



An ISO 9001  
Company

## Bharat Heavy Electricals Limited


(High Pressure Boiler Plant)  
Tiruchirappalli – 620014, TAMIL NADU, INDIA  
MATERIALS MANAGEMENT

<b>TITLE</b>	Phone: +91 431 257 7072 Fax : +91 431 252 0719 Email : sshrasool@bheltry.co.in
<b>CLOSED CIRCUIT TELEVISION SYSTEM (CCTV SYSTEM) FOR FURNACE FLAME VIEWING</b>	

	<b>Reference Number:</b> Enquiry 1701600943	<b>Enquiry Date:</b> 11.07.2016	<b>Due date for submission of quotation:</b> 11.08.2016
You are requested to quote the Enquiry number date and due date in all your correspondences. This is only a request for quotation and not an order			

**BHEL/Trichy is looking for empanelment of new vendors for supply of "FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM"**

BHEL commercial terms & conditions and all annexure can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units) Bharath Heavy Electricals Limited) under enquiry reference "XXXXXXXXXX "

<p>Tenders should reach us before 14:00 hours on the due date Technical bid will be opened at 14:30 hours on the due date Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present.</p>	<p>Yours faithfully, For <b>Bharath Heavy Electricals Limited</b></p> <p> DGM / MM</p>
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**P.L. PRAMILA**  
Senior Manager / DGM  
Materials Management / BHEL  
BHEL, TIRUCHY - 620 014



# BHARAT HEAVY ELECTRICALS LIMITED

( A Government of India Undertaking )  
HIGH PRESSURE BOILER PLANT  
PURCHASE DEPARTMENT - FOSSIL BOILERS  
THIRUCHIRAPALLI - 620014  
TAMILNADU (INDIA)

PHONE :2574111  
GRAMS : BHARATELEC  
FAX NO: 2520719  
E-mail:  
Web:

429-002/A

	<b>Enquiry No</b> 1701600943	<b>Enquiry Date</b> 11.07.2016	<b>Due Date for Quotation</b> 11.08.2016
<p>Please quote Enquiry No, Date and due date in all correspondences. This is only a request for quotation and not an order. <b>Bid should be submitted in two parts. 1.Techno-commercial bid (Part-I) and 2.Price bid(Part-II) in a separate sealed cover and both covers must be placed in a third cover and sealed. Our Enquiry No., Enq. date &amp; Enq. Due date must be written on all three covers.</b></p>			

Item	Description	Unit	Quantity	Delivery Quantity	Schedule Date
10	L171819759602001  FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM AS PER SPECIFICATION CI:1718:TAS Rev 00.	SET	2.000	2.00	05.11.16
20	R61068500048  FURNACE FLAME VIEWING CAMERA IS REQUIRED SUITABLE FOR FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM. THE SAME FURNACE FLAME VIEWING CAMERA SHALL BE SUITABLE HIGH TEMPERATURE APPLICATION.	NO	2.000	2.00	05.11.16
30	R61068500049  APPLICABLE ELECTRONIC MODULES ARE REQUIRED SUITABLE FOR FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM AS PER ORIGINAL DESIGN (MAIN ITEMS).	SET	2.000	2.00	05.11.16
40	R61999900560  APPLICABLE LCD MONITOR IS REQUIRED SUITABLE FOR FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM AS PER ORIGINAL DESIGN.	NO	2.000	2.00	05.11.16
50	R61999900561  APPLICABLE MULTIPLEXOR IS REQUIRED SUITABLE FOR FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM AS PER ORIGINAL DESIGN.	NO	2.000	2.00	05.11.16

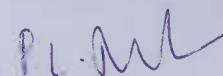
**General Note:**

1. This requirement is for Suratgarh - 7, 8 660MW (1718,19) projects and its Mandatory Spares requirement.

Site Address is as follows:  
Suratgarh 660MW Unit-7, 8  
SURATGARH,

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening.Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

  
P.L. PRASAD  
Senior Manager / PURCHASE  
(FOSSIL BOILERS)  
Materials Management  
Yours faithfully,  
3HEL, TIRUCHIRAPALLI



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Sri Ganganagar,  
Rajasthan State - 335804.  
India.

2. SUPPLY OF FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM AS PER SPECIFICATION CI:1718:TAS Rev 00.

3. Instruction for Indigenous Vendors:

a). Offer must be on three part basis and needs to be submitted on FOR/Suratgarh - 7, 8 660MW projects basis for Main items (Enq. Sl. No. 10) and FOR/BHEL Trichy stores basis for mandatory Spares item (Enq. Sl. Nos.20 to 50) inclusive of packing & forwarding, Separate charges for freight & insurance (for Main & Spares Item) shall be indicated clearly.

b). Charges for freight & insurance (for Main & Spares Item) should be indicated clearly and separately in the offer compulsorily without fail. Part 1 consists of PQR, Part 2 is technical Bid and Part 3 is Price Bid in separate sealed covers. All three sealed covers shall then be put in a fourth sealed cover. Our Enquiry No, Enquiry date, Enquiry due date must be written on all four covers. (Refer Annexure - C)

c). Indicate clearly all the taxes & duties applicable with exact Percentage.

d). Excise Duty exemption is applicable for this project.

