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PROJECT : BHUSAWAL 1x660MW

CUSTOMER : MAHAGENCO

CONSULTANT : DCPL, Mumbai

EQUIPMENT : IP CCTV SYSTEM

PREPARED BY:
AMIT KUMAR SHARMA

CHECKED & APPROVED BY
SHAILENDRA KUMAR KISAN

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REVISION HISTORY SHEET

REV No.	DATE	NATURE OF CHANGE	REASON	PREPARED BY	REVIEWED BY
00	06.01.2021	FIRST ISSUE	---	AKS	SKK

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SECTION- A

GENERAL INSTRUCTIONS TO BIDDERS:

Introduction: Bidders are required to submit technical offer for supply, installation and commissioning of IP based CCTV system for Bhusawal 1x660MW project. All required documents against this Tender/Specification shall be submitted in English only.

Evaluation methodology:

a. Bidder's PQR document (submitted against PQR criteria mentioned in Section-B) will first be reviewed and evaluated by BHEL. In case, the bidders offer do not meet the PQR, then corresponding techno-commercial offer will not be considered for further evaluation in the tender and such offers will be rejected. Technical bids of only those bidders who meet PQR shall be reviewed and further considered.

b. Bidders declared qualified for meeting Pre Qualification Requirements mentioned in section B, their credential documents, as submitted by bidder under sl no 9 of this section shall be forwarded to M/s MAHANGENCO for approval. Offer of bidders not approved by M/s MAHAGENCO will be technically rejected and shall not be considered further in the tender. Technical bids of only those bidders who are approved by MAHAGENCO only shall be reviewed and further considered.

c. If required during evaluation of PQR and Technical offers/bids, vendor should be visit BHEL Electronic Division, Bangalore or be available for online meeting, for discussions. Further in the event of order, during approval of the Vendor documents by Customer, Vendor shall accompany BHEL representative for discussions with customer / consultant, if required.

d. This specification does not prohibit any vendor to submit their offer along with clause wise deviation from the specification. Changes in technical specification / Scope etc shall be informed to Participating bidders only.

e. If bidder's offered make of camera is not found meeting PQR criteria, offer of such bidders will be rejected and no change of make of camera shall be allowed. Therefore bidders are advised to quote most suitable make and model of CCTV SYSTEM which meets all PQR mentioned at Section-B and also technical specification requirements of the CCTV system mentioned in Section-C.

f. One bidder (as system integrator) can submit only one bid. If multiple bids of same make or different makes of CCTV system are submitted by a bidder, then both offer of bidder will be summarily rejected.

g. All bidders, irrespective of their existing approval with BHEL / other units of BHEL / MAHAGENCO, should submit all documents called in this specification

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h. Consolidated Pre-Bid queries must be sought by Bidders through email within 7days from floating the tender. Clarification sought within 7 days from due date of bid submission will not be entertained and replied.

i. Multiple make / model number are not acceptable for all major active components like camera, server etc. For passive components, bidder can offer maximum two makes / model no's within approved makes mentioned later in this specification.

j. Bidders can also quote any other make for various items called in BOM of this specification. However, acceptance of such makes in the tender shall be subject to approval by MAHANGECO. As per conditions of the Bhusawal power plant contract for which CCTV system is being procured through this tender, it is suggested to quote such make of items of CCTV system which has been earlier supplied and commissioned in a 500MW power plant. BHEL will submit make of all items including camera to MAHAGENCO for approval. For taking up approval, bidder should preferably submit following documents for all items quoted by them:

   i. Tabular List such makes already installed & commissioned, preferably in 500MW power plants. The list should mention name of project, year of supply /commissioning / handing over, contact details of user/owner etc.

   ii. Technical compliance

   In case, the offered makes are not approved by MAHAGENCO, bidder will have to offer other MAHAGENCO approved make without any cost implication to BHEL.

k. Approval of bidders (system Integrators) by MAHAGENCO is also required for acceptance of such bidder's offer in the tender. Bidder must furnish following documents for taking up with customer their approval as system integrator:

   i. Company Profile of the bidder

   ii. Tabular List of IP CCTV system already executed / orders in hand of bidder (especially in power plants, cement plants, petroleum refinery, steel plant, coal mines) clearly mentioning name of project, year of supply /commissioning / handing over, make of camera and contact details of user/owner etc.

   iii. Unpriced Copy of Purchase order / Performance certificates / handing over protocols of IP CCTV system supplied commissioned by bidder.

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SECTION- B

Pre-Qualification Requirements (PQR)

All of the following Pre-qualification requirements are to be met by all bidders. Bidders should submit tabular compliance on how they are meeting these PQR criteria and shall also submit all documents mentioned against each PQR:

a) The bidder should be a system Integrator having designed, engineered, supplied and fully commissioned an IP CCTV system to power plants / Oil & Gas industry / process industry.

Following supporting documents shall be submitted for meeting above requirements:

i) Purchase Order Copies in name of bidder
ii) Bill of material or any other document to ascertain IP CCTV system
iii) Commissioning MOM or letter by user to substantiate commissioning of CCTV system.

b) Make of camera offered by bidder should have a 2 year satisfactory performance in at least 2nos of different "reheat type pulverized coal fired power plants" of not less than 500MW rating.

Bidder should submit performance certificate issued by user of such IP CCTV system. If the make of the camera is not mentioned in the performance certificate, then bidder has to submit other supporting document to establish the make of camera for which performance certificates are submitted.

c) Bidders should submit colour scanned pdf file of Manufacturer Authorisation Letter issued by the OEM for their consent to participate in this tender and confirmation following

a. OEM shall provide support / troubleshooting during commissioning and operation of the systems within warranty period.
b. OEMs offered products are new (not refurbished) and not in an existing End of Life product list
c. Spares (both finished product and spare parts) of their products shall be available for 5 years from dispatch of the CCTV system by their system integrator.

d) Bidder should have a clean track record, i.e. the bidder should not be under hold or blacklist by any of the BHEL units / any Govt of India PSU / Govt of India as on bid submission date. Bidder should submit a declaration for this on their letter head duly signed by competent authority of the organization.

e) **The bidder should have an average financial turnover of more than Rs 60 Lakhs for last three financial years viz 2019-20, 2018-19 & 2017-18.**

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SECTION- C

2.01.00 INTENT OF SPECIFICATION

2.01.01 This specification is intended to cover the design, manufacture, assembly, Inspection and testing at Bidder's works; delivery including packaging, crating in road / sea worthy packing, freight, insurance, all taxes & duties and other charges as applicable for the items and all accessories specified in the scope of supply and as required for safe and trouble free operation of CLOSE CIRCUIT TELEVISION (CCTV) SYSTEM.

2.01.02 All systems covered herein shall be for the permanent phase of the project and shall include but not be limited to; design, supply, supervision of interface installation Bidder's works, test, commission and hand over to MAHAGENCO/BHEL the equipment.

2.01.03 It is not the intent to completely specify all details of design and construction herein. Nevertheless, the system shall conform to high standard of engineering, design and workmanship in all respects and shall be capable of performing satisfactorily in continuous commercial operation under the prevailing environmental condition of the project site.

2.01.04 ABBREVIATIONS

BOQ - Bill of Quantities
CCB - Central Control Building
CCTV - Close Circuit Tele Vision
CCR - Central Control Room
DCS - Distributed Control System
DVSP - Digital Voice Storage Playback
GCC - General Conditions of Contract
LED - Light Emitting Diode
LOI - Letter Of Intent
MDF - Main Distribution Frame
MTTR - Mean Time To Repair
PC - Personal Computer QAP - Quality Assurance Plan
RH - Relative Humidity RMS - Root Mean Square
SPL - Sound Pressure Level
UCR - Utilities Control Room
UHF - Ultra High Frequency
UPS - Uninterruptible Power Supplies

2.02.00 SCOPE OF WORK AND EXCLUSIONS

2.02.00 **GENERAL**

2.02.01 The scope of work in this document specifies the technical & contractual requirements for the design, supply, erection, testing and commissioning of CCTV System and all accessories.

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2.02.02 Bidder shall be fully responsible for compliance of the system to be supplied in line with the requirements of this specification.

2.02.03 Provisions included in the specification will not be limitative to the scope of work and **bidder shall be responsible for design, fabrication, procurement, manufacturing, assembly, inspection, shop testing, supply, installation, erection including all civil and masonary works, commissioning and handing over of the complete system, on as required basis**.

2.02.04 Bidder shall provide supply/services for any further activities which will improve the quality & performance of the system offered.

2.02.05 Tentative list of distribution of cameras are provided in the Annexure-I of this specification. Plot plan of the project is also provided as Annexure-II. Bidders are required to go through the camera location as well as plot plan in detail for calculating, considering and offering quantity of all items called in lots in the BOM as all items called in lots in BOM are to be offered, supplied, installed, erected and commissioned on as required basis.

