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Purchase Specification of CCTV system, Perimeter Intrusion Detection System, Access Control System & Patrol Guard system for RRVUNL Suratgarh 2x660MW

CE/416/CCTV/SUR660

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PROJECT : RRVUNL SURATGARH 2 x 660 MW

CUSTOMER : RRRVUNL

**EQUIPMENT : IP CCTV SYSTEM, PERIMETER INTRUSION
DETECTION SYSTEM, ACCESS CONTROL
SYSTEM & PATROL GUARD SYSTEM**

Revised sheets: 7, 8, 16, 54, 85, 87 & 88

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REVISION HISTORY SHEET

REV No.	DATE	NATURE OF CHANGE	REASON	PREPARED BY	REVIEWED BY
00	09.06.2016	FIRST ISSUE	---	AKS	KRS
01	11.08.2016	2nd Issue	Change in scope of services etc	AKS	KRS

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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, Perimeter intrusion detection system, Access Control System and Patrol Guard Monitoring System for RRVUNL Suratgarh 2x660MW project. All required documents against this Tender/Specification shall be submitted in English only.

Pre-qualification requirements (PQR) are clearly mentioned in Section-B of this Specification. In case Bidder does not meet Pre-qualification requirements, their offer will be summarily rejected and Bidder's Technical offers will not be evaluated.

1. Submission of documents:

- a. Documents listed in section-B of this specification for meeting Pre Qualification Requirements (PQR) should be submitted in a separate cover with "section-B- Pre Qualification " written on cover.
- b. Technical offer / proposal as per section-C of this specification should be submitted in a separate cover with "Section-C technical offer" written on cover.

2. Evaluation methodology:

- a. Bidder's PQR document cover only will be opened first for review and evaluation 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. Technical bids of those bidders who meet PQR shall be opened for review and further consideration.
- b. Bidders declared qualified for meeting Pre Qualification Requirements mentioned in section B and are presently not registered with BHEL EDN Bangalore for supplying the charger system, shall be informed by email to submit online BHEL vendor registration form at www.bhel.com.
- c. Bidders declared qualified for meeting Pre Qualification Requirements mentioned in section B but are not in RRVUNL approved vendor list for the project, their credential documents as provided by bidder under section-B shall be forwarded to M/s RRVUNL for approval. If RRVUNL does not such vendors proposed for approval, their offer will be technically rejected and shall not be considered for further process for procurement.

3. If required during evaluation of PQR and Technical offers/bids, vendor should be present at BHEL Electronic Division, Bangalore, 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.

4. 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.

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SECTION- B

Pre-Qualification Requirements (PQR)

- a) The bidder should be a manufacturer (OEM) / system Integrator and have designed, engineered, supplied and commissioned CCTV system & Perimeter Intrusion detection system to power plants / process industry. Following supporting documents shall be submitted for meeting above requirements:
 - i) Purchase Order Copies along with Bill of material.
 - ii) Commissioning completion MOM or letter by user to substantiate commissioning of CCTV system.
 - iii) Bidder may also submit Performance certificates issued by end customer, if available.
 - iv) List of past supplies in tabular form mentioning name of project, year of supply, year of commissioning, make etc
- b) Original Equipment Manufacturers (OEM) of CCTV system, Perimeter Intrusion detection system and Access Control System based outside India, who are submitting offer for this tender, shall have authorized representatives in India for support related to Documentation, technical support, troubleshooting, Erection, Commissioning and other co-ordination work. Letter from OEM detailing Indian representative details should be provided. OEM to also furnish an undertaking letter that in case of change in Indian representative / agent, OEM shall continue to support for commissioning and troubleshooting the supplies made through this tender.
- c) BHEL shall issue call for service / commissioning with maximum 15 days' notice. Bidder to submit undertaking letter for agreeing to visit project sites within above notice period.
- d) System Integrators participating on behalf of OEM of cameras of CCTV system , OEM of cameras of Perimeter Intrusion detection system and OEM of Access Control System should submit Manufacturer Authorisation Letter from OEM for their consent to participate in this tender and for further support / troubleshooting during commissioning and operation of the systems.
- e) Make of camera, Network Attached storage, Video Management system and network Switches offered in CCTV system should have been supplied and commissioned in power/process industry. Bidder should submit supporting document substantiating this requirement.

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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, PERIMETER INTRUSION DETECTION SYSTEM, ACCESS CONTROL SYSTEM and PATROL GUARD 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 owner 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, perimeter intruder detection system, Access Control system & Patrol Guard system and all accessories.

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



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- 2.02.03 Provisions included in the specification will not be limitative to the scope of work and bidder shall be responsible for supply, installation, erection, commissioning and handing over of complete system.
- 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 listed in the Annexure-1 of this specification for calculating total quantity of each type of camera ~~in each project.~~
- 2.02.05 The plot plan of the project is enclosed as Annexure-7
- 2.02.06 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 The scope of supply in this specification includes Design, fabrication, manufacture and assembly, inspection, shop testing at manufactures works, supply, transportation to site, site testing, erection and commissioning and performance testing of the entire CCTV Security System perimeter intruder detection system, Access Control system and patrol guard equipment as specified in this tender documents.

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 area wise 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, 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 erection and commissioning of the systems.
- d) Installation and Commissioning of the CCTV, perimeter intruder detection system, Access Control system and Patrol Guard 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 erection, installation and commissioning of the complete CCTV system, perimeter intruder detection system, Access Control system will be in bidder scope of services except specific exclusion mentioned in the specification. This will include storage in weather proof container, ~~fixing of camera using suitable camera mount (as per site requirement), all cable laying & termination, fixing of conduits/cable tray, installation and commissioning of all items supplied under CCTV system, perimeter intruder detection system, Access Control system on as required basis. The cables of the systems will be generally laid on the cable tray available in the plant. For end termination, the cable may be required to be laid inside conduits. Also, the FO and power cable along perimeter shall be laid 2feet underground (10000mtre) perimeter cable for camera inside HDPE conduit. Underground cabling is also to be done where ever cable tray is not available.~~
- f) Bidder shall supply ~~and install~~ the necessary interconnecting cables, conduits and other accessories as mentioned in BOM / as required along with other required accessories for completion of the systems.



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- g) Bidder will, during the time of detail engineering and installation of the quoted system, interact and coordinate with any other agency regarding collection/retrieval of inputs/information/data and all such works shall be under the scope of this Bidder. If necessary, Bidder shall contact the purchaser for clarifications before submission of their Bid.
- h) Training to be provided to Owner’s personnel for maintenance.
- i) Establish the specified interfaces and demonstrate operation.
- j) Site modification and preparation of “as-built” documentation”.
- k) Securing certification from relevant authorities, wherever applicable.
- l) Project management and scheduling including micro-planning in specific work area and reporting progress periodically.
- m) 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.
- n) The complete erection and commissioning of CCTV system, perimeter intruder detection system, Access Control system shall be done as per availability of fronts in the project and would have to be done spreading over a period of approximately 15months 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.
- o) Redundant 240 VAC UPS feeder from main plant UPS shall be provided at Security room at Service Building Ground floor for CCTV and Perimeter Intruder Detection System. Further distribution and conversion to other voltage level for complete CCTV and Perimeter Intruder Detection System, access control system shall be suitably done by Contractor.

2.02.08 EXCLUSIONS from scope of services:

Perimeter Intruder detection system and CCTV system

- a) Lifting of CCTV 42U panel from stores to CCTV control room.
- b) Laying of all cables between Camera’s JB to CCTV panel (splicing/ termination is in bidder’s scope)
- c) Fixing / Mounting of all camera, 42” monitor, poles, cable tray, conduits, main Junction boxes.

Access Control System

- a) Fixing / mounting of card reader and lock, cable tray, conduits.
- b) Laying of all cables between reader/controller to server (splicing/termination is in bidder’s scope)

2.03.00 PERFORMANCE GUARANTEE

2.03.01 The Systems / Equipment to be supplied under this specification shall meet the guaranteed performance specified in the enclosed 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 shop test at Bidder’s works and / or at site installation in complete assembled 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.



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2.04.04 GENERAL CODES AND STANDARDS

2.04.04.01 Materials shall be designed, manufactured and tested in accordance with the latest applicable Indian Standards (IS), IEC and other internationally recognized standard except where modified and/or supplemented by this specification. Performance figures quoted shall be guaranteed within the tolerance permitted by relevant standards. In case of failure of the equipment to meet the guarantee, the equipment may be liable for rejection.

2.04.04.02 It shall be Bidder's responsibility to comply with the requirements of all Codes and Standards which are applicable to meet the Specification.

2.04.04.03 The following Codes and Standards form a part of the Specification:

ANSI	: American National Standards Institute
BS	: British Standards
CCITT	: Consultative Committee on Telephone and Telegraph
EIA	: Electronics Industry Association
FM	: Factory Mutual
IEC	: International Electrotechnical Commission
IEEE	: Institute of Electrical and Electronic Engineering
IS	: Indian Standard
ISA	: Instrument Society of America
ISO	: International Standards Organisation
ITU	: International Telecommunication Union
NEC	: National Electrical code
NEMA	: National Electrical Manufacturers Association

AMERICAN NATIONAL STANDARDS INSTITUTE (ANSI)

ANSI S3.5 Methods for the Calculation of the Speech Intelligibility Index

BRITISH STANDARDS (BS)

1	BS EN 60268-5 : 2003	Sound system equipment, Loudspeakers.
2	BS EN 6840-13 : 1998	Sound system equipment. Listening tests on Loudspeakers.
3	BS 6840-14: 1987	Sound system equipment. Guide for circular and elliptical Loudspeakers; outer frame diameters and mounting dimensions.
4	BS 8473 :2006+A1:2008	Intruder and hold-up alarm systems. Management of false alarms. Code of practice.

INDIAN STANDARD (IS)

IS-5	Colour for ready mixed paints and enamels.
IS-694	PVC insulated cables for working voltages upto and including 1100 V.
IS-1554	PVC insulated electric cables.
IS-2147	Degree of protection provided by enclosures for low voltage switchgear and control gear.
IS-3961	Recommended current ratings for cables.
IS-3975	Mild steel wires, formed wires and tapes for armoring of cables.
IS-5831	PVC insulation and sheath of electric cables.



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IS-7741	Specification for Loudspeakers.
IS-8130	Conductors for insulated electric cables and flexible cords.
IS-9302	Characteristics and methods of measurements for sound system equipment.
IS-9537	Conduits for electrical installations.
IS-10426	Specification for public address amplifiers.
IS-10918	Vented type nickel cadmium batteries.

INTERNATIONAL ELECTROTECHNICAL COMMISSION (IEC)

IEC 60268-5 Ed.3.1 EN:2007	Sound System Equipment – Part 5: loudspeakers.
IEC 60529	Classification of Degrees of Protection Provided by Enclosures (IP Code)
IEC 60839-5-2 ed. 1.0 b:1991	Alarm Systems Part 5 Requirements for alarm transmission systems.
IEC 61000	(All Parts) Electromagnetic Compatibility (EMC)

The edition or revision of the Codes and Standards shall be the edition current at the date of the Contract.

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.
- 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 Bidder shall acquaint himself by a visit to the site, if felt necessary, with the conditions prevailing at site before submission of the bid. All relevant site data /information as may be necessary shall have to be obtained /collected by the Bidder.

2.06.00 Technical specification of Accessories

a) Information Outlet (I/O) of CAT-6 UTP

Information outlet shall be RJ45 Toolless Information Outlet of CAT-6 UTP with white colour RJ-45 transparent shuttered socket outlets (modular) with all accessories including label holder, both side colour marking as per EIA/TIA standards. conformity of standards like ISO/IEC ed. 2, EN 50173 and EIA/TIA 568 for fast connection socket and it takes fast tool-less connectors with contact marking by double colour code 568A and B and numbers connectors with insulation displacement contact (IDC). It has the possibility of min. 5 times re-wiring in the event of error, multidirectional cable entry.



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- b) **Face Plate (Plastic Modular Face Plate white in Colour 1 Module)**
Face Plate shall be white modular plate type front plate with accessories for 1/2 nos RJ 45 data outlet, but excluding RJ45 data outlet complete in all respect with grid plate, screws, MS box etc with connections as required.
- c) **Rack End Patch Cord-1 mtr Blue in Colour**
The Patch Cord shall be of CAT6 UTP PATCH CORD - 1 MTR (3 feet) Blue Colour factory moulded as per EIA/TIA standrads.
- d) **End User Site Patch Cord-2 mtr Blue in Colour**
End User Site Patch Cord shall be of CAT6 UTP LSC2 PATCH CORD - 2 MTR (7 feet) Blue Colour factory moulded as per EIA/TIA standrads.
- e) **19" rackmountable 24 Port CAT6 UTP Patch Panel Loaded**
This item shall be 24 port PATCH PANEL RJ-45 Loaded CAT-6 UTP 19" rackmountable patch panel preferbaly with front loaded 6 in a blocks as per EIA/TIA standrads, modular in mechanism.
- f) **9U cabinet 504.65X600X500 (HXWXD) - Wall Mounting Rack**
9U cabinet shall be of Width (mm)-600, Depth (mm) - 500, Approx.Net Wt (kg) - 20, CRCA 'D' Grade thickness (mm) - 1.2, Powder Colour for Cabinet - RAL9002, Glass - 4mm Toughened Tinted Glass Door, Accessories:, Cooling Fan (230V A/C 90 CFM) - 2 Nos, PDU 230VAC - 1 No, Cable Manager Metal- 2 Nos, Mounting Hardware (20 sets of M6 screws,washer,cage nuts (nickel coated)) - 1 No, Wall Screws (4 sets of 2" screws, washer, rubber grommet (nickel coated)) - 1 No, Door Lock - 1 No, Front Metal Band -1 No. In the rack there must be maintained 1U = 1.75 inches space. (All Stand alone rack and server should have 6A, 220V socket link with UPS line)
- g) **Splicing Tray**
It shall be Modular Splice Tray Cassette for pigtails 12 fibre capacity.
- h) **19" LCS2 Modular Liu-Fiber Optic Drawer-24 Port**
The item shall be Modular fiber optic drawer modular 19"(LIU) 24 port - FIBER OPTIC DRAWER loaded with SC Pigtail - 9/125 µm for 6 Cr. OFC armoured LCS2 and adapter for 6 OFC SM LCS2 without Blanking plate. The LIU should either be suitable for outdoor mounting/fixing or suitable enclosure for outdoor mounting to be provided
- i) **HDPE pipe**
The HDPE pipe shall be used for laying OFC and STP cables in outdoor environment. 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
- j) **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



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continuous zinc coating with an over coat of transparent enamel lacker 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.

k) 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.

