



- iv) The Bidder shall be responsible for ensuring that all electrical equipment installed in any hazardous zone is designed and tested to suit the relevant zone classification and shall be to the approval of the Owner. Cables shall not be laid in trenches with fuel pipe work.

9.02.42 FIRE PROTECTION PROVISIONS

Unless otherwise specified or agreed with the Owner, the following design principles should be observed as minimum fire prevention requirements:

- i) Pipeline insulation and the infills of cable and pipeline wall penetrations are to be of non- combustible material.
- ii) All pipelines or vessels with internal temperatures of more than 180°C shall be so arranged as to avoid any contact with flammable liquids if fuel or lube oil lines should leak. Sufficient physical separation shall be ensured.
- iii) Particular care should be taken to eliminate any risk of hot pipeline-insulating material becoming impregnated with flammable liquids in the case of fuel or lube oil line leakage. The insulation is to be covered in its entirety, with an oil resistant sheet, over which the cladding is to be fitted.
- iv) Cable and pipeline ducts must be so arranged and sealed as to avoid any risk of flooding with, lube oil or any other flammable liquid. In addition to sealing the cable and pipeline ducts, the cable basements must be completely sealed against leakage from above as well, in order to preclude the ingress of lube oil or other flammable liquids.
- v) Covered floor ducts/trenches must be easily accessible for inspection and cleaning.
- vi) All parts of plant and equipment are to be arranged so that, no corners or pits are formed, in which flammable matter could collect, and would be difficult to inspect and clean.
- vii) Fuel preheating temperatures should be limited to a margin of at least 10°K below the fuel flash point.
- viii) Lubricating oil lines in the turbine-generator lube oil system are not to be connected with compression-type joints but rather with welded or screwed-type points.
- ix) Non-combustible materials which do not release noxious or toxic fumes must be used for wall and ceiling panelling, for floor covering, and for cubicles and cabinets.

10.00.00 ERECTION, SITE TESTING, COMMISSIONING AND RELIABILITY TEST

10.01.00 This section generally covers the minimum requirements of installation, testing and commissioning of various equipments, to be adhered to during the execution of the mechanical, electrical & instrumentation works.

10.02.00 Works shall be performed in accordance with this technical specification and various other drawings and schedules submitted and approved by the Owner during the execution and the instructions from Engineer-in-charge or his authorized representatives during the progress of the work.

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- 10.03.00 All consumables required for the job shall be ensured by the bidder.
- 10.04.00 Electrical power for testing, commissioning, reliability test and performance guarantee test shall be availed from start-up power (400kV/220kV grid) at free of cost.
- 10.05.00 All necessary equipments & instruments required to carry out the works, recalibration of the instruments required during loop checking and commissioning shall be done by the bidder.
- 10.06.00 Field quality plans shall be submitted and shall detail out for all the equipments, the quality practices and procedure etc. to be followed by the bidder's site quality control organization during various stages of site activities including receipt of materials/equipments at site, preservation and storage, pre-assembly, erection, pre-commissioning and commissioning.
- 10.07.00 All inspections and tests shall be done as per approved field quality plans and protocols.
- 10.08.00 The Bidder shall provide all necessary means for execution of inspection and testing, according to the requirements.
- 10.09.00 All critical equipments/spares/parts shall be stored in such a manner that weather effect shall not deteriorate the quality of material.
- 10.10.00 The consumables (oil, filters, glands, bearings, etc) & equipments needs to be changed after acceptance of successful completion of COD shall be provided/replaced by the bidder. Also, during conductance of PG Test if it deemed to replace/provide the consumables & equipment, it is also in the scope of bidder.
- 10.11.00 Erection**
- 10.11.01 Erection work shall be carried out in the manner and sequence as agreed with bidder's site in-charge/resident engineer and the Owner/Engineer.
- 10.11.02 Construction and erection shall be planned such that all below ground construction & erection shall be completed first, preferably before rainy season.
- 10.11.03 All existing structures, piping, conduits, equipment and facilities, if any, shall be protected by the Bidder against damage during erection. Any damage caused by Bidder shall be rectified at his cost to the satisfaction of the Owner.
- 10.11.04 As erection proceeds each assembled part before being boxed up with a view to erecting it finally, shall be inspected and approved by the concerned supervisor. If any defect is found out during such inspection, the bidder shall make it good as per directives from owner.
- 10.11.05 All materials such as electrodes, gaskets, bolts, nuts etc., shall be of reputed make and conforming to relevant Indian Standards. Prior approval of Owner will have to be obtained before commencement of work. Manufacturer's test certificate shall have to be provided when called for. The electrodes shall be of Diffusion, Bohler, D&H, Metrode make.
- 10.11.06 Bidder shall furnish all instruments, isotopes, films etc. for conducting radiography and equip himself fully. Necessary operators of all testing equipment shall be provided by the Bidder. Dark room facilities with air conditioners for

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storing and processing radiography films and equipment, as necessary, shall have to be arranged by the Bidder. The radiography shall be done on any weld (including welds for repair) only after final heat treatment.

- 10.11.07 The equipment shall be placed on respective support, levelled and aligned with precision measuring instruments, checked for proper clearance between moving and stationary parts wherever applicable.
- 10.11.08 The installation of motors shall be carried out along with driven equipment in accordance with manufacturer's instructions and/or as directed by the Owner.
- 10.11.09 Wherever the scope includes control panels, all connections in control panels shall be completed, checked and adjusted to ensure safety and satisfactory operation of the equipment.
- 10.11.10 Particular attention shall be given towards removal of buckles and other forms of distortion. Holes in plate work to assist in erection should be avoided.
- 10.11.11 Misalignment in vertical joints shall not exceed 10% of plate thickness or 1.0 mm, or whichever is larger.
- 10.11.12 Misalignment in horizontal joints shall not exceed 15% of upper plate thickness with a maximum of 2 mm for plate thickness above 8 mm and a maximum of 1.0 mm for plate thickness less than 8 mm.
- 10.11.13 Welding sequence shall be adopted in such a way so as to minimise distortion due to weld shrinkage and shall be got approved from the Owner prior to commencement of work.
- 10.11.14 Welding shall not be carried out on wet surfaces and shall be protected from high winds.
- 10.11.15 **ERECTION PROGRAM AND NOTIFICATION**
- i) The Bidder shall furnish a detailed erection programme taking into consideration the constraints likely to be encountered during various phases of work including interfacing with the existing plant. This erection programme shall be strictly adhered to. The Bidder shall take appropriate steps as directed by the Owner to make up for any slippage from this erection programme and no additional compensation shall be allowed on this account.
 - ii) Before erection commences and not later than three months before start of erection, the Bidder shall submit the proposed erection test program and the commissioning test program with all proposed erection and commissioning tests and checks. Together with the test programs the proposed test procedures have to be submitted.
 - iii) The test programs should consider:
 - a) that the sequence and duration of the proposed activities are logical, realistic and in accordance with safety and permit regulations in force
 - b) that the commissioning of any item of plant would not interrupt the normal operation of the existing plant.
 - c) that allowance for training the Owner's operation personnel during this period has been made.



