Name of Work : EXPRESSION OF INTEREST FROM INDIVIDUALS / AGENCIES FOR BURNER MANAGEMENT SYSTEM OF WALL FIRED BOILERS.

Enquiry No : **BHEL: WCM: EOI:2018-01/ 04.08.2018**

EXPRESSION OF INTEREST

BHARAT HEAVY ELECTRICALS LIMITED

TIRUCHIRAPPALLI-620 014

WORKS CONTRACTS MANAGEMENT

1.	EOI Ref No:	**BHEL:WCM:EOI:2018-01/ 04.08.2018**
2.	Name of works	**EXPRESSION OF INTEREST FROM INDIVIDUALS / AGENCIES FOR BURNER MANAGEMENT SYSTEM OF WALL FIRED BOILERS**
3.	Location of work	BHEL, TRICHY-14
4.	EOI Document details	Description — Pages Part-I : Techno commercial bid (Contractor's Profile and Qualifying Criteria) — 02 Part-II : Scope of Work — 09
5	Address for Seeking Clarifications	**Sri. A. Sriram** **Deputy Manager, R & M Engineering** **BHEL Trichy-14** **Mob: 94421 40244** **e-mail: sriram.a@bhel.in**
6.	Address for Sending EOI Offer.	**Senior Manager** **Works Contracts Management (WCM)** **Building 53, First Floor,** **BHEL-High Pressure Boiler Plant,** **Trichy – 620 014**
7.	Last Date for submission of EOI offer	30.08.2018/ 10:00 Hrs.
8.	Date of Opening of EOI Offer	30.08.2018/ 10:30 Hrs.

Expression of interest is invited for the scope as given below from interested Individuals/Agencies **as Consultant** who meet the below mentioned eligibility, qualification criteria and past experience.

The broad scope of requirement shall involve the offering of the following engineering consultancy services pertaining to renovation and modernization activity for a utility steam generator of Wall Fired design firing Pulverized coal with oil support.

(a) Complete design and engineering of Burner Management System **(**BMS).
(b) Complete design and engineering of existing wall fired burners, compatible burner air registers with actuators, selection of Igniters, Scanners and Oil gun assembly.
(c) Service and support till smooth commissioning and handing over of the above systems to end user.

Contractor Signature

Contractor Seal

Name of Work : EXPRESSION OF INTEREST FROM INDIVIDUALS / AGENCIES FOR BURNER MANAGEMENT SYSTEM OF WALL FIRED BOILERS.

Enquiry No : **BHEL: WCM: EOI:2018-01/ 04.08.2018**

PART-I (TECHNICAL BID)

A: Contractor's Profile (General details)

1.	Name of the Agency /Company /vendor.	
2	Status of the Agency / Company / vendor	( ) Public Limited; ( ) Private Limited ( ) Partnership Firm ( )Single Ownership
3	Address of the Agency /Company /vendor:	
4.	Phone No.:	
5.	E-mail Address:	
6.	Name and Contact details of person for communication related to this EOI	
7.	BHEL Vendor Code (If any)	

.

Contractor Signature

Contractor Seal

Name of Work : EXPRESSION OF INTEREST FROM INDIVIDUALS / AGENCIES FOR BURNER MANAGEMENT SYSTEM OF WALL FIRED BOILERS.

Enquiry No : **BHEL: WCM: EOI:2018-01/ 04.08.2018**

B: Qualifying Criteria:

	Technical Competence : (The agency shall meet all the following requirements as on the date of submission of offer)	
1	The individual/agency should have successfully carried out/ supported in design, engineering, manufacturing, erection, commissioning and performance testing of Wall fired boilers of capacity 200 MW or more with burners capable of firing pulverized coal and oil. Such commissioned boilers & burners should have been in satisfactory commercial operation for a period of not less than one (1) year as on the date of Bid submission.	(To be substantiated with a performance certificate from the end-user as documentary proof).
2	The individual/agency should have own engineering/design facility for Burner Management System (BMS) and have a minimum of five (5) years of experience in designing and supplying Burner Management System consisting of safety logics pertaining fuel oil firing system, coal firing system and unit common interlocks for Wall fired boilers of capacity 200 MW or more.	(To be substantiated with documentary proof).
3	The individual/agency should have designed, engineered, supplied and commissioned Burner Management System for Wall Fired Boilers of capacity 200 MW or more with Burners capable of firing pulverized coal and oil.	(To be substantiated with a performance certificate from the end-user as documentary proof).
4	List of Projects to be submitted as a proof of experience executed by the agency shall have been in successful commercial operation for a period of not less than one (1) year after commissioning of the same.	

