

# **TECHNICAL SPECIFICATIONS FOR ELV SYSTEM**

## TELEPHONE SYSTEM

### SCOPE:

The scope of work under this section includes supply, installation testing and commissioning of cabling system for the complete Telephone System including, leadin pipes, Telecom manholes, cable tray, conduit, intermediate distribution frame (MDF / IDF) and telephone wiring between the Telecom riser and the terminal blocks or telephone points in each area.

The Contractor shall install and terminate, where necessary, faceplates, jacks, cables, backboards, connection blocks, hubs, patch panels, patch cords, racks, brackets and all other hardware necessary to meet Telecom's requirement.

### STANDARDS APPLICABLE:

All equipments, material and components shall comply with the requirements of the latest editions of Indian Standards, Telecom Guidelines and Electricity Rules with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.

### GENERAL INSTRUCTIONS:

Ratings and the configuration of the telephone cabling shall be as indicated on the drawings. It is solely the responsibility of the Contractor to carry out site survey, coordinate and check the location of these facilities and make any necessary adjustment modifications with the consultants / project manager's approval.

### Submissions

- Shop Drawings indicating the routings, equipment positions, tag numbers, tag blocks, IDFs /MDFs, switching arrangement, mounting height, etc. The positions and mounting heights shall be coordinated with other services.
- The Contractor shall co-ordinate with the Telecom department and required drawing shall be submitted to Telecom for their approval prior to carry out work on site.
- Following are the documents that shall be submitted along with the deliveries in 4 Sets:
  1. Technical literature giving complete information of the components / equipment.
  2. Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.
  3. A comprehensive spare parts schedule.

### General

#### Conducting

All concealed /surface installation including the conduit run above the false ceiling space shall be heavy gauge black enameled MS/PVC Conduit. The specification for materials & installation shall be same as described in electrical section. All relevant clauses are applicable for telephone system as well. The conduit for telephone system shall be installed minimum 1 feet away from the power conduit. Care shall be taken so that no telephone conduit is run in parallel to Electrical conduit in close proximity. Wherever telephonconduits cross power conduits, they shall be at right angle, to each other. All telephone conduits shall be earthed.

<b>Size of Cable</b>	<b>Conduit Size</b>
Up to 5 pair single cable	25 mm
Above 5 pair up to 10 pair Single cable	32 mm
Above 10 pair up to 20 pair Single cable	32 mm
2 Nos. 2 pair	25 mm
Upto 5 Nos, 2 pair	32 mm
Upto 10 Nos, 2 pair cable	32 mm

The size of conduit shall depend upon no. of wires to be drawn. However minimum size of conduits shall be 25 mm.

### **Telephone Cables**

All multipair cables and wires shall be of tinned copper conductor of not less than 0.5 mm dia and shall be colour coded twisted pairs with rip cord.

Cables laid under ground or locations subject to dampness and flooding shall be filled with polyethylene compound and shall have sufficient protection against moisture and water ingress and armoured as mechanical protection.

All armouring shall be of galvanised steel wires and protected against corrosion by an outer sheath of PVC in the case of indoor cables and polythene in the case of outdoor cables. Outer sheathing must be fire- retarding and anti-termite.

All armoured single core cables and inner sheath of armoured cables shall be provided with rip cord.

All single pair cable for final extension to the telephone outlet box shall be unarmoured tinned copper conductors of not less than 0.5 mm dia and shall be drawn in conduits. All telephone outlets shall consist of 4 pair polythene connector in galvanised box with a telephone socket.

### **Telephone Tag Blocks, Boxes and Outlets**

The telephone tag blocks shall be KRONE or equivalent suitable for the multicore telephone cables and shall accommodate tin-plated phosphor bronze connectors providing economical and reliable splicing. Connectors shall splice unskinned cables upto 0.6 mm dia and shall terminate both 'in' & out lines.

The tag blocks shall be mounted inside fabricated galvanised sheet steel boxes with removable hinged covers and shall be fully accessible. The enclosure shall be painted with 2 coats of red oxide and stove enameled.

All concealed boxes shall be of G.I. as indicated in schedule of quantities & shall match with electrical wiring accessories. The boxes/main Junction box shall be suitable for wall mounting having opening for cable/ conduit entry. All PVC cable shall enter the telephone junction box from the bottom through brass cable glands and enough cable length shall be available for termination. Each PVC cable serving the telephone socket shall be marked for identification.

Junction boxes shall be fully enclosed, kept tight with lockable hinged doors. Boxes shall be zinc anodised type & same make as of socket/outlets.

### **Testing**

All tests as per relevant IS shall be conducted and shall be witnessed by the Project Manager.

## TV SYSTEM

### SCOPE:

The scope of work shall cover supply, installation, commissioning and testing of:

- i) MATV wiring
- ii) MATV distribution equipment
- iii) Antenna outlets
- iv) Head end equipment

### CONDUITS:

The conduits shall generally be as specified under section "CONDUIT WIRING."

