



**NOW
UPDATED**



NO BURN-THROUGH ELBOW GUIDE

**DISCOVER HOW DATA CENTER AND UTILITY
PROJECTS BENEFIT FROM NO BURN-THROUGH
FIBERGLASS ELBOWS**



THE APPLICATIONS






ELECTRICAL CONDUIT ELBOWS ARE COMMONLY USED IN DATA CENTERS AND UTILITIES.



DATA CENTERS

Data center projects are growing at a rapid pace. Data centers require a strong conduit with engineering and mechanical specifications to properly protect cabling.




Project challenges in this application include:

-  Conduit repairs due to burn-through
-  Wire replacement
-  Wire pulling
-  Product availability
-  Sluggish installation

UTILITIES

Electrical conduit, used to protect wire and cable from generating facilities through distribution to the end user, is a crucial piece of the power grid. There's much talk of updating the grid, retrofitting, and burying transmission lines in certain parts of the country.

Utility project challenges include:

-  Material and installation costs
-  Buried installation
-  Wire replacement
-  Wire pulling
-  Fault concerns

FIBERGLASS ELBOWS ENHANCE DATA CENTER AND UTILITY PROJECTS WITH THESE BENEFITS



LOWER MATERIAL AND INSTALLATION COSTS

Fiberglass conduit offers lower materials cost than PVC and GRC type conduit. (In fact, project managers can easily get an estimate [here](#).) Due to its light weight, shipping is also less expensive as well. **These savings help project managers stay within budget.**



NO BURN-THROUGH

Projects such as data centers and utilities that are cable dense require a conduit that protects from burn-through, compromises and breaks. Fiberglass conduit is strong and durable, able to absorb significant mechanical impact to protect conductors and conduit while pulling cable. Unlike PVC conduit, fiberglass conduit offers flexural strength so you can feel confident that the conduit won't break when pulling through. **The benefit of preventing burn-through is that fiberglass conduit helps eliminate expensive repairs.**

LOW COEFFICIENT OF FRICTION

Fiberglass conduit elbows possess one of the lowest coefficients of friction of any conduit system - .38 compared to .55 for PVC-coated steel and galvanized rigid steel and .90 for SCH 40 and SCH 80 PVC. Fiberglass conduit's low coefficient of friction allows for longer conduit runs with fewer pull boxes. **The benefit of a lower coefficient of friction is that it enables a faster, smoother pull with less labor time, cost and risk.** Additionally, cable-pulling lubricants have no detrimental effects on fiberglass conduit.

HIGH DIELECTRIC STRENGTH

High dielectric strength makes fiberglass conduit elbows the smart choice for utilities.

UL-listed Champion Fiberglass conduit has a dielectric strength of 550 volts. Even more, with a wall thickness of 0.25", Champion Duct XW can carry transmission lines up to 125 KV (or more if wall thickness is increased).

FIBERGLASS ELBOWS ENHANCE DATA CENTER AND UTILITY PROJECTS WITH THESE BENEFITS

NO CONDUCTIVITY

With the heavy cable environment of utilities and data centers, project managers are wise to consider conductivity. Fiberglass electrical conduit does not carry a charge. **The benefit of no conductivity is that unlike galvanized rigid steel and PVC-coated steel, fiberglass conduit is an excellent insulator keeping installers safe from electrical injuries.**

STREAMLINED INSTALLATION

Gasketed conduit connections enable a speedy installation. In fact, for the 6-inch diameter size, fiberglass conduit installs in 1.5 hours per elbow compared to PVC SCH 80 installing in 1.8 hours, per the NECA Manual of Labor Units. **The benefit of fiberglass conduit installation is that it is safe, seamless and saves project dollars.**

CABLE FAULT RESISTANT

Because of the cable-dense environments of both data centers and utilities, it's important to address cable fault. Fiberglass conduit is engineered to be the only electrical conduit that will not melt or weld to the inside of the conduit. **The benefit of this is that it allows cables to easily be pulled through for replacement and repair.**



FIBERGLASS ELBOWS VS. THE COMPETITION

	EPOXY FIBERGLASS (SW)	PVC SCH 40	PVC SCH 80	GALVANIZED RIGID STEEL	PVC-COATED STEEL	ALUMINUM
Cable Fault	Not Affected	Melt/ Fuse	Melt/ Fuse	Weld	Weld	Weld
Toxicity/Halogens Fiberglass conduit does not release toxic halogens (i.e. chlorine and bromine) when burning.	No	Yes	Yes	No	Yes	No
Temperature Range (°F) Fiberglass has an excellent wide temperature range.	-60° to +250°	+40° to +150°	+40° to +150°	N/A	N/A	N/A
Handling in Low Temperatures	Excellent	Brittle	Brittle	Excellent	Excellent	Excellent
Burn-through (Cable Pull)	No	Yes	Yes	No	No	No
Coefficient of Friction	0.38	0.90	0.90	0.55	0.55	0.61
Conductivity	No	No	No	Yes	Yes	Yes
Coefficient of Thermal Expansion (1.2 x 10⁻⁵ in/in/°F [2.2 10⁻⁵ m/m/°C]) <small>* The coefficient is .7 for the steel and 3.5 for the PVC layer. Because of the broad difference between the two materials, adhesion is severely affected during temperature contraction and expansion.</small>	1.0	3.5	3.5	0.7	3.5/0.7*	3.5
Distance Between Expansion Joints (ft)	200	50	50	200	200	50
Field Handling Due to its light weight, ease of cutting and integral bell, fiberglass conduit is very easy to install.	Excellent	Good	Good	Very Poor	Very Poor	Poor
Memory Fiberglass conduit will retain its original shape after impact or compression.	Yes	No	No	No	No	No

