

# Capacity of Steel Boxes and Covers

**NEC:**  
Listed for Ordinary Locations

314.16 Number of Conductors in Outlet, Device, and Junction Boxes, and Conduit Bodies. Boxes and conduit bodies shall be of sufficient size to provide free space for all enclosed conductors. In no case shall the volume of the box, as calculated in 314.16(A), be less than the fill calculation as calculated in 314.16(B). The minimum volume for conduit bodies shall be as calculated in 314.16(C).

The provisions of this section shall not apply to terminal housings supplied with motors.

FPN: For volume requirements of motor terminal housings, see 430.12.

Boxes and conduit bodies enclosing conductors 4 AWG or larger shall also comply with the provisions of 314.28.

(A) Box Volume Calculations. The volume of a wiring enclosure (box) shall be the total volume of the assembled sections and, where used, the space provided by plaster rings, domed covers, extension rings, and so forth, that are marked with their volume or are made from boxes the dimensions of which are listed in Table 314.16(A).

(1) Standard Boxes. The volumes of standard boxes that are not marked with their volume shall be as given in Table 314.16(A).

(2) Other Boxes. Boxes 1650 cm<sup>3</sup> (100 in.<sup>3</sup>) or less, other than those described in Table 314.16(A), and Nonmetallic boxes shall be durably and legibly marked by the manufacturer with their volume. Boxes described in Table 314.16(A) that have a volume larger than is designated in the table shall be permitted to have their volume marked as required by this section.

(B) Box Fill Calculations. The volumes in paragraphs 314.16(B)

(1) through (B) (5), as applicable, shall be added together. No allowance shall be required for small fittings such as locknuts and bushings.

Table 314.16(A) Metal Boxes

Box Trade Size mm (in)		Minimum Volume cm <sup>3</sup> (in. <sup>3</sup> )	Maximum Number of Conductors ①						
			18	16	14	12	10	8	6
100x32 (4x1¼)	round/ octagon	205 (12.5)	8	7	6	5	5	5	2
100x38 (4x1½)	round/ octagon	254 (15.5)	10	8	7	6	6	5	3
100x54 (4x2)	round/ octagon	353 (21.5)	14	12	10	9	8	7	4
100x32 (4x1¼)	square	295 (18)	12	10	9	8	7	6	3
100x38 (4x1½)	square	344 (21)	14	12	10	9	8	7	4
100x54 (4x2)	square	497 (30.3)	20	17	15	13	12	10	6
120x32 (4x1¼)	square	418 (25.5)	17	14	12	11	10	8	5
120x38 (4x1½)	square	484 (29.5)	19	16	14	13	11	9	5
120x54 (4x2)	square	689 (42)	28	24	21	18	16	14	8
75x50x38 (3x2x1½)	device	123 (7.5)	5	4	3	3	3	2	1
75x50x50 (3x2x2)	device	164 (10)	6	5	5	4	4	3	2
75x50x57 (3x2x2¼)	device	172 (10.5)	7	6	5	4	4	3	2
75x50x65 (3x2x2½)	device	205 (12.5)	8	7	6	5	5	4	2
75x50x70 (3x2x2¾)	device	230 (14)	9	8	7	6	5	4	2
75x50x90 (3x2x3½)	device	295 (18)	12	10	9	8	7	6	3
100x54x38 (4x2x1½)	device	169 (10.3)	6	5	5	4	4	3	2
100x54x48 (4x2x1)	device	213 (13)	8	7	6	5	5	4	2
100x54x54 (4x2x2)	device	238 (14.5)	9	8	7	6	5	4	2
95x50x65 (3¾x2x2½)	masonry box/gang	230 (14)	9	8	7	6	5	4	2
95x50x90 (3¾x2x3½)	masonry box/gang	344 (21)	14	12	10	9	8	7	4
min. 44.5 depth	FS - single cover/ gang (1¾)	221 (13.5)	9	7	6	6	5	4	2
min. 60.3 depth	FD - single cover/ gang (2)	295 (18)	12	10	9	8	7	6	3
min. 44.5 depth	FS - multi. cover/ gang (1¾)	295 (18)	12	10	9	8	7	6	3
min. 60.3 depth	FD - multi. cover/ gang (2)	395 (24)	16	13	12	10	9	8	4

① Where no volume allowances are required by 314.16(B)(2) through (B)(5).  
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references are from the 2008 edition.

(1) Conductor Fill. Each conductor that originates outside the box and terminates or is spliced within the box shall be counted once, and each conductor that passes through the box without splice or termination shall be counted once. A looped, unbroken conductor not less than twice the minimum length required for free conductors in 300.14 shall be counted twice. The conductor fill shall be calculated using Table 314.16(B). A conductor, no part of which leaves the box, shall not be counted.

Exception: An equipment grounding conductor or conductors or not over four fixture wires smaller than 14 AWG, or both, shall be permitted to be omitted from the calculations where they enter a box from a domed luminaire (fixture) or similar canopy and terminate within that box.

(2) Clamp Fill. Where one or more internal cable clamps, whether factory or field supplied, are present in the box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest conductor present in the box. No allowance shall be required for a cable connector with its clamping mechanism outside the box.

