



POLYTUBES 2009 INC

See Page 6 of 9 for Applicable
Pipe Specifications -
County of Vermilion River

POLYETHYLENE GAS PIPE

**PE-2708
ENGINEERED FOR
NATURAL GAS
DISTRIBUTION SYSTEMS**

PLASTIC PIPE MANUFACTURER "SINCE 1953"





POLYTUBES 2009 INC.

PE-2708

Medium Density Polyethylene Pipe
For

Gas Distribution Services

General Information

POLYTUBES 2009 INC. , (“**POLYTUBES**”), extrudes and fabricates its polyethylene pipe for GAS DISTRIBUTION SYSTEMS from a Medium Density Polyethylene (M.D.P.E.). This material provides an excellent combination of toughness, durability and Rapid Crack resistance for pressure gas pipe applications.

POLYTUBES polyethylene piping systems offers some unique characteristics and allows the design engineer to take advantage of these attributes such as low cost installation, rough handling in extremely cold weather, corrosion resistance, and excellent long service life with minimal maintenance requirements. Laboratory tests and field service have demonstrated that gaseous hydrocarbons have no effect on the expected service life of **POLYTUBES** pipe.

This material is listed by the Canadian Standards Association (CSA) and Plastic Pipe Institute (PPI) as a PE-2708 resin with a hydrostatic design basis (HDB) of 1250 psi at 23°C. It complies with ASTM D-3350 as a 234373E cell class material.

Identification of **POLYTUBES** polyethylene pipe by cell classification (as per ASTM D3350) is as follows:

<u>PROPERTY</u>	<u>NOMINAL VALUE</u>	<u>CELL CLASS</u>
Density	0.942 gm/cm ³	2
Melt Index	0.20g/10min	3
Flexural Modulus	100,000 psi	4
Tensile Strength, yield	2800 psi	3
Slow Crack Growth (ESCR Test)	>500 hrs	7
Hydrostatic Design Basis	1250 psi	3
Colour/UV Stabilizer		E




Pipe Properties

	<i>Units</i>	<i>Typical Values</i>	<i>ASTM Test Method</i>
Pipe Ring Tensile Strength @ Yield	MPa	19.3	D2290
Pipe Density	g/cm ³	0.942	D1505
Thermal Stability	°C	260	D3350
Long Term Hydrostatic Strength @ 23°C	psi	1250	D2837
Long Term Hydrostatic Strength @ 60°C	psi	1000	D2837
Elevated Temperature Sustained Pressure Tests @ 80°C @ 7670 psi	Hours	170	F714
Coefficient, of Linear Thermal Expansion	in./in./°F	1.2 x 10 ⁻⁴	D696
Cold Temperature Brittleness	°C	<-100	D746

*****NOTE: This list of properties is intended for basic characterization and does not represent specific determinations or specifications. Please contact your Polytubes representative for particular resin specification.*****

Our MDPE gas pipe resins are listed under the following standards:



- Plastic Pipe Institute (PPI). Standard Grade Listing as a PE-2708 material with a Hydrostatic Design Basis (HDB) of 1250 psi at 23°C and 1000 at 60°C.
- Canadian Standards Association. (CSA)  B137.4. **POLYTUBES** carries a CSA B137.4 listing up to 8" in diameter.



QUALITY COMMITMENT

POLYTUBES is ISO-9001 certified and our PE-2708 pipe obtains the highest commitment and assurance of being engineered and manufactured in full compliance with all the requirements of applicable specifications and standards.

STANDARDS

Canadian Standards Association (CSA)  and American Society for Testing and Materials (ASTM)  has researched and developed a comprehensive system of standards covering thermoplastic pipe material, testing criteria, dimensions, assembly, and installation. The principal standards and specifications for polyethylene (PE) pipe are tabulated here for easy reference:

Resin Specifications

D1248	Polyethylene Plastic Molding and Extrusion Materials.
D1238	Flow Rates of Thermal Plastics by Extrusion Plastometer.
D1693	Environmental Stress Cracking of Ethylene Plastics.
D3350	Polyethylene Plastic Pipe and Fitting Materials.