4. Instruction for Foreign Vendors:

a). Offer must be on three part basis for FOB/nearest gateway airport basis inclusive of packing & forwarding. (Enq. Sl. No. 10 - Main items and Enq. Sl. Nos.20 to 50 mandatory Spares item)

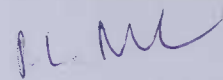
b) Materials are to be despatched to Manager/Matl.services, ROD/BHEL, 165, Thambu Chetty Street, Chennai-600001, Tamilnadu, India.

c). It is mandatory to indicate the import portion weight in Kgs for actual material weight and material weight along with packing in your offer. Part 1 consists of PQR, Part 2 is technical Bid and Part 3 is Price Bid in separate sealed covers. All three sealed covers shall then be put in a fourth sealed cover. Our Enquiry No, Enquiry date, Enquiry due date must be written on all four covers. (Refer Annexure - C)

d). Indicate clearly all the applicable extra Charges such as FOB, P & F, Inspection etc. with exact percentage.

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Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

  
MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



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5. Common points for all Vendors:

- a). Quote should confirm our specifications, enclosed commercial terms & conditions along with MSME clause, Loading Criteria (Annexure-B). Point wise confirmation are to be submitted along with your quote with duly signed, stamped to enable BHEL to ensure technical suitability. Any deviation should be specified without fail clearly in the no deviation format and the failure to comply with the same may make your quotation liable for rejection.
- b). Vendor to submit their own quality plan for FURNACE FLAME VIEWING CAMERA AND THERMOGRAPHIC ANALYSIS SYSTEM along with the offer for BHEL/End Customer's approval. VQP will be subject to BHEL approval after placement of order.
- c). In addition optional prices for complete erection & Commissioning of CCTV system at site including necessary Manpower and Material at site shall be mentioned separately in the offer.
- d). Suitable Erection support materials to be supplied by vendor.
- e). The enquiry deviation form shall be submitted after filling up all the references and deviations if any duly signed and stamped.
- f). The BHEL standard enquiry terms and conditions shall be duly signed & stamped and sent along with the offer.
- g). Entire project (Enquiry SL NO: 10 to 50) requirement will be considered as a single package for evaluation purpose and L1 finalization. L1 finalization will be done based on total cost BHEL basis.
- h). Inspection shall be carried out by respective BHEL approved third party inspection agency for indigenous vendors and the customer itself as per applicability. Foreign vendors need to submit all the necessary test certificates to obtain BHEL clearance before dispatch.
- i) Applicable Testing and Certification charges if any shall be indicated clearly and separately in the quotation. Taxes/duties applicable on the Testing and certification charges should be clearly indicated in the quotation. If the same is found to be missing then it would be taken as inclusive in the quoted amount.
- j). Two sets of O & M Manual consisting of approved drawings in PDF format (soft copy) in CDs are to be submitted to the buyer along with dispatch documents.

The offers should reach us 30 minutes before the time of opening of tenders. The offers will be opened at 14.30 hrs on the due date of tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening. Late and delayed offers are liable to be rejected.

Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

  
P.L. PRAMILA  
MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,



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Submission of O & M is one of the documents need to be sent along with dispatch documents to effect payment. You are requested to submit O & M manual in PDF format along with intimation of dispatches. No hard copy is warranted. Please note.

k). The delivery dates indicated above are tentative and the exact delivery date will be indicated in the purchase order.

l). We here by attaching the general terms, Commercial terms & Special Terms along with this enquiry (All Annexures). Please furnish your point wise confirmation to all annexures.

m). Supplier registration forms with all required credentials and confirmations/supporting documents for PQR shall be submitted along with the techno-commercial bid.

n). Offers not meeting PQR as well as BHEL specifications are liable for rejection.

o). In addition to technical and commercial conditions, vendors who are not registered vendor of BHEL Trichy, have to submit the filled in "supplier registration Forms" along with the technical bid. The new vendors need to download vendor registration forms from BHEL web site in [www.bhel.com](http://www.bhel.com) and submit all relevant data for formal registration. (Refer Annexure - C)

The vendors not registered with BHEL must ensure that they become permanent PMD vendors of BHEL after completing all supplier registration formalities before price bid opening, otherwise their offer will not be considered further for price bid opening and will be rejected.


p). Important note for MSE clause:

All vendors are requested to note the Annexure X -Special clauses for Micro and Small Enterprises (MSE) suppliers.

If L1 vendor is an MSE vendor entire project package will be ordered on L1 vendor. If a Non MSE vendor is coming as L1, then L1 prices will be counteroffered on MSE vendor who is quoting price within the price band L1+15% and if they are agreeing purchase order will be awarded for full/complete supply of total tendered value to MSE. If more than one MSE vendors are available in the L1+15% price band then lowest of the MSE vendor will be selected for counteroffering. If lowest MSE vendor is not accepting it will be counteroffered to the next MSE vendor in the price band and so on. Finally if any of the MSE vendor in the price band is not accepting it will be ordered on L1 non MSE vendor. MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of documents as mentioned in the Annexure X.

