



SECTION-1

Scope, Quantities & Specific Technical Requirements

1.1 Scope

The scope of work includes Detailed engineering, networking design, manufacturing, assembly, testing before supply, inspection, packing, loading at works, transportation to site of **Security Surveillance (CCTV) System** including all the required equipments and accessories (cable, conduits, connector, interface equipments etc.) as mentioned in this section and in various other sections of this specification to Agra site.

The scope of work also includes complete Installation, commissioning & testing of a fully functional **Security Surveillance (CCTV) System** at Agra site. Separate quotation shall be provided for the ETC work.

The **Security Surveillance (CCTV) System** comprises of following system:

- i) IP Surveillance System for Station (*except Valve hall*): System 1
- ii) CCTV system for Valve hall: System 2
- iii) Perimeter protection system

Name of customer: Power Grid Corporation of India Ltd (POWERGRID)

Name of the project: ±800KV, 6000 MW, HVDC Multi-Terminal NER/ER–NR/WR Interconnector-I Project

Project Site: Agra (AG)

1.2 Bill of Quantities

LOA BOQ REF.	ITEM DESCRIPTION	QUANTITY
BB.II.A.31.3	Security Surveillance (CCTV) System consisting of following:	1 LOT
i.	System 1: IP Surveillance System for Agra converter station	
ii.	System 1: IP Surveillance System for 400/220KV Agra extension yard *	
iii.	System 2: CCTV system for Valve hall	
iv.	Perimeter protection system for Agra converter station	
v.	Perimeter protection system for 400/220KV Agra extension yard *	

*Price to be quoted separately (optional item).



Vendor shall provide detailed bill of quantity (defining 1 LOT) required meeting the complete functionality of the specification.

Refer Annexure -1 for customer approved make & model.

Refer Annexure-2 for location of camera & perimeter protection at Agra.

1.3 Specific technical requirements

- i) All Equipments & accessories to be supplied under the package shall be as per relevant Indian/International standard.
- ii) All cables shall be supplied as per the relevant IEC/IS and selection of cables shall be based on the laying length, signal loss due to long length and environment.
- iii) The equipments and cables installed in the valve hall and DC hall shall be suitable to operate in EHV environment which is prone to various signal interference.
- iv) In case the camera is to be mounted on separate structure (other than existing steel structure) the same shall be in bidder's scope.
- v) The CCTV shall be recorded (min for 30 days) and stored, followed by transfer of the data to Juke Box.

1.4 Test Requirement

The vendor shall submit a FAT (factory acceptance test) & SAT (site acceptance test) plan complying the specification for POWERGRID / BHEL approval that will be used during inspection at works & and site respectively.

- i) Complete operating and maintenance manuals and training of O&M personnel.
- ii) System commissioning and acceptance tests as specified in site acceptance test (SAT) plan.

1.5 Documents to be provided by bidder with quotation

- Detailed BOQ to meet the requirement of specification with make, model & quantity of the item
- Technical datasheet/Catalogues/brochures of the item
- Clause-wise compliance
- Test certificates as per relevant standards
- Confirmation from camera manufacturer for providing quality check certificate at the time of inspection and also offered products are under active production and after sales service & support for at least 3 years from the date of bid opening will be provided by manufacturer.
- The vendor shall produce relevant documents to certify that genuine equipment from camera manufacturer is being supplied.



1.6 Drawing/Document Requirement in the event of order

- Vendor shall submit a layout drawing indicating the scope of work along with cable/conduit routing.
- Cable schedule for respective systems as per section 2.
- All BOQ items make & model, datasheets shall be approved by POWERGRID. Cable & conduits to be supplied as per POWERGRID approved vendor list.
- Cables shall be type tested in accordance with the relevant standards (IS/IEC). The type tests shall be witnessed by POWERGRID/BHEL and report to be approved before supply.
- Camera shall be compliant with EN61000-4-2 for electrostatic discharge immunity test, EN- 61000-4-3 for Radiated radio frequency electromagnetic field immunity test, EN61000-4-4 for Electrical fast transient/burst immunity test. Test certificates shall be produced for Approval.
- Vendor shall submit a detailed Factory acceptance test (FAT) plan to verify the quality, functionality of all the BOQ items. The FAT shall be approved by POWERGRID.
- Submission of Site acceptance test plan for approval.
- Operation & maintenance manual meeting customer specification & application.

