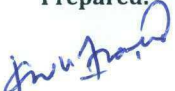


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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.		PURCHASE SPECIFICATION FOR CCTV SYSTEM PROJECT: 1X50MWp Solar Photo Voltaic Project, NTPC, MP CUSTOMER: National Thermal Power Corporation, MP				
Ref. Doc		Revisions: Refer to record of revisions :	Prepared:  Kush Anand	Checked:  Abu Malick	Approved:  Abu Malick	Date: 29/08/16

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.			1 SCOPE This specification covers the Design, Manufacture, Assembly, Testing at Bidder's Works, Packing, and Delivery to site, Erection Supervision and Commissioning of <u>Closed Circuit Television</u> (CCTV) system for NTPC, MP Project. 2 INSTRUCTIONS TO BIDDERS - Bidders are advised to contact BHEL for essential technical queries in writing within one week of issue of Enquiry. Offers with incomplete information will not be considered for evaluation, and are likely to be rejected outright without any further interaction with the Bidder. - Unsolicited requests from bidders for alterations to their already submitted offer will not be entertained. These would not be taken cognizance, and offers will be evaluated without taking into account such requests/correspondence. - Bidders are advised to comply to specifications in total, unless the requirement is not feasible. Incomplete offers will be rejected without intimating to bidders. In case feasible deviations are proposed by the bidder and subsequently withdrawn, no commercial implications can be claimed by the bidder. - Bidders are advised to quote models and brands with proven track record of testing and successful operation. - In the event of any conflict between these specifications, data sheets, related standards, codes etc. the bidder shall refer the matter to the purchaser for clarifications and only after obtaining the same shall proceed with the manufacture of the items in question. - If bidder is quoting on behalf of any of the approved makes of OEM. Then bidder shall furnish an authorization letter from principal/OEM stating that the bidder is authorized to quote for supply, Erection & commissioning and providing after sales service support. - If bidder has considered any sub components of different make (other than the specified OEM makes) then bidder shall necessarily get a certification from the OEM that the subcomponents of other make are compatible with the main system of approved makes/OEM. - If bidder has considered any sub components of different make, bidder necessarily shall furnish the makes of all the equipment and take approval of the same from BHEL before proceeding with the procurement of any sub components. The decision of BHEL shall be final in this regard. - CCTV System is meant for gathering video information from the various areas of the power plant with display and recording facilities as per requirement. It is the responsibility of the bidder to select proper models, which meet the technical requirements mentioned in this specification. If there is any deviation then it shall be brought to Purchaser's attention & written approval shall be taken.	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	j. Bidder shall submit duly filled deviation format as per attached format along with technical offer, otherwise, it will be presumed that there are no deviations from this specification. Offer without this deviation list will not be evaluated & shall be considered for rejection. If, there are no deviations, bidder shall submit signed copy of this format, mentioning "No Deviations". <table border="1"> <thead> <tr> <th>S.No.</th> <th>Cl. No./ Page No./Sec No. of specification</th> <th>Description as specified</th> <th>Deviation</th> <th>Remarks/Reasons for deviation</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>				S.No.	Cl. No./ Page No./Sec No. of specification	Description as specified	Deviation	Remarks/Reasons for deviation					
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3 TENDER EVALUATION CRITERIA 3.1 Bidder shall be responsible for providing all the items specified in the Bill of Materials (BOM) table. Any deviation in this regard will not be acceptable. 3.2 For addition/reduction of quantity, unit rate quoted in the present offer shall be considered and shall be valid up to execution of the contract. 3.3 Duly signed & stamped un-priced price schedule shall be submitted along with technical offer by bidder as a token of his concurrence that all items were quoted along with unit prices. 3.4 Annexures: ANNEXURE-1-<u>CCTV Block Diagram</u> [Drg No: PY-LK-1-M086-9701-01] ANNEXURE-2- <u>Checklist</u> ANNEXURE-3- <u>QAP Guidelines, Format & Typical Manufacturing QAP(s)</u> ANNEXURE-4- <u>Specification for Multi-Mode Fiber Optic Cable</u> 4 STANDARDS & REFERENCES The equipment furnished under this section shall meet the requirements of all the applicable international codes and standards or their latest amendments. Camera certification has to be CE/FCC/UL or equivalent.														
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		5 TECHNICAL REQUIREMENTS The CCTV system in the scope of this project mainly consists of 24 cameras, Recording & Video Management Servers, VA analytics server and other CCTV Network Accessories and erection hardware (viz. racks, junction boxes, brackets, glands, nut-bolts, conduits etc.). Exact locations of camera shall be decided during detailed engineering. 5.1 <u>Design & Construction of CCTV System</u> The CCTV system shall be designed as a standalone IP based network architecture. System shall use video signals from different cameras at different locations, process the video signals for viewing on monitors at different locations and simultaneously record all the video streams using H.264 or better compression technique. Joystick and mouse-keyboard Controllers shall be used for Pan, Tilt, Zoom and other functions of desired cameras. The monitoring of these cameras shall be done at CMCS. The required no. of hardware/software licenses to meet the requirements shall be supplied by the contractor. All the designing of hardware / software required for the CCTV system along with erection supervision and commissioning of the same shall also be in the scope of bidder. It is the responsibility of bidder to provide a new system and supply suitable hardware/software & accessories. All video and control signals from cameras shall be connected to control room via Cat-6 Cable for distances up to 90m and FO Cables for distances more than 90m. All unarmored and FO cables shall be routed through flexible conduits. Bidder to note that laying of FO cable and HDPE conduit is not in bidder's scope. Weather proof JB shall be provided for housing network equipment as indicated in block diagram for connecting outdoor cameras with CMCS/IR rack. 1No. of 230V, 1-φ AC, 50Hz UPS power supply shall be provided to each Junction box/9U rack at Inverter Room/Outdoor Plant Boundary by purchaser. Power/Voltage conversion equipment if required shall be in scope of bidder. Further distribution of power within equipment inside Junction box/9U rack and to camera shall also be in the scope of bidder. 1No. of 230VAC, 1-φ AC, 50Hz UPS power supply shall be provided to CCTV rack inside CMCS building by purchaser. Power/Voltage conversion equipment if required shall be in scope of bidder. Further distribution of power to equipment inside rack and to camera inside CMCS building shall also be in the scope of bidder. Power supply allocated for CCTV system by purchaser is as follows: 230V, 1-φ AC UPS power feeder of 2KVA shall be extended from Plant UPSDB in CMCS Building. If the power requirement by bidder exceeds 2KVA, bidder shall supply mini UPS system of suitable rating to take care of CCTV system loads in CMCS building. Same to be confirmed by bidder during submission of offer. 