AMERON
INTERNATIONAL

Dualoy® Product Data

FIBERGLASS - COMPOSITE PIPE GROUP

Dualoy®3000/LCX Coaxial Fiberglass Pipe and Fittings

contained underground fuel-handling system with rigid fiberglass primary and integral fiberglass containment layers*

Uses and applications

Fiberglass coaxial fuel handling systems requiring Underwriters Laboratories Listing for containment piping and primary lines conveying the following fuels:

- alcohols
- alcohol-gasoline mixtures
- diesel fuels
- MTBE fluids
- leaded gasolines
- oxygenated fuels
- unleaded gasolines

Description

Ameron Dualoy 3000/LCX fiberglass coaxial piping is a cost-effective solution for contained piping systems. LCX is used for product delivery lines in underground fuel handling systems to convey fuel from the tank to the dispensers. Dualoy 3000/LCX pipe is UL Listed for use with petroleum products, alcohols and alcohol-gasoline mixtures.

The LCX pipe is manufactured as an integral unit. The primary is made of chemically inert, non-permeable, fiberglass reinforced epoxy resin which is inherently resistant to deterioration due to water and microbial attack. This layer is covered with a porous sand layer to provide the small interstitial space which facilitates rapid leak detection. Then, the containment layer, comprised of the same material as the primary, is wound over the primary and sand layers.

The containment system is installed with custom-designed Amron clamshell containment fittings. Both the primary and containment systems are bonded for long-term, reliable performance.

- **Dualoy 3000/LCX containment fittings are typically bolted in place while the adhesive cures. Rivets or clips are fastener options.**
- **Dualoy 3000/LCX reduces installation and inspection time dramatically, retaining system integrity.**
- **The Dualoy 3000/LCX double wall design significantly improves impact resistance over single wall pipe.**
- **Dualoy 3000/LCX fittings provide true double wall design which permits communication of the interstitial space throughout the system.**

ISO-9001

DNV

CERTIFICATED FIRM

Listings and approvals

The rigid fiberglass piping used in Dualoy 3000/LCX is Listed in the United States with Underwriters Laboratories for nonmetallic underground piping for petroleum products, alcohols and gasoline-alcohol mixtures under File No. MH9162. Dualoy 3000/LCX pipe and fittings are also listed with Underwriters Laboratories of Canada for Petroleum Products and Oxygenated Fuels (File CMH715). Underwriters Laboratories has also approved Dualoy 3000/L and Dualoy 3000/LCX for use with MTBE fluids.

Underwriters Laboratories Inc.®

* U.S. Patent No. 5,725,920

Performance

Primary operating pressures to 300 psi (20 bar)

Continuous operating temperature to 150°F (66°C)

Containment system pressures to 40 psi (2.9 bar)

Individual system components may not have the same ratings as the pipe. Refer to the detailed product information for the specific components to determine the pressure rating for the system as a whole.

Composition

Primary pipe: Filament-wound fiberglass reinforced epoxy pipe with integral epoxy liner and exterior coating. When classified in accordance with ASTM D2310 and ASTM D2996, the pipe meets the following cell limits: RTRP 11CX-5430.

Pipe containment: Filament-wound fiberglass reinforced epoxy pipe.

Interstitial space: Dry sand particles (10-20 mesh) secured in place with adhesive backed tape.

Fittings: Compression molded or filament-wound fiberglass reinforced epoxy primary fittings. Containment fittings are molded.

Adhesive: Ameron B20, PSX™•20 or PSX™•34 ambient-cure, two-part epoxy for all services (including alcohols and MTBE).

Joining system

Primary: Bell and spigot taper/taper adhesive-bonded joint

Containment: Adhesive-bonded clamshell fittings. Parts are compression molded for exact fit and match. Material is identical to primary fittings and is fully Listed by U.L. for all services, including use in MTBE fluids.

Pipe lengths

Standard 20 ft. (6.1 m) random lengths 17 to 21 ft. (5.2 to 6.4 m) and 27 ft. (8.2 m) random lengths 25 to 27 ft. (7.6 to 8.2 m)

Other lengths up to 42 ft. available upon request.

Fittings

Primary–	Adapters: bell x NPT male[1]	Flange stub ends[1]
	Adapters: bell x NPT female[2]	Isolation bushings[1]
	Adapters: spigot x NPT female[2]	Nipples[2]
	Adapters: spigot x NPT male[2]	Reducer bushings[1,2]
	45° elbows[1]	Repair couplings[1]
	90° elbows[1]	Sleeve couplings[2]
	End caps[1]	Tees[1]
	Flange rings[1]	Dispenser pan penetration fittings[1]
Containment–	45° elbows[1]	Couplings[1]
	90° elbows[1]	Tees[1]
	Termination sleeves[1,3]	

1 Molded fitting
2 Filament-wound fitting
3 2-inch available with or without test valve. 3- and 4-inch available only with test valve

Typical pipe dimensions and weights

Nominal Pipe Size		Primary I.D.		Primary O.D.[1]		Primary Wall Thickness		Containment O.D.		Volume		Weight	
in.	*mm.*	in.	*mm*	in.	*mm*	in.	*mm.*	in.	*mm.*	(gal/ft)	*(l/m)*	(lb/ft)	*(kg/m)*
2	*50*	2.21	*56*	2.37	*60*	0.080	*2.03*	2.59	*66*	0.20	*.76*	0.90	*0.41*
3	*80*	3.32	*84*	3.50	*89*	0.085	*2.16*	3.70	*94*	0.45	*1.70*	1.30	*0.59*
4	*100*	4.33	*110*	4.50	*114*	0.087	*2.21*	4.70	*119*	0.77	*2.92*	1.74	*0.79*

1 Typical outside diameters of 2- through 4-inch pipe are within API, ASTM and ANSI fiberglass and steel pipe dimensions.

