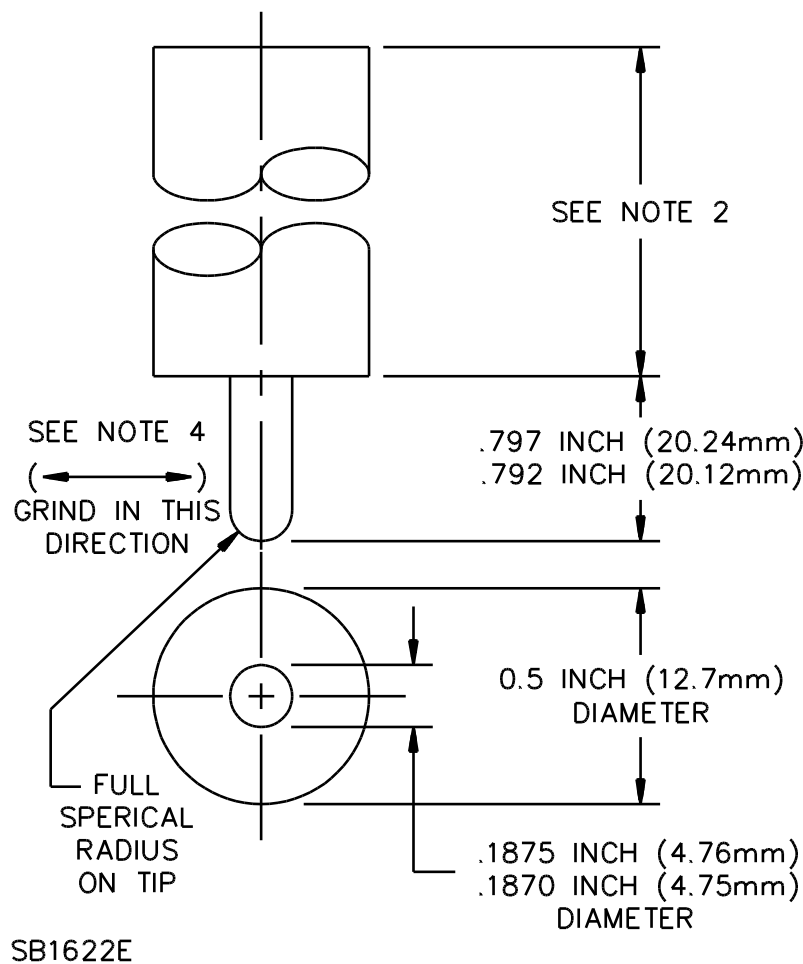


Figure 125.4
4 oz (113 g) ground pin



Material: Pin-Steel, Rockwell Hardness C58 to C60.

Handle – cold rolled steel

NOTES

- 1) The ground pin is to be fastened to handle in rigid manner.
- 2) Length not specified. Total tool weight 4 oz (113 g).
- 3) Axis of blade and axis of handle, must have combined concentricity and axial alignment of 0.006 maximum at tip of pin.
- 4) The blade surfaces shall not exceed a 32 microinch finish grind in a direction perpendicular to the major axis. Finish is to be determined visually using a comparative method and 10 X optical magnification.

inch	0.1870	0.1875	0.792	0.797	0.5
(mm)	4.750	4.762	20.12	20.24	12.7
microinch				32	
(nanometer)				813	

Pressure-Wire Terminals

126 General

126.1 In addition to the requirements in Sections [110](#) – [125](#), a receptacle rated 30 A or greater and employing pressure-wire terminals for field connection to both copper and aluminum branch circuit conductors shall comply with the Strength of Insulating Base Test, Section [128](#), and with the applicable performance requirements in the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E. The test conductors and currents used in the heat cycling tests in UL 486E shall be selected in accordance with [Table 126.1](#). The copper and aluminum test conductors to be used for all other tests in UL 486E shall be selected in accordance with [Table 126.2](#) and [Table 126.3](#) respectively.

Exception: The copper test conductors for an AL-CU range and dryer receptacle intended for use with both copper and aluminum conductors rated 75°C (167°F) shall be selected in accordance with [Table 126.4](#).