230V, 1-φ AC UPS power feeder of 500VA shall be extended from Plant UPSDB in each Inverter Room (Total 10Nos.).		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.			The Contractor shall guarantee satisfactory performance of the equipment under stipulated variations of voltage and frequency. The design and manufacture shall be such that equipment / components of same type and rating are interchangeable. From all the Keyboards / monitors connected to the CCTV Network/Servers it shall be possible to access / control / display all the cameras. Camera and database servers shall offer both video stream management and video stream storage management. These servers shall also manage and store configuration information/database for the whole system. Recording frame rate & resolution in respect of individual camera shall be programmable. It shall be possible to view and record at different resolutions and frame rates and this shall be individually programmable on every camera. It shall be possible to take back-up of system configuration and database on portable media device and restoring the same if required. System shall ensure that once recorded, video cannot be altered. Camera server shall be provided with sufficient storage space to store recordings of all cameras at 25/30 FPS at 1920X1080 (For HD cameras) for a period of Fifteen (15) days using necessary compression techniques. All recordings shall have camera ID, Location, Date and Time of recording. It shall be possible to view, record, search and replay simultaneously without affecting performance of the system. The system shall be complete in all aspects for reliable performance. The contractor shall submit the detailed block schematic, video, signal & power wiring diagram, describing the connections between the network switch/camera server systems and various cameras, monitors, keyboard and joystick. The camera & Video Management Software shall conform to ONVIF profile S or latest available applicable ONVIF profile at the time of detail engineering. The system shall include all the components, accessories, cabinets / console, cables, JB, mounting hardware with all required software for fully functional system. Components shall be of industrial grade. Consumer electronic is not allowed.	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	5.2 Camera All the cameras shall be color, suitable for day and night surveillance (under complete darkness conditions) and network compatible. There will be two types of cameras viz. PTZ & Fixed. PTZ cameras shall be high speed integrated dome type. Camera shall be directly connected to network and use of external encoder for connecting to network is not acceptable. The cameras shall be rugged, high performance color cameras. These cameras shall provide high resolution and high sensitivity suitable for operation in a power plant, both in natural and artificial lighted areas. Detailed technical specification for cameras is given below: <u>For PTZ Cameras:</u> <table border="1"> <tr> <td>Image Device</td> <td>1/2.8 -1/3" Progressive Scan CMOS</td> </tr> <tr> <td>Lens</td> <td>4.45-4.7 /89-94.0 mm focal length</td> </tr> <tr> <td>Optical Zoom</td> <td>20X or better</td> </tr> <tr> <td>Digital Zoom</td> <td>12X or better</td> </tr> <tr> <td>Number of Pixels/Effective resolution</td> <td>1920X1080 (Full HD)/2 MP at 25/30 IPS</td> </tr> <tr> <td>Video compression</td> <td>H.264 Main Profile/High profile</td> </tr> <tr> <td>Sensitivity(at 6dB)</td> <td>color mode 0.6 lux , B/W mode 0.04lux @30IRE, F1.6</td> </tr> <tr> <td>Horizontal Angle of view</td> <td>55.4 deg(wide)- 3.5 deg (Tele) minimum</td> </tr> <tr> <td>Focus</td> <td>Auto with Manual Override</td> </tr> <tr> <td>Iris Range</td> <td>F1.6-F2.9</td> </tr> <tr> <td>Iris Control</td> <td>Auto with Manual Override</td> </tr> <tr> <td>Back Light Compensation</td> <td>Required</td> </tr> <tr> <td>White Balance</td> <td>Automatic with mode selection options</td> </tr> <tr> <td>Electronic Shutter</td> <td>1/50 to 1/10000 Auto</td> </tr> <tr> <td>S/N Ratio</td> <td>>50dB</td> </tr> <tr> <td>Audio</td> <td>Full Duplex or 2-way</td> </tr> <tr> <td>Automatic Gain Compensation</td> <td>Up to 18 dB</td> </tr> <tr> <td>Gain Control</td> <td>Auto/Off</td> </tr> <tr> <td>Day/Night selection</td> <td>Yes</td> </tr> <tr> <td>IR cut-filter</td> <td>Yes</td> </tr> <tr> <td>Protocols</td> <td>IPV4/IPV6,RTP, UDP, TCP, IP, HTTP, HTTPS, FTP, DHCP, IGMP V2/V3, ICMP, ARP, SMTP, SNTP,SNMP or equivalent</td> </tr> <tr> <td>Security</td> <td>Password Protection</td> </tr> <tr> <td>Auto Resume after Power Failure</td> <td>Yes</td> </tr> <tr> <td>Multiple Streams</td> <td>H.264 /H.264 & H.264/Motion JPEG</td> </tr> </table>			Image Device	1/2.8 -1/3" Progressive Scan CMOS	Lens	4.45-4.7 /89-94.0 mm focal length	Optical Zoom	20X or better	Digital Zoom	12X or better	Number of Pixels/Effective resolution	1920X1080 (Full HD)/2 MP at 25/30 IPS	Video compression	H.264 Main Profile/High profile	Sensitivity(at 6dB)	color mode 0.6 lux , B/W mode 0.04lux @30IRE, F1.6	Horizontal Angle of view	55.4 deg(wide)- 3.5 deg (Tele) minimum	Focus	Auto with Manual Override	Iris Range	F1.6-F2.9	Iris Control	Auto with Manual Override	Back Light Compensation	Required	White Balance	Automatic with mode selection options	Electronic Shutter	1/50 to 1/10000 Auto	S/N Ratio	>50dB	Audio	Full Duplex or 2-way	Automatic Gain Compensation	Up to 18 dB	Gain Control	Auto/Off	Day/Night selection	Yes	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	Auto Resume after Power Failure	Yes	Multiple Streams	H.264 /H.264 & H.264/Motion JPEG
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For Non Dome type cameras, the housing shall also have thermostatically controlled heater kit. Continuous duty blower kit (with suitable filters) for purge air arrangement / Window wipers shall be available within the housing for cameras as indicated against each application.																																	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		5.4 <u>Application Software for Video Monitoring, Recording & Management:</u> The application software shall be used to display, store, control & manage the entire surveillance system. It shall be possible to control all cameras i.e. PTZ, auto/manual focus, selection of presets, video tour selection etc. The software shall support flexible 1/2/4 windows split screen display mode or scroll mode on the display monitors for live video. The system shall support video analytics in respect of the following 1. Video motion detection, 2. Object tracking 3. Object classification & Tracking Video Analytics feature shall be part of server. The features shall be user configurable for each camera. It shall be possible to activate recordings automatically based on events generated by video analytics. These events shall also be logged and suitably alarmed on the monitors. Note: For Axis make Cameras/Server, Milestone VMS software shall be provided as Video management software. For PELCO & Bosch Make System, respective make Video management software shall be provided. 5.5 <u>Keyboard & Joystick:</u> Keyboard shall have full function used for system control and programming for selection of various Network switches, camera/database servers, camera functions including pan, tilt and zoom lens controls and shall be ergonomically designed. Joystick shall be provided for achieving all control functions. 5.6 <u>Work Station</u> Operator work station shall be in SCADA Room of CMCS Building. Workstation shall be provided with following features as a minimum. a) USB Keyboard and USB optical Mouse. b) i3 Processor c) 4GB RAM d) 500GB Hard Disk e) 10/100MBPS Ethernet Card f) Windows 7 professional g) Antivirus software with minimum 3years up gradation license h) 2GB NVIDIA graphics card i) I / O Ports : 2 USB Front, 6 USB Rear, 1 SVGA port, 1 RS232, 1 Mic IN, 1 Mic OUT, 2 PS /2, 1 RJ45, 1 HDMI Card		
