TECHNICAL CORRIGENDUM DT 10.02.2024

GeM TENDER: GEM/2024/B/4430495

REVISED TECHNICAL SPECIFICATION

ACOUSTIC PYROMETER

SL. NO.	DESCRIPTION	EXISTING	APPLICABLE
1	SPECIFICATION REFERENCE	CI:1725:AP:REV00	CI:1725:AP:REV01

The revised specification is attached below;

The quote shall be according to this revised specification.

All other terms & conditions remain unchanged, other technical & commercial documents uploaded in the GeM tender, remains same for this tender, except the specification.

BHARAT HEAVY ELECTRICALS LIMITED

HIGH PRESSURE BOILER PLANT, TIRUCHIRAPPALLI 620014.

CONTROLS AND INSTRUMENTATION/ FB

TECHNICAL SPECIFICATION OF

ACOUSTIC PYROMETER

PROJECT: MAITREE STPP

CUST NO: 1725 & 1726

SPECIFICATION REF: CI:1725: AP

REV NO.	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	28.06.2019	INITIAL RELEASE	BALAJI K	BALAJI K	ASWINI KUMAR PANDA
01	28.06.2019	Revision for Cable run length	BALAJI K	BALAJI K	ASWINI KUMAR PANDA

Vendor shall duly sign and stamp all the pages of technical specification and shall submit along with offer. In case of any deviation to the technical specification, the same shall be clearly brought out in 'sub delivery enquiry deviation' format only. Only deviations indicated in 'sub

delivery enquiry deviation' format and accepted by BHEL in writing will be considered in the event of an order.

1.0 GENERAL INSTRUCTION:

The specification covers briefly the requirement of Acoustic Pyrometer.

Nothing in this specification shall be construed to relieve the vendor from his responsibility. It is the responsibility of the vendor to take care of all the basic and essential requirements for the offered system.

In the event of order, the entire specification will form part of purchase order for compliance during execution.

2.0 SCOPE OF SUPPLY AND WORK:

The scope of work includes design, engineering, manufacturing, quality inspection, packing, supply, integrating the system at Project site (along with loose components/modules in case of loose supply of the same), erection assistance and supervision, Commissioning (inclusive of Travel fares & accommodation of the engineers/ technicians), carrying out site acceptance tests, proving the performance of the system and handing over the system to customer. The system shall fully comply with this specification for meeting the entire functional and operational requirement.

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

a. Acoustic Transceivers along with all accessories required to determine the average flue gas temperatures and complete flue gas temperature profile based on proven technology shall be provided **at Furnace Exit plane (8 nos.) and Economizer outlet plane (8 nos.) per Boiler/Steam Generator.**
(Note: Separate acoustic signal generator and acoustic signal receiver are not acceptable. Acoustic transceivers only shall be offered).

b. To Mount Acoustic Transceivers (Sensors), 170mm diameter opening will be provided and further details are as below:
   - **At Furnace exit plane:** 2 Nos. each on left & right at elevation 49577mm and 2 Nos. each on front & rear side at elevation 49500mm
   - **At Economizer outlet:** 3 Nos. each on left and right side at elevation 36029mm. 2 nos on front side only at elevation 36029mm. Acoustic opening is not envisaged at rear side.

   (Refer Annexure-I)

c. Vendor shall consider the maximum required meter cable length from Sensor to field JB as per OEM standard.

d. Vendor shall consider 325m cable run length from Field JB to CER (Control Equipment Room) panel for unit #1 & unit #2 respectively.

e. Vendor to guarantee that the system performance will be optimum for a cable run length of 350m from Field JB to CER panel. Vendor to take care of the necessary changes required in the design like relocation of I/O panels, providing additional amplifiers, signal repeaters, converting from voltage signal to current signal etc. so as to meet the requirement. It is not possible to make any alterations in the cable run length and there are no other Air conditioned rooms other than the CER to place the control panel.

f. Vendor shall consider 80m cable run length from Control Equipment Room (acoustic pyrometer remote panel to be placed in CER) to Control room (DCS and PC located in control room).

g. One feeder of 240VAC, Single phase, 50 Hz, UPS at single point in Control Equipment room (near Acoustic Pyrometer remote panel) will be provided for each measurement plane (Total 2 feeders per boiler). Further distribution of power required for acoustic pyrometer system is in vendor scope. Any other voltage required for the system shall be derived by the vendor. Vendor shall indicate the power required (in wattage) for the system in the offer.

h. For each PC (acoustic pyrometer workstation), one feeder of 240VAC, single phase, 50Hz UPS power supply will be provided in Control room by BHEL.

i. Instrument air will be provided at single point near each plane with 2 inch tapping. Further distribution of instrument air is in vendor scope.

j. Any modifications required for installing vendor's equipment in the existing to be in vendor's scope.

k. Necessary control cabinet, isolation valves, solenoid valves, root valves, piping, tubing, instruments, hoses, Junction boxes and erection material for field JB etc. as required shall be provided by the vendor.

l. Erection materials and supporting structures required for the system shall be estimated and supplied considering the furnace expansion as below. Necessary supporting required for system shall be designed considering the boiler movements.

