

Rigid Metal Conduit Fittings

Specifications — Rigid Metal Conduit / PVC Coated Rigid Metal Conduit

Ref. CEC Rule 12-1000

Rigid Metal Conduit affords maximum mechanical protection to conductors within the raceway. Rigid metal conduit can be installed indoors and outdoors, in dry locations or wet locations, exposed or concealed, in all atmospheric conditions and in hazardous locations.

Galvanized rigid steel conduit installed in concrete does not require supplementary corrosion protection. Galvanized rigid steel conduit, installed in contact with soil, does not generally require supplementary corrosion protection. However, when buried in corrosive soil (corrosive soil is characterized by low resistivity of less than 2,000 ohm-centimeter) or cinders, a protective coating of bitumastic, asphalt-based paint or a PVC coating is applied to the conduit. CEC Rule 12-934 requires that rigid steel conduit installed in or under permanently moist cinder fill be encased in at least two inches of cinder-free concrete unless the conduit is at least 18 inches below the fill. Steel conduit protected from corrosion solely by enamel can only be used indoors and in occupancies not subjected to severe corrosive influences.

Rigid nonferrous metal conduit (aluminum) cannot be directly embedded in concrete containing soluble chlorides such as calcium chloride; unwashed beach sand, seawater, or coral bearing aggregates. However, if adequately treated by a protective coating of bitumastic or asphalt-based paint or PVC coating, the conduit can be installed in concrete containing chlorides.

Supplementary nonmetallic coatings presently used on ferrous rigid metal or nonferrous metal have not been investigated for resistance to corrosion.

CEC Rule 12-920 requires that when conduit enters a box or fitting, a bushing must be provided to protect wires from abrasion unless the design of the box or fitting provides equivalent protection.

According to CEC Rule 12-906 where No. 8 or larger ungrounded conductors enter or leave a conduit, an insulating bushing with a smooth well rounded insulating surface must be provided to protect conductors unless the terminating fitting is equipped with an insulated throat, firmly secured in place providing equivalent protection. The insulating bushing or insulating material must have a temperature rating of not less than the insulation temperature rating of installed conductors. When conduit bushings are constructed wholly of insulating material, a locknut must be installed both inside and outside of the enclosure to which the conduit is attached.

Fittings and couplings are required to be of concrete-tight type when embedded in masonry or concrete or in dry locations and of the raintight type when installed in wet locations.

In wet locations or locations where walls are frequently washed or where there are surfaces of absorbent materials, the entire wiring system including boxes, fittings, conduit and cables must be supported such that there is at least 1/4 inch air space between it and the supporting surface (CEC Rule 2-122).

CEC Rule 12-3022 requires that the raceways be metallically joined together into a continuous electric conductor and must be mechanically connected to all boxes, fittings and cabinets as to provide effective electrical continuity.

Conduit is required to be supported adequately and conduit bends in one run are restricted to the equivalent of four quarter i.e. 360 degrees total.

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Specifications — Rigid Metal Conduit/PVC Coated Rigid Metal Conduit (cont'd)

For further details and complete information please refer to the following:

1. ANSI C80.1 — Rigid Steel Conduit Zinc Coated, Specifications for
2. ANSI C80.2 — Rigid Steel Conduit, Enameled, Specifications for
3. ANSI C80.5 — Rigid Aluminum Conduit. Specifications for
4. ANSI C80.4 — Fittings for Rigid Metal Conduit and Electrical Metallic Tubing, Specifications for
5. WW-C-581 — Federal Specification, Conduit, Metal, Rigid & Coupling, Elbow, and Nipple, Electrical Conduit, Zinc Coated
6. WW-C-540 — Federal Specification, Conduit, Metal, Rigid (Electrical, Aluminum)
7. WW-C-571 — Federal Specification, Conduit, Metal, Rigid, and Coupling, Elbow, and Nipple, Electrical Conduit Enameled
8. UL 6 — Standards for Safety. Rigid Metal Conduit
9. UL 2142 — Standards for Safety. Intermediate Metal Conduit
10. CEC Section 12-1000 — Rigid and Flexible Conduit
11. CSA C22.2 No. 45 — Safety Standards for Rigid Metal Conduit
12. CSA C22.2 No. 18 — Safety Standards for Outlet Boxes, Conduit Boxes and Fittings
13. NEMA FB-1 — Standards Publication. Fittings and Supports for Conduit and Cable Assemblies
14. A-A-50553 Federal — Specification Fittings for Conduit Metal Rigid (Thickwall & Thinwall [EMT] Type)

Please Note

The excerpts and other material herein, whether relating to the Canadian Standards Association, the Underwriters Laboratories, Inc. listing, to industry practice or otherwise, are not intended to provide all relevant information required for use and installation. Reference to original or primary source material and data is mandatory before any application or use is made of the product.

