

Pipeline Elevate-RT™ PE4710 PERT Pipe Maximum Operating Temperature and Pressure

Pipeline Elevate-RT™ is a high-performance PE4710 polyethylene piping product manufactured with Dow Chemical INTREPID™ 2499 bimodal polyethylene resin, engineered for elevated-temperature service up to 180°F continuous operating temperature. Pipeline Elevate-RT is qualified per ASTM F2619, API 15LE, ASTM F714 and ASTM D3035, and is Cell Classified PE445574C per ASTM D3350. Typical applications include Raw Water, Process Water, Wastewater, District Heating & Cooling, Oil & Gas Gathering, and Chemical /Corrosive service in demanding industrial environments.

The maximum working pressure rating of Pipeline Elevate-RT pipe is based on a maximum hydrostatic design stress (HDS) in the pipe wall of 1,000 psi at 73°F, derived from a Hydrostatic Design Basis (HDB) of 1,600 psi at 73°F per ASTM D2837, using a 0.63 design factor as recommended by the Plastics Pipe Institute (PPI TR-4). Pipeline Elevate-RT maintains an elevated-temperature design rating which is independently substantiated by an HDB of 800 psi at 180°F per ASTM D2837/PPI TR-3 — well above the rating standard PE4710 compounds achieve at that temperature. As set out in ASTM F2619 Appendix, the equation relating stress and pressure is:

$$P_T = 2 \times HDS \times SF \times S_T / (DR - 1)$$

P_T = maximum operating pressure at temperature T

HDS = hydrostatic design stress at 73°F = 1,000 psi for PE4710

S_T = Temperature Service Factor – see table below

SF = Fluid Service Factor for liquid hydrocarbons – see table below

Temperature Service Factor, S_T

Service Temperature	<80°F (27°C)	100°F (38°C)	120°F (49°C)	140°F (60°C)	160°F (71°C)	180°F** (82°C)
S_T	1.00	0.84	0.73	0.63	0.55	0.50

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

**For long-term design (50 yr.+), 140°F is considered the maximum continuous-use temperature for general PE4710 design; Pipeline Elevate-RT has a D2837-substantiated 180°F HDB which supports continuous operation to 180°F. Short-term and intermittent operating temperatures above 180°F may be acceptable as long as the appropriate Temperature Service Factor is applied. Other considerations will also affect the maximum use temperature. Contact Pipeline Plastics for design recommendations at elevated temperatures.

Fluid Service Factor, SF

Service Fluid	SF
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

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

The recommended maximum operating pressure of Pipeline Elevate-RT pipe is based on several factors and outside environmental influences such as increased temperature, >2% liquid hydrocarbons, other fluids, regulations, or system design characteristics such as surge pressure. See PPI publication TR-9 for additional information on design factors and the 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 (Pipeline Elevate-RT PE4710)

Water, Brine and Dry Natural Gas

DR	<80°F	100°F	120°F	140°F	160°F	180°F**
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
21	100	85	75	65	55	50
26	80	65	60	50	45	40
32.5	63	55	45	40	35	30

Maximum operating pressures in psig. Source pressure ratings (73°F / <80°F column) per Pipeline-Elevate-RT™ Tech Data Sheet, PE4710.

Maximum Operating Pressure vs. Temperature (Pipeline Elevate-RT PE4710)

>2% Liquid Hydrocarbons – Crude Oil, Produced Water, Wet Natural Gas

DR	<80°F	100°F	120°F	140°F	160°F	180°F**
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
21	50	40	35	30	25	25
26	40	30	30	25	20	20
32.5	30	25	20	20	15	15

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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