Typical primary pipe performance

Nominal Pipe Size		Pressure Rating[1]		Ultimate Internal Pressure[1]		Ultimate Collapse Pressure[2]	
(in)	*(mm)*	(psig)	*(MPa)*	(psig)	*(MPa)*	(psig)	*(MPa)*
2	*50*	300	*2.07*	3200	*22.1*	153	*1.05*
3	*80*	200	*1.38*	2400	*16.5*	90	*0.62*
4	*100*	175	*1.21*	2000	*13.8*	39	*0.27*

1) At 150°F (66°C).
2) At 80°F (27°C). For continuous service do not exceed 75% of these values.

Note: Values shown for primary only

Fittings pressure performance

For dimensions of fittings, consult Ameron publication DUALOY 3000/L FITTINGS DIMENSIONS, FP266. Pressure ratings of fittings without UL Listing are available on request.

Nominal Pipe Size		Primary All Fittings[1]		Containment Clamshell Fittings	
(in)	*(mm)*	(psig)	*(MPa)*	(psig)	*(kPa)*
2	*50*	250	*1.72*	40	*275*
3	*80*	150	*1.03*	40	*275*
4	*100*	125	*0.86*	40[2]	*275*

1) Some fittings have higher pressure ratings than shown.
2) Compression molded 4-inch not yet listed at time of printing.

Typical physical properties of primary pipe

Dualoy 3000/LCX piping systems are designed to function at temperatures ranging from -40 to 150°F (-40 to 66°C) at service pressures between -15 to 300 psi (-1 to 20 bar). Dualoy 3000/LCX pipe conforms to ASTM D2310, D2517 and D2996.

			Method	
Pipe Property[1]	Units	Value	ASTM	ATM[1]
Thermal conductivity	Btu·in/(h·ft²·°F) W/m·°C	1.7 7.6	C177	23
Linear thermal expansion	10^{-6} in/in/°F 10^{-6} cm/cm/°C	8.5 15.3	D696	21
Friction factor	Hazen-Williams	150.0	—	156
Absolute roughness	10^{-6} ft 10^{-6} m	50.0 15.0	—	—
Specific gravity	—	1.81	D792	
Barcol Hardness	Impressor 934-1	65.0	D2583	—

1) Ameron test method.

Typical mechanical properties of primary pipe

Pipe Property[1]	Units	Value[1]	Method ASTM	Method ATM[2]
Tensile strength				
Longitudinal	10^3 psi	35.0	D2105	161
	MPa	241		
Circumferential	10^3 psi	70.0	D1599	151
	MPa	483		
Tensile modulus				
Longitudinal	10^6 psi	3.0	D2105	161
	GPa	20.7		
Circumferential	10^6 psi	4.2	—	—
	GPa	29.0		
Compressive strength				
Longitudinal	10^3 psi	35.0	—	142
	MPa	241		
Compressive modulus				
Longitudinal	10^6 psi	3.0	—	142
	GPa	20.7		
Long-term hydrostatic design basis				
Static	10^3 psi	31.5	D2992(B)	—
	MPa	217		
Cyclic	10^3 psi	8.0	D2992(A)	—
	MPa	55		
Poisson's ratio[3]				
ν_{yx}	_	0.16	—	—
ν_{xy}	_	0.26	—	—

1) Based on structural wall thickness.
2) Ameron test method.
3) The first subscript denotes the direction of contraction and the second that of the applied stress.
x denotes longitudinal direction.
y denotes circumferential direction.

Bending radius

Nominal Pipe Size (in)	Nominal Pipe Size *(mm)*	Minimum Bending Radius[1] (ft)	Minimum Bending Radius[1] *(m)*	Maximum Deflection per 20-ft Joint (deg)	Minimum Length Required for 10° Change (ft)	Minimum Length Required for 10° Change *(m)*
2	*50*	75	*23*	15	13	*4*
3	*80*	125	38	9	22	7
4	*100*	150	46	7.5	27	8

1) At rated pressure. Sharper bends may create excessive stress concentrations. **Do not** bend pipe until adhesive has cured.

Important Notice

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FIBERGLASS - COMPOSITE PIPE GROUP - HEADQUARTERS
P.O. Box 801148 • Houston, TX 77280 • Tel: (713) 690-7777 • Fax: (713) 690-2842 • http://www.ameron.com

Asia
Ameron (Pte) Ltd.
No. 7A, Tuas Avenue 3
Singapore 639407
Tel: 65 861 6118
Fax: 65 862 1302/861 7834

Europe
Ameron B.V.
J.F. Kennedylaan 7
4191 MZ Geldermalsen
The Netherlands
Tel: +31 345 587 587
Fax: +31 345 587 561

Americas
P.O. Box 878
Burkburnett, TX 76354
Tel: (940) 569-1471
Fax: (940) 569-2764

Centron International
P.O. Box 490
600 FM 1195 South
Mineral Wells, Texas 76068
Tel: (940) 325-1341
Fax: (940) 325-9681