2.02.05 INCLUSION IN SUPPLY: This system is for the entire BTG Plant and Balance of Plants (BOP) like Coal Handling Plant, Ash Handling Plant, Plant Water System, CW, ACW System etc and also along the plant boundary.

2.02.07 **SCOPE OF SERVICE**

Following service shall also be provided by Bidder for equipment & systems supplied under this specification:-

a) Carrying out detail engineering, preparation and submission of all drawings as specified elsewhere in this specification including preparation and submission of bill of materials, layout and erection drawings showing location of all system equipment and components, cable schedule, cable tray/rack and conduit routing.

b) Inspection and testing at Bidder's works as per the approved Quality Assurance Plan.

c) **Packing and forwarding of all equipment (except cable drums, cable tray, conduits and poles) included under this specification in a weather proof container with lock and key.** The bidder shall be responsible for safe storage of the items inside the container against weather. It shall be bidder's responsibility to take materials out of container for entire duration of erection and commissioning of the systems till the system is fully commissioned and handed over.

d) Installation and Commissioning of the CCTV system shall involve deploying labour (skilled and unskilled), supervisory personnel, engineer and also erection tools and tackles, testing equipment, consumables & hardware, transport and storage in container for timely and efficient execution of the contract work.

e) The complete erection, installation and commissioning of the complete CCTV system will be in bidder scope of services. This will include but not limited to storage in weather proof container, cable laying on trays/conduits, fixing of camera using suitable camera mount as per site requirement etc, digging/trenching, etc installation and commissioning of all items supplied under CCTV system on as required basis.

g) Bidder will visit Site after ordering to finalise the grouping of cameras and preparation of cable schedule. The cable schedule along with survery report

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for camera grouping should be submitted before commencing E&C of the system.

h) Training to be provided to MAHAGENCO/BHEL's personnel for operation and maintenance of the CCTV system.

i) Site modification and preparation of "as-built" documentation".

j) Securing certification from relevant authorities, wherever applicable.

k) Project management and scheduling including micro-planning in specific work area and reporting progress periodically.

l) Bidder has to provide the services required for completeness and correctness of the system irrespective of whether it is mentioned in the specification or not.

m) **The complete erection and commissioning of CCTV system shall be done as per availability of fronts in the project and would have to be done spreading over a period of approximately 24months from delivery of the materials at site. The erection and commissioning would therefore require multiple visit to site for survey, planning, cable schedule preparation, laying of cables, camera mounting, sever installation and commissioning and camera commissioning and bidders should include the same in their offer for E&C.**

n) Redundant 240 VAC UPS feeder from main plant UPS shall be provided at Central Control room for CCTV System. Further distribution and conversion to other voltage level for complete CCTV and Perimeter Intruder Detection System shall be suitably done by bidder.

2.02.08 EXCLUSIONS from scope of services:

a) Lifting of CCTV 42U panel from stores to CCTV control room.

a) Unloading of material on delivery.

2.03.00 PERFORMANCE GUARANTEE

The Systems / Equipment to be supplied under this specification shall meet the guaranteed performance specified in the data sheet, specification sheet and technical attachment sheet when operating at the rated / specified conditions. The acceptance of the System / Equipment shall be subject to satisfying these parameters during FAT at Bidder's works and at site installation in complete commissioned condition.

2.04.00 REFERENCE DOCUMENTS' CODES AND STANDARDS

2.04.01 The entire system and accessories materials shall conform to the requirements of the latest issues and most recent revisions and amendments of the standards listed below and to the local laws and regulations applicable to the Project.

2.04.02 This Specification shall be read in conjunction with material Standards, codes, practices and regulations.

2.05.00 PROJECT INFORMATION

2.05.01 Environment specified as 'Indoor' shall be air-conditioned, where mentioned, having temperature between 20-25 degrees C and RH of about 40%. Outdoor location shall follow 'site condition' data given below.

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Mean of daily max temp	: 48.25 °C
Mean of daily min temp	: 18 °C
Highest temp recorded	: 48.7 °C
Lowest temp recorded	: 13 °C
Wet bulb temperature	: 27°C

2.05.02 **All outdoor equipment shall be exposed to high humidity & oil/water vapor, coal dust and fly ash laden environment, vibration and electromagnetic interference generally encountered in similar industrial environment.**

2.05.03 All outdoor equipment shall be mechanically or environmentally protect with sunshade or canopy wherever necessary.

Project Location: The proposed power plant will be set in Dipanagar (Near Bhusawal), Maharashtra. Dipanagar is well connected by rail and road, The nearest railway station is Bhusawal and nearest airport is Aurangabad. The project is located on Mumbai-Nagpur highway.

2.06.00 Technical specification of Accessories

22 Inch LED Backlit Monitor:

Viewable size min	21.5 inches
Max resolution	1920 x 1080 Pixels.
Contrast ratio	1000:1
Brightness	250 cd /m^2.
Viewing angle	160V / 170H Typical (@ 10:1 CR)
Interface	VGA & DVI D
Power supply	100 to 240 VAC; 50/60Hz.

Full Function Keyboard:

Interface	USB 1.1/2.0 Complaint.*(USB extender device for length upto 150 ft to be provided, as required)*
Power	USB interface.
System requirements	Windows 7 or above, Vista, XP, 2000, 2003 Server
Keypad jog dial	Required

Alarm I/O Device:

Input ports	As required
Output ports	As required
Interface	RJ-45, 10/100 mbps Ethernet.
Mounting kit	DIN Rail or Rack Mount.
Compatibility	Should seamlessly integrate with proposed VMS

Network Switch: As per requirement of the system offered and environmental conditions mentioned in this specification.

Cat 6 UTP Patch Cable: UTP Patch Cable – 3 Meters Length minimum

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Cat 5e UTP, 4 Pair Stranded Copper Cable with RJ 45 Connectors.
1000 Mbps – 3 Meters Length.
Stranded, Unshielded 24 AWG
Polycarbonate Plug & Gold over Nickel Contacts
Confirming to EIA/TIA 568B
UL/ETL Verified.

Single Mode Fiber Patch Cable

Fiber Patch Cable - 3 Meters Length

SC-LC or **SC-SC** Duplex(refer BOM), 9/125 microns Single Mode with plastic molded plug type connector. Standard 2.5mm Ceramic ferrule.
Confirming to EIA/TIA 568

Cat6 Patch Panel:

Powder coated steel in 24 port configuration
Should support port identification numbers on the front of the panel.
IDC: Suitable for 22-26 AWG stranded and solid wire compatible with both 110 & Krone punch down tools
The Cat-5e transmission performance should be in compliance with the ANSI/TIA/EIA 568C.2 standard
RoHS Compliant
50 µinches gold on plug contact area , Phosphor bronze with nickel plated IDC Contact

Light Interface Unit (LIU) 24 port:

LIU– 24 Port Rack mount loaded with SC SM Simplex Couplers. Cable entry for six nos. shall be considered for this LIU.

19” Rack Mountable Cabinet
LIU Box Powder Coated Aluminum alloy, Cable grommets should be FR Grade Nylon. Flame retardant plastic.
SC Simplex SM Couplers compatibility to optical fiber 9/125 µm.
Operating temperature of coupler up to 80°C.
LIU qualifies as per ISO/IEC. Couplers – UL listed. RoHS Complaint.

Light Interface Unit (LIU)12 port:

LIU – 12 Port Rack mount loaded with SC SM Simplex Couplers.

19” Rack Mountable Cabinet
LIU Box Powder Coated Aluminum alloy, Cable grommets should be FR Grade Nylon. Flame retardant plastic.
SC Simplex SM Couplers compatibility to optical fiber 9/125 µm.
Operating temperature of coupler up to 80°C.
LIU qualifies as per ISO/IEC. Couplers – UL listed. RoHS Complaint.

Industrial Panel:

Floor standing Panel (Frame)	Basic frame consists of separate height; width and depth channels made from 2mm thick sheet steel and then welded together using a solid steel corner block to provide exceptional rigidity.

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Front door	2mm thick single front door, with partial glass Fitted with Nitrile gasket.
Rear door	2mm thick dual rear door with complete steel.
Rear panel	2mm thick, rear panel screw fixed
Side panel	1.6mm thick, panel screw fixed
Top panel	1.6mm thick panel with cable entry facility, fan mounting option. Top Canopy.
Bottom panel	1.6mm thick panel with 3 part gland plate for cable entry
19” rails	Adjustable 19” rails at the front and rear to mount 19” equipment.
Base frame	3mm thick, base frame to rest the cabinet on the floor
Baffle plate	3mm thick, baffle plate / mounting plate to mount the industrial equipment.
Load bearing capacity	Load rating of 1000Kgs
Ingress protection	IP 32
Dimensions • Width • Height • Depth	800 width in mm 2067 height in mm 800 depth in mm (The above dimension are tentative and shall be finalized during detailed engineering)
Material	Steel
Powder coating	Both exterior &Interior RAL 9002- paint shade shall be finalized during detailed engineering)
Accessories • 1U fan tray • Cooling fans • Equipment shelf • Cable manager • Earth continuity kit • Earthing bar	1.2mm thick tray with 4 fans position (as required) 230v AC, 50 Hz, 90 cfm 1.2mm thick, 1U, 100kg load bearing capacity 1U cable manager for horizontal cable routings Full length vertical managers for vertical cable routings Cables for connecting equipment to main earthing point Vertical and horizontal copper bars for earthing.

