Conduit Selection

Differences Between Above Ground and Below Ground Conduit

The difference between above ground and below ground conduit is in their relative fire resistance. Above ground conduit has fire resistance per UL 2515 and CSA C22.2 No. 2515 standards, meaning that the conduit will self-extinguish within 15 seconds after each of five successive flame applications per the UL 94 (vertical) flame test standard. Below ground conduit meets UL 94 (horizontal burn) requirements, which are less stringent than vertical burn requirements.

Above and below ground conduit share many other properties: dimensions, colors, physical and mechanical properties are the same. Because of its higher flame resistance, conduit that is manufactured and labeled for use in "above ground" applications is suitable and can be used for "below ground" applications as well.

Conduit Application Guidelines

The following recommendations must be verified by the contractor/installer and approved by the engineer of record. The information is strictly for use as a guideline and should be taken as a suggestion only.

Above Ground and Under Bridge

For above ground applications, we recommend that all conduit joints be bonded together with epoxy adhesive.

- The conduit types that have connections that require epoxy adhesive are Straight Socket and Tight Lock.
- These joining systems are available with IPS, ID and XW epoxy resin conduits.
- For above ground applications using phenolic resin conduits, all connections are Straight Socket type and require a high-temperature, fire-resistant adhesive to bond the conduit sections together.

It is recommended that the conduit diameter be based on the allowable wire fill section in this catalog. Determine the support span of your conduit by reviewing the support span section of this catalog. Champion Fiberglass has UL-Listed, NEC-compliant extended support span distances that exceed the charts shown in Article 355 of the NEC. A mid-span deflection of 5/8" (16 mm) should not be exceeded.

Encased in Concrete (EB quality)

For most concrete encasement applications, SW (Standard Wall) conduit is sufficient.

- Due to its high temperature rating (250°F), epoxy fiberglass conduit performs well when encased in concrete. (This recommendation may not apply for core boring applications.)
- The SW Interference Joint conduit can be used for this application.
- The Gasket Joint and Tight Lock Joint conduits can be used for this application but are not required.

Jack and Bore

Due to the possibility of high pressure caused by concrete, HW (Heavy Wall) or XW (Extra Heavy Wall) conduit should be used.

- The installing contractor must observe and apply proper industry-accepted standards and procedures when pumping the concrete into the core.
- If excessive pressures are reached, even HW or XW conduit may fail.
- The HW Interference Joint conduit can be used for this application.
- The Tight Lock Joint conduit can be used for this application.
- The Gasket Joint conduit is not recommended for this application. See trenchless applications on page 155 for more information.

Direct Buried (DB quality)

For direct buried applications that have deep trenches, special soil conditions, or high rates of soil compaction, HW conduit should be used.

- Applications that do not contain any of those conditions may use SW (Standard Wall) or MW (Medium Wall) conduit.
- The Gasket Joint and Tight Lock Joint conduits can be used for this application.

High-impact Areas – Bullet Resistant

For high-impact or Class I, Division 2 applications, XW conduit may be used.

- Many utility companies utilize XW conduit for the protection of their fiber-optic cables in above ground and under bridge applications.
- XW conduit has been shown to stop a .45 caliber bullet at 20 ft.

Note: Iron Pipe Size (IPS) type conduit can easily be used with standard pipe clamps as the conduit is the same OD (outside diameter) as PVC and GRC conduits. IPS conduit also has a larger inside diameter than ID tubular type conduit allowing for more cable fill area.

ID (inside diameter) tubular type conduit has a smaller OD and therefore standard pipe clamps may be used with this type of conduit, but the sizing and fit will not be as designed. Care should be taken to choose the right size pipe clamp inside diameter for the appropriate sized ID tubular type conduit outside diameter.

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P 281.655.8900 // F 281.257.2523
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Conduit UL-Listed Extended Support Spans

Champion Fiberglass conduit has been UL Listed for extended support spans. This UL listing allows for longer Champion Fiberglass conduit support spans (than outlined in the NEC) thereby reducing overall installation costs by reducing the number of required supports.

