

CHAPTER 4
METALLIC CONDUIT WIRING SYSTEM

4.0 Scope

This Chapter covers the detailed requirements for wiring work in metallic conduits. This chapter covers both surface and recessed types of works.

4.2 Material

4.2.1 Conduits

- (i) All rigid conduit pipes shall be of steel and be ISI marked. The wall thickness shall be not less than 1.6mm (16 SWG) for conduits upto 32mm dia and not less than 2mm (14SWG) for conduits above 32mm dia. These shall be solid drawn or reamed by welding, the finished with galvanized or stone enameled surface.
- (ii) The maximum number of PVC insulated cables conforming to IS : 694-1990 that can be drawn in one conduit is given size wise in Table I, and the number of cables per conduit shall not be exceeded. Conduit sizes shall be selected accordingly in each run.
- (iii) No steel conduit less than 20mm in diameter shall be used.

4.2.2 Conduit Accessories

- (i) The conduit wiring system shall be complete in all respects, including their accessories.
- (ii) All Conduit accessories shall be of threaded type, and under no circumstances pin grip type or clamp grip type accessories shall be used.
- (iii) Bends, couplers etc. shall be solid type in recessed type of works and may be solid or inspection type as required, in surface type of works.
- (iv) (a) Saddles for surface conduit work on wall shall not be less than 0.55mm(24 gauges) for conduits upto 25mm dia and not less than 0.9mm (20 gauges) for larger diameter. The Corresponding Widths shall be 19mm & 25mm.
b) The minimum width and the thickness of grider clips used for fixing conduits to steel joints, and claps shall be as per Table II.

4.2.3 Outlets

- (i) The switch box or regulator box shall be made of metal on all sides, except on the front. In the case of cast boxes, the wall thickness shall be at least 3mm and in case of welded mild steel sheet boxes, the wall thickness shall not be less than 1.2mm (18 gauge) for boxes upto a size of 20cm x 30cm, and above this size 1.6mm (16 gauge) thick MS boxes shall be used. The metallic boxes shall be duly painted with anticorrosive paint before erection as per chapter 15 of these specifications.
- (ii) (a) Outlet boxes shall be of one of the size, covered in the Schedule of Rates (Elect.), Part-I Internal-1994/2004.
b) Where a large number of control switches and/or fan regulators are required to be installed at one place, these shall be installed in more than one outlet box adjacent to each other for ease of maintenance.
- (iii) An earth terminal with stud and 2 metal washers and terminal block shall be provided in each MS box for termination of protective conductors and for connection to socket outlet/metallic body of fan regulator etc.
- (iv) A metal strip shall be welded/screwed, to the metal box as support if tumbler type of control switches, sockets and/or fan regulators in flush pattern.
- (v) Clear depth of the box shall not be less than 60mm and this shall be increased suitably to accommodate mounting of fan regulators in flush pattern.
- (vi) The fan regulators can also be mounted on the switch box covers, if so stipulated in the tender specifications, or if so directed by the Engineer-in-Charge.
- (vii) Except where otherwise stated, 3mm thick phenolic laminated sheets as per clause 3.14.c. shall be fixed on the front with brass screws, or aluminum alloy/cadmium plated iron screws as approved by the Engineer-in-Charge.

4.3 Installation

4.3.1 Common aspects for recessed and surface conduit works.

(ii) Bends in Conduit

- (a) All necessary bends in the system, including diversion, shall be done either by neatly bending the pipes without cracking with a bending radius of not less than 7.5cm, or alternative, by inserting suitable solid or inspection type normal bends, elbows or similar fittings, or by fixing cast iron inspection boxes, whichever is most suitable.
- (b) No length of conduit shall have more than the equivalent of four quarter bends from outlet to outlet.

4.3.2 Additional requirements for surface conduit work

(ii) Fixing Conduit on Surface

- a) Conduit pipes shall be fixed by saddles, secured to suitable approved plugs with screws in an approved manner at an interval of not more than one meter, but on either side of the couplers or bends or similar fittings, saddles shall be fixed at a distance of 30 cm from the center of such fittings.

4.3.3 Additional requirements for recessed conduit work

(ii) Fixing conduits in chase

- a) The conduit pipe shall be fixed by means of staples, J-hooks, or by means of saddles, not more than 60 cm part or by any other approved means of fixing.

(iv) Fixing Inspection boxes

- b) These shall be mounted flush with the wall or ceiling concrete. Minimum 65mm depth junction boxes shall be used in roof slabs and the depth of the boxes in other places shall be as per IS:2667-1988.

(vi) Fish wire

To facilitate subsequent drawing of wires in the conduit. GI fish wire of 1.6mm/1.2mm (16/18 SWG) shall be provided along with the laying of the recessed conduit.

4.3.4 Earthing Requirements

- (ii) A protective (loop earthing) conductor(s) shall be laid inside the conduit between the metallic switch boxes and distribution switch boards and terminated into proper earth lugs/terminals. Only PVC insulated copper conductor cable of specified size, green-yellow in color shall be allowed. Such conductors will not run external to the conduits.

TABLE I
Maximum number of PVC insulated 650/1100V grade Aluminium/Copper
Conductor cable conforming to IS : 694-1990

Nominal Cross Sectional Area of conductor in sq.mm	20mm		25mm		32mm		38mm		51mm		64mm	
	S	B	S	B	S	B	S	B	S	B	S	B
1	2	3	4	5	6	7	8	9	10	11	12	13
1.50	5	4	10	8	18	12	-	-	-	-	-	-
2.50	5	3	8	6	12	10	-	-	-	-	-	-
4	3	2	6	5	10	8	-	-	-	-	-	-
6	2	-	5	4	8	7	-	-	-	-	-	-
10	2	-	4	3	6	5	8	6	-	-	-	-
16	-	-	2	2	3	3	6	5	10	7	12	8
25	-	-	-	-	3	2	5	3	8	6	9	7
35	-	-	-	-	-	-	3	2	6	5	8	6
50	-	-	-	-	-	-	-	-	5	3	6	5
70	-	-	-	-	-	-	-	-	4	3	5	4

Note:

1. The above table shows the maximum capacity of conduits for a simultaneous drawing in of cables.
2. The Columns headed 'S' apply to runs of conduits which have distance not exceeding 4.25m between draw in boxes and which do not deflect from the straight by an angle of more than 15 degrees. The columns headed 'B' apply to runs of conduit, which deflect from the straight by an angle of more than 15 degrees.
3. Conduit sizes are the nominal external diameters.