Bharat Heavy Electricals Limited
High Pressure Boiler Plant, Tiruchirappalli - 620 014.

Technical Specification of
Bottom Ash Hopper Viewing Camera System

CI:STD:BHC

Project: NTPC Lot-1 Combustion Modification Package

Rev.no.	Date	Description of events	Prepared	Reviewed	Approved
00	13-08-2019	Initial release	Balaji K	Aswini Kumar Panda	V M Selvaraaj

General Instructions

1. This specification covers briefly the requirement of furnace bottom ash hopper viewing camera system installed in boiler of thermal power plant.
2. 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 basic and essential requirements for the offered system to meet the indented application.
3. In the event of order, the entire specification will form part of purchase order for compliance during execution.
4. 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 assistance, 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.

Pre-Qualification Criteria

1. The offered combination of camera and video management software (VMS)/NVR, for CCTV system, shall have at least one-year satisfactory operation prior to date of enquiry in a large industrial setup like power plant, cement plant, petroleum refinery, steel plant or coal mine. Vendor to provide performance certificates / authentication letters in favour of OEM from any end user certifying the same.

Technical Specification

1. Fixed HD CCTV cameras are to be supplied to monitor the ash build-up in furnace hopper and bottom hopper of boiler in thermal power plant. These cameras are to

be placed outside the hopper and continuously view through the sight glass (inspection window) of the hopper. (Sight glass of hopper is not in scope of camera vendor).

2. The approximate dimensions of sight glass in furnace hopper is 100mm (W) X 150mm (H) (rectangular window) and sight glass in bottom hopper is 175mm diameter (Circular opening).

3. Four numbers of cameras per boiler are envisaged for the application in total.

   a. Two (02) nos. of cameras shall be placed outside the furnace hopper (one on left and one on right) at about 10.5M elevation (above boiler S panel).
   b. Two (02 nos) of cameras shall be provided outside the bottom ash hopper (one on left and one on right) at about 8M elevation.

4. The video output from camera shall be continuously available in the Operator Work Station (OWS) proposed to be located in the control room. Vendor to provide one OWS with monitor for control and monitoring of all four cameras.

5. Necessary cables for the system, required hardware & software shall be in the scope of vendor. All the required accessories like Media converters/OFC patch cords/LIU's/Ethernet switches/Network switch/Pigtail cables shall be considered by the vendor. Any accessory not specifically mentioned but required for the working of the system shall be considered by the vendor.

6. The overall block diagram of the total system is attached along with the specification for information.

7. All the cameras and accessories are to be housed in weather proof IP-65 environmental housing made of aluminium and sun shroud. Camera Local JB shall be suitable for weather proof IP-65.

8. The housing, with heater and blower installed, shall provide protection for camera/lens assemblies in the ambient temperature range of – 0 deg. C to 50 deg. C.

9. The camera mount should be of the same make as that of camera and suitable for the model no. offered as specified by the manufacturer and should be an integrated unit.

10. The detailed technical requirements of the cameras are indicated below.

Description	**Requirement**
Image Device	1/2.8-1/3" Progressive scan CMOS
Number of Pixels	1920X1080 (Full HD)/2 MP at 25/30 IPS
Sensitivity(at f1.2,6dB)	0.21 Lux colour & 0.05 Lux B/W (at 30IRE)
Lens	Varifocal Lens f=8-50 mm, CS-Mount
Lens Mount	CS-Mount
Focus	Auto with Manual Override
Iris Range	1.6 to 360
Audio	Full Duplex or 2-way
IR cut-filter	Yes

Protocols	IPV4/IPV6,RTP, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP,SNMP or equivalent
Security	Password protection,
Iris Control	Auto with Manual Override
Analytics	Motion detection & Tamper alarm
PoE supply IEEE 802.3af compliant	Yes
SD/SDHC/SDXC in Camera (For Local alarm recording & scheduled local recording)	Yes ,minimum 32 GB capability
Rate Control	VBR/CBR
Back Light Compensation	Required
White Balance	Automatic with mode selection options
Electronic Shutter	1/50 to 1/10000 Auto
S/N Ratio	>50dB
Automatic Gain Compensation	Up to 18 dB
Gain Control	Auto/Off
Day/Night selection	Auto On-Off