- iv) The Bidder has to take care that the test programs are maintained by the erection organization during erection and commissioning.
- v) The Bidder has to mark all stages, which are subject to the Owner's acceptance and has to notify at least one (1) week in advance when such inspection for acceptance becomes due.

10.11.16 SUPERVISION DURING ERECTION

- i) The Bidder shall provide at proper time the necessary supervisory engineers, supervisors and other supervisory personnel duly qualified and in sufficient number for transportation, handling, unloading, storage, erection, pre-commissioning and post commissioning etc., start-up, testing and trial operation of plants and equipment.
- ii) The Bidder shall keep a competent representative, who shall be approved by owner, who will be resident Engineer-in- charge and shall remain as In-charge of Bidder's work site and also remain answerable to the Owner for all activities of the Bidder at site. Before his placement at site, the Bidder shall submit his bio-data to the Owner for his approval.
- iii) The resident Engineer-in-charge shall supervise the work of all men of the Bidder working at site. He shall work in complete harmony and co-operation with Owner.
- iv) All statutory rules and labour laws prevailing in the area must be followed by the Bidder.
- v) All the areas shall be maintained clean and organised, both during execution and handover.
- vi) All safety measures against occurrence of accidents must be taken effectively.
- vii) Resident Engineer-in-charge shall not be withdrawn without written permission of the Owner.
- viii) If any of the Bidder's personnel was found unsuitable for the job, the Bidder shall remove him forthwith and a suitable replacement shall be posted to site within a reasonable time. No compensation for withdrawing of unsuitable or unqualified person(s) from site or for posting suitable person(s) to site at any stage of the project shall be allowed by the Owner.

10.11.17 SEQUENCE OF ERECTION WORK

- i) All packing cases and packages shall be opened in presence of the Owner or his authorized representative.
- ii) Each material after stripping from boxes or received loose, shall be carefully inspected, checked with shipping list and identified with erection drawing if necessary. Any short supply and/or damaged part shall be reported forthwith to the Owner in writing. The Bidder shall be completely responsible to make all necessary arrangements, application and follow procedure to process claim on underwriters, obtain replacement repair/rectify and modify as required on all such damaged/defective/lost equipment and material at no extra cost to the Owner in order to execute the work to satisfaction of the Owner within the stipulated contract time. Once the materials are inspected, the same shall be preserved properly and adequately protected from theft and deterioration or damage by



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rain, storm, dust, water, tampering by casual visitors or workers. The Bidder shall prepare and maintain stores, ledgers and bin cards for all materials in his custody.

- iii) Carrying out all repairs to damages that might have suffered during transit and in subsequent storage and modifications and rectification work and replacement of all lost parts, are under the Bidder's scope.
- iv) Nails and packing strips should be pulled out with suitable appliances and kept separately in container and not thrown away at random. All timber of packing cases shall have to be sorted out and stored properly at a suitable place as directed by the Owner. From time to time packing materials, timber, nails and strips shall be delivered back to the Owner or otherwise disposed of as directed by the Owner.
- v) All timber and packing materials shall remain the property of the Owner.

10.11.18 INSPECTION

- i) After completion of erection and/or installations and before start-up the equipment and all its appurtenances shall be thoroughly cleaned and then, inspected in the presence of the Owner for correctness, soundness and completeness of installation and acceptability for start-up.
- ii) All works to be carried out by the Bidder shall be subject to inspection by the Owner as applicable. The work shall be carried out as per applicable specifications, codes of practice, drawings and instructions of Owner. The Bidder shall provide necessary facilities, instruments, personnel etc., for carrying out the inspection as above and shall comply with the instructions given.
- iii) A check list in triplicate will be furnished for the approval of Owner wherein all items to be checked and necessary instructions will be listed. Inspection and checking shall strictly follow this check list. On completion of the joint inspection and checking two (2) copies of the check list will have to be handed over to the Owner. The check lists after checking will have to be jointly signed by the Bidder's supervisor and the Owner to ensure that all inspection and checking have been properly carried out. However, such endorsement shall not relieve the Bidder from the responsibility in ensuring proper erection and cleaning.
- iv) During inspection all clearance, alignment and important measurements and adjustments as may be directed shall be noted by the Bidder for future reference and guidance. Two (2) copies of such notes shall be delivered to the Owner.
- v) All reports of radiographic examination in a format approved by the Owner shall be submitted to the Owner for his approval and records.
- vi) All critical equipment/spares/parts shall be stored in such a manner that weather effect shall not deteriorate the quality of material.

10.11.19 CLEANING

- i) The Bidder shall observe strict cleanliness throughout execution of the work till handover of the plant.

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- ii) Bidder shall be in possession of vacuum cleaner for cleaning the internals of machinery under installation. They shall check that all the finished surfaces are greased and covered.
- iii) Before boxing up, the Bidder shall examine carefully to ensure that no foreign material, such as welding rod ends, welding beads, metal chips, rope, working tools, etc., has been left inside any equipment.
- iv) In the case of motors, the following procedure shall be observed:
 - a) Checking and cleaning of bearings and charging/filling of lubricants, wherever necessary.
 - b) Cleaning of core and winding, drying out and cornicing the winding and measurement of air gap for motor assembled at site.
- v) Wherever the scope includes control panels, all withdrawable components shall be taken out and internals shall be cleaned with vacuum cleaner.

