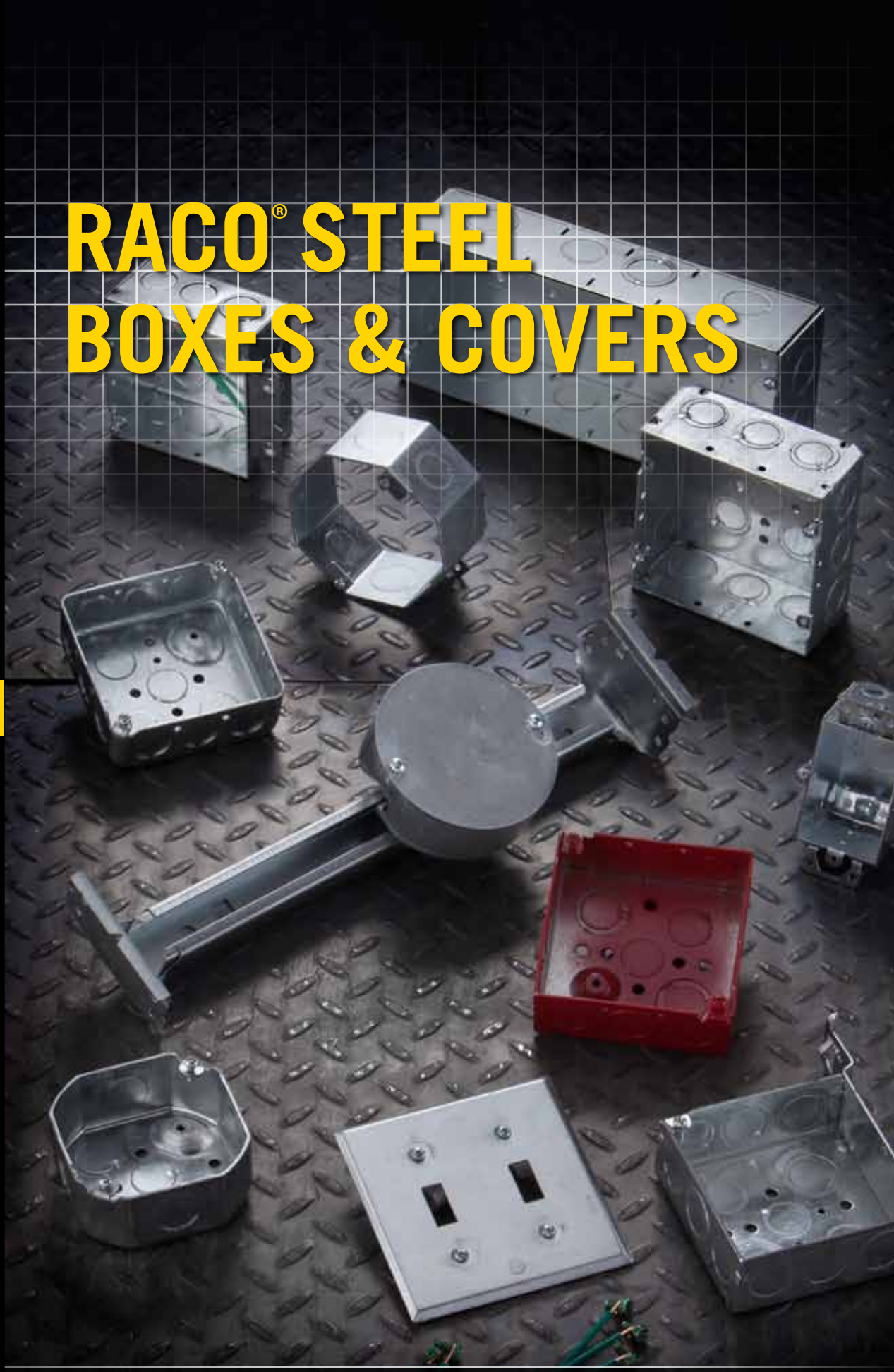
TRAINING MANUAL

RACO®

RACO® STEEL BOXES & COVERS



HUBBELL® RACO® TAYMAC® BELL®

RACO HISTORY

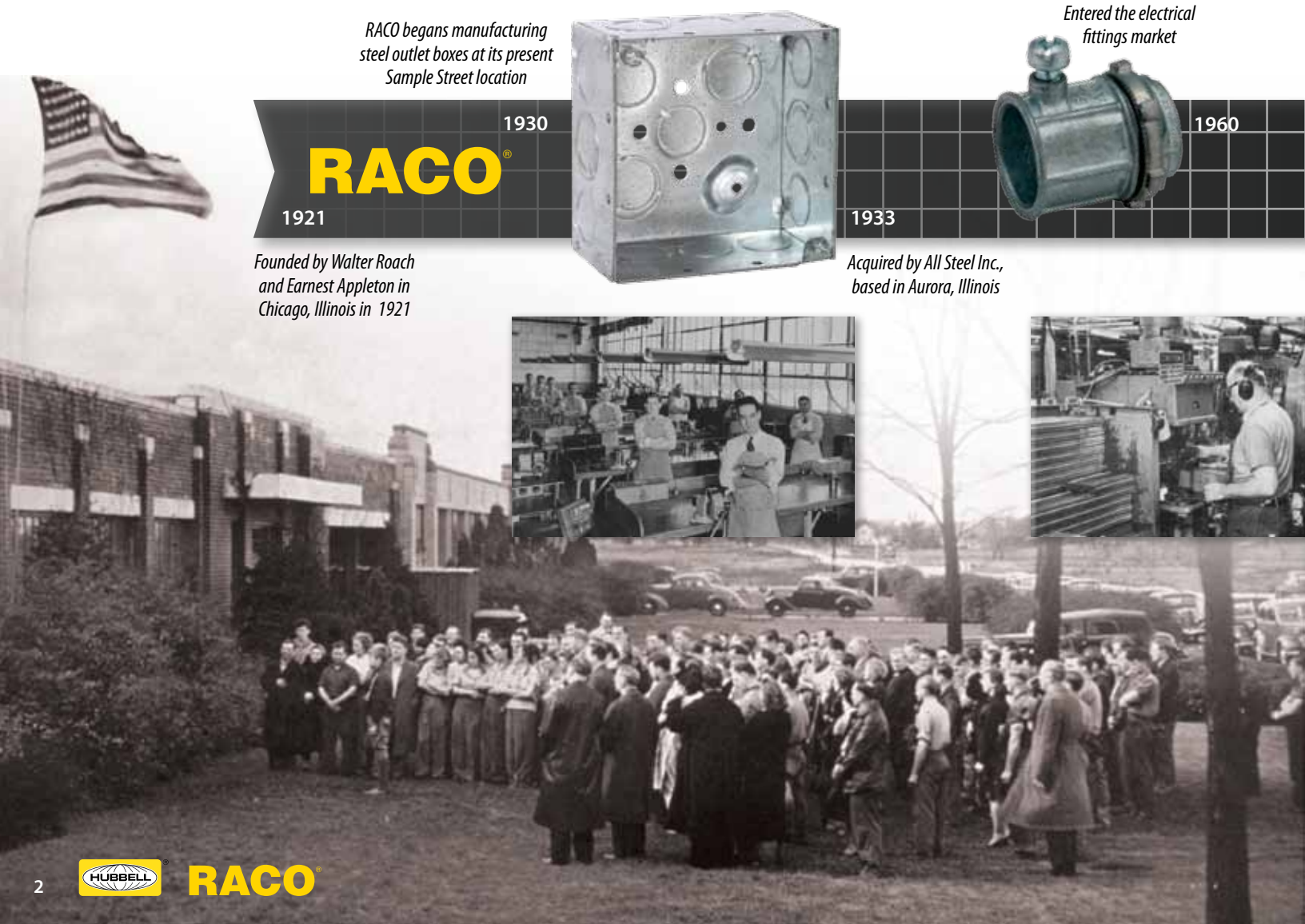
RACO was founded by Walter Roach and Earnest Appleton in Chicago, Illinois in 1921. The business was moved to South Bend in 1930.

In 1930 RACO, INC. known at that time as Roach Appleton Manufacturing Company, began manufacturing steel electrical switch and outlet boxes at its present Sample Street location. All Steel Inc., based in Aurora, Illinois, acquired the firm in 1933. since then RACO brand electrical boxes have become the recognized leader in the construction industry.

By 1960, acquisitions hastened RACO's entry into a related product, electrical fittings. Accelerated growth demanded larger facilities. During the 60's the adjoining Bike-Webb and Belleville Lumber properties on Sample Street were acquired and expanded into manufacturing facilities. In 1968 a 127,000 square foot Curtiss-Wright plant on Chippewa Avenue was purchased for a warehouse.

Hubbell Incorporated a widely recognized leader in the electrical industry and a Fortune 500 company at Orange, Connecticut, acquired RACO in April, 1981 and RACO is now operated as an independent subsidiary.

Today, RACO continues to lead the industry using state of the art manufacturing techniques while developing leading edge new product designs. The majority of RACO steel box products continue to be proudly manufactured in the United States. To service it's expanding market presence, in 2013 RACO opened a 100,000+ sq. ft. super efficient distribution facility located in South Bend, IN. The RACO, TayMac and Bell brands are managed from the South Bend facility.



Purchased the 127,000 sq. ft. Curtiss-Wright plant for use as warehouse

1968

HUBBELL®

Acquired by Hubbell a Fortune 500 company and leader in the electrical industry

1981

BELL®

Acquired the BELL Electrical Products line of outdoor and weatherproof boxes and enclosures

1986

Acquired Arizona based TayMac a leading provider of while-in-use weatherproof covers and other electrical products.

2012

TAYMAC®

2013

Open a 100,000+ sq. ft. super efficient distribution facility in South Bend, IN

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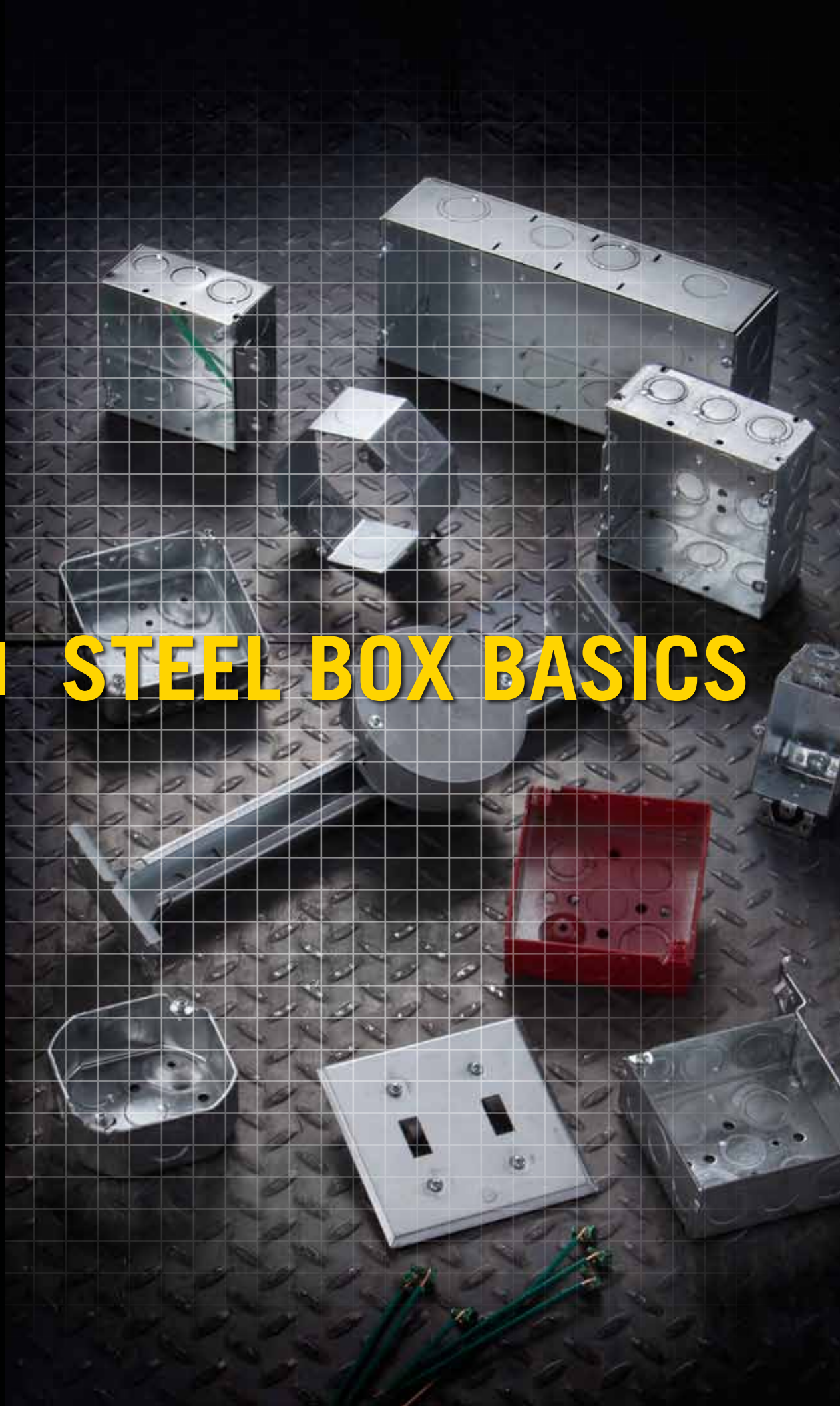
SECTION **A**

STEEL BOX BASICS



OLD WORK VS. NEW WORK

What is "New Work"?

When a building is under construction, the roughing-in takes place when the ceiling joists and wall studs are in place, but before the finished wall covers them. This is termed as *new work* in the trade. Boxes and wiring systems install the easiest at this time in the construction process. Even in remodeling, when the old drywall or plaster is removed and the studs are exposed, the electrical roughing-in proceeds efficiently.

New Work

What is "Old Work"?

With the advent and increased use of data, voice and power, many homeowners today desire additional outlets and switches. Adding these after the wall surface is in place is called *old work*. Old work takes place after the drywall or plaster is in place.

Old Work

Hidden Construction

Hidden Construction vs. Open Construction

Hidden construction is found in both residential and commercial construction. This is where the box is covered by drywall, paneling or embedded in concrete. The only part exposed is the switch or receptacle plate.

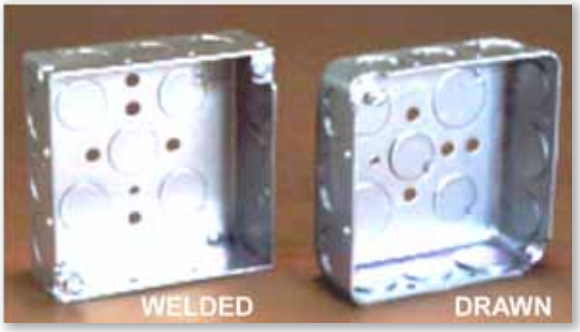
Open construction is found in attics, garages and basement walls. Industrial applications utilize open construction when running pipe and boxes across ceilings, down I-beams, or on the sides of equipment. Open construction vs. hidden construction may be important when trying to decide whether a drawn or welded box is appropriate for an application.

Open Construction

STEEL BOXES: WELDED VS. DRAWN

Steel Used in Welded or Drawn Steel Boxes

RACO steel boxes and covers are manufactured from 0.0625" or approximately 1/16" thick steel as required by Underwriters Laboratories, Inc. (UL). RACO begins with coils of steel weighing up to 15,000 lbs. The coils are slit into precise widths and inspected electronically for uniform thickness. The slit coils are then distributed to the appropriate manufacturing line where the welded or drawn boxes are made.



What is a Welded Box?

Below (Figure A) illustrates a welded box. All punching operations are done while the box is still in the "flat" state. Metal sheets are then formed and projection welded into the box shape. A projection weld produces a bond that is stronger than the steel itself. The same projection welding process is used in mounting brackets to the boxes. Welded boxes provide more "work room" due to the square, not rounded, corners.

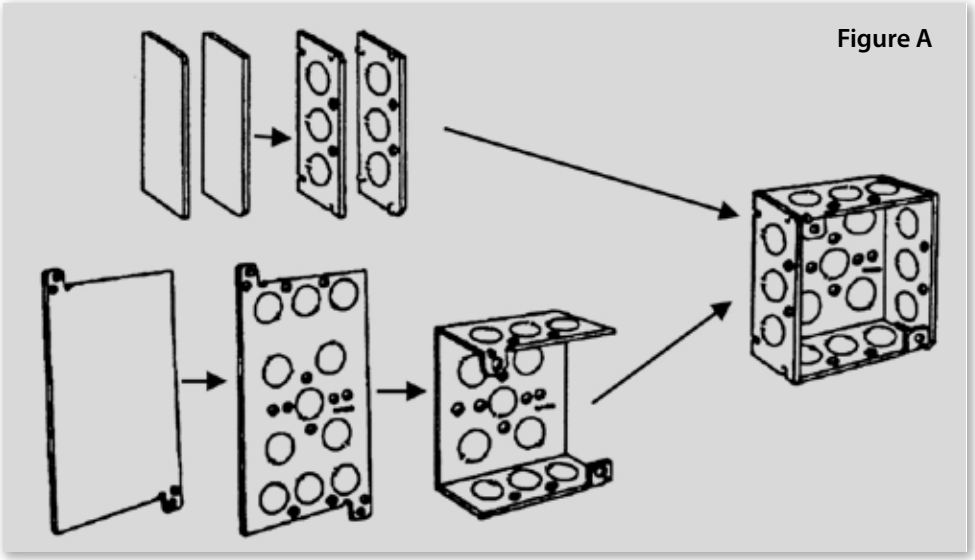


Figure A

Welded Box

What is a Drawn Box?

Figure B illustrates a drawn box. Drawn style boxes start with a steel coil that is fed into a draw press that stamps the shell of the box. The shell then moves through an automated line that produces a complete box in a series of operations (Figure B). Sharp edges are cleanly trimmed away, knockouts (KO's) are cut, ears are bent and tapped, nail holes and ground holes are pierced. Because of the rounded corners, the advantage of drawn boxes is a neater appearance (no sharp edges) when surface mounted in exposed work applications.

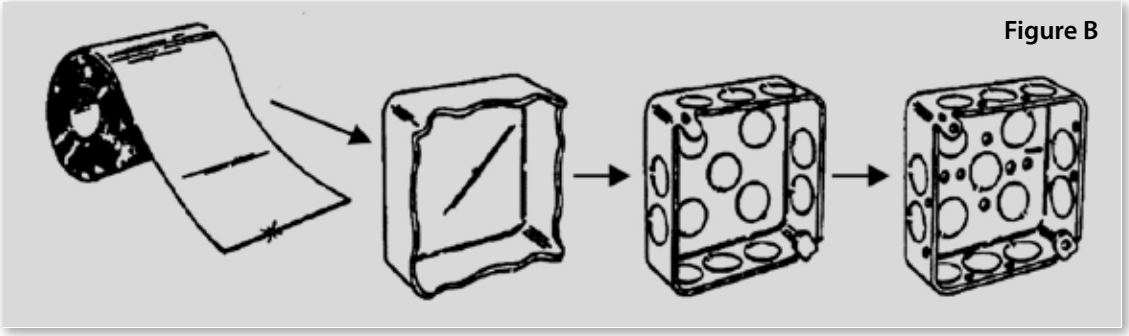


Figure B

Drawn Box

Applications

Welded boxes are typically mounted in wall and ceiling applications and are rarely surface mounted in exposed work applications. Drawn style boxes are typically used in exposed work/surface mount applications because of the smooth edges (Figure C). Overall, the use of drawn vs. welded boxes varies by different regions of the country and is usually influenced by type of installation and past use of style.

