AMERON
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FIBERGLASS-COMPOSITE PIPE GROUP

Dualoy® Guide Specification

Dualoy 3000/LCX Fiberglass Pipe and Fittings

nonmetallic underground coaxial piping for petroleum products, alcohols, alcohol-gasoline mixtures and MTBE fluids

Scope

This specification covers the approval, performance, materials and physical properties requirements for buried coaxial fiberglass piping in 2 to 4-inch (50 to 100 mm) diameters for working pressures to 300 psi (2.07 MPa) and temperatures ranging from -40 to 150°F (-40 to 66°C) for petroleum products, alcohols and alcohol-gasoline mixtures. It is also approved for use with MTBE and MTBE fluids.

Listings

ULC UL® Underwriters Laboratories Inc.

All components furnished under this specification shall be listed with Underwriters Laboratories (UL) or Underwriters' Laboratories of Canada (ULC) for use as nonmetallic underground piping for petroleum products, alcohols and alcohol-gasoline mixtures. All pipe, fittings and adhesives must demonstrate performance which meets or surpasses testing specified in UL subject 971 for all fluids.

Performance requirements

Pipe and fittings and adhesives shall be suitable for continuous operation at the pressures listed below at a sustained temperature of 150°F (66°C). The pipe shall have an integral epoxy liner.

Pressure Ratings

Nominal Pipe Size		Primary Piping		Secondary Piping	
(in)	(mm)	(psi)	(MPa)	(psi)	(MPa)
2	50	250	1.72	40	0.28
3	80	150	1.03	40	0.28
4	100	125	0.86	40	0.28

ISO-9001

DNV

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Physical and mechanical property requirements

ASTM classification

Primary pipe shall conform to ASTM D2310 standard classification RTRP-11CX and ASTM D2996 specification RTRP 11CF1-5430. Secondary piping shall be classified as RTRP-11AX.

Pipe Property	Units	Minimum Value[1]	ASTM Method
Tensile strength			
Longitudinal	10^3 psi	32.5	D2105
	MPa	224	
Circumferential	10^3 psi	65.0	D1599
	MPa	448	
Tensile modulus			
Longitudinal	10^6 psi	2.8	D2105
	GPa	19.3	
Circumferential	10^6 psi	4.0	
	GPa	27.6	
Compressive strength			
Longitudinal	10^3 psi	32.5	D695
	MPa	224	
Compressive modulus			
Longitudinal	10^6 psi	2.8	D695
	GPa	19.3	
Long-term hydrostatic design basis (static)	10^3 psi	21.0	D2992(B)
	MPa	145	
Thermal expansion			
Linear	10^{-6} in/in/°F	9.0(2)	D696
	10^{-6} m/m/°C	16.2(2)	

Stiffness factor(3) — D2412

Nominal Pipe Size (in)	Nominal Pipe Size (mm)	($lb \cdot in^3/in^2$)	(N·m)
2	50	45	5.1
3	80	65	7.3
4	100	55	6.2

1) Based on structural wall thickness.

2) Maximum value.

3) At 5% deflection.

Materials

Pipe

All primary filament-wound pipe shall contain a resin-rich inner liner with a minimum thickness of 0.015 inches (0.38 mm). The liner resin system shall be a chemically resistant epoxy resin that has been demonstrated to be satisfactory for the intended service.

Structural wall

The resins, reinforcements, colorants and other materials when combined as a composite laminate structure shall meet the performance requirements of this specification. Glass fiber reinforcement shall be Type E glass with an epoxy-compatible finish. Glass fiber content shall not be less than 60% by weight of the reinforced structural wall.

Interstitial Layer

The layer between the primary and interstitial pipe layers shall be of uniform thickness with the ability to allow fluid flow throughout, meeting UL criteria. This layer shall also prevent relative movement of the primary and secondary pipe walls.

Containment Pipe

Construction of the containment pipe and materials used shall be identical to the reinforced portion of the primary pipe, exhibiting similar physical properties.

Dimensions and tolerances

Pipe dimensions

Primary pipe shall be manufactured to steel pipe outside diameters for all sizes. Pipe outside diameter tolerances shall not exceed ±1%.

Secondary piping shall properly fit into fittings supplied by manufacturer.

Wall thickness

The total wall thickness of pipe furnished under this specification shall not at any point be greater than 120% nor less than 87½% of the nominal thickness.

Fittings dimensions

All fittings supplied under this specification shall have face-to-face dimensions and laying lengths as specified in the manufacturer's literature.

Joining methods

Tapered bell x spigot adhesive-bonded joints

Primary pipe and fittings shall be joined by means of a matching taper adhesive joint. Adhesives used for joining components shall be compatible with all intended fluids. The adhesive systems shall be used in accordance with the manufacturer's recommendations.

Containment joints shall be made with bolted clamshell halves bonded together with adhesive.

Adapters and crossovers

The following adapters and crossovers shall be provided as required:

- Bell x NPT threaded female
- Bell x NPT threaded male
- Spigot x NPT threaded female
- Spigot x NPT threaded male

Flanges

Flanges shall be two-piece (van Stone) type with raised grooves on the sealing face. Fiberglass-reinforced stub ends are to be adhesive bonded to the pipe or fitting.

Workmanship

The pipe and fittings shall be free from defects including delaminations, indentations, pinholes, foreign inclusions, bubbles and resin-starved areas which, due to their nature, degree or extent, detrimentally affect the strength and serviceability of pipe or fittings. The pipe and fittings shall be as uniform as commercially practicable in color, opacity, density and other physical properties.

Testing

Proof testing

Fittings shall be hydrostatically tested according to UL specifications by the manufacturer to rated pressure prior to shipment for signs of leakage or porosity.

Quality control testing

All primary and secondary piping shall be proof tested at or above field test conditions.

Marking

Each component shall be marked to show the following:

- Underwriters' Laboratories listing mark
- Manufacturer's name
- Maximum pressure rating

Conversions

1 psi = 6895 Pa = 0.07031 kg/cm^2
1 bar = 10^5 Pa = 14.5 psi = 1.02 kg/cm^2
1 MPa = 10^6 Pa = 145 psi = 10.2 kg/cm^2
1 GPa = 10^9 Pa = 145,000 psi = 10,200 kg/cm^2
1 in = 25.4 mm
1 ft = 0.3048 m
1 lb·in = 0.113 N·m
1 in^4 = 4.162 x 10^{-7} m^4
°C = $^5/_9$ (°F - 32)

Important Notice

This literature and the information and recommendations it contains are based on data reasonably believed to be reliable. However, such factors as variations in environment, application or installation, changes in operating procedures, or extrapolation of data may cause different results. Ameron makes no representation or warranty, express or implied, including warranties of merchantability or fitness for purpose, as to the accuracy, adequacy or completeness of the recommendations or information contained herein. Ameron assumes no liability whatsoever in connection with this literature or the information or recommendations it contains. Product specifications are subject to change.

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