10.12.00 Testing and commissioning**10.12.01 GENERAL**

- i) The Bidder upon completion of installation of equipments and systems shall conduct pre-commissioning and commissioning activities, to make the facilities ready for sustained safe, reliable and efficient operation.
- ii) The pre-commissioning and commissioning activities including checks, initial operation, trial run and Guarantee tests of the equipment furnished and installed by the Bidder, shall be responsibility of the Bidder.
- iii) All pre-commissioning/commissioning activities considered essential for such readiness of the facilities, including those mutually agreed and included in the Bidder's quality assurance program, as well as those indicated in clauses elsewhere in the technical specifications shall be performed by the Bidder.
- iv) It shall be the responsibility of the Contractor to provide all necessary temporary arrangements, connections, instrumentation and other devices required during start-up and initial operation of the equipment systems which are installed by him.
- v) The Bidder shall provide test instruments, calibrating devices, etc. and labour required for successful performance of these operations. If it is anticipated that the above test may prolong for a long time, the Bidder's workmen required for the above test shall always be present at Site during such operations.
- vi) The Bidder shall also be responsible for flushing & initial filling of all oils & lubricants required for the equipment furnished and installed by him, so as to make such equipment ready for operation. The Bidder shall be also be responsible for supplying such flushing oil and other lubricants unless specified otherwise, elsewhere in these specifications.
- vii) Bidder shall make all arrangements to conduct the commissioning and testing safely and all safety precautions shall be taken appropriately.



- viii) Wastes and effluents generated during these activities shall be suitably disposed off after neutralisation and meeting all statutory requirements, in a manner acceptable to owner and PCB.

10.12.02 TESTING & COMMISSIONING PROCEDURES

- i) Bidder shall prepare and submit equipment/system wise testing and commission procedures, for all equipment/system covered under the contract.
- ii) Commissioning and Testing procedures shall be submitted at least six (6) months prior to actual commissioning/testing; and bidder should ensure that all procedures should be approved by Owner, prior to actual commissioning/testing of the equipment/systems.
- iii) The Bidder shall furnish his recommendations regarding use of various test equipments and instruments and termination/acceptance criteria for testing & commissioning, which in any case shall meet the plant requirements.
- iv) Standard formats for Testing/commissioning procedure are expected to maintain consistency of presentation, content and reporting.
- v) The procedures should contain the following as a minimum:
- a) Equipment/System details
 - b) Design data
 - c) Objective
 - d) Pre-requisites and readiness of associated items
 - e) Proposal – Method and Sequence of Activities (SoA)
 - f) Time duration of each activity
 - g) Inputs & Consumables required – Quantity and quality
 - h) Specification of temporary arrangements, as required
 - i) Safety precautions
 - j) Emergency procedures
 - k) Schemes and drawings, wherever required.
 - l) Completion/Acceptance criteria
 - m) Reference drawings/documents
 - n) OEM approval/acceptance for certain items like valves / control-valves to be included in the commissioning activities, like Steam Blowing.
 - o) Activity Log and commissioning protocol.
- vi) Commissioning procedures should include all pre-commissioning activities.

10.12.03 PRE-COMMISSIONING AND INITIAL TRIAL

- i) On completion of erection of equipment, each item of the equipment shall be thoroughly cleaned by Bidder and inspected jointly by the Owner/Consultant and Bidder for correctness and completeness of installation and acceptability for initial trials of the equipment by the Bidder& Owner. During the above joint walk



down, the list of equipment deficiency & defects shall be prepared and for such a punch list, action shall be initiated by the bidder in agreed time frame.

- ii) The list of tests to be performed prior to initial trials shall be mutually agreed and included in the Field Quality Plan by Bidder.
- iii) The purpose of these initial trials is to ensure integrity of all individual equipment for its operation in the system for initial operation.
- iv) Following the satisfactory completion of inspection, checking and cleaning of a unit, the plant will be placed in test run. During this period, all adjustments and repairs as required shall be made by the Bidder. Protocol shall be made and signature has to be obtained from Owner/ Bidder. On completion of satisfactory test run, the plant will be placed under trial operation.
- v) Prior to initial trial of any equipment the following shall be checked:
 - a) During erection all required erection tests as well as final erection checks of the mechanical completion of the systems and part thereof have to be performed.
 - b) After successful mechanical completion Mechanical Completion Certificates will be issued.
 - c) The activities necessary for mechanical completion shall include but not be limited to following testing, as applicable:
 - 1) Visual inspection after unloading at site
 - 2) Checking of completion of relevant systems
 - 3) Proper installation of the equipment and drive where applicable (like for rotating equipment), on the foundation
 - 4) Proper alignment of the equipment and drive where applicable (like for rotating equipment).
 - 5) Freeness of the rotors of drive and rotating equipment.
 - 6) Proper connection of supports, hangers, piping, valves, instruments and other fittings.
 - 7) Healthiness of lube oil system, changing and filling as necessary.
 - 8) Safety audit
 - 9) Testing of site welds (non-destructive examinations)
 - 10) Pressure/leak/tightness test
 - 11) Pipe line and equipment flushing and cleaning
 - 12) Chemical protection of piping systems
 - 13) Checking of coating
 - 14) Testing of cranes and hoists
 - 15) Safety signs and warning signs
 - 16) Completion of buildings and civil works



17) Test of ventilating and air-conditioning units

10.12.04 PRE-COMMISSIONING TESTING

- i) After installation of all equipment on foundation, alignment tests shall be carried out by the Bidder to check levelling, clearance, eccentricity etc. Measurements will be witnessed and acceptance will be certified by the Owner and/or owner's representative.
- ii) Preconditions for the commissioning are the issue of the Mechanical Completion Certificate and the availability of the accepted commissioning program and the bidder's commissioning procedures.
- iii) Hydro Test, Air & Gas Tightness Test and vacuum tightness test shall be conducted, as applicable, for the entire system/equipment after installation at required pressure. All necessary blanking and spool arrangements for hydro testing shall be furnished by the Bidder. All necessary test pump/temporary piping/temporary tanks etc shall be supplied by the Bidder. On completion of hydraulic test, bidder shall renew the gaskets, if instructed by the engineer.
- iv) Flushing of piping, including oil flushing of control oil system, lube oil system of all rotating equipment and oil flushing of fuel oil system.
- v) Steam blowing & chemical cleaning, as applicable of integral piping of the turbo-generator, piping of auxiliaries like BFP, CEP, Drip pump, interconnecting piping of feed water heating system, Low pressure piping, Power cycle piping & other piping in the scope of the Bidder shall be done.
- vi) The Pre-commissioning checks cover the functional tests of the individual items and their alarm and tripping systems.
- vii) Following general tests shall be included:
 - a) Mechanical equipment
 - 1) Individual pre-commissioning runs/initial trials of all rotating equipment such as pumps, compressors, dosing equipment etc.
 - 2) Functional tests of the mechanical equipment
 - 3) Testing and adjustment of safety devices.
 - 4) Fill test of tanks.
 - 5) All tests and activities pertaining to the heater exchangers as per OEM recommendations and this specification.
 - 6) All test and activities pertaining to auxiliaries like BFP, CEP, Drip Pumps, etc.
 - b) Hydraulic Testing of Pressure Parts – Boiler
 - 1) On completion of installation and all welding of the Steam Generator pressure parts and boiler external (non-boiler) high pressure piping, a hydraulic test according to the requirements of the Indian Boiler regulations (IBR) shall be performed by the Bidder.
 - 2) Hydraulic cap / blanking arrangement shall be employed wherever required, especially when valves/control valves supplied by others is



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installed on the bidder's piping system, during hydraulic testing, and otherwise it should be subject to acceptance of respective valve supplier.

