BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI 620014.

CONTROLS AND INSTRUMENTATION/ FB

TECHNICAL SPECIFICATION

TRIBOELECTRIC AIRFLOW MEASUREMENT

REF: CI:ENNORE:AFM:00

REV NO.	DATE	DESCRIPTION	PREPARED S RAJESWARI	CHECKED M V RAMANA	APPROVED A K PANDA
00	05.03.18	INITIAL RELEASE	S.Rajeswari	Ramana	

1. GENERAL INSTRUCTIONS TO VENDORS:

i. The entire specification will form part of purchase order for compliance during execution.

ii. Nothing in this specification shall be construed to relieve the vendor from his responsibility. The specification covers briefly the requirement of Triboelectric airflow meter. It is the responsibility of the vendor to take care of other basic and essential requirements for the offered system.

2. PRE-QUALIFICATION REQUIREMENT:

i. The offered system shall be of proven design for a minimum duct size of 5700mm (W) X 4760 mm (H) and shall be in successful operation for a period of minimum five years in any utility boiler.

ii. Vendor to provide performance certificates / authentication letters certifying the same from end users.

iii. Commissioning and service support for the offered system shall be available in India.

iv. Documents in support of Pre-Qualification requirement shall be furnished by the vendor during offer submission.

3. SCOPE:

The scope of work includes design, engineering, manufacturing, fabrication, assembly, painting, inspection, Factory Acceptance Test, packing, supply, integrating the system at Project site (along with loose components / modules in case of loose supply of the same) with the supplied system peripherals, Erection, Commissioning (inclusive of Travel fares & accommodation of the engineers/ technicians), carrying out Site Acceptance Test and proving the performance of the system. The system shall fully comply with this specification for meeting the entire functional and operational requirement.

The scope of supply of equipment includes, but not limited to the following:

i. On line secondary air flow & velocity measurement facility on left & right side duct of boiler shall be provided by vendor for accurate, absolute and simultaneous measurement of air velocity & flow rate. The equipment shall compromise of sensors working on tribo-electric (Correlation technique) technology.

ii. The error in the measuring system shall not be more than 2 %.The scope of each steam generator shall include minimum two (02) no's of erosion free measurement sensors for each left & right side air line (Sensors quantities may also increase depending upon duct size), redundant control units (including processors, communication modules, power modules etc.), connecting cables etc. for making system complete.

iii. The system should provide 4-20mA DC output to DCS and with soft link also.

iv. Vendor shall supply all the necessary hardware package & associated system including all required interconnecting cables, power cables, from air sensor, range extenders to field cabinet, field cabinet to control cabinet and control cabinet to DCS.

v. Commissioning Spares required for successful commissioning and handing over of the system shall be included in the offer.

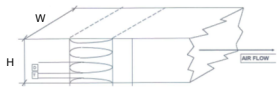
vi. The Vendor shall provide all material, equipment and services so as to make a totally integrated System together with all accessories and associated equipment's ensuring operability, maintainability and reliability. This work shall be consistent with modern power plant practices and shall be in compliance with all applicable codes, standards, guides, statutory regulations and safety requirements in force.

vii. The input power supply source of 230V AC UPS, Single phase, 50 Hz at single point (control cabinet) will be provided. Further distribution of power is in the scope of vendor. The vendor shall indicate the power required in wattage for the system.

viii. If any up-gradation of the offered system is envisaged before completion of the job to meet the specified requirements, the same shall be incorporated in the system, with the approval of the Purchaser (BHEL) without any additional cost.

ix. All equipment and dedicated cabinets required for termination and proper interface within the system and also with other systems shall be provided by the vendor.

TABLE-1

S.NO	DESCRIPTION	TECHNICAL PARAMETER
1.	**Service**	**Air Flow**
2.	Operating pressure	147 mmwC
3.	Operating Temperature	333 °C
4.	Operating velocity	15.96 m/s
5.	Operating Flow rate	898300 Kg/h
6.	Dimensions of duct	5700mm(W) X 4760mm(H) 

4. CABINETS/ ENCLOSURES/ PANELS:

Vendor shall clearly identify in his offer, the Bill of Material, the quantity of all the cabinets along with dimensional details as included in his offer.
The cabinet mounted equipment shall be fully assembled, installed in mounting racks, wired and fully tested as per specification requirements. Vendor shall ensure that the cabinets are complete and ready for installation before dispatch from manufacturing works. The installation work at project site for these cabinets should only involve cable interconnections.