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.			Actual specification of workstation shall be finalized during detailed engineering. Bidder to note that work station features specified above are minimum requirement. However, it is bidder's responsibility to incorporate any up gradation/additional feature, if it is required for the smooth operation of the CCTV system. 5.7 Camera Poles/structures Cameras to be installed in any particular location shall be mounted on the nearest equipment structures in the plant. Mounting locations shall be easily accessible for servicing purposes. Where structures are not available, rigid vibration proof CCTV Pole protected against corrosion shall be supplied. They shall be fitted with climbing and relevant safety facility. Camera structures shall have hoisting facility, fixing facilities for cables along the whole structure and for the cameras to be installed with ample space for servicing purposes. 5.8 Wiring and Connection - All the cables (indoor/outdoor), connectors and plugs shall be supplied. - Flexible cables shall only be used for flexible connections with flexible conduits. - Video and Camera Control Signals from cameras to the server shall be transmitted via Cat-6 cables/FO Cables. - Materials shall be of proven design for similar application. 5.9 Cables: Cables shall be of FRLS PVC sheathed cables for use in CCTV and shall conform to latest edition of Indian/International standards. <u>Single Mode FO Cables:</u> Optic Fiber cable shall be 8 core, galvanized corrugated steel taped armored, fully water blocked with dielectric central member for outdoor/indoor application so as to prevent any physical damage. The cable shall have multiple single-mode fibers on as required basis so as to avoid the usage of any repeaters. The core and cladding diameter shall be 9 +/-1 micrometer and 125 +/- 1 micrometer respectively. The outer sheath shall have Flame Retardant, UV resistant properties and progressive automatic sequential on-line marking of length in meters at every meter on outer sheath. The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling viz. Steel central number, Loose buffer tube design, 4 fibers per buffer tube (minimum), Interstices and buffer tubes duly filled with Thixotropic jelly etc. The cable shall be suitable for maximum tensile force of 2000 N during installation, and once installed, a tensile force of 1000 N minimum. The compressive strength of cable shall be 3000 N minimum & crush resistance 4000 N minimum. The operating temperature shall be -20 deg. C to 70 deg. C.	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.			All testing of the optic fiber cable being supplied shall be as per the relevant IEC, EIA and other international standards. Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation. Suitable chemical shall be added in to the outer sheath to protect the cable against rodent and termite attack. Spliced/ Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standard. <u>Multi-Mode FO Cables:</u> Refer Annexure-4 for technical requirements of multi-mode FO cables. However, bidder shall note that multi-mode cables are not to be used for CCTV system. Same has to be supplied for purchaser's use only. <u>Note:</u> Finalization of Cable drum lengths for single mode and multi-mode FO cables shall be done only after approval of the same by BHEL 5.10 <u>Junction Boxes & Racks:</u> - Local junction boxes for cameras shall be of Protection Class IP-55 weather proof system - Junction Boxes shall be made of 2mm thick Cold rolled sheet steel. - CCTV rack in CMCS building & 9U racks in inverter room shall be of Protection Class IP-20. 5.11 <u>Monitor/Screen</u> - One LCD color monitor (21 inch diagonally) will be installed in CMCS Building. - The monitors shall be versatile and aesthetic units. It shall also be S-VHS/composite video compatible and shall have built in audio. Monitors are to be operable at 230V AC, 50 Hz (Power supply shall be arranged by supplier from CCTV Rack). - They shall comply to the following specifications: - General Automatic degaussing, Fast warm up time Display tube, integral implosion protection. - Resolution 450 TVL minimum Controls Colour system select, volume, colour, brightness, contrast, power, video input select and Y/C termination. 5.12 <u>Earthing</u> - Each panel, cabinet, console and other equipment supplied by bidder shall be provided with an earthing lug. All these lugs shall be properly secured to the AC mains earthing bus. - All circuit grounds of electronic instruments, shields and drain wires of signal cables shall be connected to instrument ground bus, which is electrically isolated from the AC mains earthing bus. This bus shall be typically 25mm wide and 6mm thick of	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.			copper. The instrument ground bus is connected to independent instrument system ground buses through insulated wires. c) Purchaser will provide 2 sets of earth risers, one from isolated instrumentation grounding system and one from plant earth grid near control room. 5.13 Termination equipment: Supply of Termination equipment including Glands, lugs, FO Termination equipment (OFC patch cords and LIU panels etc.,) etc., at both ends of the Cable is in the scope of Bidder. Any interface equipment like adaptors required for providing power supply to cameras and other equipment shall be provided by Bidder. 6. Approved Make of Components: a) CCTV components IP based: i. BOSCH ii. AXIS (With Milestone Software) iii. PELCO by Schneider Note- Main CCTV components (i.e. Camera, NVMS etc.) shall be supplied from the principal manufacturer of CCTV and shall be of identical make. Other items which are not manufactured by principal manufacturer and excluding items against 6(b),(c),(d) & (e) can be supplied from indigenous local source approved by NTPC or Principal Manufacturer's approved source. Authorization letter for same has to be submitted for approval along with offer. b) Ethernet Cables i. Belden ii. Lap iii. D-Link c) Fiber Optic Cables i. Birla Ericsson Optical ii. Aksh Fiber iii. Finolex iv. R&M v. HFCL d) Enclosure for Panels i. Pyrotech ii. Pentair (Hoffman) iii. RITTAL iv. MPP e) OWS/PC/Server i. HP ii. DELL iii. COMPAQ iv. IBM v. LENOVO	
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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.		7. TESTING & INSPECTION - All the equipment shall be tested to conform to the defined specifications as per mutually agreed test plan / FAT procedure which shall be submitted and got approved from purchaser at least one month before inspection. The system shall be operationally tested to simulate field conditions before dispatch from the work. Besides all routine and acceptance test specified by applicable codes and standards, burn-in test for 72 hours shall be performed on the complete system. Different stringent operational conditions shall be simulated during this period. The system shall be cleared only after successful completion of these tests. All tests shall be witnessed by a representative of Owner / Contractor and engineers in accordance with approved FAT procedures. - For bought out items, the routine and acceptances tests shall be conducted at the equipment manufacturer's works. - Type test certificates from a recognized testing agency shall be furnished for the offered equipment along with the bid. - QAP format and instructions for filling up QAP are attached for preparation and submission of QAP by bidder during order execution stage - Typical QAP for CCTV attached is reference document and to be used by successful bidder in future for preparation and submission of QAP for BHEL /CUSTOMER approval and No deviation to reference document is acceptable.		
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8. Bill of Material and Price Format:

