

Section 1: General

- 1.1 Description
This specification outlines the requirements for the design, construction and performance of FRE[®] rigid non-metallic fiberglass Underwater conduit.
- 1.2 Product application & use
Conduits shall be suitable for use in either submarine trench profile, natural river or lake bed.
- 1.3 Materials
Conduits shall consist of continuous E or E-CR glass roving encapsulated in an internally steam cured, corrosion resistant and flexible epoxy resin system. Resin system substitution shall not be permitted.
- Epoxy resin system shall be impervious to a wide spectrum of chemicals including salt water.

Section 2: General Requirements

- 2.1 Sizes & wall thicknesses
Conduits shall be manufactured with nominal wall thickness as outlined below:

<u>Diameter</u>		<u>ID</u>	
		<u>Wall thickness</u>	
in	mm	in	mm
3½	91	0.070	1.8
4	103	0.070	1.8
4½	116	0.095	2.4
5	129	0.095	2.4
6	155	0.095	2.4

- 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. Splice kit shall be supplied by the manufacturer of the conduit to ensure a strong and watertight joint system.

Section 3: Requirements

- 3.1 Workmanship
Conduits 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 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) trade size (3) manufacturer's name or trademark (4) UW (5) part number (6) date of manufacture.

Section 4: Conduit system properties

4.1 Physical Properties

	<u>Test Results</u>	<u>Test protocol</u>
Glass Content	68% ± 3%	API 15LR
Specific Gravity	1.94 g/cm ³	ASTM D792
Barcol Hardness	46 ± 2	ASTM D2583
Water Absorption	< 1%	ASTM D570
U.V. Resistance	> 3500 Hrs (Xenon Arc)	CSA C22.2 No. 2515

4.2 Friction Properties

	<u>Test Results</u>	<u>Test protocol</u>
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

	<u>Test Results</u>	<u>Test protocol</u>
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	Translucent (standard)

4.5 Thermal Properties

	<u>Test Results</u>	<u>Test protocol</u>
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	Satisfactory	
Heat Deflection Temperature (HDT)	312°F (156°C)	ASTM D648

Section 5: Specification

Conduits shall comply to FRE's own specification as described above.

Section 6: Manufacturers

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