Industrial Wall Mount Enclosure:
Industrial Wall Mount Enclosure for housing Edge switch, LIU and Power distribution arrangement to camera.

Wall mount rack	Overall structural construction of 1.2mm thickness
Front door	1.2mm thick, front glass door with lock
Rear panel	1.2mm thick, rear wall mounted section hinged to the front section with a pair of 19” rails
Top panel	1.2mm thick panel with cable entry facility, fan

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	mounting option and vents at the front.
Bottom panel	1.2mm thick panel with cable entry facility
19” rails	Adjustable 19” rails at the front to mount 19” equipment.
Load bearing capacity	Load rating of 20Kgs
Dimensions • Width • Height • Depth	 600 width in mm 12U / 6U 500 depth in mm (400mm + 100mm)
Material	Steel
Powder coating	Light grey (RAL 7035)
Accessories • 1U fan tray • Cooling fans • Cantilever shelf • Cable manager • • Earth continuity kit	 1.2mm thick tray with 2 fans position (as required) 230v AC, 50 Hz, 90 cfm. 1.2mm thick, 1U, 20kg load bearing capacity 1U cable manager for horizontal cable routings Cables for connecting equipment to main earthing point

1 inch Flexible GI Conduit:
Galvanized steel, helically wound, Flexible Conduit System

Mini UPS:
Mini UPS with 30 minutes battery backup for around 10 cameras with 1-2 network switch and media converters.

	Input voltage : 140 – 270 VAC Frequency 47 – 53HZ.
	Output : 1 KVA Rated voltage: 230V AC 50HZ. Power factor : >= 0.7 Overall efficiency >= 85 % Automatic switch over time :< 5 millisecond or better. With overload, short circuit, over & under voltage protections. Battery : SMF

Junction Box

a) Material- min 4mm thick FRP or CRCA
b) Type- Screwed at four corners of door, door gasket shall be synthetic rubber
c) Mounting clamps and accessories: Mounting plate of 2mm thick mild steel to be provided inside JB, mounting clamps suitable for mounting on walls, columns, structures etc. shall be provided. The brackets, bolts, nuts, screws, glands, SS handle and Lugs required for erection shall be of SS304, included in Bidders scope of supply.
d) Protection Type : IP55 of indoor and IP65 for outdoor
e) Grounding: To be provided, as required

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HDPE pipe

The HDPE pipe shall be used for laying OFC / STP / Power cables while laid underground. HDPE pipe shall be permanently lubricated type with ISI marked. The internal diameter of the HDPE pipe shall be suitably selected so that 50% free space is maintained during cable drawing. The pipe shall conform to DOT standard GR/CDS-08/02 Nov. 2004 with latest

RIGID STEEL CONDUIT

Conduits up to and including 25 mm shall be of 16 SWG and conduits above 25 mm shall be of 14 SWG. Minimum size of conduits shall be 19 mm. Each piece of conduit shall be straight, free from blister and other defects and covered with capped bushing at both ends. All rigid conduit couplings and elbows shall be hot dip galvanized rigid mild steel in accordance with IS:9537 Part-I (1980) and Part-II(1981). The conduit interior and exterior surfaces shall have a continuous zinc coating with an over coat of transparent enamel lacquer or zinc chromate. Conduits shall be furnished in standard length of 3 meters, threaded at both ends. All rigid conduit fittings shall conform to requirements of IS:2667,1976. Galvanised steel fittings shall be used with steel conduit. All flexible conduit fittings shall be liquid tight, galvanized steel. The end fitting shall be compatible with the flexible conduit supplied.

SPECIAL FITTINGS

All rigid conduit fittings shall conform to requirements of IS: 2667, 1976. Galvanised steel fittings shall be used with steel conduit. All flexible conduit fittings shall be liquid tight, galvanized steel. The end fitting shall be compatible with the flexible conduit supplied.

FO cable specification

Sl no	Attribute	Value
1	Cladding diameter	125 + 1 µm
2	Cladding non-circulatory	<1%
3	Attenuation coefficient at 1290nm to 1340nm 1525nm to 1675nm	 <0.36 dB/Km <0.25 dB/Km
4	Chromatic dispersion coefficient at 1310nm 1550nm	 <3.5ps/nm <18ps/nm
5	Polarisation mode Dispersion	<0.5 ps/Km
6	Mode Field diameter 1310nm 1550nm	 9.2 + 0.4 µm 10.5 + 1 µm
7	Mode field concentricity error	<0.5 µm
8	Proof test	>1%
9	Fiber curl (RoC)	>4.0 m
10	Macro bend test on fiber at 1550nm	< 1dB

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Following tests are to be conducted on the FO cable before supplying

1. Attenuation and dispersion characteristic test
2. Proof test
3. Macro bend resistance test
4. Mechanical test
5. Low and high cable bend test
6. Impact resistance test
7. Compressive strength test
8. Cable twist test
9. Cable cyclic flexing test
10. Environmental characteristic test
11. Temperature cycling test
12. Colour permanence test
13. Cable ageing test
14. Water penetration test
15. Lightning test
16. Routine test / sample test
17. Site test (continuity / attenuation)

Power cable specification:

The insulation and sheath material shall be resistant to oil, acid and alkali. Armouring shall be single round wire of galvanized steel. The inner and outer sheath shall have FRLSH characteristics. Core identification shall be by colour coding. Following details shall be embossed at every meter on outer sheath

a) MSPGCL
b) Manufacturer name or trade mark
c) Voltage grade
d) Year of Manufacture
e) Type of Insulation
f) No of core and size of cable
g) Type of fire performance (FR/FR-LSH/FS)
h) IS number
i) ISI mark

Cable shall be subject to shop test in accordance to relevant IS/IEC/ASTM/IEEE /SS standard and as per approved QAP. Routine test shall be carried out on each drum of cable. Acceptance test shall be carried out on 10% of drums of each lot/type. Type test as per relevant IS, on each type of cable shall be carried out on one sample drum including measurement of armour DC resistance. Following test shall be performed on each type of cable

a) Oxygen index test
b) Temperature index test
c) Flame retardant test
d) Halogen acid gas evolution test
e) Smoke density test
f) Optical density of smoke test
g) Test for rodent and termite repulsion property
h) Flammability test – Swedish chimney test

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1.1	Rating : 1.1kV grade 85° C continuous rating under normal condition and 160°C under short circuit condition rating HRPVC Control cable (YWY) conforming to following requirement and in line with IS:1554, IS:8130, IS:5831 and IS:3975.		
1.1.1	Conductor		Stranded, non-compacted & circular, high conductivity annealed plain copper, generally conforming to IS: 8130.
1.1.2	Insulation		Extruded HRPVC type-C compound conforming to IS: 5831. The minimum volume resistivity of insulation shall be 3.5 x 10^{14} ohm-cm at 27°C and 3.5 X 10^{11} OHM-CM at 85°C.
1.1.3	Core Identification		By color coding and numbering at interval of 100mm or less.
1.1.4	Inner Sheath		Extruded HRPVC compound conforming to type ST2 FRLS of IS: 5831 for multicore cables. Single core cables shall have no inner sheath. Filler shall be of same material as of inner sheath i.e. ST2.
1.1.5	Armour		Galvanised single round steel wire for twin and multicore cables.
1.1.6	Overall Sheath		Extruded FRLSH HRPVC compound conforming to type ST2 of IS: 5831.
1.1.7	Drum		Conforming to IS: 10418 (Wooden drum).

2.07.00 DOCUMENTATION

2.07.00.01 Details of documentation to be supplied as part of the System shall be submitted to MAHAGENCO/BHEL for approval prior to execution of the contract.
2.07.00.02 Each documentation deliverable shall be an integral part of Bidder's Project schedule and shall be identified by date for delivery.
2.07.00.03 Bidder shall supply final approved sets of documentation in soft copies on DVD.

2.07.01.00 ENGINEERING DESIGN DOCUMENTATION

2.07.01.01 Bidder will produce drawings of complete system to be submitted to MAHAGENCO/BHEL for approval, indicating upon each the following :
a) Overall dimensional drawing of system cabinet, console and its accessories.

