

VOLUME-2
PART- I
Section-23
Public Address
System

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23. Public Address System

23.1 Scope of Work

The intent of these specifications is to define and cover the scope of work under this section which includes the provision of labour, tools, plants, materials and performance of work necessary for the design, manufacture, quality assurance, quality control, shop assembly, shop testing, delivery at site, site storage and preservation, installation, commissioning, performance testing, acceptance testing, training of Purchaser's personnel, handing over to Purchaser and guarantee for trouble free operation of Public Address and Communication System for Keyi Hydro Electric Project, Arunachal Pradesh as per the specifications hereunder, each complete with all auxiliaries, accessories, spare parts and warranting a trouble free safe operation of the installation.

It is not the intention to specify the minute details/smallest items to deliver a functional system or to define the standard manufacturing practice but to outline the performance, constructional, operational and guaranteed requirements. It is the responsibility of the contractor to ensure these requirements.

23.2 Scope of Supply

23.2.1 Material

- Micro-processor based EPABX System.
- Telephone handsets with cabling in strategic locations such as powerhouse control room, office room, switchgear room, machine hall, colony, guesthouse etc.
- CCTV system in powerhouse area, switchyard, intake area etc. including cameras, cables, display unit in powerhouse.
- Spare parts.
- Special Tools and instruments, if applicable.

23.2.2 Services

- Transportation and delivery to site including all logistics and proper site storage and preservation as per manufacturer's recommendation.
- Site installation and commissioning.
- Field / touch-up painting including all painting materials.
- Performance and field acceptance testing as per the relevant clause of this section and submission of report.
- Training of Purchaser's personnel including operation and maintenance staff.
- All the technical documentation including preparation and submission of O & M manuals.

23.3 Specific Parameters and Layout Conditions

23.3.1 Operating Areas for public address communication system

Operating Areas for public address communication system are-

- Powerhouse service bay,
- Machine hall
- Control room
- Switchgear floor
- Office
- Intake area

23.3.2 Communication system

The communication system shall consist of zones, sub-zones and exchanges to interface all these zones among themselves and with Purchaser's existing telephone exchange.

The communication system shall cover all operational area of powerhouse complex

The entire system shall comprise of following:

- EPBAX system
- CCTV system

The main panel of the public address system shall be located in the control room of the powerhouse. The CCTV display unit shall be in control room, and the other telephone connecting points shall be located at various points.

23.4 Performance Guarantee

The public address/telephone system along with all auxiliaries and accessories shall be capable of performing intended duties under specified conditions. The Contractor shall guarantee the reliability and performance of the individual equipment as well as of the complete system.

23.5 Design and Construction

The system and equipment shall be designed, built, tested and installed to the latest revisions of the following applicable standards. In the event of other standards being applicable they will be compared for specific requirement and specifically approved during detailed engineering for the purpose:

Standards	Description
IEC 60065	Audio, video and similar electronic apparatus-Safety requirements
IS 10426	Specification for public address amplifier

IS 1881	Code of practice for indoor installation of public address system
IS 1882	Code of practice for outdoor installation of public address system
IS 9302	Characteristics and method of measurement for sound systems equipment
IEC 60326	Printed Boards
IEC 60446	Basic and safety principles for man-machine interface, marking and identification, identification of conductors by colours or numerals
IEC 60478	Stabilized power supplies, DC output
IEC 60870-5	Tele-control equipment and systems

23.5.1 Field handset stations/CCTV

The field handset station shall be weatherproof and located / installed at multiple locations in the indoor and outdoor field. These shall be wall/column/structure mounted.

- The handset stations in the noisy areas shall be housed in acoustic hoods. The design noise level within the hood shall be limited to a maximum of 60 db SIL.
- Handset transmitter / microphone shall be noise cancelling type for effective communication from noise areas. The handset shall consist of push button type keys, handset cord protected in SS metallic tubing and external canopy in fibre for extra protection. Handset transmitter / microphone shall have filters to protect from dust.
- The weatherproof station for outdoor areas shall be made of corrosion resistance aluminium alloy.

Telephone Extensions:

The Contractor shall provide and install telephone extensions as set out below:

Location	Normal Handsets	Low Noise Handsets
Powerhouse EPABX	1	
Service bay		1
Control room		1
Office room	1	
Tool room	1	
11 kV Switchgear Room	1	
Guardhouse	1	

Colony		1
Intake area	3	
Cordless handset		3
Uninstalled spares	3	1

CCTV:

Location	Low Noise Handsets
Powerhouse machine hall	2
Entry gate	1
Approach road	1
Switchyard	1
Barrage Intake area	3

23.6 EPABX system

The EPABX system shall be fully automatic microprocessor based, standalone modular system with one touch line/ feature selection and flexible user-friendly programmable push buttons. The system shall support full simplex voice and data transmission on a twisted pair line. The system shall have complete hardware for at least 30 ports. The system shall be integrated with public address system.