The type of conduit and the service shall be shown below:

Indoor

- a) Surface run: Heavy gauge MS black enameled.
  - b) Concealed : Heavy gauge MS black enameled.
- Outdoor
- Medium duty galvanized steel tube to IS: 1239

### CABLES:

The co-axial cable shall be copper core of 0.8 mm dia tinned, PE solidly insulated and shielded with tinned copper braid with necessary protective foil and white PVC outer sheath. The cable characteristic impedance shall be 75 ohms.

### INSTALLATION:

The installation of conduits shall generally be as specified under section "CONDUIT WIRING." All cables shall be drawn inside the conduit and terminated into splitter/Tap-off in MS JB.

### DISTRIBUTION ELEMENTS

Splitters shall be suitable for the entire frequency range with an insertion loss not exceeding 4.5 dB at 8 MHz. The isolation between the outputs shall exceed 17 dB and return loss at input and output shall be 14 dB and 12 dB respectively. Splitters shall have a characteristic impedance of 75 ohms at both input and output and the RF shielding factor shall be greater than 70 dB. The entire unit shall be housed in an M.S box and shall be suitable for an ambient of 45 deg.C.

Tap-off units shall be multi tap and shall be suitable for the entire frequency range. The insertion loss shall not exceed 3 dB at 8 MHz and the tap off ratio shall be around 26 dB. at 8 MHz The isolation shall exceed 36 dB between tap and output and the return loss shall be around 20 dB at input, output and taps. The entire unit shall be housed in M.S box and shall be suitable for an ambient of 45 deg C. The characteristic impedance shall be 75 ohms at input, output and tap ports.

Antenna outlets shall be frequency flat and the insertion loss shall not exceed 0.5 dB. The outlet shall have a characteristic impedance of 75 ohms and the outlet shall be coaxial plate type cover compatible with all other switch and socket outlets.

All distribution elements shall be bi-directional to suit interactive television, unless stated otherwise.

### HEAD END EQUIPMENT:

The head end equipment shall consists of :

- a) Power supply module
  - b) 4 input amplifier modules
  - c) Video cassette player with frequency changer/modulator, band filters
- or any other equipment required for the efficient receipt and transmission of video and audio signals.

The power supply module shall be suitable for 220-230V 50 Hz supply with self-regulating features and the secondary's being of 12/24VDC capable of delivering up to 1000 to 1200 ma. The amplifier shall be high gain 60 dB and of modular construction similar to the power supply module. Amplifier modules shall have an input built-in attenuator adjustable up to 20 dB and with a maximum output level of 120 dB/dB V LED indicators. Amplifiers shall be assembled with adequate frequency gap between channels. All amplifiers shall be duly screened achieving a screening factor of 80 dB and noise level of 7 dB V. The amplifier pack shall have provision for necessary bridge connectors, terminal resistors (75ohm) and be suitable for input and output co-axial cables with characteristic impedance of 75 ohms. All amplifiers shall be suitable for off-air and in-house video input signals.

The video cassette recorder/ player shall be suitable for PAL/SECAM colour standards. The player shall have facility still frame, frame by frame double speed and slow motion. Video output shall be 1Vpp at 75 ohms and shall be fed into the amplifier rack through frequency changer/module and band filters. The video channel selection shall have sufficient frequency gap to achieve the desired intermeditation ratio of 54 dB.

#### **NETWORK DISTRIBUTION:**

The co-axial cable shall be copper core of 0.8/1.1 mm dia tinned, PE solidly insulated and shielded with tinned copper braid with necessary protective foil and white PVC outer sheath. The cable characteristic impedance shall be 75 ohms.

All splitters, tee-off's etc shall be RF shielded and selected for minimum through loss. Units could be selected for a constant side loss with supplemental line adjustable attenuators so that the tee-off units could be inter-changeable.

## DATA NETWORKING SYSTEM

### SCOPE:

The scope of work under this section includes supply, installation testing and commissioning of cabling system for the complete Data Cabling System including, Trunking, conduit, data port switches and wiring between the data switches to data points in each area.

The Contractor shall install and terminate, where necessary, faceplates, jacks, cables, backboards, connection blocks, hubs, patch panels, patch cords, racks, brackets and all other hardware necessary to meet Telecom's requirement.

### STANDARDS APPLICABLE:

All equipments, material and components shall comply with the requirements of the latest editions of Indian Standards, Telecom Guidelines and Electricity Rules with updated amendments. Standards and Regulations applicable in the area where equipment is to be installed shall also be followed.