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Block diagram of system offered with a brief write-up on operation including hook-up arrangement with existing system.

b) Data sheets.

c) Bill of Materials.

d) Typical general arrangement drawings of various handset and speaker stations.

e) Schematic diagram of each type of station.

f) Mounting details.

g) Cable connection diagram for various type of stations, clearly indicating cable size, number of pairs/cores etc.

h) Total power consumption details.

i) Heat load details of panel equipments.

j) Technical leaflets on each piece of equipment viz handset, speaker etc.

2.07.01.02 The Systems Design Manual shall contain all relevant information pertaining to the design and operation of the delivered equipment.

2.07.01.03 This is intended to provide MAHAGENCO/BHEL with an understanding of the operational and design parameters of the equipment and to resolve System operational problems.

2.07.01.04 This documentation shall typically include the following items, presented in a Systems Design Manual:

Equipment design calculations and selection basis.

Equipment construction and assembly drawings.

Parts list and drawings with manufacturer's identification codes.

Systems connection diagrams.

Accessories list and drawings with manufacturer's identification codes.

2.07.02.01 **OPERATION & MAINTENANCE DRAWINGS AND DOCUMENTATION**

2.07.02.01 The O&M Drawings and Documentation shall typically include the following items:

- Assembly drawings.
- Parts list and drawings with manufacturer's identification codes.
- Accessories list and drawings with manufacturer's identification codes.
- O&M schedules.
- Maintenance guidelines including lapping instructions.
- Troubleshooting guides.

2.07.02.02 The O&M manuals shall be submitted in the form of handy, hard bound books which can be easily handled and transported to site.

2.07.03.00 **DRAWING/ DOCUMENT SUBMISSION REQUIREMENTS**

2.07.03.01 Bid shall contain at least the following documents:

SL. NO.	DOCUMENT TYPE
1	Data sheets / catalogs of all items
2.	Main and Mandatory spare BOM with make and model number of all items
3.	Proposed System schematic diagram.
4.	Write up on architecture and operation of proposed system

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5.	Deviation list. If no deviation, then NIL deviation declaration
6.	Bidders to submit Manufacturer Authorisation Letter (MAF) from camera OEM mentioning all of the following: a. OEM's authorization to participate in this tender on their behalf b. That the bidder is their trained system integrator c. That OEM will give all Technical support / troubleshooting assistance during commissioning and operation of the CCTV system. d. That the quoted products are brand new, are not in End of Life list product and support for supply of Spare camera as well as spare parts for 5 years from the date of supply. e. That OEM will continue their technical Support for commissioning, supply of spare / spare part and repair through their other authorized system integrator (SI), if BHEL terminates the contract with present SI or their tie up with present SI ceases till complete commissioning
7.	Clause wise technical compliance indicating each parameter value of w.r.t specification. A printout of this specification may be taken and "COMPLIED" to be mentioned against each clause with signature and seal on each page. Any deviation should be marked up at relevant clause.

2.07.04 **AS-BUILT DRAWINGS**

Upon completion of the final acceptance of the System by MAHAGENCO/BHEL, all construction drawings shall be updated by Bidder to an as-built status to reflect the equipment and System configurations as actually installed.**2.08.00.00 TESTING**

2.08.01.00**FACTORY ACCEPTANCE TEST (FAT)**

2.08.01.01 Factory Acceptance Test procedure shall be prepared by Bidder along with Quality Assurance Plan. The document shall be subject to MAHAGENCO/BHEL's approval.

2.08.01.02 All items that are offered in the BOM shall be duly tested by manufacturer at their factory and test certificate of same shall be furnished to BHEL / MAHAGENCO for review and approval.

2.08.01.03 The entire CCTV system items (as called in BOM) shall be made available at bidder's work for inspection (FAT) which will include complete integrated test for checking that the equipment offered is meeting the design standards and functional requirements mentioned in this specification. As a minimum, BOM verification, physical verification, integrated test shall be performed on true sample of items selected by BHEL shall be part of FAT. BHEL reserves right to check power ON functionality of entire active components of CCTV system BOM. QAP and FAT procedure shall be subject to MAHAGENCO/BHEL approval.

2.08.01.04 One month prior to the FAT, Bidder shall submit a test procedure and QAP to BHEL for approval.

2.08.01.05 MAHAGENCO/BHEL's representative may, at MAHAGENCO/BHEL's sole discretion, attend the FAT. In this event, Bidder shall ensure all tests are carried out in the presence of MAHAGENCO/BHEL's personnel. If MAHAGENCO/BHEL declines to attend the FAT, Bidder shall carry out these tests and submit the results to MAHAGENCO/BHEL for review.

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2.08.01.06 Factory Acceptance Tests (FATs) result shall be documented and the test results shall be submitted to MAHAGENCO/BHEL prior to clearance by MAHAGENCO/BHEL for dispatch.

2.09.01.01 **COMMISSIONING**

2.09.01.01 Bidder is responsible for delivering a fully functional equipment that meets all the requirements of the Specification and applicable standards.

2.09.01.02 The Commissioning processes will demonstrate the above to MAHAGENCO/BHEL, before handing over of the System.

2.09.01.03 System Commissioning shall comprise of a number of different activities culminating in the acceptance of the operational System by MAHAGENCO/BHEL. These activities are detailed in the following sections.

2.09.01.04 Bidder shall provide all necessary test equipment required to carry out the Commissioning and acceptance testing.

2.10.01.00 CLEANING, PROTECTION AND PAINTING

2.10.01.01 All equipment shall be shipped in properly cleaned condition. All the equipment
shall be thoroughly cleaned to remove mill scales, rust etc. and properly painted with anti rust primer, where applicable

2.10.01.02 Some of the equipment and accessories, after arrival at site, are likely to be in storage for long periods before they are taken up for erection. Bidder may provide adequate protection for preventing damage due to corrosion, dust / dirt ingress, ageing etc.

2.10.01.03 Plugs shall be provided at cable entry holes/adapters to avoid entry of dust and foreign particles. Paper cap will not be acceptable.

2.11.00 IDENTIFICATION, MARKING, PACKING AND STORING

2.11.01 Each equipment shall be individually packed, tagged and protected.

2.11.02 Inscription on equipment (labels) shall be in English.

2.11.03 Packing must be such to protect all goods from possible impacts and foreign matters; moreover, it must limit the influence of both the climate and the environment, and be suitable for the kind of shipping provided for.

2.11.04 In packing the equipment and accessories, all necessary precautions will have to be taken to avoid any damage during transport and delivery.

2.11.05 All items supplied shall be packed for long term storage under the climatic conditions prevailing at the site in a weather proof container. Small items shall be packed in sealed transparent plastic bags with desiccator packs as necessary. Each item shall be clearly marked with its description, purpose and plant designation code as applicable. When more than one item is packed in a single case a general description of the contents is to be shown on the outside of each case and a detailed list enclosed. All cases and other packages must be suitably marked and numbered for identification purposes.

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2.12.00 SHIPMENT

2.12.01 Bidder shall be responsible for ensuring that all equipment are carefully and/or suitably packed for shipment, so that they arrive at site in good condition and remain so during storage at site. Before dispatch, all exposed surface shall be protected by applying anti rust primer (two coats) and suitable cover shall be provided for the equipment to be supplied.

2.12.02 Bidder will be responsible for all damages due to improper packing of the goods for shipment and shall replace all such damaged items without cost implication to BHEL

2.13.00 DISCREPANCIES

In case of discrepancies between the technical requirements and other applicable Engineering Standards, Materials System Specifications, Standard Drawings, or industry standards, codes, and forms shall be resolved in writing by Bidder with Purchase. Before starting the manufacturing / supply, Bidder shall inform Purchase of any discrepancy between the instructions of the present specification and Bidder's standard. Bidder is also advised to discuss on any clarification required before submitting their offer to avoid any ambiguity/dispute later on.

It shall be the responsibility of Bidder to determine and comply with the statutory regulation (i.e. city, state, national, provincial, etc. codes or ordinances) which will apply in the location where the item is to be installed. Mandatory regulations cannot be superseded by this specification.

In case of any discrepancy in specification / parameter mentioned in this purchase specification, the stringent between the two shall be considered and offered. However, the technical specification of the CCTV system as furnished in Annexure-I shall supersede any conflict in information given in this specification.