Contractor Signature

Contractor Seal

Name of Work : EXPRESSION OF INTEREST FROM INDIVIDUALS / AGENCIES FOR BURNER MANAGEMENT SYSTEM OF WALL FIRED BOILERS.

Enquiry No : **BHEL: WCM: EOI:2018-01/ 04.08.2018**

PART-II (SCOPE OF WORK)

1.0 INTRODUCTION:

The broad scope of requirement shall involve the offering of the following engineering consultancy services pertaining to renovation and modernization activity for a utility steam generator of Wall Fired design firing Pulverized coal with oil support.

- Complete design and engineering of Burner Management System (BMS).
- Complete design and engineering of existing wall fired burners, compatible burner air registers with actuators, selection of Igniters, Scanners and Oil gun assembly.
- Service and support till smooth commissioning and handing over of the above systems to end user.

2.0 EXISTING BOILER DETAILS

The steam generator is of radiant type, two pass, with reheat system, opposed wall fired furnace, supplying 680 TPH steam to a 210MW turbo generator. The boiler is provided with auxiliary equipment necessary to fire pulverized coal, furnace oil and light oil.

The feed water, preheated in forced flow section (economizer section), passes via the steam drum and four down-comers to the inlet boxes of water tube walls arranged around the furnace, super heater enclosure and then flows upward through tubes and riser pipes to steam drum by natural circulation. Saturated steam from steam drum is heated in the primary, platen and final super heaters and it passes through the outlet manifold to the inlet of the turbine first stage emergency stop valve (ESV). Steam temperature is controlled by two stage direct contact spray attemperators, mainly by first stage placed between primary and platen super heater while the final trimming by second stage is carried out in between the platen and final super heater.

Portion of steam from turbine first HP stage is extracted for feed water heating and the balance quantity passes through re-heater and returns to the inlet of the interceptor valve of second stage or IP turbine. Reheat steam temperature is controlled by gas proportioning dampers and two direct contact emergency spray attemperators provided in parallel at the re-heater inlet pipes and also by recycling of gas from the ID fan discharge to furnace hopper bottom. Flue gas proportioning dampers are located at the outlet of front and rear forced flow section, to regulate gas flow through primary super-heater and horizontal re-heater banks.

Contractor Signature

Contractor Seal

2.1 DETAILS OF EXISTING FUEL BURNING EQUIPMENT

2.1.1 P.F. Burners: 24 numbers P.F. burners, circular turbulent type, having throat diameter 838.2 mm complete with air registers are arranged in two horizontal rows in the front wall & two horizontal rows on the rear wall.

2.1.2 Fuel Oil Firing Equipment: LU & Stabilizing Burners: 24 numbers lighting up and combustion stabilizing, Y-jet oil burners 12 at the front wall and 12 at the rear wall with electric FFY igniters are arranged for lighting up compatible with BMS system and with local manual operation facilities. 20 numbers of LU (Light up) burners contribute to 10 % BMCR. Presently, igniters are not available.

2.1.3 Load carrying burners: Four numbers load carrying **burners** with a total capacity sufficient to produce up to 25% boiler MCR are originally provided. These four burners are suitable for fitting to any one of the six mills burner groups.

2.1.4 Mills: Six numbers Babcock and Wilcox supplied 8.5 E 9 type large ball slow speed, vertical type, Ball and Race Mill are provided for supplying required coal quantity to the boiler. The system is of HOT PA type. Each mill is provided with a separate PA fan and seal air fan. The mill is provided with one inlet pipe and two discharge pipes. Each Mill outlet pipe shall be further divided into two pipes by using a coal pipe splitter. Each Mill is catering to four burners.

3.0 BROAD SCOPE OF REQUIREMENT:

The broad scope of requirement shall involve the offering of the following engineering consultancy services pertaining to renovation and modernization activity for Wall fired boiler firing Pulverized coal with oil support.

a) Complete design and engineering of Burner Management System **(**BMS).
b) Complete design and engineering of existing wall fired burners, compatible burner air registers with actuators, selection of Igniters, Scanners and Oil gun assembly.
c) Service and support till smooth commissioning and handing over of the above systems to end user.

Note: The scope of work is limited to design/detailed engineering/services as described in the relevant sections. No supply of components/equipment/material is envisaged.

