# FRE® SPECIFICATIONS
# for Damage Location HazGuard®
## Class 1 Division 2

Atkore™
FRE Composites

## SECTION 1: GENERAL

### 1.1 Description

This specification outlines the requirements for the design, construction and performance of FRE® rigid non-metallic fiberglass HazGuard® conduit and fittings, often referred to as "Bullet Resistant" by industrial users. This term is used to indicate that the product has been demonstrated under laboratory conditions to resist damage caused by small caliber, low velocity projectiles such as bullets.

### 1.2 Product application & use

Conduit and fittings shall be suitable for use in hazardous locations which can be subject to physical damage, Class 1 Division 2.

### 1.3 Materials

Conduit and fittings shall consist of continuous E or E-CR glass roving encapsulated in an internally steam cured, corrosion resistant epoxy resin system pigmented with UV inhibiting carbon black dispersed homogeneously, manufactured for use at temperatures ranging from -40 °F (-40 °C) to 230 °F (110 °C). Resin system substitution shall not be permitted.

The epoxy resin system shall be impervious to a wide spectrum of chemicals and shall contain by weight less than 0.2% halogens as chlorine and shall not contain other toxic materials in excess of trace level limits compliant with OSHA requirements.

## SECTION 2: GENERAL REQUIREMENTS

### 2.1 Sizes & wall thicknesses

HazGuard® conduit and fittings shall be manufactured with nominal wall thicknesses as outlined below:

**TYPICAL HAZARDOUS LOCATIONS SUBJECT TO PHYSICAL DAMAGE**

| IPS Standard Wall (XW) | | | |
|---|---|---|---|
| Diameter | | Wall thickness | |
| in | mm | in | mm |
| ¾ | 21 | 0.250 | 6.4 |
| 1 | 27 | 0.250 | 6.4 |
| 1¼ | 35 | 0.250 | 6.4 |
| 1½ | 41 | 0.250 | 6.4 |
| 8* | 203 | 0.250 | 6.4 |

*Not UL listed or CSA certified.

| ID Standard Wall (XW) | | | |
|---|---|---|---|
| Diameter | | Wall thickness | |
| in | mm | in | mm |
| 2 | 53 | 0.250 | 6.4 |
| 2½ | 63 | 0.250 | 6.4 |
| 3 | 78 | 0.250 | 6.4 |
| 3½ | 91 | 0.250 | 6.4 |
| 4 | 103 | 0.250 | 6.4 |
| 5 | 129 | 0.250 | 6.4 |
| 6 | 155 | 0.250 | 6.4 |

### 2.2 Joining Method

Each length of conduit is supplied with an integral straight bell end. All joints shall be adhesive bonded inside a straight bell end of even socket depth throughout the raceway. Adhesive shall be supplied by the manufacturer of the conduit and shall have a minimum joint pull out load of 1,000 lb (454 kg) per inch diameter trade size.

### 2.3 Fittings

All fittings, adapters and elbows shall be constructed of the same filament wound materials as the conduit and shall have a socket depth and a straight bell design consistent with the conduit.

## SECTION 3: REQUIREMENTS

### 3.1 Workmanship

Conduit and fittings shall be free from defects and commercially practicable in color, opacity, density and other physical properties. The exterior surface finish shall be smooth per acceptable industry practices.

### 3.2 Marking

Conduit and fittings shall be marked at least once with a suitable identifying mark printed on the outside of the product. Such marking shall contain:

(1) RTRC, (2) for use -40°F to 230°F (-40°C to 110°C) or other applicable temperature, (3) trade size, (4) manufacturer's name or trademark, (5) XW AG, (6) part number, (7) degrees and radii (elbows only), (8) date of manufacture.

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## SECTION 4: CONDUIT SYSTEM PROPERTIES

| 4.1 Physical Properties | Test Results | Test Protocol |
|---|---|---|
| Glass Content | 68% ± 3% | API 15LR |
| Specific Gravity | 1.94 g/cm$^3$ | ASTM D792 |
| Barcol Hardness | 54 ± 2 | ASTM D2583 |
| Water Absorption | ≤ 1% | ASTM D570 |
| UV Resistance | > 3,500 Hrs (Xenon Arc) | CSA C22.2 No. 2515 |

| 4.2 Friction Properties | Test Results | Test Protocol |
|---|---|---|
| Cross Linked Polyethylene Cable | .0233 ± .02 | CSA B196.1 |
| PVC Jacketed Cable | .0385 ± .06 | CSA B196.1 |
| Concentric Neutral Cable | .0160 ± .03 | CSA B196.1 |
| Teck (Armored) Cable | .0161 ± .03 | CSA B196.1 |

| 4.3 Electrical Properties | Test Results | Test Protocol |
|---|---|---|
| Dielectric Strength | 500 volts/mil (19.68 kV/mm) | ASTM D149 |
| Dielectric Breakdown Voltage | 29.7 kV | ASTM D149 |
| Dissipation Fraction | 0.5% | ASTM D150 |

| 4.4 Surface finish | |
|---|---|
| Exterior (average) | <2000 microinches (50.8 micrometers) |
| Interior (average) | <125 microinches (3.2 micrometers) |
| Color | Black (standard) |

| 4.5 Thermal Properties | Test Results | Test Protocol |
|---|---|---|
| Coefficient of Thermal Expansion | 1.37 E$^{-5}$ in/in/°F (2.47 E-5m/m/°C) | ASTM D696 |
| Thermal Conductivity | 2 Btu·in/ft$^2$·h·°F (0.288W/m·K) | ASTM D335 |
| Thermal Resistivity | 0.5°F·ft$^2$·h/Btu·in (3.47 m·K/W) | ASTM D335 |
| Flammability | Article 5.10 | UL 2515 |
| Heat Deflection Temperature (HDT) | 312°F (156°C) | ASTM D648 |

## SECTION 5: SPECIFICATION

Conduit and fittings shall bear nationally accepted testing laboratory approval per UL 2515A. UL Listing file No. E53373 or FRE Composites' own specification.

Products identified in section 2.1 with "*" are not UL Listed.

## SECTION 6: MANUFACTURERS

Conduit and fittings shall be manufactured by FRE Composites. No substitute shall be accepted.