

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

TECHNICAL SPECIFICATIONS
FOR
INSTALLATION OF INTERNAL WIRING

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1.0 SCOPE OF WORK

- 1.1 This section covers, definition of point wiring, system of wiring and, installation, connection, testing and commissioning of point wiring for light points, ceiling fan points, exhaust fan points, convenience socket outlet points, power socket outlet points, bell outlet points etc. including fixing of light fixtures, ceiling fan, exhaust fan, wall fan, bell etc.

2.0 CODES & STANDARDS

- 2.1 The following standards and rules shall be applicable :

IS : 732	Code of practice for electrical wiring installation (System voltage not exceeding 650 V)
IS : 1646	Code of practice for fire safety of buildings (General) Electrical installation.
IS : 9537 (Part - 2)	Rigid steel conduits for electrical wiring.
IS : 2667	Fittings for rigid steel conduits for electrical wiring.
IS : 3480	Flexible steel conduits for Electrical wiring.
IS : 3837	Accessories for rigid steel conduit for electrical wiring.
IS : 694	PVC insulated cables.
IS : 9537 (Part - 3)	Rigid non-metallic conduits for electrical wiring.
IS : 6946	Flexible (Pliable) non-metallic conduits for electrical installation.
IS : 1293	3 pin plugs and sockets.
IS : 8130	Specifications of conduits for electrical installation.
IS : 3854	Switches for domestic purpose.
IS : 3419	Fittings for rigid non-metallic conduits.
IS : 4648	Guide for electrical layout in residential buildings Indian electricity act and rules

All standard and codes mean the latest.

3.0 MATERIALS REQUIRED

- 3.1 REFER SUPPLY SPECS

4.0 INSTALLATION OF THE SYSTEM

4.1 CONCEALED INSTALLATION WITH RIGID PVC CONDUIT

- 4.1.1 All the rigid PVC conduit used for concealed installation shall be as per IS ; 9537 and its accessories shall be as per IS: 3419 (Small Wire Ropes).
- 4.1.2 Whenever necessary bends or diversion may be achieved by bending the conduits with the help of bending spring. No other method of bending is allowed
- 4.1.3 Conduit pipes shall be joined with the help of plain coupler fixed at the end with the help of vinyl solvent cement. No other method of joining is permissible
- 4.1.4 All other methods, no wires through conduit, bunching, etc. Shall be as specified in the concealed installation
- 4.1.5 Prior to fixing the conduits, the complete route shall be marked on site for the approval of consultant

4.2 CONCEALED WIRING SYSTEM WITH RIGID PVC CONDUIT

- 4.2.1 The rigid PVC conduits shall be used for concealed wiring system. The conduits shall be concealed in the concrete slab, floor, walls, beams, columns etc
- 4.2.2 FIXING OF CONDUIT

1. Conduits embedded in concrete shall be installed in the frame work before pouring concrete. The conduits shall be installed above the bottom reinforcing bars, and shall provide positive wire fastening of the conduit to the reinforcing rods at an interval of not more than one meter, but on either side of couplers or bends or putlet/pull/junction boxes or similar fittings, proper hold fast shall be fixed at a distance of 30 cm from the center of such fittings. Conduits embedded in the wall shall be fixed inside the chase . The chase in the wall shall be neatly made and be fixed in the manner desired. In the case of building under construction, chase shall be provided in the wall at the time of their construction and shall be filled up neatly with cement mortar 1:4 after erection of conduit and brought to the original finish of the wall. Cutting of horizontal chases in walls is prohibited. The conduits shall be fixed inside the chase by means of staples or by means of saddles not more than 60 cm apart.
2. Conduits shall be so arranged as to facilitate easy drawing of wires through them. Entire conduit layout shall be done in such a way as to avoid additional junction boxes other than light points. The wiring shall be done in a looping manner. All the looping shall be done in either switch boxes or outlet boxes. Looping in junction or pull boxes are strictly not allowed. Where conduits cross building expansion joints, adequate expansion fittings or other approved devices shall be used to take care of any relative movement
3. All conduits shall be installed so as to avoid steam and hot water pipes
4. Conduits shall be installed in such a way that the junction, derivation and pull boxes shall always be accessible for repairs and maintenance work. The location of junction/pull boxes shall be marked on the shop drawings and approved by the client
5. A separation of 200 mm shall be maintained between electrical conduits and hot water lines in the building
6. No run of conduit shall exceed ten mtr. between adjacent draw in points nor shall it contain more than two right angle bends, or other derivation from the straight