   Furnace expansion in horizontal direction - upto 39mm sideways
   Furnace expansion in vertical direction - upto 150mm downward

m. Vendor shall consider all the necessary hardware, cables, cable gland, lugs and connectors for the entire system in their scope. The cables from field to control room will be laid in existing cable trays available at site. If separate cable trays are recommended by OEM from field to control room for system performance, the same also to be considered by the vendor. This includes supply of all power cables (for internal distribution), all required interconnecting cables from sensor to field cabinet, field cabinet to control cabinet, control cabinet to DCS and control cabinet to PC. Any protection requirement for field cabling like conduit etc. shall be considered by the vendor. Double compression brass cable glands and annealed tinned copper lugs shall be provided.

n. For each temperature measurement plane/section, a PC based system complete with all required software, comprising of minimum eight nos. of acoustic transceiver each for FEGT and ECO outlet (total 16 Nos per boiler), signal processor, interface unit, PC, full colour VDU display and colour printer shall be provided.

o. Vendor shall also include in his proposal and shall furnish all equipment, devices and services which may not be specifically stated in the specification but are needed for completeness of the equipment/systems furnished by the vendor and for meeting the intent and requirements of the specification.

p. 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.

q. 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.

r. Proving and fulfilling the functional requirements of the system solely rests with the vendor.

s. 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.

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

u. The system will erected by BHEL based on the erection drawings furnished by the vendor. Cable laying from field to control room is will also be done by BHEL. Vendor shall provide erection assistance and supervision of erection as requested by site. Any erection job involving expertize shall be done by the vendor.

v. The complete responsibility of commissioning of the system and handing over the system to End user/customer lies with the vendor.

w. 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.

x. After commissioning of the system, vendor shall get the final acceptance Protocols signed by the End User/Customer. Without this document, vendor's

responsibility for completion of the system and handing it over to customer 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 offer. This shall be valid for the entire period of the contract.

3.0 FUNCTIONAL REQUIREMENTS:

3.1 System requirements

a. Acoustic pyrometers shall be provided to determine the average flue gas temperatures and complete flue gas temperature profile at furnace exit plane (for FEGT measurement) and at economizer outlet with **minimum 8 nos. of transceivers per plane.**

b. The system shall be able to eliminate the varying high noise environment both in and out of operation boiler.

c. The measuring range shall be sufficient to cover the entire regime of boiler operation and shall not be less than 1900°C. The mean temperature and profile temperature accuracy shall be ± 2% & ± 4% of reading respectively or better. Full colour display and colour printer output shall be provided. The system should provide 4-20mA DC (measuring range) output to SG control system and DCS.

d. The transit time of each of the associated transmitters/receivers shall be transmitted to the DCS for archiving and analysis through suitable interface.

e. A temperature profile shall then be determined and displayed by analysing the mean temperature across every transit section. The time interval to make a complete cycle or eight transceivers shall be less than one minute.

f. The transducers shall not be placed directly in the hot gas stream.

g. The components to be located in the boiler area shall be able to withstand the stringent environmental condition expected at such locations with operating boiler.

h. System shall be provided with high speedy technology, so that system can collect minimum 16 paths simultaneously. The system shall be capable to measure every path in both directions simultaneously. Every path shall be measured two times (back and forth) after transmit cycle (each transceiver has transmitted once).

i. Special attention shall be given in the design for inspection, removal, replacement, cleaning and protection of any of the component parts of the acoustic pyrometer.

3.2 HMI

a. Each temperature measurement plane/section shall have its own independent signal processor unit (server if applicable), PC based complete system with all required software, interface unit along with accessories etc. All software & interface hardware required for presenting visual information on real time or historical gas temperatures including spatial temperature distribution profiles individual path temperatures, temperature trends & average gas temperature within defined area shall be provided by the vendor.

b. The HMI shall consist of an Industrial grade PC (Latest Intel processor or better), 21" Colour monitor, 500 GB hard disk, CD/DVD drive, I/O cards, key board, mouse and printer interfaces. The PC shall have effective protection from malware, virus, etc. by using state-of-art software. The Operating System, Application Software, Anti-virus software etc. shall have a full license and there shall be no recurring costs towards the software for upgrade or repair installations.

c. Detailed specification of the HMI system shall be furnished along with the offer.

