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|----------------------------------------------------------------------------------|------------------------------------------------------------------|--|---------------------------------------|---------------|
|  | <b>TITLE:</b>                                                    |  | SPECIFICATION NO. PE-TS-412-155A-A001 |               |
|                                                                                  | <b>2X660 MW ENNORE SEZ STPP</b>                                  |  | SECTION : I                           |               |
|                                                                                  | <b>TECHNICAL SPECIFICATION FOR CONDENSATE<br/>POLISHING UNIT</b> |  | <b>SUB-SECTION: IA</b>                |               |
|                                                                                  |                                                                  |  | <b>REV. NO.</b> 00                    | <b>DATE :</b> |

### ANNEXURE III

### FUNCTIONAL GUARANTEE AND LIQUIDATED DAMAGES

|                                                                                  |                                                              |                                       |        |
|----------------------------------------------------------------------------------|--------------------------------------------------------------|---------------------------------------|--------|
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## FUNCTIONAL GUARANTEES, LIQUIDATED DAMAGES FOR SHORTFALL IN PERFORMANCE AND GUARANTEE TESTS

(The term "Performance Guarantees" wherever appears in this Section shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly the term "Performance Tests" wherever appears in this Section shall have the same meaning and shall be synonymous to "Guarantee Test(s)". The term "TMCR" (Turbine maximum continuous rating) appearing in the Technical Specification shall mean 660 MW electrical power output at generator terminals (power at generator terminals as per clause indicated in this section) under 0% cycle make-up and 76 mm Hg (abs) condenser pressure unless used in conjunction with a different cycle make-up and/or a different condenser pressure.

### 1.00 PERFORMANCE GUARANTEES

#### General Requirements

- 1.01 The Bidder shall guarantee that the equipment offered shall meet the rating and performance requirements stipulated for various equipment covered in this specifications.
- 1.02 The guaranteed performance parameters furnished by the bidder in his offer, shall be without any tolerance values and all margins required for instrument inaccuracies and other uncertainties shall be deemed to have been included in the guaranteed figures.
- 1.03 The bidder shall demonstrate all the guarantees covered herein during performance guarantee/acceptance test. The various tests which are to be carried out during performance guarantee/acceptance tests are listed in the specification. The guarantee tests shall be conducted by the bidder at site in presence of BHEL / CUSTOMER on each unit individually.
- 1.04 All costs associated with the tests shall be included in the bid price.
- 1.05 In case during performance guarantee tests, it is found that the equipment/system has failed to meet the guarantees, the bidder 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 BHEL / CUSTOMER and re-conduct the performance guarantee test(s) with BHEL / CUSTOMER's consent. However if the specified performance guarantee(s) are still not met but are achieved within the Acceptable shortfall limit specified in the specification, BHEL / CUSTOMER will accept the equipment/system/plant after levying liquidated damages as mention in the specification. If, however, the demonstrated guarantee(s) continue to be more than the stipulated Acceptable Shortfall Limit, even after the above modifications/replacements within ninety (90) days or a reasonable period allowed by the BHEL / CUSTOMER, after the tests have been completed, the BHEL / CUSTOMER will have the right to either of the following:

#### a) For Category-I Guarantees

Reject the equipment/system/plant and recover from the bidder the payments already made.

**OR**

Accept the equipment/system/plant after levying liquidated damages as specified hereunder. The liquidated damages, for shortfall in performance shall be levied separately for each unit. The rates indicated are on station basis and per vessel basis respectively. The liquidated damages shall be pro-rated for the fractional parts of the deficiencies. The performance guarantees coming under this category shall be called 'Category-I' Guarantees.

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**b) For Category-II Guarantees**

Reject the equipment/system/plant and recover from the bidder the payments already made. The performance guarantees under this category shall be called 'Category-II' Guarantees. Conformance to the performance requirements under category-II is mandatory.

**c) For Category-III Guarantees**

Reject the equipment/system/plant and recover from the bidder 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 the BHEL/CUSTOMER. Such damages shall, however be limited to the cost of replacement of the equipments/systems replacement of which shall remove the deficiency so as to achieve the guarantee performance. These parameters / capacities shall be termed as Category-III, guarantees.

**2.00 GUARANTEES UNDER CATEGORY I**

NIL

**3.00 GUARANTEE UNDER CATEGORY –II**

NIL

**4.00 GUARANTEE UNDER CATEGORY –III**

**CONDENSATE POLISHING PLANT**

**5.00** Following parameter / capabilities shall be guaranteed by the Bidder for condensate polishing unit which falls under “**GUARANTEE UNDER CATEGORY –III**” but not be limited to the following:

**a. NORMAL OPERATING CONDITION:**

- i. Design Flow of each Service Vessel of Condensate Polishing Plant to be guaranteed.
- ii. Guaranteed service length (Period between two successive regenerations) of each service vessel shall be 30 days (720 hours).
- iii. Bidder shall guarantee the number of hours of operation of each service vessel in hydrogen cycle mode.

