UL2196: The Next Generation Fire Resistive Cables and Phenolic Conduit

Why the Electrical Industry is using RSCC VITAlink® 300 Cable and Champion Fiberglass Type XW Phenolic Conduit for Two-Hour Fire Rated Installations

Executive Summary

In June 2012, UL learned of compatibility issues when Classified Fire-Resistive Cables were installed in systems where zinc was used as in interior coating in steel conduits, raceways and other system components. At the high temperatures the zinc coating vaporizes and interacts with the copper conductor creating a brass alloy. Brass melts at a lower temperature which compromises the integrity of the electrical system causing pre-mature failure.

As a result, cable manufacturers were no longer authorized to place the UL trademark on the following products:

- UL Classified Fire Resistive Cable (FHJR)
- ULC Listed Fire Resistive Cable (FHJRC)
- UL Listed cable with "CI" suffix (Circuit Integrity)

UL2196 Cable Performance Testing Overview

The UL2196 test is designed to evaluate the performance of electrical circuit protective systems in severe fire events. UL2196 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.

Project Systems Impacted:

- Fire Pump – Feeder/Controls
- Elevators
- Smoke control equipment
- Command center critical systems
- Pressurized stairway systems
- Smoke management systems
- Fire alarm systems
- Electrical Equipment Rooms – Feeders/Service
- Emergency Generators & Standby Power Systems

The Fiberglass Advantage

Being the demand for fiberglass conduit in the United States alone has been growing significantly over the last two decades—and is forecasted to increase further as project owners and engineers seek to serve long-term interests of their stakeholders, it made sense to consider investigating the use of fiberglass high temperature phenolic conduit as a solution to the zinc compatibility issue that plagued rigid metal conduit. When the UL findings became public, RSCC and Champion Fiberglass partnered together to examine, develop and create a cost-effective solution that would continue to function while being exposed to the severe fire requirements of UL2196.

The Fiberglass Advantage Detail
Champions Phenolic Fiberglass Type XW high temperature conduit doesn't have the problematic zinc compatibility issues of rigid steel conduit but it contains the zero smoke and zero halogen, high temperature physical properties that enable it and RSCC VITALink ® 300 RHW-2 cable to continue functioning during the UL2196 Cable Performance testing. Tests were conducted by UL in 2013 and 2014 resulting in UL issuing two VSR (Verification of Services) reports indicating that the system as described and installed in the UL VSR continues to function throughout the entire test. Both products, RSCC VITALink 300® and Champion Fiberglass Type XW Phenolic Flameshield conduit have their own independent product UL Listings. The UL2196 VSR is not a UL Listing or Certification. It is a system compatibility test which illustrates that both products, when installed together as outlined in the UL VSR, continue functioning the for the duration of the fire test and subsequent hose stream.

Project References
The following projects have utilized RSCC VITALink 300® and Champion Fiberglass Type XW Phenolic Flameshield conduit to resolve their 2 hour fire-resistive circuit requirements.

Elizabeth River Tunnels (East & West) – Portsmouth, VA
Contractor: Mass Electric Construction – Waltham, MA
Engineer: Parsons Brinkerhoff – Boston, MA

Mt. Lebanon Tunnel – Mt. Lebanon, PA
Contractor: Vantage Corporation – Carnegie, PA
Engineer: Gannett-Fleming – Pittsburgh, PA

Overall Impact on Project Economics
The RSCC VITALink® 300 Cable and Champion Fiberglass Type XW Phenolic Flameshield conduit impacts project economics in the following ways:

- Ensuring the facility or infrastructure will perform as designed well long-term
- Allowing engineers to draft more flexible, efficient and cost-effective designs
- Streamlining the project's implementation and ability to meet milestones
- Protecting project stakeholders from future safety risk and liability exposure

These various points illustrate the economic and operational impact that choosing the right cable and conduit combination for your 2 Hour Fire-Resistive electrical circuit protective systems will have.

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