line

7. Caution shall be exercised in using the PVC conduits in location where ambient temperature is 50 degree cel. or above. Use of PVC conduits in places where ambient temperature is mote than 60 deg. cel. Is prohibited. The entire conduit system including boxes shall be thoroughly cleaned after completion of installations and before drawing of wires. Conduit system shall be erect and straight as far as possible. Traps where water may accumulate from condensation are to be avoided and if unavoidable, suitable provision for draining the water shall be made
8. All jointing method shall be subject to the approval of the client
9. Separate conduits shall be provided for the following system.
 - 15 A power outlets.
 - 5 A outlets and lighting system.
 - Low voltage system.
 - Telephone/intercom system.
 - C.C.T.V. system
 - Sound system
 - Computer data cabling system
 - Equipment wiring

4.3 CONDUIT JOINT

- 4.3.1
 1. Conduits shall be joined by means of plain couplers vinyl and/or solvent cement. Where there are long runs of straight conduit, inspection type couplers shall be provided at intervals , as approved by the client
 2. The conduits shall be thoroughly cleaned before making the joints
 3. In case of plain coupler joints, proper jointing material like a vinyl solvent cement (gray in color) or any material as recommended by the manufacturer shall be used.

4.4 BENDS IN CONDUIT

- 4.4.1 Wherever necessary, bends or diversions may be achieved by bending the conduits or by employing normal bends. No bends shall have radius less than 2.5 times outside dia. of the conduit
- 4.4.2 Heat may be used to soften the PVC conduit for bending, but while applying heat to conduit, the conduit shall be filled with sand to avoid any damage to the conduit

4.3 OUTLETS

- 4.3.1 All the outlets for fittings, switches etc. shall be boxes of substantial construction
- 4.3.2 In order to minimize condensation or sweating inside the conduits, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects , etc.

4.3.3 Fixing between conduit and boxes, outlet boxes, switch boxes and the like must be provided with entry spouts and smooth PVC bushes.

4.3.4 Joints between conduit and any type of boxes shall be affected by means of conduit couplers in to each of which shall be coupled smooth PVC bush from inside the box. In any case all the joints shall be fully water tight.

4.4 BUNCHING OF CABLES

4.4.1 Cables of AC supply of different phase shall be bunched in separate conduits

4.4.2 The number of insulated wires/ cables that may be drawn into the conduits shall be as per the following table. In this table, the space factor does not exceed 40%. However, in any case conduits having lesser than 19 mm dia. shall not be used.

MAXIMUM PERMISSIBLE NUMBER OF 650 VOLT GRADE SINGLE
CORE CABLES THAT MAY BE DRAWN IN TO RIGID PVC CONDUITS.

CABLE SIZE IN MM SQ.	SIZE OF CONDUITS (MM)			
	MAXIMUM NO. OF CABLES			
	25	32	38/40	51/50
1.5	8	15	---	---
2.5	6	10	---	---
4.0	4	8	12	---

4.5 WIRING WITH RIGID STEEL CONDUIT

4.5.1 All conduits and its accessories shall be of threaded type and under no circumstances pin grip type or clamp type accessories be used

4.6 FIXING OF CONDUIT

4.6.1 Conduit pipes shall be fixed by heavy gauge spacer bar saddles. The saddles shall be of 3 mm x 19 mm galvanized mild steel flat, properly treated and securely fixed to support by means of nuts and bolts raw bolts, brass machine screws, as mentioned, at an interval of not more than one meter but on either side of couplers, or bends, or junction/pull/outlet boxes or similar fittings, saddles shall be fixed at a distance of 30 cm from the centre of such fittings.