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Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

  
**P.L. PRAMILA**  
DCM, Manager  
Materials Management (FOSSIL BOILERS)  
BHEL, TIRUCHY - 620014  
Yours faithfully,



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Since the complete enquiry requirement is being considered as a single package for tender evaluation purpose, therefore, MSE clause will not be applicable to those indigenous vendors who are quoting only for a part of the enquiry in partnership with a foreign vendor. MSE clause can be used only by an indigenous vendor who is quoting for the full enquiry requirement on its own. All the MSE related current and valid documents must be provided along with the offer without fail.

q). This tender has been published on BHEL & NIC website [http://www.bhel.com/tender/tender\\_home.php](http://www.bhel.com/tender/tender_home.php) & <http://tenders.gov.in> and also in leading national dailies (Indian Express, New Indian Express and Financial Express) and in addition in Indian Trade Journal (ITJ) with ref no N1T\_xxxxx. All corrigendum will be published on BHEL & NIC websites only, vendors are requested to visit these websites regularly.

r). No representative is allowed to attend tender opening without authorisation letter from competent authority of the firm.

s). VENDOR SHALL SUBMIT UNPRICED BID FORMAT (ANNEXURE - D) ALONG WITH TECHNO-COMMERCIAL OFFER with duly signed, stamped. IF NOT, THEIR OFFER IS LIABLE FOR REJECTION. Also the filled Annexure - D shall be attached with PRICE BID with duly signed and stamped.

t). If there is any clarifications, you are requested to contact: Sri SYED SHAFAT HAMD RASOOL, Engineer/MM/BOI, BHEL, Trichy-620014. Ph.:+91 431 2577072; e-mail: sshrasool@bheltry.co.in

All the tenders may be addressed to the following address:

**The Tender Opening Cell / MM  
Room No: 26, Building 24, Ground Floor  
Bharat Heavy Electricals Limited  
TIRUCHIRAPALLI 620014**


In case personal delivery of the offer, it shall be dropped into the respective box kept in Room No: 26, after duly entering the data in the system.

Offers will be accepted only up to 14.00 Hrs on the due date. Therefore, vendors shall ensure to submit the offers well before this time. All due date extension requirements should be addressed to the respective Purchase mail IDs. All the due date extension requests from vendors will be considered only up to 48 hours before the due date and time.

Vendors are requested to avoid submission of offers through e mail / fax. In case of any unavoidable situation, offers shall be sent through e mail to the following mail ID only [tender\\_cell@bheltry.co.in](mailto:tender_cell@bheltry.co.in).

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Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

  
**P.L. PRAMILA**  
MANAGER / PURCHASE  
Materials Manager (FOSSIL BOILERS)  
BHEL, TIRUCHY  
Yours faithfully,



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As tenders are being opened by Common Tender Opening Cell, offer covers should be sealed with tenderer's distinctive seal and super scribed with correct Tender No. item of supply and due date of opening.

The offers will be opened at 14.30 hrs on the due date of the tender in the presence of tenderers who have submitted their offer and who may like to be present for the tender opening. Late and delayed offers are liable to be rejected.

The bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL fraud prevention policy displayed on BHEL website <http://www.bhel.com> and shall immediately bring to the notice of BHEL management about any fraud or suspected fraud as soon as it comes to their notice.

The supplier shall submit EI/EII forms to BHEL time to time as indicated by the BHEL and in case of inordinate delay in issuing EI/EII forms, then BHEL reserves the right to deduct 5% of the value of the supplied items against which EI/EII forms pending to be issued

**Enclosures:**

- 1) SPECIFICATION: CI:1718:TAS Rev 00 - 10 Pages.
- 2) Annexure - B for indigenous vendor (Commercial terms and conditions along with MSE clause & Loading Criteria) - 03 Pages.
- 3) Annexure - B for import vendor (Commercial terms and conditions along with MSE clause & Loading Criteria) - 03 Pages.
- 4) Annexure - X for MSME clause - 01 Page.
- 5) Annexure - C for Special Terms & Condition (Three part details & SRF formalities) - 03 Pages.
- 6) No deviation form (Enquiry deviation) - 01 Page.
- 7) Schedule F for details of Gateway Airport - 01 Page.
- 8) Packing Procedure: QA:CI:STD:PR:02/REV02.
- 9) ANNEXURE - D, UNPRICED BID FORMAT FOR INDIGENOUS AND IMPORT VENDORS - 01 Page.

"LD clause has to be confirmed without fail."

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Yours faithfully,  
For **BHARAT HEAVY ELECTRICALS LIMITED**

*P.L. PRAMMA*  
MANAGER / PURCHASE  
(FOSSIL BOILERS)  
Yours faithfully,  
BHEL TIRUCHY

**Bharat Heavy Electricals Limited**  
HIGH PRESSURE BOILER PLANT, TIRUCHIRAPALLI-620014.

**CONTROLS & INSTRUMENTATION**



**SPECIFICATION FOR**  
**THERMOGRAPHIC ANALYSIS SYSTEM**

**SPEC REF: CI:1718:TAS:00**

REV. NO	DATE	DESCRIPTION	PREPARED	CHECKED	APPROVED
00	02-07-2016	INITIAL RELEASE	S. Rajanelli	[Signature]	[Signature]



### I. QUALIFYING REQUIREMENT:

The system shall have proven background in similar applications in fossil-fired power plants of similar or higher capacities. Vendor shall submit a list of references of plants (for fossil fired power boilers with capacity as per enquiry or above) where the offered system is in operation for more than one year. Vendor shall ensure accurate, reliable and trouble-free operation in conditions and environments that are normally found in fossil-fired power stations.

### II. CLIMATIC CONDITIONS:

- Altitude above Mean Sea Level – less than 1000 meters
- Ambient Temperature - 50°C
- Atmosphere - Tropical, Dusty, Corrosive and highly polluted.
- Equipment shall be suitable for use in tropical climate with high humidity, heavy rainfall and climate conducive to fungus growth and corrosion.