a. Supply of CCTV BOM: Material Code- PY9755219013

S.no	Item Description	Qty	Unit Rate (Rs.)	Total Price (Rs.)	Remarks
1.	Weather Proof IP Based PTZ Camera as per clause 5.2 & 5.3 of specification PY55219; assembly ready for mounting on vertical surface/pole.	16 Nos.			
2.	Weather Proof IP Based Fixed Camera as per clause 5.2 & 5.3 of specification PY55219; assembly ready for mounting on vertical surface/pole.	8Nos.			
3.	24 Port Gigabit Network Switch with 4 SFP Slots	1 No.			
4.	8 Port Gigabit Network Switch with 2 SFP Slots	5 Nos.			
5.	SFP Module (For Single Mode FO Cables)	14 Nos.			
6.	Single Mode Media Converter	38 Nos.			
7.	NVMS Server + Software with License for All cameras	1 No.			
8.	Video Analytics Server + Software with License for All cameras	1 No.			
9.	Recording Server with storage as per Specification	1 No.			
10.	Client Workstation with 21" LCD Monitor	1 No.			
11.	Joystick Keyboard with required license	1 No.			
12.	Central Control Room Rack	1 No.			

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	13.	9U Rack	5 Nos.				
	14.	Weather Proof Junction Box (Suitable for accommodating Network Equipment, LIU & Power Distribution Equipment)	20 Nos.				
	15.	12 Port LIU Panel (Including All accessories necessary for Termination)	20 Nos.				
	16.	24 Port LIU Panel (Including All accessories necessary for Termination)	5 Nos.				
	17.	36 Port LIU Panel (Including All accessories necessary for Termination)	6 Nos.				
	18.	Cat-6 Cable Armored	800 m				
	19.	Cat-6 Cable Unarmored	800 m				
	20.	Single mode 8C FO Cable	14 Km				
	21.	2" HDPE Conduit	6.6 Km				
	22.	Power cable Cu 3Cx1.5sq.mm Unarmored	800 m				
	23.	4 Mtr Camera Pole with Required Foundation Bolt/Frame etc.	24 Nos.				
	24.	Computer Table & Operator Chair	1 No.				
	25.	Multi-mode 8C FO Cable	1.6 Km				
26.	Accessories (Necessary Connectors, Patch cords, Power Converters, lugs, glands or any other hardware/software essential and as required to complete the system)	1 Lot					
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b. Supervision & Commissioning: Material Code- PY9855219023

S.No	Item Description	Qty	Unit Rate (Rs.)	Total Price (Rs.)	Remarks
1.	Erection Supervision & Commissioning (Erection Supervision, Commissioning, Trial Runs and Performance Testing)	Lump sum			

c. Optional prices

S.No	Item Description	Qty	Unit Rate (Rs.)	Total Price (Rs.)	Remarks
1.	Wi-Fi Trans-receiver for point to point wireless transfer of data in range of 1 km with 300 Mbps speed.	1 No			
2.	Travel expenses & Incidental charges for additional visit	Lump sum			Refer to note-3&4
3.	Per Man day charges for site visit	Per man day			Refer to note-3&4
4.	Recommended Spares for 5 years operation	Lump sum			Spares List to be submitted along with the offer

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.		Notes: 1. The BOQ mentioned in Cl. 8(a) shall be supplied by bidder as minimum requirement. However, any material not listed in the BOQ mentioned in Cl. 8(a) but required by bidder for successful completion and guarantee run of the project / system shall be in the scope of the bidder. 2. The items for which qty. is mentioned as "1 Lot", it is the responsibility of the bidder to consider the material as required for the successful completion of erection & commissioning of the system. 3. In case the bidder needs to extend services again after completion of commissioning of the system, the charges shall be as per the optional prices as above. 4. No. of days and payment on account for the visits shall be released based on BHEL site certification. 5. The evaluation shall be done considering the summation of the total value of each of the packages above at Cl. 8(a) and 8(b). 6. Supply and commissioning of any other Equipment (not listed above) for successful installation and trouble-free operation of the System shall be bidder's responsibility and shall be done by bidder without any delivery and commercial implication to BHEL. 7. Bidder to quote prices for the optional items at Cl. 8(c) above along with the main equipment. BHEL reserves the right to order along with main equipment or separately or not at all. 8. Bidder to provide list of 2 years recommended O&M spares along with unit price of each item under Price Format Cl-8(c), SNo-4. BHEL reserves the right to order full/partial quantity of the 2 years recommended O & M spares along with the main equipment or separately or not at all. The bidder will keep their prices valid till execution of order or till 18 months from the date of P.O., whichever is later. 9. The size and Quantity of CCTV Rack are indicative only. However, bidder to decide the size and Quantity of CCTV Rack based on the size of Servers, Hard Disks(storage) and other network equipment to be placed in CMCS building required to meet the project requirements (for the CCTV Cameras mentioned and with 20% spare capacity for future). 10. The quantities given in BOM (Clause-8(a)) may vary to the extent of +/-10% as per finalized CCTV location layout based on Customer approval. Same shall be informed to bidder at the time of technical scrutiny. For addition/reduction of quantity, unit rate quoted in the present offer shall be considered.		
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	a. Bidder shall include the erection supervision & commissioning for this package. b. Bidder shall arrange their own lodging, boarding & traveling. c. Scope of installation, commissioning and other site services shall be as mentioned below. However, Bidder has to provide the services required for the completeness and correctness of the system irrespective of whether it is mentioned in the specification or not. <table border="1"> <thead> <tr> <th>Activity</th> <th>Scope</th> </tr> </thead> <tbody> <tr> <td>Unloading</td> <td>BHEL</td> </tr> <tr> <td>Supply Verification as per packing list, Transit damage inspection</td> <td>BHEL</td> </tr> <tr> <td>Storage at site</td> <td>BHEL</td> </tr> <tr> <td>Custody of items in stores</td> <td>BHEL</td> </tr> <tr> <td>Issue of Items from Stores</td> <td>BHEL</td> </tr> <tr> <td>Shifting of equipment to Intended Location</td> <td>BHEL</td> </tr> <tr> <td>Provision of Crane for Shifting of the equipment</td> <td>BHEL</td> </tr> <tr> <td>Unpacking of equipment</td> <td>BHEL</td> </tr> <tr> <td>Base frames stand below false floor supply and installation</td> <td>BHEL</td> </tr> <tr> <td>Installation of equipment at intended locations</td> <td>BHEL</td> </tr> <tr> <td>Supply of all Accessories for installation of bidder supplied equipment</td> <td>BIDDER</td> </tr> <tr> <td>Inter equipment Cable terminations, Cable glanding, Lugging, Ferruling and Terminations</td> <td>BIDDER</td> </tr> <tr> <td>Civil work, earth excavation for preparing cable trenches, Road crossings and refilling of soil, etc. inside the package battery limit.</td> <td>BHEL</td> </tr> <tr> <td>Termination of cable at Field/ other panels</td> <td>BIDDER</td> </tr> <tr> <td>Termination of cable at control room panels</td> <td>BIDDER</td> </tr> <tr> <td>Laying of all cables(CAT6/Signal Cables/Control Cables/Flexible Wires/Power Cables/F.O Cables as per scope), JBs in indoor area & outdoor area for complete package</td> <td>BHEL</td> </tr> <tr> <td>Erection of bidder supplied Equipment</td> <td>BHEL</td> </tr> <tr> <td>Supervision of erection of complete Package</td> <td>BIDDER</td> </tr> <tr> <td>Commissioning of system</td> <td>BIDDER</td> </tr> <tr> <td>Commissioning Supervision</td> <td>BHEL</td> </tr> <tr> <td>Loop checking from field to CMCS Room, Invertor Room & in between all the equipment</td> <td>BIDDER</td> </tr> <tr> <td>Supervision and acceptance of loop function</td> <td>BHEL</td> </tr> </tbody> </table>			Activity	Scope	Unloading	BHEL	Supply Verification as per packing list, Transit damage inspection	BHEL	Storage at site	BHEL	Custody of items in stores	BHEL	Issue of Items from Stores	BHEL	Shifting of equipment to Intended Location	BHEL	Provision of Crane for Shifting of the equipment	BHEL	Unpacking of equipment	BHEL	Base frames stand below false floor supply and installation	BHEL	Installation of equipment at intended locations	BHEL	Supply of all Accessories for installation of bidder supplied equipment	BIDDER	Inter equipment Cable terminations, Cable glanding, Lugging, Ferruling and Terminations	BIDDER	Civil work, earth excavation for preparing cable trenches, Road crossings and refilling of soil, etc. inside the package battery limit.	BHEL	Termination of cable at Field/ other panels	BIDDER	Termination of cable at control room panels	BIDDER	Laying of all cables(CAT6/Signal Cables/Control Cables/Flexible Wires/Power Cables/F.O Cables as per scope), JBs in indoor area & outdoor area for complete package	BHEL	Erection of bidder supplied Equipment	BHEL	Supervision of erection of complete Package	BIDDER	Commissioning of system	BIDDER	Commissioning Supervision	BHEL	Loop checking from field to CMCS Room, Invertor Room & in between all the equipment	BIDDER	Supervision and acceptance of loop function
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10. DOCUMENTATION

Documentation shall be in three steps, during offer submission, and next during drawing approval stage and as built.

a. **To be submitted with the Bid**

- i. Bill of material along with details of makes in Unpriced format at CI No. 8 above
- ii. Power (UPS & Non-UPS) and AC requirement
- iii. Technical literature & catalogues of all components
- iv. Type test certificates of each piece of equipment.
- v. Deviation List as per clause 2(j)
- vi. Technical Datasheets.

