

[EQ. TO SOR 2025-2026 CAT-III]

## 8. TECHNICAL SPECIFICATIONS FOR ELV WIRING

## TECHNICAL SPECIFICATIONS FOR ELV WIRING

### 1.0 SCOPE OF WORK

- 1.1 This section relates to specification for the supply, installation, connection, testing and commissioning of the wiring for Telephone / Computer / Fire detection / Music & Signage & wiring installation including supply of telephone cables, Multiple flexible wires, Shielded Wire, CAT-5 UTP computer signal wire, Junction boxes, Outlet boxes, and other related accessories required to complete the wiring and installation.
- 1.2 The main hardware of the systems shall be supplied by the client

### 2.0 CODES & STANDARDS

- 2.1 The cables shall be conforming to the following standards of latest revision :

Sr.	Item	Relevant IS	Relevant IEC
1	PVC insulated (heavy duty) electric cable.	IS : 1554 ( Part I )	
2	Copper conductors in insulated cables and cords.	IS : 8130	
3	Mild steel wires, strips and tapes.	IS : 3975	

- 2.2 For Armoured Cables,

Sr.	Item	Relevant IS	Relevant IEC
1	PVC insulated and sheath of electric cables	IS : 5831	
2	Recommended current rating for cables.	IS : 3961 ( Part I )	

- 2.3 Cables shall also meet the requirement of Indian Electricity rules, Fire Insurance Association and Electrical Inspector.

The wire for the systems shall confirm to IS: 694, 1554, 624 and local fire department.

The CCTV & Security Access System cable shall confirm to BS : 2316 and American Military standard MIL -C - 17 / JSS - 51100 and of Radio frequency co-axial type ( RG - 11 )

### 3.0 DESIGN BASIS & SITE CONDITIONS

- 3.1 The extra low voltage system wiring installation shall be carried out in the manner as approved by the local Authority. If found necessary, the drawing for installation shall be got approved by the local sanctioning authorities before commencement of the work.
- Separate conduits of 25 mm. diameter (minimum) shall be laid for extra low voltage system cables / wires.
- 3.3 The installation of conduits shall be carried out as per detailed specification given under section "INTERNAL WIRING".
- 3.4 All cables, lay on cable racks / trays shall be neatly stitched together.
- 3.5 Extra low voltage system wires / cable terminations both at the junction boxes and at

the socket outlets shall be done as per method approved by consultants and in conformity with their rules and regulations.

- 3.6 The final branch connections with single / twin pair cables in conduits and the minimum number of cables in each conduit shall be as follows:

Conduit dia. in mm.	Max. No. of cables
20	2 Nos. single pair
25	6 Nos. single pair
32	12 Nos. single pair
40	18 Nos. single pair

All the cables/wires provided shall be suitably designed for installation and satisfactory operation as specified below.

Site conditions	
Location <b>Gujarat</b>	Site altitude <b>81M above</b> mean sea level
Ambient temperature	Relative humidity
Maximum <b>45</b> ° C	Maximum <b>85</b> %
Minimum <b>13</b> ° C	Minimum <b>25</b> %
Design <b>50</b> ° C	Design <b>90 % at 50 ° C</b>
Electrical system data:	
Power supply for Equipment	
Voltage <b>12V to 90V ± 15 %</b>	Frequency <b>10Hz to 300Hz ± 3 %</b>
Permissible combined voltage & frequency variation <b>± 6 %</b>	

#### 4.0 TECHNICAL REQUIREMENTS

##### 4.1 SYSTEM:

	<u>Voltage</u>	<u>Frequency</u>
4.1.1 Fire alarm, Security	12 V DC	10 Hz. -100 KHz
Music & P.A. system	30 V AC	20 Hz. - 20 KHz.
Telephone system	90 V AC	300 Hz. - 5 KHz.

- 4.1.2 The extra low voltage system cables will be terminated on the tag block / junction box located at each floor.

- 4.1.3 From this tag block / junction boxes, separate M.S. conduits shall run for individual outlet connections to each area through tag boxes / junction boxes.

- 4.1.4 The conduits shall run in the surface manner in the vertical shaft and shall run in surface / concealed manner at every floor between shaft and the outlet box through tag box / junction boxes located on each floor.

- 4.1.5 Extra low voltage system cables / multi pair telephone cables shall be pulled through the above conduits and then be connected at both ends.

##### 4.2 MATERIAL OF CONSTRUCTION

###### 4.2.1 Conduit:

M.S. conduit, conduit accessories, steel junction boxes, etc. to be used for telephone wiring system shall have material specifications as described in section under title

“INTERNAL WIRING “ of this tender document.