CSA Standards

CAN/CSA 137.0	Definitions, General Requirements and Methods of Testing for Thermoplastic Pressure Piping.
CAN/CSA 137.4MXX	Polyethylene Piping Systems for Gas Services.
CAN/CSA Z622-XX	Oil & Gas Pipeline Systems.

ASTM Standards

D638	Tensile Properties of Plastics.
D746	Brittleness Temperature of Plastics and Elastomers by Impact.
D790	Flexural Properties of Unreinforced and Reinforced Plastics And Electrical Insulating Materials.
D1598	Time-to-Failure of Plastic Pipe Under Constant Internal Pressure
D1599	Short Time Hydraulic Failure Pressure of Plastic Pipe, Tubing and Fittings.
D2513	Thermoplastic Gas Pressure Pipe, Tubing and Fittings
D2737	Polyethylene Plastic Tubing.
D2290	Strength of Ring of Tubular Plastic by Split Disk Method.
D2837	Obtaining Hydrostatic Design Basis for Thermoplastic Pipe Materials.
F678	Polyethylene Gas Pressure Pipe, Tubing and Fittings.



FITTINGS

D2683

Socket-Type Polyethylene Fittings for Outside Diameter controlled PE Pipe.

D3261

Butt Heat Fusion Polyethylene Plastic Fittings for Polyethylene Plastic Pipe and Tubing.

Installation

D2657

Heat Joining of Polyolefin Pipe and Fittings

POLYTUBES IPS PIPE DIMENSIONS 1250 P.S.I. HDB

POLYTUBES offers a comprehensive range of M.D.P.E. pipes in both metric and IPS outside diameters. The recommended continuous working pressures for **POLYTUBES PE-2708** is dependent on the Standard dimension ratio (SDR) of the pipe or tubing selected. The design pressure is determined in accordance to the Standard ISO equation shown below:

$$P = \frac{2S}{R - 1} \times F$$

Where:

P design pressure, **psi**

S hydrostatic design basis (HDB) at 23°C,=1250 psi
(HDB = 8.6 MPa for PE-2708)

F service fluid factor (0.4 is recommended for gas)

R ratio of pipe outside diameter to pipe minimum wall thickness.

A complete listing of the sizes available and their Maximum Operating Pressure (MOP) are identified in the attached Table.



PE-2708 PIPE AND TUBING DIMENSION

Nominal Diameter	Nominal Outside Diameter.		M.O.P.	Minimum Wall Thickness		Pipe Weight	
<i>Inches</i>	<i>Inches</i>	<i>mm</i>	<i>psi</i>	<i>Inches</i>	<i>mm</i>	<i>lbs/ft</i>	<i>lbs/m</i>

*SDR 11

3/4"	1.050	26.7	100	0.095	2.42	0.122	0.40
1"	1.315	33.4	100	0.119	3.04	0.193	0.63
1 1/4"	1.660	42.2	100	0.151	3.82	0.305	1.01
1 1/4"(SDR 10)	1.660	42.2	110	0.166	4.22	0.334	1.10
1 1/2"	1.900	48.3	100	0.173	4.38	0.41	1.32
2"	2.375	60.3	100	0.216	5.48	0.628	2.06
2 1/2"	2.875	73.0	100	0.261	6.62	0.917	3.02
3"	3.500	88.9	100	0.318	8.08	1.363	4.48
4"	4.500	114.3	100	0.409	10.32	2.253	7.41
6"	6.625	168.3	100	0.602	15.28	4.883	16.05
8"	8.625	219.1	100	0.832	19.94	8.777	27.25

SDR 8.8

3/4"	1.050	26.7	128	0.119	3.03	0.149	0.49
1"	1.315	33.4	128	0.149	3.79	0.234	0.77
1 1/4"	1.660	42.2	128	0.189	4.80	0.374	1.23
1 1/2"	1.900	48.3	128	0.216	5.48	0.489	1.61
2"	2.375	60.3	128	0.270	6.86	0.766	2.52
2 1/2"	2.875	73.0	128	0.327	8.30	1.120	3.69
3"	3.500	88.9	128	0.398	10.10	1.661	5.46
4"	4.500	114.3	128	0.511	12.98	2.747	9.03
6"	6.625	168.3	128	0.753	19.12	5.990	19.58