2.07.00 DOCUMENTATION

2.07.00.01 Details of documentation to be supplied as part of the System shall be submitted to Owner 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 N/A

2.07.00.04 The following data shall be shown on all documents and/or drawings:

- Name of Bidder / Bidder
- Correct and complete designation of the document
- Exact indication of the scale employed
- Revision Index and type of revision
- Name of the site.

2.07.00.05 Bidder shall supply final approved sets of documentation in hard copy and soft copies on DVD.

2.07.00.06 Bidder shall provide the signature and seal on the each and every pages of this specification along with their offer for the confirmation to all the clauses. Along with submit deviation/clarification list if any in given format.

2.07.00.07 Final Documentation shall be assembled as per Owner's instructions for collation of Dossiers.

2.07.00.08 Following sections detail the minimum set of documentation that shall be supplied with the System.

2.0701.00ENGINEERING DESIGN DOCUMENTATION

10.01.01 Bidder will produce drawings of complete system to be submitted to Owner for approval, indicating upon each the following :

- a) Overall dimensional drawing of system cabinet, console and its accessories. 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.

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- 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 Owner 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.	Supply Document list
2.	Supply program
3	Data sheets
4.	Technical specifications & relevant drawings
5.	Start-up, Mandatory and Recommended spare parts
6.	List of Tools and Tackle
7.	Proposed System schematic diagram.
8.	Write up on architecture and operation of proposed system
9.	BILL OF MATERIALS with make and model no. of equipment
10.	Power requirement (capacity of FCBC and SMF battery)
11.	Quality Control Plan
12	Declaration stating the quoted products are brand new, Products are not in End of Life category list, Spares availability for 5 years from the date of main supply



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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 Owner, 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

2.08.01.00FACTORY 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 Owner's approval.
- 2.08.01.02 All System equipment shall be tested in the factory prior to clearance for shipping. The FAT shall include individual equipment tests and integrated under fully assembled condition.
- 2.08.01.03 The FAT shall demonstrate adherence that the equipment meets the design standards and functional compliance.
- 2.08.01.04 One (1) month prior to the FAT, Bidder shall submit a test procedure to Owner for approval. Duration of FAT at manufacturer's works shall be atleast two weeks.
- 2.08.01.05 Owner's representative may, at Owner's sole discretion, attend the FAT. In this event, Bidder shall ensure all tests are carried out in the presence of Owner's personnel. If Owner declines to attend the FAT, Bidder shall carry out these tests and submit the results to Owner for review.
- 2.08.01.06 Factory Acceptance Tests (FATs) shall be documented with the results obtained and the success or failure of the test. The test results shall be submitted to Owner prior to clearance of the FAT and authority by Owner is given to ship.

2.09.01.01COMMISSIONING

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 Owner, 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 Owner. 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.

2.09.02 SITE ACCEPTANCE TEST (SAT)

2.09.02.01 Site acceptance test shall be performed by Bidder to verify the full operational functionality of the System.

2.09.02.02 Four weeks prior to the SAT Bidder shall submit a test procedure to Owner for approval.

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2.09.02.03 All SAT tests shall be documented with the results obtained and their success or failure. These test results shall be submitted to Owner prior to clearance of the SAT and proceeding to the

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.

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 despatch, 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 preparation of the goods for shipment

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.

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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.

16.00.00 GENERAL TERMS AND CONDITIONS

- a. Considering possibilities of change in requirement, i.e. addition & deletion of quantities for individual project BOM at a later date after system design finalization, the bidder must clearly quote unit price as well as lot price for all items for indisputable calculations of lot prices in case of revised quantities later. Each item is to be offered on per unit basis including commissioning spares, cables, type test charges etc.
- b. In case of quantity change, unit rates shall be applicable.
- c. BHEL, however reserves the right to split the order with OEM as imported order (for duty benefit) & Interconnecting cables , erection & commissioning & accessories (JB's, plug & socket, cable glands etc) as indigenous order through different suppliers (Authorized dealers of OEM) for above projects based on lowest worked out tenders.
- d. Even if BHEL places split orders, the total overall responsibility of system integration at site for satisfactory operation lies with corresponding indigenous bidder only. However individually each bidder as applicable has to offer separate lump sum unit rates for erection, Commissioning and handing over of system.
- e) One Visit to project site after delivery of material at site for reconciliation of materials along with BHEL site office, within 1week of issuance of such call by BHEL, In case the vendor fails to attend the reconciliation call within 1 week, all supplied packages will be opened for verification by BHEL and any shortage / damages found shall be made good by vendor without any cost implication to BHEL, within 10 days of reporting such discrepancies.

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ANNEXURE –1
TECHNICAL REQUIREMENTS

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED	VOLUME V SECTION: TABLE16
Package: EPC	RRVUNL, 2 x 660 MW, Super-Critical TPS, Stage-V, Unit # 7 & 8 at Suratgarh, Rajasthan INSTRUMENTATION AND CONTROL EQUIPMENT PLANT SECURITY AND SURVEILLANCE SYSTEM(PSS)	SHEET 1 OF 23
<p>1.0 PLANT SECURITY AND SURVEILLANCE SYSTEM (PSS)</p> <p>1.1 PSS-GENERAL</p> <p>1.1.1 A complete integrated plant security and surveillance system (PSS) complete with all hardware and software as required shall be provided. The system to be provided shall include all necessary hardware, software, firmware, interfaces and accessories, required for implementing a fully functional PSS system for a modern power generation utility. Bidder's offered PSS shall include but not limited to the details specified in subsequent paragraphs.</p> <p>1.1.2 The design of the security & surveillance system shall take into account the potential security risks to the power plant.</p> <p>1.1.3 Plant security and surveillance system (PSS) shall be an integrated system comprising the following systems/facilities:</p> <ul style="list-style-type: none"> (a) Perimeter Intruder Detection System (b) CCTV Monitoring of Plant area/ equipment (c) Security card access system (d) Patrol Guard Monitoring System <p>1.1.4 For the purpose of perimeter detection and CCTV monitoring, a security room shall be provided in the service building. This room will house PCs, Network controllers, Video recorders, monitors, PTZ units and other associated accessories.</p> <p>1.1.5 IP Camera based system shall be provided for perimeter detection system and CCTV monitoring. All cameras for perimeter detection system and CCTV system shall be connected to Industrial Ethernet switches through single mode Fibre Optic cable for transferring camera video signals. Ethernet switches will then be connected to a network controller to a separate high speed LAN that shall handle high capacity video files.</p> <p>1.1.6 RTUs shall be suitable for accepting different types of field devices e.g fixed cameras, dome cameras, card access readers etc.</p> <p>1.1.7 All camera images shall be continuously recorded. System offered shall allow to record and hold camera images for a minimum period of 90 days. Facility for transferring camera images to separate network data storage devices and play back facility of the same shall be provided.</p> <p>1.1.8 Camera image monitoring and viewing facility shall be provided at both service security</p>		
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room and at CCR. While from CCR only CCTV monitoring will be carried out, both perimeter detection and CCTV viewing shall be possible from security room.

1.1.9 Alarm & Display monitors shall be provided as specified in end of this section.

1.1.10 COLOUR GRAPHIC VIDEO DISPLAY UNIT

22" colour LCD monitor with mouse / track ball facility shall be provided. Resolution shall be 1280 x 1024 pixels minimum. Number of characters per line shall be minimum 80 and number of lines per display page shall be minimum 48. Total number of characters shall be minimum 256 graphic characters + ASCII. Minimum Sixteen (16) colours shall be provided. Anti-reflection feature shall be provided. The VDUs shall be of table top mounting type. All VDU's shall have dedicated keyboard. .

1.1.11 Camera Mounting:

The camera shall be mounted such that a clear, unobstructed view of the scene to be observed is generated. The mounting bracket / pole and accessories shall be designed to ensure a proper, rigid support to the camera. The installation shall be done in a manner that the camera and its components / accessories are easily accessible for maintenance and there is minimal risk of accidental damage.

1.1.12 Camera Enclosure:

1.1.12.1 Enclosure shall be suitable for accommodating the fixed cameras. The enclosure shall feature a removable / sliding / hinged type cover to allow easy access to the camera, lens and the camera mounting platform. The camera mounting platform shall be constructed from rigid non-conducting material. It shall be removable and shall allow for adjustment of height. Glands shall be provided for easy installation of the power and video cables. An optically clear and distortion free viewing window shall be provided. The housing shall be suitable for obstruction free viewing. The enclosure shall have a powder coated or epoxy finish. Mounting brackets to suit the location of installation shall be supplied. The protection class of these enclosures shall be **IP 65** or better.

1.1.12.2 For outdoor camera enclosures in addition to the requirements detailed above, **thermostatically controlled heater, blower with filter and sun shroud shall be provided.**

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1.2 Perimeter Intruder Detection System

1.2.1 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. 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, the camera images shall be displayed and recorded on a multiplexed basis.
- (g) The intruder detection system shall be PC based system and will **employ a hard disk based recording system.**

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

- (a) Fixed cameras.
- (b) Video motion detection software
- (c) Necessary camera poles, camera housing and related accessories, necessary civil & masonry works.
- (d) The number of cameras and associated accessories including the cables, shall be arrived at based on the perimeter length and contour considering maximum viewing length of 150 meters. Attached plot plan shall be used for arriving at the number of cameras.

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1.2.3 Perimeter camera requirements are as following:

- (a) As many cameras as required for proper coverage of total perimeter length shall be provided. However, individual camera coverage shall not exceed 150 meter distance along the perimeter length.
- (b) Cameras provided with auto IRIS lens, low lux density 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.
- (e) Camera mounting pole height shall not be less than **6 meters.**

1.2.4 **Server/Client Workstation & Peripherals**

SI.No	Description	Unit	Qty
1	Redundant Server with 22" monitor, keyboard & mouse with necessary software licenses	No	1
2	Client Work Station with 22" monitor, keyboard & mouse with necessary software licenses	No	1
3	Network Array Storage System for Equipment CCTV	No	1
4	40" TFT LCD monitor for Large video display	No	2
5	A3 color laser printer	No	1

1.3. CCTV Monitoring System

1.3.1 Purpose of CCTV monitoring system shall be to meet the following :

- (a) To provide the plant operators with an overview of the important plant equipment so that they can ascertain that there are no obvious mechanical problems.
- (b) To provide another angle on any intruder that may have broken into the premises. Security personnel may then if required manually track the intruder.

1.3.2 CCTV monitoring system shall meet the following requirements:

- (a) Simultaneous remote centralised surveillance from both CCR & also from

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security room.

- (b) Display of images in a multiplexed fashion.
- (c) Recording of images in a time lapsed fashion and playback facility of images.