Figure C

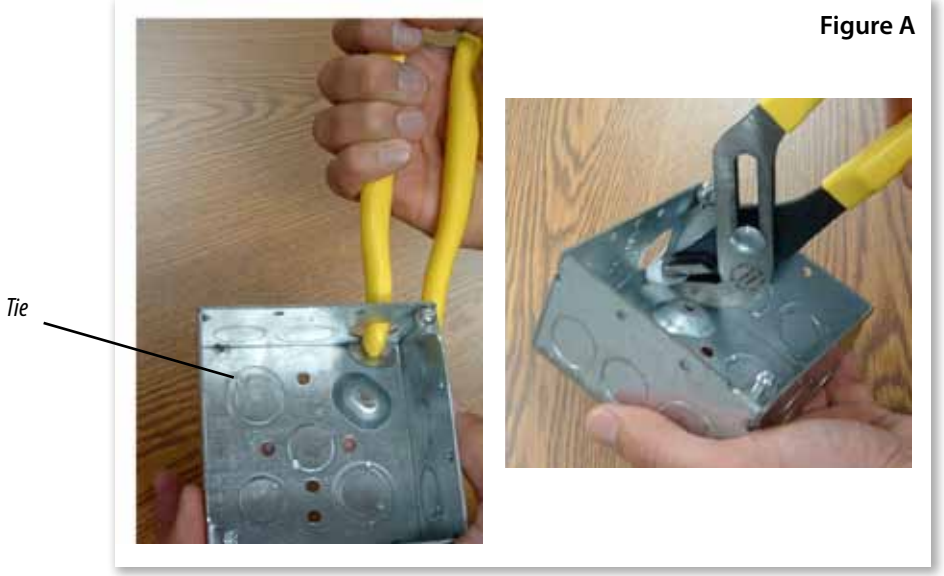
A surface mounted handy box

KNOCKOUTS & PRIOUTS

What is a Knockout (KO)

A knockout is a circular tab on the side or bottom of a box through which a fitting may be inserted to connect conduit pipe to a junction box. In the RACO manufacturing process the tab is pushed back in place with a small piece of steel remaining uncut (called a "tie"). The tie, in conjunction with the flattened feature, holds the KO in place until it is removed. While there may be many KOs on a box, few are used. Multiple KOs are provided to give the installer the ability to enter the box from any direction. Prior to use, the KO slug is pushed into the box with Channel Locks™ then twisted off (Figure A). The KO slug is then replaced with a conduit fitting or connector to accommodate the desired wiring system. Knockouts come in four trade sizes: 1/2", 3/4", 1", 1-1/4", 2".

Figure A



Conduit knockouts - push in... twist off

Eccentric vs. Concentric Knockouts

Eccentric Knockouts:

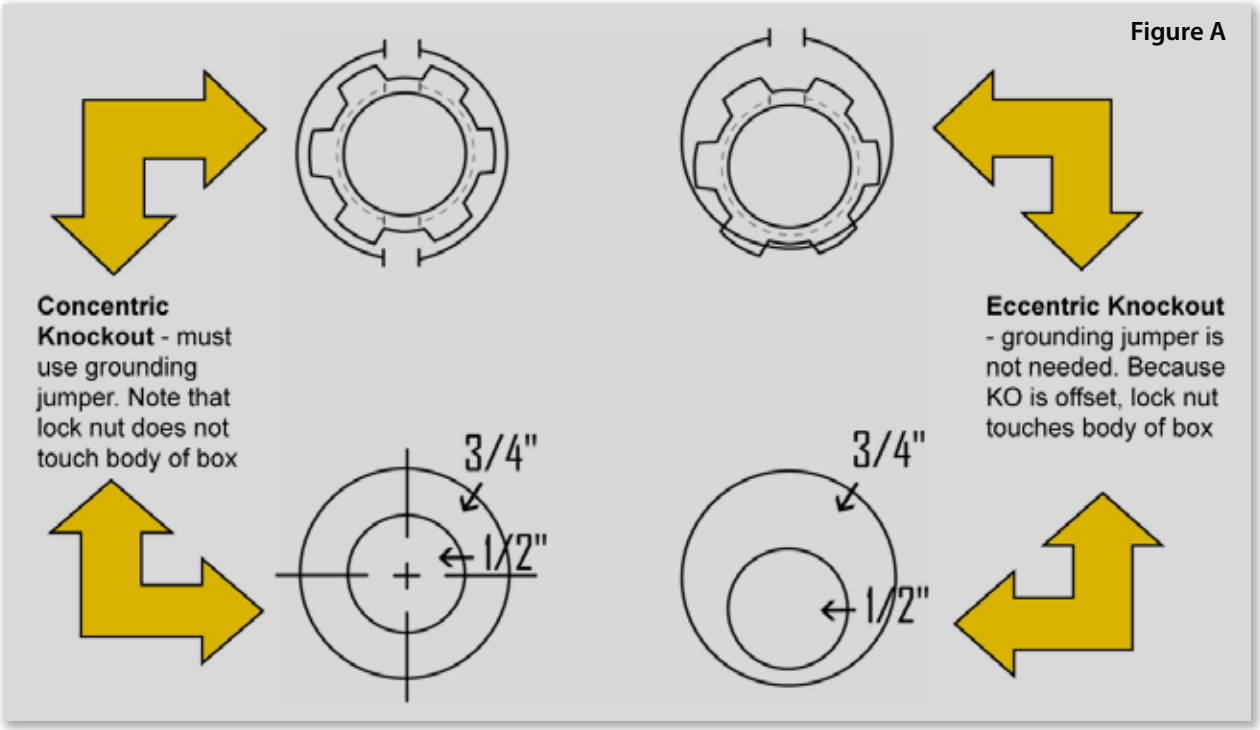
Eccentric knockouts do not share the same center point. The outside knockout is offset from the smaller inner knockout (Figure A). Eccentric knockouts, such as RACO's patented TKO®, have several distinct advantages over competitor versions. Because each KO within the RACO TKO is attached with one tie, they are easier to remove than competitive eccentric KOs (Figure A). And the RACO TKO hole edges are cleaner once the slug is removed from the box. Unlike concentric knockouts, eccentric KO's do not require the use of a bonding jumper. Eccentric KOs can be used in applications up to 600V.

Concentric Knockouts:

A concentric knockout is a combination knockout (1/2" & 3/4" or 1" & 1-1/4") where all knockouts share the same center (Figure A). This type of knockout is still used by RACO in non-gangable masonry boxes and large gang boxes only. Concentric knockouts have several disadvantages:

1. Must use a grounding/bonding jumper when connecting a fitting to the box (Figure A).
2. They are difficult to remove. For these reasons, eccentric knockouts are being used more and more by box manufacturers in place of the old concentric style knockouts.
3. Limited to 250V applications.

Figure A



What is a Priout?

A priout (or pryout) is a circle or pear shaped hole cut into the steel with a tie holding it in place. The name gives you an indication of how it is used. The priout has a slot in it where a screwdriver tip is inserted to pryout the steel, providing an opening for cable (Figure B). Where most KO's are pushed into the box during installation, a priout is pried out of the box by a single twist of a screwdriver. The pear shaped RACO priout eliminates the chances of cutting the cable during installation. Cable priouts differ from knockouts in many ways. The priout is used mostly for nonmetallic sheathed cable or metal clad (MC). Priouts are formed in pairs and are accompanied by factory installed cable clamps. Priouts can be found in octagon, switch and 4" and 4-11/16" square boxes featuring cable clamps.

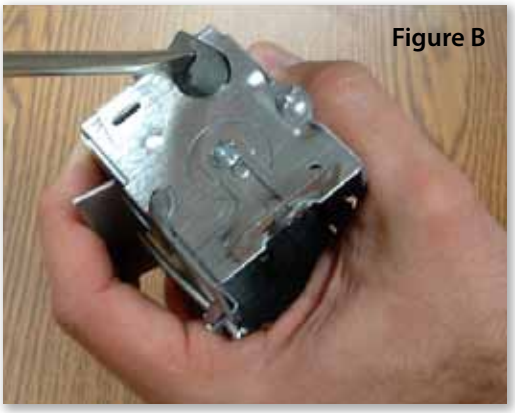
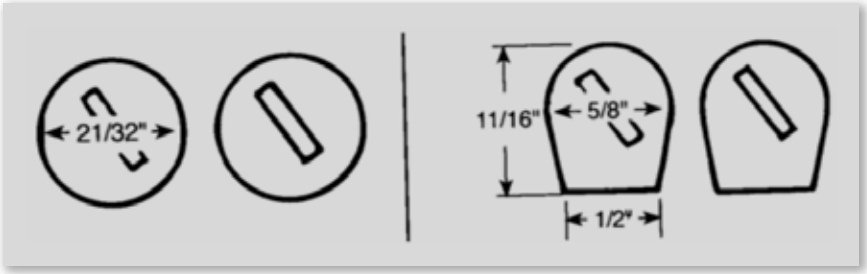


Figure B

Angled slot speeds removal



CABLE CLAMPS

What is a Cable Clamp?

RACO offers two basic types of internal cable clamps which are preinstalled in the box. One secures nonmetallic sheathed cable, the other (MCI) metal clad (MC) or armored cable (BX) type cable. Each clamp can secure two cables, side by side. Priouts must be used in order for the cable to enter the box and be installed in the clamp. Both types of clamps eliminate labor and additional costs associated with an external fitting or coupling.

"L Clamp" - For nonmetallic sheathed cable

RACO "L clamp" has a unique feature. Each clamp has legs that push the clamps away from the priout openings allowing the nonmetallic sheathed cable to slide under the clamp. The clamp screw is simply tightened down to complete the installation.

"X Clamp" - For metal clad flex cable (MC) or armored cable (BX) or (MCI)

RACO "X clamp" accommodates both metal clad cable or armored cable. (MCI) The "X clamp" has a bushed stop to prevent the sharp edges of the armored cable from being inserted into the box where it could damage the insulation or conductors.

Keeps clamp clear from priout opening until screw is tightened

Protective stop feature on clamp eliminates need for anti-short bushing

THE INSIDER® CLAMP

Product Features

THE INSIDER® is the only NMSC connector that has been UL tested for use with an eccentric knockout. It can accommodate one of the widest ranges on NMSC combinations in the industry. The unique design of THE INSIDER allows the installer to run the NMSC through a 1/2" knockout and into THE INSIDER to the desired length before snapping the connector into the knockout (Figure A).

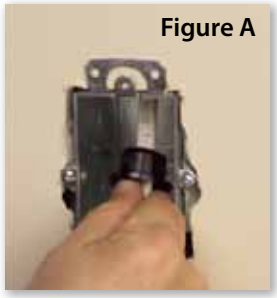


Figure A

No need to cut an oversized hole for an old work box and connector installation. The unused, larger portion of the TKO will not pull out. Tool-less installation eliminates the wasted time and material on locknut installation on a standard 1/2" fitting installation. Turns a conduit box into a Romex™ box in seconds (Figure B).


Figure B

Installation of THE INSIDER® Clamp

Installation is tool-less. Install THE INSIDER through the inside of the box (Figure C). Once insider is placed into the 1/2" knockout just press on THE INSIDER until it snaps into place and protrudes through the outside of the box (Figure D).

Should there be an error, THE INSIDER is easily removed by squeezing the side tabs and pushing THE INSIDER back into the box.

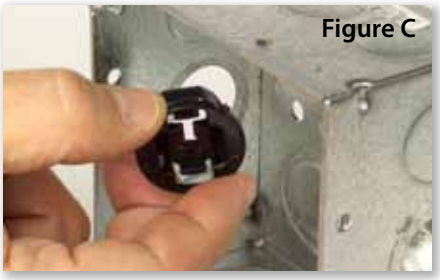


Figure C

Easy Installation - Remove desired knockout. Insert THE INSIDER into the knockout from inside the box.

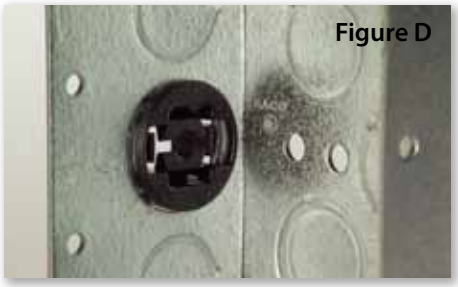


Figure D

Installed – Ready for cable.

Easy Removal - Push the wing tab of the connector with a screwdriver. Push the connector through the knockout towards the inside of the box.

Large Cable - For two cable installations insert the cables through the connector together or one by one. Ideal for circuit breaker panel use.

WIRING SYSTEMS – CABLE & FLEXIBLE CONDUIT

Types Of Wiring Systems (Figure A)

There are various types of cable wiring systems used in construction today. Most are unique to either commercial or residential construction or various geographical regions throughout the U.S. This module highlights the different types of cable and flexible conduit.

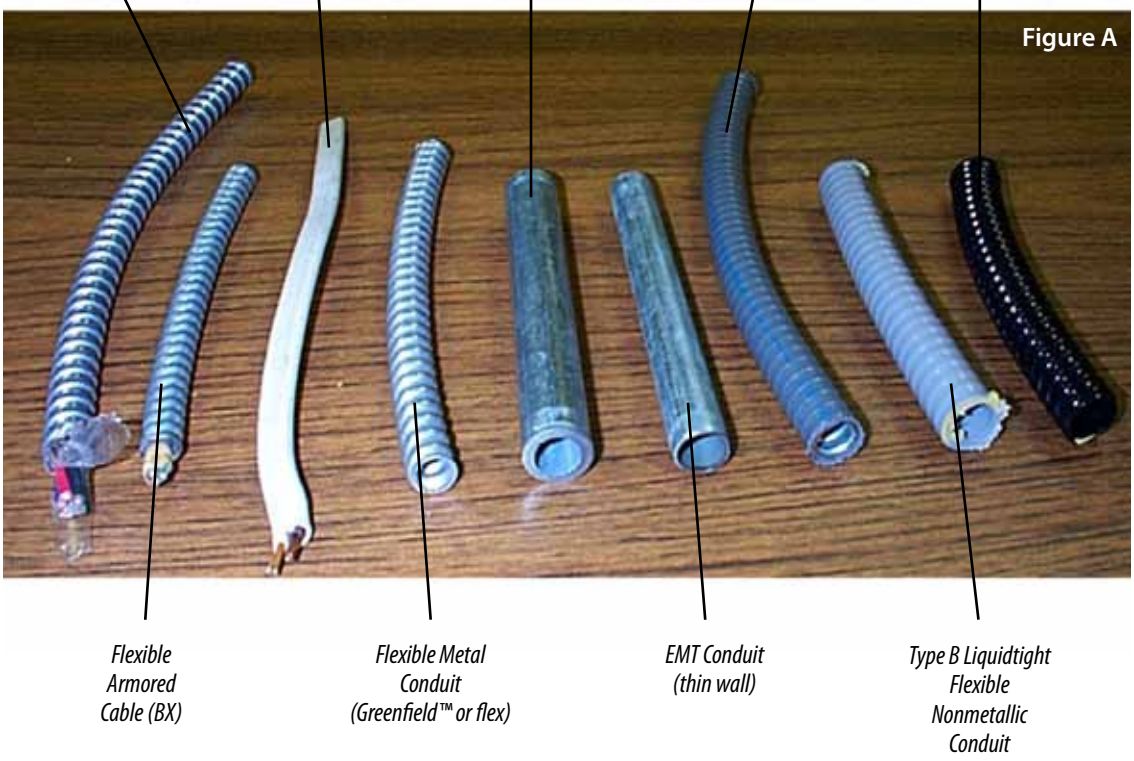
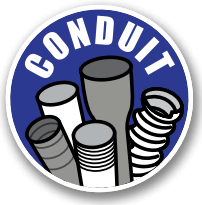


Figure A

MOST COMMON TYPES OF WIRING SYSTEMS

Flexible Metallic Conduit (Flex)



Flexible metallic conduit is frequently call "Greenfield™" which is the trade name of one manufacturer of this flexible steel or aluminum raceway. It is used around machinery where vibration or movement exists or where complex routing of the raceway dictates a flexible conduit. It is also used for short connections from junction box to light fixtures in false ceilings or commercial buildings. It offers good mechanical protection, but is approved for only dry locations. Greenfield™ is available in steel or aluminum, in trade sizes of 3/4" to 4", and is supplied in coils. Greenfield™ must be supported every 4-1/2 feet and within 12" of a box. The only exceptions to the support requirements are light fixtures in old work applications. Usually the conduit serves as the ground path.

Flexible Armored Cable (BX)

Flexible armored cable is commonly called BX, a manufacturer's trade name. It may be described as pre-wired since it includes two or more current carrying conductors and can be furnished with a grounding conductor. The conductors are individually insulated. BX is permitted indoors in dry locations only. BX must be supported every 4 feet and within 12" of a box, except in old work. Often the conduit serves as the ground path.

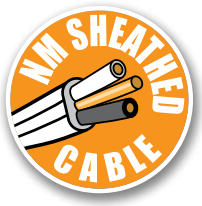
Metal Clad Cable (MC Cable)

MC Cable is a factory assembly of one or more insulated conductors wrapped in a polypropylene tape enclosed in a steel or aluminum armor. MC Cable is typically used indoors in exposed and concealed locations for power, lighting control and signal circuits. MC Cable, unlike Armored Cable, cannot be used as a grounding means.

MC Cable and Armored Cable are similar in look and feel. An easy way to differentiate between the two is to look for the type of material used to wrap the conductors inside the armor. Armored Cable typically uses paper as a wrap around the conductors, while Metal Clad Cable typically uses a clear plastic (polypropylene) tape as a wrap around the conductors.

MC Cable must be supported and secured every 6 feet and within 12" of a box.

Nonmetallic Sheathed Cable



Nonmetallic sheathed cable, often called by a manufacturer's trade name Romex™, is two or more insulated conductors, usually copper, protected by an outer covering of nonmetallic material. Type NM must be used in dry locations, but type NMC has an outer covering that resists dampness and fungus. Nonmetallic sheathed cable is used in one or two family dwellings, multi-family dwellings and other structures not exceeding three floors above ground. It is the accepted raceway for nonmetallic outlet and switch boxes. Nonmetallic sheathed cable is not permitted in industrial applications and prohibited by some local codes. Instead of "trade size", nonmetallic sheathed cable is described by conductor size, number of conductors, and with or without ground wire. Nonmetallic sheathed cable is sold in coils and is available in a range of sizes, the most popular are #14 and #12. Nonmetallic sheathed cable must be supported every 4 feel and within 12" of the box.