4.2. 2 Cables & Wires:

The type of cables and the services shall be as follows :

4.3 TELEPHONE CABLE

4.3.1 Telephone multipart cable shall confirm to P & T specifications.

4.3.2 Annealed tinned bare copper conduction 0.6 mm. dia.

4.3.3 Cores twisted into pairs, pairs laid - up, fully filled and taped with suitable absorbent tape.

4.3.4 Armouring of galvanized steel wire.

4.3.5 PVC insulated, PVC inner sheathed and outer sheathed.

4.3.6 Aluminium Mylar tape with drain wire

4. 4 FIRE DETECTION & ALARM SYSTEM :

4.4.1 The wire for the systems shall confirm to IS: 694, 1554, 624 and local fire department.

4.4.2 Annealed tinned copper conductor 1.5 mm<sup>2</sup>

4.4.3 2 core twisted into pair

4.4.4 Shielded Al. Mylar tape.

4.4.5 PVC insulated, PVC inner sheathed and outer FRLS sheathed

4. 5 C.C.T.V. & SECURITY ACCESS SYSTEM :

4.5.1 The system cable shall confirm to BS : 2316 and American Military standard MIL -C - 17 / JSS - 51100 and of Radio frequency co-axial type ( RG - 11 )

4.5.2 Annealed tinned copper conductor.

4.5.3 Polyethylene insulated.

4.5.4 Annealed bare copper braiding.

4.5.5 PVC sheathing

4.5.6 Characteristic impedance - 75 ohm  $\pm$  3

4. 6 INSTRUMENT CABLES :

4.6.1 Multi pair cables shall be used for transferring digital / analog signals from electrical meters to PLC.

4.6.2 Cable shall be capable of withstanding normal and short circuit condition of various systems to which it is connected, without damage, transportation to site, installation at site and operation.

4.6.3 Cable shall be capable of performing satisfactorily when laid in trenches, trays and directly buried in the ground.

- 4.6.4 All overhead wiring shall be supported in cable trays. The shield shall be grounded at one location only. All the wiring, cables, and termination points shall be suitably identified as per applicable codes and practices.
- 4.6.5 The vendor shall provide detailed cable scheduling mentioning the make, standard followed and other necessary details so as to satisfy the specified requirements.
4. 7 SIGNAL CABLES :
- 4.7.1 Multi core twisted cables shall be rated for 660 / 1100 volts.
- 4.7.2 The cable shall be 1.0 mm.<sup>2</sup> multi stranded, PVC coated, high conductivity annealed tinned copper conductor with PVC insulation and sheathing, 100% aluminium Mylar shielding with copper drain conductor, galvanized steel armouring and overall PVC sheathing. Rip cord shall also be provided.
- 4.7.3 Multi core cables shall have the following additional features :
- 4.7.4 Pair identification by color coding / numbering.
- 4.7.5 Individual pair shielding and testing, apart from overall shielding and twisting. All the cables shall be of flame-retardant type .All the cables shall be terminated using Siemens type gland.
4. 8 JUNCTION BOXES FOR EXTRA LOW VOLTAGE SYSTEM :
- 4.8.1 The junction boxes / the telephone tag blocks shall be suitable for the multi pair wires / cables and shall have two terminal blocks, cross connect type. All incoming and outgoing cables shall be terminated on separate terminal blocks. The cross connecting jumpers shall be insulated wires of same diameter and connected in same manner.
- 4.8.2 The junction boxes shall be mounted inside fabricated sheet steel boxes with removable hinged covers and lockable type and shall be painted as specified in section "Painting ".
- 5.0 DRAWINGS & INFORMATION
- Not applicable
- 6.0 INSPECTION AND TESTING
- Performance of each equipment in coordination with other systems to prove the functional requirement.
- 7.0 METHOD OF MESUREMENT
- 7.1 The extra low voltage system cable shall include supply, laying, connection, testing and commissioning of multi pair cable / wire on ceiling / wall on cable trays / racks including all supports and shall be measured and paid on running length basis. Cable trays / racks shall be paid for separately.
- 7.2 The multi pair junction boxes for extra low voltage system shall consist of strip, jumpered interconnections enclosure etc. and shall be measured and paid as one unit.
- 7.3 The conduit wiring for extra low voltage system outlet point shall include wire / cable in M.S. conduits and shall include junction boxes, pull boxes, 2A two pair connector / socket in M.S. box, outlet plate etc. from the floor tag blocks to the outlet point.
- 8.0 TRANSPORT, DELIVERY AND STORAGE

The prices shall be F.O.R. site basis including packing & forwarding charges. The quoted price must include all the costs for necessary mode of transportation up to the final location or site store. The ELV Wiring cables/wires should be supplied with required storage arrangements suitable for placing in open storage space. All incidental expenses during transportation shall be part of quoted prices including transit insurance. The charges for loading and unloading of equipments at site should form part of offer.

