been declared bankrupt, or
- c) Any other reason which may adversely affect the contractual obligations of the Contractor.

Performance Guarantee is intended to secure the satisfactory performance by the Contractor of the entire Contract.

7.0 **SUPPLY, ERECTION CONTRACT/DIVISIBLE CONTRACT**

Notwithstanding anything stated elsewhere in the Bid Document, the Contract to be awarded is on the basis of Supply- Erection Contract (Divisible Contract) with single point responsibility. In the mode of contracting on the basis of Supply-Erection, the supply portion of the Contract will relate to the supply of the Plant and the erection portion will relate to port clearance, port handling, inland transportation, insurance, storage, unloading, erection, construction, testing, commissioning, Engineering, Project Management etc. as will be defined in the Contract Document.

In the case of a divisible contract, the title of ownership of Goods to be supplied



shall pass on to the Owner on dispatch Ex-works/F.O.B. However, until the Work is completed in all respects and the Plant is taken over by the Owner, the Goods shall remain within the custody of the Contractor. The above arrangement shall not in any way dilute the responsibility of the Contractor for the successful commissioning of the Plant and completion of other works as per Bid Specifications and both the contracts shall contain a cross default clause, namely, that a breach of one contract shall automatically be classified as a breach of the other contract, which will confer a right on the Owner to levy LD from other contractor and to terminate also the other contract as well at the risk and cost of the Contractor.

## 8.0 TERMS OF PAYMENT

8.1 The terms of payment for the price components of the Supplies of Equipment and Mandatory Spares, civil and architectural works, and erection are detailed in the Contract Agreement.

### 8.1.1 Initial Advance

The advance in accordance with the provisions of Clause 8.4, 8.5, 8.6, 8.7, and 8.8 of these GCC (each of such advance being referred to as "Advance Payment") will be paid on fulfillment of all of the following conditions by the Contractor:

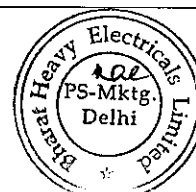
- i) Signing of Contract Agreement;(Agreement shall be signed within 45 days from the date of acceptance of LOA)
- ii) Submission of an unconditional Performance Security (Performance Bank Guarantee) as per clause -6.0 of the General Conditions;
- iii) Submission of an unconditional additional Performance Guarantee /by concerned entity, as prescribed by the Owner;
- iv) Submission of a preliminary Project network schedule indicating major milestones based on the Work schedule.
- v) Submission of Advance Payment Bank Guarantee as per clause-8.2 below.

Submission of detailed Project Network Schedule shall be made within 45 days from the date of signing of Contract.

## 8.2 Documentation and Bank Guarantee for Advance Payment

The Contractor shall furnish the following documentation as a condition for making request for Advance Payment.

- i) Invoice for amount of Advance Payment in original and five (5) copies.
- ii) Bank guarantee in the proforma attached with Volume-1, Section-2, Annexure-I-I for an amount equivalent to the aggregate amount of Advance Payment ("**Advance Payment Bank Guarantee**") with one (1) copy of original bank guarantee valid upto Take Over of Plant issued or counter guaranteed/confirmed by any Indian Nationalized Bank or its foreign branch. The charges for counter guarantee/confirmation, if any, shall be to Contractor's account.



- iii) Advance Payment Bank Guarantee for Advance Payment shall be denominated proportionately in currencies of contract or US Dollars.

### 8.3 Adjustment of Advance Payment

The Advance Payment made shall be adjusted against the progress payments, progressively at the same rate of advance i.e., if 10% advance paid, 10% of the invoice value of the progress payment will be adjusted against making progress payment. Upon each such recovery, the value of the Advance Payment Bank Guarantee shall be reduced progressively by the amount of advance so recovered by Owner from Contractor's progress payments. Apportioning the break-up of other payments shall be as further detailed below. All further payments under the Contract shall be made as stipulated in the Contract Agreement. Reduction of Advance Payment Bank Guarantee shall be permitted every six months i.e. January and July of each year based on records available with GSECL.

### 8.4 Design Engineering Charges

Design engineering charges component will be paid as per detailed break-up as set forth in the contract after issue of certification of completion of same by Contractor to Owner and acceptance thereof by Owner/Owner's representative in following installments:

- i) 0 to 5% (max 5%) of Design Engineering Charges as Advance Payment on fulfillment of conditions in sub-clauses-8.1 and 8.2
- ii) 75% (cumulative not exceeding 80%) of Design Engineering Charges as progress payment on approval of drawings and document – payable in 36 monthly equated installments.
- iii) 7% (cumulative not exceeding 87%) of Design Engineering Charges on certification of successful completion of Reliability Run of Plant as per specification by Owner.
- iv) 6% (cumulative not exceeding 93%) of Design Engineering Charges on Final Plant Acceptance/Take- Over of Plant and also submission of as built drawings.
- v) 7% (cumulative not exceeding 100%) of Design Engineering Charges on Satisfactory completion of warranty period.

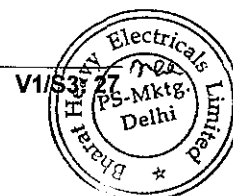
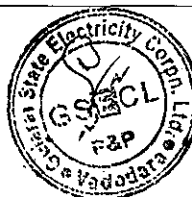
Contractor acknowledges that certification or its acceptance by the Owner's representative shall not, however, relieve or absolve in way or manner the Contractor from the performance of work and other obligations under the Contract including Performance Guarantee and Warranty obligations under the Contract.

### 8.5 Project Management Charges

Project Management charges component will be paid as per detailed break-up in following installments:

- i) 0-5% (max 5%) of Project Management charges as Advance Payment on fulfillment of conditions in sub-clauses-8.1 and 8.2

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- ii) 75% (cumulative not exceeding 80%) of Project Management charges on equal monthly installments for the Contract Period.
- iii) 7% (cumulative not exceeding 87%) of Project Management Charges on certification of successful completion of Reliability Run of plant as per specification by Owner;
- iv) 6% (cumulative not exceeding 93%) of Project Management charges on Take Over of plant.
- v) 7% (cumulative not exceeding 100%) of Project Management Charges on Satisfactory completion of warranty period and also submission of as built drawings, O & M manuals etc.

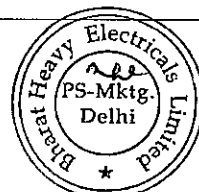
8.6

**Supply Price**

For Supplies of Equipments, the payments shall be linked with the despatch of materials and shall only be made after production of all despatch documents as specified in Letter of credit (L/C) conditions in case of supplies of non Indian origin and / or in the relevant contract conditions which will, inter-alia, include 3 original Bills of Lading in case of CIF supplies and the equipment Material Despatch Clearance Certificate issued by the Owner/Owner's representative after inspection if applicable.

- i) Supply price component will be paid as per break-up below:

Item No.	Time of Payment	% Component FOB/Ex-Works Price	Condition to be fulfilled
1.0	Advance Payment	0-5% (max 5%)	As per clauses-8.1 and 8.2 of this General Condition.
2.0	Advance Payment against placement of orders for major equipments.		
a)	Evidence of order placement of all major equipment/system	0-5% (cumulative not exceed 10%)	Evidence of order placement for all major Items to be ordered within first 6 months from zero date as per L1 schedule shall be considered-
b)	Despatch of Equipment/system from Manufacturer's Works	55% (cumulative not exceeding 65%)	Production of invoices and satisfactory evidence of shipment for major orders and submission of Material Despatch Clearance Certificate and Inspection Certificate as per quality assurance program.



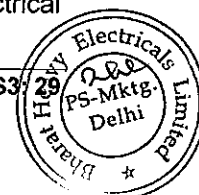
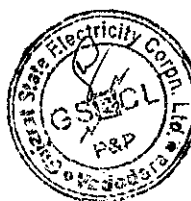
Item No.	Time of Payment	% Component FOB/Ex-Works Price	Condition to be fulfilled
3.0	Receipt of equipment /system	15% (cumulative not exceeding 80%)	Verification and certification by the Owner / Owner's representative of the equipment / system received and stored at 'Site'
4.0	Successful Completion of Reliability Run	7% (cumulative not exceeding 87%)	Certification of successful completion of Reliability Run of plant as per contract by Owner.
5.0	Successful completion of Performance tests	6% (cumulative not exceeding 93%)	Take Over of Plant
6.0	Warranty Charges	2% 7% (cumulative not exceeding 100%)	Satisfactory completion of Warranty Period and Extended Defects Correction Period, as evidenced by issuance of Defects Liability Certificate, and also submission of O & M manuals, As built drawings etc.

- ii) The Ocean Freight and Marine Insurance Charges and the in-land transportation and Marine insurance charges shall be paid to Contractor on pro-rata basis to the FOB price of component shipped on evidence of activities having been carried out. The aggregate of all such pro-rata payment shall not exceed the total amount identified in contract price provided, however, wherever equipment wise above mentioned charges have been identified in contract the payment of such charges shall be based on such charges identified in contract against evidence of activity having been carried out.

**8.7 Erection, testing and Commissioning Price**  
(Excluding civil & architectural works)

In case of erection, progress payments shall only be made after the issue of Certificates by the Owner / Owner's representative, as detailed under:

- i) 0-5% (max 5%) of total erection, testing and commissioning price as Advance Payment and fulfillment of conditions in sub-clauses -8.1 and 8.2 above and on establishment of site office by the Contractor at site.
- ii) 75%(cumulative not exceeding 80%) of the erection, testing and commissioning price will be made as progressive payments against progressive erection on tonnage basis for mechanical and electrical



items and successful completion of quality check points. Separate basis for cabling and instrumentation, which will be finalized between Owner and Contractor prior to contract award. Progress payments shall only be made after the issue of Certificates by the Owner/Owner's representative, one for the quantum of work completed and the other by the Field Quality Surveillance representative for the successful completion of quality check points involved in the quantum of work billed.

- iii) 7% (cumulative not exceeding 87%) of the erection, testing and commissioning price on successful completion of Reliability Run of Plant as per contract.
- iv) 6% (cumulative not exceeding 93%) of the erection, testing and commissioning price on Take Over of plant.
- v) 7% (cumulative not exceeding 100%) of the erection, testing and commissioning price on satisfactory completion of warranty period.

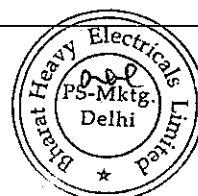
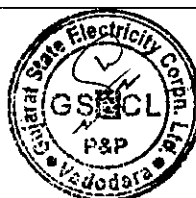
Further break-up of erection activities of the above identified equipment for progressive payments shall be as setforth in Milestone payment schedule.

#### 8.8 Civil, Structural and Architectural Price

- i) 0-5% (max 5%) of total civil, structural & architectural price as Advance Payment and fulfilment of conditions in sub-clauses 8.1 and 8.2 above and on establishment of site office by the Contractor at site.
- ii) 75% (cumulative not exceeding 80%) progressive payment on certification by the Owner/Owner's representative on the basis of the work performed of total civil, structural and architectural price of the package as per the payment stages as setforth in Milestone Payment Schedule.
- iii) 7% (cumulative not exceeding 87%) of total civil, structural and architectural price component on successful completion of Reliability Run as per contract.
- iv) 6% (cumulative not exceeding 93%) of total civil, structural and architectural price component on Taking Over.
- v) 7% (cumulative not exceeding 100%) of the total civil, structural and architectural price component on satisfactory completion of warranty period.

#### 8.9 Mandatory Spare Price

- i) The FOB Ex-works including packing and forwarding charges price component of Mandatory Spares shall be paid as indicated below:
  - a) 75% of price component for Mandatory Spares after submission of material despatch clearance and inspection certificate, despatch to Site and submission of requisite shipping documents. An indicative list of the shipping documents is given under Clause 9.3 of these GCC.



- b) 25% of price component for Mandatory Spares on receipt and storage at Site and physical verification by the Owner/Owner's Representative.
- ii) The ocean freight and marine insurance charges and the inland transportation and insurance charges shall be paid to the Contractor pro-rata to the value of Mandatory Spares received at Site on production of invoices by the Contractor.
- iii) Tools and tackles Prices: This shall form part of Supply Price and shall be claimed under supply payment.

Quantity variation in spares: The Purchaser may vary the quantity of mandatory spares to be ordered provided the ordered quantity results in a "whole number" or a "complete set". Order for spares with quantity expressed as a fraction will not be made. Variation in quantities, indicated in percentage or LOT will not be made. However, complete deletion of any item can be made.

8.10 **Not Used**

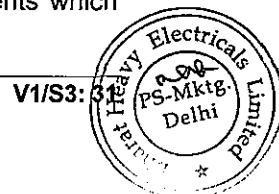
8.11 **Schedule of Payments**

Based on the terms of payment in clauses mentioned above and work schedule payment of Contract Price component linked with achievement of Milestones shall be paid in accordance with Milestone Payment Schedule. The Milestone payment schedule specifies the installments of Contract Price, and the Milestones to be achieved and the payment thereunder shall be subject to the following:

- i) The installments quoted in the Milestone payment Schedule may be modified by Owner / Owner's representative if progress is not as scheduled.
- ii) Payment shall be made on the date which is the later of (i) accomplishment of a milestone and (ii) the date fixed for accomplishment of such a milestone as set out in the Milestone Payment Schedule.
- iii) Submission of documentation/data to Owner/Owner's representative for approval.
- iv) Submission of monthly progress reports and updated Network Schedule

8.12 **Application for Interim Payment Certificates and Claim for Payments**

8.12.1 The Contractor shall submit a statement (the **Interim Payment Certificate**"), in six copies to the Owner/Owner's representative after the end of each month before the tenth day of the next month, in a form approved by the Owner/ Owner's representative, showing the amounts to which the Contractor considers himself to be entitled, together with supporting documents which



shall include the detailed report on the progress during the month. In order to be eligible for payment, the Interim Payment Certificate shall include the following items, as applicable, which shall be expressed in the currencies in which the contract price is payable, in the sequence listed:

- i) The estimated contract value of the Design and construction documents produced and the Works executed up to the end of the month (including variations but excluding items described in subparagraphs (iv) to (vii) below);
- ii) Certification from Owner/Owner's representative that the applicable Work has been performed and that the quality of Work described in the Interim Payment Certificate is in line with contract;
- iii) If there is any pending or threatened dispute, regarding Work covered by such request or payment as a result of which Contractor intends to withhold payment from such sub-Contractor, a report detailing such dispute and circumstances thereof;
- iv) Any amounts to be added and deducted for which Change Order has been issued;
- v) Any amounts to be added and deducted for the Advance Payments and repayments in accordance with clause 8.3 above;
- vi) Any other additions or deductions which may have become due in accordance with the Contract including, without limitation, deduction on account of liquidated damages.
- vii) The deduction of the amounts certified in all previous Interim Payment Certificates.
- viii) Any other information that the Owner/Owner's representative may reasonable request.

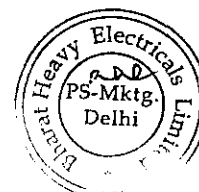
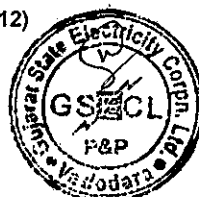
8.12.2 Contractor shall raise its consolidated invoices/bills only once a month.

### 8.13 Mode of Payment

8.13.1 For supply of Equipment and Mandatory Spares:

The mode of payment by Owner to the Contractor shall be mutually agreed before finalization of Contract. The same may be by way of establishing an irrevocable Letter of Credit (L/C) in favour of the Contractor through a bank in case of supplies of Non-Indian origin directly to Owner and through a nationalized bank to be nominated by the Contractor in case of Indian Supplies only for payments due on despatch of equipment or by way of direct disbursement of loans. The payment will be made through usance L/C as per credit period of payment specified in the specification. The L/C format will be mutually decided during finalization of Contract.

The value of L/C will be as per payment schedule for each quarter and valid for a quarter. It will be the responsibility of the Contractor to utilize the L/C to the fullest extent. In case L/C has been established by the Owner and not utilized by the Contractor, all reinstatement charges for the L/C for further period necessitated due to non-utilization of L/C will be to the account of the



Contractor.

All L/C charges shall be to Owner's account except L/C charges for confirmation by Contractor's bank which will be borne by the Contractor. For non-Indian supplies, Contractor shall be responsible for all permits, licenses and the like from respective authorities necessary for export of equipment from the respective countries to the Owner.

8.13.2 For Other Payments

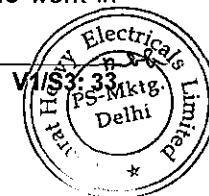
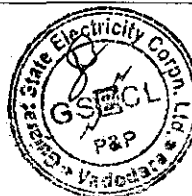
The payment of advance(s), price adjustment, any other supply payment, ocean freight, marine insurance, Taxes (wherever admissible), inland transportation (including port handling), insurance, civil and architectural works and for the erection portion of the Works shall be made direct to the Contractor by the Owner.

- 8.13.3 Unless otherwise agreed by the parties, payments by Owner to Contractor, shall be made in currencies as per Schedule of Prices by cheque to an account or accounts designated by Contractor and maintained by Contractor or by such other person or entity at a bank or banker in Vadodara, Gujarat, India in writing. Extra Work shall be paid in accordance with the applicable Change Order as part of the work under the Contract. Once all acts necessary to initiate the relevant wire transfer have been completed within the time specified for such payments, any delays within the international or domestic banking system in the transfer of such payments to Contractor's account or accounts as aforesaid shall not give rise to a claim that Owner has breached its payment obligations hereunder.

Payment will be made in the respective currencies quoted by the bidder for onshore supply for import content of raw material of onshore supply. Bidder shall have to provide the drawdown schedule in respective currencies & to include in price bid accordingly.

- 8.13.4 The Owner shall pay the amount certified in each Interim Payment Certificate within 30 days from the date on which the Owner/Owner's representative received the Contractor's statement and supporting documents and the Owner shall pay the amount certified in the Final Payment certificate within 120 days from the date of issue of the Take Over certificate.

- 8.13.5 Pursuant to this clause-8.0, if the commercial banks are closed due to a public holiday, period as above shall be extended to the first business day after the end of the period concerned. In addition, unless the parties otherwise agree, Owner shall not be obligated to pay, in respect of any request for payment, any amount in excess of 100% of the cumulative amount anticipated to be paid for work completed to such date, as set forth in the projected payment schedule as per Schedule of Prices. If any request for payment does not comply in all material respects with the Contract, Owner shall inform Contractor about the same within 15 days following the receipt of such request for payment, and Contractor shall re-submit such request for payment. If less than the full amount is paid, Owner shall state in writing the reasons for paying such lesser sum. Any dispute regarding Owner's payment of a lesser sum than that set forth in a request for payment must be raised by Contractor within 30 days of receipt of such payment, or Contractor's right to dispute such payment is waived. During the pendency of any such Dispute and the resolution thereof, Contractor shall continue to perform the work in



accordance with the provisions set forth herein.

8.14 **Payments Withheld**

8.14.1 Owner shall have the right to withhold from any payment due to Contractor, including the final payment, such amounts as Owner reasonably deems necessary or appropriate to protect it because of any one or more of the following reasons:

- i) Defects in any work, which might affect Owner's ability to operate Unit or Plant as contemplated herein, whether or not payment has been made therefor;
- ii) The filing of a any vendor/tradesman's lien or similar encumbrance in respect of the work or the plant (or any portion thereof);
- iii) A dispute as to the accuracy or completeness of any request for payment received by Owner pursuant to this clause-8.0 within 90 days of receipt thereof or payment made thereunder;
- iv) Contractor's failure to deliver any Performance Securities and additional performance to Owner as in the Contract;
- v) Any requirement in accordance with Applicable Laws to withhold any Taxes payable by Contractor in respect of the work or any part thereof; and
- vi) Contractor's failure to make payments to sub-Contractors or workers for work, including amounts withheld by Contractor because of disputes between Contractor and such Persons.

8.14.2 In addition to the provisions of this clause-8.0 which relates to the recovery by the Owner of any amounts that the Owner may have paid, for which the Contractor is liable under the contract, the Owner shall also be entitled to recover all the dues in terms of the contract including liquidated damages for delay, liquidated damages for the shortfall in the guaranteed performance parameters, etc by way of deductions from the payments due to the Contractor or that may become due to the Contractor in future or from any securities/guarantees under the contract and/or otherwise.

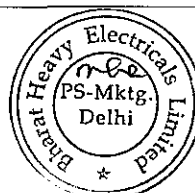
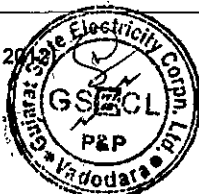
8.14.3 Notwithstanding any dispute that Contractor may have, and regardless of the basis thereof or grounds there for, Contractor agrees that it will, for so long as the Contract has not been terminated diligently prosecute the Work up to Take over of Plant, all in accordance with the terms of the Contract.

9.0 **SHIPPING PARTICULARS**

9.1 The Contractor shall be responsible for the correct appraisal of freight rates, weights and volumes of structural's or machinery as the case may be. The Owner shall not be liable to pay any warehouse or wharf age charges due to the necessity of storing Goods awaiting shipment.

9.2 All consignments shall be addressed to and the bill of lading and other shipping documents shall be made in the name of the Consignee.

9.3 After shipment is effected, the following documents shall be forwarded to the



Consignee by registered air mail/courier services.

- |      |  |   |
|------|--|---|
| i)   | The original bill of lading in duplicate and four (4) non-negotiable copies of the same. |   |
| ii)  | F.O.B. invoices  | Six (6) copies including one (1) original |
| iii) | Freight invoice & freight details  | Six (6) copies including one (1) original |
| iv)  | Insurance premium receipts or certificates   | - Ditto -                                 |
| v)   | Packing list   | - Ditto -                                 |
| vi)  | Certificate of origin  | Six (6) copies including one (1) original |

10.0 **DELIVERY TERMS**

10.1 When the Goods are ready for shipment, the Owner should be notified by the Contractor through fax or email. Notification of dispatch and delivery in regard to each and every consignment shall be made to the Owner immediately after dispatch and delivery in case of delivery at either the Site or at the port of entry as applicable at least forty-eight (48) hours ahead of actual delivery. The Contractor shall further supply to the Consignee an invoice and packing list of all Goods dispatched or delivered by him and other shipping particulars. All packages, containers, bundles and loose materials forming part of each and every consignment shall be described fully in the packing list, and full details of the contents of packages and quantity of goods shall be submitted to the Owner.

10.2 For the Goods imported by the Contractor, the Contractor shall deliver the Goods at CIF price. The Contractor shall also make all arrangements to deliver the Goods to the location specified in Technical Specifications.

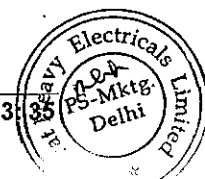
11.0 **LIQUIDATED DAMAGES**

11.1 **Delay**

Scheduled dates for Commissioning will be as specified in Schedule [insert] of the Contract. If the Contractor fails to achieve Commissioning within the time fixed thereof, he shall be liable to pay liquidated damages for the delay at the rate of half percent (½%) of the total Contract Price per week of delay. The total amount of liquidated damage on account of delay shall not exceed 10% of the Total Contract Price considering all types of Contracts including supply and erection.

11.2 **Failure to meet Performance Guarantees**

The liquidated damage for non fulfillment of Performance Guarantees will be as indicated below.



Sl. No.	Item	Value
1.	For increase in each Kcal/KWh of weighted average plant overall heat rate.	Rs. 7.5 Crores
2.	For every KW shortfall in gross power output at generator terminal	Rs. 100,000
3.	For increase in Auxiliary Power Consumption per KW	Rs. 200,000
4.	<del>For every m<sup>3</sup>/hr increase in DM water consumption</del>	<del>Rs. 1 Crore</del>

The total amount of liquidated damage for non fulfillment of Performance Guarantee shall be maximum 10% of the Contract Price considering all types of Contracts including supply and erection.