EMT Conduit

Electrical metallic tubing (EMT), sometimes called thin-wall, is commonly used instead of galvanized rigid conduit (GRC), as it is less costly and lighter than GRC. EMT itself is not threaded, but can be used with threaded fittings that clamp to it. Lengths of conduit are connected to each other and to equipment with clamp-type fittings. Like GRC, EMT is more common in commercial and industrial buildings than in residential applications. EMT is generally made of coated steel, though it may be aluminum.

Rigid Conduit

Rigid Metal Conduit (RMC) is a thick-walled threaded tubing, usually made of coated steel, stainless steel or aluminum.

IMC Conduit

Intermediate Metal Conduit (IMC) is a steel tubing heavier than EMT but lighter than RMC. It may be threaded.

Aluminum Conduit

Aluminum conduit, similar to galvanized steel conduit, is a rigid tube, generally used in commercial and industrial applications where a higher resistance to corrosion is needed. Such locations would include food processing plants, where large amounts of water and cleaning chemicals would make galvanized conduit unsuitable. Aluminum cannot be directly embedded in concrete, since the metal reacts with the alkalis in cement. The conduit may be coated to prevent corrosion by incidental contact with concrete. Aluminum conduit is generally lower cost than steel in addition to have a lower labor cost to install, since a length of aluminum conduit will have about one-third the weight of an equally-sized rigid steel conduit.[2]

In extreme corrosion environments where plastic coating of the tubing is insufficient, conduits may be made from stainless steel, bronze, or brass.

BRACKETS

Bracket Types

RACO manufactures many types of brackets used for mounting steel boxes. Some are specific to wood or metal stud construction. Most, however, can be used on both wood or metal studs. Table A highlights RACO's 11 different types of brackets. Below are RACO's most popular brackets.

FH Bracket
Side-mount bracket with hooks that drive into face of stud.

FM Bracket
Mounts on flat side of stud.

TS Bracket
Side-mount bracket for octagon, square, switch and handy boxes. Guaging tabs and recessed nailing spurs.

H Bracket
Narrow bracket allows side-by-side mounting on stud. Positioning tabs locate box perfect distance from stud. V notch centers box. Dimples protect flush drywall installation.

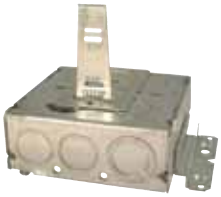
M Bracket
Brackets on both/opposite sides of box.

B Bracket
Face Mounts on front edge of wood stud. Use when space between studs is limited.

MS (BOX-LOC®) Bracket
Positions box on either side of stud. BOX-LOC® (MS) Bracket Box is a snap to install. Place the bracket on the open side of the stud. Slots in the bracket engage the lip of the stud and actually crimp it as you press the bracket on the stud. Barbed hooks dig into the flat side of the stud, quickly locking it into place.

D Bracket
Mounts on flat side of stud.

J Bracket
Spurs, slotted holes for toe-nailing. Guaging notches at 3/8" and 1/2".



UBS Bracket
Universal Back Side support to provide bracing on back of box for wall cavities 2-1/2" - 6" thick.

A Bracket
Positions handy box against face and side of stud.

USB Bracket
Mounts on flat side of stud. Guaging tabs and recessed nailing spurs.

W Bracket
Positions box away from side of stud to clear the trim molding of a door frame.

LB Bracket
Face mounts on front edge of wood stud. Use when space between studs is limited. 5/8" offset to clear narrow door molding.

Table A

BRACKET TECHNICAL DATA												
BRACKET TYPE	"A"	"B"	"D"	"FH"	"FM"	"USB"	"J"	"LB"	"MS"	"TS"	"W"	"H" or "M"
LENGTH (In.)	6-7/16"	1-61/64"	6-1/4"	7-3/8"	6-7/8"	7-3/8"	2-3/8"	1-31/32"	4-1/2"	7"	6-25/32"	4-15/16"
WIDTH	5/8"	2"	21/32"	1-9/16"	1-9/16"	1-9/16"	2-23/32"	3-3/64"	1-1/2"	1-1/16"	1-1/16"	7/8"
OFFSET				3/8"	3/8"	3/8"	1/4"			17/64"	1-5/16"	3/8"
FOR METAL	✓		✓		✓				✓	✓	✓	✓
FOR WOOD	✓	✓	✓	✓	✓	✓	✓	✓		✓	✓	✓

EARS

Ear Types...

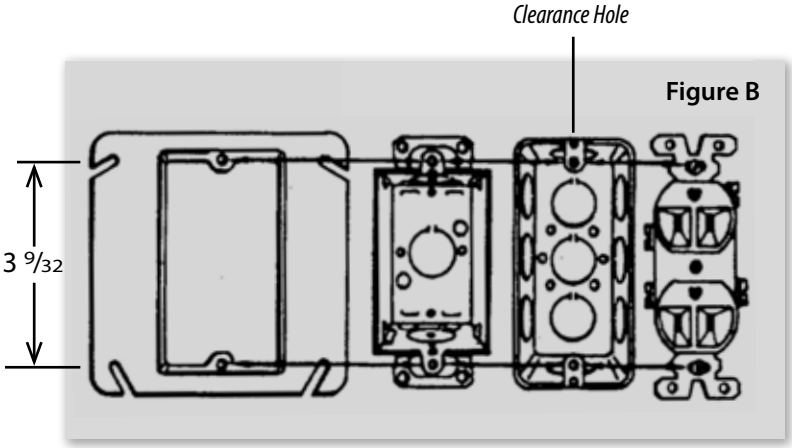
There are essentially three types of "ears" associated with steel boxes. Each type of ear is defined below.

1) Device Ears

Device ears are formed on switch boxes, handy boxes, masonry boxes, gang boxes, mud rings as well as some covers. They are called device ears because a wiring device such as a switch or receptacle mounts directly to them. The ears are turned inside on some boxes and outside on others (Figure A). You will notice that on standard 3" x 2" switch boxes, the device ears are turned out. In masonry and handy boxes, the device ears are turned in. Whether the device ears are in or out, they are always spaced on 3 9/32" centers to accept standard wiring devices (Figure B). Multi-gang boxes and device covers have a pair of device ears for each gang. On most device ears you will notice an additional hole. This is a relief hole, and is used in manufacturing. It allows the ear to be bent at a sharp 90 degree angle without distorting the tapped device hole.

Figure A

Figure B



2) Cover Mounting Ears

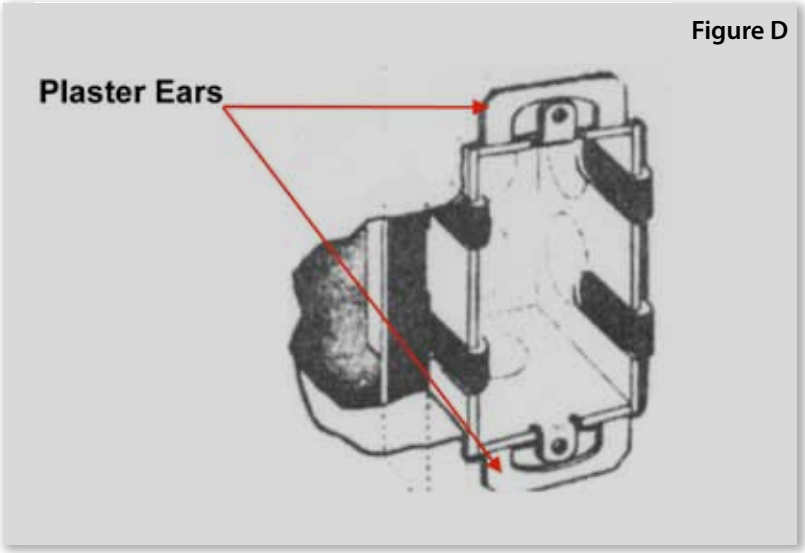
Cover mounting ears appear on square boxes and octagon boxes (Figure C). Cover mounting ears include screws and are used to attach covers, mud rings, or light fixtures to close a box.

Figure C

3) Plaster Ears

Plaster ears are sometimes referred to as "box mounting ears". They are supplied in pairs with some RACO switch boxes. Plaster ears are usually set forward 1/16" of the box opening (but commonly referred to as "flush with the box opening"). This is the "old work" position where the box fits into a hole cut into the plaster or drywall. The ears rest outside of the finished wall and prevent the box from slipping behind the wall (Figure D).

Figure D



There are two variations of plaster ears: one screw and two screw (Figure E). The one screw style is readily adjustable by loosening a single screw, sliding the ear to the desired position and tightening the screw. It often covers a conduit knockout so it is supplied on deeper switch boxes where this knockout is rarely used. The two screw ear is supplied on shallow boxes where the top conduit knockout is often used. It is adjustable by loosening and tightening both screws.

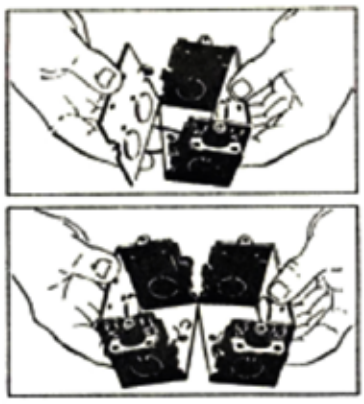
Figure E

GANGABLE VS. NON-GANGABLE BOXES

Gangable:

Gangable boxes have removable sides and give the electrician the option of constructing a box to hold two, three or more devices. Each side of a gangable switch box is held in place with a small screw which, when loosened a few turns, allows the side to be removed. To assemble a two gang box, remove one side on each of two boxes and rejoin by tightening the two screws (Figure A). Gangable boxes are sold with or without brackets. The non-bracketed boxes with no plaster ears are usually used to "add-on" to the bracketed box (Figure B).

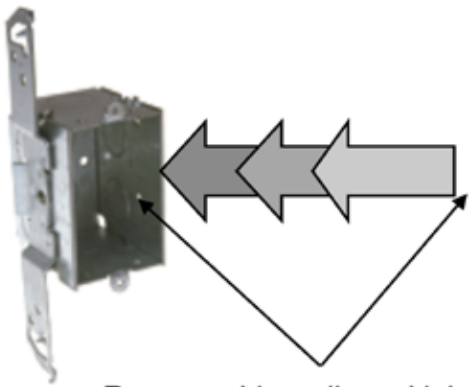
Figure A



HOW TO GANG METAL BOXES

Metal switch boxes are built so that any number may be put together, or "ganged." Simply remove wall end of each box, fit boxes together, tighten screws.

Figure B



Remove side walls and join boxes together with screws

Non-Gangable:

Non-gangable boxes do not have the gangable flexibility, but have other advantages. Non-gangable boxes are more efficient to manufacture, and therefore have a lower price than a comparable gangable box. They have flat sides that rest rigidly against a stud. Brackets are an extension of the side. Boxes with brackets are nailed or screwed directly to the stud.

NAIL HOLES & TAPPED GROUND HOLES

What is a Nail Hole?

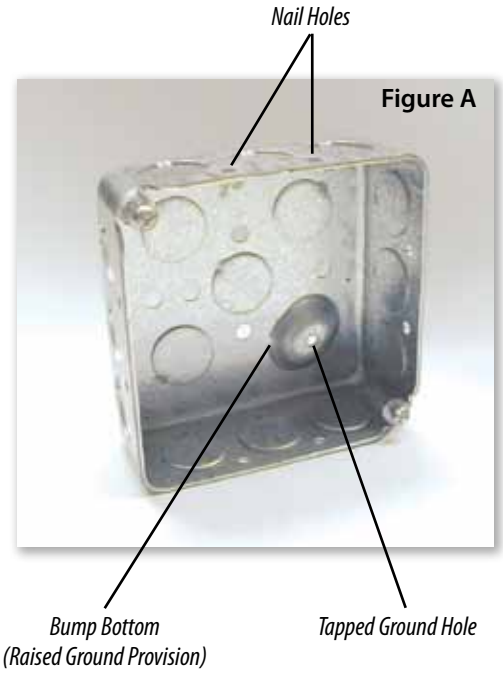
RACO steel boxes have carefully located 1/4" holes in the sides and bottom that may be used to fasten the box to a stud. Their size and placement is controlled by UL and NEMA. For example, UL may limit the "open hole area" of any box.

What is a Tapped Ground Hole?

Most steel boxes have one or more #10-32 (UL required) threaded ground holes located in the bottom. These permit a ground screw or grounding pigtail to be assembled either in the factory or at time of installation.

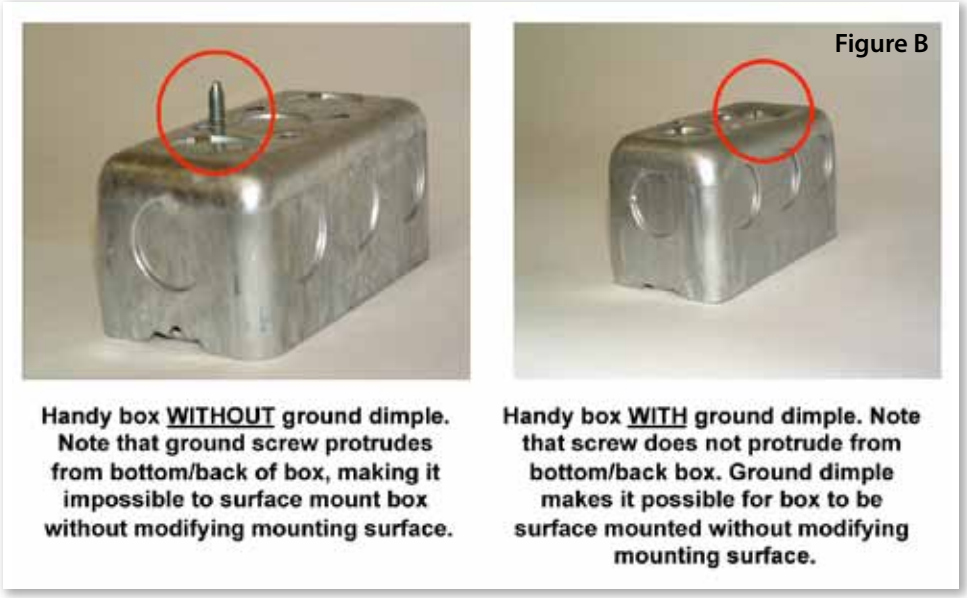
What is a "Bump-Bottom?"

A "bump bottom" or "ground dimple" is a raised, ground provision that is formed in the bottom/back of an electrical box (Figure A). It has a #10-32 threaded hole in the center to accommodate a standard ground screw. The electrician or installer uses the "bump bottom" provision with a ground screw and pigtail to ground the box.



Advantages of the bump-bottom:

- Allows box to be easily surface mounted. Boxes without a ground dimple, force installer to either drill or chisel out surface to accommodate a ground screw projecting from the back of the box (Figure B).
- Saves installer time and money. Installer isn't required to make modification to mounting surface.
- No additional tools (such as hammer, punch, drill bit, or drill) are needed to surface mount box.



BOX GROUNDING

Grounding

A hazard exists when any of the following occurs:

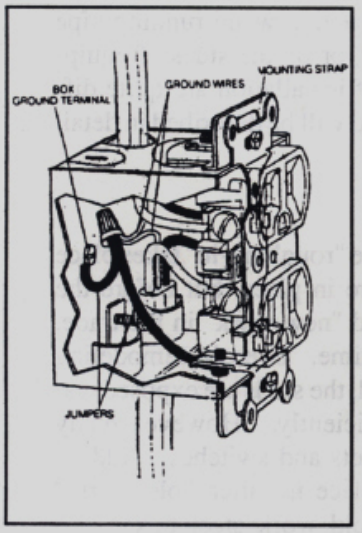
- In the rare situation where a current carrying conductor comes loose from a terminal and touches the steel box
- If water comes in contact with a live conductor
- If a power tool shorts out.

The grounding conductor provides a path for the current to return back to the neutral bus bar in the distribution panel and then to a metal water pipe or ground rod that goes into the earth. The current blows the fuse or trips a circuit breaker which shuts off the current (Figure A).

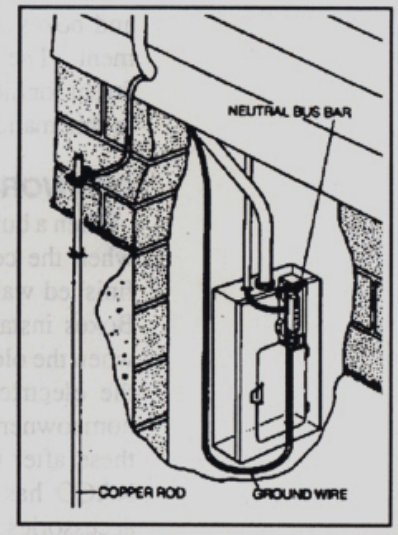
The metal parts of the box and receptacles that could become energized, need an emergency route to ground. The mounting strap of the wiring device is mechanically attached to the steel box with a screw and the cover plate, if metal, is attached to the strap with screws. A grounding pigtail and ground screw or clip also offer safe paths for fault current.

If there is no water pipe, the grounding conductor from the neutral bus bar in the distribution panel connects to a copper clad steel rod driven at least eight feet into the ground.

