

PLP TechNote 203

Maximum Operating 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)	90 (32)	110 (43)	120 (49)	130 (54)	140 (60)
	1.00	0.90	0.84	0.78	0.73	0.68	0.63

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

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)	Operating Temperature			
DR	<80°F	100°F	120°F	140°F
6	400	335	292	252
7	333	280	242	210
9	250	210	183	158
11	200	168	146	126
13.5	160	134	117	101
17	125	105	91	79

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

Maximum Operating Pressures (psig) for Crude Oil, Produced Water with > 2% liquid hydrocarbons, Wet Natural Gas				
Pipeline Plastics Energy Pipe (PE4710)	Operating Temperature			
DR	<80°F	100°F	120°F	140°F
6	200	168	146	126
7	167	140	122	105
9	125	105	91	79
11	100	84	73	63
13.5	80	67	58	50
17	63	53	46	40

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.

For other operating design options consider using our **Energy +PLUS+®** multi-layer thermoplastic piping system for the transport of liquid hydrocarbons.

Technical Information or Advice Disclaimer – Pipeline Plastics, LLC does not provide Professional Engineering services. Any technical information or advice is given without charge as an accommodation only, and is used at your sole discretion without any warranty or guarantee, express or implied. Any information should be verified independently. This includes any technical advice, recommendations, testing, or material properties, including, without limitation, information as it may relate to the selection of a product for a specific use and application.