1.7 ENVIRONMENT

Design parameters for indoor equipment (as per document 1JNL100122-145 Rev 04)

1.7.1. Indoor with controlled environment

For normal operating conditions the relative humidity is 50% in the valve hall. During the non-operation state of the station, the temperatures may be as specified for outdoor application during shorter times and then the maximum relative humidity may increase above 60%.

		Valve area	Hall	Indoor hall	DC	Other Area
Maximum temperature	°C	60		50		40
Minimum temperature	°C	5		5		5
Maximum relative humidity	%	60		60		60
Minimum relative humidity	%	10		10		--

1.7.2. Control cabinets in control room



During the non-operation state of the station, the temperatures may be as specified for outdoor application during shorter times, and then the maximum relative humidity may increase above 60%.

Maximum temperature	°C	55
Minimum temperature	°C	5
Maximum relative humidity	%	60

1.7.3. Indoor without controlled environment

Maximum temperature (dry bulb)	°C	60
Maximum 24 h average temperature (dry bulb)	°C	60
Minimum temperature (dry bulb)	°C	5

1.7.4. Outdoor environment information will be as per Section 3



SECTION-2

Equipment Specification

2.1 IP Surveillance System for Station (System 1)

The IP surveillance system (also referred as Visual monitoring system (VMS) in this specification) shall be an integrated system with IP network centric functional and management architecture aimed at providing high-speed manual/automatic operation for best performance. The system should facilitate viewing of all cameras by the authorized users. The system shall use video signals from various types of indoor/outdoor CCD colour cameras installed at various locations, process them for viewing on workstations/ monitors in the control room and simultaneously record all the cameras after compression using H.264 or better standard.

60 nos. IP Base PTZ Colour cameras for IP surveillance would be located in Agra station. The cameras shall cover the main entrance gate, all entrance doors for the service building, indoor and outdoor DC yard, indoor and outdoor isolators, earth switches, breakers, AC and DC capacitors etc. The network design shall be such that any single node/ network path failure should not affect network connectivity of other nodes to the NVR.

The no. of camera in different location is as follows:

Area	Camera	Type of camera
Station main gate	1 no.	Outdoor
Main service building	2x1= 2 nos.	Indoor
Additional service building	2x1= 2 nos.	Indoor
DC hall	2x4= 8 nos.	Indoor
Outdoor DC yard	2x4= 8 nos.	Outdoor
Converter transformer area	2x4= 8 nos.	Outdoor
Pole/Filter diameter	2x7=14 nos.	Outdoor
Filter bank area	2x5= 10 nos.	Outdoor
Other switchyard area	7 nos.	Outdoor

2.1.1. IP cameras should be capable of interfacing with LAN network. The operation of cameras shall be integrated with the Network video recorder system placed in Control room of HVDC station.

2.1.2. The network video recorder system should be EMI/EMC compatible and shall work in EHV environment. The VMS system shall be integrated with the Video projection System (VPS). Following ports/video outputs along with suitable cable required for integration with VPS are required:

- Network video recorder of VMS: 2 Nos. DVI-D port
- Control cabinet of CCTV system for Valve hall: 2 Nos. DVI-D port/ S-video output



2.1.3. Mouse–keyboard controllers shall be used for Pan, Tilt, Zoom, and other functions of desired cameras. The system shall be provided with sufficient storage (RAID disk) of all the camera recordings for a period of 30 days or more @ 25 fps, at 4 CIF or better quality using H.264 Compression for all the cameras. It shall be ensured that data once recorded shall not be altered by any means. The recording resolution and frame rate for each camera shall be user programmable.

