



6400 SPRING STUEBNER ROAD. SPRING, TX. 77389

Specification Phenolic Fiberglass Conduit Extra Heavy Wall (XW Conduit)

I. References

When a standard or other referenced document referred to in this specification is superseded by an approved revision, the revision shall apply.

II. Listing

All 3/4" - 6" conduit and fittings shall be listed by Underwriters Laboratories (UL). All other sizes are not recognized by UL. The conduit shall meet the requirements of NFPA130 and NFPA502.

The conduit when installed together with the appropriately matched 2 hour fire-rated cable will meet the requirements of the UL2196 - 2 hour fire-test @ 1850°F (1010°C). The circuits will continue functioning for the duration of the fire-test and subsequent 35 PSI hose stream test.

III. Manufacturing

The conduit shall be phenolic fiberglass conduit, also known as Reinforced Thermosetting Resin Conduit (RTRC), manufactured using the **single circuit filament winding process**. Multi circuit windings are not allowed. The conduit shall have a winding angle as close as possible to 54.75 degrees. **Winding mandrels shall be straight and true so as to produce a non-tapered conduit**. Tapering is allowed at the belled end. **Conduit shall be manufactured having non-tapered sections (except for integral belled ends)**. The conduit shall be round. The bore of the conduit shall be smooth and uniform. All conduit ends shall be cut at right angles to the axis of the conduit.

The resin system shall be phenol based. The fiberglass shall consist of continuous **E-glass Grade "A" roving**. All additives for increasing flame spread and lowering smoke density shall be halogen free, i.e. not contain chlorine or bromine.

Carbon black shall be used as ultra violet inhibitor to protect the conduit and fittings during storage and exposure to the outdoors. Conduit and elbows shall be black in color.

Curing shall be done using an oven and shall take place in two steps. The first curing zone shall bring the conduit slowly to the gel temperature. The second zone shall post-cure the conduit at no less than 350° F. The pipe has to be properly cured so that when measuring the glass transition temperature with a differential calorimeter the difference between the first measurement and the second shall not exceed 5° F.

The internal conduit and elbow walls shall be smooth and all fibers embedded in the phenolic resin.

All elbows shall meet the nominal radius + or – 2°. The wall thickness shall meet tolerance as shown below and the “Out of Rounds” as shown in NEMA TC 14.

All elbows shall have either straight ends or straight socket couplings.

All conduits and elbows shall be durably and legibly marked in accordance to NEMA TC 14. In addition the following information shall be included:

- NEMA TC 14
- UL 2515 AG (Above Ground)
- Manufacturer
- Date of Manufacturing of conduit and elbows
- Elbows shall be marked with the angle and radius
- Special customer markings (per request)

All conduit, elbows and fittings shall be **manufactured in the U.S.A. and marked as such.**

IV. Dimensions

All 2" - 6" and 10" & 12" conduits shall be manufactured in ID sizes. All other sizes to be IPS. 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 conduit straight sections.

All conduits from 3/4" – 8" shall conform to the following table. Dimensions are nominal. Nominal wall thickness shall be as noted.

Nominal Size	Nominal OD (in.)	Nominal OD (mm)	Nominal Min ID (in.)	Nominal Min ID (mm)	Nominal Wall Thickness (in.)	Nominal Wall Thickness (mm)
3/4" XW	1.410	36	.910	23	.25	6
1" XW	1.675	43	1.175	30	.25	6
1-1/4" XW	2.020	51	1.520	39	.25	6
1-1/2" XW	2.260	57	1.760	45	.25	6
2" XW	2.500	64	2.000	51	.25	6
2-1/2" XW	3.000	76	2.500	64	.25	6
Nominal Size	Nominal OD (in.)	Nominal OD (mm)	Nominal Min ID (in.)	Nominal Min ID (mm)	Nominal Wall Thickness (in.)	Nominal Wall Thickness (mm)
3" XW	3.500	89	3.000	76	.25	6
3-1/2" XW	4.000	102	3.500	89	.25	6
4" XW	4.500	114	4.000	102	.25	6
5" XW	5.500	140	5.000	127	.25	6
6" XW	6.500	165	6.000	152	.25	6
8" XW	8.900	226	8.400	213	.25	6