16.00.00 Bill of materials

Sl. No.	ITEM	Unit	Tender Qty.	Reference Qty
1	VMS software of adequate capacity including spare capacity as mentioned in technical specification for both plant and perimeter cameras.	SET	1	
2	Video Content Analytics Software (as required) for meeting specification requirement including spare capacity as mentioned in technical specification for both plant and perimeter cameras	SET	1	
3	Camera/Database Server - Primary server (CCTV) with 24” monitor	SET	1	
4	Camera/Database Server - Standby secondary server (CCTV) with 24” monitor	SET	2	
5	OWS or Server (as required) for controlling camera and storing video of all camera installed along perimeter of the plant	SET	1	
6	Camera View Work Station (CMWS) with 24” Monitor, Keyboard and Joystick for Plant CCTV	NOS	2	

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7	Camera View Work Station (CMWS) with 24" Monitor, Keyboard and Joystick in Security room – one for monitoring Plant cameras and other for perimeter cameras.	NOS	2	
8	KVM Console with 8 port Switch	NOS	1	
9	PTZ Dome Colour Camera with wall/pole mount and power supply for plant area	NOS	80	
10	PTZ Dome Colour Camera with wall/pole mount and power supply along perimeter wall of the plant area at every 500mtrs	LOT	1	12nos
11	Fixed Camera with wall/pole mount and power supply along perimeter wall of the plant area at every 100mtrs	LOT	1	60nos
12	Alarm I/O Device having 24 PFC for integration to fire alarm system of the power plant	NOS	2	
13	Type-I Switch (Core Switch)- Layer-III Switch for interconnection to station LAN	NOS	1	
14	Type-II Switch (Distribution Switch with suitable no of each types of ports required for each zone for establishing redundancy as per tender specification)	LOT	1	3nos
15	Type-III Switch (Edge Switch)	LOT	1	55nos
16	2/4 Pair Control Cable for Alarms	LOT	1	4000mtrs
17	Cat 6 shielded Twisted Pair Cable (STP)	LOT	1	6000mtrs
18	4F (minimum) armoured SM FO cable	LOT	1	35000mtrs
19	3C 2.5Sqmm armoured power cable for connecting camera and switches from CCTV panel	LOT	1	30000mrs
20	3C 1.5Sqmm un-armoured power cable for connecting camera to nearest JB (if armoured 2.5Sqmm cable can not be terminated in camera)	LOT	1	3000mtrs
21	Pair of Single Mode Media Converters -10/100 MBPS speed, suitable **for connecting cameras**	LOT	1	40 pairs
22	Pair of Single Mode Media Converters -1000 MBPS speed, suitable for **connecting workstation**	LOT	1	2 pairs
23	Industrial Panel	LOT	1	2nos
24	Industrial Wall Mount Enclosure and JB	LOT	1	55nos
25	Cable Trays / Flexible conduits / Rigid Conduits / HDPE pipes along with necessary mounting accessories for laying various types of cable depending on the site condition.	LOT	1	Cable tray-2000mtrs Flexible conduit-1000mtrs Rigid Conduit-1000mtrs HDPE pipe-5000mtrs
26	1KVA or as required rating mini UPS for powering remote located cameras along with other associated devices like switch and media converters	LOT	1	10 nos
27	Antivirus / End Point protection for servers and OWS	SET	1	
28	All types of licence for Camera View Work Stations (CMWS) with lifetime validity	LOT	1	
29	LVS interface system (refer technical spec for details)	LOT	1	
30	Fringe Miscellaneous items a) Electrical items such as Terminal Blocks (TBs), Miniature Circuit Breakers (MCB), cable coverings, cable managers, panel lamp (for	LOT	1	

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	Panel & Enclosure) and RJ45 connectors and crimping tool etc. b) Mechanical items such as G / C channels and DIN Rail, camera JBs, cable glands, mounting brackets, bolts & nuts etc. c) Fiber optic accessories like Fiber Patch Cable, LIUs, Pigtails etc required for completion of the splicing and termination of FOC d) Cat-6 cable accessories like UTP Patch Cable, patch panel, etc for termination of all CAT5e cables			
31	Camera poles made of MS / GI of minimum 6mtr height above ground after fixing. Poles shall be corrosion resistant, durable finish and high tensile steel.	LOT	1	40nos
32	Any other item mentioned in technical specification or required for functional completion of CCTV system as per technical specification and but specifically mentioned above.	LOT	1	
33	Container of suitable size and quantity as required for each project with lock and key for storing CCTV components except cable and poles	LOT	1	
34	Erection (including necessary civil and masonry works), Installation and commissioning of full CCTV package as per services scope mentioned in technical specification.	Lot	1	
35	**MANDATORY SPARES**			
A	Each type of CCTV lenses	%	10	
B	Each type of CCTV filter adapters	%	10	
C	Each type of Filters	%	10	
D	Each type of Each type of Camera and Monitors	%	10	
E	Each type of Electronic Crosshair generator	%	10	
F	Each type of Fiber optic ring illuminator	%	10	
G	Each type of Coaxial illuminator	%	10	
H	Gooseneck halogen illuminator	%	10	
I	Each type of CCTV camera mounts	%	10	
J	Each type of PTZ unit for cameras	No	1	

Note:

1. The bidder must quote unit price of supply and service cost of all items in above BOM for indisputable calculations of total prices for any change in quantity of any item called in nos.
2. The quantity mentioned under column "Reference qty" are just an indicative quantity which may be required for the CCTV system in the Bhusawal Power plant. These quantities are neither minimum nor maximum quantity to be considered/offered/supplied by bidders. Bidder should refer the plot plan & location list of cameras provided in this specification to "estimate & offer" quantities on as required basis, for all items which are called in lots/sets in above BOM, without any cost implication to BHEL.

ANNEXURE-I

VOLUME V

SECTION - 7 B

CLOSED CIRCUIT TELEVISION

CONSULTANT : PROCON ENGINEERS

1.0 CLOSED CIRCUIT TELEVISION SYSTEM

1.1 CLOSED CIRCUIT TELEVISION SYSTEM

1.1.1 Closed Circuit Television System (CCTV) with all equipment and accessories shall be installed for the purpose of surveillance of major plant areas. Also, cameras shall be installed at the Main Gate and other common auxiliary plants.

1.1.2 The CCTV system shall meet the specific functional & design requirements towards collecting live video information from the various areas of the plant and displaying that information at monitors.

1.1.3 Bidder shall include Digital Server based Video Manager, Camera unit, Video Streamer, Optical fiber network cables, Network hard wares & all other accessories including design/engineering, testing, erection & commissioning etc. for complete functioning of the system.

1.1.4 Bidder shall consider licensed version of all application and system software required for the system.

1.1.5 System shall be of proven design in dust laden atmosphere and of reputed make.

1.1.6 Bidder shall submit block schematic of Power distribution and wiring diagram, CCTV network architecture drawing, hardware & software detail and other information as necessary.

1.1.7 Requirement for minimum number of camera units and their tentative locations are listed below. CCTV system shall include industrially ruggedized high resolution colour day/night CCD camera, motorized zoom lenses, PAN & TILT mechanism, Transmitter/Receiver units & video Streamer integrated to a Digital Video Management Server for video switching, control and recording functions. Bidder shall furnish unit rate of each camera system. These unit rate shall be applicable for any addition /deletion in the quantities.

LIST OF CAMERAS TO BE PROVIDED

SR. NO.	TYPE OF CAMERA	ENCLOSURE CLASS	LOCATION	NO. OF CAMERAS
1.0	CCD camera (Dome Type)	IP 54	TG Hall	01
2.0	CCD camera	IP 54	TG Hall	02
3.0	CCD camera	IP 54	Turbine oil room	01
4.0	CCD camera	IP 54	Boiler Feed Pumps	03
5.0	CCD camera	IP 54	Condensate Extraction Pumps	01
6.0	CCD camera	IP 54	Generator seal oil system	01
7.0	CCD camera	IP 54	Compressor room	01
8.0	CCD camera	IP 54	Switchgear Room	01
9.0	CCD camera	IP 65	Boiler Firing Floor	01
10.0	CCD camera	IP 54	Boiler circulation water pumps	02
11.0	CCD camera	IP 65	Coal mill area	06
12.0	CCD camera	IP 65	Coal Feeder area	06
13.0	CCD camera	IP 65	ID Fan	02
14.0	CCD camera	IP 65	FD Fan	02
15.0	CCD camera	IP 65	PA Fan	02
16.0	CCD camera	IP 54	AHP control room	01
17.0	CCD camera	IP 65	Ash water pump house	01
18.0	CCD camera	IP 65	Air heater area	01
19.0	CCD camera	IP 65	ESP field area	02

SR. NO.	TYPE OF CAMERA	ENCLOSURE CLASS	LOCATION	NO. OF CAMERAS
20.0	CCD camera	IP 65	Generator Transformer Bay	02
21.0	CCD camera	IP 65	To be decided during detailed engineering	04
				Total - 43nos