**iv. Effluent Quality of Condensate:**

With specified Design Flow, influent quality, each CPU service Vessel shall be guaranteed to maintain the effluent quality as specified in technical specification throughout the cycle (i.e. period between two successive regenerations) of 30 days (720 hours). No shortfall in guaranteed effluent quality will be accepted by the BHEL / customer during the service cycle.

**v. Chemicals consumption of Acid (33% HCL) & Alkali (48%NaOH) per regeneration.**

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## **b. UNIT START UP CONDITION OR CONDENSER LEAK CONDITION**

- i. Design Flow of each Service Vessel of Condensate Polishing Plant to be guaranteed.
- ii. With Design Flow, influent quality, each Service vessel shall be guaranteed to maintain the effluent quality as specified in technical specification throughout useful service run of not less than 50 hours (i.e. period between two successive regenerations). No shortfall in guaranteed effluent quality will be accepted by the BHEL / customer during the service cycle.
- iii. Chemicals consumption of Acid (33% HCL) & Alkali (48%NaOH) per regeneration.
- c. Pressure drop across the polisher service vessel (as defined elsewhere) in clean and dirty condition of resin at rated design flow i.e.
  - i) At the design flow rate, the pressure drop between inlet and outlet flanges of the polisher Condensate Polisher Mixed Beds with clean resin bed shall not exceed 2.0 bar (g).
  - ii) Maximum pressure drop under dirty conditions shall be restricted to about 3.5 bar (g) including the pressure drop across effluent resin traps.
- d. Vibration & parallel operation of all the pumps and blowers at the rated duty point shall be demonstrated at site.
- e. Noise level of all pumps and blowers at the rated duty point shall be demonstrated at site.
  - i) Noise: All the CPU plant pumps and blowers covered under this specification shall perform continuously without exceeding the noise level over the entire range of output and operating frequency specified in the technical specifications. Noise level measurement shall be carried out using applicable and internationally acceptable standards. The measurement shall be carried out with a calibrated integrating sound level meter meeting the requirement of IEC 651 or BS 5969 or IS 9779. Sound pressure shall be measured all around the equipment at a distance of 1.0 m horizontally from the nearest surface of any equipment/ machine and at a height of 1.5 m above the floor level in elevation. A minimum of 6 points around each equipment shall be covered for measurement. Additional measurement points shall be considered based on the applicable standards and the size of the equipment. The measurement shall be done with slow response on the A - weighting scale. The average of A-weighted sound pressure level measurements expressed in decibels to a reference of 0.0002 micro bar shall not exceed the guaranteed value. Corrections for background noise shall be considered in line with the applicable standards. All the necessary data for determining these corrections, in line with the applicable standards, shall be collected during the tests.

## **6.00 PERFORMANCE GUARANTEE / ACCEPTANCE TEST**

### **6.1. General Requirements**

- a) It is the responsibility of the Bidder to perform the Performance Guarantee/Acceptance test as specified in this Section. The performance tests will be performed using only the normal number of BHEL /Customer supplied operating staff for monitoring of PG test. Bidder personnel shall be used for instructional purposes or data collection and conducting the PG test at site. At all times during the Performance Tests the effluents quality from the Plant shall not exceed the Guaranteed Effluent Limits.
- b) The Bidder shall make their system ready for the performance guarantee tests.

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- c) All instruments required for performance testing shall be of the type and accuracy required by the code and prior to the test, the Bidder shall get these instruments calibrated in an independent test Institute approved by the TANGEDCO/BHEL. All test instrumentation required for performance tests shall be supplied by the Bidder and shall be retained by him upon satisfactory completion of all such tests at site. All costs associated with the supply, calibration, installation and removal of the test instrumentation shall be included in the bid price. All calibration procedures and standards shall be subjected to the approval of the TANGEDCO/BHEL. The protecting tubes, pressure connections and other test connections required for conducting guarantee test shall conform to the relevant codes. Tools and tackles, thermo wells (both screwed and welded) instruments/devices including flow devices, matching flanges, impulse piping & valves etc. and any special equipment, required for the successful completion of the tests, shall be provided by the Bidder free of cost.
- d) The Bidder shall submit for TANGEDCO/BHEL approval the detailed Performance Test procedure containing the following:
- (i) Object of the test.
  - (ii) Various guaranteed parameters & tests as per contract.
  - (iii) Method of conductance of test and test code.
  - (iv) Duration of test, frequency of readings & number of test runs.
  - (v) Method of calculation.
  - (vi) Correction curves.
  - (vii) Instrument list consisting of range, accuracy, least count, and location of instruments.
  - (viii) Scheme showing measurement points.
  - (ix) Sample calculation.
  - (x) Acceptance criteria.
  - (xi) Any other information required for conducting the test.

The Performance / Acceptance test shall be carried out as per the agreed procedure. After the conductance of Performance test, the Bidder shall submit the test evaluation report of Performance test results to TANGEDCO/BHEL promptly but not later than one month from the date of conductance of Performance test. However, preliminary test reports shall be submitted to the TANGEDCO/BHEL after completing each test run.

**e) Test Interruptions:**

In the event of a test interruption resulting from an Event of Force Majeure the interrupted Performance Test must be started again and test data that were collected during the interrupted test must be ignored.