- 11.3 The total amount of liquidated damages on account of delay in Commissioning and non-fulfillment of Performance Guarantees shall not in any case exceed fifteen percent (15%) of the total Contract Price. The Owner shall deduct the amount of such liquidated damage from any money due or which may become due to the Contractor under the Contract, and/or recover such liquidated damage from the Performance Guarantee of the Contractor. To be entitled to impose the liquidated damage, the Owner will not be required to prove that he has incurred such amount as actual damages.

Liquidated damages to be paid in currency of the Contract Price on Pro-rata basis.

- 11.4 Rejection

If the total aggregate liquidated damages for short fall in Performance Guarantees of all parameters (shortfall in HR, power output, DM water consumption, Auxiliary Power Consumption) will be higher than 10% of the Contract Price then the Owner may at its option, either,

(a) Reject the Equipment/plant and recover the payments already made

Or

(b) Terminate the Contract pursuant to GCC 24.0 and recover the payments already made;

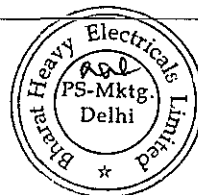
Or

© Accept the equipment after levy of liquidated damages in accordance with the provisions specified in GCC 11.0 of Contract Agreement.

- 12.0 **SHOP ASSEMBLY AND INSPECTION**

- 12.1 Shop Assembly

Shop Assembly to the largest extent feasible shall be performed by the Contractor to assure proper fitting of the various parts, and for checking the correctness of clearances and dimensions. Parts thus assembled shall be match-marked for reassembly at the Site, prior to dismantling for shipment. A detailed description of the intended shop assemblies shall be submitted along with a quality assurance plan.



12.2 Inspection before Shipment

No Goods shall be shipped before all tests and inspections have been carried out according to the Approved quality assurance plan unless otherwise instructed by the Owner.

The acceptance of any Goods prior to shipment shall in no way relieve the Contractor of any of his responsibilities for meeting all the requirements of the Specification and shall not prevent subsequent rejection if such Goods are found to be defective.

Incase inspection of Equipment/Goods needs visiting foreign countries, cost of 10 man visits shall be considered in the contract..All expenditure including that for travel shall be borne by bidder.

13.0 **CONTRACTOR'S DRAWINGS AND DATA**

13.1 a) The Contractor shall be responsible for developing detailed Drawings to adopt equipment and materials to be supplied to the requirements indicated in the Specification and shall submit a list of such Drawings and a programme for submission of these Drawings and documents within ninety (90) days from the date of receipt of the Notice to Proceed.

b) The Contractor shall also provide the Owner with the following Drawings and documents in the number of copies mentioned in Technical Specifications as per agreed schedule.

i) Technical particulars conforming to the Specifications.

ii) Outline drawings of major equipment together with weights and sufficient overall dimensions.

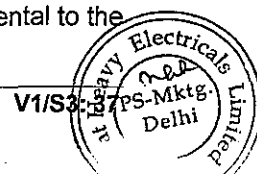
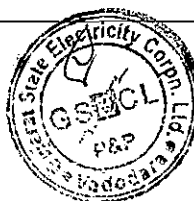
iii) Other drawings and documents as indicated in the Technical Specifications.

c) The Contractor shall, prior to submitting the Drawings and documents, submit to the Owner two copies of the Codes and Standards other than Indian Standards and Codes which shall govern the Works.

13.2 Copyright in the Owner's requirements and other documents issued by the Owner or the Owner's Representative to the Contractor shall (as between the parties) remain the property of the Owner.

The copyright in all drawings, documents and other materials containing data and information furnished to the Owner by the Contractor herein shall remain vested in the Contractor or, if they are furnished to the Owner directly or through the Contractor by any third party, including suppliers of materials, the copyright in such materials shall remain vested in such third party. The Owner shall however be free to reproduce all drawings, documents and other material furnished to the Owner for the purpose of the Contract including, if required, for operation and maintenance of the Facility

13.3 The Contractor shall indemnify the Owner in case of breach of this clause by the Contractor. If these documents are received by a third party from the Contractor and the third party makes use of these documents detrimental to the



Owner or use these documents for their personal gain, the Contractor shall compensate the Owner for the loss suffered as well as for the value of gain derived by third party.

14.0 **MISTAKES IN DRAWINGS**

The Contractor shall be responsible for and shall pay for any alterations of the Work due to any discrepancies, errors or omissions in the Drawings or other particulars supplied by him whether such Drawings or particulars have been Approved by the Engineer or not.

15.0 **MATERIALS AND WORKMANSHIP FOR MANUFACTURER**

All Goods to be supplied and all Works to be done by the Contractor under the Contract shall be manufactured and executed in the manner stipulated in the Specifications.

The Contractor shall use the best available materials for the Works. These materials shall be of recent manufacture, free from defects and imperfections and unused.

The highest standards of safety shall be adhered to during execution of the Works.

16.0 **COMPLETENESS OF EQUIPMENT**

The equipment supplied shall be complete in all respects. The Contractor shall not be eligible for any extra payment in respect of such mountings, fittings, fixtures and accessories if required for the safe and reliable operation of the equipment.

Parts of all similar equipment supplied shall be interchangeable with one another.

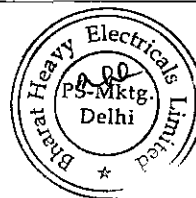
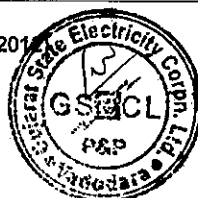
17.0 **CERTIFICATE OF THE OWNER**

Every application to the Owner for a certificate must be accompanied by a detailed invoice (in quadruplicate) setting forth in order of the schedule of quantities and prices as per Approved billing breakdowns of the Works executed and/or Goods ready for dispatch up to the date of claim. The certificate relating to such Goods and Work as in the reasonable opinion of the Engineer in accordance with the Specifications shall be issued within thirty (30) days of receipt of the application.

The Owner may, with any certificate, make any corrections or modifications to any previous certificates issued by him. The payments to be made against invoices under certification will be regulated and adjusted accordingly.

18.0 **OWNER'S DECISION**

In respect of all matters which are left to the decision of the Owner, including the granting or withholding of certificates; the Owner shall, if required to do so by the Contractor, give in writing a decision thereon and his reasons for taking such decision. If in the opinion of the Contractor, a decision made by the Owner



is not in acceptance with the meaning and intent of the Contract, the Contractor may file with the Owner within fifteen (15) days after receipt of the decision, a written objection to the decision. Failure to file such an objection within the allotted time will be considered to be acceptance of the Owner's decision and the decision shall become final and binding.

The Owner's decision and the filing of the written objection of the Contractor thereto shall be a condition precedent to the right to request for arbitration. It is the intent of the Contract Agreement that there shall be no delay in the execution of the Work in such cases and the decision of the Owner as given shall be promptly observed.

19.0 **CERTIFICATE NOT TO AFFECT THE RIGHT OF THE OWNER OR THE CONTRACTOR**

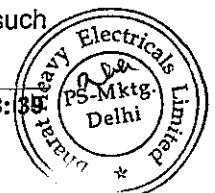
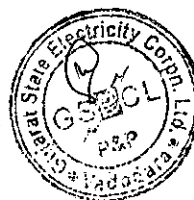
No certificate of the Engineer on account, nor any sum paid on account by the Owner, nor any extension of time for the execution of the Work by the Contractor under the powers granted by item "Certificate of the Owner" shall affect or prejudice the rights of the Owner against the Contractor, or relieve the Contractor of his obligations for the due performance of the Contract or be interpreted as Approval of the Work done or of the Goods supplied. No certificate shall create the liability for the Owner to pay for alterations, amendments, variations or additional work not ordered in writing by the Owner, or discharge the liability of the Contractor for payment of damages, whether due, ascertained or certified or not or of any sum against the payment of which he is bound to indemnify the Owner, nor shall any such certificate nor the acceptance by him or any sum paid on account or otherwise, affect or prejudice the rights of the Owner against the Contractor.

20.0 **OWNER ACCEPTANCE AND TAKE OVER CERTIFICATE**

In order to achieve Owner acceptance, Contractor must certify to the satisfaction of Owner/Owner's representative that:

- i) Reliability Run Test and Performance Guarantee Test have been completed to the satisfaction of Owner.
- ii) All punch list and pending issues have been completed in accordance with the contract;
- iii) All the Contractor's and sub-Contractor's personnel, supplies, unused materials, waste, rubbish and temporary facilities located at or near such plant have been removed from such location,
- iv) All other provisions of and all items required by the Contract have been performed or delivered, as the case may be, in accordance with the Contract and in a manner satisfactory to Owner.
- v) Contractor has delivered to Owner a Project Completion certificate certifying satisfactorily completion of each of the conditions set forth in sub-clauses -20(i) to 20(iv) above.

Upon certification by Contractor of satisfactory completion of sub-clauses -20 (i) through 20(iv), Owner shall issue a Take over Certificate certifying such



matters within 60 (Sixty) days

21.0 **WARRANTY**

21.1 The Contractor hereby provides following Warranty in respect of the Equipment to be furnished by the Contractor:

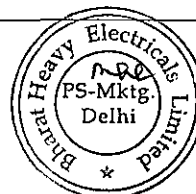
- a) All Equipment shall be new and in accordance with the Contract and shall be fit for the intended purposes,
- b) All Equipment shall be free from any defect due to faulty design, materials and/or workmanship.
- c) The Equipment shall perform satisfactorily and the performance and efficiencies of the specified Equipment shall not be less than the respective guaranteed values.
- d) The efficiencies, temperature rise and other performance data of all other Equipment shall be as per the Contract.
- e) All other Works including civil, structural and architectural works shall be in accordance with the Contract and free from any defect and omission.
- f) The Work will be designed so that the Plant is capable of being operated in a safe, reliable, economic and efficient manner, in accordance with the requirements of the Contract.

The Contractor undertakes to reaffirm the above Warranty, if so required by the Owner, in such forms as prescribed by the Owner and shall be signed by the Contractor and, if so required by the Owner, by Sub-contractor(s) of the Contractor.

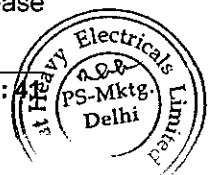
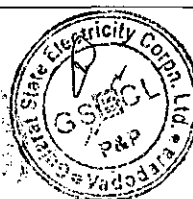
If the Contractor finds, after his Tender is accepted, that a variation in work, construction technique or the quality of materials is necessary to fulfill the Warranty called for, such variations may be made with the approval of the Owner, provided the request for changes is made during execution of the contract Agreement and the changes are to be made without any increase in the price.

21.2 The Warranty shall be valid for a period of twelve (12) calendar months commencing from the date of Taking Over of the fully completed Plant at the discretion of the Owner. This period of the Warranty shall be referred to as the "**Warranty Period**".

21.3 During the Warranty Period, the Contractor's liability shall be limited to the replacement of any defective parts that may develop in Plant, of his own manufacture or those of his associate(s) and Sub-contractor(s) under the conditions provided for by the Contract under proper use and arising from faulty design, materials or workmanship. All such replacements of defective parts mentioned above shall be made free of cost at Site by the Contractor and the return of the defective parts to the Contractor's works shall be the Contractor's responsibility and shall be made at his expense. In the case of these defective parts which are not repairable at Site but are essential, in the Owner's opinion, for the commercial operation of the Plant or the Equipment, the Contractor shall replace at the Site, free of cost of the Owner the said defective parts before the



- defective parts are removed to his Works in such a manner which will minimize interruption in the operation of the Plant and/or the Equipment. Provided always that such defective parts as are not repairable at Site, and are not essential in the meantime in the commercial use of the Plant, may be taken by the Contractor to the Contractor's works for repairs unless otherwise arranged. The decision to replace/repair the defective items shall be discussed and mutually agreed at appropriate stage.
- 21.4 The cost of any special or, general overhaul rendered necessary during Warranty Period due to defects in the Plant or defective Work shall be borne by the Contractor. The Owner will, however, render such assistance in this matter as will expedite the same.
- 21.5 If for rectification or replacement of any part of equipment or work due to defective materials, manufacture or design or workmanship, the services of the Contractor's personnel are requisitioned within the Warranty Period, these services shall be made available free of any cost to the Owner.
- 21.6 If it becomes necessary for the Contractor to replace or renew any defective portions of the Plant under this Clause, the provisions of this Clause will apply to the portions of the Plant so replaced or renewed until the expiration of **Extended Defects Correction Period**. Further, the Contractor shall ensure that the Performance Bank Guarantee shall remain outstanding or a replacement on-demand bank guarantee is delivered to the Owner in an amount equal to one hundred percent (100%) of the estimated value of each such item until the Extended Defects Correction Period applicable thereto has expired.
- 21.7 If any defect be not remedied within a reasonable time, the Owner may proceed to do the work at the Contractor's risk and expenses but without prejudice to any other rights which the Owner may have against the Contractor in respect of such defects.
- 21.8 If the replacements or renewals are of such character as may affect the efficiency of the Plant, the Owner shall have the right to give to the Contractor within one (1) month of such replacement or renewal, notice in writing that "tests on completion" be made, in which case such tests shall be carried out as provided in Clause on Tests on completion and Trial Run at the Site" in the Technical Specifications. Should such tests show that the Plant sustains the guarantee given in the Contract; the cost of the test shall be borne by the Owner. Should the guarantee be not sustained, the cost of the test shall be borne by the Contractor. Further, all necessary works will be carried out by the Contractor to achieve guarantee given in the contracts and perform tests to prove the same at his own cost.
- 21.9 Until the final certificate has been issued, the Contractor shall have the right of entry at his own risk and expenses by himself or his duly authorised representatives whose names shall previously have been communicated in writing to the Owner at all reasonable working hours of the Plant and taking notes there from and, if he desires, at his own expenses making any tests, subject to the approval of the Owner that will not be unreasonably withheld.
- 21.10 The issue of the Taking over Certificate shall in no way exempt the Contractor from the provisions of this Clause 21.
- 21.11 At the end of the Warranty Period, the liability of the Contractor shall cease



other than in respect of items which are subject to an Extended Defects Correction Period.

21.12 The Contractor shall provide, at the Site, at least one (1) control and instrumentation engineer, one (1) electrical engineer, one (1) mechanical engineer and one (1) operation expert during the Warranty Period without additional cost to the Owner.

21.13 The Contractor agrees that any item of Equipment replaced or rectified during the Warranty Period shall conform to the Technical Specifications of the corresponding original Equipment and if required by the Owner, the Contractor shall demonstrate such conformance through suitable means (to be decided by the Contractor at its sole discretion) including inspection by the Owner, shop testing or operation of the Equipment of which the replaced equipment/material constitutes a part.

#### 21.14 **WARRANTY FOR SPARES**

In addition to the foregoing, the Contractor warrants that all spares supplied will be new and in accordance with the Contract and will be free from defects in design, material and workmanship and further guarantee as under:

For mandatory spares and two (2) years recommended spares:

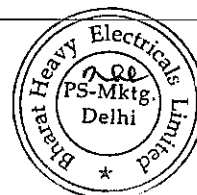
For item of spares ordered or to be ordered by the Owner for two (2) years operational requirement of the Plant which are manufactured as a continuous operation together with the corresponding main equipment/ component, the Warranty will be twelve (12) months from the Taking Over of the Plant under the Contract. In case of any failure in the original Equipment due to faulty designs, materials and workmanship, the corresponding spare parts if any, supplied shall be replaced without any extra cost to the Owner unless a joint examination and analysis by the Owner and the Contractor of such spare parts prove that the defect found in the original part that failed can safely be assured not to be present in spare parts. Such replaced spare parts will have the same Warranty as applicable to the replacement made for the defective original part/component.

#### 21.15 **Latent Defects:**

Notwithstanding the issue of the Take Over Certificate, the Contractor shall be responsible for making good with all possible speed any Latent Defect in any Works /equipment of the plant which appears at any time before the expiry of defect liability period. And shall remedy such defect at its own cost and expense. The latent defect liability period shall be a minimum of 5 years from the end of defect liability period. The defects to which this applies are defects in design, materials or workmanship or defects arising from any act or omission of the Contractor done or omitted prior to Take-over of the portion of the Plant affected by the defects or during the Warranty Period which a reasonable examination at the end of the Warranty Period would not have disclosed.

#### 22.0 **DEFAULT OF CONTRACTOR**

Termination upon Contractor's bankruptcy or default:



22.1 In the event the Contractor:

- (i) Contractor is adjudged a bankrupt or insolvent, or
- (ii) Contractor makes a general assignment for the benefit of its creditors, or
- (iii) A trustee or receiver is appointed for Contractor or for any of its property, or
- (iv) Contractor files a petition to take advantage of any debtor's act, or to reorganize under the bankruptcy or similar laws, or
- (v) Contractor fails to supply sufficient skilled workers or suitable materials or Equipment, or fails to commence the Work or abandons the Work or part thereof or fails to rectify any Work done that has been objected or rejected to by the Owner or if it fails to make prompt payments when due to Subcontractors or for labour, materials or equipment, or
- (vi) Contractor otherwise commits a material breach of any of the terms of the Contract,

Then Owner may, without prejudice to any other right or remedy Owner may have hereunder or at law or in equity, at any time terminate the Contract upon 30 days' notice to Contractor, provided such event or breach is not remedied within such 30 days period or, if the breach or default cannot reasonably be cured within 30 days, such longer period (not to exceed 90 days) as may be reasonably necessary to cure such breach or default. Owner may terminate the Contract immediately upon notice to Contractor if Contractor disregards a material provision of any Applicable Law. Owner may terminate the Contract, upon 30 days' notice, if Contractor disregards any other provision of Applicable Law, provided any such failure is not remedied within such 30 days period. Contractor shall receive no Termination Payment or other cancellation payments in the event of a termination under this clause, but Contractor shall be entitled to any part of the Contract Price then due and payable for the Works already performed.

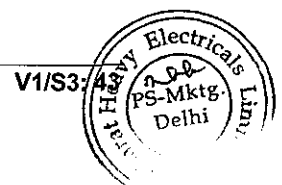
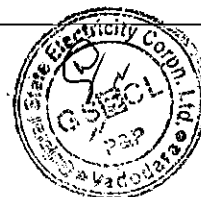
23. Not used

24. FORECLOSURE OF CONTRACT

**Termination for Owner's Convenience:**

Owner may at will for its convenience at any time and without cause, terminate the Contract upon 30 days prior written notice to the Contractor.

Immediately upon receipt of such notice, Contractor shall stop performance of the Works, stop all further sub-contracting or purchasing activity, and terminate Sub-contracts; handover all Documents, equipment, materials and spares relating to the Works prepared by the Contractor or procured from other sources up to the date of termination for which the Contractor has received payment equivalent to the value thereof and shall immediately order & commence demobilization and remove all Contractor's Equipment, which is on Site and repatriate all his staff and labour from the Site.

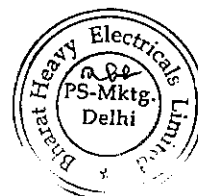


**Consequences of Termination.**

- 24.1 Termination for Contractor's bankruptcy or default under Clause 22
- 24.1.1 In the case of termination by Owner for default or bankruptcy under the circumstances contemplated by Clause 22, Contractor shall not, pending settlement of Owner's claims by reason of such termination, be entitled to receive any further payment and shall protect, defend, indemnify and hold Owner harmless from and against all Losses arising directly or indirectly from or incurred by reason of such termination and, in any event, Owner shall not be liable to Contractor for any amount of the Contract Price in excess of the percentage of Work actually completed by the termination date multiplied by the Contract Price ("**Work Value**").
- 24.1.2 In addition, should the aggregate amount of the Contract Price actually paid prior to termination exceed the Work Value, Contractor shall pay to Owner an amount equal to such excess within thirty (30) days after receipt of an invoice from Owner therefor.
- 24.1.3 Accrued or actual or potential liabilities of Contractor under the Contract, for acts and omissions with respect to Work partially or fully completed at the time of termination shall not be affected by any such termination.
- 24.1.4 In furtherance of the foregoing, Owner shall have the right (either with or without the use of Contractor's Equipment) to finish the Work itself or with the assistance of third parties and Contractor shall be liable for the excess of the total cost of the Work actually incurred by Owner to all parties, persons or entities over the price for the Work originally contracted for hereunder.
- 24.1.5 In particular, to complete the Work, Owner shall have the right to take possession of and use, or to permit any third party to use, all Contractor's Equipment on or about the Site which are the property of Contractor. Rent for use of equipment by Owner and indemnification thereof shall be provided by GSECL.
- 24.1.6 Upon completion of the Work, all such Contractor's Equipment shall be returned to Contractor, subject to the right of Owner (which shall constitute a lien on such Contractor's Equipment) to sell the same and apply the proceeds to any claim which Owner may then have against Contractor.
- 24.1.7 Owner shall have the right at its sole discretion to select third parties to assist in or undertake such completion of the Work, such selection to be based upon such criteria as Owner shall determine.
- 24.2 Termination for Owner's Convenience under Clause 24

Upon termination of the Agreement under Clause 24 (for Owner's Convenience), Contractor shall be entitled to be paid:

- (a) all actual documented costs incurred by Contractor, as audited and accepted by an independent certified public accounting firm of national reputation selected by Owner and acceptable to Contractor, incurred or that could not be avoided in connection with performance by Contractor



of Works as of the date of the Termination which were not previously paid for by Owner, and

- (b) all actual documented costs incurred by Contractor, if such cost is part of the Contract Price, in connection with the items procured/facilities executed by Contractor in connection with the services for which Contractor has not been paid, provided that such items are delivered to Owner at the Project Site together with all documents necessary to transfer title thereto to Owner (the 'Termination Payment').

As a condition precedent to receiving the Termination Payment, Contractor shall execute and deliver all such papers and take all such steps, including the legal assignment of Contractor's contractual rights, as Owner may require for the purpose of fully vesting in Owner all rights, title and interests of Contractor in and to all subcontracts, purchase orders, warranties, guarantees and other agreements.

All claims by such contractors and Subcontractors to be due and owing for Services and other work performed prior to such date shall constitute debts between Contractor and Subcontractors, and Owner shall in no way be liable for such sums. Contractor shall include in all agreements and contracts entered into with contractors and Subcontractors a provision providing for the foregoing.

- 24.3 Upon any termination aforesaid, Owner may at its option elect to (a) assume responsibility for and take title (to the extent title has not previously passed to Owner) to and possession of the Plant and any or all work, materials or equipment remaining at the Facility Site, and (b) succeed automatically, without the necessity of any further action by Contractor, to the interests of Contractor in any or all contracts and Subcontracts entered into by Contractor with respect to the Plant

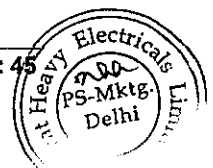
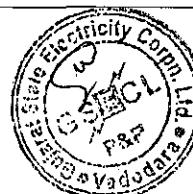
- 24.4 Surviving Obligations:

Termination of the Contract (a) shall not relieve either Party of its obligations with respect to the confidentiality of Proprietary Information as set forth elsewhere (b) shall not relieve either Party of any obligation hereunder which expressly or by implication survives termination and (c) except as otherwise provided in any provision of the Contract expressly limiting the liability of either Party, shall not relieve either Party of any obligations or liabilities for loss or damage to the other Party arising out of or caused by acts or omissions of such Party prior to the effectiveness of such termination or arising out of such termination and shall not relieve Contractor of its obligations as to portions of the Works already performed or of obligations assumed by Contractor prior to the date of termination.

- 24.5 Verification of the Termination:

Contractor shall, within 90 days of any such termination of the Agreement submit to Owner all invoices and other documentation as is sufficient to enable Owner to verify the performance of the Works and Contractor's costs associated therewith and to determine the amount of the Termination Payment. Termination Payment shall not include the costs of future anticipated profit or restocking charges.