### III. SPECIFICATION FOR FURNACE MONITORING AND THERMOGRAPHIC ANALYSIS SYSTEM

The flame monitoring and thermographic analysis system shall provide flame condition monitoring and thermo-graphic analysis of the flame in the furnace on continuous online basis for the fossil fired boiler (balanced draft, tilting tangential and corner firing arrangement) and shall guide the plant operation personnel regarding the nature of flame and combustion process. The cameras and system shall be suitable for all the fuels fired like light diesel oil, heavy fuel oil and sub-bituminous coal with high ash content.

The system should meet the following requirements as a minimum

- a. Minimum two number of cameras shall be supplied with viewing angle sufficient to view the furnace flame (fireball) and all the burners fully.
- b. Cameras shall be suitable for continuous viewing of furnace flame at a straight line of view.
- c. The system shall include all necessary hardware, software, firmware and interfaces required for implementing a fully functional system.
- d. The system shall complete with video camera, signal conditioning cards, amplifiers, special cables etc. with all necessary equipment and accessories like interconnecting cables, pneumatic tubing's required for the system from the power/air terminal points.
- e. The cameras are expected to withstand the temperature in the furnace of boiler which will not be less than 1600° C (with suitable cooling arrangements (air or water or both as per vendor standard) provided to suit this requirement if camera itself cannot withstand to this temperature.
- f. Video Camera shall be equipped with a pneumatic advance & retract system.
- g. The analysis software is expected to give thermographic analysis output where different colour should indicate different temperatures in the video output continuously which will give operator an idea about the ongoing combustion process. The analysis software should also be capable of outputting direct message on video monitor of the exact nature of fault.
- h. The system shall have facility to store bulk data for 5 years duration with facility for retrieval of the same. The system shall have facility to share all the data in the hard disk/ back up media and provide user friendly utilities to retrieve and analyze stored data.



- i. Fully wired Panel/Camera Control box with IP:65 degree of protection shall be provided in the field near camera for mounting all the controls /electronics/accessories necessary for controlling camera operation as well as to take care of interlocks such as :
  1. Automatic withdrawal of camera in case of pneumatic air supply failure, temperature exceeding the design set point at camera tip, cooling arrangement failure, camera control electronics failure and power supply failure.
  2. Camera Local/Remote operation selection along with advance/ retract provisions and indications shall be provided.
- j. However, loose components which are designed for IP: 65 or better degree of protection can be neatly mounted in an open top covered rack near the camera instead of panel.
- k. Vendor to supply Multiplexer, Camera remote advance/retract pushbuttons, Camera advance/retract/fault indications, Camera Remote/Local selected indication, Video amplifier (if required) etc as loose items in Control Room and take care of the mounting arrangement of all the loose components suitably in control desk. All pushbuttons should be properly grouped and arranged in a box for conveniently mounting in the control desk.

Dimensions of the furnace with the location of burners (shown as wind box arrangement) that the cameras are expected to view will be shown in the drawing titled "Location drawing for furnace CCTV camera" (Drg No : 3-97-596-22184) and furnished along with the enquiry specification.

#### IV. FLAME ANALYSIS SYSTEM HARDWARE/ SOFTWARE/ INTERFACING REQUIREMENT

Furnace flame analysis system shall include all hardware and software per unit as required for proper functioning of the system including but not limited to the following:

- a. Video camera unit for each burner (with advance/retract facility mounted)
- b. One (1) no Server (With PC, Video Display Unit, Keyboard /Mouse)
- c. One (1) no user station (With PCs, Video Display Unit, Keyboard/ Mouse and A3 Colour Laser Printer).
- d. Flame analysis software with all relevant user's license. Vendor to clearly specify in the offer what kind of analysis. Also vendor to note that all user licenses shall be valid for entire life of power plant. User should not pay any recurring license fee during the usage period of the system. It shall be possible to upgrade the installed system with the latest available version of the software model for up to 15 years of commissioning.
- e. Bulk data storage and retrieval facility
- f. Redundant OPC communication link with all necessary hardware and software.
- g. System cables etc.

The Server PC shall be of latest configuration available in market but with following requirements in minimum:

- a. Make/Model :- HP, DELL, IBM / Tower/6U Rack Mounted
- b. Processors :- 4 Dual Core 64bit Intel Xeon Processor, 3.0 GHz or better with min of 16 MB Cache
- c. System Bus :- Dual independent 800 MHz or better
- d. RAM :- 24 GB, DDR-3 ECC RAM expandable to 192 GB
- e. Hard Drives :- Min. of 3.6 TB expandable to 14.4 TB
- f. Raid Controller :- SAS RAID Level 5



- g. DVD R/W :- 1 no. 52X CD RW & 16X DVD RW IDE Combo
- h. Power Supply :- Dual redundant / Hot swappable
- i. Fans :- Dual redundant / Hot swappable
- j. Ethernet Card :- 4 nos. x 10/10/1000MB/1GB (2 onboard & 2 add-on)
- k. Network Controller :- 1 GbE NIC upgradable to 10 GbE
- l. Graphics Card :- SVGA integrated with min. 64MB DDR RAM
- m. PCI Slots :- 2 PCI-E Slots (1 x 4 lanes & 1 x 8 lanes), 2 PCI-X Slots (64bit/100MHz), 2 PCI Slots (1 x 32bit/33MHz & 1 x 64bit/66MHz)
- n. Serial Port (RS232) :- 1 no
- o. Parallel Port :- 1 no
- p. USB Port :- 4 nos
- q. Peripherals :- 1 no. USB/ PS2 Optical Mouse, 1 no. USB/PS2 Multimedia Keyboard, 1 no. 21"/22" Colour TFT/LCD Monitor
- r. Operating System Latest Proven Windows Server