LIST OF CAMERAS TO BE PROVIDED AT COMMON PLANT AREA

SR. NO.	TYPE OF CAMERA (DOME TYPE)	ENCLOSURE CLASS	LOCATION	NO. OF CAMERAS
1.0	CCD camera	IP 65	Ash slurry Pump House area	02
2.0	CCD camera	IP 65	CW Pumps	02
3.0	CCD camera	IP 65	ACW Pumps	01
4.0	CCD camera	IP 65	Fire Water Pump House	01
5.0	CCD camera	IP 65	Fuel oil Pressurizing Pump House	01
6.0	CCD camera	IP 65	Fuel oil unloading bay	02
7.0	CCD camera	IP 65	Fuel oil unloading pump house	01
8.0	CCD camera	IP 65	Fuel oil tank area	01
9.0	CCD camera	IP 65	Unloading Bay of Unit	01
10.0	CCD camera	IP 65	Main entry gate	01
11.0	CCD camera	IP 65	CHP area	08
12.0	CCD camera	IP 65	Switchyard	01
13.0	CCD camera	IP 65	DM plant	01
14.0	CCD camera	IP 65	Chimney	01
15.0	CCD camera	IP 65	Cooling Tower	01
16.0	CCD camera	IP 65	Train entry and exit point	01
17.0	CCD camera	IP 65	ETP plant	01
18.0	CCD camera	IP 65	Cable gallery	05

SR. NO.	TYPE OF CAMERA (DOME TYPE)	ENCLOSURE CLASS	LOCATION	NO. OF CAMERAS
19.0	CCD camera	IP 54	CCR	02
20.0	CCD camera	IP 54	Control equipment room	03

Total - 37nos

1.1.8 Pan Tilt and Zoom camera (PTZ) shall be installed after every 500 meter intervals inside the perimeter wall/fence. The fixed camera shall be installed after every 100 meter intervals insides the fence.

1.1.9 CCTV system shall be powered from UPS

1.1.10 System shall be time synchronized with the GPS master clock. **NTP Format**

1.1.11 Design and Technical Requirements

(a) CCTV system envisaged shall have a Primary Digital Video Server along with 2 (two) off Secondary Digital Video Servers, (one for main plant, one for off site plants). The prime application program shall reside at Primary Digital Video Server and shall interface Secondary Digital Video Servers & Cameras for video and audio switching and control of the system. The Primary Server shall have the capability to add future secondary servers to support future expansion.

(b) 2 (two) 24" TFT monitoring stations shall be provided for monitoring of the plant. The system elements shall be able to communicate on Ethernet network.

(c) System shall store alarm and event activated recording. Features shall be provided only to capture most needed videos. It shall also have pre-recording feature so that videos prior to the event occurring can also be stored. The system operation shall cover the complete view of the areas by control of pan, tilt & zoom of the cameras. Modification of the system parameters shall be possible from any of the above stations.

(d) The system shall have following minimum controlling capability:

(i) PTZ control with Iris level control, pre-positioning control for at least 128 cameras.

(ii) Simultaneously record and play back input from up to 128 cameras.

(iii) Both manual and automatic mode control.

(e) The system shall have capability not limited to the followings :

(i) It shall be possible to view live video from anywhere on the network, including over wide area network connections, through firewalls & routers. The live output from cameras shall be viewed through a series of displays.

(ii) Sequence view of camera preset position.

(iii) Modifying settings/record settings for a camera.

(iv) Adding and deleting camera from the system.

(v) Creating schedules for recording an video motion detection.

(vi) Video recording with features like Operator Activated Recordings, Alarm and Event Activated Recordings, Scheduled Recordings (including 24hr recording), Video Motion Detection & Recordings and Exporting of a Recorded video into Microsoft Windows Media Format file.

(vii) Video Server shall have video recorder with sufficient disk space for on-line video storage and access to archiving mechanisms for the removal of stored video to off-line media. Event shall be stored in the recorder at least for 30 days. Recorder shall have date & time search and can playback of recorded video.

(viii) Archiving of the recorded videos to archiving media like DVD.

(ix) Video features like Single camera viewing, Quad viewing and Sequence viewing.

(x) Pass word protected Security levels for the monitoring and control of cameras to authorized users.

The system should be completely compatible to be integrated to Fire Alarm System. When the fire is detected by a particular detector the camera assigned should automatically focus the site of the fire. For implementation of the same, 24 nos. potential free input contacts for main plant & 24 nos. potential free input contacts for auxiliary area shall be provided for Fire Detection system interfacing with CCTV system panel. Proper implementation of the same shall be in the scope of bidder.

1.1.12 Description of System Components

CCTV Management system for the plant shall be built upon industry-standard TCP/IP open networking. The components shall be public domain products. Bidder shall furnish latest proven model of components & accessories, not limited to the following, for completeness of the system.

(a) Primary Digital Video Server

(i) Request and receive live video from the streamers and the cameras.

(ii) Multicast or Unicast live video.

(iii) Receive camera control commands and send to the cameras.

(iv) Store live video (recordings) into hard drives.

(v) Transmit previously stored video recordings to monitors when requested.

(vi) Record video on request.

(vii) Record video upon alarm trigger.

(viii) Schedule recordings and video motion detection.

(ix) Provide search engines for recordings.

(x) Archive previously stored video to off-line storage media.

(xi) Retrieve archived video from off-line storage media.

(xii) Recording of both video and audio simultaneously for 128 channels.

(xiii) Recording 18~24 frames/second regardless of the number of streams.

(xiv) Report any camera failure or recording failure.

(xv) Time synchronization with the plant GPS.

(b) Secondary Digital Video Servers

Features of the server shall not be limited to the following :

(i) Limit and grant operator access to live and recorded video and audio.

(ii) Send request to video server to record video and audio.

(iii) Provide indication of any camera which has failed.

(iv) Configure PTZ access.

(v) Configure alarm and alarm access.
(vi) System configuration.

(vii) Video transmitter and receiver configuration.

(c) Server configuration

SR. NO.	FEATURE	REQUIRED PARAMETER
(i)	Operating system	Windows 2000 or latest version.
(ii)	Code Compression	To be specified by Bidder.
(iii)	Processor	2nd generation core i5 or better
(iv)	RAM	4 GB or better.
(v)	Hard disk	8 x 60 GB SCSI with facility of expanding.
(vi)	CD ROM Drive	52 X or better.
(vii)	DVD writer	CD Read &write DVD Read & write.
(viii)	Video output	SXGA
(ix)	Remote Control	Full control Via TCP/IP
(x)	DAT Drive	Ultrium back up drive with tape auto loader.
(xi)	Monitor	24" Colour TFT.
(xii)	Input voltage	240 V AC 50 Hz.
(xiii)	Mounting	19" rack mounting.
(xiv)	Additional software for the Primary/ Secondary Server	Microsoft SQL Server 2000 including Digital Video system.

(d) Cameras

The cameras shall be rugged 1/3 inch image format or better, full performance color CCD cameras. For Dome type camera imager may be 1/4" size. Cameras shall provide high resolution and high sensitivity , both in natural and artificially sighted areas. Features shall not be limited to the followings:

(i) Suitable for day & night time surveillance.

(ii) Manual or Automatic colour/infrared switching.

(iii) Automatic picture enhancement to give a balanced picture in too little/too much light.

(iv) Remote camera setup, with on screen menu display.

(v) Character generator giving up to 24 character text-in-pictures.

(vi) Backlight composition.

(vii) Automatic white balance, with mode selection options.

(viii) Contour correction and contrast compression control.

Technical requirements shall not be limited to the following :

COLOUR CCD CAMERA

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Imager	1/3" Color CCD.
2.0	Effective Pixels	752 (H) x 582 (V) PAL.
3.0	Television System	PAL.
4.0	Horizontal resolution	540 lines.
5.0	Focus / Iris	Automatic with manual override.

SR. NO.	FEATURE	REQUIRED PARAMETERS
6.0	Min. illumination	Color- 0.3 lux – 0.002 lux.
7.0	Lens Mount	CS/C with lens washer.
8.0	Aperture correction	Horizontal and vertical.
9.0	Shutter Speed	MFR standard.
10.0	Signal to Noise Ratio	More than 52dB.
11.0	Gain control	Automatic.
12.0	White Balance	2000K to 10000K.
13.0	BLC	On / Off switch.
14.0	Video Output	1.0V Pk-Pk, 75 Ohm.
15.0	Power Supply	AC 240V, 1Ph. 50Hz.
16.0	Operating Temperature	$-10^0 \sim 50^0$C.
17.0	Humidity	0-100%.
18.0	Accessories	(i) Outdoor type box for Power supply unit and fiber optic connectivity. (ii) Mounting accessories. (iii) PAN and TILT mechanism. (iv) Camera housing.
19.0	Preferred Certification	CE, FCC.