1.3.3 CCTV monitoring shall be provided for following plant equipment/areas:

S.No	Service	Qty for 1 Unit	Qty. for 2 Units	Remarks
(i)	ID Fans	2	4	
(ii)	FD Fans	2	4	
(iii)	PA Fans	2	4	
(iv)	Coal Mills	8	16	
(v)	BFP	2	4	
(vi)	CEP	2	4	
(vii)	CW Pumps	Plant Common	4	
(viii)	ACW Pumps	2	4	
(ix)	Boiler Operating Floor	2	4	
(x)	Turbine Hall	Plant Common	4	
(xi)	Bunker Floor	2	4	
(xii)	DM Plant Building	Plant Common	4	
(xiii)	Ash Plant Area	Plant Common	4	
(xiv)	Switchyard Control Building	Plant Common	2	
(xv)	Switchyard	Plant	2	

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	(xxxi) Electronic Cubicle Room	4	8
	(xxxii) Coal Handling Area		
	(a) Transfer points (Junction Towers)	Plant Common	20
	(b) Stacker Reclaimers	Plant Common	2
	(c) Reclaimers	Plant Common	2
	(d) Crusher Houses	Plant Common	4
	(e) Wagon Tippler	Plant Common	4
	(f) Bunkers	8	16
	(xxxiii) Spare	-	10
1.3.4	The CCTV system shall be complete in all respect and generally will comprise the following: (a) Colour Dome cameras with pre-configurable locations. (b) 2 nos Pan, tilt & zoom control units- 1 in CCR, 1 in Coal Handling Plant and 1 in service building security room. However, PTZ unit in security room shall be able to over ride the unit in CCR, multiplexers etc. (c) Necessary software for displaying camera images with multiplexing facility. (d) Necessary camera poles, camera housing and related accessories, necessary civil & masonry works.		
1.3.5	CCTV Camera		
1.3.5.1	Colour Dome cameras with auto IRIS motorised lenses. The camera shall be a high resolution, digital CCD camera comprising solid state circuitry housed in a rugged case. The camera shall incorporate digital signal processing, compatibility for DC or video type auto iris lens, back light compensation, internal or line-lock (with phase adjustment) synchronisation, automatic gain control, automatic electronic shutter and C / CS lens		
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<p>mount. The camera shall be UL / CE certified. The cameras shall have pan, tilt and zoom capabilities.</p> <p>1.3.5.2 As many cameras as required for proper surveillance of the selected areas shall be provided.</p> <p>1.3.5.3 Cameras shall be provided with UPS power supply.</p> <p>1.3.5.4 Cables both video and power to be routed in suitable conduits. Video cables to be put in separate conduit.</p> <p>1.3.6 Server/Client Workstation & Peripherals</p> <table border="1" data-bbox="347 936 1353 1375"> <thead> <tr> <th>SI.No</th> <th>Description</th> <th>Unit</th> <th>Qty</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Redundant Server with 22" monitor, keyboard & mouse for the with necessary software licenses</td> <td>No</td> <td>1</td> </tr> <tr> <td>2</td> <td>Client Work Station with 22" monitor, keyboard & mouse with PTZ control units and necessary software licenses</td> <td>No</td> <td>3</td> </tr> <tr> <td>3</td> <td>Network Array Storage System for Perimeter CCTV</td> <td>No</td> <td>1</td> </tr> <tr> <td>4</td> <td>40" TFT LCD monitor for Large video display</td> <td>No</td> <td>6</td> </tr> <tr> <td>5</td> <td>A3 color laser printer</td> <td>No</td> <td>1</td> </tr> </tbody> </table> <p>1.4 Security Card Access System</p> <p>1.4.1 Purpose of the facility is to control access to all vital areas within the important plant buildings by electronic card reader system.</p> <p>1.4.2 Access system cards shall be suitable for individual configuration of access privileges via access control software for controlling access to different locations. Biometric detection system is preferred. However, Bidder can offer other suitable systems also.</p> <p>1.4.3 Access controlled area entry/exit doors shall be fitted with Electro-magnetic locks. Access card reader shall be proximity card reader type.</p> <p>1.4.4 The card access system shall have a dedicated server to record all entries and exits through the card access locations.</p> <p>1.4.4.1 Short Range Proximity (HID) Card Readers</p>			SI.No	Description	Unit	Qty	1	Redundant Server with 22" monitor, keyboard & mouse for the with necessary software licenses	No	1	2	Client Work Station with 22" monitor, keyboard & mouse with PTZ control units and necessary software licenses	No	3	3	Network Array Storage System for Perimeter CCTV	No	1	4	40" TFT LCD monitor for Large video display	No	6	5	A3 color laser printer	No	1
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<p>(a) Central Control Room – 10 card readers</p> <p>(b) Local Control Rooms – 20 card readers</p> <p>(c) Service Building – 10 card readers</p> <p>(d) Workshop – 2 card readers</p> <p>(e) Stores – 2 card readers</p> <p>(f) Switchgear Rooms – 10 card readers</p> <p>(g) Main Entrance and Exit of Plant – 10 card readers</p> <p>(h) Administration building entrance and exits – 10 card readers</p> <p>(i) Other locations (to be identified during detailed engg. stage) – 10 card readers</p> <p>(j) Spare card readers – 10 card readers</p> <p>1.4.4.2 Long Range Smart Card Readers (for Vehicles)</p> <p>(a) Main Entrance and Exit of Plant – 10 card readers</p> <p>(b) Spare card readers – 2 card readers</p> <p>1.4.5 The card access system shall also comprise of the following:</p> <p>(a) Access card controllers to control the above card readers. Also to include 10% of the spare controllers or 2 controllers which ever is higher.</p> <p>(b) Smart Access cards for 500 plant personnel and 2000 cards for contract labours and visitors. And also spare cards of 500 nos.</p> <p>(c) Redundant Server with a Server work station and a Client work station.</p> <p>(d) Necessary software suitable for accommodating 3000 access cards.</p> <p>(e) 2 nos. of ID card Printers along with 2 nos. of web cameras to support the temporary ID card printing for visitors/contract employees.</p> <p>(f) 1 no. of A3 size color laser printer.</p>		
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1.4.6 Server/Client Workstation & Peripherals

SI.No	Description	Unit	Qty
1	Redundant Server with 22" monitor, keyboard & mouse for the with necessary software licenses	No	1
2	Client Work Station with 22" monitor, keyboard & mouse with necessary software licenses	No	1
3	A3 color laser printer	No	1
4	I.D card printer	No	2
5	Webcam	No	2

1.5 Patrol Guard System

1.5.1 Purpose of the system is to ensure that security guards on patrol duty are carrying out their duties diligently by recording the visiting time data for different locations.

1.5.2 The system shall comprise of a selected number of proximity card readers located in various strategic locations of the power plant including the perimeter. The patrol guard recorder will record the date and time when the recorder is swiped on the magnetic strips.

1.5.3 The recorder shall be suitable for downloading the data into a PC.

1.5.4 The system shall be flexible to allow for addition / deletion or movement of monitoring locations.

1.5.5 The patrol readers shall be suitable for operating with standard batteries.

1.5.6 At least five (5) nos. of card readers shall be provided. Guard locations to be considered is 50.

1.6 Local Area Network (LAN)

1.6.1 Ethernet based Local Area Network (LAN) shall be provided for communication between the cameras and switches.

1.6.2 The IP Network shall be of the gigabit type (1000Mbps) and shall utilize standard IEEE 802.3 protocols such as Ethernet. The bandwidth of LAN shall be decided by bidder and must be suitable for the total number of cameras / access system equipments. The bidder must furnish calculation of network capacity in their offer.

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1.6.3 Separate LAN shall be considered for the equipment monitoring CCTV system for 2 units and Perimeter surveillance system.

1.6.4 Layer 3 capable Industrial network switch with firewall shall be used in the LAN.

1.6.5 Each Switches provided shall be required no of minimum 4x fibre (1000Base-SX) 1Gbps uplink ports and 6. x STP (1000Base-T) 1Gbps uplink ports Ethernet switch, configurable via browser interface and have a 50% spare capacity for future addition of network points.

1.6.6 The network shall be designed in a manner such that failure of an individual switch shall not hamper the failure of the entire system.

1.7 **Specific Requirements**

1.7.1 Server shall be as per the technical requirements specified later in this document

1.7.2 User/Client Work Station shall be as per the technical requirements specified later in this document

1.7.3 The panels and JB shall be as per the technical requirements specified later in this document

1.7.4 **Camera: IP PTZ Speed Dome indoor Cameras-With all accessories**

- | | | |
|-------|--------------------------------|---|
| (i) | Sensor type | 1/4" HAD CCD |
| (ii) | Zoom – optical + digital | 36x optical zoom and 12x digital zoom up to 432x zoom |
| (iii) | Lens | f=3.4mm~122.4mm |
| (iv) | Light sensitivity – color | 1.4 lux |
| (v) | Light sensitivity – monochrome | 0.01 lux |
| (vi) | Night vision option | Required (IR based) |
| (vii) | Signal-to-noise ratio | > 50dB(AGC Close) |

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	<ul style="list-style-type: none"> (viii) White balance (ix) Backlight compensation (x) AGC, Auto Iris (xi) Privacy masking (xii) Compression (xiii) Max. resolution PAL / NTSC (xiv) Horizontal Resolution (xv) Max. frame rate (xvi) Presets (xvii) Tours (xviii) Pan rotation speed (xix) Tilt coverage (xx) Network interface (xxi) Operating temperature (xxii) Operating Relative humidity (xxiii) Enclosure Protection (xxiv) Certification (xxv) Range 	<ul style="list-style-type: none"> Manual/Auto/Indoor/Outdoor/ATW Auto Manual. Auto Manual. Required. MPEG-4 & H.264 4CIF,704x576 >530TVL 4CIF,25 fps supporting 8 users simultaneous access 32 16 0. 1°~300°/Sec 0-90 deg Ethernet 1000 Mbps 0—50deg 0 - 90% non-condensing IP65 FCC, CE 150 metre with optical zoom 	<table border="1" style="margin-left: auto;"> <tr> <td style="padding: 5px;">ISSUE R1</td> </tr> </table>	ISSUE R1
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1.7.5 Fixed Integrated IP Box type with motorised Zoom (36X) lens Camera with heater and blower

(i)	Sensor type	Wide Dynamic Range - Progressive Scan CCD ie 1/4 CCD
(ii)	Zoom – optical + digital	36x optical zoom and 12x digital zoom up to 432x zoom
(iii)	No. of pixels (effective)	752 (H) x 582 (V)
(iv)	Horizontal Resolution	>530TVL
(v)	Light sensitivity	1.4lux (color) and 0.01 lux (mono)
(vi)	Night vision option	Required (IR based)
(vii)	White balance	Auto (ATW/AWB)
(viii)	Backlighting compensation	Yes
(ix)	AGC, Auto Iris	Yes
(x)	Privacy masking	Required.
(xi)	Compression algorithm	MPEG4, H.264, M-JPEG
(xii)	Network Interface	Ethernet 1000 Mbps
(xiii)	Max resolutions	4CIF, 704x576
(xiv)	Max. frame rate	4CIF, 25 fps supporting 8 users simultaneous access
(xv)	Enclosure	Aluminium with powder painting – (IP65 weather proof)

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<p>(vii) Mounting subnet. Desktop</p> <p>(viii) Redundancy Required</p> <p>1.7.7 Video Management Software (VMS)</p> <p>As a core of the IP video solution, VMS server software shall be provided for both equipment monitoring CCTV system as well as Perimeter surveillance system. The VMS server software shall have the following characteristics:</p> <p>(a) The host server(s) shall be stand-alone or integrated products from a recognized IT industry leader with internal or external storage arrays.</p> <p>(b) Recorded video shall be stored on to the network storage devices</p> <p>(c) The VMS Software shall be compatible with a latest proven Windows server operating system</p> <p>(d) The server software shall support PTZ control for all cameras & record video stream from all Cameras (IP).</p> <p>(e) Multiple VMS host servers shall be deployed concurrently and seamlessly networked together to support an unlimited number of total cameras.</p> <p>(f) The VMS shall offer integration with leading facility access control system and security automation systems.</p> <p>(g) The VMS server(s) shall connect to an enterprise LAN or WAN network via a Gigabit Ethernet connection.</p> <p>(h) The client viewing and configuration applications shall operate on workstations connected (locally or remotely) to the LAN/WAN, and shall communicate with the VMS across this network. The VMS host server(s) and client applications shall communicate using the TCP/IP protocol.</p> <p>(i) Communication with the VMS shall be tightly restricted. Each VMS host server shall be deployed 'behind' a standard and LAN/WAN security firewall,</p>		
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<p>benefiting from the virus and malware protection software and other encryption and intrusion defenses in place on that network.</p> <p>(j) The VMS shall support multiple levels of user and administrator password authentication and privileges management to control access to the system. Each VMS shall keep a running log of all user access. These logs shall be retrievable by authorized administrators, but no user shall be able to remove entries from a log.</p> <p>(k) Alarm Notification: The VMS shall distribute notification of alarms to clients who have requested notification. All video associated with the alarm shall be displayed automatically on receipt of an alarm.</p> <p>(l) Video Playback: VMS shall support video playback by retrieving from the storage. It shall be possible to display the playback window beside the live video window. Also should support instant playback historic video record for the past 30 Seconds from live view window directly. Video Playback feature shall support the controls like Forward, Reverse, Pause, Move to the beginning/end. The speed of playback shall be variable, including or 8/16/32/64X, Frame by frame, forward and backward play back .</p> <p>(m) PTZ Control: The VMS shall allow for connection to IP PTZ cameras. Multiple PTZ cameras may be 'daisy-chained' on a single port as defined by the PTZ protocol being deployed. Control of these cameras shall be through a physical desktop PC connection to a PTZ controller (keypad/joystick) or through on-screen software controls. On-screen software controls shall include direction of camera movement, zoom, focus and configuration of camera preset locations.</p> <p>(n) VMS server shall support Compressed video & audio and Time stamping consisting of date and time with resolution in seconds,</p> <p>(o) Recording: VMS server shall support the following method of recording live video</p> <ul style="list-style-type: none"> - User activated - Event activated - Scheduled - Continuous background recording - Video motion detection 		
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<p style="text-align: center;">- Snapshot</p> <p>(p) Time Synchronisation: The VMS shall allow for clock synchronization to occur manually or from a central location through a network time protocol server or enterprise management server. The VMS shall allow the cameras to time sync with its clock.</p> <p>(q) Video Loss Detection: The VMS shall constantly monitor all video inputs for a synchronization signal and, if enabled, notify the administrator if a signal loss is detected.</p> <p>1.7.8 Client (User) Software</p> <p>1.7.8.1 General</p> <p>(a) Cameras, VMS, VMS client in this solution should be developed and maintained by a single manufacturer.</p> <p>(b) The primary client software shall be Windows® XP/Windows® latest PC compatible</p> <p>(c) The client application shall be a graphical, full-featured software interface with customizable user privileges to various section/tasks of the system.</p> <p>(d) All administration tasks like VMS configuration, system health monitoring, live video monitoring, archived video retrieval and packaging into secure case evidence, and third-party review of exported evidence.</p> <p>(e) A common software interface or client application can configure and manage all cameras, servers, decode stations.</p> <p>(f) The software shall support up to 4 or more monitors per VMS host server and up to 16 camera views or windows per monitor, in flexible grid arrangements.</p> <p>(g) The VMS client application shall provide a comprehensive set of features for searching, retrieving and reviewing stored video, regardless of where on the network the video is stored.</p> <p>(h) Digital Zoom in/Out support with both live view and historical video record view</p> <div style="text-align: right; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ISSUE R1</div>		