The User station PC shall be of latest configuration available in market but with following requirements in minimum:

- a. Processor :- Core i7 Processor, 3.2 GHz or better
- b. RAM :- 4 GB DDR2 RAM
- c. Mother board :- Intel Express chipset
- d. Graphics :- Onboard with min 512 MB Video Memory
- e. Hard Drives :- 1 no. x 500 GB SATA HDD @ 7200 RPM or Higher
- f. DVD R/W :- 1 no. 52X CD RW & 16X DVD RW IDE Combo
- g. Ethernet Card :- 2 nos. x 10/10/1000MB
- h. Network Controller :- 1 GbE NIC upgradable to 10 GbE
- i. Serial Port (RS232) :- 2 nos.
- j. Parallel Port :- 1 no.
- k. USB Port :- 4 nos.
- l. Peripherals :- 1 no. USB Optical Mouse, 1 no. USB Multimedia QWERTY Keyboard, 1 no. 21" Colour TFT/LCD Monitor
- m. Operating System Windows XP Professional or Latest Proven Windows OS.

Colour Laser Printer shall serve as a hard copy device to copy graphics/diagrams from the Operator Station/Engineering Station for documentation and graphic diagram development functions. Printer shall be of 600 DPI with minimum 16 colours. Printer shall be connected to network to facilitate printing of graphics from any of the OS / ES VDUs and accordingly suitable network interface card shall be provided. All printers shall be of A3 size. Noise levels for the Printers at 1 meter distance shall be < 45 db.

#### V. OTHER SPECIFIC REQUIREMENTS OF THE SYSTEM

- a. The cameras shall be of colour CCD suitable and proven for the respective duty.
- b. The viewing angle of the camera shall be commensurate with the furnace size, the camera location and the positioning of the burners as indicated in the enquiry drawings.
- c. It is vendor's responsibility that the offered system is suitable to provide clear picture of the furnace.
- d. The system shall confirm to PAL/Digital camera. The number of TV lines shall be adequate for clear image of the furnace. The resolution of digital camera shall be HD resolution.



- e. Thickness of water wall including insulation thickness and refractory is 350mm. (This includes half of water wall tube thickness of 51mm) Vendor to select camera insertion/ retract lengths suitably.
- f. Lens focusing range shall be selected to have clear view of the closest and farthest point in furnace as per given furnace sizes indicated.
- g. The entire cooling arrangement including all the accessories is in the scope of vendor.
- h. Each camera unit shall have the feature of Automatic light compensation suitable for furnace flame viewing application.
- i. Camera housing shall have following features.
  - The camera used shall be housed in stainless steel housing with air-cooled jacket.
  - Suitable ventilation, purging and cooling facilities shall be provided to suit application requirements.
  - Gasket sealing : All edges (Neoprene/Silicone)
- j. Applicable drawings for furnace openings provided for seal box are "Furnace CCTV opening", 2-06-653-08866/01, "Seal box assembly for Furnace CCTV opening", 2-09-001-00680/01 (enclosed in this specification). Any additional need of inserts pipe/tapping points for installing camera in seal boxes for fixing camera to be studied by vendor based on BHEL seal box drawing and to be included in offer. All necessary erection material for erection of camera and accessories as well as materials required for supporting the camera from boiler shall be in vendor scope.
- k. System will be installed by BHEL, as per the drawings furnished by vendor using the materials supplied by the vendor. On completion of installation, it is the responsibility of vendor to fully commission the system and prove the performance. It will be vendor's responsibility to interface the system with the customers LVS system. Also, it is the vendor's responsibility to get the protocol signed from customer and BHEL site for successful operation and handing over of the system.
- l. Any accessories required for erection and commissioning of the system shall be included in the offer itself even though the same is not called for in the enquiry. This may be highlighted in the offer for future improvements.
- m. All necessary remote/ local programming tools, if required, shall be included in the main offer itself.
- n. Any other accessory to make the system completely operational shall be included in the main offer itself.
- o. The entire system and accessories should not contain any asbestos material.

#### VI. PROTECTION REQUIREMENTS OF THE SYSTEM

- a. The Camera assembly & housing shall have air cooling arrangement with all accessories.
- b. The camera for furnace flame monitoring shall be mounted on a retract mechanism having automatic retraction facility with fail-safe feature. The automatic retraction unit shall be pneumatic operated. BHEL/ Customer will provide instrument air for the camera and lens tube. The requirement of the instrument air shall be indicated by the vendor in the offer stage itself.
- c. Retract mechanism mounts shall have following features.
  - Retract mechanism shall be provided with suitable mounts to fix the camera housing, the lens tube and the wall box.
  - Mounts shall be sturdy and lightweight, capable of being supported from boiler.
- d. Protection shall be given against cooling medium failure.
- e. Automatic shutter/gate mechanism at the camera port to be supplied by vendor, so that port will be closed once camera is withdrawn from the furnace.