Payment and Limitation of the Termination Payment. Owner shall pay the



Termination Payment to Contractor within 90 days of Owner's receipt of the documentation required under the clause: Verification of the Termination.

24.6 Limitation of Liability:

24.6.1 Payment of the Termination Payment shall be sole and exclusive liability of Owner, and the sole and exclusive remedy of Contractor, with respect to termination of the Contract pursuant to above clauses. In no event shall Owner have any further liability to Contractor in any such event for Consequential Damages.

24.6.2 (a) It is clarified here that except in cases of criminal negligence or wilful misconduct, the Contractor shall not be liable to the Owner, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages to the Owner; and

(b) the aggregate liability of the Contractor to the Owner, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to any obligation of the Contractor to indemnify the Owner with respect to patent infringement.

For the avoidance of doubt it is hereby clarified that the Contractor's liability to pay the amounts pursuant to Clause 24.1.2 and/or Clause 24.1.4 shall not be excluded, or interpreted in any manner to be excluded under Clause 24.6.2(a) above, however such sums shall be considered towards the threshold for limitation of liability under Clause 24.6.2(b)

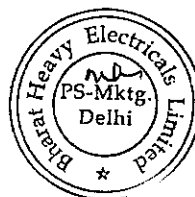
24.7 The Contract shall not be liable to be terminated except in accordance with the express provisions of the Contract.

25.0 **DEDUCTION FROM CONTRACT PRICE**

All costs, damages or expenses which the Owner may have paid, for which under the Contract, the Contractor is liable, will be claimed by the Owner. All such claims shall be billed by the Owner to the Contractor regularly as and when they fall due. Such bills shall be supported by appropriate and certified vouchers or explanations, to enable the Contractor to properly identify such claims. Such claims shall be paid by the Contractor within fifteen (15) days of the receipt of the corresponding bills and if not paid by the Contractor within the said period, the Owner may then deduct the amount, from any money due or becoming due by him to the Contractor under the Contract or may be recovered by actions of Law or otherwise, if the Contractor fails to satisfy the Owner of such claims.

26.0 **ASSIGNMENT OF CONTRACT**

The Contractor shall not assign its rights or obligations under the Contract without prior approval of the Owner. Any assignment in violation of this Clause shall be null and void. Further, such assignment, if approved by Owner, shall not relieve the Contractor from any obligations, duty, or responsibility under the Contract.



27.0 **SUBCONTRACTING**

27.1 Equipment

The Contractor may, after informing the Owner and getting his Approval, assign or subcontract any part of the Contract other than for raw materials, to manufacturers which are identified in Schedule [insert] of the Contract. Sub-contractor(s) not identified in Schedule [insert] of the Contract or any change in the identified sub-contractor(s) shall be subject to approval by the Owner. Provided that subcontracting shall not relieve the Contractor from any obligation, duty or responsibility under the Contract. Provided further that subcontracting to any subcontractor other than those identified in Schedule [insert] without prior approval of the Owner shall be null and void.

27.2 Erection Work

When the job of erection/construction is entrusted with the sub-contractor(s) the name/names of such sub-contractor(s) shall be approved by the Owner as elaborated above. Such subcontracting shall not relieve the Contractor from any obligation, duty or responsibility under the Contract.

27.3 Notwithstanding anything to the contrary contained herein, the Contractor shall remain solely responsible for and shall obtain all permits, licenses, approvals and authorisation as may be required under all applicable laws and regulations in India in respect of any award or performance of any transfer, sub-contract, sub-letting or assignment pursuant hereto.

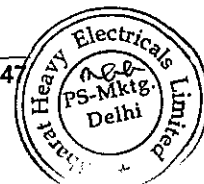
27.4 Notwithstanding any transfer, assignment or sub-letting with the approval of the Owner as aforesaid, the Contractor shall be and shall remain solely responsible and liable to the Owner for the quality, proper and expeditious execution and performance of the Works and for due performance and observance of all the conditions of the Contract in all respects, as if such transfer, assignment or sub-letting has not taken place and as if the Work so transferred, assigned or sub-let has been done directly by the Contractor.

28.0 **FORCE MAJEURE**

"Force Majeure Event" shall mean any event or circumstance or combination of events or circumstances referred to below that wholly or substantially prevents or unavoidably delays any Party in the performance of its obligations under the Contract, but only if and to the extent that such events and circumstances are not within the reasonable control, directly or indirectly, of the affected Party and could not have been avoided if the affected Party had taken reasonable care.

(a) Any cause which is beyond the control of Contractor or Owner, as the case may be (b) natural phenomenon including but not limited to weather conditions, floods, drought, earthquakes and epidemic (c) acts of any Governmental authority (domestic), including but not limited to war (declared or undeclared), revolution, quarantine, embargoes, licensing control or production or distribution restrictions (d) sabotage, riots and civil commotion (e) Nation wide or wide spread strikes or labour disputes extending beyond the Project site. (f) failure or delay in Contractor's source of supply due to force majeure causes enumerated at (a) to (e), provided that the Contractor proves to the satisfaction of the Owner that the supply from the alternate sources were not possible.

Any force majeure event which affects the Contractor's joint venture



partners/collaborators/joint venture company, who have executed the JDU, and which event satisfies the requirements of Clause 28 shall be treated as a "Force Majeure Event"

The following events are explicitly excluded from Force Majeure Events and are solely the responsibility of the affected party:

- i) any strike, work-to-rule action, go-slow, or similar labour difficulty which is not specifically, enumerated in the above clauses (a) to (f);
- ii) late delivery, of plant, machinery, equipment, materials, spare parts or Consumables for the Plant;
- iii) a delay in the performance of any contractor;
- iv) economic hardship;
- v) changes in Applicable Laws;
- vi) Force Majeure events which occur outside India and do not directly involve India comprising: (x) act of war (whether declared or undeclared), invasion armed conflict or act of foreign enemy blockade, embargo, resolution, riot, insurrection, civil commotion, act of terrorism, or politically motivated sabotage or kidnapping or (y) any event or circumstance of a nature analogous to any of the foregoing.

If the Contract is delayed or impeded in the execution of the work by circumstances of Force Majeure as herein defined, then the Contractor/Owner as the case may be, shall, within one week, give notice in writing to the Owner/ Contractor, of the existence of circumstances of Force Majeure, together with the evidence relied upon.

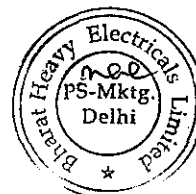
**Burden of Proof:** In the event that the Parties are unable in good faith to agree that a Force Majeure Event has occurred, the Parties shall submit the dispute to arbitration, provided that the burden of proof as to whether a force Majeure event has occurred shall be upon the Party claiming a Force Majeure Event.

**Effect of Force Majeure :** Neither party shall be considered to be in default or in breach of his obligations under the Contract to the extent that performance of such obligations is prevented by any circumstances of Force Majeure which arise after the Commencement Date.

In the event that Force Majeure circumstances continue for a period of more than one month, both the parties may discuss and mutually agree upon the future course of action which may include termination of Contract.

The Contractor shall request for extension of Time for Completion due to delay caused by Force Majeure. The Owner may agree to give extension in time as may be justified. However the Owner will not bear any additional cost whatsoever in connection with Force Majeure.

**Performance to Continue :** Upon the occurrence of any circumstances of any Force Majeure the Contractor shall endeavor to continue to perform his obligations under the Contract so far as reasonably practicable. The Contractor shall notify the Engineer of the steps he proposes to take including any reasonable alternative means for performance which is not prevented by Force Majeure. The Contractor shall not take any such steps unless directed so to do by the Engineer.



29.0 **PROGRESS REPORTS AND PHOTOGRAPHS**

The Contractor shall furnish three (3) prints each of monthly Progress Reports with photographs of the Works done in his shop . Photographs shall be taken when and where requested by the Owner. Adequate number of photographs shall be submitted indicating various stages of manufacture. Each photograph shall contain the date, the name of the Contractor and the title of the view taken.

Monthly Progress Report shall be submitted by the Contractor. These shall detail the status of design, drawings, procurement of raw materials and manufacture of the equipment and delivery of the equipment. The Owner shall advise the Contractor about the number of copies of progress schedule and photographs he has to submit each month together with the names and addresses of persons to whom they are to be sent. The Contractor shall also furnish actual progress against Works schedule and such other information as the Owner may require to satisfy himself about the timely manufacture and delivery of equipment and timely construction and erection works to suit the commissioning date.

30.0 **CONFIDENTIALITY AND PATENT RIGHTS**

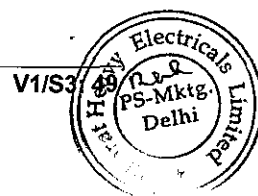
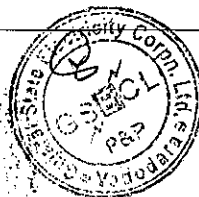
30.1 The Owner and the Contractor shall not, without the written consent of the other Party hereto, divulge to any third party any Confidential Information furnished directly or indirectly by the other Party hereto in connection with the Contract, whether such Confidential Information has been furnished prior to, during or following termination of the Contract. Notwithstanding the above, the Contractor may furnish to its Sub-contractor(s) such Confidential Information that it receives from the Owner to the extent required for the Sub-contractor(s) to perform its work under the Contract, in which event the Contractor shall obtain from such Sub-contractor(s) an undertaking of confidentiality similar to that imposed on the Contractor under this Clause 30.1.

Notwithstanding the above, the Owner may furnish any Confidential Information and other information it receives from the Contractor, to its lenders, other financing parties and to its professional advisors to the extent the same is required directly in relation to the Project or financing of the Project, in which event the Owner shall obtain from such lenders, other financing parties and professional advisors, an undertaking of confidentiality similar to that imposed on the Owner under this Clause 30.1

30.2 Save as provided above, the Owner shall not use the Confidential Information received from the Contractor for any purpose other than the operation and maintenance of the Plant. Similarly, the Contractor shall not use the Confidential Information received from the Owner for any purpose other than the design and procurement of the Plant and Equipment, construction and commissioning of the Facility and provision of other services required for the performance of the Contract

30.3 The obligation of a Party under sub-Clauses 30.1 and 30.2 above, however, shall not apply to the Confidential Information which:

(a) now or hereafter enters the public domain through no fault of that Party



(b) can be proven to have been possessed by that Party at the time of disclosure and which was not previously obtained, directly or indirectly, from the other Party hereto

(c) otherwise lawfully becomes available to that Party from a third party that has no obligation of confidentiality

30.4 The provisions of this Clause 30 shall not in any way modify any undertaking of confidentiality given by either Party prior to the date of the Contract in respect of the Facility or any part thereof

30.5 The Contractor shall indemnify and hold harmless the Owner and its employees and officers from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Owner may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract by reason of: (a) the installation of the Facility by the Contractor or the use of the Facility in India; and (b) the sale of the power produced by the Facility in India.

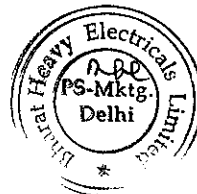
Such indemnity shall not cover: (i) any use of the Facility or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract; and (ii) any infringement resulting from the use of the Facility or any part thereof, or the power produced thereby in association or combination with any other equipment, plant or materials not supplied by the Contractor, pursuant to the Contract

30.6 If any proceedings are brought or any claim is made against the Owner arising out of the matters referred to in sub-Clause 30.5, the Owner shall promptly give the Contractor a notice thereof, and the Contractor may at its own expense and in the Owner's name conduct such proceedings or claim and enter into any negotiations for the settlement of any such proceedings or claim.

If the Contractor fails to notify the Owner within twenty-eight (28) days after receipt of such notice from the Owner that it intends to conduct any such proceedings or claim, then the Owner shall be free to conduct the same on its own behalf. Unless the Contractor has so failed to notify the Owner within the twenty-eight (28) day period, the Owner shall make no admission that may be prejudicial to the defense of any such proceedings or claim.

The Owner shall, at the Contractor's request, afford all available assistance to the Contractor in conducting such proceedings or claim, and shall be reimbursed by the Contractor for all reasonable expenses incurred in so doing.

30.7 The Owner shall indemnify and hold harmless the Contractor and its employees, officers and Sub-contractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs, and expenses of whatsoever nature, including attorney's fees and expenses, which the Contractor may suffer as a result of any infringement or



alleged infringement of any patent (excluding any infringement or alleged infringement of any patent under Clause 30.5), utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification, or other documents or materials provided or designed by or on behalf of the Owner (other than by the Contractor).

Such indemnity shall not cover: (i) any use of the design, data, drawing, specification, or other documents or materials or any part thereof other than for the purpose indicated by or to be reasonably inferred from the Contract; and (ii) any infringement resulting from the use of the design, data, drawing, specification, or other documents or materials or any part thereof in association or combination with any other design, data, drawing, specification, or other documents or materials not supplied by the Owner, pursuant to the Contract.

30.8 The provisions of this Clause 30 shall survive termination, for whatever reason, of the Contract

31.0 **BANKRUPTCY, ETC.**

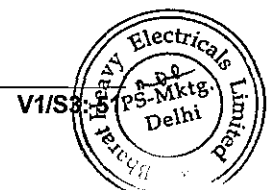
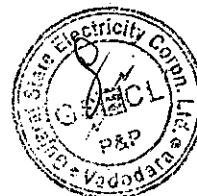
If the Contractor commits any act of bankruptcy or goes into liquidation (except for reconstruction purposes) or carries on its business under a receiver, the executors, successors, or other representatives in law of the estate of the Contractor or any such receiver, liquidator, or any person in whom the Contract may become vested, shall forthwith give notice thereof in writing to the Owner and shall for one month, during which he shall take all reasonable steps to prevent a stoppage of the work, have the option of carrying out the Contract subject to his or their providing such guarantee as may be required by the Owner but not exceeding the value of Works for the time being remaining unexecuted, provided however that nothing above said shall be deemed to relieve the Contractor or its successor of its obligation under the Contract under any circumstance. In the event of stoppage of the Works the Period of the option under this clause shall be fourteen (14) days only, provided that, should the above option be not exercised, the Contract may be terminated by the Owner by notice in writing to the Contractor, and the same power and provision reserved to the Owner by the item Default of Contractor shall apply.

32.0 **INDEMNIFICATION OF THE OWNER**

32.1. The Contractor shall indemnify the Owner of all liabilities incurred by the Owner due to any act or omission on the part of Contractor, his agent, representative, or sub-contractor(s) and causes harm/damage to other Contractor/representatives of the Owner or all or anybody rendering service to the Owner or is connected with the Owner's work in any manner whatsoever. The Contractor shall necessarily indemnify the Owner in all these respects.

The indemnity under this clause shall include all costs, charges, expenses on account of any claims, demands, actions and proceedings against the Owner in respect of such injuries, loss or damage.

32.2 Indemnification of the Contractor



The Owner shall fully indemnify, save harmless and defend the Contractor from and against any and all costs, charges, expenses on account of any claims, demands, actions and proceedings arising out of or resulting from claims by any third parties arising out of or related to the performance of Owner's obligations pursuant to this Contract to the extent caused by any act or omission on the part of the Owner, his agent, representative, or sub-contractor(s), provided that the foregoing obligation shall not apply to the extent such liabilities are caused by the acts or omissions of the Contractor, its agent, representative, or sub-contractor(s)

33.0 **CORRESPONDENCE**

The correspondence procedure will be developed mutually by the Owner and Contractor after award of Contract.

34.0 **CONTRACT AGREEMENT**

- a) The Successful Bidder will be called for Contract negotiations. A signed provisional Contract Agreement will be forwarded by the Bidder which shall be mutually discussed. The acceptable provisional agreement will be concluded within thirty (30) days. On receipt of this, the Owner will issue Notice to Proceed to Bidder. The final Agreement in six (6) originals shall be produced by the Contractor at his cost for signing within sixty (60) days.

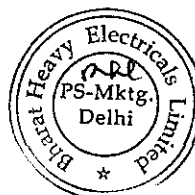
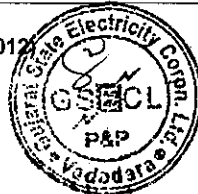
The Agreement will be signed in six (6) originals and the Contractor shall be provided with one (1) signed original and the rest will be retained by the Owner. The Contractor shall provide free of cost to the Owner all the engineering data, drawings and descriptive materials submitted with the Tender, complete set of his Tender and Tender Documents, copies of all the correspondences with the Owner, etc. in six (6) copies to form a part of the Contract Documents.

b) **Contract Documents**

These Contract Conditions together with the Specification, Tender drawings and guaranteed technical particulars, Tender data with subsequent agreed modification thereof, Tender, all correspondences with the Owner and Signed Agreement and other supporting documents shall constitute the Contract Document(s). No variation or modification or terms and conditions of the Contract Documents or waiver of any of these terms and conditions shall be deemed valid unless agreed in writing and signed by the Owner and the Contractor.

c) **Endorsement of Terms**

The failure of either party to endorse at any time any of the provisions of the Contract or any rights in respect thereto or to an option herein provided shall in no way be construed to be a waiver of such provisions, rights or option or in any way to affect the validity of the Contract. The exercise by either party of any of his rights herein shall not preclude or prejudice either party from exercising the same or any other right it may have hereunder.



35.0 **NOTICE TO PROCEED AND EFFECTIVE DATE**

35.1 Contractor shall commence Performance of Work on the date which the Owner specifies in Notice to Proceed (NTP) delivered for Commencement of the work (the "Commencement Date") which shall not be earlier than the date of issue of the Notice to Proceed. The Contractor shall perform its obligation in a manner that would ensure that the Commercial Operation of the Plant occurs within the Guaranteed Commercial Operation Date.

Before issue of NTP following conditions are to be complied with.

- (i) Signing of the Contract.
- (ii) Release of Advance payment.
- (iii) Unhindered & unencumbered access to the site as is where is basis

GSECL will issue LOA after ensuring issuance of NTP within 60 (sixty ) days

35.2 The Contract shall come into force on the date of Notice to Proceed.

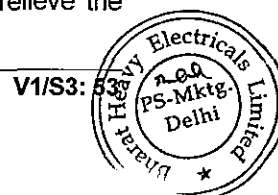
36.0 **USE OF THE PLANT PRIOR TO OWNER ACCEPTANCE**

Owner reserves the right to take possession of and use for any intended purpose, any portion or all of any delivered but as yet unaccepted Plant. The taking of possession at any time or use of any of such portion of Plant shall not be deemed to be an acknowledgement of Owner acceptance of Unit or the Plant, and shall not be exclusive with respect to Contractor until Owner acceptance of the Plant, has occurred. Owner shall provide Contractor with reasonable and timely access to complete its obligations hereunder. It is the expectation of the parties that any such modifications or repairs will be accomplished by Contractor with minimal interference with operation of the Plant.

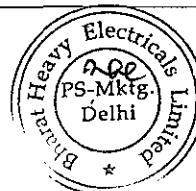
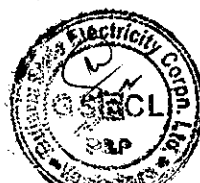
37.0 **INSURANCE**

37.1 The Contractor at his cost shall arrange, secure and maintain all insurance as may be pertinent to the Works and obligatory in terms of law to protect his interest and interests of the Owner against all perils detailed herein. MCE (Marine cum Erection comprehensive ) insurance for the plant and equipment under contractor's scope shall be effective from the date of mobilization of site by the contractor. The form and the limit of such insurance as defined herein together with the underwriter in each case shall be as acceptable to the Owner. However, irrespective of such acceptance the responsibility to maintain adequate insurance coverage up to commercial Operation date shall be the Contractor's full responsibility. The Contractor's failure in this regard shall not relieve him of any of his contractual responsibilities and obligations. The insurance policies to be taken by the Contractor shall be in a joint name of the Owner and the Contractor. The Contractor shall, however, be authorised to deal directly with Insurance Company or Companies and shall be responsible in regard to maintenance of all insurance covers.

37.2 Any loss or damage to the equipment during handling, transportation, storage, erection, putting into satisfactory operation and all activities to be performed till such time the Plant is finally accepted by the Owner shall be to the account of the Contractor. The Contractor shall be responsible for raising of all claims and make good for the damage or loss by way of repairs and/or replacement of the Works, damaged or lost. The transfer of title shall not in any way relieve the



- Contractor of the above responsibilities during the period of the Contract. The Contractor shall provide the Owner with copy of all insurance policies and documents taken out by him in pursuance of the Contract. Such copies of documents shall be submitted to the Owner immediately after such insurance coverage. The Contractor shall also inform the Owner in writing at expiry/cancellation and/or change in any of such documents and ensure revalidation, renewal, etc. as may be necessary well in time.
- 37.3 Licenses/port clearances in respect of supplies to be made by the international Contractor from outside India required for purpose of replacement of equipment lost in transit and/or during storage shall be obtained by the Contractor on behalf of the Owner. The Contractor shall, however, be required to follow the procedure as may be laid down to facilitate arranging such licenses/clearances.
- 37.4 The perils required to be covered under the insurance shall include, but not limited to fire and allied risks, miscellaneous accidents (erection risks), workmen compensation risks, loss or damage in transit, theft, pilferage, riot and strike and malicious damages, civil commotion, weather conditions, accidents of all kinds, war risks (during ocean transportation only), Terrorism etc. Further insurance cover towards contamination from nuclear fuel/waste and ionizing radiations/radioactive is not envisaged. The scope of insurance shall be equivalent to the CIF value of equipment plus ten percent (10%) for all risks up to and including delivery of the equipment on CIF basis and for CIF value plus custom duty (as applicable on the cost of replacement) and additional ten percent (10%) of CIF value for all risks subsequent to delivery of goods on CIF Indian port basis. In case of indigenous supply, the scope of insurance shall be equivalent to FOR Site price inclusive of all Taxes plus ten percent (10%) for all risks. For the risks during the erection, the insurance cover to be taken shall be of appropriate value adequate to take care of all costs incurred till the erection. The insurance policies to be taken should be on replacement value basis including the Taxes (as applicable) on the replacement value. Notwithstanding the extent of insurance cover and the amount of claim available from the underwriters, the Contractor shall be liable to make good the full replacement/rectification value of all equipment and materials and to ensure their availability as per project requirements.
- 37.5 All costs on account of insurance liabilities covered under the contract will be included in Contract Price. However, the Owner may from time to time, during the pendency of the Contract, ask the Contractor in writing to limit the insurance coverage, risks and in such a case, the parties to the Contract will agree for a mutual settlement, for reduction in Contract Price to the extent of reduced premium amount. The Contractor, while arranging the insurance, shall ensure to obtain all discounts on premium which may be available for higher volume or for reason of financing arrangement of the Plant.
- 37.6 The Contractors shall ensure that for all activities to be performed in India viz. inland transportation, storage, erection, testing, commissioning, theft, pilferage, etc. till the equipment/plant is taken over by the Owner, the insurance cover shall only be taken from Indian Insurance Companies.
- 37.7 The clause entitled "Insurance" under the Section 4 of this Volume, covers the Additional insurance requirements for the portion of the Works to be performed at the Site.
- 37.8 In respect of insurance proceeds/claim settlements relating to claims raised/referred by the Contractor, the Owner shall give, from time to time, written



authorisation to the underwriter(s) to directly pay such proceeds/settlements to the Contractor as are in accordance with the provisions hereunder:

- i) Wherever total damage/loss of equipment/materials would occur, the Contractor will be entitled to payments received from the underwriters except the following amounts :
  - a) The amount paid to the Contractor under the Contract in respect of equipment/material damaged/lost (excluding the prorata Advance Payment).
  - b) Taxes which have already been paid by the Owner.

Subsequent payments, if any, due under the Contract shall be regulated by the relevant terms of payment, provided the claim money settled by the underwriter is more than the total of the amount as per (a) and (b) above. In the event of the claim money settled is less than the total of the amount in (a) and (b) above, the entire claim money settled will be retained by the Owner and the Contractor will forthwith pay the Owner the shortfall amount between the claim money and the total amounts as per (a) and (b) mentioned above.

