Epoxy Conduit

Champion Fiberglass Conduit maintains the following Standards & Listing Compliances

- UL2420 (Below Ground)
- UL2515 (Above Ground)
- Class1 Div2
- ISO9001
- ISO14001
- NEC (Article 355 – RTRC Conduit - Reinforced Thermoset Resin Conduit)
- CSA (Section 120200 thru 12-1220 Rigid RTRC Conduit CSA)

Notes:
- All conduit sections are provided with belled ends
- No couplings are required for straight sections
- Standard conduit lengths are 10 and 20 feet
- Standard conduit colors are black & gray with special colors available upon request
- Standard and long radius elbows are available with special radii available upon request
- Conduit bodies with custom sized threaded hubs are available upon request
- Male/female adapters & box connectors are available upon request
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Forward
These instructions are intended to provide assistance only as a guide to obtain the most appropriate and satisfactory installation of Champion Fiberglass conduit systems. These instructions are not intended to replace the responsibilities of engineers, customer representatives, owners or other persons responsible in establishing engineering design practices and procedures that are best suited for individual job site conditions.
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Scope
These instructions cover recommendations for above/below ground installation procedures, Class1 Div2 installation procedures, joining of conduit sections, shipping, handling and storage of Champion Fiberglass epoxy RTRC conduit systems.
Epoxy Conduit

Concrete Encasement & Direct Burial

The following conduits are approved for concrete encasement and direct burial systems.

1. Standard Wall (SW - .070 wall) ¾” thru 4” diameters
2. Medium Wall (MW - .096 wall) 5” thru 6” diameters
3. Heavy Wall (HW - .110 wall) 5” thru 6” diameters
4. Heavy Wall (HW - .125 wall) 8” diameter
5. Heavy Wall (HW - .188 wall) 10” thru 12” diameters
There are many different configurations of commercially available spacers.

- **Encased Burial** conduit separation can be achieved by the use of commercially available spacers.
- **Direct Burial** conduit separation spacers must meet the specifications of the design engineer. The spacers must be designed for such use and appropriate backfill material and its compaction must be specified as well. Proper design engineering must be applied for the use of direct burial spacers otherwise excessive conduit point load deflections may result.
- **Spacing Considerations**: Stock spacers provide 1½”, 2” & 3” conduit separations.
Epoxy Conduit

Handling & Storage

Transportation

- Conduit is shipped in self-supporting crates designed to be unloaded by forklift. Crates should not be dropped from the truck trailer flat-beds.
- Conduit may also be shipped via enclosed vans in bundles. Care should be taken to avoid prolonged storage in enclosed vans as excessive stacking weight and elevated temperatures may cause the bottom rows of conduits to become oval in shape.
Epoxy Conduit

Handling & Storage

Storage
- **Conduit crates** should be stored on a level surface. The wooden frames should line up (below) so the load will be transferred to the wood frames rather than the conduit. The height of stacked conduit should be limited to twelve feet.
- **Elbows and accessories**, when stored outdoors, should be under cover to protect items in cartons from the outdoor elements.
- **Epoxy adhesives** should be stored at room temperature except when in use on the jobsite. Adhesives should not be stored in freezing areas as this will cause handling problems during the application process.
Epoxy Conduit

Underground Installation

Proper Installation
- To limit deflection, Conduit is to be properly installed if the inside diameter if each duct is adequate to allow the passage of the specified deflection mandrel.
- To limit deflection, special attention should be paid to trench bedding, duct separation, spacer interval, type of backfill material and amount of compaction.

Trench Excavation
- All federal, state & local regulations should be followed.
- Routing of the underground conduit should be coordinated with all utility companies.
- The trench dimensions should be determined
  » The trench depth is determined by the height of the duct bank plus the minimum required cover over the duct bank.
  » The trench width is determined by the duct bank width plus a three inch space on each side to accommodate the backfill and/or shoring materials.

Trench Wall
- Unstable soil conditions should be stabilized before laying the duct. Well points or under drains may be required to control excessive groundwater conditions.
- Soil conditions may require shoring. Duct should not be disturbed by removal of shoring materials.
Epoxy Conduit

Underground Installation

Trench Excavation —(cont.)—

» **Trench Bottom**
  
  » The trench bottom should be smooth and free of any debris that may impede the spacer positioning.
  