- 3) The water for hydraulic test shall be made alkaline by addition of suitable chemicals.
 - 4) After the test, the Boiler and high pressure external piping shall be suitably drained and preserved.
 - 5) Any defect noticed during the testing shall be rectified and the unit shall be retested by the Bidder, at the earliest.
 - 6) In case, the branch connection or tap-off piping, which is not in the Bidder's scope of piping, are not ready or not erected at the time of hydraulic testing of piping in Bidder's scope, then the Bidder has to supply and use necessary blanking arrangement as required at these locations.
 - 7) The hydraulic test shall be considered officially successful only on certification by the concerned inspecting authority as per the provision of the IBR and the Owner.
- c) Hydraulic Test for STG integral piping, heat exchangers, condenser tubes & condenser, equipment cooling water system pipes and associated equipment etc. shall be done.
- d) The hydraulic test of other piping system as per statutory requirement and specified elsewhere shall also be carried out.
- e) Air and Gas Tightness Test of Furnace, Ducts etc.
- 1) After completion of the installation of the furnace tubes and/or inner skin casing wherever applicable, on ducts and air heaters and before commencement of application of insulation, a test shall be performed on the steam generator and ducts, by the Bidder to prove and establish the gas tightness of erected components.
 - 2) The gas tightness shall include all the components in the Air-Gas path, from the outlet of FD fan, through Steam Generator, ESP, FGD, up to the Stack.
 - 3) Such tests shall be established, with all mountings like soot blowers etc. installed in position.
 - 4) Normally physical leak detection method by pressurising the section under test by running FD/PA fan or temporary blower, as the case may be, can be adopted. However, Bidder may adopt any other better method of testing, with the approval of owner.
 - 5) The air & gas tightness test, can be conducted on ducts in segmented manner, as and when these segments are ready.
 - 6) Temporary blanking wherever required has to be provided by Bidder.
- f) Boiler Chemical Cleaning



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- 1) Bidder shall perform thorough and efficient cleaning of all the internal parts of the Steam Generator, like economiser, water wall / evaporator, separator, feed water piping, start-up recirculation lines and associated piping covered under these specifications, except those portions, which are to be steam blown.
- 2) The cleaning operation will include-
 - De-mineralised (DM) water flushing
 - Chemical cleaning using acids
 - DM water rinsing
 - DM water flushing
 - Nitrogen capping etc.
- 3) The cleaning procedure shall include final flushing and draining of the boiler under a nitrogen gas cap and/or filling the boiler with inhibited water or any other proven procedure recommended by the manufacturer for the preservation of the boiler which is acceptable to the Owner.
- 4) Dry preservation of non-drainable portion during shutdown has to be provided.
- 5) Chemical cleaning of equipment and piping systems
 - Following piping system, should be included:
 - ♦ Boiler feed pump discharge piping
 - ♦ Main condensate piping
 - ♦ Extraction steam piping
 - ♦ Other miscellaneous piping
- 6) The following equipments which form a part of the above system shall also be included in the cleaning operation.
 - Deaerator
 - Gland steam condenser
 - Drain cooler
- 7) Before introducing chemicals, all the piping systems and equipment listed above shall be water flushed. Water flushing will be followed by alkaline cleaning, acid cleaning and passivation or by EDTA (Ethylene Diamene Tetra Acid) and passivation.
- 8) Pre-cleaning procedure
 - Prior to starting any phase of cleaning operation the following procedures shall be ensured:
 - ♦ Installation of all temporary piping, valves, pumps and equipments as required for the flushing and chemical cleaning



operations. Temporary piping shall be routed at floor level as far as possible and secured in place to prevent movement/ vibration beyond acceptable limits.

- ◆ Installation of the instruments as required for ensuring satisfactory monitoring and control of the cleaning process. The Bidder shall also determine and arrange locations for sampling of the cleaning solution during cleaning.
- ◆ By passing all regulation/control valves coming in the cleaning circuit or installation of temporary spool pieces.
- ◆ Installation of special end covers and temporary suction strainers, for boiler feed pumps and condensate pumps. pump internals shall not be installed.
- ◆ Installation of plastic seal in the condenser neck to protect the turbine from alkaline fumes. Blocking and securing of all spring hangers in the steam lines which may be flooded during the cleaning operation.
- ◆ Hand cleaning of the interiors of all vessels which are included in the cleaning operation.

9) General cleaning procedures:

- Seal water lines to pump shall be flushed by the permanent arrangement provided for the same.
- Where pipeline terminate in spray headers, these headers shall be inspected after each phase of the cleaning operation and cleaned if necessary.
- All strainers shall be observed closely during the cleaning operation by reading differential pressure gauges, and shall be cleaned when the differential pressure exceeds a predetermined value.
- All high points, vents shall be opened periodically to ensure full system flow.
- Upon completion of each stage of cleaning, the waste products shall be drained and transferred to the waste treatment basins. The Bidder shall then supply and add the necessary chemicals to the basin to neutralize all waste solutions and rinses generated by the cleaning process, and arrange for its disposal to an area to be indicated by the Owner/Engineer.
- Strict safety precautions shall be exercised at all times during the chemical cleaning and during storage and handling of the chemicals. The Bidder shall ensure provision of all protective clothing, apparatus and equipment along with necessary first aid kits as required for handling the chemical and for carrying out the cleaning operation.



