



Specification Epoxy Fiberglass Conduit

Extra Heavy Wall "Bullet Resistant" (XWall Conduit)

I. References

- A. When a standard or other referenced document referred to in this specification is superseded by an approved revision, the revision shall apply.

II. Manufacturing

The fiberglass conduit shall have a winding angle as close as possible to 54.75 degrees. All pipe in the diameters of 2" - 6" shall be manufactured by applying single circuit winding.

The resin system shall be epoxy based using an anhydride curing agent. The fiberglass shall consist of continuous E-glass roving.

All conduit shall be black, using finely dispersed carbon black at a concentration of no less than 1% (w/w) based on the total amount of resin and hardener.

Curing shall take place in two steps. First curing zone shall bring the pipe slowly to the gel temperature. The second zone shall post-cure the pipe at no less than 350 degrees F, and the pipe has to be properly cured, i.e. when measuring the glass transition temperature with a differential calorimeter, the difference between the first measurement and the second shall not exceed 5 degrees F. The glass transition temperature shall exceed 110 degrees C.



III. Listing

All conduit and fittings shall be listed by Underwriters Laboratories (UL).

IV. Dimensions

All conduit shall be manufactured in ID sizes. The wall thickness shall be nominal of .250". The bell end shall have a depth of 3" + 1/2". No taper shall be allowed for the straight sections of conduit.

V. Electrical Characteristics

Dielectric strength shall exceed 500 volts/mil when tested in accordance with ASTM D-149.

VI. Mechanical Characteristics

The conduit shall have following mechanical strength when tested in accordance with referenced test method:

Tensile strength, ultimate	11,000 psi	ASTM D2105
Coefficient of thermal expansion	1.2×10^{-5} in/in/ $^{\circ}$ F	ASTM D696
Glass content	65-70%	API 15LR
Water absorption	1% max	ASTM D570

Impact resistance: ASTM D2444

Size: 2"	>130 lbf
3"	>140 lbf
4"	>160 lbf
5"	>200 lbf
6"	>250 lbf



VII. Joining System

The conduit shall be supplied with an integral wound bell on one end and a machined end spigot on the other end. A two component epoxy adhesive shall be applied to the spigot end before joining the conduit together. The adhesive shall be supplied in 20 fl. oz. plastic cartridges. A plastic static mixer tip shall be attached to the cartridges. The adhesive shall be applied with an adhesive gun. The adhesive shall be available for two different ambient temperatures: 70°F and 40°F. The adhesive shall be supplied from the same manufacturer of the conduit and the fittings in order to retain the UL listing.

VIII. Fire Resistance and Flame Spread

Conduit shall meet UL specification 1684, i.e. the flame will extinguish within 15 seconds after each of 5 successive applications of a flame per the UL standard.

IX. Toxicity

The conduit shall not contain any compounds that can release halogens, i.e. chlorine, bromine, flour and iodine in more than trace amounts when burning. Following shall be the maximum values when tested in accordance to ASTM E-800:

Gases	Values (max p.p.m.)
Hydrogen Chloride	0
Hydrogen Bromide	0
Hydrogen Cyanide	< 1
Hydrogen Sulfide	0
Ammonia	0
Aldehydes as HCHO	< 10
Oxides of Nitrogen	< 50
Carbon Dioxide	< 12,500
Carbon Monoxide	< 250



X. Fittings and Accessories

All fittings, elbows and accessories shall be manufactured from the same process, using the same methods and chemicals as the pipe. Only two exceptions apply. The first is conduit bodies, which are manufactured using compression molding process (Sheet Molding Compound, SMC). The material for conduit bodies is vinylester resin with +30% reinforcement of glass. Glass fibers should be long fibers, approx. 1" in length. The material is fire resistant according to UL 1684 and halogen free. Second exception is plastic duct plugs which are made from PVC.

Specification of XWall Fiberglass Conduit, 0.250" Wall Thickness