Pipe Fittings + Transitions

Chevron Plexco®

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Polyethylene Material Properties

Physical Data

The PLEXCO YELLOWPIPE system uses a medium density polyethylene resin. The polyethylene resin is classified according to ASTM D 1248, Standard Specification for Polyethylene Plastic Molding and Extrusion Materials, as Type II, Class B, Category 5, Grade P24. The cell classification in accordance with ASTM D 3350, Standard Specification for Polyethylene Plastic Pipe and Fittings Materials, is PE 235333 E.

The polyethylene resins used have a PPI recommended Hydrostatic Design Stress rating (HDS) of 630 psi @ 73.4°F. At 140°F these compounds have a recommended HDS rating of 500 psi, the ...hest rating for any Type II and Type III ...ethylene pipe compound.

1. Elevated temperature data can be used to illustrate in a short period of time what the actual performance of the pipe will be at a lower temperature over a much longer period of time.

2. Elevated temperature performance can be used as an engineering requirement in a specification to screen out lower performance materials.

3. The elevated temperature data can be used to engineer and design an application at elevated temperatures, where permitted (such as API Specification 15LE), with a high degree of certainty of performance.

The Environmental Stress Cracking Resistance properties of these compounds have a value of > 5,000 hours (see table) and meet the requirements for a P24 polyethylene. Also, these yellow compounds have a Nominal Density equivalent to the minimum uncolored density of a Type III polyethylene plastic, and their Hydrostatic Design Basis (1250 psi) at 73.4°F is the same as the PE 3406 compounds.

ASTM Test Values

...ollowing are the ASTM specifications and test ...ues of the materials used in the manufacture of the ...LEXCO polyethylene plastic piping system. Inventory of these materials at PLEXCO plants is maintained in separate hoppers and each production run is identified as to materials used in accordance with ASTM D 2513 marking standards:

Property	ASTM Test Method	PLEXCO PE 2406 Value
Density, min. cc	D 1505	0.934 g
Melt Index, max. g/10 min.	D 1238	0.20
Tensile Yield, min. psi	D 638	2800
Ultimate Elongation, min. %	D 638	800
Environmental Stress Crack Resistance, min. hrs.	D 1693	5000*
Flexural Modulus, min. psi	D 790	110,000
Vicat Softening Point, min. °F	D 1525	235.0
Brittleness Point, max. °F	D 746	-180
Hardness, Shore D	D 2240	62
Modulus of Elasticity, psi	D 638	90,000
Thermal Expansion, in/in	D 696	8 X 10⁻⁵

**Test discontinued because of no failure and no indication of stress initiation (molded specimen).*

Permeability

All types of plastic are permeable by gases to varying extents. Although the constituent gases of natural gas are permeable through polyethylene pipe, the volume is insufficient to have any detrimental effects in the handling of natural gas in polyethylene plastic piping systems.

Since methane is a primary constituent of natural gas, its rate of permeation is of interest to the gas engineer. The American Gas Association's Plastic Pipe Manual lists the permeability factor of methane through PE 2406 pipe as 4.2×10^{-3}.

Using this factor, the volume of methane lost through permeation in one mile of SDR 11 pipe operating at 60 psi with 100% methane inside is only 0.26 cu. ft./day.

The permeation of other gases in natural gas, with the exception of hydrogen, is generally equivalent to, or less than, methane. Even though the hydrogen value is five times that of methane, the concentration of hydrogen in most natural and synthesis gas is so low that the actual amount of hydrogen permeation would be insignificant.

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Size	SDR*	Design Pressure Rating For Natural Gas PSI**	Dimensions		Coil Length, Feet	Weight Lbs./Ft.
			Average OD, Inches	Min. Wall Thickness, Inches		
CTS						
½"	7	100	.625	.090	1,000	.06
IPS						
¾"	11	80	1.050	.095	500	.12
1"	11	80	1.315	.119	500	.19
1¼"	11	80	1.660	.151	500	.30
1½"	11	80	1.900	.173	500	.40
2"	11	80	2.375	.216	250	.62
2"	11	80	2.375	.216	500	.62
2"	11	80	2.375	.216	1,500	.62
3"	11	80	3.500	.318	500	1.35
3"	11.5	76	3.500	.304	500	1.30.
3"	11	80	3.500	.318	40' Joints	1.35
3"	11.5	76	3.500	.304	"	1.30
4"	11	80	4.500	.409	"	2.23
	11.5	76	4.500	.391	"	2.15
	11	80	6.625	.602	"	4.84
6"	11.5	76	6.625	.576	"	4.65
8"	11	80	8.625	.784	"	8.20
8"	11.5	76	8.625	.750	"	7.88
10"	11	80	10.750	.977	"	12.74
10"	11.5	76	10.750	.935	"	12.24
12"	11	80	12.750	1.159	"	17.93
12"	11.5	76	12.750	1.109	"	17.22

*Standard Dimension Ratio is calculated by dividing the average OD of the pipe by the minimum wall thickness in inches, as described in ASTM D-2513, par. 3.3. SDRs other than those shown are available.

**Pressure is based on a hydrostatic design basis (HDB) of 1250 psi @ 73°F and a class location design factor of .32.