The Control system cabinets shall house all types of modules / hardware to achieve all functions of Control System including signal conditioning modules, controller modules, I/O modules, communication controller modules and all other requisite hardware for a complete system.

The terminals used for terminating the spare cores/pairs of field cables shall not be used for terminating the spare channels of I/O modules.

The protection class of cabinets and environmental rating shall be IP 55 or better for outdoor location and IP 35 for indoor location. Ventilation shall be provided as required by the equipment design suitable louvers with wire mesh shall be provided on the cabinet.

1. The cabinets shall be totally enclosed, free standing type and shall be constructed with minimum 2 mm thick CRCA steel sheet or as per supplier's standard practice for similar applications.

2. In case vendor has panel in his design the height of the cabinet is 2200mm (2315 mm including base channel & anti-vibration pad). The cabinets shall be equipped with full height front and rear doors. Depth of the cabinet shall be 800mm. (Applicable for control panels to be located in CER).

3. Cabinet doors shall be SS hinged. Door latches shall be of three-point type to assure tight closing.

4. Lifting eye bolts of required size shall be provided at the top of each separately shipped section and all necessary provisions shall be made to facilitate handling without damage.

5. Cabinets shall be designed for a grounded/ installation on the building structure/ wall mounted. Any isolation from the building ground which is required by equipment design shall be provided internal to the cabinet.

6. All alarm contacts located within cabinets as well as inputs/outputs from other related system shall be suitably terminated in the cabinets.

7. Foundation bolts, double compression type cable glands for cables, cable lugs shall be supplied along with panel as loose supply items. This shall be listed separately in the packing list.

5. CABINET/LOCAL JB'S COLOUR/ACCESSORIES:

The floor mounting arrangement for cabinets shall be furnished by the vendor during detailed engineering.

Exterior: RAL7035
Interior: Brilliant white.

Name plates / labels: Vendor Standard.

6. FACTORY ACCEPTANCE TEST:

Authorization-to-ship-test (ATST) or Factory Acceptance Test (FAT) to be carried out in vendor works shall include all required tests to fully demonstrate to BHEL's satisfaction that each equipment/sub-system/system as well as software modules furnished as per this specification fully meets the functional requirements of this specification and BHEL approved drawings/documents/test procedures.

7. SPECIAL INSTRUCTIONS:

i. Vendor shall make visits to BHEL / Trichy for detailed engineering/discussion.

ii. Vendor shall attend warranty / defect calls within 48 hours.

iii. Vendor to supply the O & M manual in 'CD-ROM'

8. TRAINING:

Training on the entire Software and Hardware of the offered Tribo electric Technology Air flow meter shall be provided for a period not less than 2 man-days. Vendor shall clearly indicate the Training Schedule and Course contents for the above duration indicated, covering all the special components of the System, Application Software, System Software, Programming, and special care to be taken care during Erection of the system.

9. ERECTION & COMMISSIONING:

The complete responsibility of erection & commissioning of the system lies with the vendor.

Any spare parts / items required for the system during commissioning shall be provided by the vendor. Vendor's engineer shall bring adequate spares for commissioning of the system and non-availability of any item shall not hold up the progress of commissioning of the system in any way. Vendor shall also furnish list of spares required for successful commissioning of the system.

After Commissioning of the system, Vendor's Engineer shall get the Protocols signed by the BHEL's site Engineer and furnish the signed copies to BHEL Tirchy. Without this document, Vendor's responsibility for completion of the system and handing it over to Owner is not deemed to have been completed. Charges for vendor's visit to site towards commissioning and handing over of the system shall be included in the price. This shall be valid for the entire period of the contract.

10. DOCUMENTATION:

a. Following document shall be submitted along with the offer

1. Detailed system description/configuration/arrangement drawing, operational write-up with working principles, bill of materials, drawings, datasheets, information, technical catalogues, test certificates, material certificate, guarantee certificate, calibration certificate and other detail as required to fully establish the capability and performance of the equipment and systems offered.