Other Features	On Screen Menu Display, contour correction and contrast compensation control
	Automatic Picture Enhancement to give a balanced picture where there is too much/too little light
	Synchronization selection for line lock and free running
	Minimum One Alarm I/P
	Minimum One Alarm O/P

11. Power supply to be provided by BHEL at site is as follows

a. One number of 1 kVA, 240V, 50 Hz, 1 ph UPS supply at field near camera. Vendor shall provide necessary arrangement to terminate this incoming power supply and further distribute to all the cameras in field. Necessary power distribution board for the same shall be considered by the vendor. Incoming power supply cable (3C X 10 Sq.mm Aluminium XLPE) shall be in BHEL scope. All other power cables for further distribution shall be in vendor scope.

b. One number of 1 kVA, 240V, 50 Hz, 1 ph UPS supply in control room. Necessary termination of this incoming supply and further distribution in control room shall be in vendor scope. Incoming power supply cable (3C X 2.5 Sq.mm Copper XLPE) shall be in BHEL scope. All other power cables for further distribution shall be in vendor scope.

c. Any other voltage required for the system shall be derived internally by the vendor from this power supply.

d. Power cables shall be XLPE insulated, FRLS cables with conductor size minimum 2.5 Sq.mm for Copper cable and 6 Sq.mm for Aluminium cable.

12. Following cable run lengths shall be considered by the vendor

a. Field Cabling for Power distribution from PDB to cameras – 100 M (for four cameras)

b. Camera to Camera Local JB – 15 M

c. Camera Local JB to Control room – 250 M

d. Control room Rack to Monitor – 25 M

13. The VMS/NVR specified shall be an enterprise class client / server based IP video security solution that provides seamless management of digital video and data across an IP network. VMS/NVR shall support additional cameras, if added, in future. All ON screen controls shall be provided to achieve remote operation. The VMS/Recording Server shall record and store a minimum of fifteen (15) days at 1080p & 25 FPS resolution of video images from all cameras as well as the historical data of system activities. All storage calculations should be based on this requirement and calculations for sizing should be indicated in offer.

14. OWS shall be suitable for smooth functioning of video management software of the OEM. OWS shall have following specifications as minimum. Intel i7 Processor with latest generation / 8GB Memory / 4 TB HDD / 2GB Graphics Card / DVD RW / 24" Monitor / Windows Operating System. The specifications mentioned for OWS are minimum required and any additional specification required for smooth functioning of the system shall be considered by the vendor.

15. All the software licences shall have full validity for the entire lifetime of the system.

16. Vendor Quality Plan (VQP) shall be followed for testing/acceptance of the system. All the functional tests and test reports shall be clearly indicated in the VQP.

17. Documents to be submitted along with the offer.

    a. Sub-delivery enquiry deviation format – If any deviation is there from the specification, the same shall be explicitly mentioned in the format. Only deviations mentioned in the format and accepted by BHEL in writing will be considered in the event of order. If there are no deviations, the format shall be submitted indicating "Nil deviation".
    b. Camera datasheet.
    c. Block diagram and BoM of the total system.
    d. Vendor Quality Plan (VQP) proposed to be followed.

18. Documents to be submitted after PO.

    a. Detailed Camera/Local JB GA drawings
    b. Detailed Camera Technical datasheet
    c. Block diagram and BoM of the total system.
    d. Any documents required for erection at site.
    e. Vendor Quality Plan (VQP) proposed to be followed.

19. Vendor documents after PO (including camera documents and VQP) are subject to customer approval.

20. Packing shall be as per vendor standard. Vendor shall be fully liable for proper, sufficient and adequate packing, completeness of contents, protection of contents during storage time 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 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. Packing shall be sufficient to prevent rain water entry.