As written in Article 355.30 (B) of the NEC (National Electric Code), "Conduit listed for support spacing other than shown in Table 355.30 shall be permitted to be installed in accordance with the listing."

NEC Table 355.30

CONDUIT SIZE	SUPPORT SPACING
3/4"	3'
1"	3'
1-1/4"	5'
1-1/2"	5'
2"	5'
2-1/2"	6'
3"	6'
4"	7'
5"	7'
6"	8'

Below are the UL extended support spans for Champion Fiberglass conduit:

Champion Fiberglass UL-Listed Support Spans

Comparison to GRC and PVC-coated steel conduit support spacing

CONDUIT SIZE	SW, MW AND HW SUPPORT SPACING	XW SUPPORT SPACING	GRC AND PVC-COATED STEEL SUPPORT SPACING
3/4"	10'	10'	10'
1"	10'	10'	12'
1-1/4"	10'	15'	14'
1-1/2"	10'	15'	14'
2"	12'	15'	16'
2-1/2"	12'	15'	16'
3"	12'	17'	20'
4"	12' SW/14' HW	17'	20'
5"	13' MW/14' HW	17'	20'
6"	13' MW/14' HW	17'	20'

Features and Benefits

The Champion Fiberglass UL Listing for Extended Support Spans offers the following features and benefits:

- Champion Fiberglass support spans are comparable to GRC and PVC-coated conduit systems.
- Champion Fiberglass support spans exceed what is available from all other RTRC manufacturers.
- Lower material and installation labor costs are realized when fewer supports are required.

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Understanding Item Numbers

When selecting fiberglass conduit for a job, ask yourself these questions. ▼

1 Nominal Size

What nominal size conduit is required for the job?

3/4" x 10' (Avail. IPS only)
1" x 10' (Avail. IPS only)
1-1/4" x 20' (Avail. IPS only)
1-1/2" x 20' (Avail. IPS only)
2" x 20'
2-1/2" x 20'
3" x 20'
3-1/2" x 20' (Avail. ID only)
4" x 20'
4-1/2" x 20' (Avail. ID only)
5" x 20'
6" x 20'
8" x 20'
10" x 20' (Avail. ID only)
12" x 20' (Avail. ID only)

2 Type

What type of conduit is required for the job?

A = IPS Below Ground (Iron Pipe Size)
B = ID Below Ground (Tubular)
C = IPS Above Ground (Most Common)
D = ID Above Ground
E = IPS Phenolic (Meets NFPA 130)
F = ID Phenolic (Meets NFPA 130)
G = IPS Below Ground – grey in color
H = ID Below Ground – grey in color
I = IPS Above Ground – grey in color
J = ID Above Ground – grey in color

Note: Above Ground conduit can be used Below Ground.

3 Thickness

What wall thickness is required for the job?

SW = Standard Wall (UL 3/4"–4")
(Most common)
MW= Medium Wall (UL designates Champion Fiberglass MW for 5" and 6" as SW)
Used for more protection in 5" and 6"
HW = Heavy Wall (UL 4"–6")
XW = Extra Heavy Wall (UL 3/4"–6")
Highest level of physical protection
Bullet resistant
Class I, Division 2 and Class I, Zone 2 Applications

SW applies in most cases > unless:
1. Class I, Division 2 then XW Conduit is required
2. Extra physical protection is required
3. UL is required, then see catalog for UL listing
4. Size of conduit
5. Specifications (i.e. DOT)
6. Extreme environments

Note: Reference Duct Catalog, page 6 for conduit selection, pages 141–152 for engineering data.

4 Joint

What joint type is required for the job?

Interference Joint (Most Common)
Above Ground and Below Ground
Available in 2"–8" IPS
Available in 2"–12" ID

Gasket Joint
Below Ground or constant temperature environment
Available in 3/4"–8" IPS
Available in 2"–6" ID

Straight Socket
Available in 3/4"–12" IPS
Available in 3/4"–12" XW

Note: Reference Duct Catalog pages 12–13.