9.0 GURANTEE OF PERFORMANCE

The Bidder shall stand guarantee for the performance of entire wiring for twelve (12) months from the date of commissioning or eighteen (18) months from the date of dispatch, whichever is earlier, as agreed up on and as reproduced in the purchase order within the tolerance specified or as permitted by the relevant standards for the wiring in his scope of supply.

11.0 ATTACHEMENTS

- Datasheet

# DATASHEET

Sr. No.	Particular	Description
1.1	Category 6 UTP Cable	
1.1.1	Class	E attenuation
1.1.2	Stander	ISO/IEC 11801, CENELEC EN50173 and TIA/EIA 568B.
1.1.3	Certify	UL
1.1.4	Performance guaranteed	6 connections in any length channel configuration up to 100 mtr
1.1.5	Support	Category 6/Class E NEXT, PSNEXT, FEXT, ELFEXT, PSELFEXT and return loss extrapolated to 250 MHz
1.1.6	Capability	Excess of 1 Gbps to the workstation in accordance with application standard
1.1.7	Supportive standard	IEEE 802.3 1000BASE-T, TIA-854-A 1000BASE-TX, ATM Forum CB1G plus other legacy LANs and applications as well as Video also.
1.1.8	Physical Specifications :	
	Weight	not more than 11.88 kg/305 m
	Nominal Jacket Thickness	not more than 0.022 in (0.559 mm)
	Nominal Outside Diameter	not more than 0.232 in (5.89 mm)
	Operating Temperature	-4°F to 140°F (-20°C to 60°C)
	Gauge:	23 AWG
1.2	Category 6 information outlet	
1.2.1	General	Category 6 outlets shall meet or exceed Category 6 transmission requirements for connecting hardware, as specified in TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801:21002 Second Edition, CENELEC EN 50173, and TIA/EIA568B
1.2.2	Standard	TIA/EIA 568-B Commercial Building Telecommunications Cabling Standard and ISO/IEC 11801:2002 Second Edition, CENELEC EN 50173, and TIA/EIA568B
1.2.3	Compatible with	Category 5E, 5 and 3 cords and cables
1.2.4	Design	Supporting to T568 A & B wiring
1.2.5	Capabilities	Being in a modular patching situation or as a modular telecommunication outlet (TO) supporting current 10BASET, Token Ring, 100 Mbps TP-PMD, 155 Mbps ATM, 622 Mbps ATM using parallel transmission schemes and evolving high-speed, high-bandwidth applications, including Ethernet, 1000BASE-T and 1 Gbps ATM
1.2.6	Supports	Category 6/Class E NEXT, PSNEXT, FEXT, ELFEXT, PSELFEXT and return loss extrapolated to 250 MHz
1.2.7	Certified	UL & cUL

Sr. No.	Particular	Description
1.2.8	Physical Specifications	
A	Dimensions	HxWxD: 2.0 cm x 2.0 cm x 3.1 cm - Universal
B	A/B labeling	
C	Plastic Material	High-impact, flame retardant, thermoplastic
D	Flammability Rating	UL-rated 94 V-0
E	Operating Temperature	14°F to 140°F (-10°C to 60°C)
F	Storage Temperature	40°F to 158°F (-40°C to 70°C)
G	Humidity	95% (non-condensing)
H	TIE/EIA Category	6
I	TIE/EIA Category	6
1.3	Category 6 Patch Panel (24/48 port)	
1.3.1	Electrical performance guaranteed	To meet or exceed TIA/EIA 568-B.2-1 Category 6 & ISO/IEC Category 6/Class E specifications.
1.3.2	Standard	ISO/IEC 11801, CENLEC EN 50173 and TIA/EIA
1.3.3	Certified	UL
1.3.4	Capabilities	network line speeds in excess of 1 gigabit per second
1.3.5	Back ward compatible	Category 5 e, 5 & 3 cords and cables
1.3.6	Panel configuration	24/48 port with A/B labeling & 110IDC connector terminations on rear of panel.
1.3.7	Physical Specifications	
A	Plastic Material	High-impact, flame retardant, thermoplastic
B	Flammability Rating	UL-rated 94 V-0
C	Operating Temperature	14°F to 140°F (-10°C to 60°C)
D	Storage Temperature	-40°F to 158°F (-40°C to 70°C)
E	Humidity	95% (non-condensing)
F	TIA/EIA Category	6
1.4	Category 6 Patch Cord	
1.4.1	Standard	TIA/EIA & ISO/IEC Category 6/Class E specifications
1.4.2	Performance guaranteed	Meet or exceed the channel specifications of the TIA "Category 6" up to 250 MHz
1.4.3	Supports	Complies Category 6/Class E NEXT, PSNEXT, FEXT, ELFEXT, PSELEFEXT and return loss extrapolated to 250 MHz
1.4.4	Protection	Antisnag features which provide protection from snagging during moves and re arrangements
1.4.5	Backward compatible	Category 5 and category 5E
1.4.6	Physical Specifications	
A	Contact Material	Phosphor Bronze
B	Contact Plating	Gold 50 micro-inch (1.27 microns), nickel 100 micro inch (2.54 microns)