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<p>1.7.8.2 Alarm Handling</p> <ul style="list-style-type: none"> (a) The VMS client application shall provide a comprehensive set of features for handling security alarms generated during the surveillance process. (b) Multiple simultaneous alarms shall be supported in real time by the VMS and the client software. (c) Pop-up of live incident video on defined workstations or video wall monitors. (d) Alarm triggered video on E-Map. Initiation of preset camera and map viewing sequences. (e) A single mouse click shall allow monitoring personnel to immediately view live video associated with an alarm incident. The option to display emergency response procedures, security or other contact information, and this information shall be modifiable as necessary for multi-site installations. (f) Each alarm shall also cause an automatic record of all operator response actions to be logged in an interactive folder system that contains links to the specific audio (if applicable) and video record of the incident. Clicking on an alarm shall cause that data to be rendered on screen automatically. The log shall also include a record of all operator screen activity for post-alarm analysis, personnel reviews or training. <p>1.7.8.3 Integration of Site Maps</p> <ul style="list-style-type: none"> (a) The software shall be capable of importing two dimensional (2D) images of floor plans, building or campus layouts or other facility or site geometries. 2D images shall be supported in .bmp or .wmf formats. Also should support Auto CAD, SHP, JPG. (b) A series of interactive icons shall be provided to deploy on top of these imported map images to indicate the location of each physical camera and enable the point-and-click interface to launch on demand a live video window from the selected fixed or PTZ camera. (c) It shall be possible to layer or nest multiple maps within the primary client screen to leverage these virtual representations across even very large or complex facilities and surveillance deployments. Simple zoom and navigation features shall provide granularity and efficiency when larger facility maps are used. <p>1.7.9 Application Software functions (Applicable for both Perimeter surveillance as well as</p>		
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<p>CCTV Monitoring)</p> <p>1.7.9.1 Live Video: The live output from cameras shall be viewed through a series of displays at a 40 deg C LED monitor provided in the security room. The software shall support</p> <ul style="list-style-type: none"> (i) Single camera view (ii) Quad view of up to four cameras (iii) Sequence view of camera preset positions (iv) Modifying settings for a camera (v) Modify recording setting for a camera (vi) Adding and deleting cameras (vii) Creating schedules for recordings and view motion detection (viii) Modifying analytics settings and tuning for video motion detection. <p>1.7.9.2 The system shall also support multiple monitors in the following way:</p> <ul style="list-style-type: none"> (a) Alarm Monitor: When an alarm occurs in the security or control system server, the live video output of the camera associated with that alarm shall be switch directly to an alarm monitor. The user shall be able to acknowledge the alarm to clear the monitor using the numeric keypad. Cameras that are directed to alarm monitors will not be removed from the queue unless explicitly cleared by the operator. It shall be possible to create a queue of alarm monitors to manage multiple alarm view simultaneously. (b) Cyclic Alarm Monitor: An alarm monitor shall be available at the end of alarm monitor queue to cycle the camera views from acknowledged alarms if the number of cameras to view exceeds the number of alarm monitors. Once the alarm monitor queue is filled any new alarm will be placed in the queue relative to its priority and time of occurrence. Existing activated alarm camera views shall reshuffle to accommodate the new alarm in the event that all the available alarm monitors 		
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<p>are used the oldest active alarm cameras shall be added to the cycling alarm monitor. The alarm views shall cycle on this final alarm monitor until acknowledged and cleared by an operator in the event of multiple alarms added to this monitor,</p> <p>(c) Surveillance Monitor:</p> <p>Operator shall be able to send any quad view, sequence view or single camera view to a surveillance monitor. User shall be able to clear the monitor using the numeric keypad. Monitors shall be able to be configured to act as both alarm and surveillance monitors. In this case, the monitor behaves as a surveillance monitor until an alarm occurs, in which case it shall show the alarm video. Once the alarm is acknowledged the video previously shown is displayed again In each these cases, these additional monitors shall be either connected to an operator station using a multi monitor PC card or to other PCs. The surveillance monitor shall support the below features</p> <p>(d) Single Camera Mode:</p> <p>(i) View the live output from the selected camera.</p> <p>(ii) Manually recording of live video that will continue for the configured period of time.</p> <p>(iii) Enabling video motion detection for the selected camera.</p> <p>(iv) Support for Pan, tilt, zoom and focus the camera using a joy stick attached to the OS.</p> <p>(v) PTZ Control through standard devices like mouse or touch screen shall also be supported.</p> <p>(vi) The following PTZ characteristics shall be tuneable on a camera by camera basis from the camera definition page</p> <ul style="list-style-type: none"> • Pan speed • Tilt speed • Zoom speed • Focus speed • Iris speed • Increment step size <p>(vii) Operator shall be to set the Camera number, Description and Location</p>		
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<p>details for each of the camera.</p> <p>(viii) For each camera, the operator shall be able to configure the parameters such as camera streamer type, resolution, video frame rate, choice of live levels of video compression, equally distributed from minimum to maximum compression, streamer IP address, streamer camera number, choice of frame rate or bandwidth limited streaming, unicast or multicast transmission of video, PAL or NTSC camera format.</p> <p>(e) Quad view</p> <p>The system shall support quad views. A quad view consists of up to four related cameras viewed simultaneously on a single display. The quad view shall be divided into four quadrants. Within each quadrant the quad view shall be configured to cycle between any of the cameras accessible to the user on a configurable time basis. There shall be no limit to the number of cameras that can be assigned to a single quad view. There shall also be no limit to the number of available quad views.</p> <p>(f) Sequence view</p> <p>The system shall support sequence views. A sequence view consists of a single camera view, which can be cycled on a time basis, pan-tilt-zoom cameras, which support preset positions can have these presets cycled on a time basis. In this way an operator can view a variety of presets on a series of PTZ cameras. Fixed cameras can also be included in the sequence and cycled accordingly. There shall be no limit to the number of cameras that can be assigned to a single sequence view. There shall also be no limit to the number of available sequence views.</p> <p>1.7.10 Industrial Grade Network Enclosure: Quantity shall be as as required at site</p> <p>Industrial Grade Network Enclosure of reputed make, with 2 numbers of cooling fans for mounting Video Encoder(s), Industrial grade Fiber media converter module(s) / Ethernet Switch, Receiver Driver Units, LIU and other accessories as required. Mounting shall be in the scope of supplier, Should have a Lead plated copper earth bus bar 100mmX18mmX5mm, holes (M4) & MS bolts for Cubicle Earth Internal power distribution and complete wiring is in the scope of the supplier. Supplier shall also consider, cable glands for termination of all cables. Supplier shall submit mounting arrangement drawing and wiring scheme for approval. Indoor / outdoor type of enclosures may be considered and supplied as per site requirements</p>		
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<p>1.7.11 Erection Hardware and accessories: Quantity shall be as as required at site</p> <p>Complete cabling should be laid through Solid GI Cable Trays / GI Pipes (Solid & Flexible). All cables (Signal/Video/Network) from Network enclosures to Cameras should be through GI Pipes. Where existing Cable trays are available they can be used to lay the fibre cables but where not available Solid GI trays to be laid.</p> <p>1.7.12 Cables</p> <p>1.7.12.1 The instrumentation and control cables and Fibre optic cables shall be as per the technical requirements specified later in this specification.</p> <p>1.7.12.2 Power cables shall be as per the technical requirements specified as specified later in this specification.</p> <p>1.7.12.3 All Cables should be suitable for the following installation</p> <ul style="list-style-type: none"> (i) All the cables shall be armoured. (ii) Direct buried in underground trenches conduits with uncontrolled back up and possibility of flooding by water and chemicals. (iii) Laid underground in RCC lined cable trenches with possibility of flooding by water (iv) Colour coding for cables shall be approved by Owner. (v) Ferruling indicating terminal numbers on termination side shall be followed. Only sleeve type ferruling with printed terminal numbers, cable number and core number shall be used. Cross ferruling shall be adopted. (vi) All the outdoor and buried applications, etc. shall be routed through GI conduits. Exposed indoor cabling shall be minimal and when used, the cables shall be laid in FRLS PVC conduits. Where wall chasing is adopted, PVC conduits are to be used. (vii) All cables, conduits and associated accessories are included in the scope of supply. <p>2.0 NOTES</p> <p>1 Plant Security and Surveillance system is illustrated in Annexure</p> <div style="text-align: right; border: 1px solid black; padding: 5px; width: fit-content; margin: 0 auto;">ISSUE R1</div>		

SPEC.NO. TCE.5750A-H-500-001	TATA CONSULTING ENGINEERS LIMITED	VOLUME V SECTION: TABLE16
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- 2 The BOM indicated here under this section is not complete and are only tentative. The actual items and quantities shall be as per the system requirements to make it functional to meet the intent of this specification.

ISSUE R1

Applicable for servers used in CCTV

2.0 HARDWARE REQUIREMENTS

2.1 SERVER HARDWARE SPECIFICATION

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

- | | | |
|-----|---------------------|---|
| (a) | Make/Model | HP, DELL, IBM / Tower/6U Rack Mounted |
| (b) | Processors | 4 Dual Core 64bit Intel Xeon Processor, 3.0 GHz or better with min of 16 MB Cache |
| (c) | System Bus | Dual independent 800 MHz or better |
| (d) | RAM | 24 GB, DDR-3 ECC RAM expandable to 192 GB |
| (e) | Hard Drives | Min. of 3.6 TB expandable to 14.4 TB |
| (f) | Raid Controller | SAS RAID Level 5 |
| (g) | DVD R/W | 1 no. 52X CD RW & 16X DVD RW IDE Combo |
| (h) | Power Supply | Dual redundant / Hot swappable |
| (i) | Fans | Dual redundant / Hot swappable |
| (i) | Ethernet Card | 4 nos. x 10/10/1000MB/1GB
(2 onboard & 2 add-on) |
| (k) | Network Controller | 1 GbE NIC upgradable to 10 GbE |
| (l) | Graphics Card | SVGA integrated with min. 64MB DDR RAM |
| (m) | PCI Slots | 2 PCI-E Slots (1 x 4 lanes & 1 x 8 lanes)
2 PCI-X Slots (64bit/100MHz)
2 PCI Slots (1 x 32bit/33MHz & 1 x 64bit/66MHz) |
| (n) | Serial Port (RS232) | 1 no |
| (o) | Parallel Port | 1 no |

- | | | |
|-----|------------------|---|
| (p) | USB Port | 4 nos |
| (q) | Peripherals | 1 no. USB/ PS2 Optical Mouse
1 no. USB/PS2 Multimedia Keyboard
1 no. 21"/22" Colour TFT/LCD Monitor |
| (r) | Operating System | Latest Proven Windows Server |

Applicable for PC used in CCTV, access control and Patrol Guard system

2.2 USER/WORK/OPERATOR/ENGG STATION HARDWARE SPECIFICATION

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

2.3 Keyboard Applicable for CCTV, access control and Patrol Guard system

2.3.1 Keyboard for OS

Qwerty type Keyboard shall be provided for operator interface with process for plant control and display functions to access plant data in conjunction with Operator station

System Cabinets

Applicable for Panel/cabinets used in CCTV, access control and Patrol Guard system

These cabinets shall house signal-conditioning cards, input/output cards, processor cards & associated power supply units. Indoor located, free standing vertical type system cabinets with IP-32 enclosure and with 2 mm thick sheet metal of cold rolled steel; double doors with neoprene gaskets; ant vibration pads of 15 mm thick; blower & louvers in each cabinet with brass mesh; fire proof compound (50 mm thickness) for sealing cable entry (bottom); fire detector for each cabinet. The racks in system cabinets shall have provision along with plug in sockets/back plane to house accommodate the spare slots/modules as specified elsewhere. The colour of the cabinets shall be indicated at detailed engineering stage. Doors shall have concealed type of hinges and swing of 100o. to, on the side to help the operator. Power supply distribution shall be provided on per cabinet basis with all associated MCBs, protections, etc. The system cabinets, racks in system cabinets, slots in the racks & the terminals shall have identification numbers. A stainless steel metal tag (plate) shall be fixed to the inside of the door & the layout of the racks, slots & details of the card type/service shall be inscribed on this metal tag. Each cabinet shall be provided with one each 3 pin receptacles for 240 V, 1P, 50 C/S and receptacles for +24V DC. Cabinet shall be delivered totally wired. All electronics shall be mounted & wiring connections at these hardware shall be terminated by Bidder. Quantity shall be as required. One of the doors shall be provided with folder to keep the relevant engineering document of the cabinet.

All cabinets shall have common key for the locks.

In each cabinet, a 24 VDC Voltmeter shall be provided to check the Field Interrogation voltage.

Junction Boxes (JB)

Applicable for JB used in CCTV, access control and Patrol Guard system

All JB's shall be Galvanised. Wall/column mounted junction boxes having suitable number of terminals and cable entry only at the bottom and sealed with fireproof compound; Screwed terminal type; IP 65 or equivalent degree of protection for enclosure.