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40 C SW 92 2D

Diameter	Type	Thickness	Conduit Length/Fittings	Suffix
07 = 3/4"	**A** = IPS Below Ground	**SW** = Standard Wall	**10** = length of conduit in feet	**I** = Interference Joint
10 = 1"	**B** = ID Below Ground	**MW** = Medium Wall	**20** = length of conduit in feet	**G** = Gasket Joint
12 = 1-1/4"	**C** = IPS Above Ground	**HW** = Heavy Wall	**30** = Box Connector	**S** = Straight Socket
15 = 1-1/2"	**D** = ID Above Ground	**XW** = Extra Heavy Wall, Bullet Resistant	**33** = Male Adapter	**CL** = Custom Length
20 = 2"	**E** = IPS Phenolic		**32** = Female Terminal Adapter	**P** = Plain End Elbow
25 = 2-1/2"	**F** = ID Phenolic		**42** = Sleeve Coupling	**2D** = 2 Deep Socket PVC Couplings bonded to elbow
30 = 3"	**G** = IPS Below Ground		**40** = Stop Coupling	**1D** = 1 Deep Socket PVC Coupling bonded to elbow
35 = 3-1/2"	**H** = ID Below Ground		**36** = Single Expansion Joint w/O-Ring	**2F** = 2 Fiberglass Couplings bonded to elbow
40 = 4"	**I** = IPS Above Ground		**29** = End Bells	**1F** = 1 Fiberglass Coupling bonded to elbow
45 = 4-1/2"	**J** = ID Above Ground		**28** = Split Anchor Rings	
50 = 5"			**92** = Elbow 90° x 36"	
60 = 6"			**LB** = Conduit Body LB	

40 C SW

Note:
If the first five characters in a item number match, they will fit together.

For Example:

All items below are 4", IPS, SW, Above Ground

40 C SW 20 I	Conduit Interference Joint
40 C SW 33	Male Adapter
40 C SW LB	Conduit Body LB
40 C SW 92 P	Plain End Elbow

IPS CONDUIT

In this section:

Iron Pipe Size (IPS) conduit is the most frequently used international conduit size. IPS conduit can easily be used with standard pipe clamps as the conduit is the same OD (outside diameter) as PVC and GRC conduits. IPS conduit also has a larger inside diameter than ID tubular type conduit allowing for more cable fill area. SW, MW and HW IPS conduits sized 3/4"–1-1/2" are supplied with the Straight Socket connection, while SW, MW and HW conduit sizes 2"–6" are supplied with the Interference Joint connection. The Gasket Joint connection is available for all conduit sizes of SW, MW and HW.

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Elbows

Available in multiple bends and radii, Champion Fiberglass Elbows are the optimum solution in a wide range of applications – electrical contractors and specifying engineers are increasingly discovering the benefits of using our fiberglass elbows. Applications include Utilities, Data Centers, and Wastewater Treatment plants, among others.

Features

- No burn-through; low coefficient of friction and single-circuit winding process protect cables.
- Lightweight and easy to install.
- NECA labor rates show that fiberglass installations take a fraction of the time that galvanized rigid steel or PVC-coated represent – especially at larger diameters.
- ISO 9001 Certified; made in the USA.
- ISO 14001 Certified

Availability and Accessories

- Larger-size bends and radii are available upon request.
- For installations that require transitions from fiberglass to conduit systems of other material types (GRC, PVC-coated), we offer an assortment of transition and termination fittings that can be factory fitted to adapt to these conduit material types. That way, the elbows arrive at the job site ready to install.
- Elbows are supplied with the following customer-specified transition ends:
  - Plain ended (no couplings or adapters)
  - Couplings (PVC or fiberglass)
  - Male and/or female adapters (PVC or fiberglass)
  - PVC stubs

Please Note

- Add suffix "-1F" to item number for one fiberglass coupling and "-2F" to item number for two fiberglass couplings.
- Add suffix "-1D" to item number for one deep socket PVC coupling and "-2D" to item number for two deep socket PVC couplings.
- Contact Champion Fiberglass for elbow item numbers that require male/female adapters or stubs.