Contractor Signature

Contractor Seal

3.1 DETAILED SCOPE OF WORK

3.1.1 Complete design and engineering of Burner Management System (BMS) for Wall fired Boilers.

a. Development of Complete Conceptual and Detailed engineering of logic for the Wall fired furnace Burner Management system (BMS) of a Pulverised coal and oil fired boiler as part of renovation activity.
b. Offering necessary support during engineering implementation, site commissioning phases of the Burner Management system logic and successful handover of the Burner Management System to end-user.
c. Undertaking preliminary Site Visit after placement of Purchase Order to
    - Collect necessary site data with respect to the existing Burner Management System.
    - Understand process and control requirement for proposed Burner Management system renovation.
    - Assess the existing site condition of Field instrument, Field equipment, missing field equipment/instrument and actuator interfaces of the proposed Burner Management system.

Note: During the design and engineering of BMS, it may happen that the required data/ drawing/ document may not be available at site. In such eventuality, the bidder has to use its own expertise to complete the BMS design.

d.
    i. Development of the Process and instrumentation diagram of air and flue gas system, fuel oil system, coal firing and pulveriser system & steam and water system.
    ii. Design and engineering of the Burner Management system for the wall fired boiler furnace based on site visit. Operational philosophy of fuel firing equipment for BMS logics development.
e. Generating BMS logic for the Wall fired boiler furnace along with complete system description of the BMS logic. The generated logic shall be in compliance with NFPA 85, 2015 safety standard. Format for logic template will be provided to the bidder after award of contract.
f. Generating the field interconnecting diagram for BMS.
g. Obtaining necessary contractual engineering document approvals from Employer (BHEL) and end-user for the generated logic, description and interconnection diagram.
h. Engineering support during implementation of the approved BMS logic in Employer's safety system hardware.
i. Engineering support during Functional checking of implemented BMS logic in Employer's safety system hardware (including Factory visit) during the system Factory Acceptance Testing.
j. Technical support during commissioning of the implemented BMS logic at site.
k. Undertaking visits to the site and meetings (a minimum of four visits) as required to fulfil activities as mentioned in the points g, h, i and j of this section.
l. To provide the necessary support at Site for successful demonstration of the implemented BMS logic during the Site Acceptance Test.
m. To extend support to Employer (BHEL) till successful handing-over of the BMS system with the implemented logic to the end-user.

Contractor Signature

Contractor Seal

3.1.2 Complete design and engineering of existing wall fired burners, compatible burner air registers with actuators, selection of Igniters, Scanners and Oil gun assembly for Wall fired Boilers.

Following details, documents and drawings are required from the successful bidder.

1. Arrangement drawing of burners and its components, including air register, oil guns, flame scanners, igniters, air register actuators and other necessary mountings and instruments.
2. Detailed/manufacturing drawing of burners and its components, including air register with actuator, oil guns, guide pipes for flame scanners, guide pipes for igniters, guide pipes for oil gun and other necessary mountings. The manufacturing drawing shall contain Bill of materials specifying the details like quantity, weight (in kgs), material specification, dimensions (in mm), etc., for each item.
3. Actuator selection for air register and mounting details, including type of actuator, locations, operation philosophy, etc.
4. Manufacturing drawing of the oil gun including part drawings of all items which are part of it.
5. Igniters type, selection criteria, procurement specification and necessary arrangement drawings. (Preferably HEA igniters).
6. Flame Scanner type, selection criteria, procurement specification, Datasheet and necessary arrangement drawings.
7. Detailed drawings of Oil gun guide pipe, scanner guide pipe, igniter guide pipe, peep hole, etc.
8. Detailed scheme and arrangement drawings of Scanners cum gun cooling air fan system with two fans (1 AC and 1 DC) with essential instrumentation. The above document shall clearly specify the air quantity required for proper operation of scanners, oil gun and igniters.
9. Various utility requirements like steam, compressed air, instrument air, purge air, cooling air, etc., for smooth operation of burners.
10. Selection criteria and detailed drawing of mill discharge valve.
11. The burners and its components manufactured based on the details and drawings furnished by the bidder, shall be suitable for the subject boiler mentioned in the Section 2.

Note: For the list of documents/drawings deliverables, bidder shall refer to section 8.0.

3.1.3 Service and support till smooth commissioning and handing over of the above systems to end user.

As per scope of work mentioned in section 3.1.1 and 3.1.2, the bidder shall extend all required service and support, as and when necessary, through clarification/ documentation/ drawings/ site visit, etc., till smooth commissioning and handing over of the above systems to end user.