4.6.2 Draw boxes shall be located at convenient location for easy drawing of wires

4.6.3 Every mains and sub mains shall run in independent conduits with an independent earth wire of specified capacity along the entire length of conduit

4.6.4 The conduits to be installed shall be of ample cross section area to facilitate the drawing of wires. The diameter of the conduit shall be selected as per table specified in these specifications. But in no case it shall be less than 25 mm diameter

4.6.5 Entire conduit layout shall be done such as to avoid additional junctions boxes other than for outlet points. Conduits shall be free from sharp edge and burrs. Conduits shall be laid in a neat and organized manner as directed and approved by the client. Conduit runs shall be planned so as not to conflict with any other services pipe,

lines/duct

- 4.6.6 The entire conduit system shall be electrically and mechanically continuous and shall be bonded, together by means of approved type earthing clamp and earthed through a bare copper conductor of 14 SWG to the earthing terminals on the nearest distribution board
- 4.6.7 If required, connection between PVC and steel conduits shall be through a junction box. Direct connection between PVC and steel conduits are not allowed
- 4.6.8 Where exposed conduits are suspended from the structure, they shall be clamped firmly and rigidly to hangers of design to be approved by client. Where hangers are to be anchored to reinforced concrete, appropriate inserts and necessary devices for their fixing shall be left in position at the time of concreting, making holes and opening in the concrete will generally not be allowed. In case, it is unavoidable, prior permission of the client shall be obtained

4.7 CONDUIT JOINTS

- 4.7.1 Conduit pipes shall be joined by means of screwed couplers and screwed accessories, as per IS: 2667
- 4.7.2 The threads shall be free from grease or oil
- 4.7.3 In long distanced straight runs of conduit, inspection type couplers two way junction boxes at reasonable intervals shall be provided or running threads with couplers and lock nuts shall be provided. The bare threaded portion shall be treated with anti-corrosive paints. Threads on conduit pipes in all cases shall be between 11mm to 27mm long, sufficient to accommodate pipes to full threaded portion of couplers or accessories. Cut ends of conduit pipes shall have no sharp edges nor any burrs left, to avoid damage to the insulation of conductors while pulling them through such pipes
- 4.7.4 Brass female bushes shall be used in each conduit termination in a switch box, outlet box, electrical panel or any other box
- 4.7.5 Conduit shall be secured in each outlet box switch box, electrical panel or any other box by means of one brass hexagonal lock nut and bush, outside and inside the box
- 4.7.6 At each building, expansion joints approved oil tight double wire wound flexible steel conduit or any other approved method shall be used. This shall be united on both sides with the rigid conduits by suitable union
- 4.7.7 Conduits installed in the plant room for mechanical equipment shall be properly clamped with the mechanical supports, but in no case, it shall be fixed with the body of the equipment
- 4.7.8 The connection of conduit to the mechanical equipment shall be through oil tight double wire wound flexible steel conduit. In any case the length of the flexible conduit shall not exceed one meter. The flexible conduit shall be properly clamped with the body of the equipment. They shall not in any case be clamped with any cover or any removable parts of the equipment

4.8 BENDS IN CONDUIT

- 4.8.1 All necessary bends in the system including diversion shall be done by bending pipes or by inserting suitable solid or circular inspection type normal box or similar fittings.

Conduit fittings shall be avoided as far as possible on conduit system exposed to weather, where necessary, solid type fittings shall be used. Radius of such bends in conduit pipes shall be not less than 75 mm. No length of conduit shall have more than the equivalent of four quarter bends from outlet, the bends at the outlets not being counted

4.9 PROTECTION AGAINST DAMPNES

- 4.9.1 In order to minimize condensation or sweating inside the conduit, all outlets of conduit system shall be properly drained and ventilated, but in such a manner as to prevent the entry of insects, as far as possible

4.10 PROTECTION OF CONDUIT AGAINST RUST

- 4.10.1 The outer surface of the conduits including bends, junction boxes, etc., forming part of the conduit system shall be adequately protected against rust, particularly when such system is exposed to weather. In all cases, no bare/threaded portion of conduit pipe shall be allowed unless such bare threaded portion is treated with anti-corrosive coating or covered with approved plastic compound

4.11 BUNCHING OF CABLES

- 4.11.1 Unless otherwise specified, insulated conductors of different phases shall be bunched in separate conduit.