Table 126.1
Heat cycling test parameters

Device rating, A	Aluminum test conductor size, AWG	Heat cycling test current, A
30	8	45
50	6	85
60	4	105
100	1	175
200	250 kCmil	350

Table 126.2
Copper test conductor sizes

Device Rating, A	Conductor size, AWG
15	14 stranded
	14 solid
	12 stranded
	12 solid
20	12 stranded
	12 solid
30	10 stranded
	10 solid
50	6 stranded
60	4 stranded
100	1 stranded
200	3/0 stranded

Table 126.3
Aluminum test conductor sizes

Device rating, A	Conductor size, AWG
30	10 stranded 10 solid 8 stranded
50	6 stranded 4 stranded
60	4 stranded 3 stranded
100	1 stranded 1/0 stranded
200	250 kCmil stranded

Table 126.4
Copper test conductors for AL/CU receptacles identified for use on 75°C (167°F) wire

Device rating, A	Conductor size, AWG
30	10 stranded 10 solid
50	8 stranded 6 stranded
60	6 stranded 4 stranded

126.2 In addition to the requirements in Sections [110](#) – [125](#), the following types of receptacles shall comply with the Strength of Insulating Base Test, Section [128](#), and with the applicable performance requirements in the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E:

- a) A receptacle rated less than 30 A and employing setscrew-type pressure-wire terminals for field connection to copper branch circuit conductors only.
- b) A receptacle rated 35 A or more and employing setscrew- or clamp-type pressure-wire terminals for field connection to copper branch circuit conductors only.

The copper test conductors to be used in these tests shall be selected in accordance with [Table 126.2](#).

126.3 A receptacle less than 30 A and employing clamp-type pressure-wire terminals intended for use on copper branch circuit conductors only shall comply with the general requirements for receptacles contained in Sections [110](#) – [125](#), only.

127 Combination Wire Binding/Pressure Wire-Type Terminals

127.1 In addition to the requirements in Sections [110](#) – [125](#), a receptacle rated less than 20 A and also employing a combination wire binding/pressure wire-type terminal for field connection to copper branch circuit conductors shall comply with the Strength of Insulating Base Test, Section [128](#), and with the applicable performance requirements in the Standard for Equipment Wiring Terminals for Use with Aluminum and/or Copper Conductors, UL 486E.

127.2 The copper test conductors to be used in these tests shall be selected in accordance with [Table 127.1](#).

Table 127.1
Copper test conductor sizes

Device rating, A	Conductor size, AWG
15	14 solid 14 stranded 12 solid 12 stranded
20	12 solid 12 stranded 10 solid 10 stranded

128 Strength of Insulating Base Test

128.1 A receptacle employing pressure-wire terminals for field connection to branch circuit conductors shall not be damaged when 110 percent of the specified terminal tightening torque is applied to the wire securing means of the pressure-wire terminal which secures the maximum intended size conductor.

128.2 Damage is considered to have occurred if any cracking, bending, breakage or displacement of the insulating base, current-carrying parts, assembly parts, or device enclosure reduces electrical spacings to less than those required, exposes live parts, or otherwise impairs the intended secure installation and use of the device.

128.3 The terminal tightening torque to be used for this test is to be that assigned by the manufacturer in accordance with [12.4.3](#) and marked in accordance with Reference No. 18 of [Table 193.4](#).

128A Spring Action Clamp Terminal Pull Test

128A.1 A receptacle employing spring action clamp terminals shall be subjected to the test conditions as specified in [128A.2](#) – [128A.6](#).

128A.2 Upon completion of this test, there shall not be any damage to the terminal or its securement mechanism. The spring action clamp shall remain capable of functioning as intended. There shall not be any damage, arcing or dielectric breakdown during application of the test potential. The conductor shall not pull free from the terminal during application of the test force.

128A.3 Each terminal of each device (three terminals minimum) shall be tested. Each terminal shall be wired with the smallest AWG conductor size and wired with the largest conductor size, as specified by the manufacturer. If the spring action clamp is also intended for both solid and stranded AWG conductors, both solid and stranded shall be tested.

128A.4 The conductor insulation shall be prepared by removing the insulation from the conductor according to manufacturer's strip gauge and then inserted into the spring action clamp terminal as intended. The lever of the spring action clamp shall then be operated to the fully latched and locked position and back to the unlatched and unlocked position. This sequence of operation shall be repeated for a total of 100 cycles.