Figure A



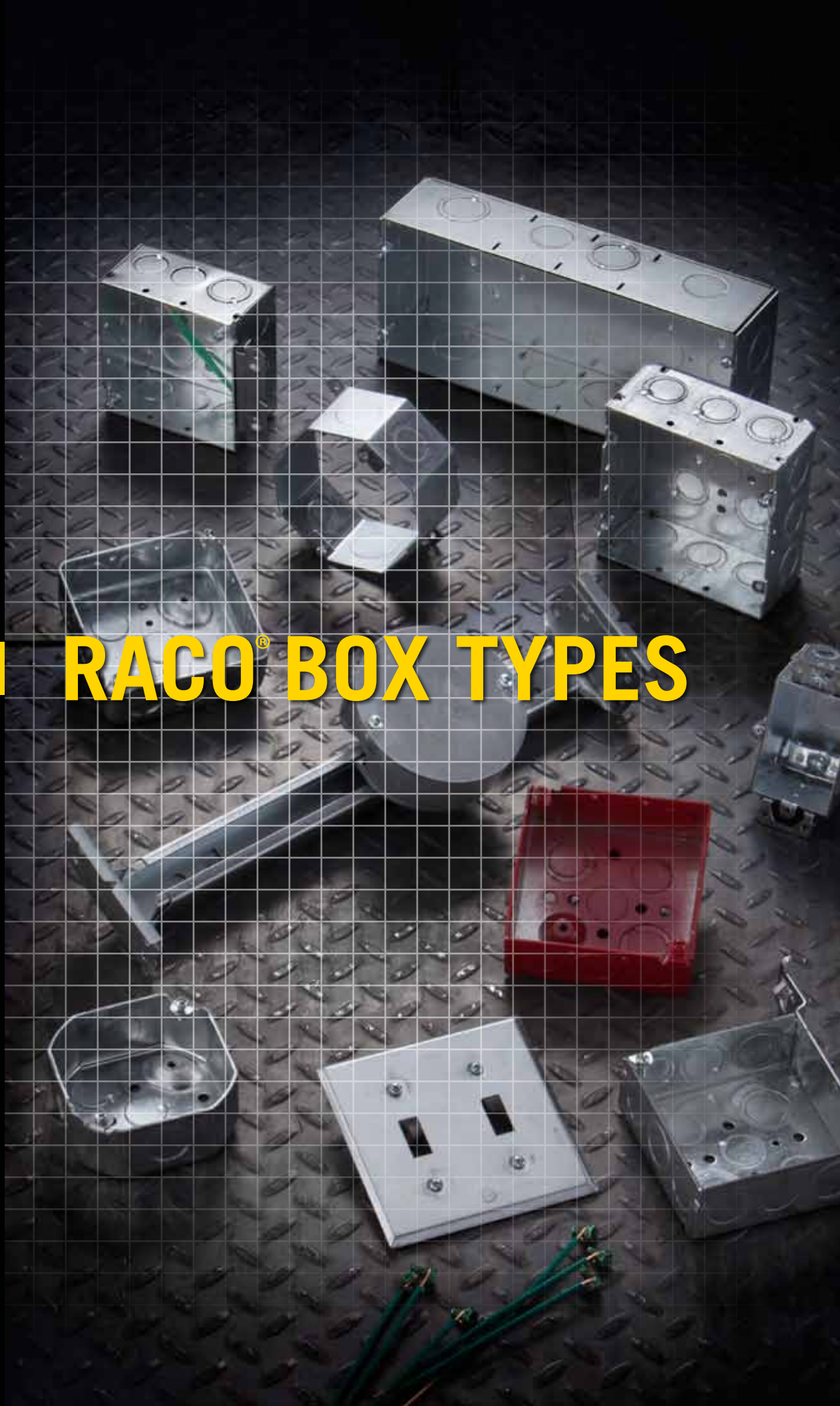
The metal parts of the box and receptacle that could become energized need emergency routes to ground. The mounting strap of the device is mechanically attached to the steel box with screws and the cover plate, if metal, is attached to the strap with screws. A grounding pigtail and ground screw or clip, described at the end of this section, also offer safe paths for fault current.



If there is no water pipe, the grounding conductor from the neutral bus bar in the distribution panel connects to a copper clad steel rod driver at least eight feet in the ground.

SECTION **B**

RACO® BOX TYPES



4" SQUARE BOXES

What is a 4" Square Box?

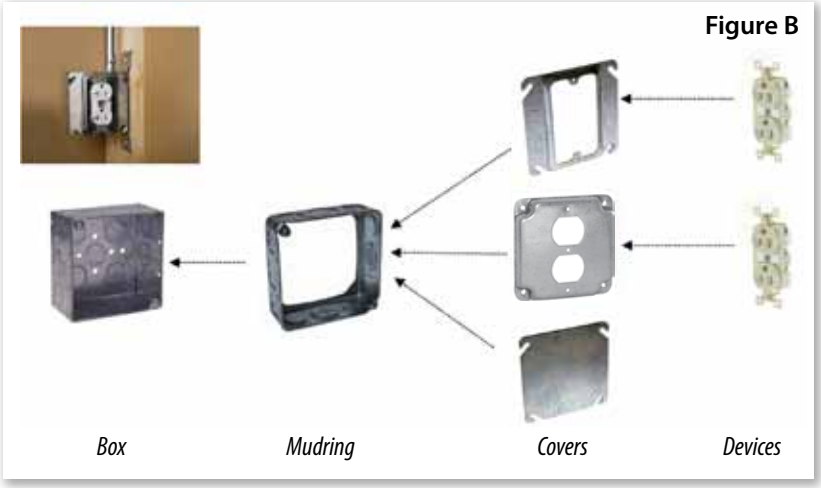
A 4" square box is a common receptacle/junction box that measures 4" high by 4" wide. It is available in three depths: 1-1/4", 1-1/2" and 2-1/8". It can be either drawn or welded construction.

Figure A

Applications

4" square boxes are larger and have more useable knockouts than octagon boxes or switch boxes. They can be used to support larger size light fixtures, but are most often used when multiple conductor runs split into two or more directions or to bring power to a number of electrical devices. Square boxes are typically used in commercial construction applications. They may also be used in industrial applications or residential applications to house switches and outlets. 4" square boxes have two cover screws, located in opposite corners (Figure A). Due to code regulations, Chicago and New York are popular markets for 4" square steel boxes.

Figure B



How is a Device Mounted to a 4" Square Box?

Unlike a switch box or handy box, devices are not mounted directly to a 4" square box). Devices are attached to a cover or "mud ring" (Figure B). The cover or mud ring is then attached to the box using the provided cover screws in each corner.

When used as a junction box, square boxes are closed with a flat blank cover (see Figure C).

Figure C

For Cable or Conduit

RACO 4" square boxes feature cable clamps and/or knockouts for conduit. 4" square boxes can be used with just about any available wiring system: MC cable, BX cable, Nonmetallic Sheathed Cable, EMT Conduit, etc. (Figure D).

Key SKUs

189, 232, 192, 196, 190

RACO Specifications

- Available in drawn or welded
- 1-1/4", 1-1/2", 2-1/8" depths
- Bracketed and Unbracketed
- With or without MC/BX Cable or Nonmetallic Sheathed Cable Clamps
- Feature RACO's Patented TKO knockout
- Available with 1/2", 3/4", 1" knockouts

Trade Terms

1900 = 4" square box, 1½" deep

1900 Deep = 4" square box, 2⅛ " deep

Figure D

4 11/16" SQUARE BOXES

What is a 4-11/16" Square Box?

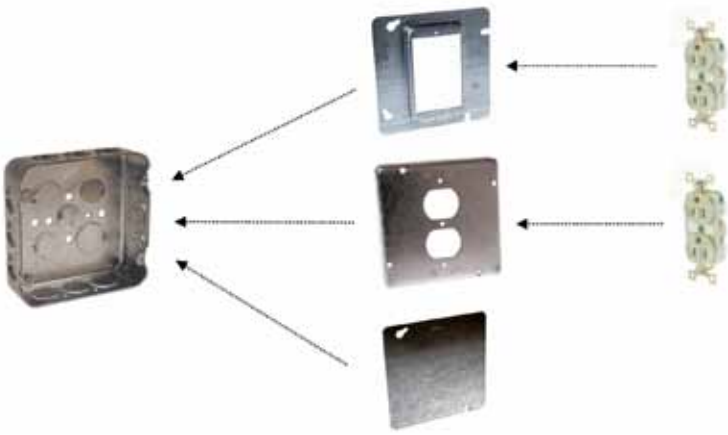
A 4-11/16" square box is a common receptacle/junction box that measures 4-11/16" high by 4-11/16" wide. It is available in two depths 1-1/2" or 2-1/8".

Applications

4-11/16" square boxes are larger and have more useable knockouts than 4" square or octagon boxes. They can be used to support larger size light fixtures but are most often used when multiple conductor runs split into two or more directions or to bring power to a number of electrical devices. 4-11/16" boxes are widely used in industrial applications for 220 and 277 volt and power and lighting systems. 4-11/16" boxes are typically used in commercial construction applications. 4-11/16" square boxes have four cover ears. Only two of the ears are equipped with screws. The second pair is used if the cover or box is rotated 90 degrees. Unlike 4" square boxes, where the cover ears are located in the corners, ears screws on 4-11/16" covers are located at the sides of box (Figure A).

Figure A

Figure B



How is a Device Mounted to a 4-11/16" Square Box?

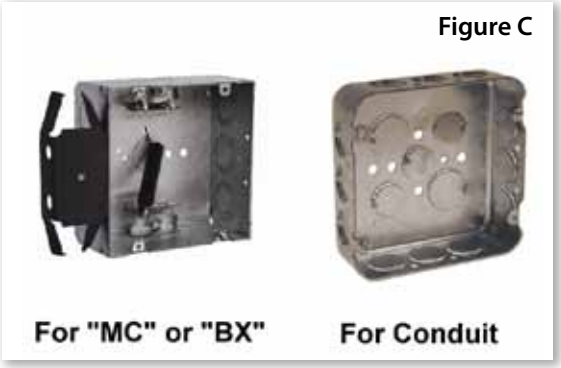
Unlike a switch box or handy box, devices are not mounted directly to the box. Devices are attached to a cover or "mud ring". The cover or mud ring is then attached to the box using the provided cover screws on two of the four ears. (Figure B).

When used as a junction box, square boxes are closed with a flat, blank cover.

For Cable or Conduit

RACO 4-11/16" square boxes feature cable clamps and/or knockouts for conduit. 4-11/16" square boxes can accommodate just about any available wiring system: MC cable, BX cable, Nonmetallic Sheathed Cable, EMT Conduit, etc. (Figure C).

Figure C



Specifications

- Available in welded only
- 1-1/2", 2-1/8" depths
- Bracketed and Unbracketed
- With or without BX Cable or Nonmetallic Sheathed Cable Clamps

Key SKUs

257, 258, 265, 254, 247

Trade Terms

11B = 4-11/16" square box, 1½ " deep

11B Deep = 4-11/16" square box, 2⅛ " deep

OCTAGON BOXES

What is an Octagon Box?

Octagon boxes are sometimes referred to as "ceiling boxes." The sides are designed flat in order to provide a level surface for the attachment of locknuts and connectors. These boxes are offered with or without brackets (Figure A). Unless stamped in the bottom of the box, octagon boxes are designed only to support fixtures up to 50 lbs, but not ceiling fans. In most industrial applications, brackets are not used for mounting of the box. Many times, they will be mounted to a ceiling beam by means of the nail holes in the back/bottom of the box. The octagon box is not restricted to only being used to support lighting fixtures. By using a blank cover plate, it can be used as a junction box (Figure B). By choosing a different cover, you can also mount a wiring device in the box (Figure B). RACO offers two different diameter size octagon boxes: 3-1/2" & 4".

Figure A

w/ Bracket

Figure B

3½" Octagon Boxes

RACO 3-1/2" octagon boxes are a 1/2" smaller than the industry standard. In some areas of the country this box is popular. It appears that electrical contractors feel that drywallers are creating a problem by using inaccurate methods of measurement when cutting holes for boxes. Most lighting fixtures come with a 4" round canopy cover that allows for greater tolerance of error when the 3-1/2" box is used.

4" Octagon Boxes

Often a bigger box is required to increase cubic inch wiring capacity. However, some contractors just prefer more "work room" in the box.

Applications

Octagon boxes are typically used in ceilings to support light fixtures, as a junction box, or as a box to house a receptacle.

Figure C

How are Light Fixtures and Devices Mounted to an Octagon Box?

Light fixtures are mounted either using a round mud ring or they are mounted directly to the two cover ears. When a fixture is mounted directly to the cover ears, the box is typically mounted flush with the drywall. The included cover screws are usually discarded and replaced with longer screws included with the lighting fixture (Figure C).

Devices: By choosing the right flat device cover, a wiring device can be mounted to a 4" octagon box (Figure B on previous page).

For Cable or Conduit

RACO octagon boxes feature cable clamps and/or knockouts for conduit. Octagon boxes can be used with just about any available wiring system: MC cable, BX cable, Nonmetallic Sheathed Cable, EMT Conduit, etc. (Figure D).

Figure D

RACO Specifications

- Available in drawn only
- 3-1/2" & 4" diameter
- 1-1/2", 2-1/8" depths
- Bracketed and Unbracketed
- With or without BX Cable or Nonmetallic Sheathed Cable Clamps

Key SKUs

125, 146, 161, 175, 167, 110

Trade Terms

8B = 4" octagon box, 1½" deep

8B Deep = 4" octagon box, 2⅛" deep

17A = 3½" octagon box

3-0 = 3½" octagon box

4-0 = 4" octagon box

CEILING PAN

What is a Ceiling Pan?

Ceiling pans are only 1/2" or 3/4" in depth. They are available in two different diameters: 3-1/2" or 4". The shallow pan mounts underneath the joist and fits flush with the finished ceiling (Figure A). Ceiling pans are typically mounted to the underside of the joist using drywall screws. The cable or conduit enters into the box from the top.

Figure A

Applications

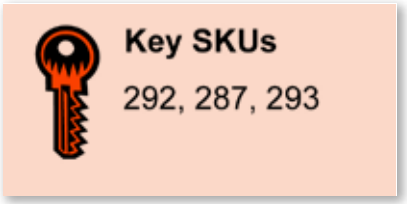
Ceiling pans are typically used to hang small-voltage light fixtures at the end of a run. Like octagon boxes, unless noted, ceiling pans are not designed to handle ceiling fans. Ceiling pans are rated to hold a fixture of 50 lbs. or less.

How is a Fixture Mounted?

Because ceiling pans are mounted flush with the finished surface, the use of a mud ring is not needed. The fixture simply attaches directly to the pan using the provided ear screws.

RACO Specifications

- Available in 3-1/2" or 4" diameters
- 1/2" knockouts

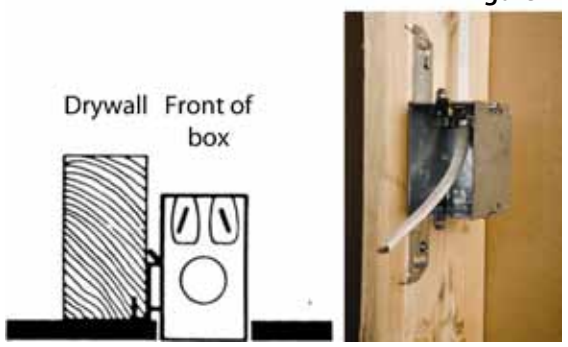


SWITCH BOX

What is a Switch Box?

Steel switch boxes are used to contain a switch or receptacle and its wiring. Steel switch boxes can be gangable or non-gangable and are mounted/hidden in the wall. Unlike a handy box, switch boxes are never surface mounted.

Figure A



Applications

Most switches and duplex receptacles you see in walls of homes are mounted in switch boxes. Generally, switch boxes are 3" high by 2" wide and are supplied in a variety of depths to fit the depth of the framing. Switch boxes are typically fastened through the sides, primarily used in commercial or residential applications, and are rarely used as a junction box. Switch boxes are available to accommodate conduit, nonmetallic sheathed cable, and armored cable.

Box Mounting

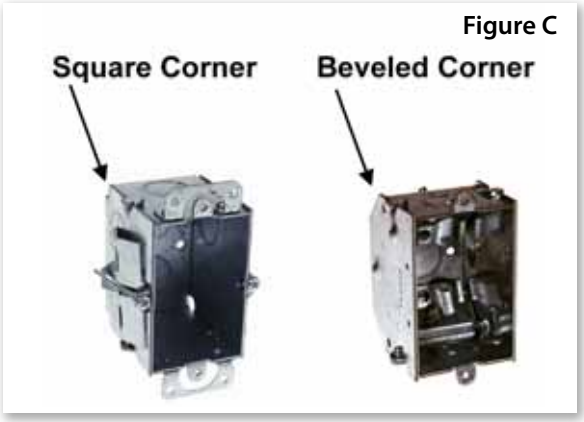
1) New work: The switch box is mounted to the face or side of the stud. It must be positioned on the stud so that the front of the box is flush with the finished wall (Figure A). The setback designed in the bracket accommodates the wall thickness and allows this to happen. After the finished wall is erected and a hole carefully cut outlining the edge of the box, the device and wall plate are attached.

Figure B

2) Old work: Switch boxes installed in *old work* fit in a hole cut in the finished wall between the studs (Figure B). *Old work* switch boxes have plaster ears that prevent the box from being pushed back into the wall cavity. *Old work* switch boxes are held in place by either a "clip" or "Grip-Lok™" support. There are a variety of *old work* style boxes available from RACO featuring different styles of mounting clips.

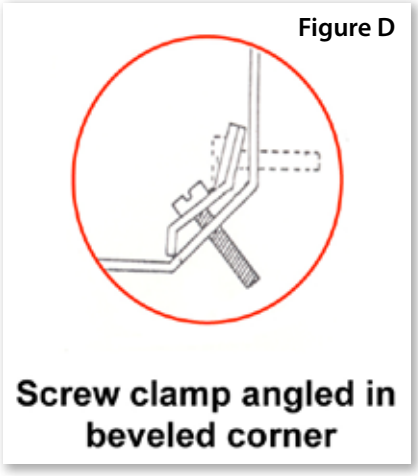
Straight Corner vs. Beveled Corner

Figure C



RACO offers both straight corner and beveled corner switch boxes (Figure C). Both styles are popular. The beveled corner boxes have a few advantages. First, the clamp screw does not protrude into the rear wall (Figure D). Second, because of the bevel the wires enter the box, it is much easier to push back into the wall cavity in old work installations.

Figure D



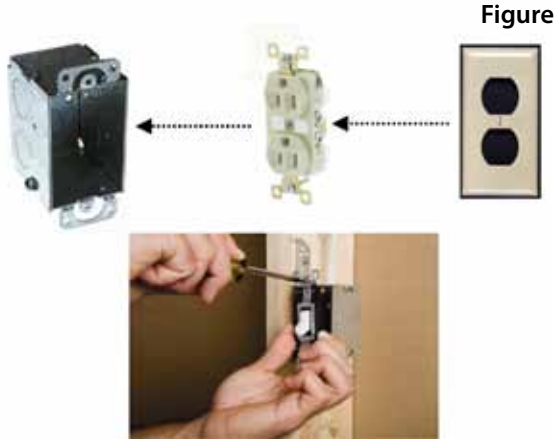
How is a Device Mounted?

Devices are mounted directly to a switch box. Unlike a handy box, the device mounting ears are turned out instead of in (Figure E).

RACO Specifications

- Available gangable or non-gangable
- Depths: 1", 1-1/2", 2", 2-1/8", 2-1/4", 2-1/2", 2-3/4", 2-27/32", 3-1/2"
- Bracketed and Unbracketed

Figure E



Key SKUs

500, 519, 506, 410, 523

Trade Terms

Loom Box
Cut-in Box
Gem Box
Gem B Box

HANDY BOXES


Figure A

What is a Handy Box?

Steel handy boxes are used to contain a switch or receptacle and its wiring.

Applications

In general, handy boxes are used in exposed work, surface mount applications. Handy boxes are surface mounted in basements of homes on concrete or concrete block walls or on a furnace. They are also used on industrial machinery to contain switches or act as a compact junction box for control wiring. Code requires that surface mounted wiring be protected with protective covering such as EMT, PVC, or similar material. For this reason, handy boxes are available only with knockouts, not cable clamps.

RACO 1-1/2" deep and 1-7/8" deep handy boxes are drawn construction. RACO 2-1/8" deep handy boxes are welded construction.

Box Mounting

Surface mounting: (Figure A). Handy boxes without brackets are fastened with screw anchors, sheet metal screws or bolts using two or more of the open holes in the bottom.

Stud wall: Handy boxes with brackets are fastened to wood or metal studs (Figure B). RACO offers brackets with setbacks of 1/4", 1/2", or 5/8" to accommodate various wall covering thicknesses. When installed to the stud, the face of the handy box is flush with the drywall or wall covering. Plaster rings (mud rings) are not used with handy boxes.


Figure B

How is a Device Mounted?