Wires carrying current shall be so bunched in the conduit that the out going and return wires are drawn into the same conduit. Wires originating from two different phases shall not be run in the same conduit

- 4.11.2 The number of insulated wires/cables that be drawn into the conduits shall be as per the following table.

MAXIMUM PERMISSIBLE NUMBER OF 650/1100 VOLTS GRADE SINGLE CORE CABLE THAT CAN BE DRAWN INTO RIGID STEEL CONDUITS.

CABLE SIZE IN MM SQ.	SIZE OF CONDUITS (MM)			
	MAXIMUM NO. OF CABLES			
	25	32	38	51
1.5	10	14	---	---
2.5	8	12	---	---
4.0	6	10	---	---

4.12 SWITCH AND SOCKET

- 4.12.1 Switches shall be installed at 900 mm above finished floor level unless otherwise indicated on the drawings

- 4.12.2 The switch controlling the light point or fan shall be connected on to the phase wire of the circuit and neutral shall be continuous, having no fuse or switch installed in the line except at the D.B. All fan regulators shall be fixed inside the switch boxes on adjustable flat M.S. strips/plates with tapped holes and brass machine screws, leaving

ample space at the back and side for accommodating wires

- 4.12.3 The cover plates to the switch box shall be fixed by means of sunk head brass cadmium screws
- 4.12.4 Where two or more switches and fan regulators are installed together, they shall be provided with one gang cover plate with knockouts to accommodate required number of switches, sockets and regulators
- 4.12.5 The switch controlling the socket outlet shall be on the phase wire of the circuit. The third pin of the socket shall be connected to the earth continuity conductor of the circuit
- 4.12.6 The switch boxes, installed back-to-back in the same wall shall be offset from each other, 150 mm horizontally, to preclude noise transmission

4.13 DRAWING OF CONDUCTORS

- 4.13.1 The drawing and joining of copper conductor or wires shall be executed with due regard to the following precautions. While drawing insulated wires into the conduits, care shall be taken to avoid scratches and kinks which may cause breakage of conductors. There shall be no sharp bends
- 4.13.2 Insulation shall be shaved off for a length of 15 mm at the end of wire like sharpening of a pencil and it shall not be removed by cutting it square or ringing
- 4.13.3 FRLS insulated copper conductor wire ends before connection shall be properly soldered (at least 15 mm length) with soldering flux/copper solder, for copper conductor. Strands of wires shall not be cut for connecting to the terminals. All strands of wires shall be soldered at the terminals. All strands of wires shall be soldered at the end before connection. The connecting brass-screws shall have flat ends. All looped joints shall be soldered and connected through terminals block/connectors. The pressure applied to tighten terminal screws shall be just adequate, neither too much nor too less. Conductors having nominal cross section exceeding 4 sq. mm shall always be provided with crimping type cable sockets. At all bolted terminals, brass flat washer of large area and approved steel spring washers shall be used. Brass nuts and bolts shall be used for all connections
- 4.13.4 Only certified wire men and cable jointers shall be employed to do joining work
- 4.13.5 For all internal wiring FRLS insulated wires of 650/1100 volts grade shall be used. The sub-circuit wiring for point shall be carried out in looping system and no joint shall be allowed in the length of the conductors. No wire shall be drawn in to any conduit, until all work of any nature that may cause injury to wire is completed. Care shall be taken in pulling the wires so that no damage occurs to the insulation of the wire. Before the wires are drawn into the conduits the conduits shall be thoroughly cleaned of moisture, dust, and dirt or any other obstruction by forcing compressed air through the conduits

4.14 JOINTS

- 4.14.1 The wiring shall be by looping back system, and hence all joints shall be made at main switches, distribution boards, socket outlets, lighting outlets and switch boxes only. No joints shall be made inside conduits and junction boxes.
- 4.14.2 Contractors shall be continuous from outlet to outlet. For joints where unavoidable,

due to any specified reasons, prior permission in writing shall be obtained from the client before making such connections. Joints by twisting conductors are prohibited.

4.15 LOAD BALANCING

- 4.15.1 Balancing of circuit in three phase installation shall be planned before the commencement of wiring and shall be strictly adhered to

4.16 EARTHING

- 4.16.1 All earthing systems shall be in accordance with IS: 3043 - 1985 code of practice for earthing