21. Erection assistance at site and commissioning of the system is in vendor scope. Fiber optic cable termination (including of splicing of all cables) at site shall be in vendor scope. Minimum Two visits to site (including travel and stay) with 5 Man days shall be considered for erection assistance and commissioning. Lump sum charges shall be considered in the priced bid for the same. Any accessories/spares required for commissioning shall be carried by the vendor which can be taken back by the vendor after successful commissioning.

22. Optional price for complete Erection and Commissioning of the camera system shall also be quoted separately along with the offer.

23. It is the responsibility of the vendor to successfully handover the system to the satisfaction of the customer. Vendor to obtain necessary protocol signing with customer after handing over the system.

24. The vendor shall guarantee satisfactory performance of the equipment for at least 12 months from the date of commissioning.

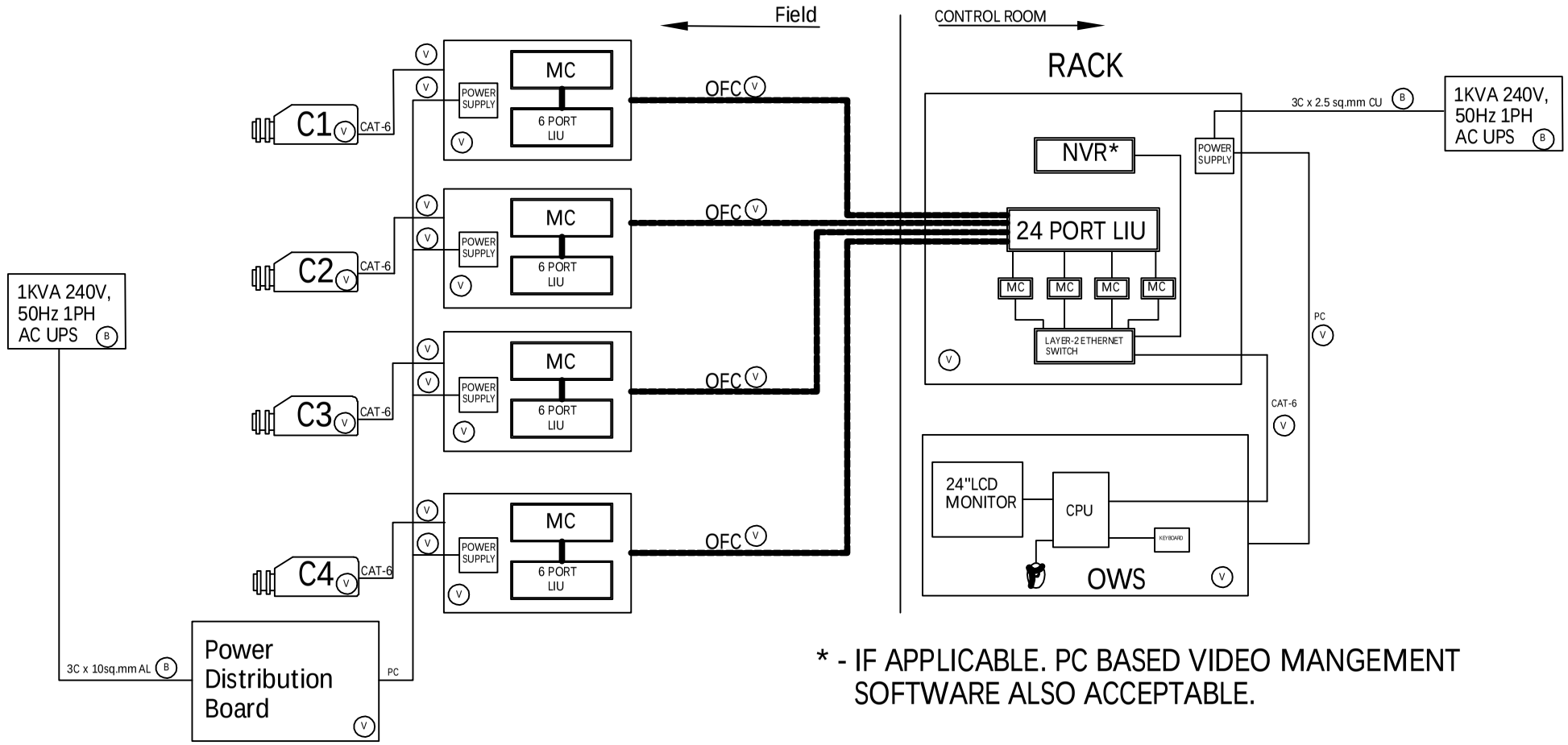
25. Makes of major sub-items shall be chosen from the attached list.