Devices are mounted directly to a handy box. Handy box device ears are turned in (Figure C). Handy boxes are closed with a steel cover that neatly matches the contours of the box. Handy box covers include retained screws.

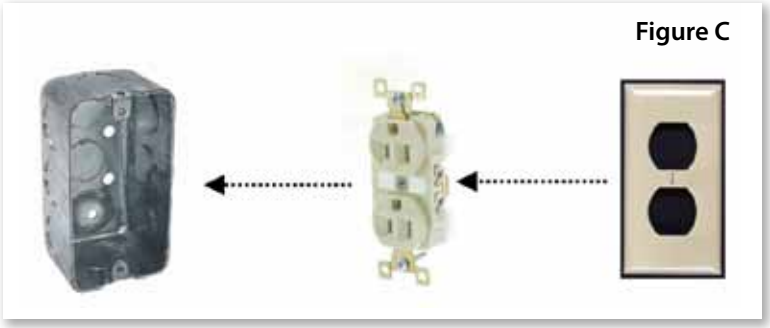


Figure C

RACO Specifications

- Available drawn or welded
- Depths: 1-1/2", 1-7/8", 2-1/8"
- Bracketed and Unbracketed

Key SKUs

660, 663, 662, 670RAC, 665

Trade Terms

Utility Box

Handy Box

MASONRY BOXES

What is a Masonry Box?

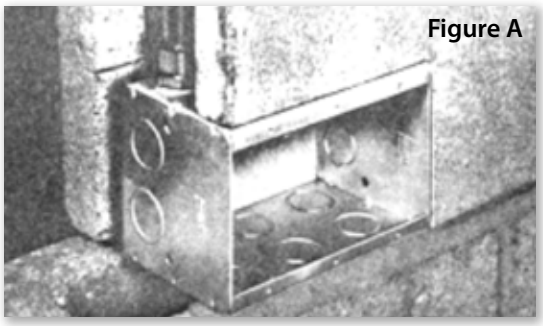


Figure A

RACO masonry boxes are an outgrowth of switch boxes with many features that give material and labor savings in concrete block. Concrete block (masonry or cinder) is 4", 6", or 8" thick with voids in the middle for conduit runs (Figure A). When outlet or switch boxes are used, the block is cut with a masonry saw. Since the block is built up from the floor, electricians often preassemble the box, connector and conduit and put it in place in conjunction with the mason. 2-1/2 " deep boxes are used in 4" block while 3-1/2" deep in 6" and 8" block. Also the front of the box is flush with the block eliminating the need for extra long device screws (Figure B). Masonry boxes have large cubic inch capacity insuring plenty of working room. The rectangular shape fits the square cuts in the block. Device ears are formed inside the box preventing mortar from getting in the device holes. Standard covers conceal switches or receptacles.

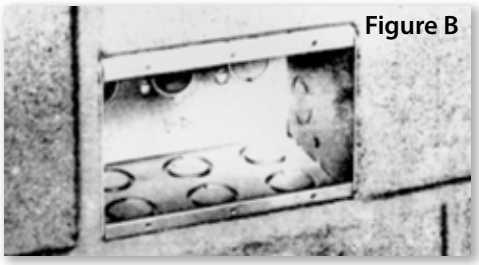


Figure B

Masonry Box Types (Figure C)

Non-gangable: Non-gangable masonry boxes are available from one to six gangs either 2-1/2" or 3-1/2" deep. Like non-gangable switch boxes, non-gangable masonry boxes cannot be ganged together. Boxes are sold in configurations specific to the number of device that will be mounted – 1 gang for 1 device, 2 gang for 2 devices, etc. . Concentric KOs limit box to 250V applications, without bonding jumpers.

Gangable: Gangable masonry boxes are similar to gangable switch boxes. Gangable masonry boxes can be ganged together on a job to make an unlimited number of gangs. Like non-gangable masonry boxes, RACO offers gangable masonry boxes in both 2-1/2" and 3-1/2" depths. The contractor simply joins boxes in the field to accommodate his needs. This reduces the number of sku's the customer is forced to stock. The TKOs in these boxes allow them to be used in applications up to 600V without bonding jumpers.

Figure C

Non-Gangable

Gangable

Applications

Masonry boxes are used to mount devices or used as a junction point in masonry block walls.

How is a Device Mounted?

Devices are mounted directly to the box. When installed, the box is flush with the block surface. A finish cover is then attached, covering all the installed devices (Figure D).

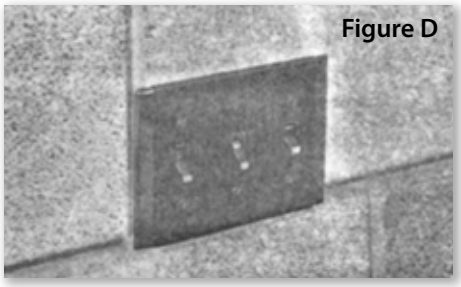


Figure D

RACO Specifications

- Available gangable (sold in single gang only) or non-gangable (one thru six gangs)
- 2-1/2″ or 3-1/2″ Depths
- Partitions are available for both depths

Key SKUs

695, 696, 690, 688, 689

Trade Terms

Mud Box

CONCRETE RING

What is a Concrete Ring?

Cut Away View — Figure A

Under reinforcing rods *Over reinforcing rods*

Concrete rings are fastened to the forms (decks) of high rise buildings and encased in concrete to make a ceiling box after the forms are removed (Figure A). They are termed "rings" instead of boxes because the top (cover) is sold separate. A back plate is attached after the ring has connectors fastened to it and nailed to the form. The bottom of the concrete ring is closed with a flat cover or a light fixture. Conduit is used with concrete tight connectors to complete installation. Despite the design of the concrete rings and connectors to ensure that concrete does not enter them, electrical contractors often stuff insulation inside the ring and tape the cover and connectors as further insurance that concrete cannot possibly enter the electrical system. Concrete rings are occasionally are used in pre-cast slabs and in open beam timber ceilings with the conduit running in the concrete insulation topping (Figure B).

Cut Away View

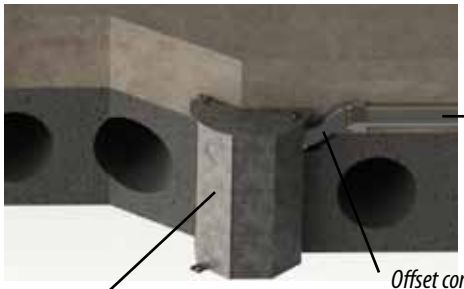


Figure B

Conduit imbedded in concrete topping poured on the job

Pre-cast slab drilled for concrete ring

Offset connector attaches conduit to concrete ring

Concrete rings are manufactured in two halves, bent to shape and projection welded. Near welded joints the material is cut away to allow plenty of room for the locknut. 2", 2-1/2", and 3" rings have a single row of knockouts 1" from the top and the conduit is installed above reinforcing rods. 3-1/2" thru 6" rings have a double row of knockouts 1" from the top and 1" from the bottom. A double row of knockouts allows conduit to be installed before or after the reinforcing rods with a minimum of bends or offsets.

An extra large tab on the top of the concrete ring covers slots in the back plate to keep concrete out. Ring has two mounting ears inside on bottom tapped 8/32" holes that may be used to attach a fixture or adaptor plate. Holes are waxed to prevent corrosion of threads. Two rings may be stacked as a field modifcation (Figure C), for use as a single deeper ring. When stacking rings the tapped holes in the top ring must be enlarged to prevent the screws from binding.

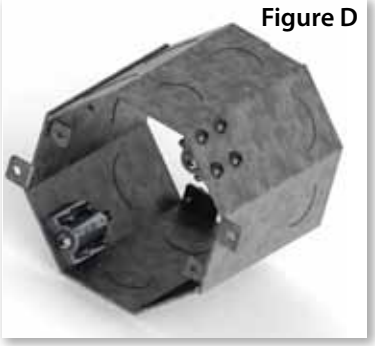
Figure C

Two rings may be stacked for use as a single, larger ring. When stacking rings, enlarge the tapped holes in the top ring creating a clearance hole to prevent the screws from binding.

Applications

Concrete rings are commonly used in the southeast where concrete commercial construction is common. Hotels, condos, and parking garages are only a few places where concrete rings may be installed. Concrete rings are used to support lighting fixtures and are also used as a junction point. RACO 284 is specifically designed for ceiling fan support (Figure D).

Figure D



RACO 284 for Ceiling Fan Support

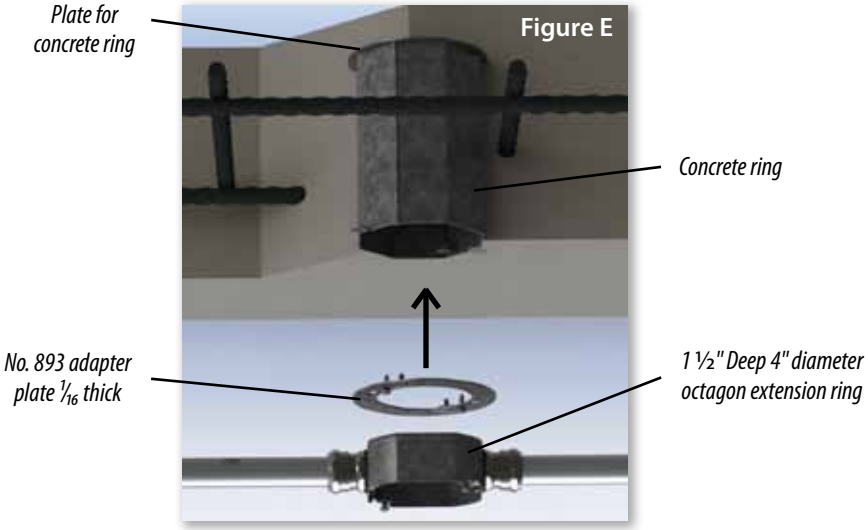
How is a Fixture Mounted?

Fixtures can be mounted two ways. First, the fixture can be mounted directly to the concrete ring using the internal tabs. Second, using an adapter plate, an octagon box can be added to the bottom of the concrete ring (Figure E). The fixture is then mounted directly to the bottom of the ring using the standard provided cover/ears/screws.

RACO Specifications

- Available in 8 different depths from 2" to 6"
- 1/2", 3/4", and 1" knockouts
- Only 284 designed for ceiling fan support

Figure E



Key SKUs

273, 274, 271, 272, 270RAC

Trade Terms

Mud Box

CEILING FAN BOX & BRACE

What is a Ceiling Fan Box & Brace?

Figure A

295 Ceiling fan support pan

293 Standard ceiling pan (not rated for ceiling fan suport)

RACO offers many different boxes and braces to hang ceiling fans safely and securely. These boxes and braces are specifically designed to handle the dynamic load of ceiling fans or heavy lighting fixtures.

Many homeowners and installers assume that a standard octagon box can support the load of a ceiling fan, wrong! Standard octagon boxes, like a RACO 125, are designed only to support the static load of light fixtures no more than 50 lbs. Ceiling fans create a dynamic, twisting load. Over time, the ears of a standard octagon box will break off. The fan will eventually fall down with the potential of seriously injuring a person. You can see that RACO ceiling fan support boxes are different. The load of the fan or fixture is not supported by the cover ear. An integral formed surface provides superior strength, and the mounting screws are threaded into pre-tapped and extruded holes to further withstand these dynamic loads. Per UL requirements, ceiling fan support boxes will have "Acceptable for Ceiling Fan Support" stamped in them.

Applications

Figure B

Direct mount ceiling fan boxes

RACO Ceiling Fan Support products are used to safely hang ceiling fans and heavy light fixtures. Note that RACO offers two different types of packaging; contractor bulk pack (indicated by a "-1" part number suffix) and individually merchandise packaged (no part number suffix).

Ceiling Fan Support Product Types

Direct Mount Boxes - RACO manufactures several types of boxes to accommodate ceiling fan support. These boxes are "direct mounted" to the beam, joist, or ceiling member (Figure B). They include:

- 295/295-1: 1/2" Deep Round Ceiling Pan
- 296/296-1: 1-1/2" Deep Round Box
- 299: 2 1/8" Deep Round Box
- 294/294-1: 2-1/8" Deep Round Box with Side Bracket
- 7120: Nonmetallic Saddle Box
- 291-1: 1-1/2" Deep Round Box with Side Bracket

Brace/Box Combination – RACO offers both new work and old work ceiling fan braces (Figure C).

Ceiling fan braces are used to hang ceiling fan or light fixture in the center of a room. The box is adjustable along the full length of the brace.

New Work (KWIK-BRACE®)

- 926/926-1: Brace with 1-1/2" Deep Round Box

Old Work (RETRO-BRACE®)

- 936: Brace with 1-1/2" Deep Round Box
- 937: Brace with 2-1/8" Deep Round Box

Figure C

RACO KWIK-BRACE® (new work application)

RACO RETRO-BRACE® (old work application)

Key SKUs

294, 295, 296, 926-1, 935

Trade Terms

Fan Box

GANG BOX

What is a Gang Box?

Gang boxes offer an alternative to the ganging of switch boxes in stud walls (Figure A). They are selected in commercial applications where many switches and outlets are used in one location. They are typically fastened to a cross brace through nail holes in the bottom/back of box.

Figure A

One RACO 4-gang 943 and mud ring equals four RACO gangable switch boxes

Gang boxes are produced with 1/2" and 3/4" concentric knockouts. A flat device cover or 3/4" depth mud ring completes the installation (Figure B). The device mud rings have eight keyhole slots for fast installation. The keyhole slots offer the versatility of using, for example, a 3-gang cover on a 2-gang box.

Figure B

Flat Cover

Raised Cover

Partitions

A low voltage partition is available to separate different voltages in the same box. It inserts between indentations in the side of the box and is held in place by the device cover (Figure C).

Applications

They are selected in commercial applications where many switches and outlets are used in one location.

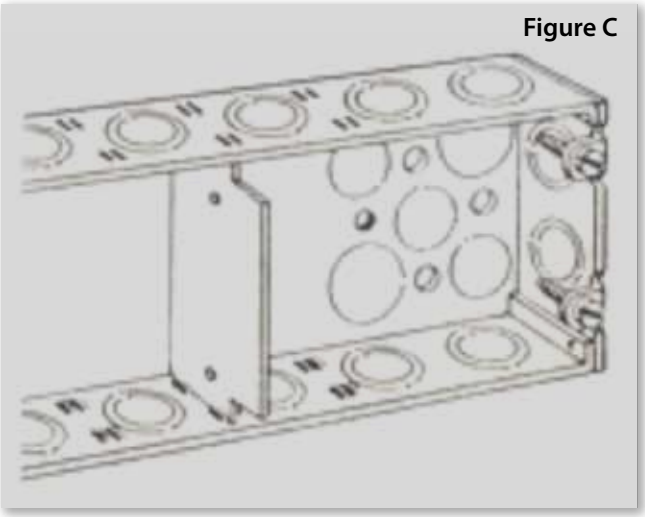
How are Devices Mounted?

Devices are mounted using a mud ring.

RACO Specifications

- Available in 1-5/8" or 2-1/2" depths
- Available from 2 to 9 gangs
- 1/2" & 3/4" concentric knockouts

Figure C



Key SKUs

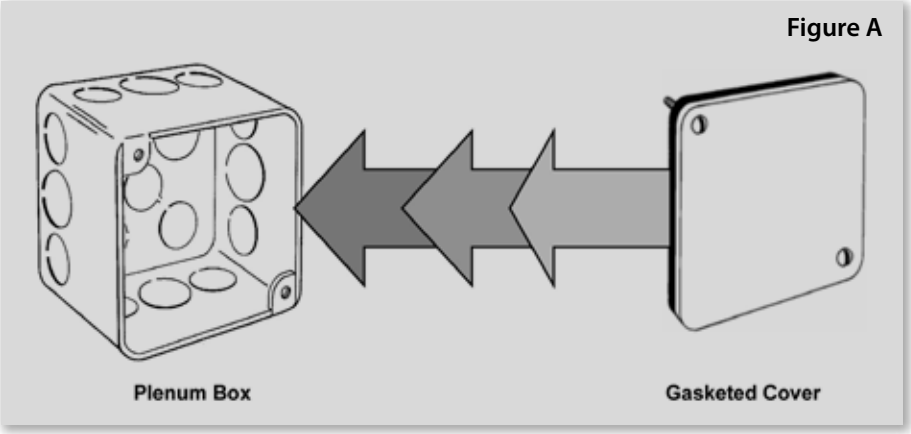
952, 953, 951, 942, 943

PLENUM BOX

What is a Plenum (Airtight) Box?

Plenum boxes are steel boxes that have no ground or nail holes, and "tight" knockouts. Plenum boxes are only plenum when a gasketed cover (RACO 762) is installed (Figure A).

Figure A



Applications

Some commercial buildings with false/drop ceilings are designed without return air ducts, which places the electrical system directly in the air flow for the building. With regular boxes, dust or other particles may blow into the electrical system through holes in boxes, covers and fittings. This poses the risk of both objectionable air noise and an accumulation of combustible material. Should there be a fire in the electrical system, smoke and fumes escape through these box openings into the duct work or ceiling and may be circulated throughout the building. Locating the source of this small fire may be difficult. The possibility of smoke damage and safety hazard is increased. Some cities, such as Chicago, require boxes, raceways and fittings that are plenum rated.

RACO offers several 4" square plenum boxes that retain smoke and keep dust out. The boxes have no nail or ground holes and the knockouts are flush. Plenum covers have a PVC gasket material.

Plenum boxes should not be used in atmospheres requiring hazardous location equipment, such as granaries and dairies.

Because they are airtight, may be also used in some poured concrete applications

RACO Specifications

- Available in 1-1/2" and 2-1/8" depths
- 1/2" & 3/4" flat knockouts, no nail holes

Key SKUs

Boxes: 226, 239

Gasketed Cover: 762

INDUSTRIAL HANDY BOX

What is an Industrial Handy Box?

RACO offers a "miniature" or "compact" version of our standard drawn handy box – our 640 (box) and 880 (cover) (Figure A). At 7.3 cubic inch capacity, this box has limited applications.

Figure A

Figure B

Applications

The RACO catalog number 640 is a handy box that is designed for OEM and other industrial applications. It is smaller than other standard RACO handy boxes (3-3/4 " long x 1-1/2 " wide x 1-1/2 " deep) and has a different ear set up than a standard handy box (Figure B). The catalog number 880 is the blank cover for the 640. The RACO compact handy box is always surface mounted, usually to the side of a machine or control panel and is most often used as a junction box by OEM's for the connection of motor or control circuits on machinery (Figure C).

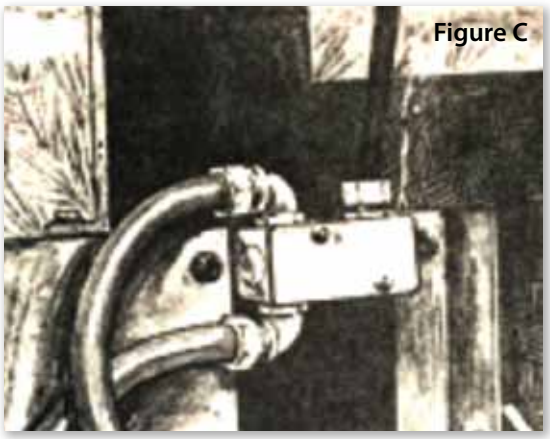
How is a Device Mounted?