4.0 EXCLUSIONS.

1. Supply of Burners, air registers with actuator, igniters, oil guns, flame scanner system and scanner air fan system.
2. All Supply and installation of BMS system hardware (Processors, I/O modules and accessories), field equipment, instruments and interconnecting cables.
3. Design/engineering of all systems other than specified under the scope of work.

Contractor Signature

Contractor Seal

5.0 DETAILED TECHNICAL SPECIFICATION

5.1 BURNERS

The bidder to provide detailed drawings of the Horizontal, Circular turbulent Burner with air register for existing Wall fired boiler of 210 MW capacity, capable of firing coal and oil. The existing boiler details and burner details are covered in section 2. The burners that are proposed for manufacturing based on bidder drawings shall be able to fit in the burner opening of throat diameter of 838.2 mm. The burners are arranged in the two rows of 6 burners each, on the front and rear walls of the furnace.

5.2 AIR REGISTERS

The bidder to provide detailed drawings of the air registers to control the air entry into the burners and also regulate the wind box pressure to the required set point for proper combustion inside the furnace. The air registers shall be of proven design and should match with the existing burner with respect to performance and safety. The bidder to visit the site to collect details of existing burner and air register. The air registers shall be part of the burner described in section 5.1.

Air registers are to be designed with actuators at burner's front with suitable arrangement to control it from DCS. Suitable actuators and all necessary arrangements for the operation of air registers from DCS are to be included in the design and required logic is to be incorporated in the BMS. The air register logic shall include all necessary interlocks required for automatic and safe operation, as applicable. The air register that is manufactured with bidder drawings shall be suitable for retrofitting in the existing burner. The air register actuator shall be capable of positioning the air register from DCS to meet various operational condition like purge condition, oil firing condition and coal firing condition and shut off condition.

5.3 OIL GUNS

The boiler was designed with 24 light up guns and 4 load carrying guns capable of firing HFO and LDO. The bidder to furnish the drawings of Load carrying guns and Light up guns. The oil firing philosophy provided by the bidder to include the LU gun and LC gun deployment criteria. The required atomisation mediums (air / steam) parameters and oil parameters (HFO/LDO) like (flow, pressure and temperature) for firing HSD / HFO are to be specified by the bidder in their proposal. The cooling air requirement for oil guns has to be specified by the bidder in the technical proposal.

5.4 IGNITORS

The bidder to select igniter (preferably HEA) for lighting up oil fuel which shall be suitable for the above specified burner. The bidder to provide igniter selection criteria, technical data etc. The igniters shall be of advance and retractable type. The bidder has to provide data on requirement of utilities such as electrical power, cooling air etc., for the selected Ignitors.

5.5 FLAME SCANNING SYSTEM

The bidder has to design a Flame scanning system compatible to the burners specified in section 5.1 for reliable flame scanning. The Flame Scanning system shall be capable of sensing coal and oil flames, detecting the individual burner flame and discriminating between the fuel oil and pulverised coal flame in the burner specified in section 5.1. The selected Flame Scanning system shall be provided

with Fail Safe, easily maintainable flame scanners of proven design for the type of fuel(coal, oil), environmental condition and of established reliability for the type of Burners/Steam Generator. Bidder to select and recommend suitable type, number and location of the Flame Scanners required for reliable flame scanning. The type, number and location of Flame Scanners shall be such that fail-safe flame detection and fuel discrimination is ensured throughout the entire operating range of the steam generator. The Flame scanning system shall conform to NFPA recommendation. The selected Flame Scanner shall detect only the flame from the burner to which it is assigned and shall not respond to the adjacent and background flame or any other radiation generated in the furnace. The design shall also take into account any radiant absorption by coal shroud, recirculated dust or other deposition on the flame scanner head. The complete system shall provide safe discrimination between oil and coal flame. The flame signal available from the selected Flame scanner sensing head shall be suitable to be processed in rugged, proven, reliable electronic processor.
The flame scanners selected shall work under all adverse conditions such as wide variations in fuel characteristics, under interruption of cooling air supply and shall be immune to Electromagnetic Interference (EMI).
The flame scanners selected shall be capable of generating

a) Individual Oil/Coal flame intensity indications as isolated 4-20 mA DC signals that can be hooked to DCS.
b) Individual potential free contacts for 'oil flame ON', 'coal flame ON' and 'scanner fault'.