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P 281.655.8900 // F 281.257.2523
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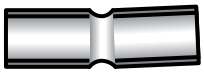
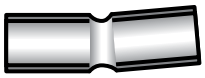
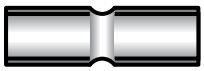
ELBOWS WITH BONDED ON PVC COUPLINGS, MALE ADAPTERS, FEMALE ADAPTERS OR STUBS



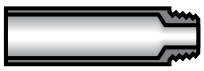
2-1/2° PVC Deep Socket Coupling



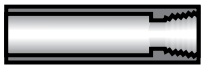
5° PVC Deep Socket Coupling



Straight PVC Deep Socket Coupling



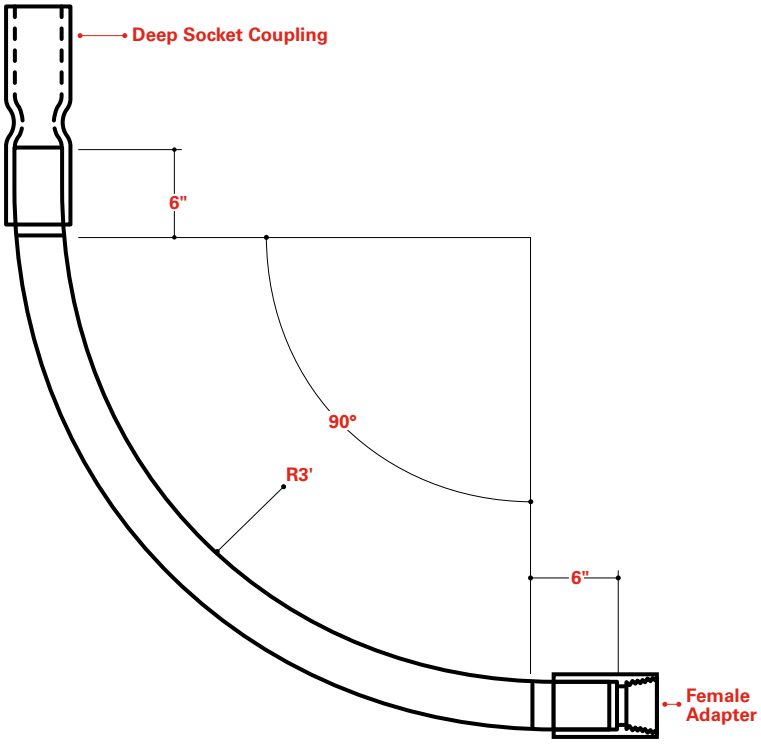
Male Adapters (PVC or Fiberglass)



Female Adapters (PVC or Fiberglass)

PVC Stubs

Deep Socket PVC Coupling
bonded onto fiberglass elbow



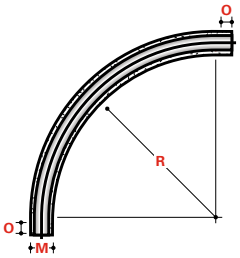
Elbow with deep socket coupling and female adapter

Elbows can be supplied with one or two PVC-bonded couplings. Replace "-P" suffix with: "-1D" for one coupling or "-2D" for two couplings. Champion elbows can also be supplied with 2-1/2° or 5° PVC offset couplings to correct conduit field misalignments. Contact Champion Fiberglass for pricing and item numbers on elbows with fiberglass PVC male and female adapters.