The Bidder may note that the drawings, data and manuals listed as above are minimum requirements only. The Bidder shall ensure that all other necessary write-ups, curves, calculations and information required to fully describe the equipment offered are submitted with his bid.

b. **Drawings to be furnished for approval after PO placement.**

Sl. No	Document	Category
1.	Write up on system operation	A
2.	Block Schematic Diagram of complete system	A
3.	Bill of material of Complete System	A
4.	Technical data Sheets & GA drawings for camera, enclosures, JB's, CCTV, furniture etc.	A
4.	Power Supply requirement	R
5.	Internal power distribution arrangement & power wiring diagram describing the connections between the network switch/camera server Systems and various cameras, monitors, Keyboard and joystick.	R
6.	Equipment arrangement inside CCTV Rack	R
7.	Any other relevant drawings, documents and data necessary for satisfactory installation, operation and maintenance	R
8.	Cable Schedule	R
9.	Quality Assurance Plan	A
10.	O & M Manuals	R

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COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	Document Schedule <table border="1"> <thead> <tr> <th>Sl. No</th> <th>Document</th> <th>Schedule</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>First Submission of Drawings</td> <td>Within 7 days from the date of PO</td> </tr> <tr> <td>2.</td> <td>BHEL Comments (along with Final/Firm inputs and revisions)</td> <td>Within 7 days from the receipt of drawings in line with inputs</td> </tr> <tr> <td>3.</td> <td>Revised Drawings submission</td> <td>Within 3 days from the receipt of commented drawings from BHEL</td> </tr> <tr> <td>4.</td> <td>BHEL Comments on submitted revised drawing</td> <td>Within 7 days from the receipt of revised drawings</td> </tr> <tr> <td>5.</td> <td>Manufacturing Cycle time, Inspection call & Delivery</td> <td>Within 3 months from Manufacturing clearance date</td> </tr> <tr> <td>6.</td> <td>As Built Drawings</td> <td>Within 10 days from the date of Commissioning of CCTV System</td> </tr> </tbody> </table> c. Final Documentation - All final documents shall be submitted in 10 sets of hard copies + 1 copy of CD along with Material directly to site. - All field modification shall also be recorded during system commissioning and mark up copy (3 sets) shall be submitted for day-to-day work. - Complete O&M manual – all in 6sets (2 sets to be included with item dispatch and balance to BHEL purchase dept.) - Warranty and all test certificates for review and acceptance by BHEL - Final as built documents revised shall be submitted within 15 days after completion of SAT (Site acceptance test) - All engineering drawings and as built drawings shall be furnished in 2 sets of CD's. 11. GUARANTEE The bidder shall provide full guarantee for performance of the equipment being supplied for a period of minimum 18 months from date of commissioning or 24 months from date of supply whichever is earlier. Whereas the technical specifications of the purchaser constitutes the broad guidelines for equipment selection, supply and performance, the bidder shall bear final and total responsibility for engineering and performance to meet the purchaser's specification. Bidder shall be fully responsible for all the items to be supplied in this package. i.e. bidder shall provide a guarantee certificate for trouble free performance of all the items for 24 months from date of supply.			Sl. No	Document	Schedule	1.	First Submission of Drawings	Within 7 days from the date of PO	2.	BHEL Comments (along with Final/Firm inputs and revisions)	Within 7 days from the receipt of drawings in line with inputs	3.	Revised Drawings submission	Within 3 days from the receipt of commented drawings from BHEL	4.	BHEL Comments on submitted revised drawing	Within 7 days from the receipt of revised drawings	5.	Manufacturing Cycle time, Inspection call & Delivery	Within 3 months from Manufacturing clearance date	6.	As Built Drawings	Within 10 days from the date of Commissioning of CCTV System
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Ref. Doc																								

Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD - 32	PY55219
			Rev No. 00
			Page 22 of 24
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED . It must not be used directly or indirectly in any way detrimental to the interest of the company.	If any defect in the material during manufacturing process, transportation activities, bidder is sole responsible for the replacement with in a period of 3 weeks from the supply/identified as defective. 12. MARKING Each device shall be identified with the following information as a minimum. a) Manufacturer’s name or identity b) Manufacturer’s model and /or serial number c) Input range d) Tag no. e) Power Supply f) Area Class & IP Class g) IS / Non IS h) ID no. for ‘FF’ field devices. The above information shall be in a permanent form on a metal nameplate, permanently attached to the device/equipment. 13. PAINTING SPECIFICATION: a) All the outdoor items shall be tropicalised and epoxy painted. All carbon steel bolting shall be hot dip galvanized or Cadmium plated and bi-chromated. b) Screws, rivets, brackets and stiffeners shall be stainless steel. c) Color of the top coat of Control Room panels shall be RAL-7035. However, Final Paint Shade for all the equipment shall be informed to bidder during detail engineering 14. SHIPPING & PACKING The equipment shall be transported to site by the bidder in fully assembled condition. However, in case some components are liable to be damaged during transit, the same shall be dismantled and supplied separately, to be reassembled at site by the bidder. Assembly of the item supplied loose at site and repairing of any item damaged during transport shall be in the bidder’s scope. The bidder shall send each consignment to site with a detailed packing list.		
	Ref. Doc		

Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD - 32	PY55219											
			Rev No. 00											
			Page 23 of 24											
COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED. It must not be used directly or indirectly in any way detrimental to the interest of the company.	15. VARIANT TABLE													
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01	PY9755219013	Supply of CCTV System	Supply of CCTV System Package consists of BOM listed in cl. 8(a)											
02	PY9855219023	Erection Supervision & Commissioning for CCTV System	Erection Supervision & Commissioning of CCTV System – as per cl. 8(b)											
Ref. Doc														

[illegible]