DOME COLOUR CCD CAMERA

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Imager	1/4" Color CCD.
2.0	Effective Pixels	752 (H) x 582. (V)
3.0	Television System	PAL.
4.0	Sync. system	Internal/External.
5.0	Horizontal resolution	460 TV Lines.
6.0	Focus	Automatic with manual override.
7.0	Iris	Automatic with manual override.
8.0	Field of view	2.7 Deg. to 48 Deg.
9.0	Sensitivity	For day & night surveillance 0.0005 lux in night mode slow shutter on 0.031 lux in night mode slow shutter off. 0.0033 lux in day mode slow shutter on. 0.25 lux in day mode slow shutter off.
10.0	Aperture correction	Horizontal and vertical.
11.0	Optical & digital Zoom	12X.
12.0	Signal to Noise Ratio	More than 50dB.
13.0	Gain control	Off/automatic.
14.0	White Balance	2000K to 10000K.

SR. NO.	FEATURE	REQUIRED PARAMETERS
15.0	BLC	On / Off switch.
16.0	Video Output	1.0V Pk-Pk, 75 Ohm.
17.0	Power Source	AC 240V, 1Ph. 50Hz.
18.0	Operating Temperature	$-10^0 \sim 50^0$C.
19.0	Humidity	0-100%.
20.0	Accessories	(i) Outdoor type box for Power supply unit and fiber optic connectivity.
		(ii) Mounting accessories.
		(iii) PAN and TILT mechanism.
		(iv) Camera housing.
21.0	Preferred Certification	CE, FCC.

(e) Lens

The lens shall be minimum Auto-iris lens of 1/3 inch. with zooms facility. Depending upon the system requirements bidder shall provide the exact zoom lens.

(i) LENS (Zoom Lens of 6-60mm)

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Zoom	6-60 mm. (10 X)
2.0	Lower focal distance	6 mm.
3.0	Size	1/3″ format.

SR. NO.	FEATURE	REQUIRED PARAMETERS
4.0	Iris	Auto-video drive.
5.0	Pre-set	Focus, Zoom.
6.0	Zoom Control	Motorized.
7.0	Focus Control	Motorized.
8.0	Connector to camera	"C" or "CS".
9.0	Iris control	Motorized and /or automatic.

(ii) LENS (Zoom Lens of 8--120mm)

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Zoom	8-120 mm. (15 X)
2.0	Lower focal distance	8 mm.
3.0	Size	1/3" format.
4.0	Iris	Auto-video drive.
5.0	Pre-set	Focus, Zoom and/or automatic.
6.0	Zoom Control	Motorized.
7.0	Focus Control	Motorized.
8.0	Connector to camera	"C" or "CS".
9.0	Iris control	Motorized and/or automatic.
10.0	Interchange ability	From same make with interchange ability/ compatibility with associated accessories.

(f) Camera Housing

All the cameras and accessories shall be housed in Weather proof environmental cases of aluminium.

The housing should also have thermostatically controlled heater kit, continuous duty blower kit, purge air arrangement, Window wipers etc. Features available shall be as follows :

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Construction Material	Extruded and die cast aluminium.
2.0	Protection Degree	IP65.
3.0	View window material	Fully tempered plate glass of 0.5" thick.
4.0	Finish	Grey Polyester Powder coated.
5.0	Accessories	Thermostatic heater, Defroster, Blower and sun shroud & Should have provision for washer and wiper for the dust prone areas.
6.0	Input Voltage	240V AC.
7.0	Camera compatibility	Enclosure dimension should provide sufficient space to house the offered camera and lens assembly.
8.0	Cabling (Housing with P/T)	Internal, through Pan/Tilt assembly.
9.0	Cabling (Fixed Housing)	Two entries for cabling with compression gland.

SR. NO.	FEATURE	REQUIRED PARAMETERS
10.0	Camera Mount	Removable with Sleds.
11.0	Certification	UL/CE.

(g) Pan & Tilt Unit :

The Pan & Tilt unit should be weather proof (IP-55) type and designed to meet harsh environment and should be constructed with corrosion resistant hardware and with 100% duty cycle motors to permit continuous operation.

Features available shall be as follows :

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Pan Range	0-355 Degrees.
2.0	Pan Speed	7 degree/Second or better.
3.0	Tilt Range	$\pm 90^0$ (in vertical plane)
4.0	Tilt Speed	3 Degrees/second or better.
5.0	Duty cycle	50%, 30 minute rating.
6.0	Connectors	Cables/glands to be supplied with P/T unit.
7.0	Construction	Aluminium plate. Internal & external parts corrosion resistant.
8.0	Presets	Should be available.
9.0	Limit Switches	Internally adjustable.
10.0	Input Power	24V AC, 50 Hz.

SR. NO.	FEATURE	REQUIRED PARAMETERS
11.0	Operating Temperature	0 to 50 degree centigrade.
12.0	Certifications	UL/CE.

(h) On-site Receiver/Driver Unit :

The on-site receiver/drive unit should be able to control the motor drives for pan/tilt and cameras for zoom and aux control. These would be used in conjunction with the Camera Streamer systems. Features available shall be as follows :

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Input/Output Signal	RS-422 or RS 232 or RS 485.
2.0	Pre-sets	Minimum 64.
3.0	Output	Pan, Tilt, Focus, Zoom, Wipe, Wash.
4.0	Output voltages	As required by lens and PTZ unit.
5.0	Diagnostics	Built in should be available.
6.0	Up Gradability	Should operate with any industry standard PTZ units.
7.0	Testing of Pan/Tilt functions	On site testing should be available.
8.0	Housing	Should be housed in weather proof or explosion proof housing as per locations.

SR. NO.	FEATURE	REQUIRED PARAMETERS
9.0	Input Voltage	240 Volts AC, 50 Hz.
10.0	Operating Temperature	0-50 Degrees centigrade.
11.0	Humidity	95%
12.0	Certifications	CE/UL.

(i) Video Streamers

Industry standard commercial video streamers to perform the following functions shall be used:

(i) Convert the analog camera video signal into a digital format.

(ii) Stream the digital video onto the Ethernet network.

(iii) Receives camera control commands from Digital Video Server and send these commands to the camera PTZ head using a serial connection.

SR. NO.	FEATURE	REQUIRED PARAMETERS
1.0	Video Input	1 input, 1V pp, 75 ohms, PAL.
2.0	Serial Port	RS 232 or RS422 or RS 485.
3.0	Video compression	MPEG. H.263.
4.0	Protocols	TCP / IP, UDP / IP, IGMP (Multicast) DHCP Client, HTTP.
5.0	Regulatory	EN55022,EN55024.

SR. NO.	FEATURE	REQUIRED PARAMETERS
6.0	Input/output ports	RJ 45 for 10/100 Mbps, RS 232/422/485 port. 4 opto isolated general inputs and 1 relay output. 1 video input (BNC) & 1 video output (BNC).
7.0	Resolution	704 x 576 (Single high resolution), 352 x 250 (Standard Size) or better
8.0	Video through put	Upto 25 fps or better.
9.0	Bit rate	User configurable bit rates from 8 Kbps to 2 Mbps. It should be able to send CIF size video at 18 ~24 fps at 400 Kbps.
10.0	Decoder	The Encoder should be usable as a decoder to give output to an analogue CCTV monitor if required.
11.0	Operating Temperature	0 to 50 degrees centigrade.
12.0	Input Power	240 V AC, 50 Hz.
13.0	Housing	Should be housed in dust & weather proof housing as per locations.

(j) Network Infrastructure & Cable

CCTV network configuration shall be built on the Stackable Managed Ethernet switches for better control of data traffic & performance and future expansion. Switch configuration shall be

redundant with seamless changeover without any upset in the CCTV operation. MTBF of the switch shall be more than 20 Years. Configuration shall be automatic.

1.1.13 Perimeter intruder detection system

1.1.13.1 Perimeter intruder detection system shall meet following requirements:

(a) The detection system shall be installed along the entire length of fence/boundary of the power plant and all entry & exit gates on the boundary. Pan Tilt and Zoom camera (PTZ) shall be installed after every 500 meter intervals inside the perimeter wall/fence. The fixed camera shall be installed after every 100 meter intervals insides the fence The system shall be capable of providing 24 hour continuous surveillance by means of a network of video cameras.

(b) The intruder detection system shall be based on video motion detection technology.

(c) The system shall be able to identify and distinguish between whether the intruder is a human being or an animal.

(d) Upon detection of intrusion, suitable alarms to be raised to security guards and corresponding camera image shall be displayed on a high resolution dedicated alarm screen.

(e) The system shall allow for the adjusting the sensitivity to reduce false alarms.

(f) When there is no intrusion, suitable alarms to be raised to security guards and corresponding camera image shall be displayed on a high resolution dedicated alarm screen.

(g) The intruder detection system shall be PC based system and will employ a hard disk based recording system.

1.1.13.2 The intruder detection system shall be complete in all respect and generally will comprise the following:

(a) Fixed cameras.and Dome cameras

(b) Video motion detection software

(c) Necessary camera poles, camera housing and related accessories, necessary civil & masonary works.