2. Complete BOM for the offered system. The BOM submitted shall contain the make, model number, rating of the item. The import and indigenous content shall clearly brought out in the offer.

3. Any previous factory acceptance test reports for a similar application qualifying the accuracy of the system with respect to laboratory measurement.

4. Power requirements, details of accessories etc. required to establish product quality and scope of supply.

5. Schematic wiring drawing, general arrangement & Internal General Arrangement drawing of control panels.

6. List/description of various types of cable along with unit price.

7. Bill of materials for special cable and cable accessories (if any).

8. Signal exchange scheme with DDCMIS etc.

9. The break-up price for each component shall be furnished along with the offer, which shall be valid throughout contract period.

10. Filled in “Deviation format” with reason / justification for the deviations taken.

11. Separate offer for recommended spares for two years Operation and Maintenance which shall be valid throughout the contract period.

12. List of Commissioning Spares required for successful commissioning.

13. Requirement of electric power for utilities, service/ instrument air etc.

14. List of reference of similar system already in service.

15. All other documents not specifically mentioned here but required for completion of engineering work and proper coordination shall be unit wise.

16. Procedure for Factory acceptance test and Site acceptance test for purchaser’s (BHEL) approval.

17. Training schedule and course content.

b. <u>Offer without the above documents will be considered as incomplete / non-responsive and liable for rejection.</u>

Following documents shall be submitted after PO.

Vendor shall furnish a detailed list of documents along with the schedule for submission, after placement of PO. This list shall be furnished along with the offer.

System OGA drawing, Bill of materials with make, model nos. and applicable literature/catalogues have to be furnished within 2 weeks from the date of PO for Purchaser's (BHEL) Approval.

All final documents like GA drawing, data sheets of all components, internal arrangement drawings etc., shall be submitted.

After commissioning, if submitted drawings undergo any change, the same shall be revised suitably. The revised drawings referred to as 'AS BUILT' drawings shall be submitted to BHEL.

11. <u>O&M Manuals:</u>

The O&M manual shall contain complete details about the system including the following:

2 sets of Operation & Maintenance manuals in softcopy (CD-ROM) for each category of equipment shall be submitted within two week, from the date of inspection.

The O&M manuals shall be with sufficient detail to enable the user to maintain, dismantle, reassemble and adjust all parts of the equipment. Step by step procedure for all operations likely to be carried out during the life of the plane/ equipment including erection, testing, commissioning, operation, maintenance, dismantling and repair.

Full details and drawings of all equipment furnished the testing, operations and maintenance procedures etc. separately on each equipment.

Each manual shall also include a complete set of approved drawings together with performance/ rating curves of the equipment and test certificates wherever applicable.

Application software listing.

Relevant catalogues of all the modules / components used in the system.

Complete spare parts list, including ordering procedure and complete address(es) of spare part supplier(s).

Storage instruction of components.

Do's and Don'ts.

Testing and troubleshooting instructions.

Programming manuals.

A collection of the manufacture's standard leaflets will not be acceptable. The O&M manual shall be specifically compiled for this project.

12. QUALITY ASSURANCE PROGRAM, INSPECTION AND TESTING

Quality Plan:

The vendor shall submit the vendor quality plan along with offer for BHEL approval.

Inspection:

The complete system has to be offered for inspection by BHEL'S (wherever applicable) and the vendor shall give 30 days in advance notice for arranging the inspection after the system is fully tested and ready.

After Inspection, the equipment can be despatched only after obtaining the MDCC from customer. No material shall be despatched without MDCC.

13. PACKING:

The system should be packed with sea worthy packing.

Vendor shall be solely responsible for packing and marking of CARGO with respect to handling, transport, and storage at plant site. VENDOR shall be fully liable for proper, sufficient and adequate packing, completeness of contents, protection of contents for a storage time of minimum 2 years, and correct preparation of the packing list. All damage and costs whatsoever resulting from inadequate or insufficient packing shall be fully charged to vendor.

Packing and conservation of goods shall be sufficient to protect them from damage during transit from point of manufacturer and storage at job SITE under conditions which may involve multiple handling, extended storage, exposure to moisture and the possibility of pilferage.