  » Rocky bottom trenches may require a layer of compactable bedding material.
  
  » For direct burial applications, bedding must be uniformly graded for continuous duct support.
  
  » Blocking or mounding should not be used to raise the duct to grade.
  
  » Unstable trench bottoms may require crushed stone or gravel bedding to provide duct stability.
  
  » The maximum bedding particle size should be 1 inch.
Epoxy Conduit

Assembly

Joining Systems

- **Straight Socket (For Use w/Above & Below Ground Applications)**
  - Consists of an integral bell & spigot.
  - Spigot end easily slides into belled end.
  - Intended for use with Champion Fiberglass Epoxy Adhesive.
  - High pull-out strength of 10,000 lbs.
  - Concrete and water tight joint.
  - Straight socket joining system is provided for the following:
    - IPS conduits ¾” thru 1 ½” diameters
    - ID conduits 8” thru 12” diameters
    - XW conduits all diameters
Epoxy Conduit

Assembly

Joining Systems

- **Interference Joint** *(For Use w/Concrete Encasement Underground Applications)*
  - Consists of an integral bell & spigot.
  - Spigot end has buttress type male threads for easy installation.
  - Belled end contains the mating female threads.
  - Tapered threads make for a quick easy connection.
  - High pull-out strength of 1,000 pounds.
  - Concrete tight joint – not watertight.
  - The interference joining system is provided for the following:
    - IPS conduits 2” thru 8” diameters
    - ID conduits 2” thru 6” diameters
Epoxy Conduit

Assembly

Joining Systems
- **Tight Lock Joint** *(For Use w/Above & Below Ground Applications)*
  - Consists of an integral bell & spigot.
  - Spigot end has buttress type male thread with Interference Joint.
  - Intended for use with Champion Fiberglass Epoxy Adhesive.
  - High pull-out strength of 10,000 lbs.
  - Concrete and water tight joint.
  - Straight socket joining system is provided for the following:
    - IPS conduits 2” thru 8” diameters
    - ID conduits 2” thru 6” diameters
Epoxy Conduit

Assembly

Joining Systems

- **Gasket Joint (For Use w/Direct Burial Underground Applications Only)**
  - Consists of an integral bell & spigot.
  - Belled end has Triple Seal gasket with Interference Joint.
  - Gasket seats into permanent groove wound into the conduit.
  - Thermoplastic gasket retaining rings are not necessary.
  - Concrete and water tight joint.
  - Pull out strength of 2,000 lbs.
  - Pull out strength without threads of 500 lbs.
  - Straight socket joining system is provided for the following:
    - IPS conduits 3/4” thru 8” diameters (3/4” thru 1 1/2” has no interference joint)
    - ID conduits 2” thru 6” diameters
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Assembly

» Cutting the Conduit
  » Can be cut with hand held hack saw, circular saw containing abrasive grit blade or porta-band saw.
  » Remove any cutting burrs or ridges with 60 grit emery cloth
Epoxy Conduit

Assembly

- Sanding the Conduit
  - Sand areas to be bonded with 60 grit emery cloth. Sanding can be easily done by hand.
  - Factory ends come pre-sanded – only field cut conduit sections require sanding.
  - Sand surfaces to be bonded until factory “sheen’ is removed.
Epoxy Conduit

Assembly

» **Bonding the Conduit**
  » Apply the Champion Mix two part epoxy adhesive to the spigot end of conduit with a metal spatula. The Champion mix adhesive is supplied in 20 ounce, 2 component cartridges and is designed to permanently bond fittings and joints of fiberglass reinforced epoxy conduit. It is also designed for use with pultruded polyester & vinyl ester fiberglass components.
Epoxy Conduit

Assembly

» **Bonding the Conduit**
  » Insert conduit section into coupling or fitting.
  » Allow adhesive to set up before pulling cables.
Epoxy Conduit

Assembly

Bonding the Conduit

- **Champion Mix—two part epoxy adhesives**
  - Each Champion Mix cartridge system contains resin, hardener and one static mixing tube. An adhesive gun is required for applying the adhesive (ordered separately).
  - **The Champion Mix adhesive systems consists of the following components:**
    - CM-AG (adhesive gun)
    - CM-2070 (for 70°F temperatures and above)
    - CM-2070-FG (fast gel adhesive for 70°F and above)
    - CM-2040 (for 40°F temperatures and above)
    - CM-MT (12” long mixer tip)
Epoxy Conduit