The equipment offered complying with other standards; shall be equal to or superior to those specified below:

EIA/TIA 568	Building facilities design guidelines for telecommunications (568-A & 568-B)
EIA/TIA TSB-36	For UTP Cable Specifications
EIA/TIA TSB-40	For UTP Connecting Hardware
EIA/TIA TSB-67	Recommendations for testing UTP Cabling
ISO-IEC	International Cabling Standards
Fibres	ITU-T-G652 / 651 Series EN 188000- IEC 793 Test Standards
Cables	IES 794 Test Standards EN 187000
EIA/TIA 568	Building facilities design guidelines for telecommunications (568-A & 568-B)
EIA/TIA TSB-36	For UTP Cable Specifications
EIA/TIA TSB-40	For UTP Connecting Hardware

### GENERAL INSTRUCTIONS:

Ratings and the configuration of the data cabling shall be as indicated on the drawings. It is solely the responsibility of the Contractor to carry out site survey, coordinate and check the location of these facilities and make any necessary adjustment modifications with the consultants / project manager's approval.

## Submissions

- Shop Drawings indicating the routings, equipment positions, tag numbers, switching arrangement, mounting height, etc. The positions and mounting heights shall be coordinated with other services.
- The Contractor shall co-ordinate with the Telecom department and required drawing shall be submitted to Telecom for their approval prior to carry out work on site.
- Following are the documents that shall be submitted along with the deliveries in 4 Sets:
  1. Technical literature giving complete information of the components / equipment.
  2. Erection, Operation and Maintenance Manual complete with all relevant information, drawings and literature for auxiliary equipment and accessories, characteristics curves for relays etc.
  3. A comprehensive spare parts schedule.

## General

### Conduiting

All concealed /surface installation including the conduit run above the false ceiling space shall be heavy gauge black enameled MS/PVC Conduit. The specification for materials & installation shall be same as described in electrical section. All relevant clauses are applicable for telephone system as well. The conduit for telephone system shall be installed minimum 1 feet away from the power conduit. Care shall be taken so that no telephone conduit is run in parallel to Electrical conduit in close proximity. Wherever telephone conduits cross power conduits, they shall be at right angle, to each other. All telephone conduits shall be earthed.

### UTP Cable

UTP cable used in the horizontal wiring system shall be 100□□□category 5 and shall consist of 24AWG copper conductors with thermoplastic insulation formed into 4 – individually twisted pairs and enclosed in a thermoplastic jacket. The cable shall meet all the requirements of ANSI / ICEA publication for both plenum and general applications.

Characteristic values, tested and corrected to 20C, shall be as follows:

Frequency MHZ	Characteristic Impedance (Ohms)	Max. Attenuation (dB per 305m)	NEXT coupling loss for worst pair dB@305m
0.772	102 ± 15%	6.8	43
1.0	100 ± 15%	7.8	41
4.0	100 ± 15%	17.0	32
8.0	100 ± 15%	26.0	28
10.0	100 ± 15%	30.0	26
16.0	100 ± 15%	40.0	23

Cables shall be colour coded as follows:

Pair 1	W-BL / BL
Pair 2	W – O / O
Pair 3	W – G / G
Pair 4	W – BR / BR

UTP cables shall have 24 AWG conductor with thermoplastic insulation formed into groups of 50 pairs forming a bound core which is covered by a thermoplastic metallic sheath. The cable shall have the same characteristic values as for UTP horizontal wire and colour coded to industry standard composed of 10 distinct colours. Large cables shall be assembled in units or sub units of 50 pairs and each 50 pairs bundle duly identified.

### Fibre Optic Cabling

Fibre cable for horizontal wiring shall be multimode graded index optical wave guide with 62.5 / 125 micron nominal core / cladding diameter and should conform to all the requirements of the EIA / TIA specifications.

The cable shall meet the following performance parameters.

Wave length (nm)	Max attenuation (dB / Km)	Band width MHZ - Km
850	3.75	160
1300	1.5	500 (FDDi)

Fibre cable for backbone service shall meet with the same performance parameters as for horizontal wires.

Horizontal cables shall contain a minimum of 2 fibres and 6 or 12 fibres for backbone cables.

### Connecting hardware

The connecting hardware consists of

- 1) S110 connecting blocks in standard EIA 19" modular units with suitable wire management system suitable for patching.
- 2) Modular cords, jumpers, plugs and cables, both at the Patch panels and telecom terminal outlets.
- 3) Information outlets at work area (WA)

All hardware components shall be compatible with the media used (100 ohm UTP or Fibre optic cable) with attenuation and Next performance equal to or better than the media cable performance.

Connecting blocks / Patch panels shall create gas tight IDC connections with well over 200 terminations without physical or electrical degradation. The reliability, durability and transmission performance requirements shall be better than ANSI / EIA/ TIA – 568 & TSB 40A Category 5 compliant. Panels shall employ high impact self – extinguishing plastics.

Panels (LIU) for Fibre optic media shall be mountable on EIA 19" rack with removable tray cover. All connectors shall be ST standard with bayonet coupling.

All panels shall have suitable wire management systems.

Patch cords and jumpers shall be 4 pair with terminal connectors and compatible with category 6 cable.

### Testing

All tests as per relevant IS shall be conducted and shall be witnessed by the Project Manager.