- ii) In case of damage to any equipment/material during any stage, the Contractor upon rectification of the damaged equipment to the satisfaction of the Owner shall be paid to the extent of full claims settled by the underwriters. Subsequent payments, if any, due under the Contract shall be regulated by the relevant terms of payment.

37.9 The Contractor shall be responsible for making good any loss or damage at his own cost in a prompt manner, irrespective of the extent of settlement of claims by the insurers/underwriters or the time taken in settlement of such claims.

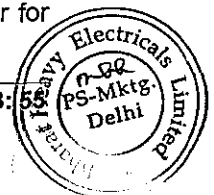
37.10 The Contractor shall ensure adequacy of the value of insurance covers irrespective of the coverage indicated under this clause.

### 38.0 CONTRACTOR'S CARE OF THE WORKS

38.1 The Contractor shall take full responsibility for the care of the Works from the Notice to Proceed until the date of issue of the Take Over Certificate when responsibility shall pass to the Owner. If the Owner's representative issues a Take Over Certificate for part of the Works, the Contractor shall cease to be responsible for the care of that part from the date of issue of such certificate of Take Over when responsibility shall pass to the Owner.

38.2 The Contractor shall take responsibility for the care of any outstanding Work which is required to be completed prior to the expiry of the Contract Period, until the Owner's representative confirms in writing that such outstanding work has been completed.

38.3 If any loss or damage happens to the Plant, during the period for which the Contractor is responsible, the Contractor shall rectify such loss or damage, at his cost, so that the Works conform with the Contract. Without prejudice to any other obligation of the Contractor under the Contract, the Contractor shall also be liable for any loss or damage to the Works caused by operations carried out by the Contractor prior to the expiry of the Contract Period in so far as such loss or damage is not covered under Insurance to be taken by the Owner for

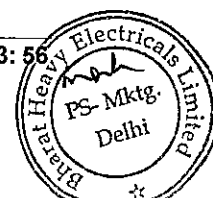


operation of Plant.

39.0 **ARBITRATION AND JURISDICTION**

39.1 **Arbitration**

- a) The Parties shall negotiate in good faith and attempt to resolve any dispute, controversy or claim arising out of or relating to the Contract or the breach, interpretation, termination or validity thereof (a "Dispute"); provided, however, that if the Parties are unable to resolve a Dispute within a period of [30] days from the date of first occurrence of the Dispute, such Dispute shall be settled by valid and binding arbitration conducted by three arbitrators in accordance with the UNCITRAL (United Nations Commission on International Trade Law ) rules.
- b) If a Dispute is not resolved by the good faith negotiation of the Parties, either Party may serve upon the other a written demand that such matter be resolved through arbitration, which written demand shall include a brief description of the Dispute and shall specify the name and address of an arbitrator selected by it. The other Party shall within 20 days of receipt of the arbitration demand select its arbitrator and provide the name and address of such arbitrator to the demanding Party and its arbitrator. The two selected arbitrators shall within 15 days of the selection of the second arbitrator select the third arbitrator, failing to do so, the arbitrators shall request the President of International Chamber of Commerce (ICC), promptly to appoint the third arbitrator in good standing of its association as the third arbitrator in accordance with ICC Appointing Authority Rules, 2003. Related costs of such appointment shall be borne by the defaulting party for the appointment of its arbitrator.
- c) The place of arbitration shall be Vadodara, Gujarat , India and the law applicable to the arbitration procedure shall be UNCITRAL. The English language shall be used throughout the arbitrage proceedings. Each Party shall bear its own arbitration proceeding expenses, including but not limited to counsel fees, except common expenses of arbitration which shall be shared equally. The Parties and the arbitrators shall proceed with the arbitration expeditiously and shall to the best of their ability conclude all proceedings there under, including any hearings, in order that a decision may be rendered by the arbitrators within 120 days from the filing of the demand for arbitration by the demanding Party.
- d) The decision of any two of the three arbitrators shall be final and binding. The parties agree that the decision and any award rendered by the arbitrators in connection with a Dispute :
- i) Shall be final and binding on the Parties and may be enforced in any court having jurisdiction over the Party against which enforcement is sought;
  - ii) Shall be the sole and exclusive remedy between the Parties regarding the Dispute and any claims, counterclaim issues or accountings presented or pled to the arbitrators in connection with the arbitration of the Dispute; and
  - iii) In the case of an award, shall be made and promptly paid in



Rupees free of any tax, deduction or offset.

Any costs, fees or taxes incident to enforcing the decision or award shall be charged against the party resisting such enforcement. Any award shall include interest from the date of any damages incurred for breach or other violation of the Agreement, and from the date of the award until paid in full, at a rate to be fixed by the arbitrators.

- e) The provisions of this Clause shall survive the termination or expiration of the Contract. All notices by one Party in connection with an arbitration shall be delivered in accordance with instructions.
- f) The arbitrator shall have full powers to review and/or revise any decision, opinion, directions, certification or valuation of the Owner in consonance with the Contract, and neither party shall be limited in the proceedings before such arbitrators to the evidence or arguments put before the Owner for the purpose of obtaining the said decision.
- g) No decision given by the Owner in accordance with the foregoing provisions shall disqualify him as being called as a witness or giving evidence before the arbitrators on any matter whatsoever relevant to the dispute of difference referred to the arbitrators as aforesaid.
- h) Performance of the Contract shall continue during arbitration proceeding unless the Owner shall order the suspension thereof or any part thereof and if any such suspension shall be added to the Contract Price. No payments due or payable by the Owner shall be withheld on account or a pending reference to arbitration.

39.2 Subject to Clause 39.1 above, the Courts at [Gujarat] shall have the exclusive jurisdiction on any matter arising out of, under or in relation to the Contract.

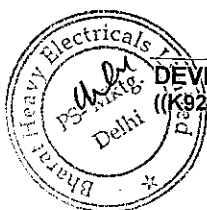
#### 40.0 **SUSPENSION OF WORK**

40.1 Owner's Right to Suspend:

40.1.1 Owner may at any time and from time to time and for any reason, by written notice to the Contractor, suspend furtherance performance of all or any part of the Works hereunder upon 10 days' prior written notice to Contractor (or, in emergency situations, upon such prior notice as circumstances permit) indicating (a) the portion of the Works the completion of which Owner has elected to defer, (b) Owner's estimate of the duration of such suspension, and (c) the effective date of such suspension of the Works.

Upon receipt of and consistent with the effective date of such notice, Contractor shall:

- (a) stop performance of further Works which Owner has elected to defer and shall continue to complete performance of the balance of the Works. During the period of such suspension Contractor shall properly care for and protect all Work in progress and all property of Owner which pursuant to the terms of the Contract is subject to the supervision of Contractor in whatever state of completion;
- (b) place no further subcontracts or purchase orders for materials, services, work or facilities in respect of the Work except to the extent expressly



requested by Owner; and

- (c) unless otherwise directed by Owner, use all reasonable endeavours to suspend on the most favourable terms available to Contractor all purchase orders, subcontracts and rental and lease agreements to the extent affected by such suspension and otherwise minimise any additional costs associated with such suspension.

40.1.2 Contractor shall promptly deliver to Owner copies of all such Work in progress and all such property as may be requested by Owner & mutually agreed. Owner may at any time terminate the suspension by written notice to Contractor specifying the effective date of termination and Contractor shall use its best efforts to resume performance of its obligations pursuant to the Contract immediately upon receipt of such notice. During the suspension period, the Contractor shall not be allowed to take all such properties outside the plant premises without Owner's permission.

40.1.3 During a suspension, Contractor shall not be entitled to payment of the Contract Price which would have otherwise been ordinarily payable during the relevant period of such suspension, except for such part of the Work which has been completed prior to the date of suspension specified in the notice of suspension.

40.1.4 Upon resumption by Contractor of all activities affected by a suspension, Owner shall resume payments of the Contract Price (it being understood that no interest shall be payable in respect of such resumed payments) with the payment dates therein adjusted to reflect the period during which scheduled payments were not made.

## 40.2 Consequences of Suspension

40.2.1 Owner's instructions under Clause 40.1 shall be treated as instructions to carry out a change under Clause 4.4, except to the extent that the suspension instructed by Owner is necessary by reason of default, breach, failure or non-performance on the part of Contractor.

40.2.2 To the extent such instructions are treated as a request for a change under Clause 4.4 in accordance with the immediately preceding Clause 40.2.1, Contractor shall be entitled to submit to Owner a preliminary change order for a determination of an adjustment Guaranteed Commercial Operation Date, the Contract Price, the payment and milestone Schedule, the Project Schedule and the Performance Guarantees, as appropriate. Contractor shall mitigate to the fullest extent reasonably possible any additional expenses to be borne by Owner as a result of suspension of the Works pursuant to this clause.

40.2.3 Except as provided in this Clause 40.2.2 Contractor shall have no claim against Owner.

40.3 Contractor's Right to Suspend.

The Contractor shall have the right to suspend the relevant Works, for the reasons mentioned below, by giving twenty one (21) days' notice to the Owner upon occurrence of the following reasons:

- (a) If the Owner has failed to pay the Contractor, without reasonable cause, any

sum due to the Contractor under the Contract within thirty (30) days after the expiry of time within which payment of such amount was required to be made under the Contract;

- (b) If the Contractor is unable to carry out any of its obligations under the Contract for reasons solely attributable to the Owner, including but not limited to the Owner's failure to provide access to Site or failure to obtain any Applicable Permit necessary for the execution and/or completion of the Facility which the Owner is required to obtain as per the provisions of the Contract or as per Applicable Laws,

If the Contractor's suspends performance of the Works or the rate of progress is reduced pursuant to this Clause 40.3, then the Time for Completion shall be extended, and any and all additional costs or expenses incurred by the Contractor as a result of such suspension or reduction in the rate of progress shall be paid by the Owner to the Contractor in addition to the Contract upon resumption of Works, except where the suspension of the Works or reduction in the rate of progress is attributable to the Contractor's default or breach of Contract.

#### 41.0 TRAINING OF OWNER'S PERSONNEL

The Contractor shall furnish all manuals, documentation and train Owner's Engineers/Personnel free of cost for safe, successful and reliable operation of the plant (for minimum 60 people).

The Contractor shall undertake to train free of charge, Engineering personnel selected and sent by the Owner at the works of the Contractor (not less than 60 man month duration). The period and the nature of training for the individual personnel shall be agreed upon mutually between the Contractor and the Owner. These engineering personnel shall be given special training in the shops, where the equipment will be manufactured and/or in their Collaborator's works and in any other plants where equipment manufactured by the Contractor or his Collaborator is under installation/operation or testing to enable those personnel to become familiar with the equipment being furnished by the Contractor.

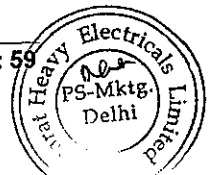
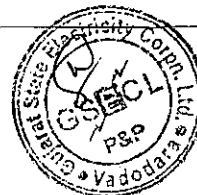
All traveling expenses for the engineering personnel to be trained during the total period of training will be borne by the Owner. However, the Contractor shall provide necessary accommodation and local transport for such personnel.

The Contractor shall also train Owner's Operation & Maintenance personnel to become proficient in operating the equipments and for routine maintenance/repair/replacement, lubrication, overhauling, adjustments, testing etc. of the plant and equipments.

#### 42.0 AS-BUILT DRAWINGS

The Contractor shall furnish drawings and document in as-built condition as stipulated in the Specification.

On completion of the project, contractor should submit Three Sets of As commissioned drawings, Three Sets of as Installed Bill of Materials and Three Sets of As Commissioned Data/ Specification /Parameter Sheets Duly Signed



by the Competent Authority. (Note: This was earlier at definition of drg sr no (f) CI 2.1)

43.0 **REJECTION OF DEFECTIVE PLANT**

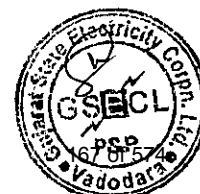
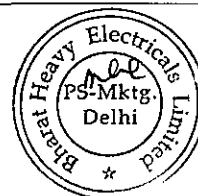
43.1 Without prejudice to the rights of the Owner elsewhere in the Contract, if the completed Plant or any portion thereof, before it is Taken Over under Clause "Taking Over" or during the Warranty Period, is found defective or fails to fulfill the requirements of the Contract, the Engineer shall give the Contractor notice setting forth particulars of such defects or failure, and the Contractor shall forthwith make the defective Plant good or alter the same to make it comply with the requirements of the Contract. Should he fail to do so within seven (7) days, the Owner after giving seven (7) days written notice may reject and replace at the cost of the Contractor the whole or any portion of the Plant, as the case may be, which is defective or fails to fulfill the requirements of the Contract.

43.2 In the event of such rejection, the Owner shall have the right to operate any and all Equipment and/or Plant as long as it is in operating conditions, whether or not, such Equipment has been accepted as complete and satisfactory, to enable him to obtain necessary replacement except that this shall not be construed to permit operation of any equipment which may become damaged by such operation before any required alterations or repairs and/or replacements have been made. All repairs or alterations or replacement required of the Contractor shall be made by the Contractor at such times as directed and in such a manner as will cause the minimum interruption in the use of the equipment by the Owner. Should the Contractor not so replace the rejected plant within the time frame as directed by the Engineer, up to the requirements of the Specification, the Contractor's full and extreme liability under this Clause will be satisfied by the repayment of all money paid by the Owner to him in respect of such plant plus dismantling, site clearance and disposal costs or should be replacement cost whichever is higher.

43.3 Nothing in this Clause shall be deemed to deprive the Owner or, effect any right under the Contract which he may otherwise have in respect of such defects or deficiencies or in any way relieve the Contractor of his obligation under the Contractor. Further, this Clause shall be in addition to and not in derogation of any other right of the Owner under the Contract.

44.0 **MOST FAVOURED CUSTOMER**

The Contractor agrees that Owner is and throughout the implementation of the Works will be "the most favoured customer" of the Contractor and all its Associates. As such, Contractor confirms and agrees that no other customer of the Contractor or its Associates will receive greater priority including provision of project personnel, resources and systems than Owner and Contractor hereby assures Owner that the successful, efficient and effective implementation of the Works is and will be the most important customer activity of Contractor and all its affiliates and associates. Contractor and all its affiliates shall not undertake any other project anywhere in the world if to do so, reasonably could be expected to have an adverse effect on the implementation of the Works.



45.0 **CONTRACTOR'S ACCEPTANCE OF THE WORK AND SITE**

45.1 **Acceptance of the Work Generally**

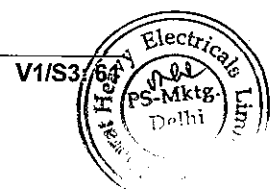
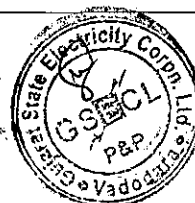
Contractor acknowledges that it has:

- (1) Entered into the Contract for the consideration set forth in the Contract and after due and careful inquiry.
- (2) Satisfied itself in respect of all pertinent matters which may bear upon the performance of the Contract and the Work, including:
  - (a) The nature and magnitude of the Work;
  - (b) The Applicable Laws and all environmental risks, conditions and applicable restrictions;
  - (c) The calculation and sufficiency of the Contract Price;
  - (d) Achievement of the Commercial Operation and Performance Guarantees;
  - (e) Quality and quantity of the Equipment and Contractor's Equipment required for the performance of the Work;
  - (f) Access to the Site;
  - (g) Availability of all labour and personnel;
  - (h) The character and quality of the Work to be performed;
  - (i) General and local conditions;
  - (j) Disposal, handling and storage of materials;
  - (k) All other pertinent, relevant or related matters and conditions.

45.2 **Acceptance of the Site:**

Bidder acknowledges that:

- (1) The Plant shall be designed and engineered for erection and installation and performance in accordance with the Contract at the Site; and
- (2) Bidder has satisfied itself as to all general, local and groundwater conditions at the Site and the areas adjacent thereto, including but not limited to:
  - (a) Sea, river and land transportation and access and right of way to the Site, including the availability and condition of roads and ports and rights-of-way, conditions affecting transportation, access and egress;
  - (b) Handling and storage of materials;
  - (c) Availability and quality of labour, sand, and rock;



- (d) Rainfall and other climatic conditions, tides, currents, soundings and ground water and other hydrological conditions (including the monsoons);
- (e) Topography, ground surface, subsurface
- (f) Equipment required by Bidder prior to and during performance of its obligations hereunder;
- (g) Availability of housing and other relevant social and urban infrastructure;
- (h) Any and all other pertinent, relevant or related matters and conditions.

45.3 No Claim for Actual Conditions

Contractor acknowledges that all appropriate allowances for the matters and conditions referred to in Articles 45.1 and 45.2 and those pertaining to the Work or to the Contract generally have been taken into account in calculating the Contract Price, and the other terms and conditions of the Contract.

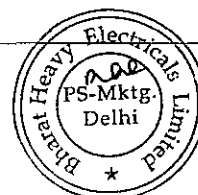
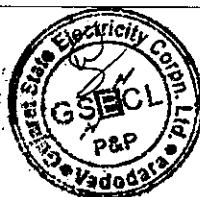
Contractor's failure to acquaint itself and consider any applicable condition, situation, requirement or other matter referred to in Articles 45.1 and 45.2 and those pertaining to the Work or to the Contract generally, will neither relieve it from the responsibility for successfully performing the Contract, nor entitle the Contractor to a Change Order, adjustment of Contract Price or Guaranteed Commercial Operation Date for reasons relatable to such failure.

45.4 Except as otherwise expressly stated in the Contract:

- (1) Contractor shall be deemed to have obtained all necessary information as to risks, contingencies and other circumstances which may influence or affect the Work;
- (2) Contractor accepts total responsibility for having foreseen all difficulties and costs and expenses of successfully completing the Work; and
- (3) No increase in the Contract Price, or extension of the schedule based in whole or in part upon any discrepancy between the actual conditions encountered by Contractor and those which Contractor anticipated, or any unforeseen difficulties or costs generally, shall be considered by the Owner or effected.

45.5 The Contractor acknowledges that all engineering data and information and data and information relating to hydrological, geo-technical and sub-surface at the Site made available to the Contractor by the Owner in the Specifications, information made available to bidders during the bid process, generally or otherwise, directly and indirectly, are all solely for the convenience of the Contractor. The verification and interpretation of the same shall be at the sole risk and responsibility of Contractor.

Contractor agrees that the Owner shall have no liability for the adequacy, correctness, accuracy or completeness of such data and information. The Owner makes no representation or warranty, express or implied, as to the adequacy, accuracy, correctness or completeness of any such data or information.



Contractor further agrees that it shall protect, indemnify and hold Owner harmless from and against any and all Losses arising directly or indirectly from or incurred by reason of the use of any such data and information by any Person to whom Contractor has supplied such data and information or any portion thereof including the Contractor himself, his Subcontractors, and their respective employees, agents, personnel and consultants.

Furthermore, Contractor hereby waives any claims it may otherwise have against any Person that has prepared, compiled, provided or prepared any such data and information arising due to any reason whatsoever, including without limitation, from the use thereof by Contractor or by other Persons to whom Contractor has supplied such data and information.

Specifically and without limitation, Contractor agrees and warrants that it shall independently and fully verify, check and establish the adequacy, correctness, accuracy and completeness of all data and information which it may require for any purposes related directly or indirectly to the Contract, its obligations hereunder or for any other reasons, at its sole risk and cost.

#### 46.0 **Applicable Permits**

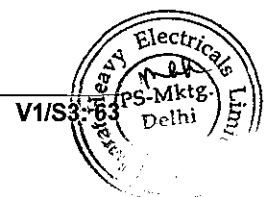
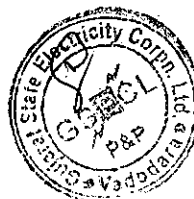
The Owner and the Contractor shall each be responsible for obtaining the Owner Permits and the Contractor Permits respectively. If the Contractor at any time becomes aware, whether as a result of notice from Owner or otherwise, of any Applicable Permit not obtained by the Contractor, the Contractor shall promptly give notice thereof to Owner and the Contractor shall be responsible for obtaining such Applicable Permit.

The Contractor shall be responsible for ensuring compliance with the terms and conditions of all Applicable Permits, whether obtained by the Owner or the Contractor.

The Contractor shall indemnify and hold harmless to the Owner and all Owner indemnified parties from and against any damages arising from and out of the securing of, or failure to secure, the Contractor Permits or failure to maintain the Owner Permits.

With respect to the Owner Permits, the Contractor shall provide support to Owner in obtaining all Owner Permits. Such Contractor support shall include:

- i. Attendance at meetings with Owner and third parties designated by Owner;
- ii. Preparation of permit applications or, as applicable, application to transfer permits to the Owner;
- iii. Assistance in preparation of responses to inquiries by governmental instrumentalities / agencies;
- iv. Assistance in presentations at hearing of governmental instrumentalities / agencies;
- v. Provision of all available information and documents required by Owner in connection with obtaining any Owner Permits; and



- vi. Such other services as Owner may request from time to time required for Owner permits.

47.0 **Law and Language**

The Contract and the respective rights, privileges, duties and obligations of the Owner and the Contractor hereunder shall be governed by the laws of the Republic of India.

48.0 **Stamp Duty**

Costs of stamp duty and other similar charges imposed by law on the Contract or any part thereof shall be borne by the Contractor.

49.0 **TERMINATION BY THE CONTRACTOR.**

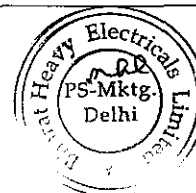
49.1 Upon the occurrence of any one or more of the following events, the Contractor may issue a notice of default to the Owner (the "Contractor's Preliminary Notice"):

- (a) If the Owner has failed to pay the Contractor any sum due to the Contractor under the Contract within sixty (60) days after the expiry of time agreed for payment of the said sum.
- (b) In case of prolonged suspension imposed by the Owner for a continuous period of 120 days that affects the whole of Works.
- (c) In case of prolonged suspension imposed by the Contractor under Clause 40.3 for a continuous period of 90 days that affects the whole of Works.
- (d) If the Owner is adjudged bankrupt or insolvent; or if the Owner makes a general assignment for the benefit of its creditors, or a trustee or a receiver is appointed for all or a substantial part of the Owner's assets, or if the Owner files a petition for reorganization under bankruptcy or other Applicable Laws.

if the Owner has not remedied or cured the default specified in the notice within 30 days of receipt of notice, then the Contractor shall have the right to terminate the Contract forthwith by issue of a notice of termination to the Owner.

Upon such termination the contractor shall be paid as per Clause no.24.2(a) & (b) i.e. Upon termination of the Agreement pursuant to Contractor's right to terminate, the Contractor shall be entitled to be paid :

- (a) all actual documented costs incurred by Contractor, as audited and accepted by an independent certified public accounting firm of national reputation selected by Owner and acceptable to Contractor, incurred or that could not be avoided in connection with performance by Contractor of Works as of the date of the Termination which were not previously paid for by



Owner, and

(b) all actual documented costs incurred by Contractor, if such cost is part of the Contract Price, in connection with the item procured / facilities executed procured by Contractor in connection with the services for which Contractor has not been paid, provided that such items are delivered to Owner at the Project Site together with all documents necessary to transfer title thereto to Owner (the 'Termination Payment'). As a condition precedent to receiving the Termination Payment, Contractor shall execute and deliver all such papers and take all such steps, including the legal assignment of Contractor's contractual rights, as Owner may require for the purpose of fully vesting in Owner all rights, title and interests of Contractor in and to all subcontracts, purchase orders, warranties, guarantees and other agreements.

(c) All claims by such contractors and Subcontractors to be due and owing for Services and other work performed prior to such date shall constitute debts between Contractor and Subcontractors, and Owner shall in no way be liable for such sums. Contractor shall include in all agreements and contracts entered into with contractors and Subcontractors a provision providing for the foregoing.