EPABX system shall also have features based on suitable technology for mobile connectivity with project area.

EPABX system shall be capable for VOIP transmission.

At least following features shall be provided:

P and T line connectivity, Call transfer, Call back, Call forwarding, Account code, Group calling, Conference facility, Messages, Call waiting etc.

Ten (10) analogue telephone sets with at least following features shall be provided:

Redialling, Hands free answer and dialling.

23.6.1 Junction boxes

Junction boxes shall be used for connecting field handset stations, loudspeakers, etc to central equipment. The Junction box shall be constructed with suitable locking arrangement.

All junction boxes shall have minimum 20% spare terminals for future requirements

Junction boxes shall be of 4-way type having opening on each side. The degree of protection shall be minimum IP-65. Disconnecting (sliding) cage clamp type terminal blocks shall be provided, to facilitate testing and maintenance without disconnecting the cables.

23.6.2 Cables

Cables for use in public address system shall be of FRLS PVC sheathed cables and shall conform to latest edition of Indian/International standards. Video cables shall maintain high quality of signal for at least ten (10) years.

Cables shall be suitable for installation as follows:

- Above ground in open air location (tray/ducts) in tropical, humid and corrosive atmosphere prevalent in power plant,
- Direct buried in underground trenches conduits with uncontrolled back fill and possibility of flooding by water and chemicals,
- Laid underground in RCC lined cable trenches with possibility of flooding by water.

Cabling shall be done at various important location of the powerhouse to ensure the portable camera connection wherever needed.

23.7 Drawings, Documents and Design Calculations

23.7.1 Design memorandum

The Contractor shall submit to Purchaser a design memorandum prepared in accordance with clause 1.2 of "Section 1- General Technical Specification (GTS)"

23.7.2 Drawings and documents

The Contractor shall submit all the drawings and documents in accordance with requirements stipulated in "Technical Documents" of "General Technical Specification (GTS)".

23.7.3 Design calculation

The Contractor shall submit the design calculation in accordance with Clause 2.6 of "General Technical Specification (GTS)" covering at least the following, for review / acceptance.

- Calculation for echo sound generated in the powerhouse,
- Design calculation for selecting number of loudspeaker with power output,
- Other design calculations as required.

The Contractor shall also provide other calculations as required by the Engineer for his approval of the Contractor's design.

23.8 Delivery, Installation and Commissioning

The Contractor shall follow the requirements of Delivery, Installation and commissioning elaborated in clause 1.7 "Delivery, Installation and commissioning" of "General Technical Specification."

Testing of the complete system for proper functioning at site shall be carried out.

Training to Purchaser's engineers for operation and maintenance of the system shall be provided.

23.8.1 Specific packaging, handling and storage requirements

The packaging and storage of electronic and electrical equipment shall be strictly in accordance with internationally accepted standards.

Electronic equipment shall be packaged, shipped and stored in anti-static packing. All packages shall be stored indoor. Packages containing electronic equipment shall be stored in humidity-controlled environment.

23.9 Spare Parts

The spare parts shall be standard spares as recommended by the OEM and list of which shall be submitted by the contractor for supply.

23.10 Special Tools

The Contractor shall propose the list of recommended special tools (other than those included under "Tools and Appliances" above) including their make and detailed specification as recommended by manufacturer(s) and to be accepted by the Purchaser.

23.11 Quality Assurance and Testing

The bidder shall submit the quality assurance plan along with bid for approval of the purchaser. The Contractor shall follow the quality assurance and testing requirements as per quality assurance plan approved by the purchaser.

23.12 Guaranteed and Technical Particulars

Guaranteed and Technical Particulars as called for in Vol. VI shall be furnished along with the bid. Bids lacking in this may be considered unresponsive. Particulars subject to guarantees shall be clearly marked

23.13 Completeness of Equipment

All fittings and accessories of the Public Address System and associated auxiliary and ancillary equipments that may not have been specifically mentioned in these specifications but are usually necessary for completion of above equipment, shall be deemed to be covered by the specification and shall be indicated and furnished by the contractor without any extra charges to the purchaser.

23.14 Deviation from Specifications

While the purchaser does not bind himself to accept any deviation, due consideration will be given to any special devices or equipment put forward by the supplier with a view to increase the efficiency of the equipment and minimize the maintenance cost of the equipment as a whole.

Should the supplier wish to depart from these specifications, he shall submit a complete and itemized list of such deviations, together with full particulars of the reasons for the deviations in a separate schedule with special reference to clause and paragraph nos. of this specification. Unless this is done and also the purchaser's concurrence in respect of such deviations is obtained in writing, the equipment offered shall be deemed to comply in every respect with these specifications.