Sr. No.	Particular	Description
C	Insertion Life	750 minimum
D	Plug Material	Polycarbonate UL-rated 94 V-O
E	Operating Temperature	14°F to 140°F (-10°C to 60°C)
F	TIA/EIA Category	6
G	UL and cUL	CM (cordage)
1.5	Face Plate for Information Outlet	
1.5.1	Contains	Slots that cover the screws to house labels and covers Two labels and covers included
1.5.2	Numbering	Both side for installation & maintenance identification
1.5.3	Provision	Blank to fill the unused outlet openings
1.5.4	Material	High impact, flame retardant, UL rated 94V-0 thermoplastic
1.6	Network Rack -12U (each per floor)	
1.6.1	Height	12U
1.6.2	Size	600 mm wide x 450mm deep
1.6.3	Cover	Top
1.6.4	Horizontal Cable Manager	2
1.6.5	Front section	Glass door & lock
1.6.6	MS door & glass door	Powder coated
1.6.7	Bottom/Upper cover	Suitable for sufficient cable opening (30-40 Cat 6 cable)
1.6.8	Fan	Single fan position with loaded fan
1.6.9	Distribution boxes	One 4 port (5 Amp x 4 socket)
1.6.10	Front & rear angles	19 ‘’
1.7	Network Rack-42U (for server room)	
1.7.1	Height	42U
1.7.2	Size	600 mm wide x 1000 mm deep
1.7.3	Front door	Toughened glass
1.7.4	Cover	Top
1.7.5	Rear MS doors	With venting options
1.7.4	Horizontal Cable Manager	4
1.7.5	Front section	Glass door & lock
1.7.6	MS door & glass door	Powder coated
1.7.7	Bottom/Upper cover	Suitable for sufficient cable opening (00-400 Cat 6 cable)
1.7.8	Fan	4 fan position with 4 cooling fans
1.7.9	Distribution boxes	One vertical box on back side( 5/15Amp x 10 socket)
1.7.10	Front & rear angles	19’’

Sr. No.	Particular	Description
1.8	24 port Layer 2 data switch (each floor)	
1.8.1	Port	24 port 10/100 Mbps RJ45 Ethernet port
1.8.2	10/100/1000 Mbps	2 dual purpose
1.8.3	Power supply redundancy	1 serial port for control and RPS adaptor
1.8.4	Switch	Stackable
1.8.5	Capacity	Minimum 12Gbps Switching capacity 100 Gbps Stacking capacity 9 Mpps Packet Forwarding capacity 75 Mpps total stack packet forward capacity
1.8.6	Features	Protocol and Port based VLAN, 802.1X authentication, MAC based port authentication, Multilayer packet processing, 802.3ad, IGMP snooping, 4 priority queues per port, Jumbo Frame Support, One to One & One to Many port mirroring, SSH2 and SSL support
1.8.7	Foot print	1 RU
1.9	24 port Layer 2+ data switch (each floor)	
1.9.1	Port	24 port 10/100 Mbps RJ45 Ethernet port 4 combo 1000 Base SFP shared with RJ45 Ethernet port
1.9.2	Switch	Stackable switch with dedicated stacking port at back plane
1.9.3	Power supply redundancy	1 serial port for control and RPS adaptor
1.9.4	Capacity	Minimum 94 Gbps aggregate switching throughput capacity Minimum 35 Mpps Packet Forwarding capacity, 230 Mpps total stack packet forward capacity
1.9.5	Features	Protocol and Port based VLAN, 802.1X authentication, MAC based port authentication, Web based authentication, Multilayer packet processing, 802.3ad, IGMP snooping, 8 priority queues per port, Dynamic VLAN assignment, Jumbo Frame Support, One to One & One to Many port mirroring, SSH2 and SSL support
1.9.6	Upgradeable options	Suitable for layer 3 features such as static routes, RIP V2, inter VLAN routing, VRRP
1.9.7	Upgradeable options	Suitable for layer 3 features such as static routes, RIP V2, inter VLAN routing, VRRP