128A.5 Following the 100 cycles, the conductor shall be reattached to the spring action clamp terminal and the lever place in the latched position as intended. A static pull force as specified in [Table 128A.1](#) shall be applied to the conductor for 1 minute in a direction perpendicular to the plane of the receptacle body, tending to remove the conductor.

Table 128A.1
Test values for spring action clamp terminal pull test

Size of conductor AWG	Pullout force lbf (pounds)
16	9
14	11.5
12	13.5
10	18.0
8	20.5
6	21
4	30

128A.6 Each device is then to be subjected to a 50 - 60 Hz essentially sinusoidal potential equal to twice the rated voltage plus 1000 V applied between live parts of opposite polarity and between live parts and grounding or dead metal parts. The test voltage is to be increased at a uniform rate and as rapidly as is consistent with its value being correctly indicated by a voltmeter, and maintained at the test potential for 1 minute.

Self-Grounding Receptacles

129 General

129.1 In addition to the general performance requirements for receptacles, a self-grounding receptacle shall comply with the requirements in Section [130](#).

130 Fault Current Test

130.1 When tested as described in this section, the cotton surrounding the mounting screw and the self-grounding device shall not ignite. Electrical continuity between the mounting yoke and the metal test outlet box shall be maintained. The circuit breaker shall operate as a result of this test.

Exception: This test is not required for isolated-ground receptacles or receptacles rated more than 150 V to ground that are provided with devices intended solely to bond a metal flush plate to the metal test outlet box. Such devices are not intended for use in lieu of the bonding jumper required by the National Electrical Code, ANSI/NFPA 70.

130.2 When the receptacle is provided with a self-grounding device on each end of the yoke, each self-grounding device is to be evaluated separately.

130.3 Each of six previously untested receptacles is to be conditioned by completely removing the mounting screw from the self-grounding device and mounting yoke and replacing it three times. The mounting screw is to be removed by exerting a straight pull (not by rotating the screw) using a pair of pliers or other tool and reinserted by exerting a straight push. When mounting screws are not provided, steel flat-headed No. 6-32 mounting screws are to be used.

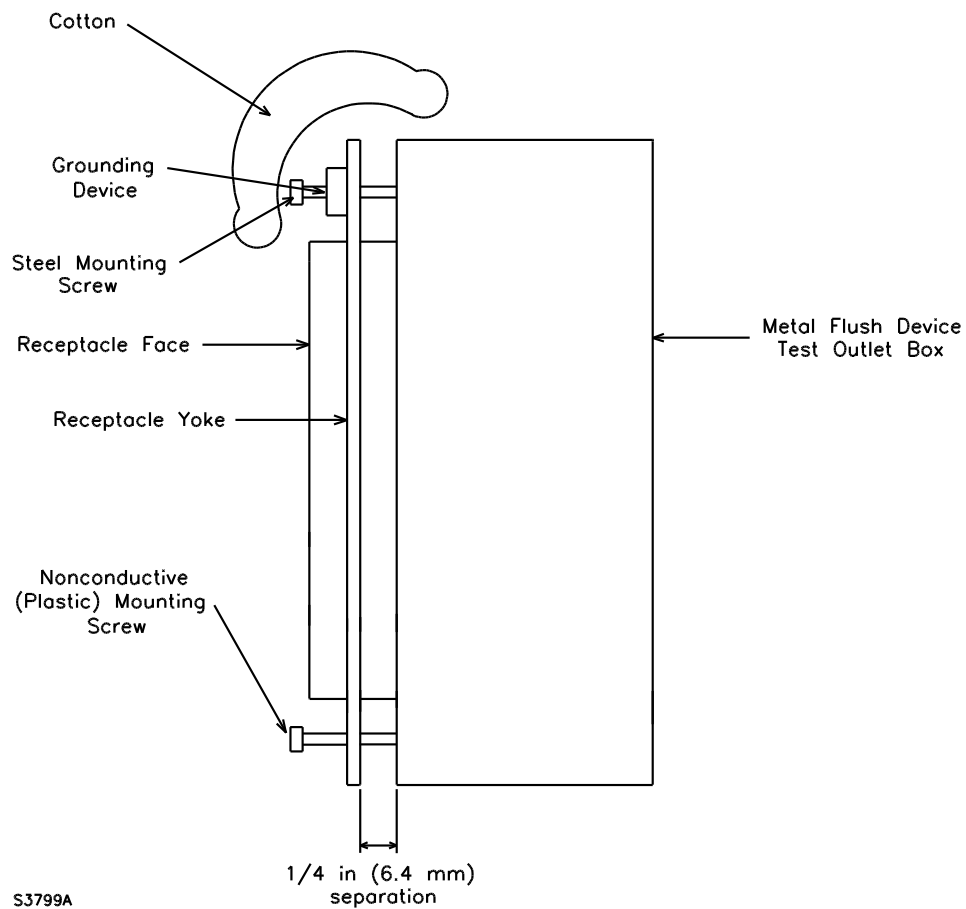
130.4 Each receptacle is to be tightly installed in a metal test outlet box using the mounting screws provided with the receptacles or steel flat-headed No. 6-32 mounting screws when mounting screws are not provided. Each receptacle is then to be removed from the outlet box and replaced three times without removing the mounting screws from the mounting yoke or self-grounding device. The installations and removals are to be made using a screwdriver or other tool and engaging the screw threads in the mounting hole and self-grounding device in the intended manner.