1.1.13.3 Perimeter camera requirements are as follows

(a) As many cameras as required for proper coverage of total perimeter length shall be provided. However, individual camera coverage shall not exceed 100 meter distance along the perimeter length.

(b) Cameras provided with auto IRIS lens, low lux density (0.1 lux) suitable for functioning in darkness (night shot capability) and infra red illuminator.

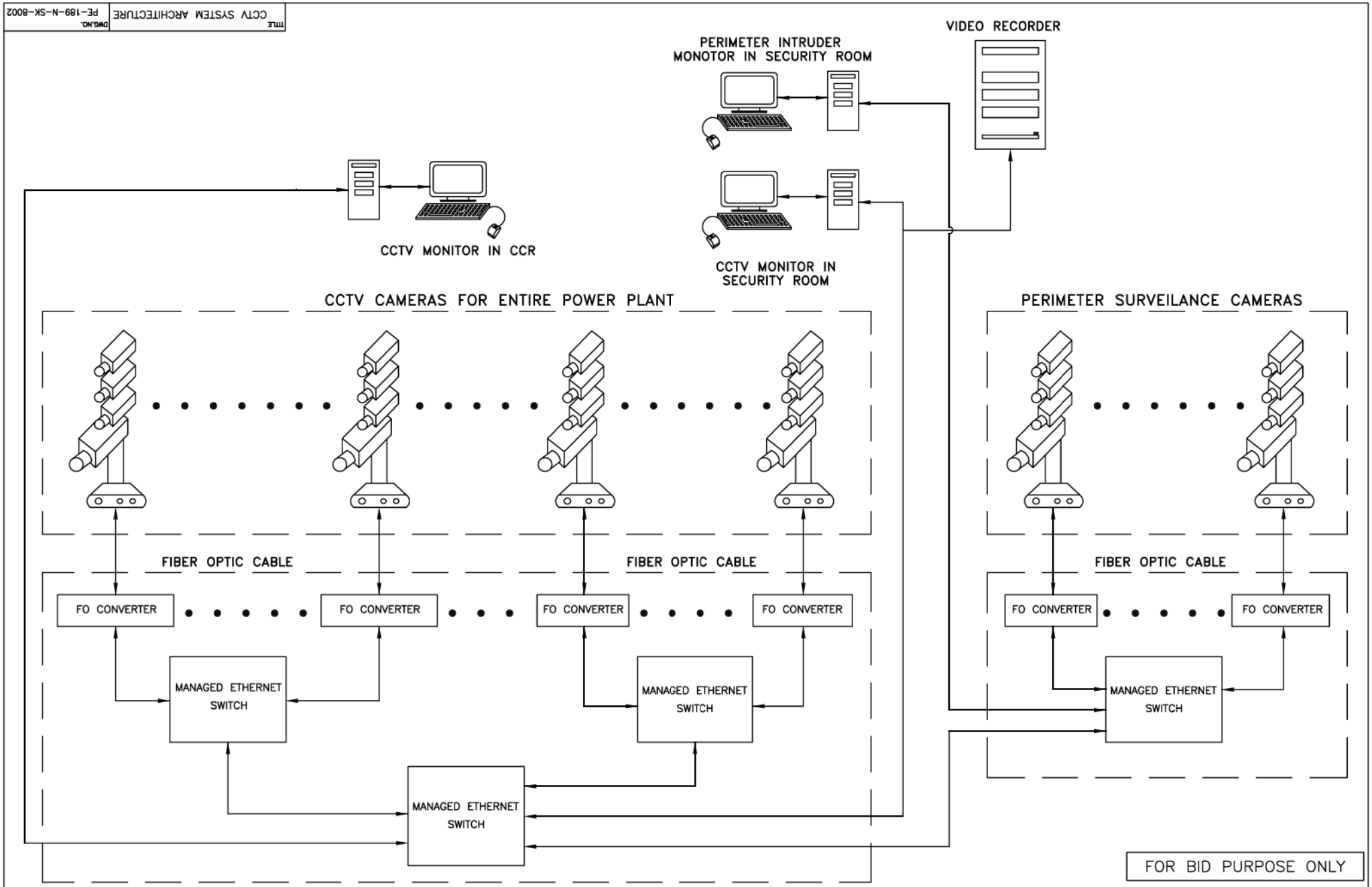
(c) Cameras provided with UPS power supply.

(d) Cameras shall be provided with IP65 enclosure and desired to be with remote controllable window cleaning facilities.

(e) Camera mounting pole height shall not be less than 6 meters.

1.1.13.4 Common requirement of CCTV and perimeter intruder detection system

All cameras for CCTV and perimeter detection system shall be grouped and connected to respective sever. Two number display unit shall be provided in security room in the service building (one for CCTV and one for perimeter intruder system). The security room shall house all network controller, video recorder, PTZ unit and associated accessory.PTZ unit for CCTV system shall be able to override the unit in CCR.



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MAHAGENCO

MAHARASHTRA STATE POWER GENERATION CO.LTD.
BHUSAWAL T.P.S. UNIT-6 : 1 X 660 MW PROJECT

CCTV SYSTEM ARCHITECTURE

PROCON ENGINEERS
(DIVISION OF NIMOTO CONSULTING ENGINEERS PVT.LTD.)

SCALE ~	APPROVED		DATE(RO ISSUE)
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TITLE CCTV SYSTEM ARCHITECTURE
DWG.NO. PE-189-N-SK-8002

ANNEXURE-III (COMPONENT MAKE LIST)	
SERVER AND WORK STATION	**POWER CABLE**
IBM/LENOVO	DELTON, FARIDABAD
HP/COMPAQ	UNIVERSAL CABLE, SATNA
DELL	NICCO CABLE, KOLKATA
TFT MONITOR	POLYCAB, DAMAN
IBM/LENOVO	GOYOLENE, MUMBAI
HP/COMPAQ	RELIANCE ENGRS, BANGALORE
LG	CORDS CABLE, RAJASTHAN
SAMSUNG	PARAMOUNT CABLE, ALWAR
DELL	THERMOCABLE, BANGALORE
JB (FRP)	KEI INDUSTRIES, CHENNAI
DEVI POLYMERS, CHENNAI	CABLE CORP OF INDIA LTD, CHENNAI
SUCHITRA INDUSTRIES, BANGALORE	RPG CABLES, CHENNAI
RITTAL (BANGALORE)	FORT GLOSTER, KOLKATA
PYROTECH (UDAIPUR)	DECO CABLE, DELHI
L&T	KRISHNA CABLE, GWALIOR
HENSEL, SRIPERUMBUDUR	THERMAPADS
MINI UPS	ELKAY TELELINKS
HITACHI HIREL (GANDHINAGAR)	INCAB INDUSTRIES
APC (BANGALORE)	**ALARM CABLES**
EMERSON/TATA LIEBERT (MUMBAI)	DELTON, FARIDABAD
APLAB (India)	UNIVERSAL CABLE, SATNA
DB POWER (PUNE / SATARA)	NICCO CABLE, KOLKATA
DELTA (GURGAON)	POLYCAB, DAMAN
NETWORK SWITCH	GOYOLENE, MUMBAI
CISCO	RELIANCE ENGRS, BANGALORE
BROCADE (FOUNDARY)	CORDS CABLE, RAJASTHAN
HIRSHMANN (GERMANY)	PARAMOUNT CABLE, ALWAR
GARRET (USA)	THERMOCABLE, BANGALORE
NETGEAR	KEI INDUSTRIES, CHENNAI
JUNIPER (USA)	**FO cable:**
ALLIED TELESYS	Birla Erricson
42U PANEL / WALL MOUNTABLE PANELS	Aksh Fibre
PYROTECH (UDAIPUR)	Finolex (Pune / Goa)
RITTAL (BANGALORE)	Corning Cable System, USA
PENTAIR TECHNICAL PRODUCTS INDIA PVT LTS (HOFFMAN)- BANGALORE	HFCL, Goa
IL (KOTA)	R&M, Switzerland
SCHNEIDER ELECTRIC (BANGALORE)	D-Link
CAT6 ACCESSORIES	Molex, UK
AMP / DIGILINK / D-LINK / SYSTEMAX	**SINGLE MODE MEDIA CONVERTER**
FO ACCESSORIES	Avaya / Belden /D-Link / Digilink / Tyco/ CTC Union
Avaya / Belden /D-Link / Digilink / Tyco	

1. For all other items whose make are not mentioned above, the offered make shall be reputed and must have been supplied & commissioned earlier. Also refer note (i) of section-A of the technical specification.

2. Camera and Joystick should be of same make.

3. If make of offered VMS is not same as camera, then letter of from both camera & VMS OEMs to be submitted for compatibility of VMS & camera/joystick.