Conduit

NEC Articles
300, 343, 344, 350, 352, 356, 358

Standard
Specifications
• 8-20.3(5)
• 9-29.1
The ends of all conduits, metallic and non-metallic, shall be reamed to remove burrs and rough edges.

8-20.3(5)
Threading Galvanized Steel Conduit
Threading on a Tri-pod
New Thread Cut Not Square

8-20.3(5) Field cuts shall be made square and true.
Coat New Threads with Galvanizing Repair Paint
Colloidal Copper
Slip joints or running threads will not be permitted for coupling metallic conduit. When installing RGS conduit, and a standard coupling cannot be used, an approved 3 piece coupling shall be used. 8-20.3(5)
Screw It Together
Geared Threader 2.5” to 4”
Conduit On Bridge, Deflection Fittings, & LB’s
Conduit Bodies
PVC Expansion Fitting
PVC Expansion Fitting
Poured Into Rail
Deflection (DX) Fittings
Deflection Fitting Cut In Half
What Is Wrong With This Picture
Corrosion Resistant Tape

Standard Plan J-16B Traffic Barrier detail sheets (Bridge sheets)
Corrosion Tape
Mounted Under Bridge
Suspended Under a Bridge
4 Inch Steel on Hangers
Conduit in the Trench
Conduit ends shall be capped 8-20.3(5)
Road Crossing 8-20.3(5)

1. The pavement shall be saw cut a minimum of 3-inches deep. The cuts shall be parallel to each other and extend 2 feet beyond the edge of the trench.
2. Pavement shall be removed in an approved manner.
3. Trench depth shall provide 2-feet minimum cover over the conduits.
4. Trench width shall be 4-inches or the conduit diameter plus 2-inches.
5. Trenches located within paved roadway areas shall be backfilled with controlled density fill (CDF) to the bottom of existing pavement. The pavement shall be replaced with paving material that matches the existing pavement.
Conduit Placed in Foundation
Mechanical Seals Required in Cabinet Conduits

- NW Region Special Provisions 8-20.3(5)
  - All conduits entering pad mounted cabinets and all conduits entering ITS hubs shall be sealed with an approved mechanical plug at both ends of the conduit run. Conduit duct seal will not be accepted. Pad mounted cabinets shall include, but not be limited to, service, signal controller, data station, CCTV, ramp meter, environmental sensor station, gate controller, cable terminal, and transformer cabinets.

- Approved products
  - Tyco Electronics TDUX
  - Tyco Electronics Jackmoon Triplex Duct Plug
  - O-Z/Gedney Conduit Sealing Bushing
TriPlex Conduit
Plugs
TDUX by Tyco Electronics

Inflatable Sealing System for Telephone Cable Ducts for Underground Applications

**TDUX**

- **Features**
  - Fast and easy to install, even in congested environments.
  - Very flexible and reliable wraparound sealing system.
  - Independent of duct or cable quality.
  - Wide application cable range with one size.
  - Seals vacated ducts and ducts with one or more cables.
  - Can be installed while water is flowing out of the duct.
  - Water tight up to 500 kPa.
  - Environmentally friendly and non-toxic.
  - Resistant to chemicals and hazards.
  - Easy and fast removal.
  - Different sizes are available, sealing a wide variety of ducts and cables.

The TDUX inflatable duct sealing system wraps around cables in the ducts of manholes or exchange vaults. The product effectively seals telephone cable ducts, stopping or preventing water from leaking into the manhole or vault.

The TDUX duct sealing system is suitable for use with polyethylene or lead sheathed cables in the plastic, concrete, or steel ducts of wall feed-through systems. It permits cable movement while retaining its sealing properties. The TDUX system has been tested in severe environmental conditions, and is airtight up to 7 psi (50kPa). The TDUX system is watertight in depths up to 16 ft. (5m).

The product can be easily and quickly installed, even in flowing water. The TDUX system is inflated with air or CO2 gas, and conforms to the irregular geometry of cables and ducts. With an optional accessory kit, it can be used in square ducts. The TDUX system is easy to remove, as well, even in adverse field conditions.

Standard kits accommodate a wide range of cable diameters, as well as empty ducts and ducts with multiple cables. TDUX is environmentally friendly: no hazardous chemicals are used to create the seal. It is made from chemical- and bacteria-resistant materials, and will provide a reliable, durable, long-lasting seal.
Triplex and Quadplex Plugs by Tyco Electronics “Jackmoon”
Conduit Sealing Bushings

Type CSB Series

1. Segmental Design: Conduit pressure deeks and all neoprene sealing rings produce a corne-segment design which allows the sealing bushing to be installed without having to thread it along the cable or allows installation around cables already pulled. (Include Catalog Number “SEG”). Also available with all neoprene sealing ring and one piece pressure discs.

2. Double Sealing Ring: A second neoprene sealing ring may be added for cable support applications. Add suffix “02” to catalog number. Contact your local representative for price and availability.

3. Close/Short Nipples: Short nipples which can be screwed into conduit hubs or couplings. Seal fittings are then installed in the open ends of these nipples. To specify a fitting complete with nipple add “N” after Catalog Number. (Example: CSBE-200P-N).