130.5 Each receptacle is then to be removed from the outlet box. A 4 foot (1.22 m) length of copper wire sized in accordance with [Table 130.1](#) is to be connected to the grounding terminal of the receptacle and a second 4 foot (1.22 m) length is to be connected to the grounding terminal of the outlet box. Each receptacle is then to be installed in the outlet box as shown in [Figure 130.1](#), so that the mounting yoke and all other grounded parts except the mounting screw passing through the self-grounding device are fully isolated from the outlet box. To isolate the box, the mounting screw passing through the self-grounding device is to be tightened to seat the yoke securely against the outlet box, then backed off until the yoke and the outlet box are separated by 1/4 inch (6.4 mm). The mounting screw and self-grounding device are to be loosely covered with cotton. The other end of the yoke is to be secured to the outlet box by a plastic mounting screw.

Table 130.1
Grounding conductor sizes

Receptacle rating, A	Grounding conductor size, AWG (mm ²)
15	14 (2.1)
20	12 (3.3)
30	10 (5.3)

Figure 130.1
Fault current assembly



NOTES

- 1) The test outlet box dimensions may vary to fit receptacle under test.
- 2) The test outlet box shall be either an outlet box that complies with the Standard for Metallic Outlet Boxes, UL 514A, or a test fixture made of sheet metal other than aluminum, not less than 0.0625 inch (1.59 mm) and shall employ threaded screwholes for No. 6-32 screws with a minimum of 2 full threads in the metal.

130.6 The free ends of the conductors are to be connected to a source capable of delivering a test current of 1000 A at the receptacle's rated voltage to ground with a power factor of 75 to 80 percent. A circuit breaker intended for branch circuit protection of the same rating as the receptacle under test but not less than 20 A is to be installed in series with the conductor connected to the outlet box.

130.7 After subjecting each receptacle to one application of the test current, the cotton is to be examined for ignition. Electrical continuity between the self-grounding device and the outlet box is to be checked using an ohmmeter, battery-and-buzzer combination, or other similar indicating device.

Push-In Terminals

131 General

131.1 In addition to the general requirements for receptacles, receptacles employing push-in terminals shall comply with the requirements in Sections [132](#) – [137](#).

131.2 Tests with receptacles that contain wire release mechanisms that activate more than one wire opening at a time, are to be tested with all single and multiple intended conductor combinations.

132 Pullout Test

132.1 A push-in (screwless) terminal for a factory-wired device for use with both solid and stranded conductors is to be tested as described in this Section and in Temperature Test, Section [133](#), using both solid and stranded conductors. Tests with stranded conductors are to include separate conductors for the maximum and minimum numbers of strands available in the wire sizes intended for use with the terminal in accordance with the manufacturer's instructions.

132.2 When tested with stranded conductors, all strands of the conductor must enter the terminal gripping area as intended without exposure of stray strands or reduction of required spacings.

132.3 A push-in (screwless) terminal shall withstand without pullout or breakage of the conductor, or of any strand of the conductor, the application of a straight pull for 1 minute as described in [132.4](#).