- g. In case of failure of purging air the camera assembly shall retract automatically to avoid any damage or deterioration due to overheating. Also, shutter/gate located in the furnace opening shall close to prevent radiant heating.
- h. Necessary limit switches shall be supplied along with the camera system by the vendor to detect camera advanced/retracted positions. Vendor shall build necessary interlocks for protection of camera with the limit switches.
- i. Necessary interlocks to be built into the camera system such that once camera gets retracted due to fault, only after the cause of the fault is corrected and acknowledged by operator camera can be inserted again.
- i. For acknowledging and resetting the fault, necessary pushbuttons to be made available in Control room and shall be mounted at a suitable location at operators convenience.
- j. An air tank shall be provided near the camera which can store sufficient instrument air for advancing and retracting the camera minimum three times into and out of the furnace. The capacity of the air tank shall be 10 litres minimum for advance / retract operations.
- k. In case camera retracts due to fault such as loss of air for prolonged duration necessary protections shall be built into the system so that camera do not drift into the furnace due to gravity.

#### VII. CABLES

- a. The Scope of Cables to be provided by the Vendor is as follows.
  - All Video/Fibre optic/Ethernet cables required for the system. The cables shall be armoured.
- b. Following lengths are given as inputs
  - Length between Camera and Central Control Room (CCR) is 300 m.
- c. Any other length input required shall be requested by vendor along with the offer, which shall be provided by BHEL.
- d. BHEL will arrange 19 C x 1.5 Sq.mm Control Cable from Camera to Control room for interlocks. Any other control cable required shall be specified clearly in the offer by vendor which will be arranged by BHEL.
- e. Requirement of video amplifiers, if any, based on the length shall be included by vendor in the offer itself.

#### VIII. ADDITIONAL FACILITIES :

- a. Multiplexing units (vendor to specify the type offered) to display one / multiple Furnace Flame viewing Camera system inputs in the monitor and LVS simultaneously.

#### IX. POWER/AIR FACILITIES PROVIDED BY BHEL/CUSTOMER AT SITE :

##### a. Power Supply

- Only one number 240V AC, 50 Hz, UPS single phase supply will be made available for each flame viewing camera at Vendor's Field camera control box. Exact power rating required for local control box shall be indicated by the vendor along with the offer. Any other voltage required for the operation has to be derived by the vendor from the above supply. Isolation/ protection requirements for the same also shall be in vendor scope.
- One feeder 240V AC, 50 Hz. UPS single phase will be given in Control Room. Exact power rating required for control room shall be indicated by the vendor along with the offer. Electrical power requirements for other accessories shall be derived by the vendor from this supply.



b. Air Supply

- Instrument air at 4.0 to 5.0 kg / sq.cm (g) will be made available for camera housing cooling and lens tube cooling at one point for each camera, terminated with a valve of connection size Nb40 (F) within three metres from the camera. It shall be in vendor's responsibility to derive any other requirement for air supply from this available source. Vendor to provide all required accessories to receive this air and supply to the various components that requires air supply.
- As boiler is not a fixed structure and tends to expand and contract based on firing status, tubes connecting camera with the air source shall consist of flexible, SS braided hoses with quick disconnect facility along with PVC coated copper /SS tubes /GI pipes and shall be supplied by the vendor along with the camera system.
- Quality of instrument air provided may not be meeting the necessary standards all times and hence, it is vendor's responsibility to include suitable air filter arrangements for getting good quality instrument air for their Furnace flame viewing camera system.

X. MAKE OF COMPONENTS OFFERED:

- a. Makes of all major brought out components shall be subjected to BHEL/Customer approval.

XI. VENDOR TO INCLUDE THE FOLLOWING IN THE OFFER:

- Commissioning spares, if any, with bill of materials.
- Commissioning of system is in the scope of vendor. Also, erection assistance shall be provided by vendor. Number of man-days to be accounted as 15 with three visits to site for erection/commissioning each boiler. All necessary arrangements for travel and stay shall be taken care by vendor only.
- Erection materials and supporting structures required for the Furnace Flame viewing camera system shall be estimated and supplied considering the furnace expansion as below. Necessary supporting required for camera system shall be from boiler only and not platforms considering the boiler movements.
  - Furnace expansion in horizontal direction - 39mm sideways
  - Furnace expansion in vertical direction - 150mm downward

XII. DOCUMENTS TO BE FURNISHED BY THE VENDOR

Along with the offer (Offer shall be given in duplicate. Each copy shall contain the following)

- Complete Bill of material.
- Catalogue on the various equipments.
- Detailed Functional write-up of the system
- Block diagram showing inter-connection among various equipments (from field to control room) showing the components and cabling in-between.
- Dimension of the panels and loose components in control room.
- List of references of plants where similar systems are in operation
- Unit price for various equipments & video cables (in the priced bid)
- Instrument air /Power supply requirement of the system.
- Vendor quality plan in BHEL format.

Documents to be given after placement of order



The soft copy (in\*pdf format) of following documents/drawings shall be sent for approval within 15 days from the date of placement of order.

