2.1.1.1 2.2.1

## 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.

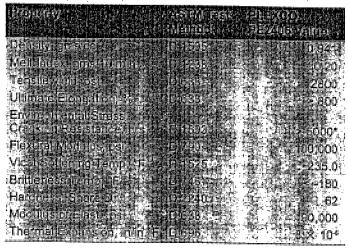
- 1. Elevated temperature data can be used to illustrate in a short period of time what the actual performance of the pipe will be at a lower temperature over a much longer period of time.
- 2. Elevated temperature performance can be used as an engineering requirement in a specification to screen out 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 uses 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:



\*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  $4.2 \times 10^{-3}$ .

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.

, Size	SDR*	Design Pressure Rating For Natural Gas PSI**	Dimensions			
			Average OD, Inches	Min. Wall Thickness, Inches	Coil Length, Feet	Weight Lbs./Ft.
CTS			·			
1/2 "	7	100	.625	.090	1,000	.06
IPS						•
3/4 "	11	80	1.050	.095	500	.12
1"	11	80	1.315	.119	500	.19
1 1/4 "	11	80	1.660	.151	500	.30
1 1/2 "	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 <i>.</i> 30.
3″	11	80	3.500	.318	40' Joints	1 <b>.3</b> 5
3″	11.5	76	3.500	.304	"	1.30
A #	11	80	4.500	.409	"	2.23
<b>&gt;</b>	11.5	76	4.500	.391	. 11	2.15
	11	80	6.625	.602	"	4.84
6″	11.5	76	6.625	.576	11	4.65
8″	11	80	8.625	.784	,,	8.20
8″	11.5	76	8.625	.750	, n	7.88
10 "	11	80	10.750	.977	11	12.74
10 "	11.5	-76	10.750	.935	11	12.24
12 "	11	80	12.750	1.159	11	17.93
12 "	11.5	76	12.750	1.109	11	17.22

<sup>\*</sup>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.

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