132.4 Six conductors of the intended size, either solid or stranded are to be connected to the terminals in accordance with the manufacturer's instructions. If both solid and stranded conductors are to be used, six of each type are to be tested. Each assembly is to be subjected to a pull on the wire that is to be gradually increased to 5 lbf (22 N).

133 Temperature Test

133.1 A push-in (screwless) terminal, for a factory-wired device, when tested as described in this Section, shall be capable of functioning without the temperature rise exceeding 30°C (54°F) based on an ambient temperature of 25°C (77°F).

133.2 For a factory-wired device, the size and type of conductors used are to be in accordance with the manufacturer's instructions. The maximum rated current is to be passed through the assemblies.

133.3 The assemblies described in [133.2](#) are to be tested for 30 days without interruption. The device temperature is to be measured at the end of each working day.

133.4 The test described in this section may be conducted in conjunction with the Temperature Test described in Section [113](#).

134 Conductor Insertion and Retention Test

134.1 A flush or self-contained receptacle having a 5-15R, 5-20R, 6-15R, or 6-20R configuration and provided with push-in terminals, when tested as outlined in [134.2](#) – [134.7](#) shall be capable of being wired properly without:

- a) Physical damage to the receptacle, including the terminals,
- b) Damage to the electrical insulation, or
- c) A reduction in spacings.

134.2 For one half of the receptacles, one line terminal and one neutral terminal on a receptacle rated 125 V, or one line terminal on each pole of a 250 V receptacle, are to be tested. On the remaining receptacles, terminals of the same polarity with the break-off tab between them removed to simulate a multiwire branch circuit installation, are to be tested. The receptacles are to be wired following the manufacturer's instructions. The stripped wire is to be inserted into the terminal as far as possible.

134.3 For terminals intended to receive one or more wires under the same spring, the terminals are to be tested in each of the following wiring configurations:

- a) One terminal with one wire in one wire entrance hole,
- b) One terminal with one wire in the other entrance hole, and
- c) One terminal with one wire in each of the two entrance holes, at the same time.

134.4 To determine compliance with [134.1](#) each tested terminal and wire combination is to be examined after the last wire insertion. The receptacles are to be subjected to a Dielectric Voltage- Withstand Test, as described in Section [65](#), except that the receptacles are not required to be subjected to the humidity conditioning described in [65.1.2](#). The test potential of 1000 volts plus twice the rated voltage is to be applied between:

- a) Live parts of opposite polarity, and
- b) Live parts and dead metal parts.

134.5 Each tested terminal and wire combination shall then withstand the application of a straight pull for 1 minute of the force in [134.6](#) without:

- a) Pullout or breakage of the conductor, or
- b) Any reduction in the electrical spacings at wiring terminals or within the device.

134.6 Each tested terminal is to be subjected to a pull on the wire that is to be gradually increased to 20 lbf (89 N) for a general-use device, or 5 lbf (22 N) for a factory-wired device.

134.7 At the completion of the test described in [134.6](#) there shall not be dielectric breakdown when each terminal is again tested as described in [134.4](#).

135 Conductor Push-In Test

135.1 The same flush and self-contained receptacles having a 5-15R, 5-20R, 6-15R, or 6-20R configuration used for the Conductor Insertion and Retention Test, Section [134](#), but with the original test wires removed, are to be tested for conductor push-in as described in [135.2](#), using newly stripped conductors as described in [135.3](#).

Exception: For receptacles without a wire release mechanism, previously untested receptacles are to be used.

135.2 As a result of inserting the test conductors, there shall not be:

- a) Interference with the insertion of an attachment plug, or
- b) Protruding of the test conductors through the device face or any other openings in the device body, or
- c) Contact with grounding or dead metal parts such as the mounting yoke, or
- d) Interference with the electrical connection between the contact and the blades or ground pin of a mating attachment plug, or
- e) Dielectric breakdown when tested as described in [134.4](#) and [134.5](#).

135.3 Previously unused lengths of solid copper wire are to be used. Strip 2 inches of the wire insulation. The bare wire is then to be inserted until the entire length is used or further insertion is not possible. Each terminal of a receptacle is to be tested. A force sufficient to fully insert the wire is to be applied.