Unlike a standard handy box, devices are not mounted in the RACO 640 compact handy box. Because of it's small size, it is always used as a junction box.

Key SKUs

640, 880

Figure C



2-GANG SWITCH (HANDY) BOX

What is a 2-Gang Switch Box?

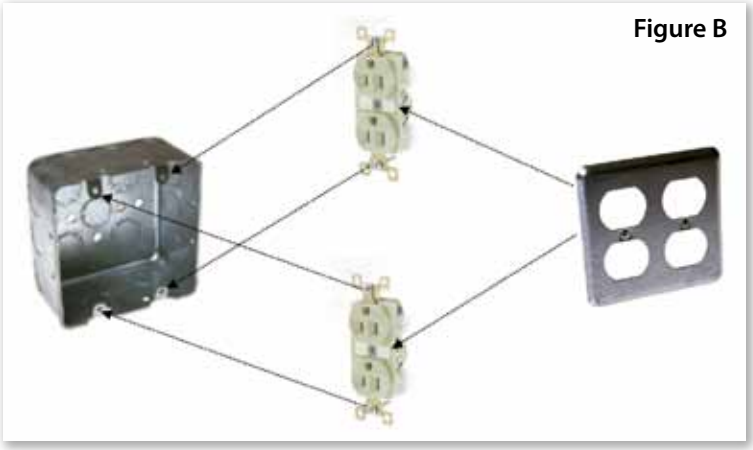
RACO 2-gang switch boxes are a combination of two types of steel boxes: a 4" square box and a standard drawn handy box. Dimensionally, they are similar to a 4" square, 2-1/8" deep box. However, instead of having cover ears in opposing corners, they are similar to a handy box in that they have device ears that are turned in (Figure A). They are available with or without brackets for mounting.

RACO sells special steel covers for these boxes. The covers fully conceal the box and devices (Figure B).

Figure A

Device ears turned in

Figure B



Applications

2-gang switch boxes can be used in surface mount handy box applications where two devices are needed. If mounted in a wall, because they have device mounting ears, there is no need to use a mud ring. The box opening is positioned flush with the wall surface.

Box Mounting

2-gang switch boxes can be surface mounted or used in a stud wall.

How are Devices Mounted?

Devices are mounted similar to a handy box. No mud ring is needed to mount a device to this type of box (Figure B).

RACO Specifications

- Available with or without brackets
- 2-1/8" deep

Key SKUs

680, 681, 683, 871, 873

Trade Terms

2-Device Handy Box
Square Handy Box
Double Handy Box

EXTENSION RINGS

What is an Extension Ring?

Figure A

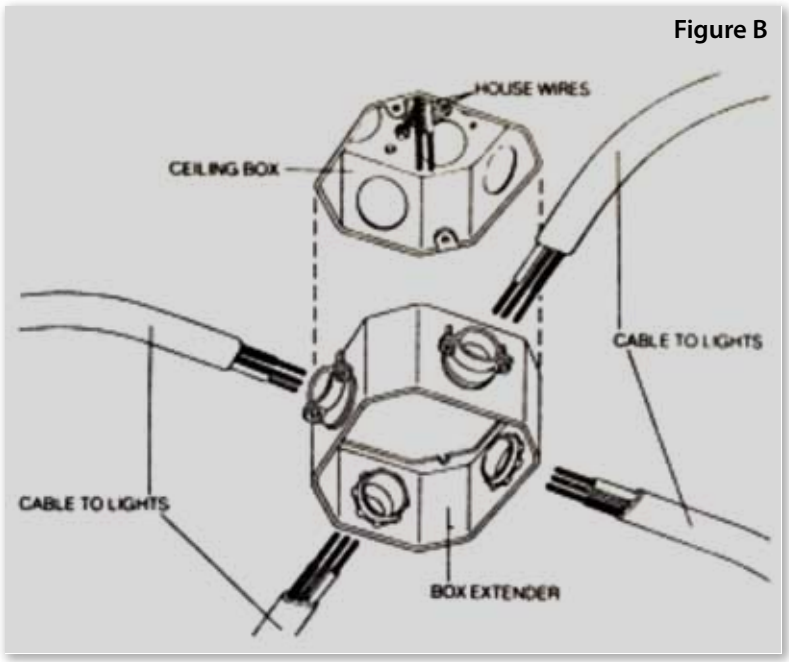
An extension looks like a standard box, but with no bottom/back. Extension rings have standard knockouts. RACO manufactures extension rings for octagon boxes, 4" square boxes, handy boxes and 4-11/16" square boxes (Figure A).

Applications

Extension rings are used for one or more of the following applications:

- In remodeling to increase the cubic inch capacity of a box (Figure B) to add new circuits.
- In new work to increase the cubic inch capacity of a box.

Figure B



RACO Specifications

- Octagon: Two rings available, 1-1/2" deep
- 4" Square: Five rings available, 1-1/2" deep
- 4-11/16" Square: Two rings available, 1-1/2" or 2-1/8" deep
- Handy Box: Two rings available, 1-1/2" or 1-1/8" deep

Key SKUs

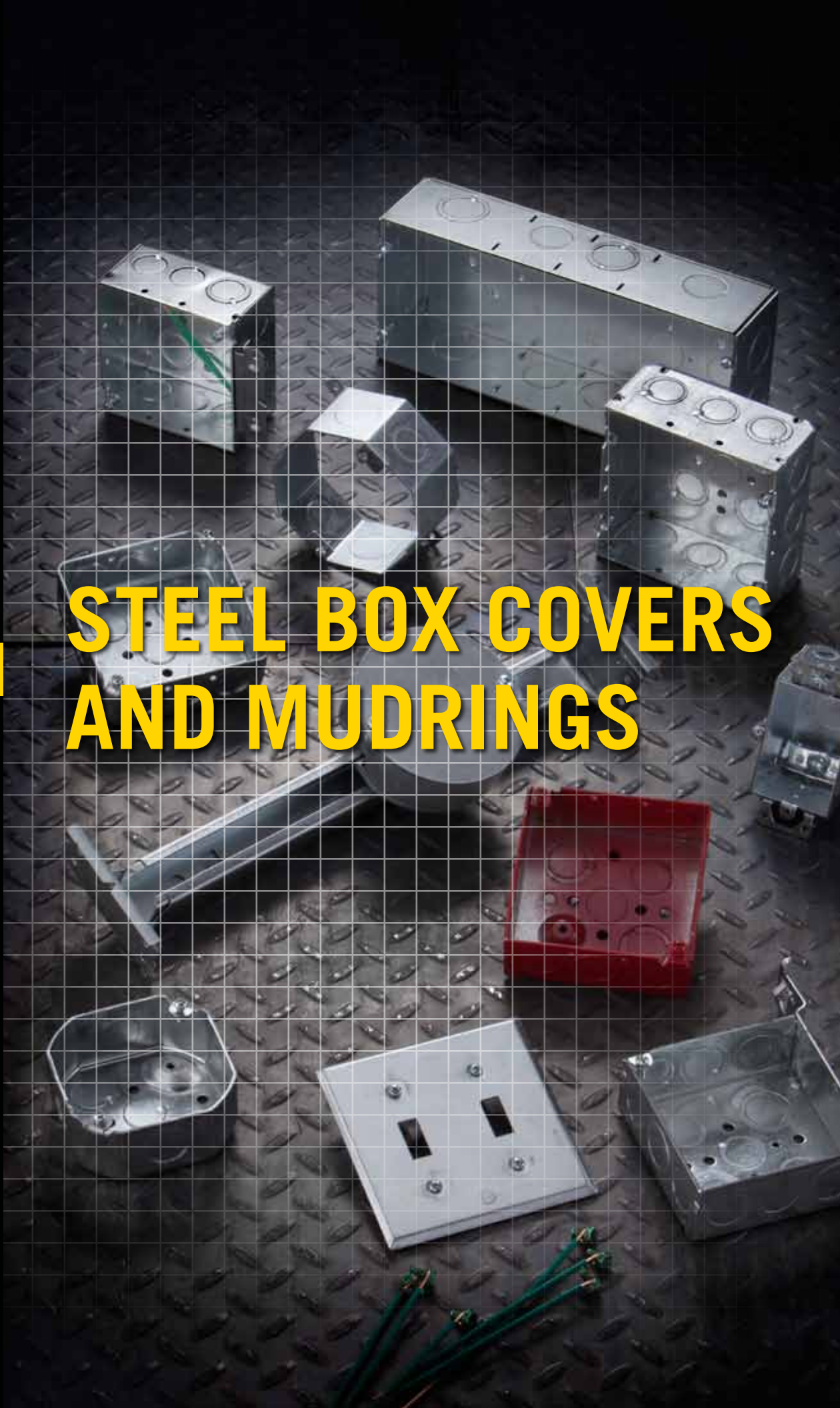
201, 203, 128, 130, 250

Trade Terms

Box Extender

SECTION **C**

STEEL BOX COVERS AND MUDRINGS



4" and 4 11/16" SQUARE MUD RINGS

What is a Mud Ring?

A mud ring is used to mount a device(s) to a 4" square or 4-11/16" square box. A typical example of a mud ring application can be seen in (Figure A). In this example, a box is nailed to a stud hidden behind 1/2" drywall. A 1/2" raised mud ring extends the box flush with the face of the drywall, positioned perfectly for the switch or receptacle. A finished plastic or metal wall plate would complete the installation. To accommodate the many thicknesses of drywall, plaster or paneling, mud rings are available in many depths (Figure B). They are manufactured in both one device and two device configurations.

Figure A

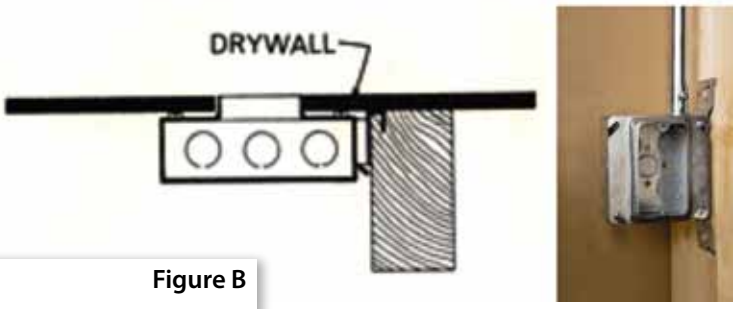
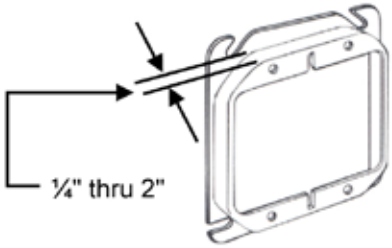


Figure B



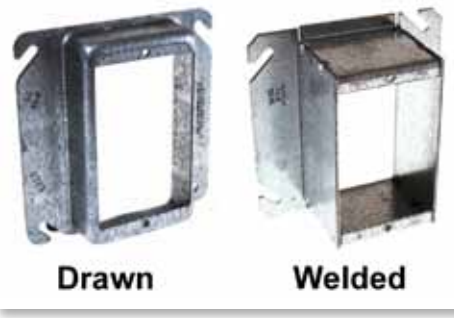
Applications

Mud rings are used in both commercial construction and residential applications where power is routed in a stud wall behind drywall, plaster or paneling.

Drawn vs. Welded

Like boxes, mud rings are also available in either drawn or welded construction (Figure C).

Figure C



- **Drawn:** Drawn mud rings are suitable for use in drywall, plaster and paneling. They are manufactured like a drawn box, from a single piece of steel. As a result, they have rounded edges and are limited to 1-1/4" deep.
- **Welded:** Welded mud rings are sometimes called "tile covers". They are made from four pieces welded together. Welded rings have crisp corners and edges. This allows for a neat cut in concrete block and wall tile. Welded rings can go up to 2" in depth.

How is a Device Mounted to a Box and Mud Ring?

Figure D

Unlike a switch box or handy box, devices are not mounted directly to a 4" square or 4-11/16" square box. Devices are attached to a cover or mud ring. The cover or mud ring is then attached to the box using the cover screws supplied with the box (Figure D). RACO mud rings have angled mounting slots that compensate up to 12 degrees for a box that is cocked or not mounted level (Figure E).

RACO Specification

- Available in drawn or welded styles
- 1/4", 1/2", 5/8", 3/4", 1", 1-1/4", 1-1/2", 2" depths
- Single or Two Device Configurations

Figure E

If box is cocked, rotate on one screw to compensate

Key SKUs

722, 782, 768, 778, 769

Trade Terms

Plaster Ring = Drawn corners

Tile Cover = Welded corners

Mud Cover

4" and 4 11/16" SQUARE EXPOSED WORK and FLAT COVERS

What is a Exposed Work Cover? What is a Flat Cover?

Exposed Work Covers: Exposed work covers attach on surface mounted 4" or 4-11/16" square boxes. Exposed work covers allow full access to the installed device. RACO offers over 23 different cover configurations to accommodate the many different types of wiring devices.

Flat Covers: Flat covers mount to the box using the provided cover screws. Flat covers are used to enclose a square, round, or octagon box. Flat covers are provided blank, with a knockout in the center, or with a device opening. Blank covers are used to create a junction box. Flat covers with a knockout are used to nipple down to hang a light fixture.

Figure A

Types of Exposed Work Covers

Applications

Exposed Work Covers: Are used where a box is surface mounted and is to remain exposed such as in a industrial application (the side of a machine) or on a concrete/cinder block basement wall. They perform a double duty as a box cover and finished wall plate (Figure A).

Figure B

Flat blank cover Flat cover with KO

Flat Covers: Blank covers are used to create a junction box. Flat covers with a knockout are used to nipple down to hang a light fixture. Flat covers with a device opening are used to mount devices in an exposed work, surface mount applications (Figure B).

How is a Device Mounted to an Exposed Work Cover or a Flat Cover?

Exposed Work Covers: All RACO exposed work covers are individually poly-bagged with one to four #6-32, 7/16" long device screws. The device attaches to the cover with the provided device screws and nuts. The "crushed corner" design allows the cover to be installed using provided box ear screws (Figure C).

Figure C

Crushed Corner Cover

Flat Covers: Device simply installs into opening using existing hardware provided with device and box.

RACO Specifications

- Exposed work covers: 23 different cover configurations
- Flat covers: Available with or without knockout in 4" & 4-11/16" square

Key SKUs

800C, 902C, 907C, 752, 835

Trade Terms

Exposed Work Cover
Surface Cover
Crushed Corner Cover

FIXTURE MUD RINGS and OCTAGON FLAT COVERS

Figure A

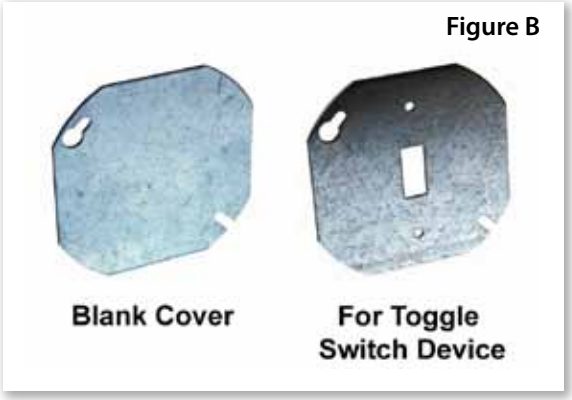
What is a Fixture Mud Ring?

Fixture Mud Ring: Fixture mud rings attach to 4" octagon boxes. They are similar to a standard wall mud ring except they are round and have 2 ears turned in to accommodate hanging a light fixture (Figure A). To accommodate a standard light fixture, the fixture ears are spaced 2-3/4" on center.

What is a Flat Cover?

Octagon Flat Covers: Octagon flat covers mount on 4" octagon boxes. Octagon flat covers are used to enclose an octagon box. Octagon flat covers are provided blank, with a knockout in the center, or with a device opening (Figure B). Blank covers are used to create a junction box. Flat covers with a knockout are used to nipple down to hang a light fixture.

Figure B



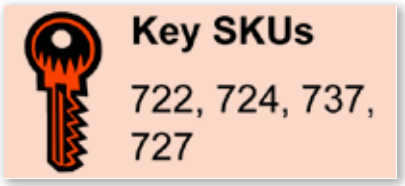
Applications

Fixture Mud Ring: These are used in drywall or ceiling applications in conjunction with an octagon box to hang a light fixture.

Octagon Flat Covers: Blank covers are used to create a junction box. Flat covers with a knockout are used to nipple down to hang a light fixture. Flat covers with a device opening are used to mount devices in exposed work, surface mount applications.

RACO Specifications

- Fixture Mud Rings: Available in 1/2", 5/8" or 1" depths
- Octagon Flat Covers: Available with or without knockout, for one toggle device, or for one duplex device



HANDY BOX COVERS

What is a Handy Box Cover?

A handy box cover is used to close off a handy box (Figure A). The covers are contoured to neatly match the handy box in surface mount applications.

Figure A

Applications

Handy box covers are available in six different styles. All boxes include captive mounting screws. Handy box covers can be used to make a junction box or to mount a device.

Device covers (Figure B)**:** three examples of device covers - single receptacle (1.406" diameter), duplex and toggle. You often will see handy boxes with device in surface mount applications on a basement wall or on the side of a furnace.

Figure B

Handy box covers to mount devices

Blank and with knockout covers (Figure C)**:** Blank cover is used to create a junction box. Cover with knockout can be used to "nipple-down" a light weight fixture such as security cameras.

Figure C

Blank cover ½" knockout in center

RACO Specifications

- 6 different cover styles available

Trade Terms
Utility Box Cover

Key SKUs
860, 865, 864, 861

GANG BOX COVERS

Figure A

Raised Cover

Flat Cover

What is a Gang Box Cover?

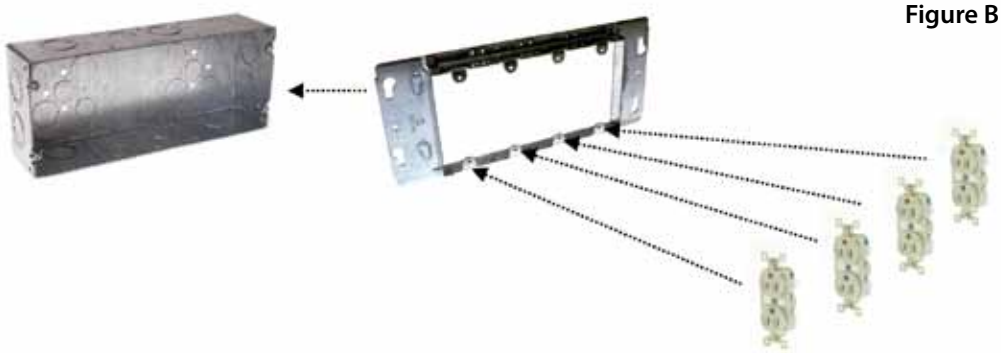
A gang box cover is used to close off a multi-device gang box. RACO gang box covers are either raised (a mud ring) or flat (Figure A). A low voltage partition is available to separate different voltages in the same box. It inserts between indentations in the side of the box and is held in place by the device cover.