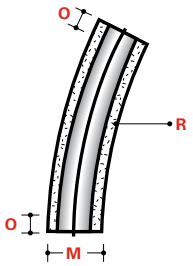
IPS 90° STANDARD RADIUS ELBOWS

	NOMINAL		IPS ITEM NO		M		O-TANGENT (MIN)		R-RADIUS (MIN)		WEIGHT	
	SIZE	TYPE	BELOW GROUND	ABOVE GROUND							LBS	KG
☐	3/4"	SW	07A-SW-9SR-P	07C-SW-9SR-P	1.05"	**(27)**	6"	**(152)**	4.50"	**(114)**	0.27	**(0.1)**
☐	1"	SW	10A-SW-9SR-P	10C-SW-9SR-P	1.32"	**(33)**	6"	**(152)**	5.75"	**(146)**	0.33	**(0.2)**
☐	1-1/4"	SW	12A-SW-9SR-P	12C-SW-9SR-P	1.66"	**(42)**	6"	**(152)**	7.25"	**(184)**	0.46	**(0.2)**
☐	1-1/2"	SW	15A-SW-9SR-P	15C-SW-9SR-P	1.90"	**(48)**	6"	**(152)**	8.25"	**(210)**	0.68	**(0.3)**
☐	2"	SW	20A-SW-9SR-P	20C-SW-9SR-P	2.37"	**(60)**	6"	**(152)**	9.50"	**(241)**	0.87	**(0.4)**

Champion Fiberglass IPS (SW, MW and HW) Standard Radius Elbows are available in 11-1/4°, 22-1/2°, 30°, 45° and 90° bends. Chart shown is for 90° standard radius bends. Please contact Champion Fiberglass for additional information regarding pricing, weights, dimensions and item numbers for elbows other than 90°.



22-1/2° elbows



22-1/2° x 12"

	NOMINAL		IPS ITEM NO		M		O-TANGENT (MIN)		R-RADIUS (MIN)		WEIGHT	
	SIZE	TYPE	BELOW GROUND	ABOVE GROUND							LBS	KG
☐	3/4"	SW	07A-SW-60-P	07C-SW-60-P	1.05"	**(27)**	6"	**(152)**	12"	**(305)**	0.24	**(0.11)**
☐	1"	SW	10A-SW-60-P	10C-SW-60-P	1.32"	**(33)**	6"	**(152)**	12"	**(305)**	0.27	**(0.12)**
☐	1-1/4"	SW	12A-SW-60-P	12C-SW-60-P	1.66"	**(42)**	6"	**(152)**	12"	**(305)**	0.33	**(0.15)**
☐	1-1/2"	SW	15A-SW-60-P	15C-SW-60-P	1.90"	**(48)**	6"	**(152)**	12"	**(305)**	0.47	**(0.21)**
☐	2"	SW	20A-SW-60-P	20C-SW-60-P	2.37"	**(60)**	6"	**(152)**	12"	**(305)**	0.54	**(0.25)**
☐	2-1/2"	SW	25A-SW-60-P	25C-SW-60-P	2.88"	**(73)**	6"	**(152)**	12"	**(305)**	0.65	**(0.30)**

22-1/2° x 24"

	NOMINAL		IPS ITEM NO		M		O-TANGENT (MIN)		R-RADIUS (MIN)		WEIGHT	
	SIZE	TYPE	BELOW GROUND	ABOVE GROUND							LBS	KG
☐	3/4"	SW	07A-SW-61-P	07C-SW-61-P	1.05"	**(27)**	6"	**(152)**	24"	**(610)**	0.30	**(0.14)**
☐	1"	SW	10A-SW-61-P	10C-SW-61-P	1.32"	**(33)**	6"	**(152)**	24"	**(610)**	0.33	**(0.15)**
☐	1-1/4"	SW	12A-SW-61-P	12C-SW-61-P	1.66"	**(42)**	6"	**(152)**	24"	**(610)**	0.40	**(0.18)**
☐	1-1/2"	SW	15A-SW-61-P	15C-SW-61-P	1.90"	**(48)**	6"	**(152)**	24"	**(610)**	0.58	**(0.26)**
☐	2"	SW	20A-SW-61-P	20C-SW-61-P	2.37"	**(60)**	6"	**(152)**	24"	**(610)**	0.67	**(0.30)**
☐	2-1/2"	SW	25A-SW-61-P	25C-SW-61-P	2.88"	**(73)**	6"	**(152)**	24"	**(610)**	0.81	**(0.37)**
☐	3"	SW	30A-SW-61-P	30C-SW-61-P	3.50"	**(89)**	6"	**(152)**	24"	**(610)**	1.06	**(0.48)**
☐	4"	SW	40A-SW-61-P	40C-SW-61-P	4.46"	**(113)**	6"	**(152)**	24"	**(610)**	1.27	**(0.58)**
☐	4"	HW	40A-HW-61-P	40C-HW-61-P	4.51"	**(114)**	6"	**(152)**	24"	**(610)**	1.71	**(0.78)**