Removable gland plate shall be supplied. JB shall have single lockable door with gasket, able to open side ways, with common keys. Painting inside shall be glossy white & outside - IS-5 shade 631. Shield bus for screw connection shall be provided. Terminal size shall be suitable for Cables used in the system. Terminal blocks shall be vertical. JB shall have provision to add 10% additional terminals. Accessories like metal tag (SS), clamps, fixtures, bolts (SS), nuts (SS), gaskets (neoprene), lock & key, fireproof compound for sealing, etc. shall be supplied. The grouping of instruments in JB's is subject to Owner / Project Manager's approval. All the field Junction boxes shall have single doors and provision for locking. The doors shall not have screwed type of locking, but turnable hinge based. The JB's are subject to approval prior to manufacturing All JB's shall be provided with individual canopies to avoid ingress of water.

All the TB's used shall be 6.6polymide to withstand corrosion and the metallic portion shall be coated against rust / corrosion.

ANNEXURE -2
LIST OF MANDATORY SPARES

SL.	ITEM/DESCRIPTION	QUANTITY / UNIT
17.0	Servers	
17.1	RAM	1 no
17.2	Hard Disc Drive	2 nos
17.3	Raid Controller	1 no
17.4	DVD RW Drive	1 no
17.5	Power Supply Module	2 nos
17.6	Graphics Accelerator Card	1 no
17.7	SVGA Adaptor	1 no
17.8	External Network Interface card	2 nos
17.9	Ethernet LAN Card	2 nos
17.10	Serial Port Card	1 no
17.11	Parallel Port Card	1 no
17.12	Power Supply Cord/ Cable	2 nos.
17.13	Any Other Special Cord/ Cable	2 nos.

ANNEXURE –3

QUALITY ASSURANCE PLAN

(For reference only and is subject to approval by end customer / consultant)

S. No	COMPONENT & OPERATIONS	CHARACTERISTICS	CLASS OF CHECK	TYPE OF CHECK	QUANTITY	REFERENCE DOCUMENT	ACCEPTANCE NORMS	FORMAT OF RECORD		AGENCY			REMARKS
								DOCUMENT	DR *	S	M	C	
1	Camera	1. Electrical Functional Test Zoom Function Day & Night Mode Pan movement, Tilt Movement (Applicable for PTZ Camera) Back light compensation White balance AUTO/Indoor/outdoor/Manual Alarm inputs	Major	Electrical	Sample	Approved drawings/datasheet	Approved drawings/datasheet	IR		P	W	W	

2	Keyboard	3. Electrical Functional Test Input voltage Control and selection of camera including pan/tilt (if applicable) & zoom using keyboard & mouse	Major	Electrical	Sample	Approved drawings/datasheet	Approved drawings/datasheet	IR			P	W	W	
---	----------	--	-------	------------	--------	-----------------------------	-----------------------------	----	--	--	---	---	---	--

3	Control Video Monitor	<p>1.Electrical Functional Test</p> <p>Input Voltage</p> <p>Control OSD menu, cursor down, Cursor UP, decrease adjustment, Switch Video Input</p>	major	Electrical	Sample	Approved drawings/datasheet	Approved drawings/datasheet	IR		P	W	W	
---	-----------------------	---	-------	------------	--------	-----------------------------	-----------------------------	----	--	---	---	---	--

4	Server & Video Recorder	1.Electrical Functional Test Input Voltage Search Date & time ,camera Recording speed N frames per seconds programmable	Major	Electrical	Sample	Approved drawings/datasheet	Approved drawings/datasheet	Approved drawings/datasheet	IR			P	W	W	
5	Rack/Panel/JB/Pole	Dimension	Major	Dimensional	Sample	Approved drawings/datasheet	Approved drawings/datasheet	Approved drawings/datasheet	IR			P	W	W	
6	Ingress Protection	Type Test	Major	Type Test	Prototype	Approved drawings/datasheet	Approved drawings/datasheet	Approved drawings/datasheet	Valid Type test certificate	*		P	R	R	

7	BOM	BOM Verification	Major	Visual	100%	Approved BOM	Approved BOM	IR		P	W	R	
SKS	SA	SD	<p>S: Manufacturer/ Sub Vendor M: EPC Contractor L&T / Third Party Inspection Agency (TPIA) C: End user/ Customer</p>										
Prepared by	Reviewed by	Approved By	<p>P: Perform, W: Witness, RW: Random Witness 10%, R: Review of certificate/record, H: Hold, ITR: Internal test report, MTC: Material Test Certificate, IR: Inspection report. CHP: Customer hold point</p>										
			<p>NDE : Non Destructive Examination VT: Visual Testing WPS: Welding Procedure Specification</p>										
			<p>MT: Magnetic Particle Testing PT: Dye Penetration Testing RT: Radiographic Testing UT: Ultrasonic Testing</p>										
			<p>WPO: Welder Performance Qualification T: Thickness L&T - Larsen & Toubro Ltd. D* : For Items Marked (*) In Column "D" Test Certificates shall be Submitted</p>										
			<p>L&T Representative</p>										
			<p>Customer/ customer representative</p>										

ANNEXURE – 4
DELIVERY SCHEDULE

Delivery Schedule

SI.No.	Description of Activity	Target	Common Target
	Submission of Documents by Vendor	Within 3 weeks from PO	
	Document approval by customer	3 weeks from submission.	
	Re-submission implementing RRVUNL/TCE's comment till approval.	Additional 2 week (each re-submission)	
	Approval of Document by RRVUNL/TCE	Expected 7 to 11 weeks after PO	
1.	Manufacturing Clearance	After Document Approval	
2.	Material readiness with internal quality check report		Planned for December-2016
3.	Inspection Call by Vendor		
4.	Inspection by L&T/TCE/RRVUNL		
5.	Dispatch Clearance		
6.	Dispatch of Material		

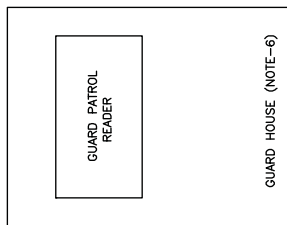
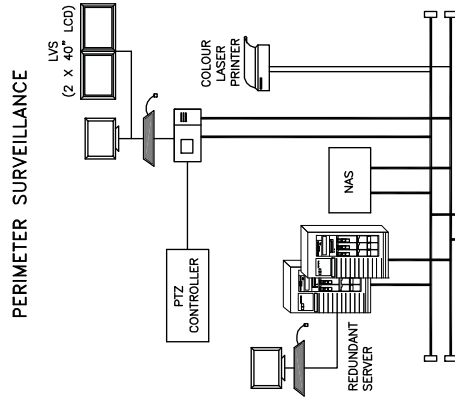
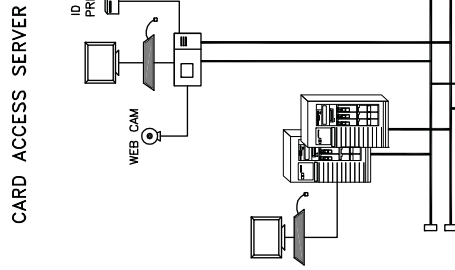
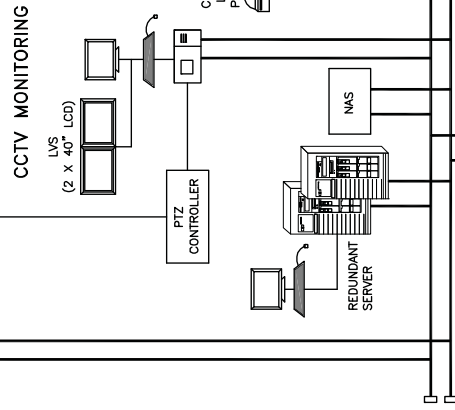
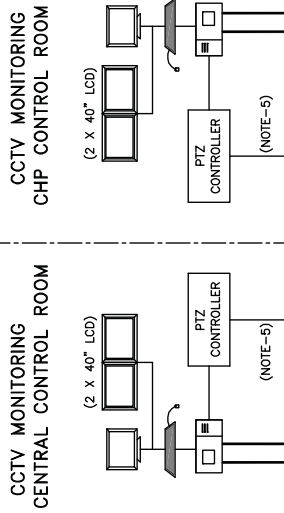
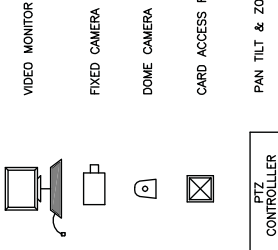
ANNEXURE – 5

SPECIFICATION COMPLIANCE TABLE

Form for Submission of Vendor's Compliance to Specification			
Clause no.	Description	Vendor's compliance/acceptance	Remarks/Deviation, if any
2	Definition of different types of spares		
3	Codes & Standards		
4	General Requirements		
4.1	System Proveness Criteria		
4.2	General Design requirements		
4.3	Panel specifications (if applicable)		
4.4	Wiring and Terminal Block specifications		
4.5	Grounding guidelines		
4.6	Document Requirement		
4.7	Approved vendor list for bought out items		
5	Drawings and documents to be submitted		
6	Technical Requirments covering the following		
6.1	Scope of Work		
6.1.1	Scope of Supply		
6.2	Scope of Services		
6.3	Terminal Points		
6.4	Exclusions		
Annexure-1	RRVUNL technical specifications requirements		
Annexure-2	Paintining Requirement		
Annexure-3	List of Essential spares		
Annexure-4	Quality assurance plan		
Annexure-5	Delivery Schedule		
Annexure-6	Specifications Compliance table		
Annexure-7	Typical Schematic		
Annexure-8	Pilot Plan		
Annexure-9	Training		

ANNEXURE – 6
TYPICAL SCHEMATIC

LEGEND



NOTES

1. SCHEME INDICATES CONCEPTUAL REQUIREMENT OF DIFFERENT ELEMENTS OF PLANT SECURITY & SURVEILLANCE SYSTEM. SUCH AS PLANT PERIMETER INTRUDER DETECTION, CCTV, ACCESS CONTROL & PATROL GUARD ETC. BIDDER TO DEVELOP DETAILED SCHEME BASED ON SPECIFIED REQUIREMENT.
2. INDUSTRIAL ETHERNET SWITCHES WILL BE LOCATED GEOGRAPHICALLY AT DIFFERENT LOCATIONS IN THE PLANT.
3. NETWORK CONTROLLERS WILL BE LOCATED IN SECURITY ROOM. AS MANY NETWORK CONTROLLERS AS REQUIRED TO BE PROVIDED.
4. PERIMETER INTRUDER DETECTION IS BASED ON VIDEO MOTION DETECTION TECHNOLOGY.
5. PTZ CONTROL UNIT AT SECURITY ROOM CAN OVERRIDE PTZ CONTROL UNIT AT CCR/CHP CONTROL ROOM.
6. GUARD PATROL SYSTEM IS A STAND ALONE SYSTEM.

CONTROL ROOM SECURITY ROOM FIELD

DO NOT SCALE		FOR BID PURPOSE ONLY	
PLANT SECURITY SURVEILLANCE SYSTEM			
SCALE: NTS	APPROVED	DATE (RD ISSUE)	
OFFICE-DES: DB-IC		DATE (CURRENT ISSUE)	26-06-2012
DRN: KVS	DWG NO	TCE.5750A-580-SK-04	ISSUE NO
CHD:			P1

TATA CONSULTING ENGINEERS LIMITED
MUMBAI

CLIENT : RRVUNL

PROJECT : 2x660 MW SUPER-CRITICAL TPS, STAGE-V, UNIT # 7 & 8 AT SURATGARH, RAJASTHAN

FILE NAME: 123456789.DWG	APPRO DATE	CHEM	CIVIL	ELEC	I&C	MECH

REVISIONS	ISSUE

FOR RD ISSUE ONLY	CLEAR	SIGNATURE	DATE

ANNEXURE – 7

Plot Plan

ANNEXURE – 8

TRAINING REQUIREMENT

ANNEXURE-8

Project: 2 X 660 MW Suratgarh SUPERCRITICAL TPS
Document: Training Plan for CCTV, Access control system, Patrol Guard system and Perimeter Intrusion Detection System

Sr. No.	Name of System / Package / Equipment	Operation			Maintenance			Commissioning			
		Manufacturer's Works Hrs.	Location	Site	Manufacturer's Works Hrs.	Location	Site	Manufacturer's Works Hrs.	Location	Site	
1	CCTV and Perimeter Intrusion Detection System	96	Later	NA	NA	NA	160	NA	NA	NA	Later

- Notes :**
- 1) Please mention as NA, whichever is not applicable.
 - 2) Please include all equipment under main package / system for which training is to be provided.

ANNEXURE – 9

**TECHNICAL SPECIFICATION OF
CABLES**

1.47.6 Fibre Optic cables

Applicable for FO cable for CCTV

1.47.6.1 Mono mode type fibre optic cable shall have following parameters:

- (a) Wavelength band optimized : 850nm / 1300nm / 1550nm
Mode field diameter : 9-10m + 10% of nominal value
Cladding diameter : 125m + 3
Non-concentricity core/cladding : not more than 2m
Non-circularity of cladding : not more than 3m
Cut-off wavelength : 1200mm
- (b) Mode field diameter : 9-10m + 10% of nominal value
- (c) Cladding diameter : 125m + 3
- (d) Non-concentricity core/cladding : not more than 2m
- (e) Non-circularity of cladding : not more than 3m
- (f) Cut off wavelength: 1200mm
- (g) Attenuation : Less than 0.3-0.4 dB/Km at 1300nm, less than 0.15 - 0.25 dB/km at 1550nm



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1.00.0 CODES & STANDARDS

1.01.0 All standards, specifications and codes of practice referred to herein shall be the latest editions including all applicable official amendments and revisions as on date of opening of bid. In case of conflict between this specification and those (IS: codes, standards, etc.) referred to herein the former shall prevail. All the cables shall conform to the requirements of the following standards and codes :

- IS : 1554 – I PVC insulated (heavy duty) electric cables for working voltages up to and including 1100 V.
- IS: 3961 Recommended current ratings for cables.
- IS : 3975 Low carbon galvanized steel wires, formed wires and tapes for armouring of cables.
- IS: 5831 PVC insulation and sheath of electrical cables.
- IS: 8130 Conductors for insulated electrical cables and flexible cords.
- IS: 10418 Specification for drums for electric cables.
- IS: 10810 Methods of test for cables.
- ASTM-D-2843 Standard test method for density of smoke from the burning or decomposition of plastics.
- ASTM-D-2863 Standard method for measuring the minimum oxygen concentration to support candle like combustion of plastics.
- IEC - 754 (Part - I) Test on gases evolved during combustion of electric cables.
- IEC - 332 Tests on Electric cables under fire conditions. Part - 3 : Tests on bunched wires or cables (Category - C).
- IEE - 383 Flammability test.



