

Maximum Operating Temperature and Pressure for Pipeline Plastics Energy Pipe

Pipeline Plastics Energy pipe is a high performance PE4710 polyethylene piping product designed for a range of applications. A PE4710 is the latest and highest performing PE compound recognized by ASTM F2619, API 15LE and other common standards.

The maximum working pressure rating of our Energy pipe is based on a maximum hydrostatic design stress (HDS) in the wall of the pipe of 1000 psi (PE4710) at 73°F as recommended by the Plastics Pipe Institute and published in TR-4 (see PPI website www.plasticpipe.org), and is based on a maximum 0.63 design factor for non-regulated service applications. As put forth in ASTM F2619 Appendix the equation relating stress and pressure is:

$$P_T = \frac{2 \times HDS \times S_F \times S_T}{(DR - 1)}$$

Where: P_T = maximum operating pressure at temperature T
HDS = hydrostatic design stress at temp. T (73°F) = 1000 psi for water PE4710
 S_T = Temperature Service Factor – see table below
 S_F = Fluid Service Factor for liquid hydrocarbons – see table below

Temperature Service Factor, S_T									
Service Temperature °F (°C)	<80 (27)	90 (32)	100 (38)	110 (43)	120 (49)	130 (54)	140 (60)	160** (71)	180** (82)
S_T	1.00	0.90	0.84	0.78	0.73	0.68	0.63	0.55	0.50

Note: See PPI Handbook of PE Pipe, 2nd, ed, Chapt.3 for additional design guidance.

**For long-term design (50 yr.+) 140°F is considered maximum continuous use temperature. Short-term and intermittent operating temperatures above 140°F are acceptable as long as appropriate Temperature Service Factor is applied for maximum pressure determination, and cumulative time above 140°F is limited to 1 year. Contact Pipeline Plastics for additional design recommendations at these elevated temperatures.

Fluid Service Factor, S_F	
Water, Brine, dry gas gathering	1.0
Liquid hydrocarbons (> 2%) - Wet natural gas and liquid hydrocarbons. Continuous exposure to produced water containing >2% liquid hydrocarbons, gas condensates	0.5

Note: See Plastics Pipe Institute Technical Report TR-9, “Design Service Factors for Plastic Pipe”

The recommended maximum operating pressure of Pipeline Plastics Energy pipe is based on several factors and outside environmental influences such as increased temperatures, >2% liquid hydrocarbons, other fluids, regulations, or system design characteristics such as surge pressures. See PPI publication TR-9 for additional information on design factors and PPI “Handbook of PE Pipe, 2nd ed.” for additional design guidance. This guidance is for non-federally regulated pipeline applications. Other Federal or State regulations may apply.

Maximum Operating Pressure vs. Temperature (PE4710) Water, Brine and Dry Natural Gas

Maximum Operating Pressures (psig) for Water, Brine and Dry Natural Gas						
Pipeline Plastics Energy Pipe (PE4710) DR	Operating Temperature					
	<80°F	100°F	120°F	140°F	160°F**	180°F**
6	400	335	290	250	220	200
7	335	280	240	210	180	165
9	250	210	185	160	140	125
11	200	170	145	125	110	100
13.5	160	135	115	100	90	80
17	125	105	90	80	70	60

Maximum Operating Pressure vs. Temperature (PE4710) >2% Liquid Hydrocarbons

Maximum Operating Pressures (psig) for Crude Oil, Produced Water with > 2% liquid hydrocarbons, Wet Natural Gas						
Pipeline Plastics Energy Pipe (PE4710) DR	Operating Temperature					
	<80°F	100°F	120°F	140°F	160°F**	180°F**
6	200	165	145	125	110	100
7	165	140	120	105	90	80
9	125	105	90	80	70	60
11	100	85	70	60	55	50
13.5	80	65	55	50	45	40
17	60	50	45	40	35	30

There are many considerations required in the course of a piping system design and this recommendation should not be construed as approval of any specific design.

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