22-1/2° x 36"

	NOMINAL		IPS ITEM NO		M		O-TANGENT (MIN)		R-RADIUS (MIN)		WEIGHT	
	SIZE	TYPE	BELOW GROUND	ABOVE GROUND							LBS	KG
☐	3/4"	SW	07A-SW-62-P	07C-SW-62-P	1.05"	**(27)**	6"	**(152)**	36"	**(914)**	0.35	**(0.16)**
☐	1"	SW	10A-SW-62-P	10C-SW-62-P	1.32"	**(33)**	6"	**(152)**	36"	**(914)**	0.40	**(0.18)**
☐	1-1/4"	SW	12A-SW-62-P	12C-SW-62-P	1.66"	**(42)**	6"	**(152)**	36"	**(914)**	0.48	**(0.22)**
☐	1-1/2"	SW	15A-SW-62-P	15C-SW-62-P	1.90"	**(48)**	6"	**(152)**	36"	**(914)**	0.69	**(0.31)**
☐	2"	SW	20A-SW-62-P	20C-SW-62-P	2.37"	**(60)**	6"	**(152)**	36"	**(914)**	0.79	**(0.36)**
☐	2-1/2"	SW	25A-SW-62-P	25C-SW-62-P	2.88"	**(73)**	6"	**(152)**	36"	**(914)**	0.96	**(0.44)**
☐	3"	SW	30A-SW-62-P	30C-SW-62-P	3.50"	**(89)**	6"	**(152)**	36"	**(914)**	1.25	**(0.57)**
☐	4"	SW	40A-SW-62-P	40C-SW-62-P	4.46"	**(113)**	6"	**(152)**	36"	**(914)**	1.50	**(0.68)**
☐	4"	HW	40A-HW-62-P	40C-HW-62-P	4.51"	**(114)**	6"	**(152)**	36"	**(914)**	2.02	**(0.91)**
☐	5"	SW	50A-SW-62-P	50C-SW-62-P	5.52"	**(140)**	6"	**(152)**	36"	**(914)**	1.88	**(0.85)**
☐	5"	MW	50A-MW-62-P	50C-MW-62-P	5.57"	**(141)**	6"	**(152)**	36"	**(914)**	2.50	**(1.14)**
☐	5"	HW	50A-HW-62-P	50C-HW-62-P	5.60"	**(152)**	6"	**(152)**	36"	**(914)**	2.75	**(1.25)**
☐	6"	SW	60A-SW-62-P	60C-SW-62-P	6.58"	**(167)**	6"	**(152)**	36"	**(914)**	2.08	**(0.94)**
☐	6"	MW	60A-MW-62-P	60C-MW-62-P	6.63"	**(168)**	6"	**(152)**	36"	**(914)**	2.96	**(1.34)**
☐	6"	HW	60A-HW-62-P	60C-HW-62-P	6.66"	**(169)**	6"	**(152)**	36"	**(914)**	3.40	**(1.54)**

APPROVAL STAMP

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P 281.655.8900 // F 281.257.2523
info@championfiberglass.com // championfiberglass.com

Champion Engineering Specifications (IPS)

IPS EPOXY FIBERGLASS CONDUIT ABOVE GROUND SPECIFICATIONS

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

The conduit shall be listed by UL, Underwriters Laboratories, to the UL 2515 IPS (Above Ground) standard.