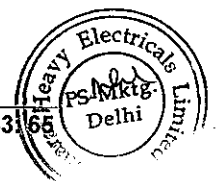
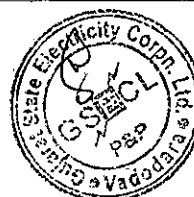
The Contractor shall send a copy of the Contractor's Preliminary Notice to the Lenders and notwithstanding anything contained in this Clause or in any other Clause of the General Conditions of Contract or elsewhere, the Contractor's right to terminate the Contract shall be subject to the right of the Lenders to step-in and remedy the default or substitute the Owner; provided that the Lenders must exercise their right to remedy the default and/or substitute the Owner within a period of thirty (30) days from the date of receipt of the Contractor's Preliminary Notice, failing which the Contractor shall have the right to terminate the Contract upon the expiry of the said 30 days' period."

50.0 DEEMED COMPLETION

In case the Performance Guarantee Tests cannot be completed within 90 days of Trial Operation for reasons not attributable to Contractor, the Performance Guarantee Tests shall be deemed to be completed successfully and the unit shall be deemed to be Taken Over and payment linked to this activity shall be released to Contractor by Owner. Contractor shall conduct the Performance Guarantee Tests to establish that performance guarantees are met for the unit, using applicable correction curves. Contractor shall be allowed to demobilize its resources on deemed completion of Performance Guarantee Tests and remobilize at the expense of the Owner for carrying out the Performance Guarantee Tests at a later date. In any case, the Performance Guarantee Tests for the unit shall be conducted within 6 months of the Trial Operation of the unit

51.0 DEEMED COMMISSIONING

In case the Initial Operation cannot be completed within 30 days from Scheduled date for reasons not attributable to the Contractor, the Initial Operation shall deemed to be completed and payment linked to successful completion of Reliability Run shall be released to the Contractor by Owner



1X800 MW WANAKBORI TPS

TECHNICAL SPECIFICATION  
FOR  
COMPRESSED AIR SYSTEM

VOLUME-IIB  
SECTION C 2- B  
(ENGINEERING SERVICES)



BHARAT HEAVY ELECTRICALS LTD  
POWER SECTOR PROJECT ENGINEERING MANAGEMENT  
PPEI, NOIDA-INDIA

## **CONTENT**

<b>CLAUSE NO.</b>	<b>DESCRIPTION</b>
1.00.00	GENERAL
2.00.00	DESIGN COORDINATION MEETING
3.00.00	CO-OPERATION WITH OTHER CONTRACTORS AND CONSULTING ENGINEERS
4.00.00	GUIDELINES FOR ENGINEERING SERVICES
5.00.00	OPERATING MANUALS AND MAINTENANCE INSTRUCTIONS
6.00.00	PLANT HANDBOOK
7.00.00	CONTRACT STAGE DOCUMENT SUBMISSION AND APPROVAL PROCEDURE
8.00.00	TENDER STAGE DOCUMENT SUBMISSION

**VOLUME : IIA**

**SECTION-VI**

**ENGINEERING SERVICES**

1.00.00 **GENERAL**

1.01.00 As part of the overall project management activity, the Contractor shall be responsible for proper engineering and co-ordination of activities during various phases of execution of the contract. The Contractor shall identify a person, designated as Project Manager, with whom the Owner, the Consulting Engineer or the Review Consultant shall interact on matters related to engineering as well as execution of the contract. The Project Manager shall be the single-point contact person on behalf of the Contractor and shall be responsible for all engineering co-ordination. The Owner/Consultant/Review Consultant shall interact with the Project Manager only on all matters of co-ordination between the Owner and the Contractor or on matters involving the Contractor, his manufacturing units and sub-vendors. For the purpose of expediting the Owner or his representative may sometimes interact with the manufacturing units or sub-vendors of the contractors. However such interaction will not, under any circumstance, dilute the responsibility of the Contractor to provide a fully engineered and co-ordinated package under this contract.

1.02.00 On finalization of the contract, a procedure for exchange of engineering information will be mutually agreed and finalized between the Owner and the Contractor.

2.00.00 **DESIGN COORDINATION MEETING**

The Contractor and his sub-vendors will be called upon to attend design co-ordination meetings with the Engineer, other Contractors and the Consultants of the Owner during the period of execution of contract. The Contractor including his sub-vendors shall attend such meetings at their own cost at Owner's or Consultant's office in Kolkata or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

3.00.00 **CO-OPERATION WITH OTHER CONTRACTORS AND CONSULTING ENGINEERS**

The Contractor shall agree to cooperate with the Owner's other Contractors and Consulting Engineers and freely exchange with them such technical information as is necessary to obtain the most efficient and economical design and to avoid unnecessary duplication of efforts. The Engineer shall be provided with copies of all correspondences addressed by the Contractor to other Sub- contractors and Consulting Engineers in respect of such exchange of technical information.

- 4.00.00 GUIDELINES FOR ENGINEERING SERVICES**
- 4.01.00 Prior to commencement of the engineering work as part of design submissions, all aspects of design viz., criteria for selection and sizing of all equipment and systems, design margins etc. including that for structural steel and civil work shall be outlined and these shall form the basis for the detailed engineering work.
- 4.02.00 Engineering work shall be performed on modern and proven concepts and internationally accepted good engineering practices but fully compatible with the Indian environments. Owner shall have the right to review and approve the engineering work by themselves and/or through consultant and ask for any clarifications and changes/modifications to the work performed by Contractor.
- 4.03.00 At any stage during the performance of assignment, the Contractor may be required to make certain changes/modification/improvements in design/drawing/other documents which are applicable to 800 MW Unit, which in the opinion of the Owner could result in better improved design, layout, operability, plant availability, maintainability, reliability or economy of the plant and its systems/sub-systems in view of revised and more accurate information/data available at a later date(s) or feedback(s) received during execution / operation of similar units. Such changes / modifications/improvements required could be identified by Owner and/or consultant and mutually discussed. Owner requires the Bidder to incorporate such action in the subject assignment appropriately without any additional cost liability and time implication to the Owner and same shall be within the responsibilities and scope of the Contractor.
- 4.04.00 During the course of review of detailed engineering stages, it may be essential in the opinion of Owner to obtain certain classified data for review purposes only. In case Owner so desires, the Bidder shall submit such data to Owner.
- 4.05.00 During the course of review of detailed engineering, it may be essential in Owner's opinion to obtain data and information on similar equipment and plants engineered by the Bidder. In case Owner so desires the Bidder shall submit such data and information to the Owner.
- 4.06.00 It is not the intent to give details of every single task covered in the total engineering work to be carried out by Contractor, however, all engineering work required for the satisfactory completion of the plant/systems as specified shall be carried out by the Contractor. Broadly, the following are the minimum requirements in respect of scope of major items of work:
- 4.06.01 Preparation, updating and finalisation of scheme drawings, control and interlock diagrams, detailed and fully dimensioned layout drawings (plant layout and equipment layout detailed plan, elevation and cross-sectional drawings at different elevations / floor levels) covering all mechanical, electrical, C&I, civil and structural items, equipment, systems and facilities. Drawings and Schedules prepared by the Contractor from time to time, as detailed designs are developed, shall be submitted for Owner's / Consultant's approval before the work is taken up. Revisions, corrections, additions to drawings and schedules shall not be considered to change the scope of work.

- 4.06.02 Preparation of detailed technical specifications including data sheets, tender drawings and bill of material for all bought out items, as also finalisation of corresponding sub-contractors.
- 4.06.03 Review of sub-contractor's data, drawings, design calculations, schedules, bill of materials, instruction manuals etc. for all equipment, before forwarding them to Owner/Consultant for approval.
- 4.06.04 Preparation of civil construction drawings for all equipment showing foundation details and full details regarding equipment loads, floor openings, details of embedments etc. required for preparation of civil construction drawings and also as referred at relevant sections of Scope, Terminal Points & Exclusions. These documents shall be preceded by appropriate design calculations, static and dynamic analysis as necessary.
- 4.06.05 Preparation and finalisation of process piping and instrumentation diagrams and schematics, complete in all respects for all systems/packages of the power plant.
- 4.06.06 Preparation of consolidated schedules and bills of materials, including line numbers, tag numbers, source of supply, service conditions, specifications, materials, types and connections details, quantities for items of the plant including dampers, steam traps, strainers, instrumentations, ducting.
- 4.06.07 Sizing of all piping and equipment as per the stipulated design criteria; carrying out of flexibility analysis/dynamic analysis as necessary; hangers & support engineering.
- 4.06.08 Final revision of all documents including preparation and compilation of Instruction Manuals for installation, commissioning, operation and maintenance for all equipment and systems. Refer clause 5.00.00 for the specific requirement in this regard.
- 4.06.09 Certification and submission of final as-built drawings for all areas.
- 4.06.10 Preparation and compilation of all drawings, schedules and instructions which may be required at site, whether separately mentioned or not.
- 4.06.11 All erection and assembly drawings which may be required at site.
- 4.06.12 For all bought out item packages, the Contractor shall provide complete material / component list along with detail specification, drawings, component part no. etc. during detail engineering stage prior to final approval. Such approved drawing/document shall be made available at site in adequate number prior to commencement of work. Moreover, such document/drawing shall be provided in soft form (CD)
- 4.06.13 Preparation of necessary documentation, design calculations etc. required for submission to statutory authorities like IBR, Chief Electric Inspector etc.

**5.00.00 OPERATING MANUALS AND MAINTENANCE INSTRUCTIONS**

5.01.00 The Contractor shall provide at least six (6) months before the time of commissioning and before taking over of the plant and equipment, all necessary maintenance manuals and operating instructions. The instruction manual shall be submitted in the form of one (1) soft copy in CD and 15 hard copies.

5.02.00 The information provided, which shall be contained in loose leaf stiff backed covers, shall include :

- a) A complete inventory of all main items of plant, with identification details.
- b) Service manuals for all plant and equipment giving full descriptions of the main items and auxiliary items such as power packs, hydraulic equipment, actuators, lubricating pumps, etc.
- c) A separate electrical manual covering items such as switchgear, cabling, instrumentation, controls, cabling layouts and wiring diagrams.
- d) A schedule of recommendations for routine maintenance of all electrical and mechanical equipment, recommended inspection point, information on detection, cause and rectifications of troubles & faults.
- e) A lubrication schedule with all necessary drawings diagrams to identify the lubrication points.
- f) Manufacturer's literature.

5.03.00 The instruction manual shall be subject to the approval of Owner.

**6.00.00 PLANT HANDBOOK**

The Contractor shall submit to the Engineer, a preliminary plant handbook preferably in A-4 size sheets which shall contain the design and performance data of various plant, equipment and systems covering the complete project including single line flow diagrams, within twenty four (24) months from the date of his acceptance of the letter of award. The final plant handbook complete in all respects shall be submitted by the Contractor six (6) months before start-up and commissioning activities. The plant handbook shall be submitted in the form of two (2) soft copy in CD (one to Owner and one to Consultant) and twenty five (25) hard copies in decent bound forms.

**7.00.00 CONTRACT STAGE DOCUMENT SUBMISSION AND APPROVAL  
PROCEDURE**

7.01.00 Within fifteen (15) days of issue of Letter of Award (LOA) by the Owner, the Contractor shall furnish a schedule of drawings and design document to be submitted by him to the Owner/Engineer indicating dates against each document.

The documents shall be divided into two categories : a) for approval and b) for information/further engineering and co-ordination by the Owner.

In preparing this schedule, the Contractor shall allow four (4) weeks from date of receipt for review and comments by the Owner/Engineer for each submission of a document.

This document submission schedule shall require approval by the Owner/Engineer.

7.02.00 All contract documents shall be marked, without fail, with the name of the Owner, the Project, the specification title and number and the unit designation.

All dimensions shall be in metric units.

All notes, markings etc. shall be in English.

7.03.00 Documents/Drawings, submitted during tender stage, shall be revalidated or revised as required and submitted as certified contract document for approval / information of the Owner/Engineer.

7.04.00 Unless specified otherwise, the following categories of documents/drawings would require approval of the Owner/Engineer:

- a) List of sub-vendors (from Owner only)
- b) System scheme and instrumentation diagrams
- c) Design basis justifying selection of equipment & process parameters where not specified in the Contract
- d) Equipment data sheets and general arrangement drawings
- e) Materials of construction
- f) Layout drawings.
- g) Operation logic diagrams.
- h) Typical control circuit.
- i) Drawings of Instrumentation and control.

7.05.00 Unless specified otherwise, the following categories of documents/ drawings would be treated for information/further engineering by the Owner/Engineer. The Contractor shall, however, incorporate all additional information and clarifications in these documents / drawings as and when desired by the Owner/Engineer.

- a) Equipment foundation drawings.
- b) Equipment cross-section drawings, product literature etc. which are of proprietary nature.
- c) Predicted performance curves of equipment.
- d) Various bills of quantity, schedules etc.
- e) Piping fabrication drawings, isometrics etc.
- f) Panel wiring diagrams.
- g) Instruction/Operation manuals.
- h) Service manuals and trouble shooting guide for C & I system including field instruments.
- i) Cable schedule and interconnection chart.
- j) Drive/feederwise control scheme showing all external interfaces.

In essence, the Contractor is solely responsible for corrections and adequacy of design & engineering for documents under this category.

7.06.00 Upon review, the Owner/Engineer shall put his remarks and one of the following action stamps on the drawing/document:

- a) Approved.
- b) Approved except as noted, forward final drawing
- c) Approved except as noted, resubmission required.
- d) Disapproved.
- e) For information/reference only.

For action stamps in category (c) & (d), documents must be resubmitted for review by the Owner/Engineer. For action stamp in category (b), further review by Owner/Engineer would not be necessary provided the Contractor agrees & incorporates the comments made on the document.

Except for action stamp under category (c) & (d), the Contractor can proceed with manufacturing and other sequential activities for those areas of a drawing/document which do not have any review comment by the Owner/Engineer.

The Owner/Engineer may accord approval in category (c) or (d) in more than one submission of a document till he is satisfied that the intent of the specification has been fully complied with. The Contractor shall be responsible for delay in such cases and no extension of time shall ordinarily be allowed on such grounds. Approval of contract documents by the Owner/Engineer shall not relieve the Contractor of his responsibility for any errors and fulfillment of contract requirements.

The Contractor's work shall be in strict accordance with the finally approved drawings and no deviation shall be permitted without written approval of the Owner/Engineer.

7.07.00 Except key plan/general yard plan, any layout drawing requiring scrutiny shall not be drawn to a scale less than 1:50.

7.08.00 For review by the Consulting Engineer, the Contractor shall furnish soft copies of drawings & documents and three (3) prints of each drawing/document. Two (2) prints of such submission shall also be sent to the Owner. After review, comment/approval will be sent to the Contractor. Upon action under category (a) or (e), the Contractor shall directly distribute the documents to the various offices of the Owner and other agencies in number of copies as specified in the contract document. Such distribution copies shall be marked with the reference and date of the letter by which the Owner/Engineer has accorded his final approval. Penal action shall be taken against the Contractor for any unauthorised revision in the drawings so distributed from the drawings approved by the Owner/Engineer. The contractor shall furnish three (3) CDs of all as built/final drawings for Owner/Consultant site.

7.09.00 In case of contradiction between the stipulations above and those stated elsewhere in the specification, the stipulations herein shall prevail.

7.10.00 For details of documentation for Civil, Structural and Architectural works, Vol. II-G may be referred.

8.00.00 **TENDER STAGE DOCUMENT SUBMISSION**

8.01.00 The Bidder shall submit along with his bid all documents/drawings as requested in respective specifications. The documents shall include but not be limited to the following :

- a) All Bid proposal sheets duly filled up.
- b) Detailed experience list and financial resources of the prime bidder his collaborators/associates in this bid as well as the sub-vendors proposed.
- c) Scheme drawings indicating scope of supply and service as offered by the Bidder indicating clearly exclusions, if any.
- d) List of terminal points of the package offered together with quality and quantity of various input (i.e. water, air, electricity etc.) as required from the Owner at such interfaces.

- e) Equipment GA, Layout, Design Calculations, interlock and other write-up, catalogues/literature etc. as required for clear understanding of the bid submitted.
- f) L-1 network indicating target dates for intermediate milestones and final commissioning of equipment supplied; This network shall be supplemented by a detailed write-up on proposal procedure of project implementation, deployment schedule for Key personnel with their bio-data, schedule of construction machinery etc.
- g) List of suppliers for all bought out items.

1X800 MW WANAKBORI TPS

TECHNICAL SPECIFICATION  
FOR  
COMPRESSED AIR SYSTEM

VOLUME-IIB

SECTION C 2- B

(PROJECT MANAGEMENT AND SITE SERVICES)



BHARAT HEAVY ELECTRICALS LTD  
POWER SECTOR PROJECT ENGINEERING MANAGEMENT  
PPEI, NOIDA-INDIA

## CONTENT

CLAUSE NO.	DESCRIPTION
1.00.00	PROJECT MANAGEMENT SERVICES
2.00.00	SITE SERVICES

**VOLUME : IIA**

**SECTION-V**

**PROJECT MANAGEMENT AND SITE SERVICES**

1.00.00 **PROJECT MANAGEMENT SERVICES**

1.01.00 **Responsibility**

The Bidder shall identify a separate and independent project management team headed by a Project Manager for the execution of this project. Responsibilities of this project Management team shall cover the areas listed below :

- a) Planning and Monitoring
- b) Engineering Management
- c) Contracts Management
- d) Quality Assurance, Inspection & Expediting
- e) Construction Management
- f) Spares Management
- g) Erection & Commissioning Management

Detailed responsibilities in the above areas are discussed below :

1.02.00 **Organisation**

1.02.01 Headquarters

The headquarters of the project management team shall be headed by a senior level executive designated as the Project Manager who shall be responsible to Owner for the execution of the project. He should have adequate financial power and authority to give decision.

Separately, designated leaders shall be identified for each of the areas mentioned under 1.01.00, who, in turn, will report to the Project Manager for all matters relative to this contract.

1.02.02 Central Co-ordination Cell

The central coordination cell shall have sufficient technical personnel to coordinate technical matters and to quickly resolve day to day queries or references made by Owner and his Consultants without having the need to refer to his headquarters each time.

1.02.03 Site Organisation

The site should have a competent construction manager for all site operations with adequate financial power and sufficient level of authority to take site decisions. The organisation chart for site should indicate the various levels of experts to be posted for supervision in the various fields in civil construction, erection, commissioning etc.

1.02.04 Organisation Chart

The Bidder shall furnish a detailed organisation chart for the project management team, clearly identifying the key personnel in each of the areas mentioned at 1.01.00 above. The expected number of executives at different levels shall also be indicated, separately for headquarters, central coordination cell and site organisation.

1.03.00 **Implementation Schedule**

The schedule for the completion of the Project would be as follows :

	<b>Period in Months from Zero date (Taken as the date of issue of Notice to Proceed)</b>
a) Boiler Hydro-test	By Bidder
b) Boiler light up	By Bidder
c) Unit synchronisation	45
d) Commercial operation	48

To achieve these targets, the Contractor shall furnish to the Owner, various schedules as defined below:

1.03.01 Engineering Schedules

These schedules shall cover various design submissions indicating different engineering activities to be performed. Such schedules shall be furnished by the Bidder for each and every plant/systems/ equipment item covered in the scope of this specification.

1.03.02 Manufacturing Schedule

The Contractor shall submit to the Engineer his manufacturing and delivery schedules for all equipment within thirty (30) days from the date of issue of the Letter of Award (LOA). Such schedules shall be in line with the detailed network for all phases of the work of the Contractor. Such schedules shall be reviewed, updated and submitted to the Engineer, once in every two months thereafter, by the Contractor. Schedules shall also include the materials and equipment purchased from outside suppliers.

1.03.03 Erection Schedules

In order to achieve the overall completion schedule, the Contractor shall provide the Owner all the information covering erection sequence, testing and commissioning activities. These schedules may be based on the recommended erection procedures and will be subject to discussions/agreements with the Owner subsequent to the award of contract.

1.03.04 The successful Bidder shall have to provide all the above schedules (i.e. 1.03.01, 1.03.02 & 1.03.03) in a tabular form in addition to that in the form of L2 & L3 networks and these shall necessarily include information not limited to the earliest and latest dates for various activities/submissions and also any related constraints. However, the Bidder shall include in his proposal a Level-1 (L-1) network showing the major activities and various milestones to achieve the above mentioned completion schedule.

1.03.05 The Contractor shall provide the Owner the original disc/software for all such schedules alongwith requisite no. of copies (as required by the Owner) within an agreed time schedule. This time schedule will be agreed between Owner/Bidder at the time of award. The Contractor's project management software shall be compatible with that of the Owner and the input data shall be furnished to the Owner in a manner compatible with Owner's project management software, Primavera.

1.04.00 **Detailed Responsibilities**

1.04.01 Planning & Monitoring

a) Planning

The Bidder shall prepare a Master Network Schedule in the form of PERT network.

The network shall be prepared on a Work Breakdown Structure for the project which sub-divides the project into a set of manageable systems/sub-systems. The master network will identify milestones of key events for each system/package in the areas of engineering, procurement, manufacture and despatch and erection and commissioning. The master network shall represent the Level-I plan and will form the basis for development of detailed second and third tier execution plans. The master network shall conform to the overall schedule prescribed by Owner.

The master network should be submitted along with the bid which would be mutually discussed and finalised before the Award of Contract. This master network would clearly indicate the responsibility of the Bidder and project management team. This master network would form a part of the contract. The master network shall also identify a complete list of inputs to be furnished by the Owner which may be required for proper interfacing and tie-up. Scheduled dates for providing such inputs shall also be indicated, which will be mutually discussed and finalised.

b) Monitoring & Progress Reporting

The progress reports would be emanated every month, one from the head office of the Contractor and another from the site office. The progress report emanating from the head office should necessarily include the following sections:

- i) Report on key milestones.
- ii) Management summary indicating critical areas with details of actions initiated and effect of any on the project.
- iii) Action needing attention of the Owner/Consultant.
- iv) Detailed packagewise status of engineering submissions, quality plan submissions and approval, procurement manufacture and despatch.

The monthly report generated from the site office should necessarily include:

- i) Report on key milestones.
- ii) Management summary indicating critical areas with details of actions initiated and effect if any on the project.
- iii) Action needing attention of the Owner/Consultant.
- iv) This report would also cover the areas pertaining to the receipt of the equipment at the port, port clearance, transport, receipt at site, erection and commissioning.

In addition to the above, as the project execution progresses, the Contractor shall also be responsible for generating more frequent reports in the form of fax/e-mail information on progress in critical areas so that actions can be expedited. The exact format of the progress report shall be finalised after award of Contract.

1.04.02 Engineering Management

Based on the master network for the project (L-1) the Contractor will prepare an exhaustive list of engineering activities for the equipment/systems covered in his scope and a detailed programme of accomplishing the same within the time frame specified in the master network. This schedule will form the Level-2 (L-2) network for engineering activities.

Based on (L-2) network, the Bidder shall further develop the Level-3 (L-3) network for engineering activities which will indicate schedule for data availability, drawing release date and document submission dates.

Detailed (L-2) and (L-3) networks would be submitted sequentially by the Contractor within two months from the date of issue of Letter of Award and finalised within one (1) month thereafter.

All such networks shall be provided in MS PROJECT software as well as in other format / software suitable to Owner.

The engineering management team should also co-ordinate all interface engineering activity between the Contractor and the equipment sub-vendors so as to ensure the correctness and completeness of related engineering documentation before the same is submitted to the Owner.

#### 1.04.03 Contracts Management

Based on the master network, the Contractor shall submit L-2 programmes of manufacture and despatch. In addition, the master network shall also include periods considered for site activities viz. erection, commissioning etc. These L-2 programmes would be submitted in 2 months time from the date of award of contract and finalised within one (1) month thereafter. The Contractor will also submit site mobilisation plan. This programme would be submitted at the time of finalisation of award of contract and agreed immediately thereafter so that immediate development of the various activities at site could take place.

