

Sub.: Standard procedures – Electrical wires and colour code.

In circular 542(e) standards for electrical wires and colour code were specified. However, use of terminology of standard wire gauge (SWG) i.e. 1/18, 3/20, etc., for both copper wires and aluminum wires has caused a lot of confusion. It is now clarified that SWG terminology shall apply for copper wires and for aluminum it shall mean the aluminum equivalent of copper wire. As a thumb rule the conductor area of aluminum wires for an equivalent current carrying capacity of copper wire is 150% the cross section of copper wire. The table below gives details of wires, no of strands, current and power capacity.

Sl. No.	SWG size	Area of Cu conductor in sq mm	Equivalent Al in sq mm	Current carry capacity in Amps	Max power capacity in KW
1	1/18	1.0	2.5	11	2.5
2	3/20	2.5	-	18	4.0
3	7/20	4.0	6.0	24	5.5
4	7/18	6.0	10.0	31	7.0
5	7/16	10.0	16.0	50	11.0

Engineers are advise to prepare requisition in square mm rather than SWG size. The size of wires to be used in specified below.

Size of wires

Sl. No	Wire description	Uses
1	1/18 PVC insulated copper wire (1.0 sq mm).	Connection from switch board to electrical points. Use as circuit wire for points with generator backup. Do not use in open to sky areas.
2.	3/20 PVC insulated copper wire (2.5 sq mm).	Use as circuit wire from DB to each room. Used for all circuits including kitchen and utility. Cannot be used for 15A points Do not use in open to sky areas.
3.	7/20 PVC insulated copper wire (4.0 sq mm).	Use as circuit wire from DB to 15A points only. Do not use for 5 A points. Exclusively use for AC and geyser. May be used for kitchen and utility for 15A points on request of customer at extra charge. Do not use in open to sky areas.
4.	2.5 sq mm 2 core PVC insulated aluminum service wire (equivalent to 1/18 copper wire)	Use for labour quarters, security lighting, temporary lighting, pump and motors upto 1HP. Use for generator connection from DB to flat (do not use in bungalows). Primarily use for open to sky areas
5.	6 sq mm 2 core PVC insulated aluminum service wire (equivalent to 7/20 copper wire)	Use for power connection from meter to flat (2 nos). Do not use for power connection for bungalows. Use for power connection upto DB for labour quarters, security lighting, temporary lighting. Use for all motor /pump connections of more than 1HP capacity.

		Use for generator connection from DB to bungalows (do not use in flat). Primarily use for open to sky areas
6.	10 sq mm 2 core PVC insulated aluminum service wire (equivalent to 7/18 copper wire)	Use for power connection from meter to flat in select cases where power consumption is high or distance to flat exceeds 100 ft. Incase of difficulty in passing this wire through conduits use 6 sq mm copper wire.
7.	10 sq mm 4 core Al armored cable	Use for providing power supply for a distance greater than 100 mtrs (do not use 7/20 wire). Use for power supply along perimeter of site. Use for providing power supply to each floor in apartment building for machines used for construction. Use for power supply from DB to bungalow.
8.	Two pair telephone cable	Use two pair cable for all connections. Do not use single pair cable Purchase to order Finolex / Delton or equivalent brand.
9.	RG6 co-axial cable for TV connection	Use this cable only upto DB board within flat/bungalow. At best use upto electrical room on each floor. Thereafter let the cable service provider take up the work Purchase to order Finolex or equivalent brand.
10.	1/18 yellow with 1/18 black.	Use for common area lighting in corridors and stilt floor of apartments.

Colour code

Sl. No.	Wire size/ colour	Use
1	Black	Use for neutral
2	Red, blue, yellow	Use for three phases of power supply (live).
3	Green	Use for earthing.
4.	1/18 red	Use inside flats and bungalows exclusively for all points and circuits which are connected to generator backup. Provide one fan and light point in each room with generator backup. Use 1/18 black colour for neutral.
5.	1/18 yellow	Use for connecting each point to circuit. Use 1/18 black colour for neutral.
6.	1/18 blue	Do not use
7.	3/20 red	Do not use
8.	3/20 yellow	Use for all circuits within the flats / bungalow except generator backup points, including kitchen and utility. Do not use for 15A points. Use 3/20 black colour for neutral.
9.	3/20 blue	Do not use
10.	7/20 blue	Exclusively use for circuits of 15A points like geysers and ACs. Use in kitchen and utility only on customers request at extra cost. Use 7/20 black colour for neutral.

11.	7/20 red, 7/20 green & 7/20 yellow	Do not use
12.	1/18 green	Use for earthing in all points upto to 5A.
13.	3/20 green	Optionally, can be used for earthing in all 15A points in place of 1/18 green.

Note:

At the 3 phase DB, one phase will be exclusively used for generator (will have only 1/18 black and red wires). Other two phases to be used for other circuits (will have 3/20 yellow, 7/20 blue, 3/20 black and 7/20 black wires). These colour codes are very clear and all types of circuits can be identified.

Use of DBs, MCBs, Isolators, etc.

Sl. No.	MCB size	Use
1	6A MCB	Use for all circuits except ones with 15A points. Split circuits with more than 10 points to ensure that they do not trip.
2.	16A MCB	Use for ACs, geysers and 15A points. Purchase to order appropriate MCBs for inductive load.
3.	4P Isolator 40A or 4 Nos 32 A MCBs	This is the maximum capacity of isolator to be used at DB. Preferably use MCBs in place of isolator with a clip joining the neutral and 3 phases.
4.	DP Isolator 40A	This is the maximum capacity of isolator to be used for temporary single phase power connections provided for construction equipment, pumps, labour quarters, etc.
5.	Changeover 25A – double pole	Use MCB type isolator for generator connection.
6.	4 way distribution board	To be used for distribution within the flat.
7.	6 way distribution board	To be used for distribution within the villa.
8.	8 way distribution board	To be used for club house.
9.	4 way distribution board – double door	To be used for common area lighting, swimming pool etc. May be installed in open to sky areas with a drip patti of about 3”/ 3”.

Project managers/ engineers / purchase are strongly advised against placing orders or requisitions for any other sizes or colours other than the ones specified above. Use of MCBs, Isolators and wires other than above shall be discontinued. However, ensure material available at site not confirming to the above is fully utilized and as a last resort is exchanged.

Project managers are advised to get 1 or 2 bundles of each type of wire checked by QC whenever material is received and before using it. The parameters for QC check are given below.

Sl. No.	Cable Type	Area of conductor in sq mm	SWG equivalent	No of cores	No of strands per core	Strand dia in mm	Insulation or thickness in mm	aprox. Overall dia in mm	Resistance per 90m in ohms
	Cu	1	1/18	1	14	0.3	0.7	2.8	1.63
	Cu	2.5	3/20	1	35	0.3	0.8	3.8	0.67
	Cu	4	7/20	1	56	0.3	0.8	4.6	0.45
	Cu	6	7/18	1	85	0.3	0.8	5.4	0.30
	Al	2.5	1/18	2	3	1.03	1.0	9.2x5.6	1.09
	Al	6	7/20	2	7	1.04	1.1	11.2x6.8	0.41
	Al	10	7/18	2	7	1.35	1.2	13.8x8	0.28

In all projects common area lighting can be controlled by a timer. The timer should be connected to a 32A contactor and the contactor to the load. Timing of the lights should be from 6.30pm to 6 am.

Controller for bore wells can be installed at select locations. Such a controller should switch off the pump when the water tank is full or bore well is empty. However, disable the automatic switch-on function when over a tank is empty.

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