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

1



1. CCTV IS DESIGNED AS PER TECHNICAL SPECIFICATIONS GIVEN IN CONTRACT DDO NO. CS-5714-004(R) -9 PART C-C-1.8) CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM
2. THE CAMERA (CAMERA) IS AS PER TECHNICAL SPECIFICATION GIVEN IN CONTRACT BID DDO NO. CS-5714-004(R) -9 PART C-C-1.8) CLOSED CIRCUIT TELEVISION (CCTV) SYSTEM PAGE 242 OF 415.
3. CCTV MONITOR SHALL BE DESK MOUNTED IN "SCADA ROOM" OF CMCS BUILDING
4. ALL UN-ARMoured AND FO CABLES SHALL BE ROUTED THROUGH FLEXIBLE CONDUITS.
5. POWER SUPPLY OF 230V AC FOR CAMERA WILL BE PROVIDED FROM a) UPS SYSTEM OF CMCS BUILDING FOR CCTV INSTRUMENTATION & CAMERAS LOCATED IN CMCS BUILDING.
b) UPS SYSTEM OF INVERTER ROOM FOR CCTV INSTRUMENTATION & CAMERAS LOCATED IN INVERTER ROOM.
c) UPS SYSTEM OF CMCS BUILDING/NEAREST INVERTER ROOMS FOR CCTV INSTRUMENTATION & CAMERAS LOCATED IN AREAS OTHER THAN CMCS BUILDING & INVERTER ROOMS.
6. VA ANALYTICS FEATURE SHALL BE PART OF SERVER.
7. THE CAMERA & VIDEO MANAGEMENT SOFTWARE SHALL CONFORM TO ONVIF PROFILE S OR LATEST AVAILABLE APPLICABLE ONVIF PROFILE.
8. ONE NUME ETHERNET PORT SHALL BE PROVIDED IN THE NETWORK SWITCH FOR CCTV RACK AT CMCS BUILDING FOR INTEGRATION PURPOSE.
9. ALL THE CAMERA AND ACCESSORIES ARE TO BE HOUSED IN WEATHER PROOF IP65 ENVIRONMENTAL HOUSING MADE OF ALUMINIUM AND SUN SHIELDING HOUSING, IF NEARLY BLASTER INSTALLED, SHALL PROVIDE PROTECTION FROM CAMERA/LENS ASSEMBLIES IN THE AMBIENT TEMPERATURE RANGE OF 0 DEG.C TO 50 DEG.C.
10. FOR NON DOME TYPE CAMERAS, THE HOUSING SHALL HAVE THERMISTOR FOR TEMPERATURE CONTROLLED FAN KIT, CONTINUOUS FLOWER KIT (WITH SUITABLE FILTERS) FOR PURGE AIR ARRANGEMENT/WINDOW WIPERS SHALL BE AVAILABLE WITHIN THE HOUSING FOR CAMERAS AS INDICATED AGAINST EACH APPLICATION.
11. SWITCH TO SWITCH CONNECTION SHALL BE THROUGH SFP MODULES, SUITABLE NUMBER OF SFP PORTS SHALL BE PROVIDED IN NETWORK SWITCHES.