The Contractor should also submit L-3 programmes for the manufacturing, despatch of the various items. These networks shall also show the customer hold points (CHP) which have to be cleared by Owner or their authorised representative(s) before further manufacture can take place. These L-3 programmes for the manufacture and despatch would clearly identify responsibilities of the Contractor, sub-Contractor and Owner. These networks shall be submitted within one (1) month of the date of finalisation of the various sub-contracts by the Contractor.

In case all the manufacture is being done by the Contractor then the L-2 programmes would be themselves amplified to cover details of the manufacture, inspection, clearance by Owner and despatch.

The Contractor shall also submit the programme for procurement of boughtout items, detailed shipping schedule and cash flow statement for Owner's approval.

#### 1.04.04 Quality Assurance, Inspection and Expediting

The Contractor shall submit the list of manufacturers/sub-vendors from whom the equipment are expected to be procured and the quality assurance plans thereof for the manufacture shall be approved by the QA group of Owner before the manufacture is commenced. The list of major suppliers would be submitted along with the bid and this shall be mutually discussed and approval will be given by the Owner during contract negotiation meeting prior to placement of Letter of Award. This approved list will be binding to the bidder. In the said list, Owner reserves the right to include reputed/reliable vendors of his own choice. Regarding the various other sub-vendors, the list would be submitted within six (6) months of the award of the contract that shall be scrutinized by the Owner to accord approval. In such list Owner

reserves the right to include vendors of his own choice. No further vendor approval will be given after six (6) months. On the quality plans, the customer hold points will also be identified based on which Owner would give clearance for the manufacture to proceed further.

Quality assurance/Inspection group of Owner or its representative would issue a material despatch clearance certificate (MDCC) after the inspection clearance which will enable the Contractor to despatch the equipment and claim the payment. In the despatch programme, the Contractor shall indicate a schedule of estimated programme, tonnages specifically identifying various oversize dimensioned consignments (ODC). Further the Contractor will also be required to ensure at all stages of shipment that packing of all shipments despatched are suitable for ocean freight to India, handling at the port of entry, inland transportation and preservation at site upto erection. All despatch details & item lists shall be made available to both Owner & site immediately after shipping.

The Contractor shall also expedite all despatches from their own works/works of their sub-vendors, so as to match with the various activities mentioned at 1.04.03 above.

**1.04.05 Construction Management**

Based on the L-1 Master Network Programme, within two (2) months of the issue of Letter of Award, the Contractor shall submit a programme of construction/erection/commissioning, either in continuation with the manufacture and despatch or separately for the implementation. These programmes would be amplified showing when the civil drawings shall be released by him and construction of civil works shall be completed by him to facilitate start of erection and subsequent activities and shall form the basis for site execution and detailed monitoring. The three monthly rolling programme with the first month's programme being tentative based on the site conditions would be prepared based on these L-3 programmes. The Contractor shall also be involved along with the Owner to tie up detailed resource mobilisation plan over the period of time of the contract matching with the performance targets.

The L-3 programme would be jointly finalised by the site in charge of the Contractor with the Owner's project coordinator as well as the site planning representative. The erection programme will also identify the sequential erectable tonnages that are required for various equipment which should be taken care of in the despatch programmes.

Erection and commissioning of the equipment shall also be done under the supervision of experts from the respective equipment/ system supplier.

**1.04.06 Spares Management**

Alongwith the proposal for the plant and equipment, the Contractor shall also submit proposals/schedule for the following:

- a) Mandatory spares
- b) Recommended spares

While the award for mandatory spares will be finalised at the time of the award of contract, recommended spares will be finalised thereafter.

**1.05.00 Project Progress Review Meetings**

Keeping in mind the overall responsibility of the Contractor it is intended that periodic progress reviews on the entire activities of execution in respect of Wanakbori Thermal Power Plant (Unit-8) will be held initially atleast once in two (2) months at Vadodara/site or in the country (India) depending on the circumstances and mutual agreement. During peak period it may be held once in a month. These meetings will be attended by reasonably higher officials of the Contractor and their leading sub- contractors and will be used as a forum for discussing all areas where progress needs to be speeded up. Actions will be placed on the concerned agencies and decisions will be taken to expedite/speed up the progress. Minutes of such meetings will be issued reflecting the major discussions and decisions taken and circulated to all concerned for reference and action. The Contractor shall be further responsible for ensuring that suitable steps are taken to meet various targets decided upon such meetings.

In addition to the above, and to streamline the construction and erection at site, a suitable frequency and forum of periodic meetings between the Contractor and the Owner will be decided upon as part of erection coordination procedure. Site co-ordination meeting may be held on weekly basis.

**1.06.00 Owner's Consultant**

The Owner would appoint a consultant to assist him in some of the areas mentioned at 1.01.00 above. The details of interaction and procedures for coordination between Owner/Owner's Consultant & Contractor/ Contractor's project management team shall be finalised during contract negotiations.

**1.07.00 Commissioning Management**

**1.07.01** For commissioning of the various equipment/system covered under the scope of contract, Owner will form an organisation structure which may consist of the following committees. The Contractor shall nominate his representative on one or more of the committee as decided by the Owner:

- a) Steering Committee
- b) Commissioning Panel.
- c) Working Parties
- d) Testing Teams.

**1.07.02** Commissioning documents shall be prepared by the Contractor in the following manner and submitted for Owner's approval :

- a) Field Quality Plan

This document shall be prepared for the various equipment/ systems under commissioning and shall have the following objectives to fulfill and shall be submitted for Owner's approval at least six (6) months before their actual commissioning :

- i) Establish design data against which Plant Performance will be compared.
  - ii) Set-out the testing objectives and proposals.
  - iii) Define the documentation required.
- b) Testing/Commissioning Schedule
- These shall be prepared for the various equipment/systems under consideration and shall contain sections like detailed testing method, programme, safety, individual responsibility and results.
- c) Standard Check Lists
- Standard check lists are intended for use at the completion of erection to ensure correct erection, testing and to a limited extent operation for repetitive items.

**1.07.03 Test Reports**

After the completion of commissioning activity of equipment/ systems, the Contractor shall prepare the test reports which shall include all the relevant information related to various commissioning checks, tests carried out, any deviations/commissions noticed with respect to the intended design requirements, sequence of various commissioning activities as actually adopted vis-a-vis as recommended in the procedures, programme schedules achieved and any other such information as required. These test reports shall be submitted in requisite number of copies to the Owner and this should be duly signed jointly by the Owner/Consultant and the Contractor/Equipment supplier, who are involved during the commissioning activities.

**2.00.00 SITE SERVICES**

These services shall be rendered by the Bidder as part of the overall project management service. The services shall broadly include but not be limited to the following :

- 2.01.00 Arranging material despatch from the shop by rail/road and/or sea as applicable.
- 2.02.00 Monitoring movement of materials & follow-up as necessary with Railways, road transport, port clearance etc. from the time of despatch F.O.R. works/ F.O.B. port of shipment by Contractor till receipt of the same at site.
- 2.03.00 Unloading of materials at Railway Station/Railway Siding inside project area/ Road Transportation, transportation to site store, assessment of lost/damaged items in transit and arranging insurance claims and replacement of lost/damaged items. The Contractor shall submit to the Engineer a report detailing all the receipts during the week as well as storing, preservation of material at site.

- 2.04.00 Issuing materials from site store/open yard from time to time for erection as per the construction programme. The Contractor shall be the custodian of all the materials issued till the plant is officially taken over by the Owner after complete erection and successful trial run & commissioning.
- 2.05.00 Transportation of materials to their respective places of erection and erection of the complete plant & equipment as supplied under this specification.
- 2.06.00 Trial run and commissioning of individual equipment/sub-systems and the plant as a whole to the satisfaction of the Owner, including supply of temporary equipment & services for chemical cleaning, steam blowing as well as performance guarantee tests.
- Apart from Boiler, proper chemical cleaning shall be carried out in following pipe lines/equipment before commissioning
- a) Deaerator
  - b) Boiler feed suction, recirculation leak-off lines
  - c) Boiler Feed discharge line by passing heaters
  - d) Attemperation lines
  - e) Condensate suction & discharge piping upto de-aerator by passing the feed water heaters.
  - f) Fuel oil lines.
- Provision for preservation of individual equipment after trial run and commissioning e.g. Nitrogen blanketing etc. as necessary shall also be in the scope of the Bidder.
- Safe disposal of effluent after chemical cleaning shall be done by the contractor.
- 2.07.00 Supply and application of the final paints and first fill lubricants on all the equipment to be erected under this specification. Supply of LDO, chemicals, lub oils upto COD.
- 2.08.00 For the purpose of erection and commissioning the Contractor's scope of work shall include but not be limited to the following :
- 2.08.01 Deployment of all skilled and unskilled manpower required for erection, supervision of erection, watch & ward, commissioning and other services to be rendered under this specification.
- 2.08.02 Deployment of all erection tools & tackle, construction machinery, transportation vehicles and all other implements in adequate number and size, appropriate for the erection work to be handled under the scope of this specification.

- 2.08.03 Supply of all consumables, e.g. welding electrodes, cleaning agents, diesel oil, grease, lubricant etc. as well as materials required for temporary supports, scaffolding etc. as necessary for such erection work except those listed under exclusion elsewhere in this specification.
- 2.08.04 Construction of all civil/structural/architectural works, including construction of foundation for all equipment supplied as required, grouting of equipment on foundation after alignment, and all other incidental civil activities as detailed elsewhere.
- 2.08.05 All structural steel fabrication and erection work as detailed elsewhere in the specification.
- 2.08.06 Providing support services for the Contractor's erection staff e.g. construction of site offices, temporary stores, residential accommodation and transport to work site for erection personnel, insurance cover, watch & ward for security and safety of the materials under the Contractor's custody etc. as required.
- 2.08.07 Maintaining proper documentation of all the site activities undertaken by the Contractor as per the proforma mutually agreed with the Owner; submitting monthly progress reports as also any such document as and when desired by the Owner; taking approval of all statutory authorities e.g. Boiler Inspector, Factory Inspector, Inspector of Explosives etc. for respective portions of work under the jurisdiction of such statutes or laws.
- 2.08.08 The Contractor shall provide 'Industrial Relations' unit and 'Medical' unit to take care of his erection staff and the Owner shall have no obligation in the regard.
- 2.08.09 The successful Bidder shall arrange for Tower crane of adequate capacity for speedy erection activities.

2.09.00 **Site Organisation**

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

On award of contract, the Contractor shall submit to the Owner a site organisation chart indicating the various levels of experts to be deployed on the job. The Owner reserves the right to reject or approve the list of personnel proposed by the Contractor. The persons, whose bio-data have been approved by the Owner, will have to be posted at site and deviations in this regard will not generally be permitted.

The Contractor shall also submit to the Owner for approval a list of construction equipment, erection tools, tackle etc. prior to commencement of site activities. These tools & tackle shall not be removed from site without written permission of the Owner.

**2.10.00 General Guidelines for Field Activities**

- 2.10.01 The Contractor shall execute the works in a professional manner so as to achieve the target schedule without any sacrifice on quality and maintaining highest standards of safety and cleanliness.
- 2.10.02 The Contractor shall co-operate with the Owner and other Contractors working in site and arrange to perform his work in a manner so as to minimise interference with other Contractors' works. The Owner's engineer shall be notified promptly of any defect in other Contractor's works that could affect the Contractor's work. If rescheduling of Contractor's work is requested by the Owner's engineer in the interest of overall site activities, the same shall be complied with by the Contractor. In all cases of controversy, the decision of the Owner shall be final and binding on the Contractor without any commercial implication.
- 2.10.03 The Engineer shall hold weekly meetings of all the Contractors working at Site at a time and a place to be designated by the Engineer. The Contractor shall attend such meetings and take notes of discussions during the meeting and the decisions of the Engineer and shall strictly adhere to those decisions in performing his Work. In addition to the above weekly meeting, Engineer may call for other meetings either with individual contractors or with selected number of contractors and in such a case the Contractor, if called will also attend such meetings.
- 2.10.04 Time is the essence of the Contract and the Contractor shall be responsible for performance of his Work in accordance with the specified construction schedule. If at any time the Contractor is falling behind the schedule, he shall take necessary action to make good of such delays by increasing his work force or by working overtime or otherwise accelerate the progress of the work to comply with the schedule and shall communicate such action in writing to the Engineer, satisfying that his action will compensate for the delay. The Contractor shall not be allowed any extra compensation for such action.
- 2.10.05 The Engineer shall however not be responsible for provision of additional labour and or materials or supply or any other services to the Contractor except for the co-ordination work between various Contractors as set out earlier.
- 2.10.06 The works under execution shall be open to inspection & supervision by the Owner's engineer at all times. The Contractor shall give reasonable notice to the Owner before covering up or otherwise placing beyond the reach of inspection any work in order that same may be verified, if so desired by the Owner.
- 2.10.07 Every effort shall be made to maintain the highest quality of workmanship by stringent supervision and inspection at every stage of execution. Manufacturer's instruction manual and guidelines on sequence of erection and precautions shall be strictly followed. Should any error or ambiguity be discovered in such documents, the same shall be brought to the notice of the Owner's engineer. Manufacturer's interpretation in such cases shall be binding on the Contractor.

- 2.10.08 The Contractor shall comply with all the rules and regulations of the local authorities, all statutory laws including Minimum Wages, Workmen Compensation etc. All registration and statutory inspection fees, if any, in respect of the work executed by the Contractor shall be to his account.
- 2.10.09 All the works such as cleaning, checking, leveling, blue matching, aligning, assembling, temporary erection for alignment, opening, dismantling of certain equipments for checking and cleaning, surface preparation, edge preparation, fabrication of tubes and pipes as per general engineering practice at site, cutting grinding, straightening, chamfering, filling, chipping, drilling, reaming, scrapping, shaping, fitting-up bolting/welding, etc., as may be applicable in such erection and are necessary to complete the work satisfactorily, are to be treated as incidental and the same shall be carried out by the Contractor as part of the work.
- 2.10.10 In case of any class of work for which there is no such specification as laid down in the contract such as, blue matching, welding of stainless steel parts, etc., the work shall be carried out in accordance with the instructions and requirements of the Engineer.
- 2.10.11 It may sometimes be necessary to remove some of the erected structural members to facilitate erection of bigger/pre-assembled equipment. In such cases, the removal and re-erection of such members, which are essential, and if so agreed by the Engineer, will have to be done by the Contractor.
- 2.10.12 Attachment welding of necessary instrumentation tapping points, thermocouple pads, root valves, condensing vessels, flow nozzles and control valves etc., both for regular measurement and performance testing to be provided on equipment, its auxiliaries or pipelines covered within the scope of this tender, will also be the responsibility of the Contractor and the same will be done as per the instructions of Engineer. The erection and welding of all above items will be the Contractor's responsibility, even if :
- a) Product groups under which these items are re-leased are not covered in the scope of this tender.
  - b) Items are supplied by an agency other than the Contractor.
- 2.10.13 Preservation of all materials/equipment under custody of the Contractor during storage, pre-assembly & erection, commissioning etc., shall be the responsibility of the Contractor. All necessary preservatives and consumables like paints, etc., shall be arranged by the Contractor. Necessary touch up painting, periodic application of preservatives/paints on pressure parts/other equipment even after erection until completion of work shall be carried out by the Contractor. The Contractor shall fabricate piping, install lub oil systems and carry out the acid cleaning of fabricated piping. The Contractor shall also service the lub. oil system, carryout the hydraulic test of oil coolers, etc.
- 2.10.14 It is responsibility of the Contractor to do the alignment etc. if necessary, repeatedly to satisfy Engineer, with all the necessary tools & tackles, manpower, etc. The alignment will be complete only when jointly certified so, by the Contractor's Engineer & Owner. Also the Contractor should ensure that the alignment is not disturbed afterwards.

- 2.10.15 Additional platforms for approaching different equipment as per site requirement, which may not be indicated in drawings, shall be fabricated and erected by the Contractor. The materials required for these works shall be supplied by the Contractor and he will have to fabricate them to suit the requirement.
- 2.10.16 Equipment and material which are wrongly installed shall be removed and reinstalled to comply with the design requirement at the Contractor's expense, to the satisfaction of the Owner/ Consultant.
- 2.10.17 Before erection of any equipment on a foundation, the Contractor shall check and undertake if necessary rectification of foundation bolts, reaming of holes, drilling of dowels, matching of bolts and nuts, making new dowel pin, etc.
- 2.10.18 Assistance for calibrating/testing the power cylinders, valves, gauges, instruments, etc., and setting of actuators coming under various groups shall be provided by Contractor.
- 2.10.19 It shall be the responsibility of the Contractor to provide ladders on columns for initial works till such time stairways are completed. For this, the ladder should not be welded on the column and should be prefabricated clamping type. No temporary welding on any structural member is permitted except under special circumstances with the approval of Owner.
- 2.10.20 Structural materials required for the supporting/operating platforms required for the valves at various levels for the same operation of valves will be arranged by the Contractor.
- 2.10.21 For civil, structural and architectural works, volume IIG/1 & IIG/2 may be referred. For Instrumentation and Electrical works Vol. IIE and Vol. IIF/1 & F/2 may be referred.
- 2.11.00 **Safety**  
Safety and overall cleanliness of work site shall be given top priority.
- 2.11.01 The Contractor shall ensure the safety of all workmen, materials and equipment either belonging to him or to others working at site. He shall observe safety rules & codes applied by the Owner at site without exception.
- 2.11.02 The Contractor shall notify the Owner of his intention to bring to site any equipment or material which may create hazard. The Owner shall have the right to prescribe the conditions under which such equipment or material may be handled and the Contractor shall adhere to such instructions. The Owner may prohibit the use of any construction machinery, which according to him is unsafe. No claim for compensation due to such prohibition will be entertained by the Owner.
- 2.11.03 Storage of petroleum products & explosives for construction work shall be as per rules and regulation laid down in Petroleum Act, Explosive Act and Petroleum and Carbide of Calcium Manual. Approvals as necessary from Chief Inspector of Explosives or other statutory authorities shall be the responsibility of the Contractor.

- 2.11.04 The Contractor shall be responsible for safe storage of his and his sub-contractor's radioactive sources.
- 2.11.05 All requisite tests & inspection of handling equipment, lifting tools & tackle shall be periodically done by the Contractor. Defective equipment shall be removed from service. Any equipment shall not be loaded in excess of its recommended safe working load.
- 2.11.06 All combustible waste and rubbish shall be collected and removed from the worksite at least once each day. Use of undercoated canvas paper, corrugated paper, fabricated carton, plastic or other flammable materials shall be restricted to the minimum and promptly removed.
- 2.11.07 The Contractor shall provide adequate number of fire protection equipment of the required types for his stores, office, temporary structures, labour colony etc. Personnel trained for fire-fighting shall be made available by the Contractor at site during the entire period of the Contract.
- 2.11.08 All electrical appliances used in the work shall be in good working condition and shall be properly earthed. No maintenance work shall be carried out on live equipment. The Contractor shall maintain adequate number of qualified electricians to maintain his temporary electrical installation.
- 2.11.09 All workmen of the Contractor working in construction site shall wear safety helmets, safety boots and safety belts. The Contractor shall take appropriate insurance cover against accidents for his workmen as well as third party.
- 2.11.10 All the worksites shall be provided with adequate lighting facilities e.g. flood lighting, hand lamps, area lighting etc. by the Contractor for proper working environment during night times.
- 2.11.11 All safety precautions shall be taken for welding and cutting operations as per IS-818.
- 2.11.12 All safety precautions shall be taken for foundation and other excavation marks as per IS-3764.
- 2.12.00 **Taking Delivery & Storage**
- 2.12.01 The Contractor shall arrange issue of all equipment and materials to be erected under the contract from the stores/open yard at site by signing on standard indent forms. After completion of work, detailed auditing of the materials so issued shall be submitted to the Owner.
- 2.12.02 The Contractor shall arrange for proper and safe storage of materials till the same are taken over by the Owner as per terms of the contract. Manufacturer's instructions for preservation shall be strictly followed.
- 2.12.03 All empty containers, packing materials, gunny bags, transport frames and also surplus and unused materials reconciliation prior to completion of contract shall be the property of the Owner and returned to the Owner by the Contractor.

**2.13.00 Site Welding & Heat Treatment**

- 2.13.01 Welding shall be done in accordance with IS-813, IS-816, IS-9595 & other relevant IS/International standards and as per instructions of Contractor. Only those welders, who are qualified as per IS-817 for ordinary welds and as per IBR/ASME Section-IX for high pressure welds, shall be employed in the job.
- 2.13.02 All welders shall be tested and approved by Engineer before they are actually engaged on the work even though they may possess the requisite certificates. The Owner reserves the right to reject any welder without assigning any reason. The welder identification code as approved by the Engineer shall be stamped by the welder on each joint done by them. The Contractor will be responsible for the periodic renewal, re-testing of the welders as demanded by Owner.
- 2.13.03 The Engineer is entitled to stop Contractor's any welder from his work if his work is unsatisfactory for any technical reason or there is a high percentage of the rejection of joints welded by him, which in the opinion of Engineer will adversely affect the quality of welding even though the welder has earlier passed the tests. The welders having passed the tests do not relieve the Contractor from his contractual obligations, to check the performance of the welders.
- 2.13.04 All charges for testing of welders including destructive and non-destructive tests if conducted by Owner or by the inspection authority at site shall have to be borne by the Contractor. The necessary test materials and consumables will have to be arranged by the Contractor and all testing facility made available, as required.
- 2.13.05 All welded joints shall be subject to acceptance by Engineer. Inspection of welds shall be in accordance with IS-822 or equivalent code.
- 2.13.06 Preheating/post heating and stress relieving after welding are part of fabrication and erection work and shall be performed by the Contractor in accordance with the instruction of Engineer. Contractor shall arrange to supply heating equipment with automatic recording devices. Also the Contractor shall have to arrange for the labour, heating elements, thermocouples, compensating cables, insulation materials like mineral wools, asbestos cloth, ceramic beads, asbestos rope, etc. required for the heat-treatment and stress relieving works. During pre- heat/stress relieving operations, the temperature shall be measured at one or more points as required by attaching thermocouples and recorded on a continuous printing type recorder. All the record graphs for the heat treatment works carried out shall be got signed by the Engineer prior to the commencement of each cycle and handed over to Engineer on completion. The graphs will be the property of Owner. The Contractor has to provide thermo-chalks temperature recorders, thermocouple attachments, units, graph sheets, etc. required for the job and maintain them in good condition.
- 2.13.07 All electrodes shall be baked and dried in the electric/electrode drying oven to the required temperature and for the period specified by the Engineer before they are used in erection work. The electrodes used shall be as per IS-814, IS-815, IS-1442, IS-7280 and other codes as applicable, and shall be of

approved reputed manufacture. The electrodes shall meet the requirement of the pipe material. No electrode manufactured more than 12 months ago and the type covered under certificate issued after conducting tests more than 6 months ago shall be used. All electrodes shall be preserved at works and at site as per manufacturer's recommendations.