3.3 Junction box / Panel.

~~a.~~ All system modules, power supply components, other control devices (except field mounted sensors/transmitters) which are required for completeness of the system shall be housed in Panel and the same shall be mounted in CER. Vendor to furnish the dimensional details of JB/Panel.

b. Vendor shall furnish the internal layouts of CER JB's/Panel and field JB's wiring terminal details.

c. Field JB's shall be totally enclosed with IP 65 as per EN 60529 constructed with minimum 2mm thick stainless steel suitable for wall/column/structure mounting.

d. CER Panel shall be totally enclosed with IP 54 as per EN 60529 constructed with minimum 2mm thick CRCA Steel suitable for floor mount (floor mount panel height shall be 2200mm + plinth 100mm+ anti vibration pad 15mm) Exterior paint shade: RAL7035 and Interior paint shade: RAL7035.

e. CER Panel door latches shall be of three-point type to assure tight closing with locking, lighting and lifting arrangement.

f. Foundation bolts shall be supplied along with panel as loose supply items. This shall be listed separately in the packing list.

4.0 SPECIAL INSTRUCTIONS:

a. Vendor shall make visits to BHEL-Trichy for detailed engineering/discussion, if required.

b. The entire system shall not contain any asbestos material.

5.0 TRAINING

a. Training on the entire software and hardware of the offered Acoustic Pyrometer shall be provided for a period not less than 5 man-days to 4 engineers. 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 and maintenance of the system.

6.0 DOCUMENTATION

Following document shall be submitted along with the offer

a. Filled in technical datasheets, Schematic wiring drawing, general arrangement & Internal General Arrangement drawing of control panels. Signal exchange scheme with DDCMIS etc.

b. Detailed system description/configuration/arrangement drawing, operational write-up with working principles, drawings, technical catalogues.

c. Complete BOM for the offered system. The BOM submitted shall contain the make, model number, rating of each item. The import and indigenous content shall be indicated in the offer.

d. Power requirements, Air requirements (in Nm3/hr), details of accessories etc. required to establish product quality and scope of supply.

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

f. Filled in "Deviation format" with reason / justification for the deviations taken. If there are no deviations the fully filled up format shall be returned indicating "No deviation".

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

h. List of Commissioning Spares required for successful commissioning.

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

j. All other documents not specifically mentioned here but required for completion of engineering work.

k. Vendor quality plan, procedure for Factory acceptance test and Site acceptance test for purchaser's(BHEL) approval.

l. Training schedule and course content.

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

Following documents shall be submitted after PO.

a. System OGA drawing, consolidated Bill of materials with make, model nos., datasheets of all the components, panel layout and internal arrangement drawings and applicable literature/catalogues have to be furnished within 2 weeks from the date of LOI for Purchaser's (BHEL) Approval. All drawings for approval shall be submitted.

b. 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.

c. Technical write-up giving principle of operation.

d. Configuration diagrams of the PC –based system and total schematic drawing giving interconnection between various system components, power supply etc.

e. Installation and mounting drawing for the acoustic pyrometer and its accessories.

f. Interconnection scheme and cable schedule.

g. Detailed technical literature giving system description, all technical parameters, installation procedure & precautions, trouble-shooting and maintenance procedure etc.

h. 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.

O&M Manuals:

a. Complete Operation & Maintenance manuals in softcopy ".pdf" file format shall be submitted.

b. User manual for use of the PC-based software.

c. 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 equipment including erection, testing, commissioning, operation, maintenance, dismantling and repair.

d. The O&M manual shall be specifically compiled for this project.

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

a. Each manual shall include a complete set of approved drawings together with performance/ rating curves of the equipment and test certificates wherever applicable. Operations and maintenance procedures separately for each equipment.

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

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

d. Storage instruction of components.

e. Do's and Don'ts

f. Testing and troubleshooting instructions.

g. Programming manuals

7.0 QUALITY ASSURANCE PROGRAM, INSPECTION

a. Quality Plan:

- Vendor shall submit a Quality Plan (QP), covering the various tests (Routine, Functional, Type tests) conducted from Initial stage to finished product .
- Inspections will be carried out as per BHEL & Customer approved VQP.
- Any comments raised by Customer in quality plan during document approval stage, shall be taken care of the by the vendor without any cost implication.

b. Inspection:

- The complete system has to be offered for inspection by BHEL/Customer (wherever applicable) and the vendor shall give 30 days' 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 (Material Despatch Clearance Certificate) from customer. No material shall be despatched without MDCC.

8.0 PACKING:

a. The system should be packed with sea worthy packing.

b. 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.

c. 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.