g) Steam blowing

- 1) Steam blowing of Boiler including, complete Superheaters, Reheaters and various external and interconnecting steam piping system shall be carried out by the Bidder, as per the agreed/approved procedure.
- 2) Steam blowing shall include engineering, supply and installation of all temporary piping, valves, fittings including quick actuating valves (for puffing purposes), supports, blanking plates, spools, target plates, instruments, controls and all other accessories and services required to complete the cleaning process as specified herein.
- 3) The detailed schemes and procedure for steam blowing operations shall be prepared and furnished by the bidder and discussed and finalized during the detailed engineering stage.
- 4) Steam blowing shall also include reinstatement of cleaned piping systems; and dismantling/removal of all temporary piping, equipment and materials from site. All temporary piping, valves, equipment and materials shall be taken back by the bidder upon satisfactory completion of cleaning, and shall be removed from the Owner's premises.
- 5) Engineering involved regarding temporary piping shall include the following:
 - Selection of temporary piping including disturbance factor calculation.
 - Preparation of layout of temporary piping and performing stress analysis as per ANSI B 31.1.
 - Selection of temporary hangers and supports as required.
- 6) The following piping systems shall be cleaned through steam blowing operation:
 - Main steam, HRH, CRH, HP bypass & LP bypass piping
 - Auxiliary steam piping including TG gland sealing lines.
- 7) Steam blowing shall be carried out for removal of particles (rust, scales, weld splatter etc.) from various piping systems to avoid damage to turbine balding. Cleanliness of system shall be checked by means of test plates made of steel, which will be installed in the centre line of the piping system.
- 8) Cleaning shall be achieved by steam purging i.e. by blowing of steam through the piping such that the momentum of flow is greater than that of steam flow during normal operation of unit (at TMCR). The disturbance factor during steam blowing (ratio of momentum of flow during purge to that during TMCR) shall be more than 1.4
- 9) The blow off shall be done with steam, which is exhausted through adequately sized, open-ended temporary piping. Temporary piping



and motor operated valves shall be installed for steam blowing operation. Pressure shall be built up in the boiler and the piping warmed before release of steam by quick opening of motor operated valve located on temporary piping. The cycle shall be repeated until steam from the blow out pipe is determined to be clean.

- 10) OEM's acceptance for Valves/control valves which are to be kept installed in steam blowing circuit, should be furnished for owner's approval, before steam blowing; otherwise they will have to be removed during steam blowing. These acceptances should be included along with the procedure.
- 11) For equipments/components installed on high pressure external piping, such as various thermo-wells, flow meter, control valves, HP/LP Bypass valves etc., the Bidder shall comply with guidelines to be followed during steam blowing, with respect to removal / blanking / replacement of such items their internals etc. by spool pieces as given by the respective manufacturer/sub-contractor.
- 12) The actuator operated valves used for steam blowing shall have special characteristics like minimum loss of pressure, resistance to wear during severe working conditions (high velocity and carryover of water and solid particles), quick opening time, minimum effort on actuator etc.
- 13) If the flow nozzles and control valves etc. have already been erected these shall be removed and replaced by spool pieces before steam blowing. The removed flow nozzle and control valves etc. shall be put back after steam blowing.
- 14) In the case of branch connections/ tap-off piping are not ready or not erected at the time of steam blowing operation then the contractor to supply/use necessary blanking arrangements required at these tap-off / branch connections.
- 15) It will be the responsibility of the Bidder to operate the Steam Generator and its accessories equipment to generate adequate steam at the parameter and quality in line with the requirements of steam blowing procedure.
- 16) The Bidder shall make adequate provisions for temporary enhancement of fuel oil firing capacity of the steam generators by changing oil gun tips etc. as may be required so as to be able to conduct complete steam blowing operation by oil firing alone.
- 17) All necessary precautions to avoid fires and cold end corrosion of Air pre-heater, during such oil firing at enhanced SG loads, shall be taken by the Bidder.
- 18) For the steam blowing operation, steam conditions like pressure, temperature etc. at the Steam Generator outlet shall be so selected that a minimum cleaning ratio/ disturbance factor of more than 1.3 is achieved.



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AREA AT UKAI TPS

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LEAD TECHNICAL SPECIFICATION

REV. - A

- 19) A cycle of heating, cooling and blowing/ purging, is to be repeated to ensure thorough cleaning of the interior of the pipes/ tubes etc.
- 20) The final indication of cleanliness shall be demonstrated by purging through target plates positioned at the discharge point.
- 21) The steam blowing termination criteria shall be, achievement as under:
 - Acceptable target plate condition
 - Measured disturbance factor (DF) more than 1.3.
- 22) The required values to calculate actual DF will be measured at site. The criteria for acceptable target plate condition shall be finalised during detailed engineering.

h) SCR System

- 1) Complete pre-commissioning work including tests of facilities such as pressure drop test of SCR system and all other tests as mutually agreed in the Bidder test procedure and field quality assurance program as well as those identified in the specification.

i) ESP

- 1) Complete pre-commissioning work including tests of facilities such as air and gas tightness tests of ESP, pressure drop test of ESP, gas distribution test of ESPs etc. and all other tests as mutually agreed in the Bidders test procedure and field quality assurance program as well as those identified in the specification.

j) FGD

- 1) Complete pre-commissioning work including tests of facilities such as air and gas tightness tests of FGD, pressure drop test of FGD etc. and all other tests as mutually agreed in the Bidders test procedure and field quality assurance program as well as those identified in the specification.

k) Electrical equipment

- 1) All tests and activities pertaining to Generator and Excitation system and auxiliaries like Primary water system, Seal Oil system, gas system etc.
- 2) The following checks and test measurements shall be made during erection and pre- commissioning (as appropriate) in accordance with agreed standards:
 - Screwed connections for correct assembly
 - Terminals and terminal connections for correct assembly;
 - Checking of earthing connections and testing of earthing resistances
 - Measurement of insulation values



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- Fire proof partitioning
- Marking, inscription, provision of designation plates
- Voltage checks
- Polarity checks in the case of D.C. voltages
- Fuses, over current trips, short-circuit trips, time settings, relay settings
- Transformer oil levels
- Safety signs and warning signs
- Setting indicators, revertive (check-back) signals to the central control room etc.
- Checks on wiring and cabling for conformity with the constructional circuit-drawings and plans
- High-voltage tests
- Trip tests
- Functional test on equipment.
- Tests on the transformers
- During installation - checking of complete delivery, checking of core earthing and insulation of active part from tank, H.V. sample tests of transformer oil in accordance with IEC, or equivalent Standards.
- During the Tests on Commissioning - checking of satisfactory operation.
- Tests on the generator main busbar - Checking for perfect electrical and mechanical correctness and for the air-tightness of individual main connections system.
- Tests on the earthing and lightning protection system - Acceptance tests and measurements of the earthing installations in accordance with IEC or IS standards.
- Tests on the lighting system - Proof of the minimum new value of lighting densities, checking of correct operation both electrically and mechanically.

I) Control and instrumentation equipment

- 1) Site related test for Control & Instrumentation equipment and calibration tests of instrumentation loop checking, functional testing of control equipment, interlocks, protection inputs, etc. are covered under Volume III, Part – C, Detail Technical Specification for Control & Instrumentation.