(3) Support Fittings Fill. Where one or more luminaire (fixture) studs or hickies are present in the box, a single volume allowance in accordance with Table 314.16(B) shall be made for each type of fitting based on the largest conductor present in the box.

Table 314.16(B) Volume Allowance Required per Conductor

Size of Conductor (AWG)	Free Space Within Box for Each Conductor cm <sup>3</sup> (in. <sup>3</sup> )
18	24.6 (1.50)
16	28.7 (1.75)
14	32.8 (2.00)
12	36.9 (2.25)
10	41 (2.50)
8	49.2 (3.00)
6	81.9 (5.00)

(4) Device or Equipment Fill. For each yoke or strap containing one or more devices or equipment, a double volume allowance in accordance with Table 314.16(B) shall be made for each yoke or strap based on the largest conductor connected to a device(s) or equipment supported by that yoke or strap.

(5) Equipment Grounding Conductor Fill. Where one or more equipment grounding conductors or equipment bonding jumpers enter a box, a single volume allowance in accordance with Table 314.16(B) shall be made based on the largest equipment grounding conductor or equipment bonding jumper present in the box. Where an additional set of equipment grounding conductors, as permitted by 250.146(D), is present in the box, an additional volume allowance shall be made based on the largest equipment grounding conductor in the additional set.

## 406.8 Receptacles in Damp or Wet Locations.

(B) Wet Locations.

(1) 15- and 20-Ampere Receptacles in a Wet Location. 15- and 20-Ampere, 125- and 250-Volt receptacles installed in a wet location shall have an enclosure that is weatherproof whether or not the attachment plug cap is inserted.

(2) Other Receptacles. All other receptacles installed in a wet location shall comply with (B)(2)(a) or (B)(2)(b).

(a) A receptacle installed in a wet location, where the product intended to be plugged into it is not attended while in use, shall have an enclosure that is weatherproof with the attachment plug cap inserted or removed.

(b) A receptacle installed in a wet location where the product intended to be plugged into it will be attended while in use (e.g., portable tools) shall have an enclosure that is weatherproof when the attachment plug is removed.

# Outlet and Switch Boxes

## Material, Finish, Knockouts, Fire-Rated Assemblies, Compliances, Groundskeeper Raised Ground Boss

**NEC:**  
*Listed for Ordinary Locations*

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### Material/Finish

- AISI/SAE 1008
- Pre-galvanized G60, 183.09 g/sq m (0.60 oz/sq ft)
- Thickness: 0.0625" minimum

### Concentric and Eccentric Knockouts

- Boxes with concentric or eccentric knockouts are suitable for bonding without any additional bonding means where used in circuits above or below 250 V. Unless otherwise noted all concentric or eccentric knockouts are 1/2" – 3/4" combinations.

### Use in Fire-Rated Assemblies

- Single and double gang metallic outlet and switch boxes are acceptable for use in two-hour fire rated walls. For additional information refer to the UL guide card information for metallic outlet boxes, QCIT.

### Groundskeeper Raised Ground Boss

- Groundskeeper raised ground feature on boss inside box provides one or two #10-32 tapped hole, allowing a 3/8" long green ground screw to be threaded into box without contacting mounting surface. Other boxes provided with flat ground tapped hole, except Plenum Boxes.

### NEC/CEC Compliances and Certifications

- UL Standard: 514A, 514B, 514D
- UL Listed: E2527, E14817
- NEMA: FB-1, OS-1

# Outlet and Switch Boxes

## Styles of Clamps and Brackets

NEC:  
Listed for Ordinary Locations

### Clamps ①



**CL-9**  
For nonmetallic cable



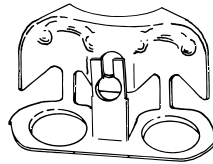
**CL-20**  
For nonmetallic cable



**CL-24**  
For nonmetallic cable



**CL-26**  
For nonmetallic cable



**CL-13**  
For armored cable (AC), metal clad cable (MCI, MCI-A, MCC) and flexible metal conduit

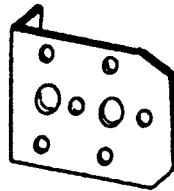


**CL-25**  
For armored cable and flexible metal conduit

### Brackets ①



**JB**



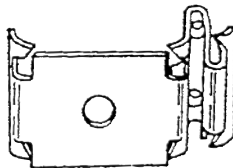
**Plain NL**



**Stud NL**



**Snap-in metal stud**



**MSC-OBN**  
Outlet box metal stud clip  
for individual sale ②



**892**  
LOX BOX™ switch box supports  
for individual sale ②

① Products available as installed parts only.

② Products available as individual parts. Order by product catalog number.

# Outlet and Switch Boxes

## Styles of Clamps and Brackets

NEC:  
Listed for Ordinary Locations

### Brackets ①



Plain, Offset Side Combination



Barbed-Hook, Vertical



Plain, Vertical



Vertical with Stud



Plain, Vertical



Plain, Vertical Angle



Offset, Vertical



Plain, Vertical

Appleton OZGEDNEY

COMMERCIAL AND INDUSTRIAL FITTINGS: OUTLET BOXES, SWITCH BOXES AND COVERS

① Products available as installed parts only.