All conduit shipped shall contain UL labels.

III. UL-listed Extended Support Spans

The conduit shall be UL listed for the following extended support span lengths.

CONDUIT SIZE	STANDARD WALL (.070")	MEDIUM WALL (.096")	HEAVY WALL (.110")
3/4"	10'	–	–
1"	10'	–	–
1-1/4"	10'	–	–
1-1/2"	10'	–	–
2"	12'	–	–
2-1/2"	12'	–	–
3"	12'	–	–
4"	12'	–	14'
5"	–	13'	14'
6"	–	13'	14'

UL designates Champion Fiberglass MW for 5" and 6" as SW.

IV. Manufacturing

The conduit shall be 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°. Winding mandrels shall be straight and true so as to produce a non-tapered conduit. Tapering is allowed at the belled end.

The resin system shall be epoxy based, with no fillers, using an anhydride curing agent. 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 ultraviolet inhibitor to protect the conduit and fittings during storage and exposure to the outdoors. Conduit and elbows shall be black in color unless a custom color has been sourced by special request.

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 epoxy.

All elbows shall meet the nominal radius plus or minus 2°. The wall thickness shall meet tolerance as shown on the next page and the "Out of Rounds" as shown in NEMA TC 14.

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

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6400 Spring Stuebner Rd // Spring, TX 77389
P 281.655.8900 // F 281.257.2523
info@championfiberglass.com // championfiberglass.com

All conduit bodies shall be compression molded from vinyl ester resin and utilize "Champ-Seal" gasket technology. The gasketing system will consist of a silicon-based gasket that is water-tight, corrosion-resistant and resists impression setting.

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 (Above Ground)
- Manufacturer and reseller
  (if the conduit was modified or bent other than by the 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**.

V. Dimensions

Conduit shall be manufactured having **non-tapered sections** (except for integral belled ends).

Conduit shall be manufactured with following nominal dimensions:

		OUTSIDE DIAMETER	INSIDE DIAMETER	WALL THICKNESS
SIZE	TYPE	INCH	INCH	INCH
3/4"	SW	1.050"	0.910"	.070"
1"	SW	1.315"	1.175"	.070"
1-1/4"	SW	1.660"	1.520"	.070"
1-1/2"	SW	1.900"	1.760"	.070"
2"	SW	2.375"	2.235"	.070"
2-1/2"	SW	2.875"	2.735"	.070"
3"	SW	3.500"	3.360"	.070"
3-1/2"	SW	4.000"	3.860"	.070"
4"	SW	4.460"	4.320"	.070"
4"	HW	4.512"	4.320"	.096"
5"	MW	5.572"	5.380"	.096"
5"	HW	5.600"	5.380"	.110"
6"	MW	6.627"	6.435"	.096"
6"	HW	6.655"	6.435"	.110"

VI. Electrical Characteristics

Volume Resistivity	3.8×10^{14} ohm-cm	ASTM D257
Surface Resistivity	1.1×10^{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 (19.7 kv/mm)	ASTM D149

VII. Mechanical Characteristics

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

Tensile Strength, Axial	11,000 psi (76 MPa)	ASTM D2105
Compressive Strength	12,000 psi (83 MPa)	ASTM D695
Ultimate Elongation	2% psi (9.6 GPa)	ASTM D2105
Modulus of Elasticity (4" conduit)	$1.4 \times 10^{+6}$ psi (9.6 GPa)	ASTM D2105
Thermal Conductivity	2.0 Btu.in/ft^2.hr.°F (0.30 W/m.K)	ASTM D5930-1

Specific Gravity	1.9	ASTM D792
Glass Content	65–75%	API 15LR
Water Absorption	1% max	ASTM D570
Barcol Hardness	52–56	ASTM D2583
Coefficient of Thermal Expansion	1.2 x 10-5 in/in/°F (2.2 x 10-5 m/m/°C)	ASTM D696

Impact Resistance

The minimum impact resistance values for the conduit shall be as shown in the table below when tested in accordance with ASTM D2444.