10.12.05 COMMISSIONING

- i) A precondition of the commissioning is the successful completion of the pre-commissioning checks of all items of the whole system. Commissioning basically consists of
 - a) Commissioning Tests
 - b) Initial operation and trial operation which also includes in it a Reliability Run and followed by PPA tests.
- ii) Commissioning tests
 - a) Commissioning tests shall be performed in accordance with the procedure contained in the commissioning program approved by the Owner for individual equipment/system and as a plant. Commissioning test shall also include redundancy and automatic fall back by simulation of fault conditions
 - b) On completion of each commissioning activity to the satisfaction of the Owner/ Owner's Engineer, the commissioning schedule shall be signed and dated by the Bidder and countersigned by the Owner and Owner's Engineer.
 - c) Commissioning test and initial operation shall prove that the plant is prepared and adjusted to ensure the correct functioning of the individual components and of the complete plant.
 - d) After successful completion of the commissioning tests and initial operation "Authorization to Trial Operation" shall be signed.
 - e) The commissioning test shall cover at least demonstration and acceptance of following tests:
 - 1) Test run and Operation of Pumps, Blowers, Fans, Compressors and other rotating equipment.
 - 2) Capability of all drives
 - 3) Protection tests
 - 4) Interlock tests
 - 5) Tests on Control & Instrumentation (C&I) Equipments
 - 6) Calibration tests of orifice, flow nozzles, instruments and control equipment to the extent included in these specifications
 - 7) Operation of protection devices including the following as a minimum
 - Boiler protection
 - Steam turbine protection
 - Generator protection
 - Transformer protection
 - Auxiliaries protection
 - 8) Fire protection systems operation



- 9) Isolation procedures method of isolation of plant equipment for safe shut-down and maintenance procedures including as a minimum
 - HV station and unit supplies
 - LV supplies
 - Protection systems/settings, in accordance with agreed design and the requirements of the transmission system
- 10) Cold Air Velocity Test (CAVT)
 - A CAVT shall be conducted on each Steam Generator during commissioning before its initial operation to establish the average cold air velocity and the velocity distribution at minimum three predetermined sections (Owner's Choice) of steam generator.
 - The data obtained from the CAVT will be used to compute the actual flue gas velocities as well as their distribution at the test sections during actual operation by correlating the CAVT data with the test/computed data from Thermal Performance Test.
 - Should the CAVT results after this correlation with TPT data indicate actual localized high flue gas velocity zones/ mal-distribution of gas flow and/or flue gas laning, suitably designed stainless steel screens at required SG cross sections shall be provided by the Contractor to bring the deviation of the localized gas velocity within $\pm 20\%$ of average gas velocity specified.
 - Through this test the Contractor shall also demonstrate the compliance with the specification requirements regarding the maximum allowable flue gas velocities at various sections of the Steam Generator.
 - The Contractor shall submit a detailed CAVT report and the computations of actual velocities after correlating CAVT data with TPT data to the Owner for approval.
- 11) Starting with stand-by auxiliaries
- 12) Operation of all auxiliaries, including chemical dosing systems.
- 13) Check run on the Pulverised Fuel (P.F.) Mills including clean air flow test.
- 14) Checks on operation of all air heaters and adjustment of seals, if necessary when each heater is up to its working temperature.
- 15) Checks on operation of all soot blowers and retraction gear and the sequences control.
- 16) Checks on correct functioning of the Burner Management System (BMS).
- 17) Start-up tests
- 18) Commissioning tests and procedures as per agreed/approved procedure for all SG &TG auxiliaries and BoP items within the



Bidder's scope of work; including checks on operation of all individual control loops in the control system.

- 19) Checks on operation of all individual control loops in the turbine generator control system.
- 20) Checks on correct functioning of the Turbine Protection System (TPS), Turbine Supervisory Control System (TSCS) for main turbine, Automatic Turbine Run-up System (ATRS), Automatic Testing of Turbine (ATT).
- 21) Turbine bypass operation capability - Test for HP/LP bypass valves operation & their control system.
- 22) Test for operation of governing control system for turbines.
- 23) Condenser vacuum test, feed water heater operational tests for establishing correct cascaded flow, heater water levels etc. & checking of all parameters as per approved heat balance diagrams.
- 24) Verification of start up times and loading rates of power unit and steam generator at various downtime conditions
- 25) Normal automatic start to preset load
- 26) Staged automatic including start to synchronous speed, manual synchronizing (including synchro-check), automatic synchronizing, manual and automatic loading
- 27) Power unit(s), to test partial and full load rejection to demonstrate
- 28) Full load rejection tests to measure transient maximum speed and steady state speed at normal governor droop setting
- 29) Method of resynchronism to be demonstrated

10.12.06 INITIAL AND TRIAL OPERATION

- i) After successful completion of commissioning and Initial Trials of respective equipment and after relevant test protocols have been accepted by the Owner, the Bidder shall be allowed to prepare the Plant Unit for Initial Operation.
- ii) After successful Initial Trials of all the individual equipment, all equipment shall be operated together as a system. The purpose of this Initial Operation is to ensure integrity of all the sub-systems which compose the total system. Based on the observations made during Initial Operation, necessary corrections shall be effected in the equipment/systems to ensure proper integrated operation of the system.
- iii) During Initial Operation, any adjustments/calibrations to the instruments fitted in the new system shall be done in the presence of testing staff of Owner so as to enable them to familiarise themselves with its adjustments and maintenance. The Bidder has also to ensure that he trains Owner's Engineers at site dealing with this system in proper way.
- iv) After satisfactory completion of Initial Operation for each sub-systems and systems, the complete Unit shall be considered ready for Trial Operation.