Sl no.	Major Sub-Items	List of Approved vendors
1	CCTV Camera	Axis/Pelco/Bosch/Honeywell Security and Fire

2	Operator Workstation	HP/DELL
3	Network Switch	D-Link/Netgear/Allied Telesys/Juniper (USA)/Hirschmann(Germany)/Cisco
4	Wall mountable Panel/Enclosure	Rittal/Pyrotech/Pentair Technical products India Pvt Ltd Hoffman (Bangalore)/Schneider Electric (Bangalore)
5	Power cables	Advance Cable/Cable Corporation of India/Cords Cables/Delton Cables Ltd/Elkay Telelinks/Finolex/Gemscab Industries/Gupta Power Cables/Havells India Ltd/KEI/Nicco Corporation/Paramount Communications/Polycab/ /RR Kabel/Thermocables
6	Fibre Optic Cable	Birla Erricson/Aksh Fibre/D-Link/Finolex
7	CAT 5e UTP Cable / Patch cable/Patch Panel/LIU:	AMP/Digilink/D-Link/Systemax
8	Single Mode Fibre Patch cable/SC Pigtail Simplex	Avaya/Belden/D-Link/Digilink/Tyco
9	Single Mode Media Converter	Avaya/Belden/D-Link/Digilink/Tyco/CTC Union

DRAWING NO :

BLOCK SCHEMATIC DIAGRAM OF CCTV SYSTEM



* - IF APPLICABLE. PC BASED VIDEO MANGEMENT SOFTWARE ALSO ACCEPTABLE.

C1 TO C4 - CAMERA 1 T0 4
OWS - OPERATOR WORK STATION
NVR - NETWORK VIDEO RECORDER
OFC - OPTICAL FIBRE CABLE
MC - MEDIA CONVERTER
LIU - LIGHT INTERFACE UNIT
PC - POWER CABLE
(V) - VENDOR SCOPE
(B) - BHEL SCOPE

TYPE OF PRODUCT
OR NAME OF
CUSTOMER / PROJECT

Bharat Heavy Electricals Ltd
UNIT: HIGH PRESSURE BOILER PLANT
TIRUCHIRAPPALLI - 620014

	NAME	SIGNATURE	DATE	NO. OF VAR
DRN				—
CHD				
APPD				

ALL DIMENSIONS ARE IN MM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
		——	—	—	—