136 Terminal Abuse Test

136.1 The same flush and self-contained receptacles having a 5-15R, 5-20R, 6-15R, or 6-20R configuration used for the conductor insertion and retention test and the conductor push-in test are to be tested as described in this section. The test conductors used in the previous tests are to be removed from the receptacles using the wire release mechanism.

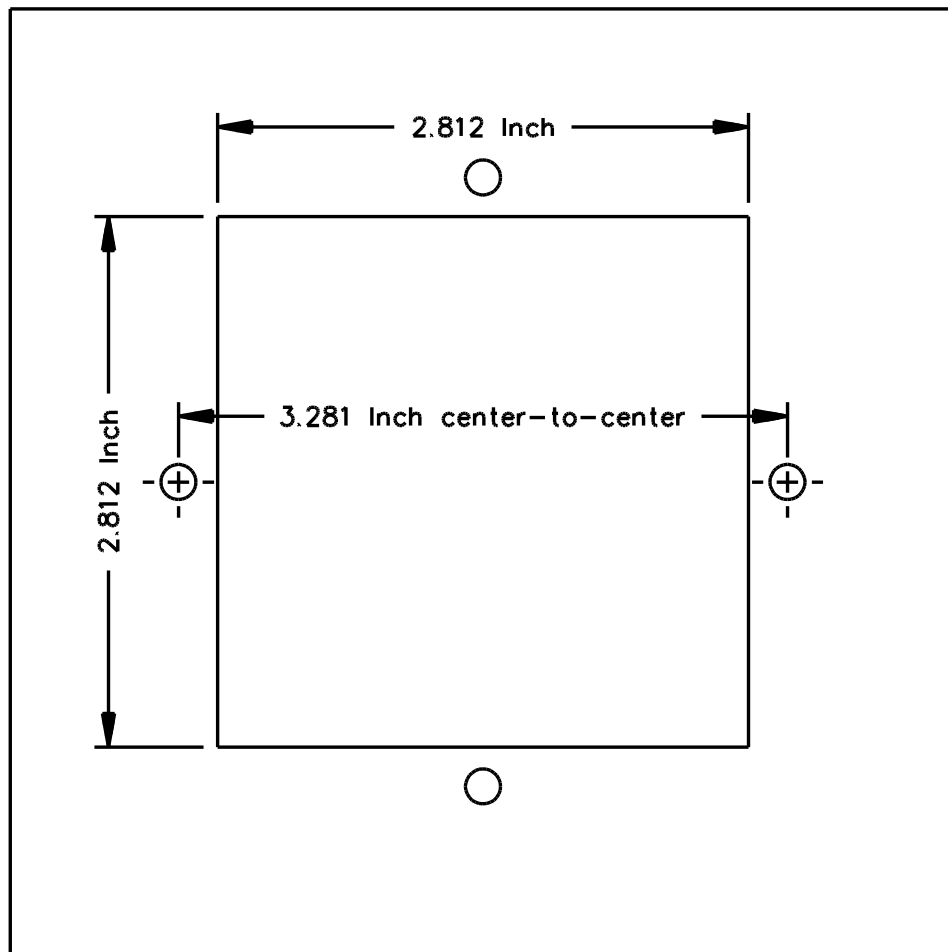
Exception: For receptacles without a wire release mechanism, previously untested receptacles are to be used.

136.2 As a result of the test described in [136.3](#), there shall not be any breakage or distortion of the insulating body of the receptacle that:

- a) Would expose live parts to contact by a 1/32 inch (0.79 mm) diameter rod, or
- b) Results in reduction of electrical spacings to values less than those required for the receptacle.

136.3 Each receptacle is to be mounted in the test fixture shown in [Figure 136.1](#) with its face in a vertical plane. The test pin shown in [Figure 136.2](#) is then to be fully inserted into the "Push-In" terminal opening. An 8-ounce (0.23-kg) weight is to be gradually suspended from the test pin 6 inches (152 mm) from the plane of the terminal opening. The weight is to be applied for one minute, following which the weight is to be removed. The application of the weight is to be repeated with the receptacle rotated 90, 180 and 270 degrees for a total of four applications per receptacle.

Figure 136.1
Test fixture



S3631

NOTE – Holes are tapped for No.6-32 Device Mounting Screws