Rigid Metal Conduit Fittings

Suggested Specifications for Rigid Metal Conduit/PVC Coated Rigid Metal Conduit and Fittings

- Conduit shall be securely fastened in place, at intervals as specified by the code, using suitable straps, hangers and other supporting assemblies as indicated on plans and as manufactured by Thomas & Betts, Series 1276, 690 and 700. All strap hangers and supporting assemblies shall be of rugged construction capable of supporting weight with a reasonable factor of safety and shall be adequately protected against corrosion. Where applicable, it shall conform to Canadian Standards Association Standard C22.2 No. 18.
- In wet locations or in locations where corrosive conditions are present, vertical and horizontal runs of conduit shall be firmly supported so that there is at least 1/4 in. air space between the conduit and the wall or supporting surface. Spacers and supporting straps shall be of malleable iron construction, hot dipped galvanized conforming to Canadian Standards Association Standard C22.2 No. 18 such as Thomas & Betts Series 1276 straps and Series 1350 spacers. Nonferrous metal straps and spacers may be substituted as required.
- Where threaded conduit terminates into a threadless opening, a locknut shall be provided both inside and outside the box or enclosure and the conduit end shall be fitted with an insulating bushing. In wet locations, a suitable gasket shall be provided between the outside locknut and the opening.

Locknuts shall be rugged, of hardened steel or malleable iron construction, electro-zinc plated and capable of cutting through protective coating on box or enclosure to ensure positive bond such as Thomas & Betts Series 140.
- Where raceway and associated fittings are used as part of an equipment grounding system, terminating fittings shall be equipped with bonding type locknuts such as Thomas & Betts Series 106 bonding locknuts. Sealing gaskets shall be constructed of oil resistant/moisture resistant rubber and shall be suitably protected by and permanently bonded to a stainless steel retainer such as Thomas & Betts Series 5302.
- Where threaded rigid metal conduit is installed outdoor or indoors or in locations exposed to continuous or intermittent moisture, a sealing hub type terminating fitting shall be installed. Hubs shall be of malleable iron/steel construction, electro-zinc plated and equipped with a nylon insulated throat and oil resistant/moisture resistant sealing ring as manufactured by Thomas & Betts, Series 370 or Series H050-TB. Female taper hub threads shall be adequately relieved to prevent bottoming of conduit.

Hubs constructed of copper-free aluminum may be substituted when used with rigid nonferrous (aluminum) metal conduit, Thomas & Betts Series 370AL or H050A.

For environmental conditions that are more than normally corrosive to exposed surfaces, hubs suitably protected with PVC coating such as Thomas & Betts Series 485 shall be used.



Rigid Metal Conduit Fittings

Suggested Specifications for Rigid Metal Conduit/PVC Coated Rigid Metal Conduit and Fittings (cont'd)

- Where concrete-tight requirements must be met, or in dry locations, rigid metal conduit or intermediate metal conduit fittings and couplings shall be of the concrete-tight type. Fittings shall be rugged, of ferrous metal construction, electro-zinc plated inside and outside, and furnished with a nylon bushing as manufactured by Thomas & Betts, Series 8123 and 8120. Insulated set screw type fittings such as Thomas & Betts Series 8125 and 8124 may be substituted unless otherwise indicated on drawings.

Components critical to performance such as set screws, split rings, and locknuts shall be hardened or adequately designed to ensure positive bond between conduit and enclosure or conduit runs.

All fittings of the system shall be capable of carrying ground fault currents per the following:

1/2 in. through 1-1/2 in. size...10,000 amps RMS (duration of fault current 3 cycles)

2 in. and above...20,000 amps RMS (duration of fault current 3 cycles)

- All back-to-back nipping of boxes shall be done using locknuts and nylon bushed nipples as manufactured by Thomas & Betts, Series 140 locknuts and Series 1942 nipples. Nipples, or suitably designed bushings such as Thomas & Betts Series 3210, shall also be used where conductors pass through either factory or field punched, cut or drilled holes in metallic members.
- Where neither length of threaded conduit can be rotated, couplings such as Thomas & Betts Series 674 shall be installed in conduit runs.
- Where threaded or threadless conduit terminates outside a box or an enclosure, or where conduit is stubbed up, it shall be equipped with an insulated metallic or nonmetallic bushing such as Thomas & Betts Series 1222 or TRIB50.
- Where code requires bonding and grounding of single or multiple rigid metal conduits or where positive bonding and grounding of conduit to the box, enclosure or auxiliary gutter is required, the end of the conduit shall be equipped with an

insulated metallic grounding and bonding bushing such as Thomas & Betts Series 3870.

