FRE® SPECIFICATION FOR EXTRA HEAVY WALL BREATHSAVER® FOR CORROSION PROOF 2-HOUR RATED CABLE SYSTEM (UL 2196)

75 Wales St, St-Andre-d'Argenteuil (QC) Canada J0V 1X0 Telephone: +1 450 537-3311 • Toll free: +1 888 849-9909 • Fax: +1 450 537-3415 www.frecomposites.com
60 Greenhorn Drive, Pueblo, Colorado, 81004, USA Telephone: +1 719 565-3311 • Toll free: +1 888 849-9909 • Fax: +1 719 564-3415 www.frecomposites.com

Section 1: General

1.1 Description

This specification outlines the requirements for the design, construction and performance of the Extra Heavy Wall (XW) BreathSaver® rigid non-metallic fiberglass conduits and fittings.

1.2 Product application & use

Conduits and fittings are Class 1, Division 2 which can be subject to physical damage.

1.3 Materials

Conduits and fittings shall consist of continuous E or E-CR gla ss roving encapsulated in an internally steam cured, corrosion resistant phenolic resin system pigmented with UV inhibiting carbon black dispersed homogeneously manufactured for use at temperatures ranging from –40 °F (-40 °C) to 1850 °F (1010 °C). Resin system substitution shall not be permitted.

Phenolic resin system shall be impervious to a wide spectrum of chemicals and conduit 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 thicknesses

Conduits and fittings shall be manufactured with nominal wall thicknesses as outlined below:

IPS				ID			
Diameter		Wall thickness		Diameter		Wall thickness	
in	mm	in	mm	in	mm	in	mm
1	27	0.250	6.4	2	53	0.250	6.4
8*	203	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 inside tapered bell on one end and spigot on the other end. All joints shall be adhesive bonded inside a tapered 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 an inside tapered 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 ºF (-40 °C) to 1850 ºF (1010 °C) (3) trade size (4) manuf acturer's name or trademark (5) part number (6) degrees and radii (elbows only) (7) date of manufacture.

Section 4: Conduit system properties

4.1 Physical Properties

			Test Results		Test protocol
Glass	Content	68%	± 3%	API	15LR
Specific	Gravity	1.70	– 1.75 g/cm^3	ASTM	D792
Barcol	Hardness	50	± 2	ASTM	D2583
Water	Absorption	<	1.5%	CSA	C22.2 No. 2515
U.V.	Resistance	>	3500 Hrs (Xenon Arc)	ASTM	D570

4.2 Flame & Smoke Properties

		Test Results		Test protocol
Flame Spread	15	(Asbestos: 0) (Red Oak: 100)		ASTM E84
Flame Spread Index	2	(max: 35)	ASTM	E162
Smoke Optical Density @ 4 minutes		2	(max: 200)	ASTM E662
Light Absorption	0%	(no smoke generated)		SAV 242
Emissions NO^2		2 ppm	(max: 100 ppm)	SMP 800C
Emissions SO^2	<	1 ppm	(max: 500 ppm) SMP	800C
Emissions HCI	<	1 ppm	(max: 100 ppm) SMP	800C
Emissions HF	<	1 ppm	(max: 100 ppm) SMP	800C
Emissions HBr	<	1 ppm	(max: 100 ppm) SMP	800C
Emissions HCN	<	1 ppm	(max: 100 ppm) SMP	800C
Emissions CO		330 ppm	(max: 3 500ppm)	SMP 800C
Emissions CO^2		9 400 ppm	(max: 90 000ppm)	SMP 800C

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

4.4 Surface finish

Exterior (average)	<2000	microinches (50.8 micrometers)
Interior (average)	<250	microinches (6.4 micrometers)
Color		Black (standard)

4.5 Thermal Properties

		Test Results	Test protocol
Coefficient of Thermal Expansion		0.51 E-^{5} in./in./°F (0.927 E-^{5}m./m./°C)	ASTM D696
Thermal Conductivity	1.67	Btu.in/ft^2.h. °F (0.240W/ m.K)	ASTM D335
Thermal Resistivity	0.6°F.	ft^2.h/Btu.in (4.17 mK/W)	ASTM D335 Heat
Deflection Temperature (HDT)		> 482 °F (> 250 °C)	ASTM D648

Section 5: Specification

Conduits and fittings are approved UL following tests made in laboratory by Underwriters Laboratories (UL file #E53373). Furthermore, products are superior in required expressed by the Standard NFPA 130. Class 1 fire rated (ASTM E84), NFPA 502 compliant, FT4 rated (CSA). Product identified in section 2.1 with "*" is not UL Listed.

Section 6: Manufacturers

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