2.1.4. The IP surveillance system shall operate on 230V, 50 Hz single phase power supply.

2.1.5. Network Video Recorder System (along with accessories):

- a) Intel 5000P, 2(01) Dual Core XENON 2.0 GHz 5130, 1333MHz, 4Mb cache, 3GB DDR buffered ECC 7.5/16/32 TB RAID 0,1,5 JBOD config, 3.0GB/s SATA II, DVD/RW, Keyboard & mouse, 3XUSB ,8xPCIe, Dual 10/100/1000, Triple redundant hot swap ATX,PFX, WIN XP(SP3) 64 channel software with analytic 6u, overpower/voltage/current protected.
- b) 1 no. Colored TFT 22" monitor
- c) PTZ CAMERA CONTROLLER: Enable to control the cameras (PAN/TILT/ZOOM), 3D Joystick.
- d) OFC Cable: Single mode- 9/125 microns 6 core steel armored fiber cable.
- e) POWER CABLE: ARMOURED 3X2.5 sq mm, 1100 V, Annealed Bare copper.
- f) Junction Box: IP 65 Standard for power station environment.
- g) UPS: UPS supply shall be provided from HMI UPS (not in the scope of CCTV system vendor) for network video recorder in control room.
- h) It is also required that the cameras should also be viewed from Security room near the entrance of Sub- station. Configuration of DESK TOP PC for Security room: C2D 2.66 GHz, 2GB RAM With 19" LCD, 250 GB HDD, OS Window XP/VISTA Business.
- i) Control Room Switch: Min 48 port, 10/100 managed switch. 48 single mode managed media convertor preferred chassis base.
- j) Remote Optical switch: 8 port 10/100, 1 port single mode media convertor.
- k) NETWORK Cable: STP Cat 5e OR Better.
- l) Control Cable: 4 Core screen shielded (Armoured)
- m) GI Pipe shall be used for laying of wire if un-armoured cable is used.
- n) Any other accessory required to complete the functionality of visual monitoring system as per the requirement of this specification.

2.2 CCTV System For Valve Hall (System 2)

A closed circuit television (CCTV) Surveillance system shall be provided for vigilance in each valve hall (4 valve halls). The CCTV System shall consist of four remotely controlled Analogue PTZ video cameras per valve hall (total 4 X 4= 16 camera), two 21" TFT monitors, a keyboard and a control cabinet (DVR) *including quad units & a video matrix switcher*. The keyboard shall be used to control the cameras and to control what pictures are shown on the different monitors. The pictures from each valve hall shall be displayed on the two nos. 21" *quad* monitors located in the operator control room. The monitor shall facilitate display of all four images simultaneously on the monitor or any single image by choice. The monitors, control cabinet (DVR) and the digital keyboard shall be located in the operator control room. The DVR shall have in-built



storage capacity for recording 30 days video. Also provision shall be made to transfer the data to the RAID disk provided with system 1.

The location of the camera needs to be coordinated with other services in order to avoid any disturbances in the clearance requirement for the high voltage equipment's inside the valve hall area. Selection of signaling cable shall be done according to losses in route length. PTZ camera should be able to withstand the voltage interference or environment that it will be exposed to.

2.3 PERIMETER PROTECTION

Adequate nos. of sensors shall be installed along the boundary fence of the converter station immediately after completion of boundary fence to prevent intrusion from outside and integrated with VMS/ BMS & VPS to prevent intrusion.

SENSORS FOR PERIMETER PROTECTION: Infrared photoelectric system for outdoor sensor, Quad Beam, Long range-100 meter or higher.

Any other accessory/item required for mounting the beam sensors on boundary wall/fence shall be in vendor's scope.



**±800KV, 6000MW, HVDC MULTI-TERMINAL NER/ER – NR/WR
INTERCONNECTOR-I PROJECT**

Security Surveillance (CCTV) System
Doc. No. : TB-343-558-034B Rev. 03

SECTION-3

GENERAL TECHNICAL REQUIREMENTS

Please refer Document **TB-343-316-000** for General Technical Requirements.

ABB AB
HVDC

±800 kV, 6000 MW HVDC Multi Terminal NER/ER - NR/WR
Interconnector - I

Document Transmittal

V/c

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Doc No: TM-NEA1-11031
Date: 2011-07-27
Reg./ Class No: NEA-D
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Document No & Rev	Document Description	Document Type	Station	Action	Before	Class No X	Class No Y
TB-343-316-000 Rev. 02	General Technical Requirements - Section 3 (BHEL)	Requirement Specification	-	Approval	2011-08-10	FE	000
TB-343-316-000-CLAR-02 Rev. 00	Clarifications to TS of Technical Requirements- Section 3 Rev.01 (BHEL)	Memorandum	-	Approval	2011-08-10	FE	000

Best regards,
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Approved in Category :	<input checked="" type="checkbox"/> I	<input type="checkbox"/> II	<input type="checkbox"/> III <input type="checkbox"/> IV
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Date :	28-07-2011		

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