- v) During Trial Operation, the associated plant auxiliaries and Unit will be started up and loaded. During this loading operation all the controls and protections shall be finally set.
- vi) During the period of Trial Operation, all the necessary adjustments in the plant/equipment shall be made by the bidder to establish that the complete system as a whole with all sub-systems and with all standby equipment is ready for coordinated continuous operation. During these trials, all the standby equipment also shall be run alternatively to prove their performance.
- vii) After the plant is loaded to the maximum capability rating and the bidder is fully satisfied with its performance, he shall offer the unit for Reliability run by communicating the same to the Owner in writing. After receipt of such communication and if the owner/engineer is also satisfied with the initial operations, after approval from owner; the plant will be put on trial operation/reliability run.
- viii) During this period, the Bidder shall demonstrate capabilities of his supplied equipment as indicated in the specification or in subsequent discussions.
- ix) The trial operation/reliability run shall also demonstrate the following:
 - a) Performance of individual system during coordinated operation and their performance in design condition.
 - b) Unit Start-up
 - 1) Start-up time (upto full load), and loading capabilities for the Turbine Generator together 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) or as indicated by the Bidder in the offer and accepted by the Owner, shall be demonstrated, ensuring that the various turbine operational parameters like vibration, absolute and differential expansion, eccentricity and steam-metal temperature mismatch etc. are within design limits.
 - c) Unit start-up/shutdown demonstration as per combined start-up curves for cold, warm and hot conditions
 - d) Sustained capability of the plant
 - e) Reliability of the equipment and auxiliaries
 - f) Adequacy of the various auxiliaries, ancillaries & systems and controls.
 - g) Capability of all equipment & drives of the plant to correctly perform the functions, for which it is specified/designed, shall be demonstrated.
 - h) Safety requirements
 - i) Standby system availability
 - j) Operation of interlocks



- k) LP/HP bypass operation capabilities
- 1) The HP & LP Bypass system should satisfy the following functional requirements under automatic interlock action. It should come into operation automatically under the following conditions:
 - Generator circuit breaker opening
 - HP - IP stop valves closing due to turbine tripping
 - Sudden reduction in demand to house load
 - 2) It shall also be demonstrated that, under all these conditions, while passing the required steam flows as per the relevant heat balances, the condenser should be able to swallow the entire steam without increasing the exhaust hood temperature and condenser pressure beyond the maximum permissible value indicated by the Bidder in his offer and accepted by the Owner.
- l) SH/RH spray system
- m) SADC and its control
- n) Boiler Air & Gas System interlock operation
- o) Soot blower operation
- p) TG Set Capability
- 1) The steam turbine generator unit shall be capable of delivering at generator terminals the output as indicated by the Bidder in the heat balances submitted along with his bid, under the following condition.
 - 2) Maximum continuous output at generator terminals corresponding to both strings of HP heaters out of service, under rated steam conditions, at condenser pressure of 89 mmHg(Abs) and 1% make-up & Aux. Steam requirement tapped from CRH, generating not less than the rated output OR output corresponding to design BMCR heat duty, whichever is less without overstressing turbine components.
 - 3) While conducting the tests of (a) above the condenser pressure measurement shall be done at 300mm above the top row of condenser tubes .
- q) Condenser
- 1) Temperature of condensate, at outlet of condenser, shall not be less than saturation temperature corresponding to the condenser pressure at all loads.
 - 2) Oxygen content in condensate, at hot well outlet, shall not exceed 0.015 CC per litre over the entire load range and shall be determined according to calorimetric Indigo - Carmine method
 - 3) Air leakage in the condenser under full load condition shall not exceed more than 50% of design value taken for sizing the condenser air evacuation system.



- 4) When one half of the condenser is isolated, condenser shall be capable of taking at least 60% T.G. load under EMCR conditions.
- 5) The capacity of each vacuum pump in free dry air under standard conditions at a condenser pressure of 25.4 mm Hg (abs) and sub cooled to 4.17 deg.C below the temperature corresponding to absolute suction pressure shall not be less than specified elsewhere. Correction curves for establishing the capacity at site conditions shall also be furnished
- 6) Condenser on load tube cleaning system shall be made ready before trial operation of the plant. Life of sponge rubber balls & Number of balls lost during 720 hours of continuous operation of COLTCS shall be demonstrated by the bidder.
- r) Feed Water Heaters & Deaerator
 - 1) TTD's and DCA's of feed water heaters in line with 800 MW TMCR heat balance shall be demonstrated.
 - 2) Dissolved O₂ content in Deaerator effluent at deaerator outlet without chemical dosing at all loads, not to exceed 0.005 CC/ litre determined as per ASTM-D-5543-09 or Indigo Carmine method.
 - 3) Difference between saturation temperature of steam entering the deaerator and temperature of feed water leaving deaerator.
- s) Boiler Feed Pumps
 - 1) The vibration, noise level and parallel operation of any two of the three pumps shall be demonstrated as per specification requirements.
 - 2) Cold start up / hot start up of the unit using TDBFP with motive steam from auxiliary steam header.
- t) Condensate Extraction Pumps
 - 1) The vibration, noise level and parallel operation of any two of the three pumps shall be demonstrated.
- u) Drip pumps (if envisaged)
 - 1) The vibration and noise level shall be demonstrated.
- v) Balance pumps, Blowers, Fans, Compressors and other rotating equipment
 - 1) The vibration, noise level and parallel operation, wherever applicable, of the pumps, blowers, fans, compressors and rotating equipment shall be demonstrated.
 - 2) Pumps, blowers, fans, compressors and rotating equipment shall be capable of delivering flow and head corresponding to design point as specified
- w) Demonstration of boiler operation, rate of change of load and sudden load change withstand capability



- x) Sudden Total Loss of External Load
 - 1) On occasions, the steam turbine generator unit may experience sudden total loss of all external load. Under these conditions, the steam turbine generator unit shall not trip but shall continue to be in operation under the control of its speed governor to supply power for the plant auxiliary load with HP-LP bypass in operation while staying within the agreed limits of steam to metal temperature mismatch, exhaust hood temperature, absolute and differential expansion, vibration and eccentricity.
 - 2) The same shall be demonstrated. Further, the provisions of relevant Parts/Sections of the specification shall also be complied with.
- y) Steam Metal Temperature Mismatch Limitation
 - 1) The steam-metal temperature differential for cold, warm and hot start up, loading / unloading and shutdown conditions shall be within the permissible limits indicated by the Bidder in the offer and accepted by the Owner.
- z) Steam Temperature Imbalance
 - 1) The Contractor shall 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 under all loads including transients.
- aa) Minimum continuous low load operation, without oil support, when firing with the coals from the range identified. The contractor shall demonstrate that with any combination of mills/adjacent mills in service (to Owner's choice) the Steam Generator does not require oil firing for stable boiler operation at the agreed load.
- bb) Operating stability when operated in the full range of load conditions with load variations by increasing or decreasing the electric load
- cc) Demonstration of the capabilities of the Power Unit to operate at rated voltage and frequency, at power factors and reactive conditions between 0.85 (lag) and 0.95 (lead) start-up tests of the Plant equipment, facilities and systems including checking of automatic change-over of standby facilities
- dd) Capabilities of firing of coal & 10% Biomass
 - 1) Bidder shall demonstrate the capability of Steam generator and its auxiliaries to operate at rated parameters stably, safely and on sustained basis at TMCR load while firing 10% Biomass, along with the range of Indian coals
 - 2) Duration of such test, to establish the Steam Generator co-firing capability, will be mutually agreed by Bidder and Owner.
- ee) Performance characteristic of fans (PA/FD/ID fan capacity, head developed, etc