Assembly

Bonding the Conduit
- *Champion Mix– two part epoxy adhesives*
  - Below is the estimated number of joints per each Champion Mix 20 ounce cartridge

<table>
<thead>
<tr>
<th>Size</th>
<th>Joints</th>
</tr>
</thead>
<tbody>
<tr>
<td>¾”</td>
<td>100 joints</td>
</tr>
<tr>
<td>1”</td>
<td>85 joints</td>
</tr>
<tr>
<td>1 ¼”</td>
<td>75 joints</td>
</tr>
<tr>
<td>1 ½”</td>
<td>60 joints</td>
</tr>
<tr>
<td>2”</td>
<td>50 joints</td>
</tr>
<tr>
<td>2 ½”</td>
<td>40 joints</td>
</tr>
<tr>
<td>3”</td>
<td>35 joints</td>
</tr>
<tr>
<td>3 ½”</td>
<td>30 joints</td>
</tr>
<tr>
<td>4”</td>
<td>25 joints</td>
</tr>
<tr>
<td>5”</td>
<td>20 joints</td>
</tr>
<tr>
<td>6”</td>
<td>15 joints</td>
</tr>
<tr>
<td>8”</td>
<td>10 joints</td>
</tr>
</tbody>
</table>
Epoxy Conduit

Assembly

Field Bending
- Can be accomplished using a PVC hot box
  » Heat to 240°F.
  » Use a one shot hydraulic bender.
  » Bend to desired angle.
  » Cool the elbow with water or a wet rag.
Expansion joints are available in a wide selection of styles and total movement lengths. Special length movement expansion joints are available upon request. The expansion and contraction of epoxy conduit is usually larger and independent of any expansion and contraction of the structure or bridge.

- **Expansion Joint Spacing Requirements:**
  - Conduit runs less than 50 feet – no expansion joint required
  - 50 – 200 foot conduit runs – one joint required in the center of the run
  - Conduit runs over 200 feet – one joint required every 200 feet
Epoxy Conduit

Assembly

Expansion Joints
The following chart illustrates the expansion/contraction for different temperature changes:

<table>
<thead>
<tr>
<th>Temp Change °F</th>
<th>Conduit Length Change (Inches per/100 ft.)</th>
<th>Temp Change °F</th>
<th>Conduit Length Change (Inches per/100 ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>5 degree</td>
<td>.09 Inches</td>
<td>60 degrees</td>
<td>1.08 inches</td>
</tr>
<tr>
<td>10 degrees</td>
<td>.18 Inches</td>
<td>80 degrees</td>
<td>1.44 inches</td>
</tr>
<tr>
<td>20 degrees</td>
<td>.36 inches</td>
<td>100 degrees</td>
<td>1.80 inches</td>
</tr>
<tr>
<td>40 degrees</td>
<td>.72 inches</td>
<td>120 degrees</td>
<td>2.16 inches</td>
</tr>
</tbody>
</table>
Epoxy Conduit

Assembly

Champion Fiberglass Conduit Bodies

Champion Fiberglass Conduit bodies are available in LB’s, C’s, LL’s, LR’s, T’s, TB’s and X’s. They are compression molded from vinyl ester resin and are supplied with stainless steel cover set screws and a high performance cover rubber gasket which provides a water tight seal between the cover and conduit body. Conduit bodies can also be provided with threaded hub inserts upon request. Conduit bodies are connected to conduit straight lengths with Champion Mix 2 Part Epoxy Adhesive.
Epoxy Conduit

Assembly – Class 1, Div2

*Class 1, Div2*

Only Champion Fiberglass HazDuct conduit (XW - .250 wall thickness) can be used in Class 1, Division 2 hazardous areas.

When *transitioning from Class 1, Division 1 to Class 1 Division 2*, sealing fittings shall be located on the Class 1, Division 2 side (shown on right). The seal must within 10 feet (3.05 meters) of the boundary between the two sides.

When *transitioning from a Class 1, Division 2 area to a non-hazardous area*, there shall be a sealing fitting located within 10 feet (3.05 meters) on the non-hazardous side of the boundary (shown on right).
Thank you!