- Block diagram showing inter-connection among various equipments (from field to control room).
- Functional write up of the system offered including the functional requirements and interlocks provided.
- Logic drawings/Interlocks for camera advance/ retract and hold in retract positions.
- OGA / dimensional details for all the major components.
- Panel mounting / fixing arrangement drawings.
- Power / signal external connection details.
- Power / Air requirement.
- Vendor shall furnish recommended erection/installation drawings for the camera & retract assembly showing mounting and support arrangements for approval from BHEL.
- Catalogues and detailed functional write-up with system specification.
- Vendor quality plan after incorporation of BHEL comments and indicating PO number

#### O & M Manuals

- All O&M manuals shall be in A4 size and shall contain only the contract specific information. Irrelevant information's shall be scored-out.
- All drawings shall be inserted in an appropriate place in O&M manuals with proper tagging.
- All drawings in the O&M manual shall be in black and white and in A3 or A4 size format only. Bigger size drawings shall be reduced to A4 or A3 size before insertion.
- Final O&M manual in CD-ROM shall be sent to BHEL (T). It shall not be sent along with the equipment to site directly. O&M shall contain as built drawings, catalogues for all the components used in the system in addition to the erection, operating, maintenance and trouble-shooting instructions. CD-ROM shall contain all the details specified above.

### XIII. INSPECTION AND TEST REQUIREMENTS

- The vendor shall submit the Vendor Quality Plan (VQP). The same will be subjected to BHEL/ customer approval after purchase order.

### XIV. PACKING PROCEDURE

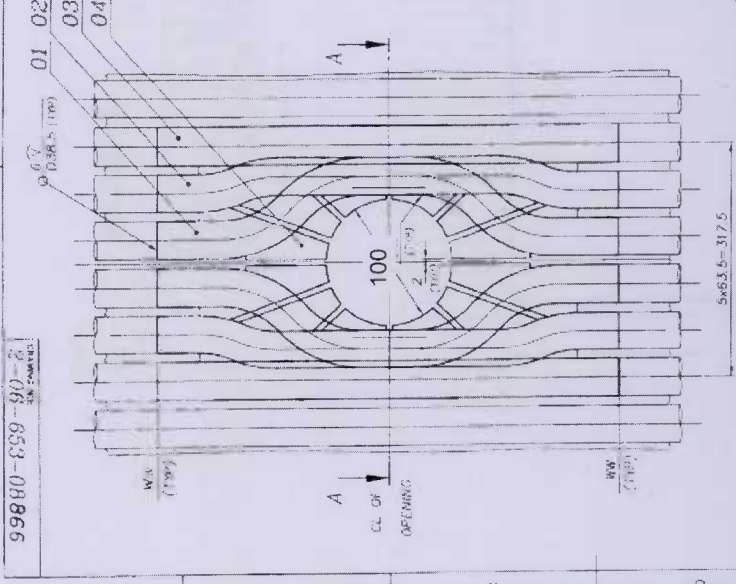
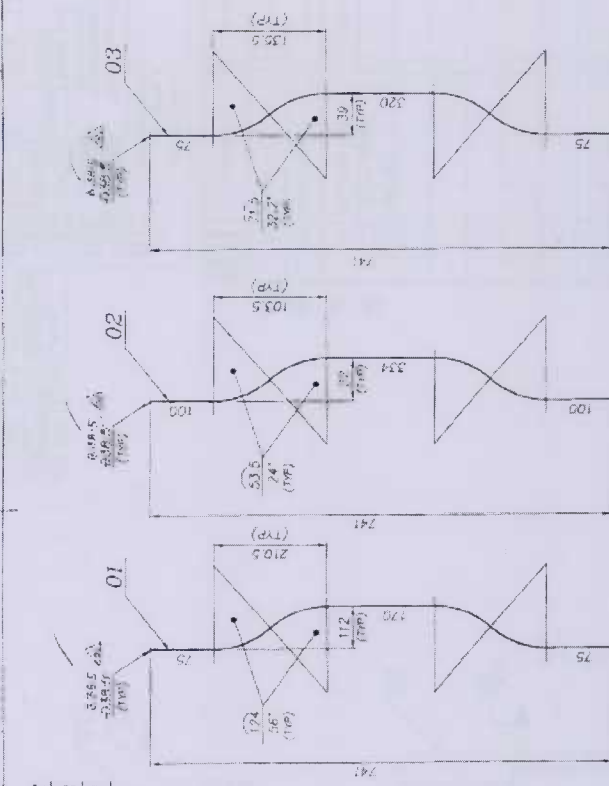
- All components of the system except panel should be packed in such a way that it should not get damaged during transportation and storage at site. Panel, if applicable, shall be packed as per BHEL standard packing procedure QA:CI:STD:PR:02/02.

### XV. GUARANTEE

- The equipment shall be guaranteed for a period of 12 months from the date of commissioning OR 24 months from the date of dispatch whichever is earlier.



FOR TOLERANCES OF INTERFACES  
CONSULT DRAWING MANUFACTURER  
MAY 1980 - STD. NO. TP 003 0004



**NOTES:**

- 01. FOR DESIGN PARAMETERS REFER ASSY DRAWING
- 02. RADIUS OF BEND R127
- 03. TOLERANCE UNLESS OTHERWISE SPECIFIED  
LINEAR +1.5MM  
ANGULAR +1°
- 04. FINS SHALL BE CUT TO SUIT THE BURE FRANGLE  
AND WELDED WITH TUBE SUCH THAT IT SHOULD  
BE NORMAL TO TUBE AT THE POINT OF CONTACT.
- 05. EDGE PREPARATION AS PER STD TP 003 00 99

ITEM NUMBER	DESCRIPTION	QTY	UNIT WEIGHT	QUANTITY
01	PLATE 60 15.240 277	3	3.500	
02	PIPE 50.270 057	1	5.610	
03	PIPE 50.270 057	1	5.610	
04	PIPE 50.270 057	1	5.610	
05	PIPE 50.270 057	1	5.610	
06	PIPE 50.270 057	1	5.610	