TITLE: Block Schematic Diagram of CCTV system

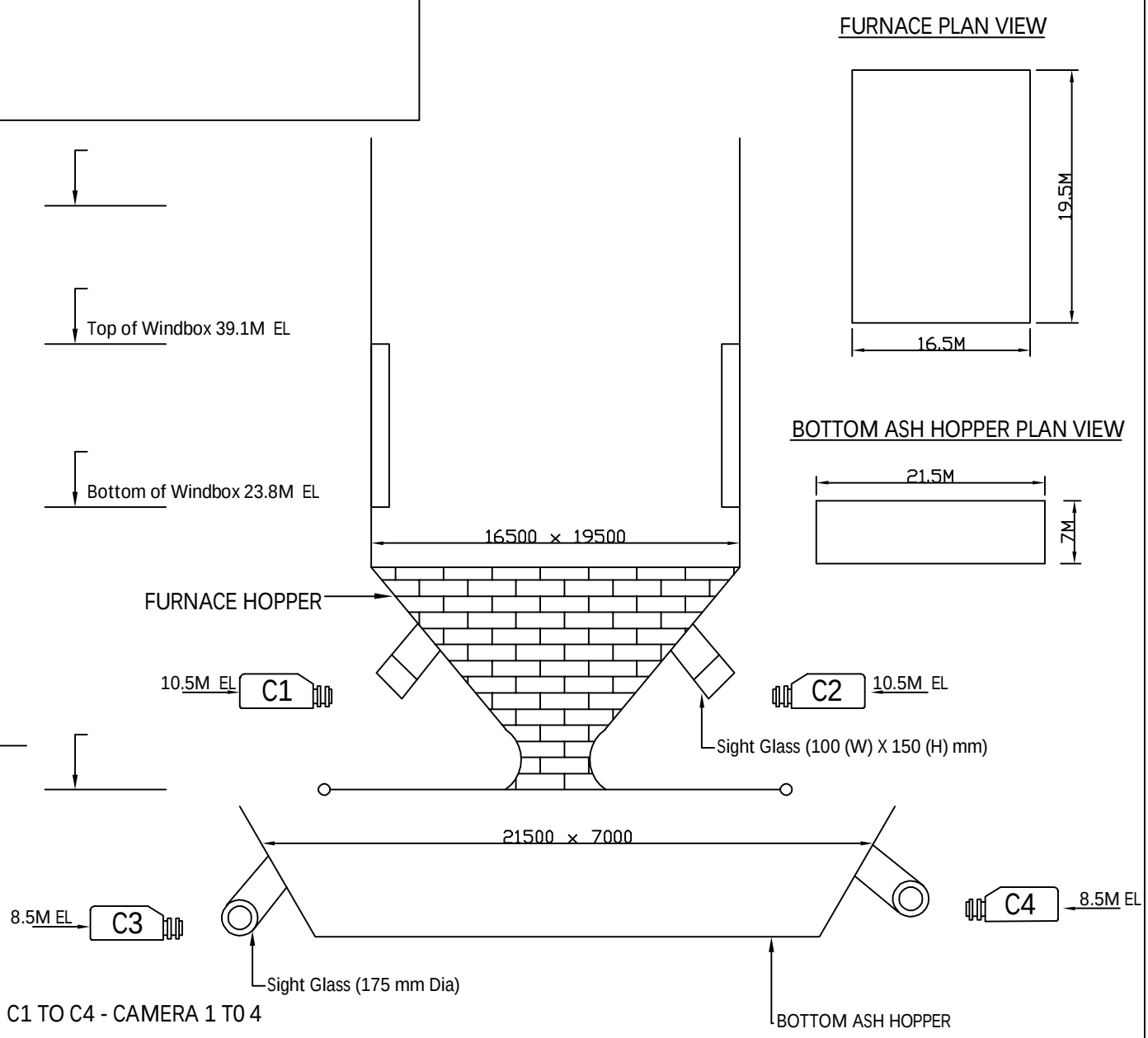
CARD CODE: U 01

DRAWING NO:

REV

FILE NAME :

REV	DATE	ALTERED :
		CHD./APPD. :



C1 TO C4 - CAMERA 1 T0 4

GA Drawing of Boiler With Camera

TYPE OF PRODUCT
OR NAME OF
CUSTOMER / PROJECT

		NAME	SIGNATURE	DATE	NO. OF VAR
Bharat Heavy Electricals Ltd UNIT : HIGH PRESSURE BOILER PLANT TIRUCHIRAPPALLI - 620014	DRN				
	CHD				
	APPD				

DEPT. : C&I		ALL DIMENSIONS ARE IN MM	SCALE	WEIGHT (Kg)	REF TO ASSY / OLD DWG	ITEM NO	No OF ITEMS
CODE : 392							

TITLE: GA Drawing of Boiler With Camera	CARD CODE U 01	DRAWING NO :	REV

FILE NAME:


TYPICAL INSTALLATION
CAMERA
SIGHT GLASS


SIGHT GLASS
CAMERA