FRE® SPECIFICATION FOR PHYSICAL DAMAGE LOCATION HAZGUARD™ Class 1 Division 2

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Section 1: General

1.1 Description

This specification outlines the requirements for the design, construction and performance of FRE® rigid non-metallic fiberglass HazGuard™ conduits 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

Conduits and fittings shall be suitable for use in hazardous location 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 homogeneou sly manufactured for use at temperatures ranging from –40 °F (-40 °C) to 230 °F (110 °C). Resin system substitution shall not be permitted.

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 levels limits compliant with OSHA requirements.

Section 2: General Requirements

2.1 Sizes & wall thickness

HazGuard™ conduits and fittings shall be manufactured with nominal wall thickness as outlined below:

TYPICAL HAZARDOUS LOCATION SUBJECT TO PHYSICAL DAMAGE

IPS

Diameter		Wall thickness	
in	mm	in	mm
1	27	0.250	6.4
8*	203	0.250	6.4

ID

Diameter		Wall thickness	
in	mm	in	mm
2	53	0.250	6.4
3	78	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 through out 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

Conduits 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

Conduits and fittings shall be marked at le ast once with a suitable identifying mark printed on the outside of the product. Such marking shall contain:
(1) RTRC (2) for use -40 °C to 110 °C (-40 °F to 230 °F) or other applicable temp erature (3) trade size (4) manuf acturer's name or trademark (5) XW AG (6) part number (7) degrees and radii (elbows only) (8) date of manufacture.

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
U.V.	Resistance	>		3500 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 Factor	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^{-5}m./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 mK/W)	ASTM	D335
Flammability		Article 5.10		UL 2515
Heat Deflection Temperature (HDT)		312°F (156°C)	ASTM	D648

Section 5: Specification

Conduits 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

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