Applications

There are two types of gang box covers: raised or flat:

Raised covers:
RACO standard gang box mud rings are raised 3/4" because most gang boxes are installed in commercial applications where 3/4" wall board is prevalent.

Figure B



A raised gang box cover functions the same as a standard mud ring. The mud ring is mounted to the box, then the devices are mounted to the mud ring (Figure B). After the devices are installed, a standard wall plate is used to cover the devices.

Figure C

Raised covers have a total of eight keyhole slots for fast installation. Four keyhole slots are used to mount the cover to the correlating box – example: a (4) device raised cover with a (4) gang box. The other remaining four key holes allow a larger gang cover to used on a smaller gang box – example: a (4) device raised cover on a (3) gang box (Figure C).

Flat covers:
Typically used when a gang box is surface mounted or flush mounted to a surface. RACO sells flat, blank covers with no device openings. These covers are modified in the field by the installer to mount the desired device.

RACO Specifications

- Raised covers/mud rings: 2 thru 9 gang
- Flat covers/mud rings: 2 thru 9 gang

Key SKUs
844, 845, 846, 821, 822

SWIVEL FIXTURE COVERS

What is a Swivel Fixture Cover?

RACO swivel fixture hangers help protect commercial lighting fixtures from limited wind and vibration damage. Swivel Fixture Covers mount on octagon boxes or square boxes.

Standard Hangers

Figure A

Hands-Free KWIK-HANG®

Applications

- RACO sells two types of Swivel Fixture Covers (Figure A):
- Standard Round and Square
- For use with 4" steel square boxes, and 4" steel octagon boxes
- Permits 20 degree swing from vertical
- Accommodates either 1/2" or 3/4" fixture stem sizes. 1/2" reducer bushing is included
- Steel body with malleable iron swivel hub
- Designed for 50 lbs. maximum fixture support (not designed for ceiling fan support)

KWIK-HANG® Hands Free Round and Square

- Unique patented, open gate design allows for easy installation of high bay lighting fixtures.
- Design permits fixture to rest in position while wiring is completed.
- For use with 4" steel square boxes, 3-1/2" and 4" steel octagon boxes
- Permits 20 degree swing from vertical
- Accommodates either 1/2" or 3/4" straight thread stem sizes. 1/2" reducer bushing is included.
- Steel body with malleable iron swivel hub
- Designed for 50 lbs. maximum fixture support (not designed for ceiling fan support)

RACO Specifications

- Standard = 895 (round), 896 (square)
- Kwik-Hang® = 894 KH (round), 897 KH (square)

Key SKUs

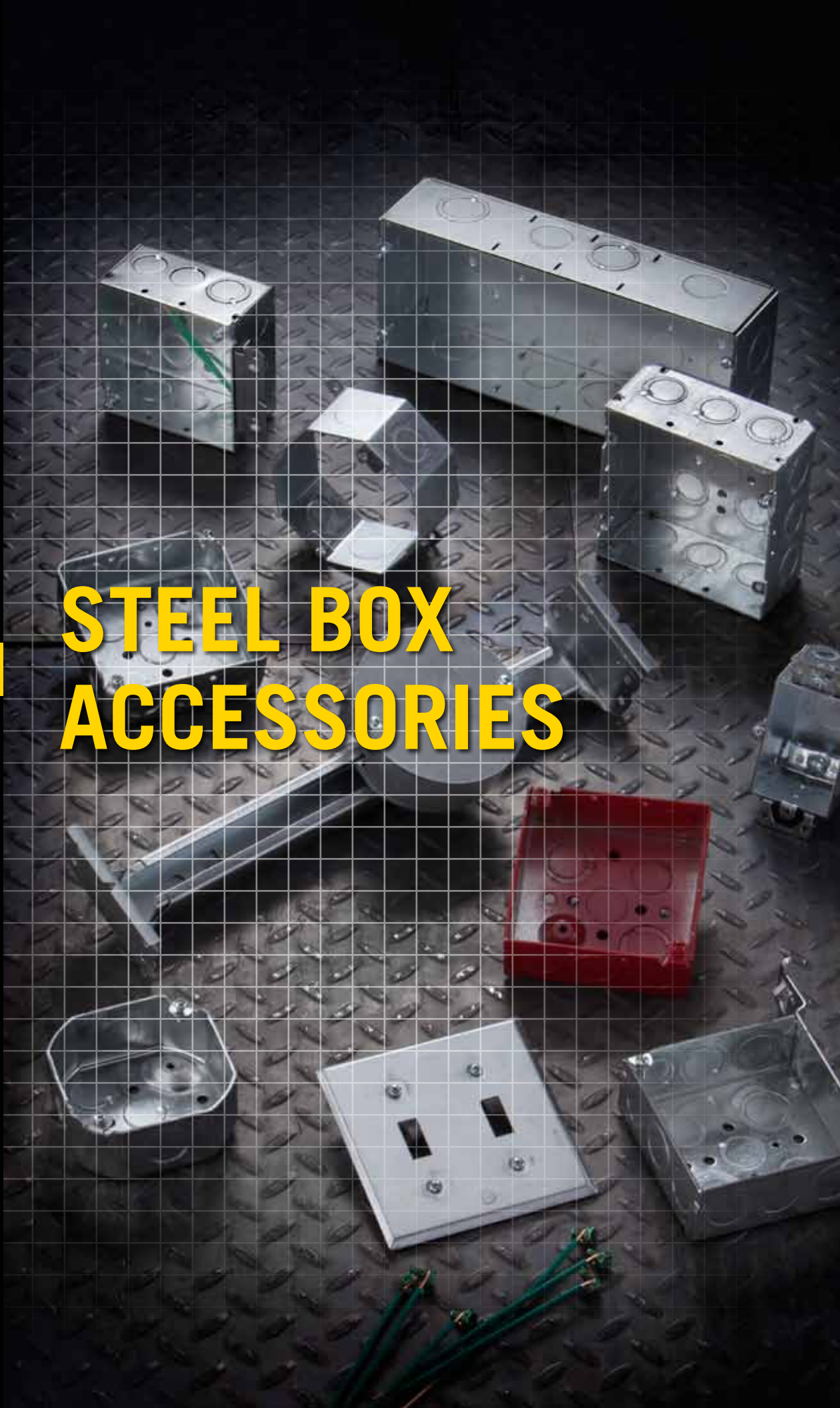
894KH, 895, 896, 897KH

Trade Terms

Swivel Fixture Hanger

SECTION **D**

STEEL BOX ACCESSORIES



NEW WORK BOX SUPPORTS

Applications

- Box supports are used to mount boxes in wall cavities when mounting direct to a support stud is impractical or box does not have a mounting bracket attached.
- Supports can be used to mount switch boxes to metal or wood studs (Figure A) or 4" SQ and 4-11/16" SQ boxes to metal or wood studs (Figure B).
- Figures C and E would be used to mount boxes between studs mounting each end to a stud.
- Figure D is a floor mount box support between studs at fixed heights of 12" or 18" depending upon spec.
- Figure F is a mounting ring for low voltage. The two tabs in the middle fold back into the wall cavity to be wrapped behind the drywall opening.

Figure A

Figure B

Figure C

Figure D

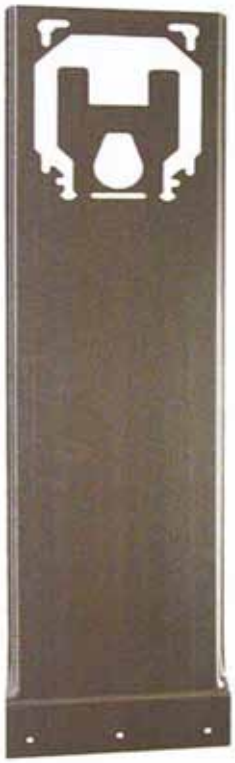


Figure E

Figure F

OLD WORK SWITCH BOX SUPPORTS

What is an Old Work Switch Box Support?

Switch box supports are used to support switch boxes in old work hollow wall installations. RACO offers three styles. All styles require that the switch box being installed have plaster ears.

Figure A

Switch boxes with plaster ears are often used in old work

Trace outline of the box on the wall in an area with no obstructions (framing, wiring, pipes, etc.)

Cut an opening slightly larger than box size.

Insert a section of the GRIP LOK® on both sides of the box

Keeping support snug against back of wall, fold tabs around front of box

The plaster ears and GRIP LOK® work together to hold the box in place

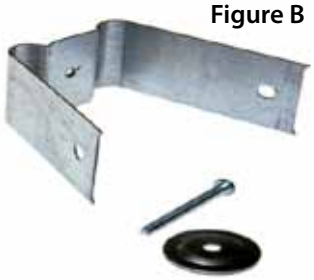
1) GRIP-LOK® Straps

Using GRIP-LOK® Straps (977) is one of the most popular and economical methods to mount old work switch boxes. In fact, RACO sells millions of these a year! They are supplied in one piece and are broken into two pieces before installation (Figure A).

2) Switch Box Support (also called "Old Work Saddle") (Figure B)

This product is designed to be used with a switch box with plaster ears and a 1/2" knockout in the a back. The switch box support (970RAC) is used by removing the back 1/2" knockout and threading the included screw into the "U" shaped support. The support is then pressed to the sides of the box, slipped through the hollow wall box opening and released so it springs back out behind the wall. Tightening the screw locks the box rigidly in the wall.

Figure B

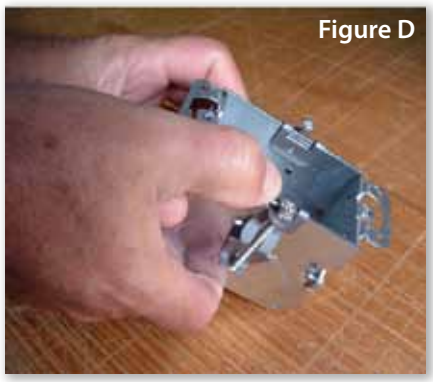


3) Old Work Box Support

Old Work Clips (Figure C) are used to secure steel switch boxes tightly to walls. Used in pairs (Figure D), boxes can be mounted in plaster, drywall, concrete block, brick and concrete walls. Can also be used with 4" or 4-11/16" SQ boxes with plaster ears (sold separately).

Figure C

Figure D



Key SKUs

970RAC, 969, 977

Trade Terms

Madison Straps
Battleships
Old Work Saddle

RETRO-RING® FOR OLD WORK

Applications

The RACO RETRO-RING® is used to position a 4" SQ steel junction box at any point on a sheet rock covered wall cavity which does not have a stud immediately behind the sheet rock. The RETRO-RING® can be used to mount one or two devices – no mud ring required. In addition, a second version of the RETRO-RING® can be used in combination with RACO 4" SQ for Old Work installations of life safety appliances.

Installations

Using the template provided with the RETRO-RING®, draw the outline for the installation (Figure A).

Using a utility knife and following the templated line, cut opening in wall (Figure B).

Assemble 4" SQ box to RETRO-RING® using the screws provided with the box (Figure C).

Insert assembled box and RETRO-RING® into wall opening (Figure D).

Using a Phillips screwdriver, turn the two RETRO-RING® screws located on the sides. This will flip the wings of the RETRO-RING® out and continue to draw the wings up against the back-side of the wall (Figure E).

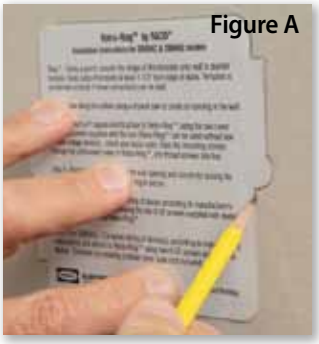


Figure A


Figure B


Figure C

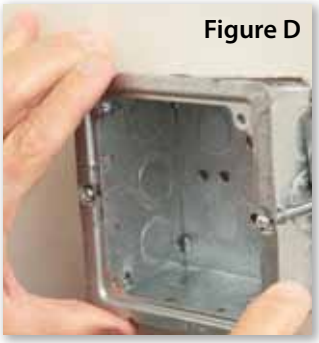


Figure D

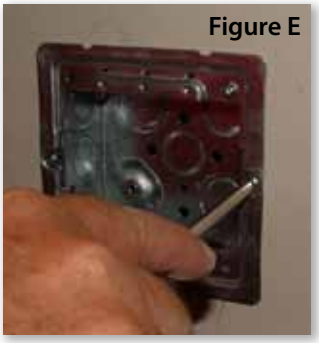


Figure E

GROUNDING PRODUCTS

Grounding Products

For a general understanding of grounding, review Training Section A.

Figure A

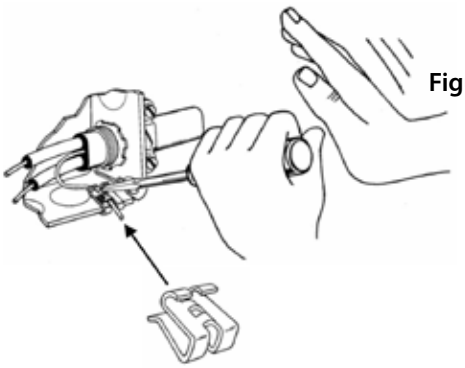
Insulated Solid Wire

Bare Solid Wire

Grounding Wire

A "pigtail" is a green or bare wire that is typically 6" to 8" in length. Pigtails are used to ground the installed wiring device to the box. RACO offers a variety of solid wire and stranded wire pigtails. Stranded wire pigtails are supplied with a fork terminal attached at one end. All RACO pigtails are provided with a ground screw at one end (Figure A). Solid wire pigtails are typically used in residential applications due to the use of nonmetallic sheathed cable (Romex®). Stranded pigtails are easier to bend back into box.

Figure B



Insert wire through clip and place clip on box. Tap clip on using screwdriver and bend wire over edge of box.

Ground Clip

Ground clips provide a quick method of fastening a ground conductor to the edge of a steel outlet box (Figure B).

Ground clips are designed to be used with solid No. 14, 12, and 10 gauge copper conductor or No. 12 and 10 gauge aluminum conductor.

Only one solid ground wire is to be installed per ground clip.

Ground Screws

RACO offers two types of green-dyed ground screws: slotted and combo head. Per UL, both types are required to be #10-32 (that means #10 diameter size, 32 threads per inch). (Figure C) illustrates both types.

Figure C

#10-32 Combo Head

#10-32 Slotted Head

Key SKUs

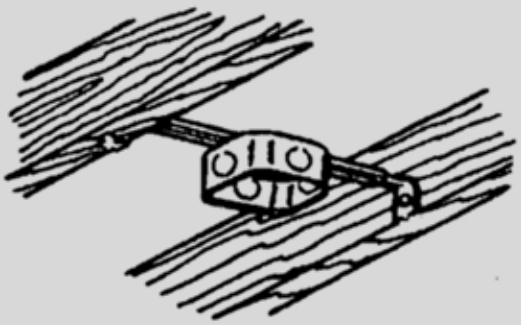
973, 983, 993, 975

Trade Terms

Pigtail

BAR HANGERS

Figure A



What is a Bar Hanger?

Bar hangers position electrical boxes between two ceiling joists or wall studs (Figure A).

Applications

Sometimes during construction, everything doesn't line up just as planned. For instance, the architect wants a light in the middle of the hall and the carpenter puts the joist 6" to left of center. With this situation, it's impossible for the electrician to center a box in the middle of the hallway unless a bar hanger with octagon box is used.

RACO bar hangers are designed to accommodate joists on 16" or 24" centers.

Bar hangers are equipped with adjusting tabs to help locate the box to the proper depth. The tabs are set for a 1-1/2" deep box to be flush with 1/2" drywall/sheetrock.

RACO bar hangers are designed to support light fixtures of 10 lbs. or less. UL rates them for 50 lbs., but RACO engineering recommends a maximum load of 10 lbs. Bar hangers ARE NOT designed for ceiling fan support.

RACO sells bar hangers with or without boxes pre-installed (Figure B). Preassembled bar hangers only cost the contractor a few cents more, saving time and labor on the jobsite.

Figure B

How is a Box Installed to a Bar Hanger?

RACO's bar hangers are supplied with a clip and mounting screw that are used to attach the box to the brace. Figure C demonstrates how a box is mounted to a bar hanger.

HOW TO INSTALL A BOX TO A BAR HANGER

Figure C

Step 1

- Octagon or square boxes attach to RACO 8920 bar hanger through center 1/2" knockout.
- Remove 1/2" center knockout.

Step 2

- Using a screwdriver, remove the bar clip from the bar hanger.

Step 3

- Position box over bar clip so that the clip is centered in the 1/2" knockout.
- Install threaded fixture stud to bar so that the two sharp point teeth are in cavity of bar straddling bar clip. Install screw.
- After box is located accurately between the joists, tighten the screw securely.

RACO Specifications

920/ 922 - Bar hanger with box clip

Key SKUs

920, 922, 325, 326

Trade Terms

Cleat Hanger
Light Duty Bar Hanger
Set-up Bar

SWITCH BOX ADD-A-DEPTH RING

What is an Add-A-Depth Ring ?

Switch boxes do not have extension rings like octagon, square, or handy boxes. The Add-A-Depth ring (976) is a way to correct for a switch box set too deep in a wall (Figure A). This common problem happens in new work when the finished wall is thicker than planned and in remodeling with new paneling or drywall is placed over the old wall.

Applications

The Add-A-Depth ring slips inside any 3" x 2" switch box and fastens to the device ears with extra long screws supplied with the ring. The ring and screws are supplied in a heavy polybag. The rings extends the box from a 1/4" to a maximum of 1". The ring also can be used in a single device cover on a 4" square box. It is a popular item that inexpensively solves a common problem.

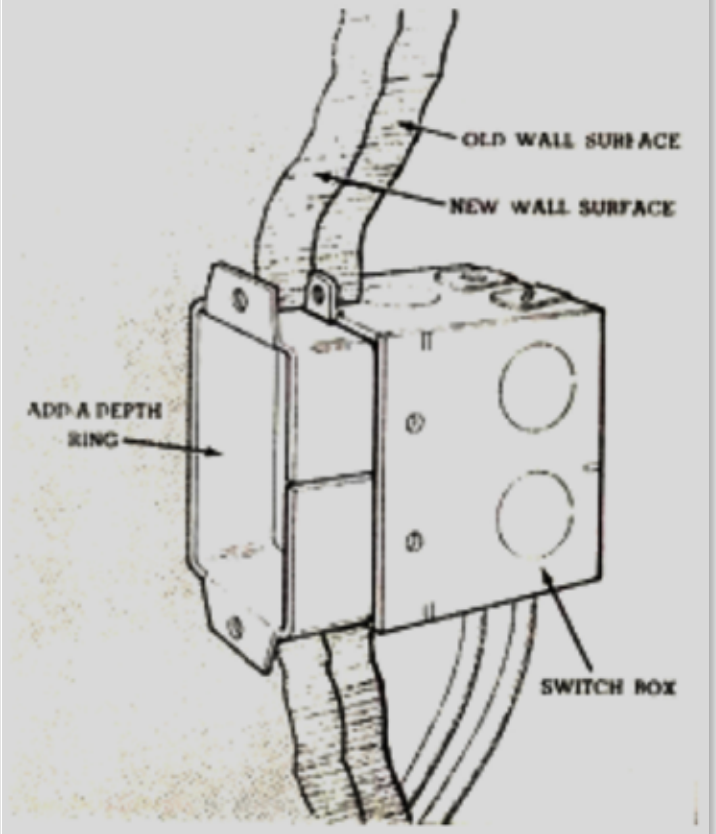
Key SKUs

976

Trade Terms

Goof Ring

Figure A



Slip ring inside existing switch box or cover. Slots in ends let ring clear plaster ear screws. Insert extra-long screws, included, through device ring and screw into tapped ears in existing switch box or cover.

