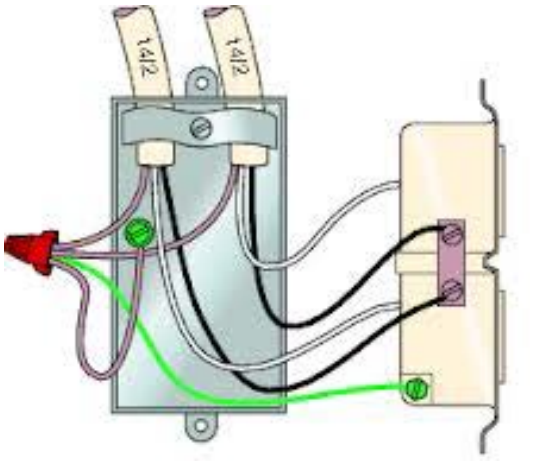
Maximum Number of Conductors in a Box

Reference: 12:3038, Table 22 & 23 (see next page)



Sample Problem:

- Minimum device box size for a receptacle and 2 14-2 romex cables as in picture to the left.

2 14-2 romex	4 #14 AWG	-12-3038 (b)
2 Internal clamps	Not Counted AWG	-12-3038 (5)
1 Duplex receptacle	2 #14 AWG	-12-3038 (2d)
2 Ground wires	Not Counted	-12-3038 (1)
1 Wire connector	Not Counted	-12-3038 (2b)
	6 Total	

Therefore minimum device box size is 3*2*2" (1 mark)
Source: Table 23 (1 mark)

Questions

Show answer (1 mark) breakdown (1 mark), exact rule-sub-rule and table # (1 mark) for full marks

1. What size device box would be needed to accommodate 6 #14AWG conductors and what is its cubic inch capacity?

/2

2. If question one, above, also had three insulated connectors used what size device box would now be needed according to the code?

/2

3. Determine the maximum number of conductors allowed in a 3*2*2. ½" device box with two internal cable clamps, using #12 AWG wire.

/3

4. Determine the minimum octagon box size used with a standard lamp holder with 2 14-2 & 2 14-3 cables using 2 insulated wire connectors.

/3

5. What if in question 4, another 14-2 cable and one more insulated wire connector, what would the minimum octagon box size be now?

/3

6. Determine the smallest size square box needed to accommodate 3 14-2, 2 12-3 cables, and 4 insulated wire connectors.

/3

Maximum Number of Conductors in a Box

Reference: 12-3038 and Tables 22-23

12-3038 Maximum Number of Conductors in a Box

(1) Boxes shall be of sufficient size to provide usable space for all insulated conductors contained in the box, subject to the following:

(a) A conductor running through a box with no connection therein shall be considered as one conductor.
(b) Each conductor entering or leaving a box and connected to a terminal or connector within the box shall be considered as one conductor;
(c) A conductor of which no part leaves the box shall not be counted;
(d) No. 18 and No. 16 AWG fixture wires supplying a lighting fixture mounted on the box containing the fixture wires shall not be counted.

(2) Except as specified in Subrule (3) and subject to the details given in Subrule (1), boxes of the nominal dimensions given in Table 23 shall not contain more insulated conductors of a given size than permitted by the Table, and the number of conductors shall be reduced for each of the following conditions as applicable:

(a) One conductor if the box contains one or more fixture studs, hickeys or insulated grounding conductors;
(b) One conductor for every pair of wire connectors with insulating caps (no deduction for one wire connector, deduct one conductor for 2 or 3 wire connectors, two conductors for 4 or 5 wire connectors, etc.);
(c) One conductor if the box contains mounting nails passing through the interior of the box, except when nails are within 3 mm from the back;
(d) Two conductors if the box contains one or more flush devices mounted on a single strap.

(3) Where a box contains a device having a dimension greater than 1 inch between the mounting strap and back of the device, the total usable space shall be reduced by the space occupied by the device, calculated as 5 cubic inches multiplied by the depth of the device in inches (for example, a device having a depth of 1 ½ inches would occupy a space of 7½ cubic inches, that is 5 times 1½).

(4) Subject to the details given in Subrules (1) and (3), boxes having nominal dimensions or volume other than those shown in Table 23 or any box containing insulated conductors of different sizes, shall have the amount of usable space per insulated conductor as specified in Table 22, but the number of conductors so calculated shall be reduced by one for each of the conditions of Subrule (2) as applicable.

(5) The total usable space in a box considered under Table 22, shall be considered to be the internal volume of the box and shall disregard any space occupied by lock nuts, bushings, box connectors, or clamps.

(6) Where sectional boxes are ganged, or where plaster rings, extension rings or raised covers are used in conjunction with boxes, ganged or otherwise, and are marked with their volume measurement, the space in the box shall be the total volume of the assembled sections.

Notes:

1 Box to be of sufficient size to provide free space for the conductors. Size determined by the numbers and size of conductors enclosed.
A Def. Of conductors

2. Table 23- Limitations
A-D Conductor substraction pending situation.

Devices > 1" deep shall have space used, calculate

Not nominal or different sizes of boxes-use table 22 and use subrule #2

Using table 22 and disregard ....

Ganged or Extensions will be the total of all