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2.00.00 TECHNICAL REQUIREMENTS

2.01.00 The cables shall be suitable for laying on racks, in ducts, trenches, conduits and under ground buried installation with chances of flooding by water.

2.02.00 Cables shall be flame retardant low smoke (FRLS) type designed to withstand all mechanical, electrical and thermal stresses develop under steady state and transient operating conditions as specified elsewhere in this specification.

2.03.00 Conductor of control cables shall be made of stranded, annealed tinned copper.

2.04.00 Extruded PVC -A insulation shall be suitable for continuous conductor temperature of 70 deg. C and short circuit conductor temperature of 160 deg. C.

2.05.00 The cable cores shall be laid up with fillers between the cores wherever necessary. It shall not stick to insulation and inner sheath. If fillers are used to make the cable round same shall also be with FR properties All the cables, other than single core unarmoured cables, shall have distinct extruded PVC – FRLS ST1 inner sheath of black colour as per IS : 5831.

2.06.00 For single core armoured cables, armouring shall be of aluminium wires. For multicore armoured cables armouring shall be of galvanized steel as follows :

Calculated nominal dia Of cable under armour	Size and Type of armour
i) Upto 13 mm	1.4 mm dia GS wire.
ii) Above 13 & upto 25 mm	0.8 mm thick GS formed wire / 1.6 mm dia GS wire.
iii) Above 25 & upto 40 mm	0.8 mm thick GS formed wire / 2.0 mm dia GS wire
iv) Above 40 & upto 55 mm	1.4 mm thick GS formed wire / 2.5 mm dia GS wire.
v) Above 55 & upto 70 mm	1.4 mm thick GS formed wire / 3.15 mm dia GS wire.
vi) Above 70 mm	1.4 mm thick GS formed wire / 4.0 mm dia GS wire

The gap between armour wires / formed wires shall not exceed one armour wire / formed wire space and there shall be no cross over / over - riding of armour wire / formed wire. The minimum area of coverage of armouring shall be 90 %. The breaking load of armour joint shall not be less than 95 % of that of armour wire / formed wire. Zinc rich paint shall be applied on armour joint surface of G.S wire / formed wire.



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2.07.00 Outer sheath shall be of PVC type ST1 as per IS: 5831 & Black in colour. In addition to meeting all the requirements of Indian standards referred to, outer sheath of all the cables shall have the following FRLS properties.

- (a) Oxygen index of min. 29 (As per ASTM D 2863).
- (b) Temperature index of min 250 °C (As per ASTM D 2863)
- (c) Acid gas emission of max. 20 % (As per IEC - 754 - I).
- (d) Smoke density rating shall not be more than 60 % during Smoke Density test as per ASTM D - 2843.

2.08.00 Outer sheath material shall have resistance to water, UV radiation, fungus, rodent and termite attack.

2.09.00 Cores of the cables shall be identified by colouring of insulation. Following colour scheme shall be adopted :

- 1 Core - Red, Black, Yellow & Blue.
- 2 Core - Red & Black.
- 3 Core - Red, Yellow & Blue.
- 4 Core - Red, Yellow, Blue & Black.
- 5 Core - Red, Yellow, Blue, Black & grey.

For cables having more than 5 cores, core identification shall be done by numbering the insulation of cores sequentially, starting by number 1 in the inner layer (e.g. say for 10 core cable, core numbering shall be from 1 to 10). The number shall be printed in Hindu-Arabic numerals on the outer surfaces of the cores. All the numbers shall be of the same color, which shall contrast with the color of insulation. The color of insulation for all the cores shall be grey only. The numerals shall be of legible and indelible. The numbers shall be repeated at regular intervals along the core, consecutive numbers being inverted in relation to each other. When the number is a single numeral, a dash shall be placed underneath it. If the number consists of two numerals, these shall be disposed one below the other and a dash placed below the lower numeral. The spacing between consecutive numbers shall not exceed 50 mm.

2.10.00 In addition to manufacturer's identification on cables as per IS, following marking shall also be provided over outer sheath.

- (a) Cable size, voltage grade & RRVUNL – To be embossed.
- (b) Word 'FRLS' at every 5 meter – To be embossed.
- (c) Sequential marking of length of the cable in meters at every one meter - To be embossed / printed.

The embossing / printing shall be progressive, automatic, in line and marking shall be legible and indelible.



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2.10.00 All cables shall meet the fire resistance requirement of IEEE – 383 with cable installations made in accordance with clause “Flammability test” and as per category-B of IEC 332 Part – 3.

2.10.00 Allowable tolerances on the overall diameter of the cables shall be ± 2 mm maximum over the declared value in the technical data sheets.

2.11.00 In plant repairs to the cables shall not be accepted. Pimples, fish eye, blow holes etc. are not acceptable.

3.00.00 CABLE DRUMS

(d) Cables shall be supplied in non-returnable wooden or steel drums of heavy constructions. The surface of the drum and the outer most cable layer shall be covered with water proof layer. Both the ends of the cables shall be properly sealed with heat shrinkable PVC / rubber caps secured by ‘U’ nails so as to eliminate ingress of water during transportation storage and erection. Wood preservative anti - termite treatment shall be applied to the entire drum. Wooden drums shall comply with IS : 10418.

(e) Each drum shall carry manufacturer’s name, purchaser’s name, address and contact number, item number and type, size and length of cable and net gross weight stenciled on both sides of the drum. A tag containing same information shall be attached to the leading end of the cable. An arrow and suitable accompanying wording shall be marked on one end of the reel indicating the direction in which it should be rolled.

4.00.00 TESTS

(a) All cables to be supplied shall be of type tested quality. The vendor shall submit for BHEL/BHEL’s customer approval the reports of all the type tests as listed in this specification and carried out within last five years from the date of bid opening/ Reverse auction. These reports should be for the tests conducted on the same type of cable to those proposed to be supplied under this PO and the test(s) should have been either conducted at an independent laboratory or should have been witnessed by a client.

(b) In case the Vendor is not able to submit report of the type test(s) conducted within last five years from the date of bid opening/Reverse auction or in case the type test report(s) are not found to be meeting the specification requirements, the Vendor shall conduct all such tests under this contract free of cost to BHEL and submit the reports for approval.

(c) All acceptance and routine tests as specified below and in relevant standards shall be carried out. Charges for these shall be deemed to be included in the cable price.



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4.01.01 TYPE TESTS

All cables to be supplied will be of type tested quality. The list of type tests applicable for cables is given in table below this clause. The vendor shall submit the reports of all the type tests listed in the below table for each size & type of cable under the supply (for each variety) for Customer/BHEL approval. The reports should be of type tests conducted within 5 years. The type tests should have been either conducted at an independent laboratory or should have been witnessed by a client. The type test reports in compliance to these requirements shall be submitted for Customer/BHEL approval. In case the vendor is not able to submit type test reports of earlier conducted type tests in compliance to above requirements, or, the type test reports submitted by the vendor is not approved/not accepted by Customer/BHEL, then the vendor shall conduct all such tests and submit the reports for Customer/BHEL approval

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TYPE TESTS FOR CONTROL CABLES				
Sl. No.	Component	Test	Standard	Remarks
1	For Conductor (including drain wire)	Resistance test	VDE-0815	
2		Diameter test	IS-10810	
3		Annealing test		
5	For PVC	Test for Thickness	IS-10810	
6	Insulation and PVC Sheath (Inner & Outer)	Tensile Strength & Elongation (before & after ageing)	IS-10810	
7		Ageing in air ovens	IS-10810	
8		Loss of mass	IS-10810	
9		Hot deformation	IS-10810	
10		Heat shock	IS-10810	
11		Shrinkage	IS-10810	
12		Color fastness to water	IS-5831	Only for outer sheath
13		Bleeding & Blooming	IS-10810	
14		Cold bend/ Cold impact test	VDE-0472	
15		Thermal stability test		
16		Volume resistivity & water immersion test (at room & elevated temperature)		
17		Oxygen Index & Temperature Index Test	ASTMD-2863	Test is to be conducted for fillers too as and where applicable.
18		Smoke Density Rating Test	ASTMD-2843	
19	Acid gas generation test	IEC-60754-1		



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Sl. No.	Component	Test	Standard	Remarks
20	For Armoring	Tensile Strength		Only for armored cables
21		Elongation		
22		Winding / Torsion test		
23		Resistivity		
24		Dimensions		
25		Uniformity of zinc coating		
26		Dip test		
27		Mass of zinc coating		
28		For Completed cables	Constructional Details (Conductor - number of strands & diameter of strands, Thickness of Insulation and Sheath, Dia of Armor, overall diameter, color & marking on outer sheath, numbering of pairs, core color, band marking, unit identification, visual & surface finish etc.)	
29	Insulation resistance			
30	Thermal EMF test			
31	High Voltage test		VDE-0815	
32	Noise Interference		IEEE Transactions	
33	Flammability test		IEEE-383, IEC-332-3	
34	Swedish Chimney test		SEN-4241475	
35	Drain wire continuity			
36	Anti-rodent, anti-termite, anti-fungus, moisture retardant test on sheath			
37	UV radiant test & Hydraulic Stability test		As per DIN 53387	



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4.02.0 Acceptance Tests

Following Acceptance tests shall be carried out on each type and size of the cables on the cable drums selected at random as per following sampling plan :

SL. NO.	NUMBER OF DRUMS OF DRUMS IN THE LOT	NO OF DRUMS TO BE TAKEN AS SAMPLE (n)	PERMISSIBLE NO OF DEFECTIVE (a)
01.	Upto 50	2	0
02.	51 to 100	5	0
03.	101 to 300	13	0
04.	301 to 500	20	1
05.	501 & above	32	2

ACCEPTANCE TESTS FOR CONTROL CABLES

Sl. No	Component	Test	Standard	Remarks	
1	Construction al details	Conductor Diameter, Thickness of Insulation and Sheath, Dia of Armour, overall diameter, marking on outer sheath, band marking, numbering of cores, colour.	As per relevant standard/ approved DS		
2	PVC Insulation & Sheath	Tensile Strength & elongation test		Before & After ageing	
		Thermal stability test			
3	FRLS properties test	Oxygen index & temperature index test			
		Smoke density rating			
		Acid gas generation test			
4	Armoring	Mass of zinc coating test			Only for armored cables.
		Torsion/Winding test			
		Dip test			
		Resistivity			
5	Completed cables	Insulation resistance test			
		Conductor resistance test (cable & Drain wire)			
		High Voltage test			
		Persulphate test (for drain wire)			
		Flammability test			
		Swedish chimney test (Overall cable)			
		Length checking			
		Visual & Surface finish			

4.03.00 Routine Tests

Routine tests shall be carried out for each drum of cables of all sizes. Following shall constitute routine tests :

Sl. No. 1 & 31 of list of type tests specified at clause no. 4.01.01 (i) in this chapter.

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TECHNICAL SPECIFICATION OF INSTRUMENTATION CABLE:
 Refer this specification for 2P / 4P etc cable, if required, for CCTV and access control system



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1) General Requirements:

Sl. No.	Description	Technical Requirement
1.1	Codes and Standards	All cables shall comply with BS 50288 Part-7, SEN-4241475, ANSI MC 96.1, IS-1554, IS-8130, IS-5831, IS-3975, ASTM D-2863 & 2843, IEC-754-1, IEC 60189, IEC 60584, IEC-332-3 CAT C, IEEE-383, SS-424-1475, IS-8784, IS-10810, IS-10418 (latest editions) and their amendments.
1.2	Voltage Grade	As per SOS.
1.3	Continuous operation suitability	At 70 deg. C
1.4	Progressive automatic on-line sequential marking of length in meters	To be provided at every 1 meter on outer sheath
1.5	Marking to read 'FRLS'	To be provided at every 1 meter on outer sheath
1.6	Allowable tolerance on overall diameter	±2 mm (max.) over the declared value in datasheet
1.7	Variation in diameter	Not more than 1.0 mm throughout the length of cable
1.8	Ovality at any cross section	Not more than 1.0 mm
1.9	Marking on outer sheath	Durable marking/embossing at intervals not exceeding 625 mm shall include manufacturer's name, insulation material, FRLS, RRVUNL, conductor's size, number of pairs/cores, voltage rating, type of cable (analog or binary), year of manufacture, Drum or lot number to be provided
1.10	Overall Quantity Tolerance	+2%, -0% (Negative values are not acceptable)
1.11	Others	Cables shall be suitable for crimping, screw termination or cage clamp type screw less terminal blocks, laying in conduits, ducts, trenches, racks and underground-buried installation with chances of flooding by water Repaired cables shall not be acceptable All cables shall be anti-rodent, anti-termite, moisture-retardant & fungus-retardant type. Rip cord shall be provided under inner sheath for all cables.