BOX-LOC® (OLD WORK SADDLE)

Applications

Box Loc (Figure A)

Spring steel bracket used to mount boxes onto either side of steel studs. Sharp prongs (circled in red) on all four legs grabs steel stud and locks bracket into place. No mounting screws or nails required and, thus, no tools required. If repositioning is needed, legs of Box Loc can be pulled apart by hand to move bracket on stud.

Bracket snaps onto side of 4" and 4-1/16" SQ metal boxes with tabs (circled in yellow). BOX LOC comes already installed on several versions of metal boxes (4" SQ: 227, 229, 228, 238, 243 / 4-11/16" SQ: 266). Can also be used on wood stud.

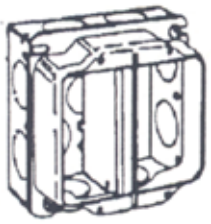
Figure A

LOW VOLTAGE BOX PARTITIONS

What is a Low Voltage Partition?

Often low voltage paging systems, alarm systems, TV or telephone jacks will be used in the same box as 110 volt or 277 volt switch or outlet. A box partition separates a box into two separate compartments allowing for the installation of low voltage and line voltage devices side by side.

Figure A



Partition installed in 4" square box with 2-device mud ring

Applications & Types

Types: RACO offers various types of low voltage box partitions. Partitions are available for the following types of boxes:

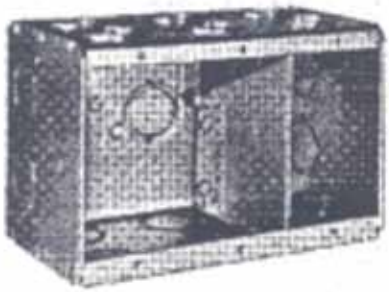
- 4" Square and 4-11/16" Square – A two gang mudring must be used to mount the partition in the box. The partition is installed by inserting through the slot in the mudring, then breaking off at the score line to accommodate the proper depth (Figure A).

Figure B

599 Gangable switch box partition installed

- Gangable Switch Boxes – RACO offers one type of low voltage partition for 2-1/2" deep gangable switch boxes. The 599 low voltage plate can be used with any RACO gangable switch box. It is easily installed between the two boxes being ganged together (Figure B).
- Masonry Boxes – RACO offers low voltage partitions for both non-gangable and gangable masonry boxes. Non-gangable masonry box partitions simply bolt into place using the back of the box (Figure C).

Figure C



Partition installed in 3-gang masonry box

Key SKUs

599, 971, 676, 706, 707

GLOSSARY OF ELECTRICAL BOX TERMS

A

ADD-A-DEPTH RING – a means of extending the walls of a device box to the wall surface, providing a barrier between a wiring device and the surrounding wall material.

AIR PLENUM – a compartment or chamber to which one or more air ducts are connected and which forms part of the air distribution system.

AMP (A) – a measurement of the amount of electrical current in a circuit at any moment.

ARMOR – a metallic covering around the cable for mechanical protection. Typically interlocked steel or aluminum.

ARMORED CABLE CLAMP – a means of securing armored cable to a box, providing an electrical ground. The clamp will accommodate two cables.

B

BX – see flexible armored cable.

BAR HANGER – a means that is used to position a lighting fixture or fan between ceiling joists or studs. The bar hanger may be adjustable, and permits the electrical outlet box to be positioned along its length.

BEAM CLAMP – a fastening means, usually made of malleable iron or steel, commonly used with hangers and a threaded rod to fasten a raceway to an I-beam.

BONDING – the permanent joining of metallic parts to form an electrically conductive path that will assure electrical continuity and the capacity to conduct safely any current likely to be imposed.

BOX EXTENSION – see extension ring.

BOX-LOC® – RACO trade name of our snap-on metal stud bracket.

BOX MOUNT – a term commonly used to denote where the screws of a cover attach.

C

CSA – see Canadian Standards Association.

CABLE – two or more insulated conductors wrapped in metal or plastic sheathing.

CABLE BOX – a box provided with clamps to accommodate either metallic or nonmetallic sheathed cable.

CABLE CLAMP – a generic name for a clamp that mechanically secures the cable to the electrical outlet box.

CANADIAN STANDARDS ASSOCIATION (CSA) – an independent testing agency that certifies products to its established standards of safety and performance.

CIRCUIT – the path of electrical flow from a power source through an outlet and back to ground.

CLAMP BACK – a raceway fastening accessory typically used with a conduit strap to position a raceway away from a wall.

CLEAT HANGER – see bar hanger.

CONCENTRIC KNOCKOUT – a combination knockout where all the knockouts have the same center (e.g., masonry boxes).

CONCRETE BOX – a box intended for support in concrete.

CONCRETE RING – see concrete box.

CONCRETE-TIGHT FITTING – a fitting that, when assembled to conduit or tubing of the proper size, excludes concrete aggregate.

CONDUCTOR FILL – refers to the number of current carrying and grounding conductors permitted by the National Electrical Code (NEC) to be used in conduit and tubing.

CONDUCTORS – electrical term describing wires capable of carrying an electrical current or wire being used as a ground, usually sheathed with an insulating material.

CONDUIT – (raceway) a pipe or tube designed to enclose and protect conductors or cables from moisture and physical damage.

CONDUIT CLAMP – a fastening clamp used to mount raceways.

CONDUIT HANGER – a fastening means used to support conduit.

CONNECTOR – a fitting intended to terminate a cable or raceway into a box, panel, etc.

D

DEVICE EARS – ears or tabs with holes spaced to accommodate wiring devices. Device ears are found on plaster rings, switch boxes and handy boxes.

DEVICE MOUNT – a term commonly used to denote where the screws of a device cover attach.

DUPLEX RECEPTACLE – a contact device for the connection of attachment plugs.

E

8B – a 4" octagon box that is 1-1/2" deep.

8B DEEP – a 4" octagon box that is 2-1/8" deep.

ELBOW – a curved section of raceway intended to change the direction of the run.

ELECTRICAL METALLIC TUBING (EMT OR THINWALL) – conduit called thinwall as a contrast to the "heavywall" of rigid or IMC.

ELECTRICAL NONMETALLIC TUBING (ENT) – a plastic corrugated raceway of circular cross section that is resistant to moisture and chemical atmospheres, and that is flame retardant.

ELECTROPLATING – a term used to describe the process of electrically depositing a layer of corrosion resistant material (I.e., zinc) onto steel or iron parts.

EMT – see electrical metallic tubing.

END RUN – that portion of the branch circuit that extends to the last fixture or device.

ETL – certification mark for Intertek Testing Services. ITS tests to the standards of UL, CSA and other international standards.

EXPOSED WORK – boxes and branch circuits that are mounted external or exposed on walls, beams, columns, etc.

EXTENSION RING – used to extend the box when it is recessed back in a wall. Also provides more cubic inch capacity for the box if needed.

F

FAN BOX – a box that is UL listed for the support of a ceiling (paddle) fan.

FINISHED WALLS – studs, furring strips, joists, that are covered with wood paneling, drywall, plaster, Masonite or ceramic are considered finished.

FIXTURE – a lighting assembly that is permanently attached to a building's wiring system, usually to a ceiling box.

FIXTURE EARS – ears or tabs with holes in them spaced 2-3/4" or 3-1/2" apart to accommodate lighting fixtures. The screw size is a #8-32. Fixture ears are found on octagon boxes and square covers, 4" or 4-11/16".

FLEX – see flexible metal conduit.

FLEXIBLE ARMORED CABLE (BX) – commonly called BX, a manufacturer's trade name. It may be described as prewired flexible metallic conduit since it includes two or more current carrying conductors and can be supplied with a grounding conductor.

FLEXIBLE METAL CONDUIT (GREENFIELD OR FLEX) – frequently called "Greenfield," which is the trade name of one manufacturer of this flexible steel or aluminum raceway. It is used around machinery where vibration or movement exists or where complex routing of the raceway dictates a flexible conduit.

FURRING STRIPS – small wood strips attached to an existing wall to provide a means to attach paneling or drywall.

G

GFCI – see Ground Fault Circuit Interrupter.

GANGABLE – box with a side that can be removed to allow the attachment of another box for installation of multiple devices.

GAUGE – a term used to describe the physical size of a wire.

GREENFIELD – see flexible metal conduit.

GRIP-LOK® – RACO registered trademark for old work clips used to secure switch boxes with plaster ears in hollow walls.

GROUND – a conducting connection between an electrical circuit or equipment and the earth, or to some conducting body that serves in place of the earth. Neutral wires carry the current to ground in all circuits. An additional grounding wire, or the sheathing of metal clad cable or conduit, protects against shock from a malfunctioning tool or other device.

GROUND FAULT CIRCUIT INTERRUPTER (GFCI) – a safety device that senses shock hazard and automatically stops electrical flow in a circuit.

GROUND FITTING – a fitting used to attach a ground conductor to a ground pipe or rod.

GROUND LUG – means used to connect a ground wire to a fitting, clamp, or enclosure. Generally made of copper, aluminum, brass or bronze.

GROUND SCREW – a UL listed screw used to secure a grounding conductor to an enclosure.

GROUND WIRE – the conductor used to connect the electrical equipment to ground (or earth) at the service entrance point, minimizing the potential for electrical shock. Usually clad in green insulation or unclad.

H

HANDY BOX – box designed for enclosing devices; usually surface mounted.

HANDY ELL – a 90 degree elbow used either to connect two runs of conduit, or to connect a run of conduit to an enclosure.

HAZARDOUS LOCATIONS – are those locations where fire or explosion hazards may exist due to flammable gases or vapors, flammable liquids, combustible dust, or ignitable fibers or flyings.

HEAVYWALL – see rigid metal conduit.

HICKEY – (1) a threaded extension for support of a lighting fixture; (2) conduit bending tool.

HIDDEN WORK – residential and commercial construction where the electrical work is hidden by the finished wall; only the wiring device, switch, wall plate or light fixture is visible.

HOT WIRE – the higher voltage conductor carrying electrical current (usually black).

I

I.D. – inside diameter.

IMC – see intermediate metal conduit.

INSULATION – sheathing or jacket of nonconducting material used to cover wires.

INTERMEDIATE METAL CONDUIT (IMC) – a lighter weight, more economical version of rigid metal conduit. It has the same outside diameter (O.D.) as a thinner wall.

J

JIFFY BOX – old work switch box.

JOIST – horizontal beams that extend from wall to wall and support the floor or ceiling – typically 2" X 10", 2" X 8" or 2" X 6".

JUNCTION BOX – an enclosure used for splitting circuits into different branches. In a junction box, wires connect only to each other, never to a switch, receptacle, or fixture.

K

KILOWATT – (KW) one thousand watts, kilowatt measures power.

KILOWATT HOUR – a kilowatt hour is the standard measure of electrical consumption or energy.

KO (KNOCKOUT) – a circular tab on the side or bottom of a box pushed back in place with a small piece of steel remaining uncut to hold the tab in place until it is removed for installation.

L

LOAD BEARING – walls that are an integral part of the structure that supports the joists.

LOCKNUT – an internally threaded barbed nut for use on conduit or fittings to prevent turning and to provide a secure joint.

LOW VOLTAGE PARTITION – a barrier added inside an electrical box to separate communication and power circuits. Also required where voltage levels between adjacent switches exceed 300.

LUG – see ground lug.

M

MC CABLE – metal clad cable. A UL classification indicating an assembly of insulated conductors with a metal cladding applied over the core and with grounding conductor(s) if the cladding is interlocked armor.

MADISON HOLD ITS ® – registered trademark for #977 griplok old work brackets.

MASONRY BOX – box installed in block walls prior to the blocks being laid. The mason cuts the block to fit around the box.

MOUNTING EARS – ears on a box which are used to mount a box cover, device or fixture.

MUD RING – all rings are called mud rings regardless of the finished wall material used. There are two styles of rings, one for mounting a switch or receptacle, and one for mounting lighting fixtures.

N

NEC – see National Electrical Code.

NEMA – National Electrical Manufacturer's Association.

NM –nonmetallic.

NAIL-UP STRAPS – a fastening device used to mount raceways to wooden studs, siding, etc.

NATIONAL ELECTRICAL CODE (NEC) – a set of rules governing safe wiring methods drafted by the National Fire Protection Association. Local codes sometimes differ from and take precedence over NEC requirements.

NEUTRAL WIRE – a grounded conductor that complete a circuit by providing a return path to the

source. Neutral wires are always identified by white or gray insulation.

NEW WORK – electrical work that is completed before the drywall or plaster is installed.

1900 – a 4" square box that is 1-1/2" deep.

1900 DEEP – a 4" square box that is 2-1/8" deep.

NIPPLE – an externally threaded fitting intended primarily to serve as a short raceway between close-spaced enclosures.

NONMETALLIC SHEATHED CABLE (ROMEX ®) – nonmetallic sheathed cable, popularly called by a manufacturer's trade name of Romex, is two or more insulated conductors, usually copper, protected by an outer jacket or sheath of nonmetallic material.

O

O.D. – outside diameter (of conduit, etc.).

OCTAGON BOX – a metal box used on a wiring system, usually at an outlet. It provides means for connection to a wiring system and is intended primarily to enclose splices and wiring devices or to support a fixture or other equipment intended for similar installation.

OLD WORK – electrical work that takes place after the drywall or plaster is in place.

OUTLET – anything that allows access to the wiring system (e.g., box, conduit body, etc.).

P

PAN – see pancake box.

PANCAKE BOX – this round box typically is the same depth as the finish wall material in which it is mounted.

PARTITION WALLS – walls that are nonload bearing – typically interior walls of an office building that can be removed.

PLASTER EARS – ears of switch boxes that prevent the box from falling back into the wall.

PLASTER RING – see mud-ring.

PLENUM – a compartment or chamber to which one or more air ducts are connected to form part of the air distribution system.

PRE-GALVANIZED – the application of hot zinc to the exterior surfaces of steel.

PRIOUT – a circle or pear shaped hole cut into the steel with a tie (a little piece of steel uncut) holding it in place; the priout has a slot in it where a screwdriver tip is inserted to pry out the steel, providing an opening for cable.

R

RACEWAY – enclosed channel designed expressly for holding wire or cables. Conduit is a raceway; so is a duct.

RAFTER – parallel beams that support a roof running from the top of the joist to the peak of the roof.

RAISED COVER – used for a job that is surface mounted. There are a variety of covers that may be used depending on the type of device being installed.

REDI-LOC® - a registered RACO trademark for MCI, AC and HCF cable connectors.

RIGID – see rigid metal conduit.

RIGID METAL CONDUIT (RIGID OR HEAVYWALL) – rigid metal conduit is a raceway that provides a high degree of mechanical protection indoors or out, in dry or wet locations, exposed or concealed, in all kinds of atmospheric conditions, locations, and in hazardous locations such as explosion proof, vapor tight and dust tight.

RIGID NONMETALLIC CONDUIT – three types of rigid nonmetallic conduit are listed by UL: (1) rigid nonmetallic plastic Schedule 40 and 80 PVC; (2) rigid nonmetallic underground plastic; and (3) rigid nonmetallic underground other than plastic, fiber type

ROBERTSON HEAD SCREW – a type of screw with a square key that is popular in Canada. A special tool (called a Robbie) is required to drive the screw.

ROMEX® - see nonmetallic sheathed cable.

S

SERVICE DROP – service entrance conductors from the utility pole to the service entrance conductors of a building that has overhead service. The utility company usually supplies and connects the service drop.

SERVICE ENTRANCE – the point at which electrical service enters a building.

SERVICE ENTRANCE CABLE (SE) – service entrance cable can b compared to nonmetallic sheathed cable (Romex®) in large conductor sizes, with a weatherproof nonmetallic outer covering. It is often encased by rigid, IMC or EMT conduit for additional protection.

SERVICE-ENTRANCE HEAD – an enclosed fitting intended for use at service entrances where open wiring is connected to a service-entrance cable or raceway system.

SET BACK – the distance a box is set forward on a stud to accommodate the thickness of the finished wall and leave the face of the box flush with the front surface of the wall.

SET SCREW CONNECTOR – a fitting which terminates a run of conduit into an enclosure using set screws.

SET-UP BOX – trade term for an octagon box, factory installed on a bar hanger.

SHEATH – material, usually an extruded plastic material applied outermost to a wire or cable. Often called a jacket.

SHIELDED CABLE – a cable in which the insulated conductor(s) are enclosed in a conductive mesh envelope. The mesh is intended to protect the enclosed conductor(s) from external electrical interference.

SPLICE – the joining of two or more conductors.

SPLICE BOX – see junction box.

SPLIT COUPLING – a term used to refer to a coupling used for rigid/IMC conduit. Used where the conduits to be coupled cannot be rotated.

STRAIN RELIEF – a term used to describe the sealing and gripping action of a cord connector.

STRAPS – used to support conduit as required by Code. Beam and conduit clamps perform this function in industrial locations.

STUD – 2" X 4" or 2" X 6" wood or steel used to construct walls.

STUD WALL – wood or steel 2" X 4" spaced 16" or 24" on center – drywall or paneling typically is attached to the studs to finish the wall.

SWITCH BOX – boxes with device ears for direct mounting of switches as opposed to boxes requiring mud rings for switch mounting.

T

THINWALL – see electrical metallic tubing.

TIGER BOX ® - RACO registered name for a patented switch box for old work applications.

TILE COVER – a series of covers designed for use with tile. These covers are for mounting switches or receptacles. Rings are available in different depths depending on the finished wall thickness.

TKO® - RACO trademark for combination 1/2" and 3/4" knockout. The two knockouts are off-center to enable a 1/2" locknut to engage the box for proper grounding of the electrical system.

TOGGLE SWITCH – a switch intended for use in general distribution and branch circuits.

TRADE SIZE – conduit is referred to by trade size according to its inside diameter.

U

UL – see Underwriters Laboratories.

UNDERGROUND FEEDER CABLE – underground feeder cable (Type UF) is a group of conductors manufactured in the form of a cable assembly similar to Type NM (Romex ®) but with the physical and electrical characteristics that allow for direct burial in the earth.

UNDERWRITERS LABORATORIES (UL) - an independent testing agency that tests and lists electrical equipment to its established standards of safety and performance.

UTILITY BOX – see handy box.

V

VOLT (V) – Unit for electric potential (voltage), electric potential difference, and electromotive force.

W

WATT (W) – a measure of the power an electrical device consumes: [volts x amps = watts].