



FREQUENTLY ASKED QUESTIONS

Champion Flame Shield® Phenolic Conduit for Tunnel & Transit Applications



1. What makes Champion Flame Shield® phenolic conduit suitable for 2-hour fire-rated tunnel applications?

Champion Flame Shield® phenolic conduit is manufactured from a proprietary phenolic resin system designed to withstand extreme fire exposure. It is rated to endure temperatures up to 1,850°F for two hours while maintaining circuit integrity. This performance makes it suitable for applications requiring compliance with two-hour fire-resistive standards commonly specified in tunnels, subways, and mass transit systems.

Unlike conventional conduit systems, Champion Flame Shield phenolic conduit is engineered to limit flame spread, smoke generation, and toxic gas release, critical performance criteria in enclosed transit environments.

2. How does Champion Flame Shield phenolic conduit meet NFPA 130 and NFPA 502 requirements?

Champion Flame Shield phenolic conduit is designed to meet the fire protection requirements outlined in:

- > NFPA 130 – Standard for Fixed Guideway Transit and Passenger Rail Systems
- > NFPA 502 – Standard for Road Tunnels, Bridges, and Other Limited Access Highways

Both standards require materials installed in tunnels to limit flame propagation, smoke development, and toxic emissions while maintaining functionality during fire exposure. Champion Flame Shield phenolic conduit is a zero-smoke, zero-halogen system that satisfies these life safety performance expectations.

3. What does “zero-smoke, zero-halogen” mean in a tunnel fire scenario?

In enclosed tunnels, smoke and toxic gases often present a greater life safety hazard than flame itself. Zero-smoke, zero-halogen means:

- > Minimal visible smoke generation
- > No release of halogenated gases such as chlorine or bromine
- > No emission of corrosive acid gases

This is especially important for evacuation pathways, emergency responders, and protection of sensitive communication and signaling equipment.



4. How does Champion Flame Shield phenolic conduit perform at temperatures up to 1,850°F?

Champion Flame Shield phenolic conduit has been tested to withstand exposure to 1,850°F for two hours without structural collapse. During fire exposure, it forms a protective char layer that insulates internal conductors and helps maintain system integrity.

This characteristic allows critical life safety circuits, including emergency lighting, ventilation controls, and communications, to remain operational during a fire event.

5. How does phenolic conduit differ from standard epoxy fiberglass conduit in fire conditions?

Standard epoxy fiberglass conduit is flame resistant and self-extinguishing under UL 94 testing. However, phenolic conduit offers significantly enhanced fire endurance.

While epoxy fiberglass conduit has an operating range up to approximately 230°F, Champion Flame Shield phenolic conduit can withstand direct flame exposure up to 1,850°F for two hours. This makes phenolic the preferred material when a two-hour fire rating is required.

6. What UL listings and certifications apply to Champion Flame Shield phenolic conduit?

Champion Flame Shield is UL listed and manufactured in compliance with applicable NEC requirements. It meets requirements for UL 2196, UL 2515-A, NFPA 130, NFPA 502, and ASTM E136. As part of the Champion Fiberglass product portfolio, it is produced in a facility certified to:

- > ISO 9001:2015
- > ISO 14001:2015
- > ISO 45001:2018

The conduit system is specifically engineered for fire-rated transit and tunnel installations requiring third-party validation.

7. Why is phenolic conduit often specified for subways and tunnels?

Tunnels represent one of the most demanding electrical installation environments due to:

- > Limited ventilation
- > Restricted emergency egress
- > High passenger density
- > Strict life safety codes

Phenolic conduit addresses these concerns by minimizing smoke generation and maintaining circuit survivability under fire conditions. It has become a preferred solution for subway systems, vehicular tunnels, and underground transit stations.

8. How does Champion Flame Shield phenolic conduit help protect life safety circuits?

Life safety systems must remain operational long enough to allow evacuation and emergency response. Champion Flame Shield phenolic conduit provides:

- > Two-hour fire resistance
- > Low smoke characteristics
- > Nonmetallic insulation properties
- > Resistance to corrosion in damp tunnel conditions

These attributes help maintain the integrity of emergency power, lighting, fire alarm, and communication systems during critical events.