LEGEND: -

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JS KEYBOARD : JOYSTICK KEYBOARD
DOM-XXXXXXX : WEATHER PROOF PTZ CAMERA
FIX-XXXXXXX : WEATHER PROOF FIXED CAMERA
```

-  : SMALL FORM FACTOR PLUGGABLE
-  : MEDIA CONVERTOR
-  : LIU BOX
-  : ETHERNET SWITCH
-  : POWER CABLE
-  : 8C Single mode armoured F.O cable
-  : CAT 6 CABLE

 BHEL : SCOPE DEMARCATION BETWEEN M/s NTPC & M/s BHEL
 **WPJB-XXX** : WEATHER PROOF JUNCTION BOX

REFERENCE DRAWINGS: –

- 1) TECHNICAL SPECIFICATION
BID DOC. NO: CS-5714-004(R)-9
- 2) ARRAY LAYOUT OF SPV PLANT
(DOC NO: 5711-004-P4-PVE-F-003-REV-01)

PROJECT :	50MWp SOLAR POWER PLANT (P4 BLOCK)
CUSTOMER :	 NTPC- MANDSAUR MP


BHARAT HEAVY ELECTRICALS LTD
 UNIT : HYDERABAD

	NAME	SIGN.	DATE	NO.OF VAR.
DRN.	M PAVAN KUMAR		17.06.16	
CHD.	G SESUJI VIRAM		18.06.16	NA



CHD.	G. SASTRI KIRAN	18.05.16	27/05/16
APPO.	J. K. PATTANAIK	18.05.16	

DEPT.	UNTO
PED	

DIMS.		SCALE	WEIGHT
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WT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO.OF ITEMS
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CODE 450	9
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19	70		
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NA	NA	NA	NA
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TITLE	DATE	BY	NO.	PRICE	REMARKS
...	...	...	...	...	...

4. LOCATION LAYOUT

CARD CODE	DW-IV-1-M096-0701-01	REV.	02
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CONSTRUCTION, ENVIRONMENT,
AND ARCHITECTURE

NA	SHT. No	01	NO. OF SHT.	02
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REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED	REV.	DATE	ALTERED
CHG/APPD			CHG/APPD			CHG/APPD			CHG/APPD			CHG/APPD			CHG/APPD		
ZONE			ZONE			ZONE			ZONE			ZONE			ZONE		
2			3			4			5			6			7		

REV.	DATE	ALTERED	KUSH ANAND
02	24.08.16	CHD/APPD	ATM/JKP
ZONE	REVISED BASED ON M/s NTPC COMMENTS RECEIVED FOR REV-01 ON 03.08.16 AND CHANGED ARRANGEMENT OF ARRAYS, INVERTER ROOMS AND ROAD LAYOUT.		

REV.	DATE	ALTERED	MPK
01	14.07.16	CHD/APPD	GSK/JKP
ZONE	REVISED BASED ON M/s NTPC COMMENTS RECEIVED FOR REV-00 ON 01.07.16.		

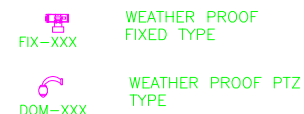
DEPT. PED	UNTO
CODE 450	9
TITLE	
C	

(ALL DIMENSIONS ARE IN mm)

SHT. 02 02 OF 20

GENERAL DIMENSIONAL LIMITS, FITS & TOLERANCES AS PER HY0230261

INVENTORY NO	SIGN. AND DATE	REF. ORG. NO.	COMPUTER FILE NAME
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S.No	LOCATION	TYPE	QTY (No's)
1	CMCS ROOM	WEATHER PROOF FIXED TYPE	1
2	MOUNTED ON INVERTER ROOMS (TOTAL 10 ROOMS)	WEATHER PROOF PTZ TYPE	1 PER ROOM(TOTAL 10 Nos)
3	ENTRY GATE	WEATHER PROOF FIXED TYPE	TOTAL 2 Nos (1Nos AT EACH ENTRY GATE)
4	SECURITY ROOM	WEATHER PROOF PTZ TYPE	1
5	CAMERAS AT STRATEGIC LOCATIONS ALONG BOUNDARIES	WEATHER PROOF FIXED TYPE	5
6	CAMERAS AT STRATEGIC LOCATIONS ALONG BOUNDARIES	WEATHER PROOF PTZ TYPE	5

S.No	LOCATION	TYPE	QTY (No's)
1	CMCS ROOM	WEATHER PROOF FIXED TYPE	1
2	MOUNTED ON INVERTER ROOMS (TOTAL 10 ROOMS)	WEATHER PROOF PTZ TYPE	1 PER ROOM(TOTAL 10 Nos)
3	ENTRY GATE	WEATHER PROOF FIXED TYPE	TOTAL 2 Nos (1Nos AT EACH ENTRY GATE)
4	SECURITY ROOM	WEATHER PROOF PTZ TYPE	1
5	CAMERAS AT STRATEGIC LOCATIONS ALONG BOUNDARIES	WEATHER PROOF FIXED TYPE	5
6	CAMERAS AT STRATEGIC LOCATIONS ALONG BOUNDARIES	WEATHER PROOF PTZ TYPE	5

REV.	DATE	ALTERED CHD/APPO		REV.	DATE	ALTERED CHD/APPO		REV.	DATE	ALTERED CHD/APPO		REV.	DATE	ALTERED CHD/APPO		REV.	DATE	ALTERED CHD/APPO		REV.	DATE	ALTERED KUSH ANAND ATM/JKP		REV.	DATE	ALTERED CHD/APPO	MPK GSK/JKP				
ZONE				ZONE				ZONE				ZONE				ZONE				ZONE				02	24.08.16	CHD/APPO	REVISOR BASED ON M/S NTPC COMMENTS RECEIVED FOR REV-01 ON 03.08.16 AND CHANGED ARRANGEMENT OF ARMS, INVERTER ROOMS AND ROAD LAYOUT.	01	14.07.16	CHD/APPO	

PROJECT :		50MWp SOLAR POWER PLANT (P4 BLOCK)																					
CUSTOMER :				NTPC - MANDSAUR MP																			
		BHARAT HEAVY ELECTRICALS LTD. UNIT : HYDERABAD				<table border="1"> <thead> <tr> <th>NAME</th> <th>SIGN.</th> <th>DATE</th> <th>NO. OF PAGES</th> </tr> </thead> <tbody> <tr> <td>M PAVAN KUMAR</td> <td></td> <td>17.06.16</td> <td rowspan="3">X.A.</td> </tr> <tr> <td>G SESHU KRISHN</td> <td></td> <td>18.06.16</td> </tr> <tr> <td>J K PATTANAIK</td> <td></td> <td></td> </tr> </tbody> </table>		NAME	SIGN.	DATE	NO. OF PAGES	M PAVAN KUMAR		17.06.16	X.A.	G SESHU KRISHN		18.06.16	J K PATTANAIK				
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G SESHU KRISHN		18.06.16																					
J K PATTANAIK																							
SEPT. FED. C/COD. NO.	UNTL. DMS. 9/10/17		SCALE	WEIGHT (KG)	REF. TO ASSY. DRG.	ITEM NO.	NO. OF ITEMS	REV.															
TITLE				CARD CODE	DRAWING NO.	PT-IX-1-M086-9701-01 SHT. No 02 OF 02 NO. OF SHT. 02																	
CCTV LOCATION LAYOUT AND ARCHITECTURE				N/A																			



Form No.

PRODUCT STANDARD
PROJECT ENGINEERING & SYSTEMS DIVISION
HYDERABAD - 32

Annexure-2 to
PY55219

Rev No. 00

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Ref. Doc

Annexure-2

CHECK LIST

(TO BE FILLED BY BIDDER AND SUBMITTED ALONG WITH TECHNICAL OFFER)

Sl. No.	Check point description	Supplier Confirmation
1.	Bill of Material	YES/NO
2.	Unpriced Schedule as per BHEL specification complying to following enclosed: 1. Signed & Stamped 2. In BHEL format. 3. All items are quoted.	YES/NO YES/NO YES/NO
3.	Duly signed Deviation Schedule(Technical) enclosed as per BHEL format	YES/NO
4.	Clause wise confirmation to BHEL specification included in technical offer except the deviations listed in deviation schedule.	YES/NO
5.	Completely filled-in Technical Data sheets of Equipments listed in BOM.	YES/NO
6.	Following documents enclosed for information 1. UPS & non-UPS power requirement. 2. Preliminary GA of Equipments listed in the BOM.	YES/NO YES/NO
7.	Catalogues Enclosed.	YES/NO

Along with the offer, bidder to furnish this checklist duly filled and signed. No deviation is acceptable in this regard. Without duly signed & stamped checklist offer shall not be considered for evaluation.

BIDDER'S STAMP & SIGNATURE

TD-201 Rev No. 00	Form No.		PRODUCT STANDARD PROJECT ENGINEERING & SYSTEMS DIVISION HYDERABAD	ANNEXURE- 3
<u>Project : 1x50 MW Solar PV at Mandsaur MP</u> <u>QUALITY ASSURANCE REQUIREMENTS</u> The vendor shall prepare & submit Quality Assurance Plan (QAP) for respective package /equipment in NTPC format. A typical QAP in NTPC format /BHEL format attached for respective equipment /package is a reference document for the vendor for future use by vendor for preparation and submission of QAP in NTPC format. Hence, no deviation to such document is acceptable. Any, additional type or special tests or routine tests or acceptance test if found necessary to establish the intended quality after detailed engineering then the same shall have to be incorporated in the QAP without any commercial implication. Along with QAP, successful vendor shall submit “Vendor Endorsement Sheet” in NTPC format. NTPC QAP format and Vendor Endorsement sheets are enclosed along with this document. Note : Vendor shall submit QAP with in 07 days from PO receipt date. COPYRIGHT AND CONFIDENTIAL The information on this document is the property of BHARAT HEAVY ELECTRICALS LIMITED, It must not be used directly or indirectly in any way detrimental to the interest of the company.				

MFGR.'s LOGO	MANUFACTURER'S NAME AND ADDRESS	MANUFACTURING QUALITY PLAN		PROJECT :
		ITEM :	QP NO.:	PACKAGE :
		SUB-SYSTEM:	REV.NO.:	CONTRACT NO. :
			DATE:	MAIN-SUPPLIER:
			PAGE: OF....	

SL. NO	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS	CLASS TYPE OF CHECK	QUANTUM OF CHECK		REFEREN CE DOCUMENT	ACCEPTA NCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
					M	C / N					M	C	N	
1	2	3	4	5	6		7	8	9	D *	**	10		11

		LEGEND: * RECORDS, IDENTIFIED WITH "TICK" () SHALL BE ESSENTIALLY INCLUDED BY SUPPLIER IN QA DOCUMENTATION. ** M: MANUFACTURER/SUB-SUPPLIER C: MAIN SUPPLIER, N: NTPC P: PERFORM W: WITNESS AND V: VERIFICATION. AS APPROPRIATE, CHP: NTPC SHALL IDENTIFY IN COLUMN "N" AS ' W"			DOC. NO.:		REV..... CAT.....		