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT  
Bhrol Heavy Electricals Ltd  
HIGH PRESSURE BOILER PLANT  
TRENDSAPALI - 5200 4

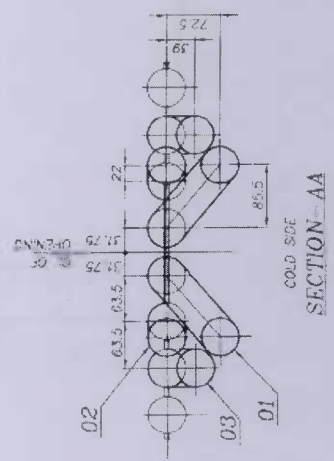
REV. DATE: 01/01/80  
REV. NO: 01  
REV. BY: B.C. & APP. S.P. S.P.

ITEM NO: 37760  
MATERIAL CODE: A  
MATERIAL SPEC: 2

UNIT WEIGHT: 3.500  
QUANTITY: 3

DRAWING NO: 2-06-653-08866-01

TITLE: ACOUSTIC PYROMETER OPENING



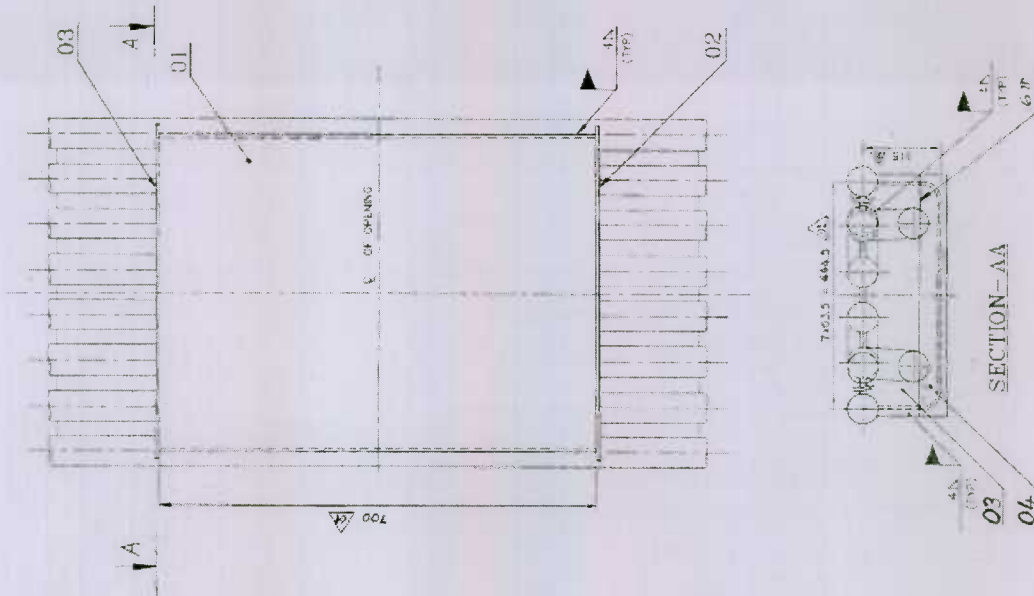


FOR TOLERANCES OF UNDIMENSIONED DIMENSIONS DURING MANUFACTURE REFER TO ENIT 932 AND EN 10203

NOTES:

1. SEAL BOX TO BE FILLED WITH DASTABLE REFRACTORS
2. WHEN CUTTING, BENDING, DRILLING AND FABRICATING MAY BE DONE AT THE TO SORT THE REQUIREMENT
3. PAINT THE SURFACE OF ALL METALS THAT ARE EXPOSED TO CORROSION WITH AN APPROPRIATE PAINT
4. FOR WELDS OF 1.5 SCALLOPED BAR REFER DRG. NO. 3-09-002-00194

08900-100-60-2



TYPE OF WELD	TYPE OF ELECTRODE	LENGTH OF WELD
01 (WELDED)	E 7018-1	Ø7 MMS
02 (WELDED)	E 7018-1R	1.3 MMS
03 (WELDED)	E 7018-1R	1.68 MMS
04 (WELDED)	E 7018	Ø.22 MMS

ITEM NO.	DESCRIPTION	QTY	UNIT	UNIT WEIGHT	QTY ORDERED
04	PL 63	1	L	1.80	1
05	50 x 44x.5	1	L	1.30	1
06	SCALLOPED BAR	4	PCS	2.400	4
07	SCALLOPED BAR	4	PCS	2.400	4
08	SEAL BOX	1	PCS	19.800	1

TYPE OF PRODUCT OR NAME OF CUSTOMER/PROJECT

**Ujjwal**

Ujjwal Heavy Electricals Ltd  
 100, INDUSTRIAL AREA, PHASE II, GATE NO. 1, JALPAIGURI, WEST BENGAL - 741004

DATE: 15/01/2024  
 DRAWING NO: 2-09-001-00680-01

SCALE: 1:1

PROJECT NO: 24-600

DESIGNED BY: [Signature]  
 CHECKED BY: [Signature]  
 APPROVED BY: [Signature]

REVISIONS:

NO.	DATE	DESCRIPTION
01	15/01/2024	ISSUED FOR MANUFACTURE