

BreathSaver®

Fiberglass Conduit System for Low Smoke/High Temperature Applications

SECTION 1: GENERAL

1.1 Description

This specification outlines the requirements for the design, construction and performance of BreathSaver® rigid non-metallic fiberglass conduits and fittings.

1.2 Product application & use

Conduits and fittings shall be suitable for use in non-hazardous locations and applications not subject to physical damage, such as tunnels, subways, confined locations where smoke and flame resistance are critical.

1.3 Materials

Conduits and fittings shall consist of continuous E or E-CR glass 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 525 °F (274 °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			
Diameter		Wall thickness	
in	mm	in	mm
1	27	0.066	1.7
1¼	35	0.066	1.7
1½	41	0.066	1.7

ID			
Diameter		Wall thickness	
in	mm	in	mm
2	53	0.070	1.8
2½	63	0.070	1.8
3	78	0.070	1.8
4	103	0.070	1.8
5	129	0.095	2.4
6	155	0.095	2.4

2.2 Joining Method

Each length of conduit 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 1000 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 least 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 274°C (40 °F to 525 °F) or other applicable temperature (3) trade size (4) manufacturer's name or trademark (5) 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	1.70 – 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	> 3 500 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 HCl	< 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: 3 500 ppm)	SMP 800C
Emissions CO ₂	9 400 ppm (max: 90 000 ppm)	SMP 800C

4.3 Electrical Properties

	Test Results	Test Protocol
Dielectric Strength	150 volts/mil ASTM D149	
Dielectric Breakdown Voltage	21.5 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 shall comply to FRE's own specification as described above.

SECTION 6: MANUFACTURERS

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