- 2.13.08 Oxy-acetylene flame or Exothermic chemical heating for stress relieving is not permitted. Heating shall be by means, of electric induction coil or electric resistance coil.
- 2.13.09 It may become necessary to adopt inter layer radiography/MPT/UT depending upon the site/technical requirement necessitating interruptions in continuation of the work and making necessary arrangement for carrying out the above work.
- 2.13.10 Gas tungsten arc welding process (TIG) shall be adopted for all root pass welds except for structural works until 4.75 mm thickness is deposited. Subsequent welding after root pass can be carried out by manual metal arc welding with coated electrodes. For pipes of thickness less than 6 mm the entire welding has to be carried out by TIG welding.
- Fillet weld shall be made by shielded metal arc process as per applicable codes.
- However, the Engineer will have the option of changing the method of welding as per site requirement. The method adopted for manual arc welding shall be weaving technique and the width of weaving shall not exceed 1.5 times of the dia. of the electrode.
- In case of deviation from welding process and electrodes, the Contractor shall take approval of the Owner prior to adoption of same.
- 2.13.11 The root pass for butt joints shall be such as to achieve full penetration with complete fusion of root edges.
- 2.13.12 Each pass shall be cleared and freed of slag before the next pass is deposited.
- 2.13.13 On completion of each run, craters, weld irregularities, slag etc. shall be removed by grinding or chipping.
- 2.13.14 Each layer of welding shall have an even and smooth appearance.
- 2.13.15 Welding sequence shall be adjusted in such a way that distortion due to welding shrinkage is minimised. Further any movement, shock or vibration during welding shall be avoided to prevent weld cracks.
- 2.13.16 Proper protection of welders and the work shall be taken during periods of rain. No welding shall be carried out when surfaced to be welded are wet from any cause.

- 2.13.17 Following will be stages of inspection during welding :
- a) Two pieces to be joined shall be individually checked for the weld edge preparation and profile dimensionally and to the template. Dye penetrant check shall be carried out on edge prepared surfaces at random. The percentage will depend upon on criticality as specified by Engineer.
  - b) Joint fit up will be a stage of inspection. Misalignment after fit up may vary from 0.3 mm to 1.6 mm depending on outside diameter and thickness.
  - c) All joints shall be offered for visual inspection after root run. Subsequent welding should be made only after the approval of root run.
- 2.13.18 All welded joints shall be painted with anti-corrosive paint immediately on completion of radiography and stress-relieving.
- 2.14.00 For further details on procedures of work at site on civil, architectural, electrical and instrumentation & control services, refer Volume : II-E, II-F & II-G of this specification.



**TECHNICAL SPECIFICATION  
1 X 800 MW GSECL WANAKBORI TPS  
COMPRESSED AIR SYSTEM**

**SPECIFICATION No: PE-TS-408-555-A001**

**VOLUME: II B**

**SECTION : C-2C**

**REV. 00**

**DATE: 14.08.2015**

**SECTION: C-2C  
PERFROMANCE GUARANTEE TESTS**

## CONTENT

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**VOLUME : II-A**

**SECTION-X**

**PERFORMANCE GUARANTEES AND TESTS**

**1.00.00 PERFORMANCE GUARANTEES, PERFORMANCE/ACCEPTANCE TESTS & LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE**

1.01.00 The Bidder shall guarantee that the equipment offered shall meet the ratings and performance requirements stipulated for various equipment covered in this specification. The guarantees are categorised as:

- a) Those which attract liquidated damages, as listed below (Category-"A"). The Bidder shall furnish signed declarations in the manner prescribed in the bid proposal schedules for these guarantees.
- b) Those which do not attract liquidated damages, as listed below (Category-"B"). This guarantee list indicated in this section is not exhaustive and the Owner reserves the right to call upon the Bidder to demonstrate any parameter, operation, etc. of any equipment as specified and as required to meet the duty conditions.

1.02.00 The guaranteed parameters shall be without any tolerance values. The Bidder shall demonstrate all the guarantees covered in various volumes and sections of this specification during Performance/Acceptance test. In case during tests it is found that the equipment/system has failed to meet the guarantees, the Contractor shall carry out all necessary modification to make the equipment/system comply with guaranteed requirements. However, if the Contractor is not able to demonstrate the guarantees, even after the modifications within ninety (90) days of notification by the Owner, the Owner will at his discretion :

- i. reject the equipment and recover the payment already made or accept the equipment only after levying liquidated damages as identified in this section for those guarantees which are covered under category "A".

**OR**

- ii. reject the equipment and recover the payment already made or accept the equipment only after assessing and deducting from the contract price an amount equivalent to the deficiency of the equipment/system as assessed by the Owner, for those guarantees which are covered under Category-B.

1.03.00 All guaranteed parameters shall necessarily be quoted by the Bidder based on the established proven results obtained from similar units in successful operation. Evidence for this shall necessarily include the test codes used, acceptance test results, accuracies of various instruments used for the performance test, details of tolerances, if allowed, etc. While quoting the guaranteed parameters, the Bidder shall keep in view the requirements specified in the specification especially regarding the reliability, operability and maintainability of the equipment proposed. The Owner reserves the right to evaluate the parameters quoted by the Bidder based on his experience and published material available.

- 1.04.00 The liquidated damages shall be calculated prorata for the fractional parts of the unit unless stated otherwise.
- 1.05.00 The turbine generator, boiler, auxiliaries, and all other plant equipment and system shall perform continuously without the noise level (individual or collectively) exceeding the values specified in respective equipment specification over the entire range of output and operating frequencies.
- 1.06.00 **Performance/Acceptance Tests**
- 1.06.01 The performance/acceptance tests for various equipment and systems shall be carried out as specified under the respective equipment specifications and those specified below shall be specifically applicable. All the guarantees shall be tested together as far as practicable.
- 1.06.02 In case of systems with stand-by equipment the liquidated damages for non-performance will be levied for normal operating number of equipment only. However, for this purpose all the equipment including standby equipment shall be tested and average values arrived at.
- 1.06.03 For instrument inaccuracies during PG Test, refer subsequent clauses of this section.
- 1.06.04 For Total Auxiliary Power Consumption, the transformers listed under the respective clauses, shall be taken together for purposes of guarantee and not individually.
- 2.00.00 **START-UP, INITIAL OPERATION, RELIABILITY RUN AND PERFORMANCE TESTS**
- 2.01.00 The Contractor shall provide commissioning & start-up supervisory engineering staff specially identified for the period commencing with start-up and extending from initial operation to all performance tests. During this period, the Contractor shall furnish the calibration devices, special test instruments, etc. required to prepare for and conduct the performance tests. The Owner will associate his operating personnel and necessary supporting staff and shall make available the main fuel; i.e. coal and the system electrical load.
- Contractor's commissioning, & start-up supervisory engineering personnel shall conduct training for the Owner's personnel prior to and during this period and shall train them so that they will be able to operate and maintain the new equipment satisfactorily after acceptance by the Owner.
- 2.02.00 The following field inspections and tests shall be carried out in the sequence detailed below, and the successful performance and completion of all the tests taken together shall constitute the Owner acceptance tests. The Contractor shall provide supervisory services during field inspection and tests.

2.02.01 Inspection and Checking of the Units

After completion of erection and/or installation, and before being put into operation, the unit and all its appurtenances shall be thoroughly cleaned and then inspected, for correctness and completeness of installation and acceptability for placing in operation. All piping system shall be flushed, chemically cleaned, steam blown, air blown as required and cleanliness demonstrated using acceptable industry standards. Procedures to accomplish this work shall be subject to Owner's approval.

The check outs during the pre-commissioning period should be programmed to follow the construction completion schedule. Each system, as it is completed by construction and turned over to the commissioning (start-up) engineer(s), should be checked out and cleaned. The checking and inspection of individual systems should then follow a prescribed schedule.

On completion of inspection, checking and after the pre-commissioning tests are satisfactorily over, the complete equipment shall be placed on Initial Operation during which period the complete equipment shall be operated integral with sub-systems and supporting equipment as a complete plant.

When the equipment is operating properly, its characteristics shall be recorded on the start-up report sheets. Copies of typical start-up report shall be given to the Owner. Start-up reports for all equipment shall be completed before the start of the Reliability Run.

2.02.02 Initial Operation, Reliability Run

The plant shall be on Reliability Run during which period all necessary adjustments shall be made while operating over the full load range enabling the plant to be made ready for performance and guarantee tests.

The duration of Reliability Run of the complete plant & equipment in the automatic mode of control shall be fourteen (14) days out of which atleast seventy two (72) hours shall be in continuous operation on full load or any other duration as may be agreed to between the Owner and the Contractor. The Reliability Run shall be considered successful, provided such item of the equipment can be operated, continuously at the specified operating characteristics for the period of Reliability Run.

For the period of Reliability Run, the time of operation with minimum 85% load shall be counted, minor interruptions not exceeding one(1) to Two(2) hours at a time caused during the continuous operation shall not affect the total duration of Reliability Run. Maximum number of such interruption during the reliability run shall be four(4). However, if in the opinion of the Owner, the interruption is long, the Reliability Run shall be prolonged for the period equivalent to the duration of interruption.

A Reliability Run report comprising observations and recordings of various parameters to be measured, in respect of the above run shall be prepared by the Contractor. This report besides recording the details of the various observations during operation shall also include the dates of start and finish of the Reliability Run and shall be signed by the representatives of both the parties. The report shall have sheets, recording and print out of all the details of

interruption occurred, adjustments made, any minor repairs done during the Reliability Run. Based on the observations, necessary modifications/repairs to the plant shall be carried out to the full satisfaction of the Owner to enable the later to accord permission to carry out Performance and Guarantee Tests on the plant. However, minor defects which do not endanger the safe operation of the equipment shall not be considered as reasons for with holding the aforesaid permission.

Should any major failure or interruption occur in any portion of the plant due to or arising from faulty design, materials, workmanship or omissions or incorrect erection, sufficient to prevent safe and full commercial use of the plant, the reliability run shall be considered void and the reliability test period of 14 days shall recommence after the Contractor has remedied the cause of defect.

### 2.02.03 Performance and Guarantee Test

- a) The final tests as to the performance and guarantees shall be conducted at site, after the reliability run, by the Contractor with full involvement of the Owner. The necessary operating inputs shall be provided by the Owner. The Contractor's engineering staff for commissioning and start-up shall ensure that the equipment are ready for such tests. The Owner shall associate his necessary supporting staff with the Contractor to carry out the various activities related to PG tests. The necessary labour/supporting staff etc. shall be provided by the Contractor. Such tests will be conducted within a period of two (2) months after the successful completion of Reliability Run. Any extension of time beyond the above two (2) months shall be mutually agreed upon.
- b) These tests shall be binding on both the parties of the Contract to determine compliance of the equipment with the performance guarantees.

The Contractor shall submit the test procedure for Owner's approval within twelve (12) months from the date of letter of award of the contract. The test shall be carried out by the test grade instruments as stipulated in the applicable test code. These instruments shall be calibrated by the Contractor in a laboratory duly approved by Owner. Batch calibration will not be acceptable. The available instrumentation and control equipment in the plant if found suitable could also be used with the prior approval of the Owner after calibrations in the plant/outside laboratory. The tests will be conducted at the specified load points, and as near the specified cycle conditions as practicable. Proper corrections in calculations to take into account the conditions which do not correspond to the specified conditions will be applied in the test report as brought out under the respective sections of the specification.

The contractor shall submit for Purchaser's approval the detailed Performance Test procedure containing the following :

- i. Object of the test
- ii. Scope
- iii. Various guaranteed parameters & tests as per contract

- iv. Method of conductance of test and test code
  - v. Duration of test, frequency of readings & number of test runs.
  - vi. Method of calculation
  - vii. Correction curves
  - viii. Instrument list consisting of range, accuracy, least count and location of instruments.
  - ix. Scheme showing measurement points
  - x. Sample calculation
  - xi. Acceptance criteria
  - xii. Any other information required for conducting the test.
- c) All special test grade instruments, including flow nozzles etc., equipment, tools and tackles, required for the successful completion of the Performance and Guarantee Tests shall be brought for the purpose of test, free of cost by the Contractor.
- d) The guaranteed performance figures of the equipment shall be proved by the Contractor during these Performance and Guarantee Tests. The Contractor shall submit a detailed test report in the manner, already agreed to within one (1) month time of completion of the test, for Owner's approval. Should the Owner's assessment of these tests show any deterioration from the guaranteed values the Contractor/Owner shall modify the equipment as required to enable it to meet the guarantees. In such case Performance and Guarantee Tests shall be repeated after one (1) month, from the date the equipment is ready for retest and all costs for modifications including labour, materials and the cost of additional testing to prove that the equipment meets the guarantees, shall be borne by the Contractor.
- e) The specific tests to be conducted on equipment have been brought out in the technical specifications. The procedure to be submitted by the Contractor should include the detailed methodology to conduct these tests/verify the guarantees offered by the Contractor notwithstanding whether these attract liquidated damages or not.
- f) The test results shall be considered as calculated from test observations with only corrections as are provided in the code ASME PTC-6.
- The guaranteed parameters shall be without any tolerance or allowance values. Uncertainty analysis shall not be used to adjust test results.
- g) The Bidder shall establish the following modes of operation to the satisfaction of the Owner before acceptance test :
- i. Operation of each system by remote manual control.
  - ii. Operation of the entire system in integrated manner on auto control.

- iii. Operation of the entire plant with auto-control loops fully implemented including different modes of load control with the help of control system.
- h) Ten (10) copies of the test reports are to be furnished by the Contractor to the Owner backed up with jointly signed data sheets.

Wherever it is not practicable to conduct the performance guarantee test at site, and an accurate test to prove the guaranteed parameter has already been conducted in the shop test, such a test may not be repeated, if so agreed by the Owner. However, in such cases, should there be any short fall in the performance during shop tests, the liquidated damages will be calculated on that basis.

3.00.00

**SCHEDULE OF GUARANTEES WHICH ATTRACT LIQUIDATED DAMAGES [CATEGORY-A]**

Sl. No.	Plant/ System	Parameter for Performance Guarantee	Liquidated Damages
3.01.00	<b>Plant</b>		
3.01.01	Guaranteed Output	800 MW Continuous output at 100% TMCR, at Generator terminals (excluding excitation power), at 0.85 power factor lagging and at rated hydrogen pressure and 39°C cooling water temperature for Generator, under rated steam conditions at Turbine Inlet (250 ± 3 kg/cm <sup>2</sup> , 566 ± 3°C, 593°C) and CW temperature of 33°C for condenser and with zero percent make-up.	As per Volume-I.
3.01.02	Guaranteed Overall Heat Rate	Overall Heat rate in Kcal/Kwh at 100% & 80% TMCR under rated steam conditions at turbine inlet & design condenser vacuum and cooling water temperature of 33 deg C with zero make up. (Refer Note-1 for estimation of overall Heat Rate)	As per Volume-I.
3.01.03	Guaranteed Total Auxiliary Power Consumption	Total Auxiliary power consumption (kW) of the plant on the basis of measured output at Generator terminals minus sent out power measured downstream of Generator Transformer and station transformer at 100% TMCR with rated steam conditions and design condenser vacuum with zero make-up and with 34°C ambient air temperature and 65% RH ( <b>Refer Note 2, 3 &amp; 4 for the basis of computation of Auxiliary power</b> )	As per Volume-I.

Sl. No.	Plant/ System	Parameter for Performance Guarantee	Liquidated Damages
3.02.00	<b>System</b>		
3.02.01	Guaranteed DM Water Consumption	Continuous consumption of DM water in m <sup>3</sup> /hr.	As per Volume-I.

**Note :**

1. For items 3.01.02, Overall Heat Rate shall be estimated as follows :

$$a) \quad \text{Overall Heat Rate} = \frac{\text{Turbine Cycle Heat Rate}}{\text{Boiler Efficiency}}$$

For estimation of turbine cycle heat rate, refer Cl. No. 4.01.00 in Vol-IIC-Sec.01.

$$b) \quad \text{Guaranteed Overall Heat rate} = \frac{\text{HR at 80\% TMCR x 1955 hrs} + \text{HR at 100\% TMCR x 6320 hrs}}{(1955 + 6320)}$$

2. For computation of Auxiliary Power, output measured at Generator terminals minus sent out power measured downstream of Generator Transformer, applicable Losses (No load loss + Load loss+ auxiliary loss for coolers) for Station Transformers, Unit Transformers and Bus duct losses shall be considered.
3. For intermittent running auxiliaries i.e., AC & Ventilation system, and outdoor area illumination, a duty factor of 0.5 shall be considered.
4. For computation of auxiliary power consumption of Ash Handling Plant, Bidder to follow the methodology as below :
- Duty factor for Lean Slurry Bottom Ash System shall be considered as 0.3.
  - Duty factor for Dry Fly Ash System shall be considered as 0.6.
  - Duty factor for HCSD & Ash Water Recovery System shall be considered as 1.0.
5. For auxiliary power consumption of coal handling plant following shall be considered :
- Total power consumption of all conveyor drives and other equipments shall be at the guaranteed design capacity of 1400 MTPH with flow path from Wagon Tippler to Boiler Bunker.
  - Single Stream Operation.
  - Duty Factor = 0.5.

6. Power consumption for Fire Pumps, Sump Pumps and Fuel oil transfer system drives, Elevators, EOT Cranes shall not be considered in the Auxiliary Power consumption estimate.
7. Heat Rate of TG Cycle : Maximum 1850 Kcal/Kwh with Steam Turbine driven BFP.
8. Steam Generator Efficiency : More than 87%
9. Auxiliary Power Consumption shall be limited to 6% with Steam Turbine driven BFP.
10. Bidder has to furnish the expected availability of plant & plant reliability.

**4.00.00 SCHEDULE OF GUARANTEES WHICH DO NOT ATTRACT LIQUIDATED DAMAGES FOR VARIOUS EQUIPMENT WHICH INCLUDE BUT ARE NOT LIMITED TO THE FOLLOWING [CATEGORY-B]:**

**4.01.00 Steam Generator**

4.01.01 Capacity in T/hr of steam at rated steam parameters at superheater outlet (with any combination of mills working as per Owner's discretion) and the coal being fired within range specified, corresponding to 100% BMCR at 1% make up, 33 deg.C CW temperature and auxiliary steam consumption.

Bidder shall consider necessary provision for demonstration of steam generation at 100% BMCR condition.

4.01.02 Efficiency in percentage at 100% & 80% TMCR and 34 deg. C ambient air temperature and 65% RH with zero make-up, design condenser vacuum while firing the design coal at rated steam parameters at Superheater and Reheater outlet and rated excess air and with any combination of mills working as per Owner's discretion.

4.01.03 Air heater air-in-leakage after 3000 hrs. of operation from taking over date. To be demonstrated.

4.01.04 NOx emission.

NOx emission from the unit – shall not be more than 365 ppm or 750 mg/Nm<sup>3</sup> (equivalent NO<sub>2</sub>) at the ESP outlet at 6% excess oxygen.

4.01.05 Mill capacity at rated fineness.

4.01.06 Gas tightness efficiency of Guillotine dampers.

4.01.07 Bidder to demonstrate the steam parameters at 30% load without HFO/LDO support (only coal firing). No fuel oil support shall be required at 30% of BMCR and above.

4.01.08 Performance characteristics of pumps, fans, etc. viz; capacity, head developed etc.

- 4.01.09 Capabilities of all drives.
- 4.01.10 Margins on fans. Through operation of single fan at a time.
- 4.01.11 Equal load sharing of pumps/fans while running in parallel shall be demonstrated.
- 4.01.12 Run back capabilities.
- 4.01.13 Ramp/sudden load change withstand capability. Sudden load throw off typically 25%, 50%, 75% and 100% shall be demonstrated.
- 4.01.14 Life of mill wear parts
- 4.01.15 Steam Temperature Imbalance
- The Bidder shall guarantee and demonstrate that at SH and RH outlets (in case of more than one outlet) the temperature imbalance between the outlets does not exceed 10 Deg.C.
- 4.01.16 SH/RH Attemperation System
- The Bidder shall guarantee and demonstrate that the spray water flow to SH attemperation system does not exceed the value considered for design (to be indicated in the bid) while maintaining the rated SH outlet steam temperature at BMCR. The Bidder shall also guarantee and demonstrate that the RH temperature is maintained at the rated value without any spray water requirement, for the secondary attemperation system, at all loads for which the specified RH steam temperature is required to be maintained at the rated value.
- 4.02.00 **Electrostatic Precipitator**
- 4.02.01 Pressure drop across the electrostatic precipitator.
- 4.02.02 Collection efficiency and outlet dust concentration shall be as per cl. no. 3.01.00 of Section-II in Volume-II-B.
- 4.03.00 **Turbine Generator**
- 4.03.01 Turbine Generator-Set Capability
- The steam turbine generator unit shall be capable of delivering continuously at generator terminals the output as indicated by the Bidder in the following heat balances detailed out elsewhere with equipment specification submitted alongwith the bid.
- a) Output corresponding to top HP heaters out of operation (for 1x100% HP heater configuration).
  - b) Output corresponding to one string of HP heater out of operation (for 2x50% HP heaters configuration).
  - c) Output corresponding to all HP heaters out of operation.

- d) Output corresponding to VWO rating, at rated steam conditions with condenser CW temperature 33°C & design condenser vacuum with zero make-up.
- e) Output corresponding to overpressure operation of the boiler-turbine-generator set, at rated main steam and hot reheat steam temperature with condenser CW temperature corresponding to design Condenser vacuum with zero make-up.

4.03.02 Operating Frequency Range

As per the stipulations of Cl. No. 7.06.00 Vol. II-C, Section-I.

4.03.03 Constant Pressure and Sliding Pressure Operation

The constant pressure operation and sliding pressure operation from 30% turbine MCR to VWO condition of the unit in conjunction with the steam generator, HP-LP bypass system and instrumentation & control system shall be demonstrated.

In sliding pressure mode of operation, during quick load increase the idle control valve (s) must respond rapidly to pick up 20% of operating load, so that immediate increase of boiler pressure is not required. The load response capability shall be demonstrated in steps of 5 %.

Change-over from constant pressure mode to sliding pressure mode and vice-versa shall also be demonstrated.

4.03.04 Start-up, Loading, Unloading and Shutdown Capabilities

Start-up, loading, unloading and shutdown characteristics and startup time and loading capabilities for the steam turbine generator and steam generator both operating as a unit for cold start conditions (greater than 36 hours shutdown), warm start conditions (between 8 and 36 hours shutdown) and hot start conditions (less than 8 hours shutdown) under constant pressure and variable pressure mode and suitability for cyclic operation as indicated by the Bidder in the offer and accepted by the Owner shall be demonstrated ensuring the parameters of vibration, differential expansion, etc.

4.03.05 Vacuum Pulling time

Vacuum pulling time from condenser at atmospheric pressure to rated vacuum compatible to start Steam Turbine

4.03.06 Sudden Total Loss of External Load

On occasions, the steam turbine generator system may experience sudden total loss of all external load. Under these conditions, the steam turbine generator unit shall not trip on overspeed but shall continue in operation under the control of its speed governor to supply power for the plant auxiliary load station transformers, while staying within the prescribed permissible limits of steam metal temperature mismatch, exhaust hood temperature, absolute and differential expansion, vibration and eccentricity acceptable to the Owner.

- 4.03.07 Capacity with Reduced Hydrogen Pressure
- Generator shall be capable of operating at reduced capacity at reduced generator hydrogen pressure in accordance with values furnished by the Bidder in his proposal and accepted by the Owner.
- 4.03.08 HP/LP Bypass Capabilities
- i. HP/LP bypass capacity and capabilities under various modes of operation shall be demonstrated.
  - ii. Condenser performance with HPLP Bypass operating at rated conditions.
- 4.03.09 Lube Oil Purification System - Capacity and Purity
- Lube oil purification system capacity and the purity of purified oil at the outlet of the centrifuge and the outlet of the polishing filter, shall be demonstrated. If purity check is not possible at site, this shall be carried out at Vendor's works.
- 4.03.10 Extraction and CRH NRVs
- Operation of the valves under turbine trip and high water level in the heaters, shall be demonstrated.
- 4.03.11 The performance of the condenser, i.e., the back pressure achieved at design CW flow and inlet temp. and cleanliness factors, VWO heat load shall be demonstrated.
- 4.03.12 Temp. of condensate at outlet of condenser shall not be less than saturation temp. corresponding to the condenser pressure at all loads.
- 4.03.13 Oxygen content in condensate at hot-well outlet shall not exceed 0.015 cc/litre over the entire load range and shall be determined according to an internationally approved codes/standard.
- 4.03.14 When one half of the condenser is isolated, condenser capability shall be demonstrated to take at least 60% T.G. load under TMCR conditions.
- 4.04.00 **Deaerator**
- 4.04.01 The dissolved oxygen content in feed-water measured at deaerator outlet shall not exceed 0.005 cc/litre at all loads from no load to VWO condition with 1% cycle make-up with normal pressure and overpressure with incoming condensate presumed to be saturated with oxygen (without any chemical dosing).
- 4.04.02 Free carbon dioxide in deaerator effluent shall be non-traceable at all loads from zero to VWO with 1% cycle make-up with normal pressure according to ASTM standards.