The bidder has to provide data on requirement of utilities such as electrical power, cooling air, etc., for the selected Flame Scanning system. Bidder shall provide technical specification, data sheet and recommended inspection plan for Flame scanner. Based on the specification provided by the bidder, employer (BHEL) will procure. After award of contract, Bidder shall be involved in the procurement process of Flame scanner and offer evaluation of the qualified flame scanner vendor. Bidder to offer a recommendation for a minimum of three different makes of the flame scanning system.

5.6 SPECIFICATION FOR LOGIC DEVELOPMENT FOR BURNER MANAGEMENT SYSTEM

1. The Logic for the burner management system (BMS) offered shall be capable of ensuring Safe start-up, Safe operation and Safe-shutdown of the fuel firing system and its auxiliary equipment under all boiler operating conditions. The logic for BMS shall include all the relevant key components, including the common boiler protection interlock logic, Coal milling system interlock logic, the Oil firing system interlock logic and FD & ID fan interlock logic.

2. The logic shall be implementable in a microprocessor based system, based on hardware and software specifically designed for Burner Management application provided to achieve the Boiler protection action e.g. master fuel trip (MFT), control of mills & fuel oil systems etc.

3. The BMS Logic shall incorporate the critical safety functions such as.

    - Furnace purge supervision.
    - Boiler trip protection.
    - Logics for automatic furnace purging post boiler trip.
    - Overall boiler flame monitoring and flame failure protection.
    - First out trip condition monitoring.
    - Loss of all fuel trip protection.
    - Permit to light ignitors.

Contractor Signature

Contractor Seal

- Logic for Automated Start-up, Monitoring, Shutdown and Tripping of Fuel oil burners and associated auxiliary equipment.
- Logic for Automated Start-up, Monitoring, Shutdown and Tripping of Milling system and associated auxiliary equipment.
- Preferential tripping of mills on loss of one FD fan.
- Automated Start-up, shutdown and tripping of PA and SA fans.
- Automatic Start-up, shutdown and tripping of ID fans.
- Automatic Start-up, shutdown and tripping of FD fans.
- Logic for Fast cutback / runback of Boiler on loss of critical auxiliaries like ID, FD, BFP etc.
- Automatic control of the secondary air register for different operational conditions like a furnace purge, all combinations of oil and coal firing, boiler tripping and post trip furnace purging.

4. The essential features of the BMS logic shall include, but not limited to:

- Prevent any fuel firing unless a satisfactory purge sequence has first been completed.
- Prevent startup of individual fuel firing equipment unless associated permissive interlocks have first been satisfied.
- Prevent startup of ID and FD fans unless associated permissive interlocks have first been satisfied.
- Monitoring and control equipment sequencing during start-up, controlled shutdown and emergency shutdown of fuel firing equipment.
- Provide equipment status feedback and annunciation to the unit operator.
- Provide flame monitoring when fuel-firing equipment is in service and effect a burner trip or master fuel trip upon warranted firing conditions.
- Continually monitor boiler conditions and actuate a master fuel trip (MFT) during adverse operating conditions which could be hazardous to equipment and personnel.
- Reliably operates and minimize the number of false trips.
- Logic shall provide a relay based master fuel trip independent of processors and I/O modules to provide a completely independent trip path.
- Include a first out feature in all controllers to identify the cause of any burner trip or boiler trip.
- Design of the Logic shall be complete with a BMS self-diagnostic feature that can immediately identify and annunciate to the operator presence of any system module failure
- Allow the automatic start and stop of oil burners based on boiler load. The sequence on which burner will be started or stopped will be selected by the operator from an OWS/ LVS display.
- Incorporate unit runback logics on loss of critical auxiliary equipment failure.
- Continuous operation of fuel firing equipment and auxiliaries till associated safety interlocks remain satisfied.
- Allow oil burners and igniters to be started, stopped and tripped on a burner basis.

5. The logic for the BMS shall be capable of automatic self-monitoring of the healthiness of system hardware & software and transfer the process to failsafe condition on malfunction detection. The logic shall be designed such that any single fault either in primary sensor, I/O modules, and multifunction controllers should not result in loss of the safety function. The

Contractor Signature

Contractor Seal

logic shall be capable of annunciating all the faults to the operator right at the time of its occurrence and also for alarm annunciation system. The BMS shall meet all applicable safety requirements, including those stipulated in the latest editions of NFPA 85 or similar international standards. Bidder shall certify compliance of the design of the BMS logic for this project to applicable safety requirements, including those stipulated in the latest editions of NFPA 85 or similar international standards. The configuration of the MFT logic of BMS provided shall be fail safe. The exact implementation shall be subject to Employer's approval during detailed engineering.