SEAMLESS ELBOW INSTALLATION

GASKET CONNECTIONS HELP SPEED INSTALLATIONS

Contractors have discovered how easy fiberglass conduit is to install in below ground applications, direct buried or encased in concrete applications due to its gasket joint system, which does not require adhesive like PVC conduit.

This system consists of an integral bell and spigot. The belled end has a triple seal gasket in addition to the interference joint. The triple seal gasket fits into a permanent groove formed during the manufacturing of the conduit. The gasket seal eliminates the need for thermoplastic retainer rings. It creates a concrete-tight and water-tight seal and has a pull-out strength of 2000 pounds.



See how easy this joining system is in this installation video.

BURIED INSTALLATION EASE

Whether installed in a trench or duct banks, fiberglass conduit buried installations benefit from:


- > No burn-through and the ability to stand up to extreme conditions of underground conduit.
- > The broadest range of corrosion resistance of all in-market underground ducting products.
- > The lowest installation rates for most diameters for installing underground electrical conduit according to the National Electrical Contractors Association (NECA) Manual of Labor Units.
- > Shape retention after impact or compression.



LABOR SAVING, COST SAVING FIBERGLASS ELBOWS

Based on the NECA Manual of Labor Units, most sizes of fiberglass conduit install faster than PVC, galvanized rigid steel, PVC-coated steel, and aluminum providing installation savings.

See how fast our elbows install per [NECA](#).



ELBOWS								
CONDUIT DIAMETER	EMT	PVC SCH 40*	PVC SCH 80*	ALUMINUM	STAINLESS STEEL	GALVANIZED RIGID STEEL*	EPOXY FIBERGLASS*	PVC-COATED STEEL
3/4"	.22	.22	.24	.3	.53	.4	.5	.6
1"	.25	.25	.28	.35	.67	.5	.6	.7
1-1/4"	.32	.32	.36	.4	.8	.6	.63	.8
1-1/2"	.4	.4	.46	.5	1	.75	.67	1
2"	.5	.5	.58	.75	1.3	1	.75	1.2
2-1/2"	.6	.5	.69	1	2	1.5	.82	1.75
3"	.7	.7	.84	1.3	2.67	2	.9	2.25
3-1/2"	.85	.85	N/A	1.6	3.33	2.5	1.05	2.75
4"	1	1	1.2	2	4	3	1.2	3.25
5"	N/A	1.25	1.5	2.5	5.3	4	1.35	4.5
6"	N/A	1.5	1.8	3	6.67	5	1.5	5.5

Average installation man/hours per elbow

REF: 2022-2023 NECA Manual of Labor Units (normal installation man/hours per elbow)

* Add 20% to GRC, SCH 40, SCH 80 for long sweep elbows

Pricing of Fiberglass VS GRC and PVC-Coated Steel Elbows

Here's what costs look like when estimating 20 elbows of fiberglass conduit compared to galvanized rigid steel and PVC-coated steel at the 4" size, with an \$80/hour labor rate:

	GRC	PVC-COATED STEEL	FIBERGLASS CONDUIT (RTRC)
Material cost per elbow	\$305	\$848	\$154
Total Material Net	\$6,100	\$16,960	\$3,080
Install Hours (Per NECA MLU)	72 Hours	78 Hours	24 Hours
Installation Cost at \$80/hour	\$5,760	\$6,240	\$1,920
Total Installed Cost (Mtl. + Labor)	\$11,860	\$23,200	\$5,000

Some sizes of elbows stocked in warehouses locally. Verify with a [Rep.](#)

CHOOSE THE RIGHT ELECTRICAL CONDUIT ELBOWS FOR YOUR DATA CENTER OR UTILITY JOB BY TAKING THE NEXT STEPS FOR PROJECT SUCCESS



Learn how one data center contractor installed three miles of conduit in one day.

[>> Read Case Study](#)



Learn how nearly \$3 million was saved on a power plant project in Indiana.

[>> Read Case Study](#)



GET AN ESTIMATE

See how fiberglass conduit elbows compare in price to PVC-coated steel, GRC, aluminum and stainless steel with our elbow calculator.

[CALCULATE SAVINGS](#)



BIM/REVIT MODELS

BIM/Revit elbow models help promote efficiency among all teams while collaborating on a project.

[GAIN ACCESS](#)



QUESTIONS?

Get in touch to get answers to specific questions about how Champion Fiberglass conduit elbows can benefit your projects.

[CONTACT US](#)



READY TO MOVE FORWARD ON A PROJECT?

Our manufacturer's rep network offers extensive experience in helping engineers and contractors solve complex data center and utility project challenges.

[FIND A REP](#)