SIZE	TYPE	ASTM D2444
3/4"	SW	20 lbs/ft
1"	SW	25 lbs/ft
1-1/4"	SW	30 lbs/ft
1-1/2"	SW	35 lbs/ft
2"	SW	40 lbs/ft
2-1/2"	SW	55 lbs/ft
3"	SW	70 lbs/ft
3-1/2"	SW	80 lbs/ft
4"	SW	85 lbs/ft
4"	HW	120 lbs/ft
5"	MW	140 lbs/ft
5"	HW	160 lbs/ft
6"	MW	160 lbs/ft
6"	HW	200 lbs/ft

Stiffness

The minimum conduit stiffness at 5% deflection for all sizes of conduit shall not be less than the values given in the table below when tested in accordance with ASTM D2412.

SIZE	TYPE	ASTM D2412
3/4"	SW	1,500 lb/ft/in^2
1"	SW	1,200 lb/ft/in^2
1-1/4"	SW	850 lb/ft/in^2
1-1/2"	SW	600 lb/ft/in^2
2"	SW	320 lb/ft/in^2
2-1/2"	SW	200 lb/ft/in^2
3"	SW	140 lb/ft/in^2
3-1/2"	SW	85 lb/ft/in^2
4"	SW	50 lb/ft/in^2
4"	HW	130 lb/ft/in^2
5"	MW	75 lb/ft/in^2
5"	HW	90 lb/ft/in^2
6"	MW	55 lb/ft/in^2
6"	HW	65 lb/ft/in^2

VIII. Quality Assurance Program

Manufacturer shall have a current Certificate, issued by an independent and accredited company, of compliance with an **ISO 9001: 2015 Quality Management System**.

IX. Joining System

A. Conduit Subjected to Changes in Ambient Temperature

The conduit shall be supplied with a bonded coupling or an integral wound bell on one end and a machined spigot on the other end. A two-part adhesive, epoxy resin system, designed to permanently bond fittings and joints of conduit shall be properly mixed and applied to the spigot end before joining the conduits together. The adhesive shall be available for use in three different ambient temperatures, 70°F, 40°F and 20°F. The adhesive shall be supplied from the same manufacturer of conduit and fittings in order not to void the listing by UL.

B. Constant Ambient Temperature – Gasketed Joining System

The conduit shall be supplied with a gasketed joining system which can be used for concrete encasement as well as direct burial installations. This gasketed conduit shall consist of a three-ribbed gasket made from water-resistant rubber material. The gasket shall be fit into a permanent groove in the belled end of the conduit. Retainer rings etc. are not permitted and shall not be used in order to create the gasket groove.

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C. Constant Ambient Temperature – Interference Joining System

The conduit shall be supplied with an interference joining system which can be used for concrete encasement (only). The interference joining system consists of an integral bell and spigot. The spigot end has a buttress type male thread for easy installation into the belled end female mating threads. The tapered buttress threads make the joining system easy to assemble while providing a high pull-out strength of 1,000 lbs. The joining system is concrete tight, but not water tight.

X. Toxicity

The conduit shall not contain any compounds that can release halogens, i.e. chlorine, bromine, flourine 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 PPM)
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

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 compression molding process, Sheet Molding Compound (SMC), for the manufacture of the finished component. The SMC material shall be a vinyl ester 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.

All conduit bodies shall be supplied with Champion's unique "Champ-Seal" gasketing system. This is a silicon-based, water-tight, corrosion-resistant gasketing system that completely resists impression setting.

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. Installation Training

Manufacturer may provide (upon request) contractor installation training for field cutting, joint preparation, joint assembly, field bending and RTRC field cut sealing (with field cutting sealant) at manufacturer's discretion.