Insulated metallic grounding and bonding bushing shall be approved for the purpose. It shall be of malleable iron/steel construction adequately protected against corrosion, assembled with an insulator listed or certified for 150°C/302°F application and flammability rating of 94V-0 with insulator positively secured in place.

Bonding to enclosure shall not be dependent on locknut bushing type contact but by a positive bonding means such as a hardened screw or equivalent.



Rigid Metal Conduit Fittings

Suggested Specifications for Rigid Metal Conduit/PVC Coated Rigid Metal Conduit and Fittings

- Rigid ferrous metal conduit or PVC coated rigid conduit prior to coating shall be of the hot dipped galvanized type adequately protected against corrosion inside and outside including threads, and conforming to the following applicable specifications:
 - Rigid Ferrous Metal Conduit Federal Specification WW-C-581/ANSI C80.1/UL 6/CSA C22.2 No. 45
 - PVC Coated Ferrous Metal Conduit Applicable listed under (i) and in addition conforming to NEMA Publication No. RNI-2005 (Type A) PVC coating on conduit and associated fittings shall have no sags, blisters, lumps or other surface defects and shall be free of holes.
- Rigid nonferrous metal conduit shall conform to Federal Specification WW-C-540/ANSI C80.5/UL 6/CSA C22.2 No. 45.
- All field cuts shall be square, reamed and deburred. Conduit threads shall be tapered for entire length with 3/4 in. taper per ft. Conduit threads prior to assembly shall be clean and coated with grease metallic type conductive compounds such as Series CP8 KOPR-SHIELD® for ferrous conduit or Series AP8 ALUMA-SHIELD for nonferrous (aluminum) conduit as manufactured by Thomas & Betts.
- To prevent ingress of plaster, dirt, trash or moisture in raceways, boxes, fittings and equipment during course of construction, all open ends shall be closed with rugged thermoplastic plugs as manufactured by Thomas & Betts, Series 1470 and 1451. Plugs shall be firmly secured in place to provide adequate seal and shall be functionally unaffected by moisture. Thermoplastic plugs shall be rated at 105°C/221°F and have a UL flammability rating of 94V-1.



**Cat. #CP8
KOPR-SHIELD***
* TM of Jet-Lube, Inc.



**Cat. #AP8
ALUMA-SHIELD®**



**Series 1451
Knockout Plug**



**Series 1470
Plug, Conduit/Fitting**

Rigid Metal Conduit Fittings

Specifications — Locknuts



**140 Series
141AL Series**



106 Series

Application

- To connect externally threaded conduit or fitting to a threadless opening in a box or enclosure
- To effectively bond conduit or fitting to box or enclosure

Features

- Hardened Steel/Malleable Iron/Copper-free Aluminum construction
- Tightens without deformation
- Locknuts specially designed to
 - (1) Provide extended reach for clamping on thin boxes and enclosures
 - (2) Cut through protective coating on box and enclosure thereby ensuring ground continuity
 - (3) Permit tightening from outside
 - (4) Prevent loosening under vibration
- 106 Series provided with a hardened cone point screw

Standard Material

140 Series & 106 Series

- 3/8 in. thru 2 in. Steel (hardened)
- 2-1/2 in. thru 6 in. Malleable Iron
- All screws steel

141AL Series

- All copper-free aluminum (less than 0.4% copper)

Standard Finish

All Steel and Malleable Iron locknuts including bonding screws Electro-zinc plated

All Aluminum locknuts degreased

For chromate coating use prefix 040

Range

- 3/8 in. through 6 in. conduit (all threads straight pipe [NPS]) (140 Series)
- 1/2 in. through 4 in. conduit (106 Series & 141AL Series)

Conformance

UL 514B

CSA C22.2 No. 18.3

NEMA FB-1

ANSI C80.4

Federal Specification W-F-408

Federal Standard H-28 (Threads)

“Case Hardened Locknuts”

Case hardened locknuts make fittings faster and easier to install. Case hardened locknuts do not slip or turn thereby protecting the biting edge. Case hardened locknuts bite through the paint on the enclosure providing excellent continuity of ground (typical T&B/ Thomas & Betts fitting with case hardened locknuts successfully passed minimum fault current of 10,000 amps RMS). Case hardened locknuts when assembled in the intended manner will not vibrate loose thereby ensuring excellent ground continuity.