MANUFACTURER/ SUB-SUPPLIER	MAIN-SUPPLIER		FOR NTPC USE						
SIGNATURE				REVIEWED BY		APPROVED BY		APPROVAL SEAL	

VENDOR'S NAME & ADDRESS:		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:					
		CUSTOMER: BHEL, HYDERABAD PROJECT: PRODUCT: CCTV				BHEL PO No: PO DATE: BHEL SPEC:			REV:		REV NO:		DATE:	
		PAGE 1 OF 4												
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS	

1.0 RAW MATERIALS, BOUGHT OUT ITEMS AND SPARES													
1.1	LAN Switch / Network Switch	Make, Model, Type, Rating	Major	Physical	100%	BHEL Spec/ Appd drg /data sheet	BHEL Spec/ Appd drg /data sheet	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
		Switching Capability and sequence	Major	Test	100%	-do-	-do-	IR	√	2		1	
		No. inputs /outputs, Display	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Provision for connectivity with LVS	Major	Physical	100%	-do-	-do-	IR	√	2		1	
1.2	Keyboards, Joystick	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.3	Cameras	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.4	Lens	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.5	Camera Housing	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	

LEGEND: P: PERFORM, W: WITNESS, V: VERIFICATION. INDICATE 1 FOR BHEL CQS (OR BHEL NOMINATED INSPECTION AGENCY) & 2 FOR VENDOR/SUB VENDOR AS APPROPRIATE AGAINST EACH COMPONENT /CHARACTERISTIC UNDER P, W & V COLUMNS. * FOR ITEMS MARKED √ (TICK) IN COLUMN 'D', TEST CERTIFICATES SHALL BE SUBMITTED TO BHEL FOR RECORDS.

VENDOR'S NAME & ADDRESS:			TYPICAL MANUFACTURING QUALITY PLAN						MQP. NO.:				
			CUSTOMER: BHEL, HYDERABAD PROJECT: PRODUCT: CCTV			BHEL PO No: PO DATE: BHEL SPEC:			REV NO:		DATE:		
									PAGE 2 OF 4				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.6	Pan & Tilt unit	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Pan range /speed, tilt /tilt speed	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.7	Media converter	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.8	Monitor	Make, Model, Type, Rating	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.9	Software	Make, Model, Type,	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.10	Server, Work Station, A, Storage Device	Make, Model, Type,	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Functional check	Major	Test	100%	-do-	-do-	IR	√	2		1	
1.11	Central Control Room rack, 9U rack	Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	

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VENDOR'S NAME & ADDRESS:		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		CUSTOMER: BHEL, HYDERABAD				BHEL PO No:			REV NO:		DATE:		
		PROJECT: PRODUCT: CCTV				PO DATE:			PAGE 3 OF 4				
		BHEL SPEC:				REV:							
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY			REMARKS
										P	W	V	
		Statutory certificates	Major	Test	100%	-do-	-do-	TC	√	2		1	
1.12	Weather proof Junction box	Dimension /constructional requirement	Major	Physical	100%	-do-	-do-	IR	√	2		1	
		Statutory certificates	Major	Test	100%	-do-	-do-	TC	√	2		1	
1.13	LIU, Adaptors, Patch Panel, FO Connectors, FO Patch cards etc	Make, Model, Type,	Major	Physical	100%	-do-	-do-		√	2		1	
1.14	Cat-6 cable	Make	Major	Physical	100%	-do-	-do-		√	2		1	
		Routine Tests	Minor	Test	100%	-do-	-do-	IR	√	2		1	
1.15	FO cable	Make	Major	Physical	100%	-do-	-do-		√	2		1	
		Routine Tests	Minor	Test	100%	-do-	-do-	IR	√	2		1	
1.16	Power cable	Make	Major	Physical	100%	-do-	-do-		√	2		1	
		Routine Tests	Minor	Test	100%	-do-	-do-	IR	√	2		1	
1.17	Connectors, Glands & Patch Cords	Make, Model, Type,	Major	Physical	100%	-do-	-do-	IR	√	2		1	
1.18	HDPE conduit	Physical	Minor	Visual	100%	Approved BOM	--		√	2		1	
1.19	Camera Poles	Physical	Major	Visual	100%	Approved BOM	--		√	2		1	
1.20	Computer table, operator chair	Physical	Minor	Visual	100%	Approved BOM	--		√	2		1	
2.0	FINAL INSPECTION & TESTING												
2.1	Integrated System Testing	Functional	Major	Functional	100%	BHEL Spec/ Appd drg /Scheme	BHEL Spec/ Appd drg /Scheme	IR	√	2	1		

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VENDOR'S NAME & ADDRESS:		TYPICAL MANUFACTURING QUALITY PLAN							MQP. NO.:				
		CUSTOMER: BHEL, HYDERABAD PROJECT: PRODUCT: CCTV				BHEL PO No: PO DATE: BHEL SPEC:			REV NO:		DATE:		
									PAGE 4 OF 4				
SL NO	COMPONENTS	CHARACTERISTICS	CLASS	TYPE OF CHECK	QUANTUM OF CHECK	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD	* D	AGENCY P W V			REMARKS
3.0	PRESERVATION & PACKING												
3.1	PACKING*	Proper packing	Major	Visual	100%	BHEL Spec	BHEL Spec	Report/ Packing list	√	2		1	*In case of exporting/ importing, packing shall be as per BHEL export packing spec

Notes:-

1. This MQP should be read along with specification (latest revision as per PO), approved drawings & approved datasheet.
2. Drawing/datasheet shall prevail over quality plan for contradiction if any.
3. Any project/customer specific requirements which shall be notified have to be fulfilled by the vendor at the time of execution of order.
4. Detailed procedure of Environmental stress Screening test shall be as per engg specification as applicable.
5. This is an indicative list of tests /checks. The manufacturer is to furnish a detailed QAP in NTPC format which is attached separately indicating practice and procedure along with relevant supporting documents.
- 6.

Abbreviations:-

MTC – Material Test certificate	AS – Alloy Steel
IBR – Indian Boiler Regulations	SS – Stainless Steel
DFT – Dry Film Thickness	TC – Test Certificate
PMI – Positive Material Identification	IS – Indian Standards
IR – Inspection Record	

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ANNEXURE-4

Cables shall be of (FR-LSZH) PVC sheathed cables and shall conform to latest edition of Indian/International standards.

Multi Mode FO Cables (For Purchaser's Use Only):

Optic Fiber cable shall be 8 core, galvanized corrugated steel taped armored, fully water blocked with dielectric central member for outdoor/indoor application so as to prevent any physical damage. The cable shall have multi-mode fibers on as required basis so as to avoid the usage of any repeaters. The core and cladding diameter shall be 62.5 +/-1 micrometer and 125 +/- 1 micrometer respectively. The outer sheath shall have Anti rodent & anti termite, Flame Retardant, UV resistant properties and are to be identified with the manufacturer's name, year of manufacturing, progressive automatic sequential on-line marking of length in meters at every meter on outer sheath.

The cable core shall have suitable characteristics and strengthening for prevention of damage during pulling viz. Steel central number, Loose buffer tube design, 4 fibers per buffer tube (minimum), Interstices and buffer tubes duly filled with Thixotropic jelly etc. The cable shall be suitable for maximum tensile force of 2000 N during installation, and once installed, a tensile force of 1000 N minimum. The compressive strength of cable shall be 3000 N minimum & crush resistance 4000 N minimum. The operating temperature shall be -20 deg. C to 70 deg. C.

All testing of the optic fiber cable being supplied shall be as per the relevant IEC, EIA and other international standards.

Minimum 100% cores are kept as spare in all types of optical fiber cables. Cables shall be suitable for laying in conduits, ducts, trenches, racks and underground buried installation.

Spliced/ Repaired cables are not acceptable. Penetration of water resistance and impact resistance shall be as per IEC standard.

Data sheets (FO cable) and Test certificates (FO cable) should be submitted.

Other Technical details of the Multi mode Fibre Optic Cable:

DOT approved Fiber Cable shall be supplied and mechanical specification shall be as per IEC 794-1 is given below:

S. No	Cable Construction	Requirement	Remarks
1.	No of fibers per tube	4	
2.	Drum length	1600m	
3.	Attenuation & Bandwidth Wave length 850 nM Wavelength 1300 nM	<3.5db/km <1.2db/km	
4.	Coupling losses	<0.75db per connection	

Location of the Installation:

NTPC 50 MWp Solar PV Plant at Mandasaur, Madhya Pradesh