9. Can Champion Flame Shield phenolic conduit be used for emergency lighting and communication systems?

Yes. Champion Flame Shield phenolic conduit is commonly specified for:

- > Emergency lighting circuits
- > Public address systems
- > Fire alarm systems
- > CCTV and communication systems
- > Ventilation control wiring

Its fire endurance rating makes it appropriate for circuits that must function during a tunnel fire event.



10. How does phenolic conduit perform in confined tunnel environments?

In confined spaces, material behavior under fire conditions is critical. Champion Flame Shield phenolic conduit:

- > Produces virtually no visible smoke
- > Does not emit halogenated toxic gases
- > Limits corrosive byproducts

This reduces secondary damage to electrical infrastructure and improves visibility for evacuation and first responders.

11. What joining systems are available for above-ground tunnel installations?

Phenolic conduit systems utilize a straight socket joining system. All above-ground and tunnel installations require a high-temperature, fire-resistant adhesive to bond conduit sections together. This creates a secure, permanent joint designed to perform under fire exposure conditions.

12. What adhesive is required for phenolic conduit?

Champion Fiberglass specifies a high-temperature, fire-resistant adhesive engineered specifically for phenolic conduit applications. The adhesive ensures structural continuity of the conduit system under elevated temperatures and fire exposure.

13. How does the lightweight design impact tunnel installation?

Compared to metallic conduit systems, phenolic fiberglass conduit is significantly lighter. This offers advantages such as:

- > Easier handling in confined tunnel spaces
- > Improved installation efficiency
- > Reduced strain on overhead supports
- > Simplified staging and transport underground

Lightweight conduit contributes to safer, more manageable installations.

14. What support span options are available?

Champion Fiberglass conduit systems are UL listed for extended support spans, allowing spacing that can exceed standard NEC table values when installed per listing requirements.

Extended support spans are particularly beneficial in overhead tunnel installations where access and anchoring locations may be limited.

15. How does Champion Flame Shield phenolic conduit perform in high-moisture or corrosive environments?

Tunnels often experience:

- > Condensation
- > Water intrusion
- > Deicing salts
- > Corrosive atmospheric conditions

As a nonmetallic conduit system, Champion Flame Shield phenolic conduit will not rust or corrode. It maintains structural and dielectric properties in damp and chemically aggressive environments.

16. What dielectric properties does phenolic conduit provide?

Champion Flame Shield is nonconductive and offers high dielectric strength. This provides:

- > Electrical insulation
- > Reduced risk of stray current corrosion
- > No need for additional grounding of the conduit body

These characteristics are especially valuable in transit infrastructure.

17. How does phenolic conduit respond to cable fault conditions?

Fiberglass conduit systems will not weld conductors to the interior surface during fault conditions, unlike metallic conduit systems. This helps preserve conductor insulation integrity and simplifies maintenance or cable replacement following fault events.

18. Does Champion Flame Shield resist burn-through during cable pulling?

Yes. The material construction and internal surface characteristics help prevent burn-through during cable pulling operations. The conduit's design protects conductors during installation and long-term operation.

19. When should XW wall thickness be specified?

Extra Heavy Wall (XW) conduit should be specified when:

- > Class I, Division 2 conditions apply
- > Additional physical protection is required
- > Project specifications mandate higher impact resistance
- > Severe mechanical conditions exist

Engineers should review project specifications and NEC requirements when determining wall thickness.

20. What is the UL 2196 test?

The UL 2196 test is designed to evaluate the performance of electrical circuit protective systems in severe fire events. UL 2196 is designed to evaluate the functionality of electrical circuit systems when exposed to fire for 2 hours followed by the mechanical shock of a fire hose stream. RSCC and Champion Fiberglass partnered to develop a cost-effective solution that would continue to function while being exposed to the severe fire requirements of UL 2196.

Testing concluded that the system as described and installed continued to function throughout the entire test. For a copy of the test report, please contact Champion Fiberglass.

21. What engineering documentation and design resources are available?

Champion Fiberglass provides:

- > Detailed engineering specifications
- > Product data sheets
- > Installation instructions
- > UL listing documentation
- > BIM/Revit models for integration into project designs

These resources support accurate specification and coordination during tunnel design and construction.



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