- ff) Margin on equipment, especially fans
- 1) After completion of installation of fan drives, Fans, inlet and outlet ducting, measuring equipments etc. contractor shall demonstrate the margin on seal air fans, primary fans, Forced draft fans and induced draft fans as specified elsewhere in Technical Specifications.
 - 2) Similarly margin on other equipment as specified shall be demonstrated.
- gg) Balancing of Coal/Primary air flow
- 1) Bidder shall balance the primary air as well as coal flows in the pulverised fuel pipes such that the minimum PF and PA flow imbalance in the PF pipes from each coal pulveriser does not exceed 5% of average flows.
 - 2) The above balancing shall be checked by the Bidder by carrying out both clean air test and dirty air test (using dirty pitot tubes)
- hh) ESP
- 1) Contractor shall demonstrate that ESP air in leakage shall be limited to 1% of the total gas flow under guarantee point condition.
 - 2) Contractor shall demonstrate that the maximum flue gas pressure drop across the ESP under specified guarantee point condition shall not exceed 20 mmwc.
- ii) FGD
- 1) Capabilities of all drives & equipment
- jj) Fire Protection System
- 1) Vibration and noise of fire water pumps
 - 2) Parallel Operation, vibration & noise level of the fire water pumps and diesel engines.
 - 3) Performance test of each of systems such as, as per the design parameters/standards/TAC –
 - Hydrant,
 - HVW Spray,
 - MVW Spray,
 - Foam Injection system,
 - Inert gas extinguishing system,
 - fire detection and alarm system,
 - Fire monitors
 - Fire extinguishers
 - 4) All tests as required by the TAC.



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AREA AT UKAI TPS**

SECTION - 2

BID SPECIFICATION NO.: ETG106-EPC-UKAI/UNIT# 7-TS-01

LEAD TECHNICAL SPECIFICATION

REV. - A

- kk) Satisfactory operation of the Mill Reject Handling System as per the requirements of the specification.
- ll) Satisfactory operation of Coal and Biomass handling plant as per the requirement of the specification
- mm) Satisfactory operation of Ash handling plant as per the requirement of the specification
- nn) Satisfactory operation of Lime and Gypsum handling plant as per the requirement of the specification
- oo) Satisfactory operation of compressed air system as per the requirement of the specification
- pp) Satisfactory operation of all Air conditioning and ventilation system per the requirement of the specification
- qq) Satisfactory operation of plant water system and cooling water system as per the requirement of the specification
- rr) Satisfactory operation of all other BOP (Balance of plant) systems as per the requirement of the specification
- ss) Satisfactory operation of the Auxiliary Steam and PRDS System as per the requirements of the specification.
- tt) Verification of vibration and noise emission guarantees
- uu) Environmental monitoring equipment, water quality monitoring equipment, functioning tests and verification of guarantees
- vv) Verification of active power response and voltage control response according to the requirements specified in the network connection conditions
- ww) Demonstration of proper controlling, monitoring and recording according to the requirements of the grid code
- xx) Verification of completeness of scope of supply
- yy) Verification of 24 hours uninterrupted MCR operation
- x) Owner will arrange necessary dispatch clearance (to export generated power to the grid) for initial and trial operation from Load dispatch centre
- xi) The Reliability run of the unit/plant shall be undertaken jointly with the Owner as a part of the trial operation and within the trial operation period.
- xii) The Reliability Run of the plant will be established and the Trail Operation Test shall be considered successful if, during the Trial Operation, the complete plant as an integral unit, shall be operated for minimum 720 continuous hours, on designated fuel, at prevailing ambient conditions, and achieves the following:
 - a) The plant should operate continuously on for minimum Fifteen (15) days uninterrupted at a load not less than 95% of the capacity of the plant; and
 - b) The plant should operate continuously minimum seventy two (72) hours at rated full load, in fully automatic mode i.e. with Coordinated Master Control



(CMC) on fully automatic mode. No interruption is allowed during this 72 hrs period; and

- c) During the 30 days (720 hrs) period of operation, the 800MW unit shall generate a minimum of 4896 million units (kWh) i.e. 85% of maximum possible generation at 100% TMCR, as measured at generator terminals.
- xiii) During the period of trial operation, the time of operation with any load shall be counted. Minor interruptions not exceeding thirty minutes at a time, caused during the continuous operation, shall not affect the total duration of trial operation.
- xiv) However, for longer interruption and any interruption due to defect in the equipment and sub-system or system, the owner may extend the duration of trial operation depending upon the period of interruption. In the event of interruptions to the reliability test run, for which the Bidder is responsible, the length of the reliability test run can be extended by a period equal to the total duration of the interruptions.
- xv) If such an interruption due to bidder lasts more than 24 hours, the reliability test run shall be restarted, after repairing the defect. The reliability test run may be interrupted due to bidder on a maximum of three occasions only.
- xvi) A trial operation report comprising of dates and duration of trial, observations and recordings of various parameters to be measured shall be prepared by the bidder and signed jointly by the owner and the bidder. The report shall have sheets, recording all the details of interruptions occurred, adjustments made and any minor repairs done during the trial operation. If the trial operation is established to be satisfactory, except for some minor adjustments, if any, the bidder shall prepare the plant for performance guarantee test.
- xvii) However, if the Trial Operation is not satisfactory, necessary modification/repairs to the plant/ equipment based on the observations during trial operation shall be carried out by the bidder and on completion of such works the trial operation shall be repeated again.
- xviii) The initial & trial operation shall be undertaken jointly with the owner.
- xix) After the trial operation is carried out successfully, to declare it as such, a joint protocol shall be signed among the Chief Engineer (O&M), GSECL, the Project Manager or their authorised representatives and the Bidder.
- xx) The fuel (primary and secondary) and start-up power for initial & trial operation, test/commissioning and PG Test shall be provided by the Owner.
- xxi) Moreover, for the Purpose of commissioning, trial operation and Guarantee Tests, the Owner shall provide operating personnel for operation of the equipment. Such personnel provided by the Owner shall work under the supervision of the Bidder till the Plant is taken over by the Owner.

11.00.00 PERFORMANCE GUARANTEES AND ACCEPTANCE TESTS

- 11.01.00 The term "Performance Guarantees" wherever appears in the technical specification, shall have the same meaning and shall be synonymous to "Functional Guarantees". Similarly the term "Performance Tests" wherever