SDR 13.5

2"	2.375	60.3	80	0.176	4.46	0.58	1.90
4"	4.500	114.3	80	0.333	8.46	1.88	6.14
6"	6.625	168.3	80	0.491	12.46	4.08	13.33
8"	8.625	219.1	80	0.678	16.23	7.29	22.68

TUBING

1/2" CTS	0.625	15.9		0.062	1.58	0.047	0.16
1/2" CTS	0.625	15.9		0.090	2.28	0.065	0.21
1" CTS	1.125	28.6		0.062	1.58	0.089	0.29
1" CTS	1.125	28.6		0.099	2.50	0.138	0.45

SDR = Standard Dimension Ratio = O.D. Divided by Wall Thickness

SPECIAL DIMENSIONS NOT LISTED ARE AVAILABLE UPON REQUEST



GAS FLOW CALCULATION

Polyethylene compared to other conventional materials offers superior flow characteristics for natural gas. This is primarily due to the low coefficient of friction and extremely smoother interior surface of the pipe, which offers little resistance to flow. It will maintain excellent flow properties throughout its service life due to its chemical resistance. The following Mueller formula should be used to calculate the gas flow rate (@ pressures ≥ 1 psig) through **POLYTUBES** smooth wall polyethylene pipe.

$$Q_h = \frac{2826}{G^{0.425}} \left[\frac{P_1^2 - P_2^2}{L} \right]^{0.575} \times D^{2.727}$$

Where:

- Q_h = Gas Flow rate (Standard cubic feet per hour)
- G = Specific gravity of gas (natural gas = 0.65 , air = 1.0)
- P_1 = Pipe inlet pressure (psia)
- P_2 = Pipe outlet pressure (psia)
- L = Length of pipe (feet)
- D = Inside diameter of pipe in inches

WEATHERABILITY

POLYTUBES PE-2708 gas distribution pipe can be identified by its yellow color. This particular color gives high visibility for gas distribution applications and provides adequate weatherability and Ultra-Violet protection. **POLYTUBES** PE-2708 pipe is protected against ultraviolet degradation when exposed to direct sunlight by a UV inhibitor. The recommended outdoor storage when exposed to direct sunlight is limited to a maximum of 2 years. However, depending on the conditions, storage up to 5 years can be determined as acceptable. Please consult your **POLYTUBES** representative for the longer storage life parameters.



Normal Packaging Configurations

POLYTUBES pipe is available in the following packaging configuration:

Straight Lengths (Crates)

Available :

Pipe Sizes: 42.2 mm (1 1/4")
to
323.8 mm (12")

Lengths:

12 meter (39')
15 meter (49')
18 meter (59')



For actual crate dimensions piece per crate and crates per truckload, please discuss with your **POLYTUBES** representative.

COILS

Available:

1/2" (15.9 mm)
300 meters (1000 ft)

3/4" (26.7 mm)
150 meters (500 ft)

1" (33.4 mm)
150 meters (500 ft)

1 1/4" (42.2 mm)
150 meters (500 ft)

1 1/2" (42.2 mm)
150 meters (500 ft)

2" (60.3 mm)
150 meters (500 ft)



For actual coil dimensions, coils per pallet and pallets per truckload, please discuss with your **POLYTUBES** representative.



REELS

Available:

26.7 mm (3/4")
Up to 3000 meter

33.4 mm (1")
Up to 3000 meter

42.2 mm (1 1/4")
Up to 2500 meter

48.3 mm (1 1/2")
Up to 2500 meter

60.3 mm (2")
Up to 1600 meter

73.0 mm (2 1/2")
Up to 800 meter

88.9 mm (3")
Up to 650 meter

114.3 mm (4")
Up to 400 meter

168.3 mm (6")
Up to 500 meter



For actual REEL dimensions quantity per truckload, please discuss with your **POLYTUBES** representative.

OTHER PRODUCTS MANUFACTURED BY POLYTUBES

- Polyethylene pipe for gas gathering applications
- Wide range of diameters of pipe in Low and High Density Polyethylene for various applications
- Custom extrusion available upon request.
- Conduit