4. Type GL Cabinet Adapter (Figure 2): For use with sealing bushings when exposed wires enter cabinets. Hot dip galvanized malleable or ductile iron is standard; aluminum if specified. Adapter is supplied in several lengths and diameters. Type GL Cabinet Adapters must be ordered separately. See table for catalog numbers.

Thread length on special smooth bore nipples will accommodate 1/4” thick cabinet or structural on Type CSBG (specify if thinner than 1/4”), and up to 1/4” thickness on Types CSBE & CSSB.

Type GL Cabinet Adapter

These fittings are designed for use in schedule 40 rigid conduit. For use with IMC or EMT, a short nipple of Rigid conduit should be used to accommodate the Conduit Sealing Bushing. Blank fittings are intended as abandonment and future use devices only. DO NOT FIELD DRILL.

Dimensional Data: See Page RA19

Conduit Sealing Bushings

For Use with Cable in Rigid Steel Conduit and Rigid Aluminum Conduit

Type CSBE:

- Seals against pressure from the outside of the conduit and to provide support for the cables when fitting is used in vertical position as shown in illustration.
- Type CSBE:

Type CSBI:

- Seals against fluids or gases that are inside a conduit and prevents them from entering an enclosure.
- These conduit Sealing Bushings are used for sealing the ends of conduit in applications involving high static gas or fluid pressures than can be handled by standard conduit bushings.
- For use with IMC or EMT, a short nipple of Rigid conduit should be used to accommodate the Conduit Sealing Bushing. For Schedule 40 PVC Conduit, contact your local representative.

Features:

- The complete assembly is provided with 1 or multiple holes to accommodate the size and number of cables which emerge from the conduit. When the screws are tightened, the neoprene sealing ring is compressed between the metal plates and is forced against the inside wall of the conduit and also against the cable insulation to effect a complete seal at the conduit end.

To order specify:
1. Catalog Number
2. Conduit Size
3. Number of Cables
4. Outside Diameter of Cables
5. Segmented, if Required

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7770 N. Frontage Road
Skokie, Illinois 60077
Innerduct Plugs
Innerduct Nipple
Conduit on Unistrut
Conduit on Unistrut
Surface Mounted Conduit

- Stainless Steel Struts
- Stops placed in each end of the struts
- SS or galvanized two hole straps
- Minimum 1-inch between straps
- Minimum 1-inch from strap to end of strut
- Maximum of 5 foot between struts
- Struts 1-foot longer than needed for future
- No surface mounted PVC

Standard Specifications 8-20.3(5)
Page 8-78 and 79
Conduit clamps shall be two hole type straps, stainless steel or hot dip galvanized, except in marine environments, where type 316 stainless steel shall be used. 9-29.1
Conduit Placement

Conduits shall enter from the direction of the run and within 3-inches of the wall nearest its entry.
Fractured Fin Back Form
Minimal Bends Are Better

The conduit has to be installed near the back of the box.
PVC in Cast in Place Bridge Rail
Directional Boring Machine
Directional Boring “Drill Heads”

Directional Indicator

Inserts here
Pick Your Spot and Drill
Vacuum Trailer Picks up Bentonite Slurry
Locator Finds Drilling Head Location
Locator

Headed down 7 degrees

Spade at 11 o'clock

134 inches deep
Universal Joint Attached to Conduit
Ready to Pull It Back
Multiple Conduits in Same Bore
Connect 4 HDPE Conduits
Space can be a Challenge

1 - Three Inch
3 – Two Inch
HDPE Conduits
A Tough Bore

SR 18 from Military Rd. Bridge

Direction Of Bore

Directional Boring Machine
Pulling Back With Reamer
No glue is allowed when installing the adaptors on the HDPE. Glue will soften the threads in the coupler and they will be flattened during installation. It will not be tight. Water based pulling lubricant may be used.
Testing Mechanical Coupler

Top left - Set up for the test.
Top right - Parts after failure.
Bottom - Max pull at 700 lbs. Pulled apart at 700 lbs.
Conduit Fill For New Work
(WSDOT design standard)

26% Conduit Fill → 1 1/2” Conduit
Conductors → 4 - #2
= 0.532 in^2

Adjustment factors for more than three conductors. (310.15(B)(2)(a)
Conduit Fill For Adding to Existing Conduit

Chapter 9 Table 1
Over 2 conductors NEC is 40%.
Adjustment factors for more than three conductors. (310.15(B)(2)(a)

40% Conduit Fill → 1 ½” Conduit
Conductors → 4 - #2, 2 - #4, and 2 - #8
= 0.838 in^2
Conduit Fill At 60%

(NEC Charter 9 Note 4 to Table 1)
(Nipples not longer than 24”)

60% Conduit Fill $\rightarrow$ 1 ½”
Conduit Conductors $\rightarrow$ 5 - #2,
2 - #4, 2 - #6, 3 - #8, 1 - #10,
and 1 - #12 = 1.232 in\(^2\)

Use for nipple fill only. Adjustment factors for more than three conductors would apply as per NEC (310.15(B)(2)(a)).