*Conduit shall be manufactured having **non-tapered sections.**

V. Electrical Characteristics

Volume Resistivity	3.8 x 10 ¹⁴ ohm-cm	ASTM D257
Surface Resistivity	1.1 x 10 ¹⁴ ohms	ASTM D257
Dielectric Constant	3.5 (at 10 ³ cps)	ASTM D150
Dissipation Factor	0.005 (at 10 ³ cps)	ASTM D150
Dielectric strength	500 volts/mil	ASTM D149

VI. Characteristics

Property	Value	Testing Method
Temperature Range	-60°F to +1850°F	ASTM E119 (1850°F 2 hours)
Vertical Flame Test FT4	passed	CSA 22.2
Surface Flammability	<2	ASTM E162
Tunnel Test, Flame Spread	<1	ASTM E84
Tunnel Test, Smoke Density	<1	ASTM E84
Tensile strength, ultimate	7,000 psi	ASTM D2105
Dielectric Strength	150 volts/mil	ASTM D149
Smoke Density, D _{S4 min}	<1	ASTM E662
Smoke Density, D _{max} flaming	<30	ASTM E662
Smoke Density, D _{max} non-flaming	<20	ASTM E662
Water Absorption	<1.0%	ASTM D570
Coefficient of Thermal Expansion	0.51x10 ⁻⁵ in/in/°F	ASTM D696
Specific Gravity	1.70-1.75	ASTM D792
Barcol Hardness	68-72	ASTM D2583
Glass Content	65-75%	API 15LR
Modulus of Elasticity	1.2 x 10 ⁺⁶ psi	ASTM D2105

VII. Fire Resistance and Flame Spread

The conduit shall be UL 2515 Above Ground Listed and shall meet the UL specifications for Above Ground use, i.e. the flame shall extinguish within 30 seconds each time after 4 consecutive applications of 15 seconds and shall extinguish within 60 seconds after the 5th flame application also being 15 seconds in duration.

VIII. Toxicity

The conduit shall not contain any compounds that can release halogens, i.e. chlorine, bromine, fluorine, and iodine, in more than trace amounts when burning. The 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
Oxides of Nitrogen	< 5
Carbon Dioxide	< 10,500
Carbon Monoxide	< 350

IX. Joining System

The conduit shall be supplied with a bonded coupling on one end and a spigot on the other end.

X. Adhesive System

A one part alumina based high temperature adhesive shall be applied to the spigot end for joining the conduits or for joining a conduit and a fitting together. Apply a thin layer (5-15 mils) to the spigot end using a brush, spatula or dispenser. Adhesive will bond at ambient temperatures. Higher strength will develop if the bond is heated to 200°F.

XI. Fittings and Accessories

Fiberglass conduit fittings, elbows, and accessories shall be manufactured using one of two manufacturing procedures. The first method shall use the same process, methods, and components as used to manufacture the fiberglass conduit. The second method shall use the phenol based compression molding process, Sheet Molding Compound (SMC), for the manufacture of the finished component. The SMC material shall be a phenolic resin with +30% reinforcement of glass. The glass fibers should be approximately 1" in length. The SMC material shall be fire resistant to UL 2515 specifications and shall be halogen free.

XII. Environmental

Manufacturer shall have a current Certificate, issued by an independent and accredited company, of compliance with an **ISO 14001: Environmental Management Systems and Performance**.

XIII. Quality Assurance Program

Manufacturer shall have a current Certificate, issued by an independent and accredited company, of compliance with an **ISO 9001:2008 Quality Management System**.

XIV. Installation Training

Manufacturer shall provide contractor installation training and certification for field cutting, joint preparation, joint assembly and RTRC field cut sealing (with field cutting sealant).

Specification of XWall Phenolic Conduit, 0.250" Wall Thickness



CERTIFICATE OF REGISTRATION

This is to certify that

Champion Fiberglass Inc.

6400 Spring Stuebner Rd., Spring, Texas 77389 USA

operates a

Quality Management System

which complies with the requirements of

ISO 9001:2008

for the following scope of registration

Manufacture of fiberglass conduit and fittings.

Certificate No.:	CERT-0065909	Original Certification Date:	November 6, 2009
File No.:	1058413	Current Certification Date:	November 5, 2012
Issue Date:	September 28, 2012	Certificate Expiry Date:	November 4, 2015

Chris Jouppi
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ISO 9001



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