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2) Technical Requirements:

Sl. No	Specification Requirement	Kx Type	Rx Type	Individual & Overall Shielded (Type-F)	Overall Shielded (Type-G)
A	Conductors				
i	Cross section Area (sq.mm)	0.5			
ii	Conductor material	ANSI type Kx (Cr-Al)	ANSI type Rx (Cu—Cu-Ni)	High conductivity Annealed Tinned copper	
iii	Color code	Yellow-Red	Black-Red	As per IEC 60189 - 2 2T-Red/Red/White, also numbering on each core of each triad	
iv	Numbering on each core	Numbering on each core at an interval of 100 mm or less in cores of multipair cable			
v	Conductor grade	As per ANSI MC96.1		Electrolytic	
vi	No & dia. of strands	Solid Conductor		7 X 0.3 mm (nom)	
vii	No of pairs	2		2,4, 8, 12,16,24,48	
viii	Max conductor resistance per Km(in ohm) at 20 ° C	2162 ohm/Km (loop)		40.9 ohm/Km	
	Reference standard	As per ANSI MC 96.1, IEC 60584		BS 50288 Part 7	
B	Insulation				
i	Material	Extruded PVC type A as per IS 5832/84			
ii	Thickness in mm (Nom)	0.6			
iii	Volume resistivity (min) in ohm-cm	1 X 10 ¹⁴ at 20° C & 1 X 10 ¹¹ at 70° C			
iv	Reference standard	BS 50288 Part 7			
v	Core diameter above insulation	Suitable for cage clamp connector			

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Sl. No	Specification Requirement	Kx Type	Rx Type	Individual & Overall Shielded (Type-F)	Overall Shielded (Type-G)
C	Pairing and Twisting				
i	Max lay of pairs/triads(mm)	20 twists/meter (All pairs twisted in same direction. Lapped to form bunch with mylar tape)			
ii	Single layer of numbered binder tape on each pair/triad provided	Numbered Tape		Yes	
iii	Unit formation of four pairs with printing of no. of unit provided	NA		Yes, As per IEC 60189	
D	Shielding				
i	Type of shielding	Al-Mylar shielding			
ii	Individual pair shielding	To be provided			No
iii	Minimum thickness of individual pair shielding	24 micron			NA
iv	Overall cable assembly shielding	To be provided			
v	Minimum thickness of overall cable assembly shielding	40 micron			
vi	Shielding coverage	100% with at least 25% overlap			
vii	Drain wire provided for individual shield	Yes (for F-type), 7-strand 20 AWG (0.51 sq.mm) Annealed Tin coated Copper			NA
viii	Drain wire provided for overall shield	Yes, 7-strand 20 AWG (0.51 sq.mm) Annealed Tin coated Copper			

TECHNICAL SPECIFICATION OF INSTRUMENTATION CABLE



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Sl. No	Specification Requirement	Kx Type	Rx Type	Individual & Overall Shielded (Type-F)	Overall Shielded (Type-G)
ix	Metallic side of screen	Metallic side of screen shall be in contact with drain wire			
X	Binder tape	Non-Hygroscopic polyester tape of thickness min of 0.023 mm applied helically with 50% overlap.			
E	Fillers (if applicable)				
i	Non-Hygroscopic flame & moisture retardant	To be provided for circular shape			
F	Outer sheath				
i	Material	Extruded PVC compound ST1 with FRLS properties as per IS 5831			
ii	Reference standard	As per BS 50288 Part 7			
iii	Minimum thickness at any point	As per BS 50288 Part 7			
iv	Nominal thickness at any point	As per BS 50288 Part 7			
v	Color	Yellow	Blue	Blue	
vi	Resistance to water, fungus, termite & rodent attack & UV	Outer sheath material shall have resistance to water, UV radiation, fungus, rodent and termite attack.			
vii	Oxygen index as per ASTM D-2863	Not less than 29 %			
viii	Temperature index as per ASTM D 2863	Not less than 250 ° C			
ix	Acid Gas generation by weight as per IEC - 60754-1	Maximum 20 %			
x	Smoke density rating as per ASTM D 2843	Maximum 60 % (defined as the average area under the curve when the results of smoke density test plotted on a curve indicating light absorption vs. time as per ASTM D 2843)			



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Sl. No	Specification Requirement	Kx Type	Rx Type	Individual & Overall Shielded (Type-F)	Overall Shielded (Type-G)
G	Inner sheath (only for armored cables)				
i	Material	Extruded PVC type ST1 as per IS 5831/84			
ii	Reference standard	As per IS 50288 Part 7			
iii	Minimum thickness at any point	As per IS 50288 Part 7			
iv	Nominal thickness at any point	As per IS 50288 Part 7			
v	Color	Black			
vi	Resistance to water, fungus, termite & rodent attack	Required			
H	Armoring (wherever applicable)				
i	Armoring as per G.I. Wire/Strip as per As per IS 50288 Part-7. (The gap between armor wires/formed wires shall not exceed one armor wire/formed wire space and there shall be no cross over/over-riding of armor wires/formed wires. The minimum area of coverage of armoring shall be 90%. The breaking load of armor joint shall not be less than 95% of that of armor wire/formed wire. Zinc rich paint shall be applied on armor joint surface of GS wires/formed wires)				
I	Electrical parameters (at 20 deg. C)				
i	Maximum Mutual capacitance between conductors at 0.8 KHz	120 nF/km			
ii	Maximum Mutual capacitance between Core and shield	450 nF/Km			
iii	Insulation Resistance (min)	500 M ohm/km			
iv	Cross talk figure (min) at 0.8 KHz	60 dB			



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3) TESTS

3.1) All cables shall be subject to Routine, Acceptance & Type Tests in line with the requirements under this specification.

3.2) Type Tests for Instrumentation & Thermocouple Cables

3.2.1) All Instrumentation & Thermocouple cables to be supplied shall be of type tested quality. The list of type tests applicable for Instrumentation & Thermocouple cables is given in table below this clause. The vendor shall submit the reports of all the type tests listed in the below table for each size & type of cable under the supply (for each variety) for Customer/BHEL approval. The reports should be of type tests conducted within 5 years. The type tests should have been either conducted at an independent laboratory or should have been witnessed by a client. The type test reports in compliance to these requirements shall be submitted for Customer/BHEL approval. In case the vendor is not able to submit type test reports of earlier conducted type tests in compliance to above requirements, or, the type test reports submitted by the vendor is not approved/not accepted by Customer/BHEL, then the vendor shall conduct all such tests and submit the reports for Customer/BHEL approval.

TYPE TESTS FOR INSTRUMENTATION & THERMOCOUPLE CABLES				
Sl. No.	Component	Test	Standard	Remarks
1	For Conductor (including drain wire)	Resistance test	VDE-0815	
2		Diameter test	IS-10810	
3		Tin coating test (Persulphate test)	IS-8130	
4		Annealing test		



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Sl. No.	Component	Test	Standard	Remarks
5	For PVC	Test for Thickness		
6	Insulation and PVC Sheath (Inner & Outer)	Tensile Strength & Elongation (before & after ageing)	BS-EN 50288-7	
7		Ageing in air ovens	VDE-0472	
8		Loss of mass	VDE-0472	
9		Hot deformation	VDE-0472	
10		Heat shock	VDE-0472	
11		Shrinkage	VDE-0472	
12		Color fastness to water	IS-5831	Only for outer sheath
13		Bleeding & Blooming	IS-10810	
14		Cold bend/ Cold impact test	VDE-0472	
15		Thermal stability test		
16		Volume resistivity & water immersion test (at room & elevated temperature)	BS-EN 50288-7	
17		Oxygen Index & Temperature Index Test	ASTMD-2863	
18		Smoke Density Rating Test	ASTMD-2843	
19		Acid gas generation test	IEC-60754-1	
20		Oxygen index & Temperature index test for fillers	ASTMD-2863	
21		Acid gas generation test for fillers	IEC-60754-1	
22	For Al-Mylar Shield	Continuity test		
23		Shield thickness test		
24		Overlap & coverage test		
25	For Armoring	Tensile Strength		Only for armored cables
26		Elongation		
27		Winding / Torsion test		
28		Resistivity		
29		Dimensions		
30		Uniformity of zinc coating		
31		Dip test		
32		Mass of zinc coating		
33		Tightness and gap test		



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Sl. No.	Component	Test	Standard	Remarks
33	For Completed Cable	Constructional Details (Conductor & drain wire - number of strands & diameter of strands, Twisting & Lay of pairs Thickness of Insulation and Sheath, Dia of Armor, overall diameter, color & marking on outer sheath, numbering of pairs, core color, band marking, unit identification, visual & surface finish, ovality etc.)	BS-EN 50288-7	
34		Electrical Parameters (Mutual capacitance, Cross talk, Attenuation, L/R ratio, Characteristic Impedance etc. as applicable)	BS-EN 50288-7	Only for instrumentation & Thermocouple cables.
35		Insulation resistance	-do-	
36		Thermal EMF test	ANSI MC 96.1	Only for T/C cables.
37		High Voltage test	BS-EN 50288-7	
38		Noise Interference	IEEE Transactions	
39		Flammability test	IEEE-383, IEC-332-3-CAT C	Also refer to clause 5.3.3 below
40		Swedish Chimney test	SEN-4241475	
41		Drain wire continuity		
42		Anti-rodent, anti-termite, anti-fungus, moisture retardant test on sheath		
43		UV radiant test & Hydraulic Stability test	As per DIN 53387	

3.2.2) With respect to the list of type tests in above table, relevant standards/reference document shall be referred to by the vendor in case there is no standard listed against any test(s) or the listed standard is not relevant/complete reference to the test(s) in context of this supply.

3.3. Acceptance Tests

3.3.1) For these tests, the selection of cable drums shall be at random, as per the following sampling plan.




SL. NO.	NUMBER OF DRUMS OF DRUMS IN THE LOT	NO OF DRUMS TO BE TAKEN AS SAMPLE (n)	PERMISSIBLE NO OF DEFECTIVE (a)
01.	Upto 50	2	0
02.	51 to 100	5	0
03.	101 to 300	13	0
04.	301 to 500	20	1
05.	501 & above	32	2

ACCEPTANCE TESTS FOR INSTRUMENTATION, THERMOCOUPLE CABLES

Sl. No	Component	Test	Standard	Remarks
1	Constructional details	Conductor Diameter, Thickness of Insulation and Sheath, Dia of Armour, Shield Thickness, Coverage and overlap of shield, overall diameter, marking on outer sheath, band marking, numbering of pairs, colour, continuity of drain wire, etc	As per relevant standard/ approved DS	
		Mutual Capacitance (between core to core & core to shield, L/R Ratio)		
		Cross talk		
		Characteristic impedance		
2	Electrical parameters	Attenuation		
3	PVC Insulation & Sheath	Tensile Strength & elongation test		
		Thermal stability test		
4	FRLS properties test	Oxygen index & temperature index test		
		Smoke density rating		
		Acid gas generation test		
5	Armoring	Mass of zinc coating test		
		Torsion/Winding test		
		Dip test		
		Resistivity		
6	Completed cables	Insulation resistance test		
		Conductor resistance test (cable & Drain wire)		
		High Voltage test		
		Persulphate test (for drain wire)		
		Flammability test		
		Swedish chimney test (Overall cable)		
		Length checking		
		Visual & Surface finish		
Thermal EMF test (for T/C cable)				

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		 <p>A4-11</p>		<p>CE/416/SURAT/CBL/IC-TC/TR</p> <hr/> <p>REV 00</p> <hr/> <p>PAGE 12 OF 12</p>
<p style="writing-mode: vertical-rl; transform: rotate(180deg);"> COPY RIGHT AND CONFIDENTIAL THE INFORMATION ON THIS DOCUMENT IS THE PROPERTY OF BILAKAT HEAVY ELECTRICALS LIMITED. IT MUST NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO THE INTEREST OF THE COMPANY. </p>		<p>3.3.2) The sampling plan of acceptance tests shall be generally '1 No. of each size & type per lot' for all tests except for the following tests for which sampling plan shall be '1 No. per completed lot offered for inspection' – FRLS properties tests, Tensile Strength & % elongation of insulation & sheath(s) (before & after ageing), Flammability, Volume resistivity (at room & elevated temperature) & tests for armoring.</p> <p>3.3.3) Flammability Test</p> <p>a) This test shall be carried out as per IEEE-383, IEC— 332 part I and III. The instrumentation cables installation to be tested shall consist of as many instrumentation cables as necessary to give at least 10 Kg of Organic material per meter. The cables in the installation can be of any (or all) of the various types specified. However in case of failure to pass this test, the whole lot shall be subjected to rejection.</p> <p>b) The size of the cables (measured by total cross sectional area of the conductor) shall be that which has maximum organic material per sq.mm of total cross sectional area of all the conductors.</p> <p>3.4) <u>Routine Tests</u> The routine tests for Instrumentation & Thermocouple Cables shall consist of the tests under Sl. No. 1, 35, 37 &41 under the list of type tests in clause no. 3.2 above and are to be done on 100% drums.</p> <p>3.5) The list of tests as given under sub clauses of clause 3 of this specification (above) has been prepared in line with Customer specification, however, these lists are for general/broad guidance of vendor, and the final list of tests with other details related to tests shall be as per the Customer/BHEL approved documents - approved Quality Plan & Datasheet.</p> <p>3.6) Bidder shall include in his total bid price, the cost of carrying out all the type tests, if required; charges for conducting each of the type test shall be indicated separately for each type and size of the cables in the relevant bid proposal sheets and the total charges included in the bid price. BHEL/Customer at their discretion may ask the bidder to conduct any or all the type tests for which at least 15 days advance notice shall be given by the bidder. Charges for acceptance and routine tests shall be deemed to be included in the bid price of individual cables.</p> <p>3.7) BHEL/Customer reserves the right to get the cables, type tested at their own expenses for any further tests to verify the compliance with the specifications. However BHEL/Customer reserves the right to waive any of the type tests in which case the test charges quoted will be taken for adjustment purposes.</p> <p>3.8) TEST CERTIFICATES The equipment/material shall be satisfactory & completely factory tested before shipment in accordance with the latest standards available. The tests specified in technical specification and/or any other tests which may be necessary to ensure that the equipment/material is satisfactory, shall be also be conducted. BHEL/Customer shall be supplied with certified test reports along with oscillograms if any, of all tests carried out on equipment/material</p>		