6.0 PERFORMANCE ASPECTS

6.1 GENERAL REQUIREMENTS

The components mentioned in the scope of work shall be designed for maximum reliability, availability, operability and maintainability particularly in respect of the following:
The components shall be of proven design, using proven materials with well-established physical properties and as appropriate to the service as intended. The retrofitted system shall be suitably designed with required instrumentation for safe start, safe operation and shutdown without causing any problems.

6.2 UNBURNT CARBON.

The bidder in their technical proposal shall mention the unburnt carbon percentage expected in fly ash and bottom ash after installation of the new air registers that are manufactured with bidder drawings.

6.3 FLAME SENSING FOR COAL AND OIL

The flame scanner shall indicate flame only when flame is present in the respective burners. The flame scanner shall not indicate the flame when there is no flame present in the respective burner. The bidder shall support in demonstrating the performance of flame Scanners in cold start up and load condition. In cold start up, capability of flame Scanners to detect oil flame under varying oil pressure shall be demonstrated. In load condition, the selected flame Scanners shall be able to detect presence of oil flame, the presence of coal flame independent of each other demonstrable for each burner group. Any shortfall in flame scanner performance at the site, if observed, shall be resolved by the bidder by modification recommendation to bridge the same without any implication.

7.0 SUPPORT DURING ERECTION AND COMMISSIONING

Bidder's Scope shall include adequate support for erection supervision and smooth commissioning required for successful performance demonstration of all equipment and systems indicated in **clause 3.0 of the scope of work**.

The bidder shall support in commissioning checks at site on all the equipment and the systems that are newly designed by the bidder or equipment and the systems which were modified **based on the inputs furnished by the bidder.** Commissioning checks shall ensure satisfactory performance of the equipment / system as whole and to check its integration with steam generator.

Contractor Signature

Contractor Seal

8.0 DOCUMENTS AND DELIVERABLES REQUIRED FROM THE BIDDER

All the deliverable shall be submitted in editable soft format. All the drawings, schemes and logics shall be submitted in the latest AutoCAD format (.dwg). All approved as built drawings shall be handed over to the employer in triplicate CD format. Engineering review and approval mechanism will be finalised on award of contract.
As part of scope detailed in 3.1.1 and 3.1.2, following documents/drawings are to be submitted during the contract stage by the bidder:

1. Arrangement drawing of burners and its components, including air register, oil guns, flame scanners, igniters, actuators of air register and other necessary mountings and instruments.
2. Detailed/manufacturing drawing of burners and its components, including air register with actuator, oil guns, guide pipes for flame scanners, guide pipes for igniters, guide pipes for oil gun and other necessary mountings. The manufacturing drawing shall contain Bill of materials specifying the details like quantity, weight (in kgs), material specification, dimensions (in mm), etc., for each item.
3. Actuator selection for air register, mounting details, including the type of actuator, locations and procurement specification.
4. Operation philosophy and interlock logics pertaining to the air register system
5. Operation philosophy of fuel firing system/burners and its components.
6. Igniter type, selection criteria, procurement specification and necessary arrangement drawings.
7. Flame Scanner type, selection criteria, procurement specification, data sheet and necessary arrangement drawings.
8. Manufacturing drawing of oil gun including part drawings of all items.
9. Detailed drawings of Oil gun guide pipe, scanner guide pipe, igniter guide pipe, peep hole, etc.
10. Detailed scheme and arrangement drawings of Scanner air cum gun cooling system with two fans (1 AC and 1 DC) and essential instrumentation required for scanner air system. The drawing should clearly specify the scanner air capacity required for proper operation of scanners.
11. Various utility requirements like steam, compressed air, instrument air, purge air, cooling air, etc., for smooth operation of burners. Bidder to indicate the requirement in terms of pressure, temperature and flow etc.
12. Air register characteristic curve.
13. Oil gun characteristic curve
14. BMS control description
15. BMS Logic.
16. BMS field interconnection diagram.
17. Process and instrumentation diagram of a) air and flue gas system b) fuel oil system, c) coal firing and pulveriser system d) steam and water system with detailed process description of each system.
18. Instrument list indicating ranges and set point.

Contractor Signature

Contractor Seal