- 4.05.00      **Power Cycle Pumps**
- Performance of each pump (flow, head, vibration, noise, parallel operation) to be demonstrated.
- 4.06.00      **Automatic On Line Turbine Testing (ATT) System**
- Demonstrated without disturbing normal operation.
- 4.07.00      **Coal Handling Plant**
- Refer Cl. No. 11.00.00 in Volume-II-K/1.
- 4.08.00      **Condensate Polishing Unit**
- Bidder shall ensure that condensate temperature for CPU shall not go beyond 50°C during normal steady state operation.
- 4.09.00      **DM Plant**
- Performance Gurantee of DM plant shall be in accordance with Cl. No. 8.04.00 in Section-1, Volume-II-K/3.
- 4.10.00      **Instrumentation and Control**
- The Bidder shall demonstrate that the Instrumentation and Control system meets all the functional/performance requirements, specified in technical specifications.
- 4.11.00      **Noise Level**
- The Bidder shall demonstrate Noise Level of various plants/equipments/ systems as per Clause no. 17.02.00 in Section-IV of Volume-II-A.
- 5.00.00      **PERFORMANCE/ACCEPTANCE TESTS PROCEDURES**
- 5.01.00      **Steam Generator**
- The performance tests shall be conducted in accordance with the latest version of ANSI PTC 4.0 except for the specific requirements brought out herein below. This test may be done simultaneously or immediately after P-G test of Turbine Generator set. During this test, Boiler unit shall be fully on automatic control under steady load condition.
- 5.01.01      The efficiency tests shall be carried out with the steam generator operating at the guaranteed point condition i.e. corresponding to 100%, 80% Turbine rated loads, or at the agreed loads as near these as possible, with the boiler operating at the rated excess air, rated SH/RH attemperation flows, flue gas temperature, coal fineness, etc. corresponding to the loads on boiler. At control load, the stable and efficient operation of the unit with the rated excess air, rated mill outlet coal fineness, while achieving the rated S/H, R/H steam parameters shall be demonstrated by the Contractor to the satisfaction of the Owner.

- 5.01.02 For finding out the performance values, two sets of consistent reading shall be taken and the average of the above values shall be considered for the guarantee purpose.
- 5.01.03 Corrections shall be applied to the tested efficiency, to correct it to the design conditions, for variations in the following parameters only :
- a) Feed water temperature at economiser inlet.
  - b) Ambient air temperature
  - c) Relative humidity of ambient air.
  - d) Hydrogen in coal.
  - e) Moisture in coal.
  - f) Gross calorific value of coal.
- The Bidder shall furnish correction curves, for Owner's approval, covering the expected ranges of variations for all these parameters for the range of coals specified.
- 5.01.04 In all other aspects, not spelt out above, or in specifications, where ANSI code stipulates agreement between the parties concerned before the test, Bidder shall get these approved by the Owner.
- 5.01.05 No negative tolerance on account of instrument in-accuracies or otherwise shall be allowed on the guaranteed values.
- 5.01.06 Performance tests shall also be conducted to prove the steam generating capacity of the steam generator at rated parameters at stipulated loads.
- 5.01.07 Necessary write ups, schemes, instrument schedules, detailed procedures clearly indicating periods of tests, frequency of observations, etc. shall be prepared and submitted for all the tests for Owner's review and shall be got specifically approved from the Owner within one year of L.O.A. issue.
- 5.02.00 **Mill Performance Warranty**
- 5.02.01 Performance testing shall be done on the mill towards establishing its capacity specified at the specified fineness applying corrections for the variations in coal characteristics i.e. HGI, moisture, etc.
- 5.02.02 The Bidder shall guarantee a capacity output not less than the offered value, at each mill outlet, with coal fineness of not less than 70% through 200 mesh and not less than 98% through 50 mesh screen, when grinding coal having specified grindability index, total moisture content including surface moisture, etc. Bidder shall guarantee that the above capacity will be maintained and demonstrated with the originally installed grinding elements in nearly wornout condition as mutually agreed for the purpose of ascertaining wear life of any of the wear parts or when pulveriser grinding elements have successfully completed the specified guaranteed hours of operation as mentioned by the

Bidder, whichever is earlier. During the above mentioned operating period of the mill, manufacturer's operation instructions will be followed and mill will be operated with the specified range of coal without any such readjustment that requires a shutdown of the mill or reduction of the load and/or any replacement of any mill wear parts.

For the purpose of testing to demonstrate the capacity, if grindability and surface moisture vary from those given above, the pulveriser measured capacity shall be corrected using the capacity correction curves furnished by the Bidder alongwith the offer. HGI vs grindability factor curve shall be furnished for HGI variations upto a value above which the capacity remains constant.

Capacity guarantee shall be conducted on all the mills. However, should the results of test as conducted above indicate that deficiency in capacity guarantee is observed in case of one or two mills only and that Owner is further, convinced that such deficiency does not occur out of reasons attributable to mill manufacture and supplier, Owner may waive off the requirement of demonstration of capacity guarantee for such mills only.

5.02.03 Mill Wear part life guarantee

The Bidder shall guarantee the wear life of all wear parts of the mill when grinding the specified range of coals. For this purpose the wear parts shall be defined as those parts of the mill which are in contact with coal or coal dust and are likely to wear out during the operation of the mill (except for the grinding media balls). The guarantee shall be demonstrated on each mill after establishing successful operation of the mill continuously for a period of not less than 24 hours at or near its guaranteed rated capacity. The establishment of the guarantee will be based on actual total hours of operation of the mill regardless of the specified range of coal or fuel loading. The mill wear parts shall be considered to have passed their guaranteed operating life when they have demonstrated their capability to meet the full load rated capacity of the mill at the rated power consumption at the end of the guarantee trial period. In case any of the wear parts has worn out to such an extent that either the normal and safe operation of the mill is jeopardised if it is not replaced/repared or its continued use may lead to exposure or wear of other parts which are not meant for the purpose, that part shall be deemed to have completed its life for the purposes of checking the short fall in wear life even if there is no reduction in mill rated capacity and rated power consumption shall be as quoted by the Bidder when grinding the coal having parameters specified in Vol-II-A, Section-IX and achieving the grind fineness of not less than 70% through 200 mesh and 98% through 50 mesh.

5.03.00 **Electrostatic Precipitator**

5.03.01 The performance test on electrostatic precipitator will commence after completion of reliability run along with the testing of Boiler and Turbine. During the interval between the commencement of trial operation and the commencement of performance test only routine maintenance shall be carried out. No physical or chemical cleaning of ESP shall be permitted during this period or immediately before the conductance of the performing tests.

- 5.03.02 The test efficiency shall be based on the overall performance of the electrostatic precipitator over a mutually agreed period of operation under the conditions given in this specification and following the normal operation of the unit including rapping and normal soot blowing and/or warm up guns. Outlet dust concentration of ESP shall be as specified in relevant section under Steam Generator subject to applicable modification adopted by Environmental Department, Government of India, at the time of project execution.
- 5.03.03 The performance tests shall be carried out in accordance with Method-17 of EPA (Environmental Protection Agency of USA) code. The details of the tests shall, however be mutually agreed upon between the OWNER and the CONTRACTOR.
- 5.03.04 All calibration procedures and standards shall be subjected to the approval of the Owner. The protecting tubes, pressure connections and other test connections required for conducting guarantee test and maintenance testing shall conform to the relevant codes. The Bidder shall fully elaborate, in his proposal, the provisions made to this effect. Method of measurement for all air leakage test and power consumption test proposed by the Bidder shall be clearly indicated in his offer, and shall be subject to Owner's approval.
- 5.04.00 **Turbine Generator**
- 5.04.01 The performance test for the turbine generator set shall be conducted in accordance with the latest edition of ASME-PTC-6 - full scale test method.
- The test results shall be considered as calculated from test observations with only corrections as are provided in the Code PTC-6.
- The guaranteed parameters shall be without any tolerance or allowance values. Uncertainty analysis shall not be used to adjust test results.
- For determination of primary flow to the turbine, low beta ratio throat tap nozzle assembly including required machined straight length meeting the requirements of ASME-PTC-6 shall be provided.
- 5.04.02 The performance tests shall be carried out to determine compliance with the following heat balance conditions :
- a) 100% TMCR condition under rated steam parameters at condenser CW temperature 33°C and design condenser vacuum with zero make-up.
  - b) 80% TMCR condition under rated steam parameters, at condenser CW temperature 33°C and design condenser vacuum with zero make-up.
- 5.04.03 The test heat rate under the above load conditions shall be computed as per relevant clause of T.G. Specification.
- The performance test shall be carried out with Turbine driven BFPs in service. To account for the conditions during the conductance of the test which do not correspond to the specified conditions, necessary corrections shall be applied.
- 5.04.04 The test results shall be considered as calculated from test observations with only corrections as are provided in the code ASME PTC-6.

The guaranteed parameters shall be without any tolerance or allowance values. Uncertainty analysis shall not be used to adjust test results.

- 5.04.05 The tests shall be arranged in a manner such that the Owner's operation is not disrupted. Duplicate test run will be performed at the 100% and 80% unit loads. The test results of corrected heat rate of the duplicate test runs shall agree within 0.25%. If they differ by more than 0.25% a third test shall be run at the same test points. Corrected results of anyone of the three test runs which deviates from the corrected average heat rate of all the runs by more than 0.25%, shall be eliminated, otherwise the results of the test with the highest heat rate figure will be considered.

The test for TG test capacity shall be carried out alongwith the heat rate test. Instrumentation and other details shall comply as above.

- 5.04.06 Condenser

Performance test for the condenser shall be conducted in accordance with the latest edition of ASME PTC-12.2. The condenser pressure shall be measured at 300 mm above the top row of tubes under VWO condition, zero make-up and design CW flow and CW inlet temperature corresponding to guranteed vacuum. The cleanliness factor shall be determined in accordance with the latest edition of ASME PTC-12.2.

- 5.04.07 Feed Water Heaters and Drain Cooler

Performance test for feed water heaters shall be conducted in accordance with the latest edition of ASME PTC-12.1.

- 5.04.08 Deaerator

Performance test for deaerator shall be conducted in accordance with the latest edition of ASME PTC-12.3.

The dissolved oxygen content in feed water at outlet of deaerator shall be determined by ASME-D 888. Reference Method A and any recognised modification thereof.

Free carbondioxide content of deaerator effluent shall be measured by APHA method.

- 5.05.00 **Statutory Requirements**

All parameters of plant, equipment & facilities which are under jurisdiction of Statutory Authorities, like MOEF, GPCB etc., shall be guaranteed. Conformance to the performance parameters under statutory requirement is mandatory.

- 5.06.00 **Remaining Plant and Equipment**

For other equipment, plants and systems, the performance test shall be carried out as per the respective equipment specification and the applicable codes.

## PERFORMANCE GUARANTEE TESTS FOR COMPRESSED AIR SYSTEM

### At Shop:

1. Capacity and discharge pressure of each air compressor.
2. Power consumption of each air compressor at its rated duty point with its own motor.

The tests shall be demonstrated at manufacturer's work.

### At Site:

1. Parallel operations of air compressors.
2. Capacity & dew point of air at the outlet of air drying plants of instrument air compressors.
3. Pressure drop across the air drying plants of air compressors.
4. Vibration & noise level of air compressors, blowers of air drying plant (if applicable).
  - Vibration limits shall be as per VDI 3836 applicable for the oil-free screw compressors.
  - All machines / components / system shall be acoustically designed for a surface sound pressure level of  $L_p < 85$  dB (A), measured in accordance with ISO 3746 respectively at a distance of 1.0 m from equipment surface and at a height of 1.5m above ground level. The surface sound pressure level ( $L_p$ ) shall be averaged over the measurement surface and corrected for effect of background noise and the influence of reflected sound at measurement surface (environmental correction). With sound pressure levels of 85 dB (A) or less according ISO it shall be ensured that maximum surface noise levels of any item of plant of less than 85 dB (A) at 1.0 m from outline and a height of 1.5m from the floor shall be met during normal operating conditions.
  - In case during test it is found that the equipment/system has failed to meet the guarantees, the contractor shall carry out all necessary modifications and/or replacements to make the equipment/ system comply with the guaranteed requirements at no extra cost to the Employer. However, if the contractor is not able to demonstrate the guarantees, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by BHEL, after the tests have been completed, BHEL will have the right to Reject the equipment / system / plant and recover the payments already made or accept the equipment / system after assessing the deficiency in respect of the various ratings, performance parameters and capabilities and recover from the contract price an amount equivalent to the damages as determined by BHEL.
  - The bidder will prepare a document titled "HANDLING OVER PROTOCOL" successful consisting various activities to be demonstrated by them for handing over of the package.



**TECHNICAL SPECIFICATION  
1 X 800 MW GSECL WANAKBORI TPS  
COMPRESSED AIR SYSTEM**

**SPECIFICATION No: PE-TS-408-555-A001**

**VOLUME: II B**

**SECTION : C-2B**

**REV. 00**

**DATE: 14.08.2015**

**SECTION: C2-D  
QUALITY ASSURANCE**

## **CONTENT**

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2.00.00	GENERAL REQUIREMENTS QUALITY ASSURANCE
3.00.00	QUALITY ASSURANCE DOCUMENTS
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**VOLUME : IIA**

**SECTION-VII**

**QUALITY ASSURANCE REQUIREMENTS**

1.00.00 **QUALITY ASSURANCE PROGRAMME**

1.01.00 To ensure that the equipment and services under the scope of Contract whether manufactured or performed within the Contractor's works or at his Sub-contractor's premises or at the Owner's site or at any other place or work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points, as necessary. Such programmes shall be outlined by the Contractor and shall be finally accepted by the Owner/Authorised representative after discussions before the award of contract. A quality assurance programme of the Contractor shall generally cover the following :

- a) His organisation structure for the management and implementation of the proposed quality assurance programme.
- b) Documentation control system.
- c) Qualification data for Bidder's key personnel.
- d) The procedure for purchase of materials, parts, components and selection of Sub-contractor's services including vendor analysis, source inspection, incoming raw-material inspection, verification of materials purchased etc.
- e) System for shop manufacturing and site erection control including process controls and fabrication and assembly controls.
- f) Control of non-conforming items and system for corrective actions.
- g) Inspection and test procedure both for manufacture and all site related works.
- h) Control of calibration and testing of measuring and testing equipments.
- i) System for quality audit.
- j) System for indication and appraisal of inspection status.
- k) System for authorising release of manufactured product to the Owner.
- l) System for handling storage and delivery.
- m) System for maintenance of records.

- n) Furnishing of quality plans for manufacturing and field activities detailing out the specific quality control procedure adopted for controlling the quality characteristics relevant to each item of equipment/component as per format enclosed at Annexure-I to this section.

**2.00.00 GENERAL REQUIREMENTS - QUALITY ASSURANCE**

2.01.00 All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the Contractor for some of the major items is given in the respective technical specification. This is however, not intended to form a comprehensive programme as it is the Contractor's responsibility to draw up and implement such programme duly approved by the Owner/Consultant. The detailed Quality Plans for manufacturing and field activities should be drawn up by the Bidder, separately in the format attached at Annexure-I and will be submitted to Owner/Authorised representative for approval. Schedule of finalisation of such quality plans will be finalised before award.

2.02.00 Manufacturing Quality Plan will detail out for all the components and equipment, various tests/inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by Contractor's Quality Control organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/performance testing.

2.03.00 Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the Contractor's site Quality Control organisation, during various stages of site activities from receipt of materials/equipment at site.

2.04.00 The Bidder shall also furnish copies of the reference documents/plant standards/acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality plans and reference documents/standards etc. will be subject to Owner's approval without which manufacture shall not proceed. These approved documents shall form a part of the contract. In these approved quality plans, Owner/Authorised representative shall identify customer hold points (CHP), test/checks which shall be carried out in presence of the Owners Engineer or his authorised representative and beyond which the work will not proceed without consent of Owner/Authorised representative in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Owner/Authorised representative for approval and dispositioning.

2.05.00 No material shall be despatched from the manufacturer's works before the same is accepted subsequent to pre-despatch final inspection including verification of records of all previous tests/inspections by Owner's Engineer/ Authorised representative, and duly authorised for despatch issuance of Material Despatch Clearance Certificate (MDCC).

- 2.06.00 Materials used or supplied shall be accompanied by valid and approved materials certificates and tests and inspection report as per Owner's approved QAP. These certificates and reports shall indicate the sheet numbers or other such acceptable identification numbers of the material. The material certified shall also have the identification details stamped on it.
- 2.07.00 Castings and forgings used for construction shall be of tested quality. Details of results of chemical analysis, heat treatment record, mechanical property test results shall be furnished.
- 2.08.00 All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section-IX/BS-4870 or other International equivalent standard acceptable to the Owner.
- All brazers, welders etc. employed on any part of the contract at Contractor's/ Sub-Contractor's works or at site shall be qualified as per ASME Section-IX or BS-4871 or equivalent international standard approved by the Owner. Such qualification tests shall be conducted in presence of Owner/his authorised representative.
- For welding of pressure parts and high pressure piping the requirements of IBR shall also be complied with.
- 2.09.00 All non-destructive examination (NDT) shall be carried out in accordance with approved international standard. The NDT operator shall be qualified as per SNT-TC-IA (of American Society of non- destructive examination). Results of NDT shall be properly recorded and submitted for approval.
- 2.10.00 All the sub-vendors proposed by the Contractor for procurement of major bought out items including castings, forgings, semi-finished and finished components/equipment list of which shall be drawn up by the Contractor and finalised with the Owner shall be subject to Owner's approval. Quality Plans of the successful vendors shall be discussed, finalised and approved by the Owner/Authorised representative and form part of the Purchase Order between the Contractor and the Vendor.
- 2.11.00 All the purchase specifications for the major bought-out items, list of which shall be drawn up by the Contractor and finalised with the Owner shall be furnished to the Owner for comments and subsequent approval before orders are placed.
- Owner reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the Contractor's or their sub-vendor's quality management and control activities. The Contractor shall provide all necessary assistance to enable the Owner carry out such audit and surveillance.
- Quality audit/approval of the results of tests and inspection will not prejudice the right of the Owner to reject an equipment not giving the desired performance after erection and shall not in no way limit the liabilities and responsibilities of the Contractor in earning satisfactory performance of equipment as per specification.
- 2.12.00 Quality requirements for main equipment shall equally apply for spares and replacement items.

2.13.00 Repair/rectification procedures to be adopted to make any job acceptable shall be subject to the approval of the Owner.

2.14.00 For quality assurance of all civil works refer to the specifications for civil works.

3.00.00 **QUALITY ASSURANCE DOCUMENTS**

3.01.00 The Contractor shall be required to submit two (2) copies and two (2) sets of microfilms of the following Quality Assurance documents within three (3) weeks after despatch of the equipment :

- a) Material mill test reports on components as specified by the specification.
- b) The inspection plan with verification, inspection plan check points, verification sketches, if used and methods used to verify that the inspection and testing points in the inspection plan were performed satisfactorily.
- c) Non-destructive examination results /reports including radiography interpretation reports.
- d) Factory tests results for testing required as per applicable codes and standards referred in the specification.
- e) Welder identification list listing welder's and welding operator's qualification procedure and welding identification symbols.
- f) Sketches and drawings used for indicating the method of traceability of the radiographs to the location on the equipment.
- g) Stress relief time temperature charts.
- h) Inspection reports duly signed by QA personnel of the Owner and Contractor for the agreed inspection hold points. During the course of inspection, the following will also be recorded :
  - i) When some important repair work is involved to make the job acceptable.
  - ii) The repair work remains part of the accepted product quality.
- i) Letter of conformity certifying that the requirement is in compliance with finalised specification requirements.

4.00.00 **INSPECTION, TESTING AND INSPECTION CERTIFICATES**

4.01.00 The Engineer, his duly authorised representative and/or an outside inspection agency acting on behalf of the Owner shall have access at all reasonable times to inspect and examine the materials and workmanship of the works during its manufacture or erection and if part of the works is being manufactured or assembled on other premises or works, the Contractor shall obtain for the Engineer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works.

- 4.02.00 The Contractor shall give the Engineer/Inspector fifteen (15) days written notice of any material being ready for testing. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Engineer/Inspector, unless the witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date on which the equipment is notified as being ready for test/inspection failing which the Contractor may proceed with test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector duly certified copies of test reports in six (6) copies.
- 4.03.00 The Engineer or Inspector shall within fifteen (15) days from the date of Inspection as defined herein give notice in writing to the Contractor, or any objection to any drawings and all or any equipment and workmanship which is in his opinion not in accordance with the contract. The Contractor shall give due consideration to such objections and shall either make modifications that may be necessary to meet the said objections or shall confirm in writing to the Engineer/Inspector giving reasons therein, that no modifications are necessary to comply with the contract.
- 4.04.00 When the factory tests have been completed at the Contractor's or sub-contractor's works, the Engineer/Inspector shall issue a certificate to this effect fifteen (15) days after completion of tests but if the tests are not witnessed by the Engineer/Inspectors, the certificate shall be issued within fifteen (15) days of the receipt of the Contractor's test certificate by the Engineer/Inspector. Failure of the Engineer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the works. The completion of these tests, or the issue of the certificates shall not bind the Owner to accept the equipment should it, on further tests after erection be found not to comply with the contract.
- 4.05.00 In all cases where the contract provides for tests whether at the premises or works of the Contractor or any sub-contractor, the Contractor, except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Engineer/Inspector or his authorised representatives to carry out effectively such tests on the equipment in accordance with the Contractor and shall give facilities to the Engineer/Inspector or to his authorised representative to accomplish testing.
- 4.06.00 To facilitate advance planning of inspection in addition to giving inspection notice as per Clause 4.02.00, the Contractor shall furnish quarterly inspection programme indicating schedule dates of inspection at customer hold point and final inspection stages. Updated quarterly inspection plans will be made for each three consecutive months and shall be furnished before beginning of each calendar month.

**ANNEXURE-I**

**FORMAT OF QUALITY ASSURANCE PROGRAMME**

Name of Company/ Contractor	NAME OF CONTRACT PACKAGE			QUALITY PLAN FOR						
	Package No. : _____			QP No. : _____ Date _____						
	Contractor : _____			Rev. No.: _____ Date _____						
Sl. No.	Component & Operation	Characteristics	Class	Type of Check	Quantum of Check	Reference Document	Acceptance Norm	Format of Record	Agency	Remarks

Note: All the information for QAP as stipulated above shall be finalized and agreed during contract execution.

**ANNEXURE-II**

**FIELD WELDING SCHEDULE**

PROJECT : FWS NO :  
 CONTRACTOR : REV NO. :  
 PACKAGE : FIELD WELDING CODE :  
 SYSTEM : PAGE NO. :

Sl No.	Drawing No. for Weld Locations & Identification mark	Description of parts to be welded	Material specification	Dimensions	Process of Welding	Type of Weld	Electrode Filler Specification	WPS No.	Minimum Pre-heat Temperature	Heat Treatment Temperature [Holding Time in secs]	NDT Method Quantum	NDT Specification Number	Acceptance Norm Ref.	Remarks

The Field Welding Schedule should be submitted for :

- Pressure Parts
- Tanks/Vessels
- Piping
- Heavy/Important Structural Steel
- Heat Exchangers
- Bus Ducts