ANNEXURE – 10

LIST OF APPROVED SUB-VENDORS

LIST OF APPROVED VENDORS FOR SUB ITEMS OF CCTV AND ACCESS CONTROL SYSTEM
Instrumentation Cable
1) M/S ASSOCIATED CABLES PVT LTD, MUMBAI (L402145)
2) M/S POLYCAB WIRES, DAMAN (S405921)
3) M/S GEMSCAB INDUSTIRIES LTD, BHIWADI (M306280)
4) M/S DELTON CABLES, FARIDABAD. (M113843)
5) M/S CORDS CABLE, BHIWADI (S113927)
6) M/S SKYTONE ELECTRICALS (I) LTD (X124000)
7) M/S GENERAL INSTRUMENTS CONSORTIUM (M602312)
8) M/S UDEY PYRO CABLES, MUMBAI (OTI0159)
9) M/S KEI INDUSTRIES, CHENNAI(X404186)
10) M/S PARAMOUNT COMMUNICATIONS LTD., ALWAR (X114324)
11) M/S THERMO CABLES LTD., HYDERABAD (S506199)
Power cable
1) M/S THERMO CABLES LTD., HYDERABAD (S506199)
2) M/S KEI INDUSTRIES, CHENNAI(X404186)
3) M/S PARAMOUNT COMMUNICATIONS LTD., ALWAR (X114324)
4) M/S CORDS CABLE, BHIWADI (S113927)
5) M/S NICCO CORPORATION LTD., KOLKATA (X704371)
6) M/S POLYCAB WIRES, DAMAN (S405921)
7) M/S FINOLEX CABLES, PUNE (X412375)
8) M/S KEC INTERNATIONAL LTD, BANGALORE (L403610)
9) M/S TORRENT CABLES LTD (X384446)
10) M/S UNIVERSAL CABLES LTD (X483657)
11) M/S DELTON CABLES, FARIDABAD. (M113843)
12) M/S Cable Corporation of India Ltd(CCI) (X404370)
13) M/S ISHWAR METAL INDUSTRIES, JAIPUR (OTICA00095)
14) M/S ISHWAR CABLES PVT LTD (OTICA00096)
15) M/S DAKSHA (OTI0158)
16) M/S TIRUPATI (OTICA00097)
17) M/S ROMESH POWER PRODUCTS PVT LTD (OTICA00099)
18) M/S ALPHA COMMUNICATION (OTICA00098)
19) M/S GEMSCAB INDUSTIRIES LTD, BHIWADI (M306280)
FO cable:
1. Birla Erricson
2. Aksh Fibre
3. D-Link
4. Finoles (Pune / Goa)
SERVER AND WORK STATION
IBM
HP
DELL
PRINTER
HP

Xerox
40" TFT MONITOR
Sony
Samsung
LG
42U PANEL
Automation Pvt Ltd
C&S Electric Ltd, New Delhi
Chemin
Electric Automation
ENPRO Industrial
IL, Kota
Industrial Controls & Appliances Pvt Ltd
J&H
Pyrotech ,Udaipur
Rittal India Pvt Ltd,Bangalore
WALL MOUNTABLE PANELS
Electric Automation
Industrial Controls
Vidyut Controls
Pyrotech
Industrial Control Appliances
Positronics
Automatic Electric
MECO
Rishabh Instruments

For all other items whose make are not mentioned in technical specification and above, the offered make shall be reputed and supplied & commissioned earlier in power/process industry.

Makes of Access control system, Patrol guard system, camera and network switches are not specified above. The offered makes of these system of all PQR qualified bidder shall be taken up with end user M/s RVUNL and consultant M/s TCE for approval of makes. Technical offer of only such bidders whose offered makes of these items are approved will be evaluated. Bidders whose offered make of these items are not approved by end user / consultant, will be given a chance to change make of only such item/system to makes which are approved.

ANNEXURE – 11

BILL OF MATERIALS

SL.	ITEM DESCRIPTION	UOM	QUANTITY
Perimeter Intrusion detection system- BOM			
1	Redundant server with 22" monitor, mouse, keyboard & other required accessories	SET	1
2	Client Work Station with 22" monitor, keyboard & mouse with PTZ control units and necessary software licenses.	SET	1
3	A3 laser colour printer	NO	1
4	Digital Video Management, Motion Detection System and Video Analytic software	NO	1
5	40" TFT LCD monitor for large video display	NO	2
6	Network Access Storage (NAS) with accessories	NO	1
7	Fixed cameras with housing and other accessories (as per technical specification)	NO	70
8	L3 Core Switch (meeting specification and port quantity shall be as required for number of camera mentioned, number of monitoring station, number of large screen connection etc)	SET	1
9	L2 Field network switches for connecting FO cable at one end to 2 cameras along plant boundary (with surge protective devices & IP65 protection)	NO	35
10	42U panel for housing the server, network switch etc in security room on as required basis	LOT	1
11	6 core Single mode armoured OFC cable	MTRS	11000
12	Twisted 4 pair STP CAT6 cable and connectors for connecting field switch to cameras	MTRS	2000
13	3C 1.5Sqmm un-armoured power cable for camera end connection	MTRS	2000
14	3C 2.5Sqmm Armoured power cable for looping around perimeter	MTRS	10000
15	Passive Fiber Optic Components and termination kit consisting of Fiber panel, Information outlet, Cabinets, LIU, face plates, SC Coupler, Fiber Optic Drawer with Pigtail, UTP CAT6 Patch cords, various connectors, cable ties, Multi strand Copper wire for grounding of equipment etc. This lot quantity should be on as required basis for the technical specification and BOM specified for perimeter Intrusion detection system	LOT	1
16	25mm GI Conduit with coupler and other accessories between JB to camera	MTRS	2000
17	Permanently lubricated HDPE PIPE of suitable cross section with coupler and other accessories for routing Power & FO cable underground along perimeter	MTRS	10000
18	Earthing system for Servers and also for cameras	LOT	1
19	Power distribution boards for distributing power supplied to camera from UPS/CCTV Panel/PDB	LOT	1
20	6mtrs GI Poles suitable for mounting Camera and related JB etc	NO	30
	Mini UPS of 3KVA or suitable rating to power upto 10 cameras, 5nos of L2 switches and FO accessories	NO	6
	Junction Box IP66 for keeping mini UPS, network switches, FO accessories etc along perimeter on as required basis as per technical specification & BOM specified for perimeter Intrusion detection system	lot	1
21	Any other supply item not covered above but required for completion of the system (Bidder to mention the items clearly in their offer)	SET	1
22	Any other item mentioned in technical specification and not covered above	SET	1
23	Training charges	SET	1
24	Engineering, Design, Documentation, Testing, Erection, installation & commissioning	SET	1
CCTV system- BOM			
1	Redundant server with 22" monitor, mouse, keyboard & other required accessories	SET	1
2	Client Work Station with 22" monitor, keyboard & mouse with PTZ control units and necessary software licenses.	SET	6
3	A3 laser colour printer	NO	1
4	Digital Video Management, Motion Detection System and Video Analytic software	NO	1
5	40" TFT LCD monitor for large video display	NO	3
6	Network Access Storage (NAS) with accessories	NO	1
7	PTZ cameras with housing and other accessories (as per technical specification)	NO	170
8	L3 Core Switch (meeting specification and port quantity shall be as required for number of camera mentioned, number of monitoring station, number of large screen connection etc)	SET	1
9a.	L2 Field network switches for connecting L3 switch to upto 3 Cameras in power plant (with surge protective devices & IP65 protection AND AS PER TECHNICAL SPECIFICATION SPECIFIED)	NO	55
9b.	L2 Field network switches having 4F & 10STP port for connecting L3 switch to upto 5 Cameras in power plant (with surge protective devices & IP65 protection & as per technical specification)	NO	5
10	42U panel for housing the server, network switch etc in security room	LOT	1
11	6 core Single mode armoured OFC cable	MTRS	15000
12	Twisted 4 pair STP CAT6 cable and connectors for connecting field switch to cameras	MTRS	4500
13	3C 1.5Sqmm un-armoured power cable for camera end connection	MTRS	2000
14	3C 2.5Sqmm Armoured power cable	MTRS	15000
15	Passive Fiber Optic Components and termination kit consisting of .Fiber panel, Information outlet, Cabinets, LIU, face plates, SC Coupler, Fiber Optic Drawer with Pigtail, UTP CAT6 Patch cords, various connectors, cable ties, Multi strand Copper wire for grounding of equipment. This lot quantity should be on as required basis for the technical specification and BOM specified for CCTV system	LOT	1

16	25mm PVC Conduit with coupler and other accessories between JB to camera at indoor locations	MTRS	2000
	25mm GI Conduit with coupler and other accessories between JB to camera at outdoor locations	MTRS	2000
17	Permanently lubricated HDPE PIPE of suitable cross section with coupler and other accessories for routing Power & FO cable underground in power plant	MTRS	2000
	Cable tray with all accessories for mounting and fitting	MTRS	3000
18	Earthing system for Servers and also for cameras	LOT	1
19	Power distribution boards for distributing power supplied to camera from UPS/CCTV Panel/PDB	LOT	1
20	6mtrs GI Poles suitable for mounting Camera and related JB etc	NO	10
	Mini UPS of 1KVA or suitable rating to power upto 4 cameras, 2nos of L2 switches and FO accessories	NO	5
	Junction Box IP66 for keeping mini UPS, network switches, FO accessories etc along perimeter on as required basis as per technical specification and BOM specified for CCTV system	lot	1
21	Any other supply item not covered above but required for completion of the system (Bidder to mention the items clearly in their offer)	SET	1
22	Any other item mentioned in technical specification and not covered above	SET	1
23	Training charges	SET	1
24	Engineering, Design, Documentation, Testing, Erection, installation & commissioning	SET	1
Access Control System- BOM			
1	Redundant server with 22" monitor, mouse, keyboard & other required accessories	SET	1
2	Client Work Station with 22" monitor, keyboard & mouse and necessary software licenses.	SET	6
3	A3 laser colour printer	NO	1
5	HID card reader with electromagnetic door locks	NO	94
6	Long range card reader	NO	12
7	Access card	NO	3000
8	Access card controller (with 10% or min 2nos spare) to be offered on as required basis for location of readers mentioned in technical specification	LOT	1
9	ID card printer with web camera	NO	2
10	Unarmoured Data cable of suitable number of core and cross section between Access Door to controller (Bidder to include FO cable if the same are required for their offered system. The distance between farthest controller to server shall be 1500mtrs)	MTRS	1000
11	Unarmoured Power cable of suitable number of core and cross section between Access Door/Gate / controller to power supply	MTRS	2000
12	Un Armoured data cable between Long range reader to Server	MTRS	1500
13a	Un Armoured data cable between HID card reader to Server	MTRS	1500
13b	Armoured FO cable for cabling between Server to HID's located at longer distance which can not be connected by data cable (If all HID can be connected using data cable in system offered by bidder, then bidder to quote armoured data cable under this item)	MTRS	5000
13	All other accessories including network switches, FO termination accessories, JB, PDB etc required for establishing connection between various card readers and controller as required to complete the system (Bidders to provide BOM breakup for all such items)	LOT	1
14	25mm PVC Conduit with coupler and other accessories between JB to camera	MTRS	2000
15	Permanently lubricated HDPE PIPE of suitable cross section with coupler and other accessories for routing Power & FO cable underground in power plant	MTRS	500
16	Any other supply item not covered above but required for completion of the system (Bidder to mention the items clearly in their offer)	SET	1
17	Any other item mentioned in technical specification and not covered above	SET	1
18	Training charges	SET	1
19	Engineering, Design, Documentation, Testing, Erection, installation & commissioning	SET	1
PATROL GUARD SYSTEM - BOM			
1	Patrol Guard PC, mouse, keyboard with all accessories at Central Control Room.	SET	1
2	Patrol Guard TAGS	NOS	50
3	Patrol Guard Card Reader	NO	10
4	Patrol Guard Data Collection and transfer unit	NO	10
5	Data Transfer cable with connector	NO	2
6	Patrol Guard Software	SET	1
7	Any other supply item not covered above required for completion of Patrol Guard system (mention the items with unit rate of each item)	SET	1
8	Engineering, design, documentation, testing, Erection, installation & commissioning of complete patrol guard monitoring system	SET	1
	Weather proof storage container to keep all electronic items of above four systems with lock and key.	LOT	1
MANDATORY SPARES FOR PLANT SECURITY AND SURVEILLANCE SYSTEM			
1	REFER BOM OF MANDATORY SPARES - ANNEXURE-II	SET	1