



**DETAILED SPECIFICATION  
PEX-Flex  
(with diffusion barrier)**

**1) General**

The PEX pipe(s) shall be insulated by Logstor and supplied by Urecon Ltd. Insulation of associated joints; fittings and accessories shall be as per Urecon's recommendations. The product shall be manufactured in accordance to ISO 9001-2000 Standards, or approved equal.

**2) Pipe**

The carrier pipe shall be made of cross-linked polyethylene (PEX) to DIN 16892/16893 with an organic oxygen diffusion retainer (EVAL). The jacket shall be made of extruded low density polyethylene (LDPE). It is required that Semi-flexible polyurethane (PUR) is foamed between carrier pipe and the jacket providing excellent insulation properties, and a patented diffusion barrier is incorporated between the PUR foam and outer jacket. This proprietary selective membrane will reduce the intrusion of atmospheric gases while permitting the emission of small amounts of water vapour outwards. The insulation will retain its excellent properties throughout the service life of the pipe. The pipes shall be available in coils from 50 to 300 m (33 to 656 ft) depending on the core pipe dimension required. The maximum diameter of the coils shall be 2.3 m (7.54ft) for all pipes. The PEX carrier pipe must be protected against daylight; consequently all pipes are delivered without stripped ends and with end caps.

Mechanical properties of PEX pipe:

	Metric	Imperial
Density	938 Kg/m <sup>3</sup>	58.6 lb/ft <sup>3</sup>
Tensile strength (20 <sup>0</sup> C)	20-26 N/mm <sup>2</sup>	3030-3939 lb/in <sup>2</sup>
(100 <sup>0</sup> C)	9-13 N/mm <sup>2</sup>	1364-1970 lb/in <sup>2</sup>
Young's Modules (20 <sup>0</sup> C)	600-900 N/mm <sup>2</sup>	90909-136363 lb/in <sup>2</sup>
(80 <sup>0</sup> C)	300-400 N/mm <sup>2</sup>	45454-60606 lb/in <sup>2</sup>
Elongation at rupture		
(20 <sup>0</sup> C)	300-450 %	
(100 <sup>0</sup> C)	500-700 %	
Thermal Properties:		
Coefficient of expansion		
(20 <sup>0</sup> C)	1.4·10 <sup>-4</sup> K <sup>-1</sup>	0.77 <sup>0</sup> F <sup>-1</sup>
(100 <sup>0</sup> C)	2.05·10 <sup>-4</sup> K <sup>-1</sup>	1.14 <sup>0</sup> F <sup>-1</sup>
Specific heat	0.55 Kj/kgK	0.134 BTU/lb <sup>0</sup> F
Thermal conductivity	0.38 W/mK	0.219 BTU/h·FT

The general (mechanical) advantages of flexible piping systems are:

- Reduction in the number of joints needed through the availability of long coil lengths.
- Reduction in the number of bends/fittings needed as the flexibility allows the piping to follow the best and easiest path
- Reduction of waste as pipe can be cut to measure
- No special considerations necessary to take up thermal expansion
- Reduction of excavation costs as pipes can be laid on top of each other and/or in very narrow trenches
- No-dig methods ( direct boring) can be applied

# URECON PRE-INSULATED PIPE

- Polyurethane-cyclopentane foam with a lambda-value of 0.029 W/m K (0,2 Btu·in/ft<sup>2</sup>·h·°F) measured at 50°C (122°F) is the most efficient insulation available.
- Fast installation (quick return on investment)

### 3) Insulation

Semi flexible polyurethane foam (PUR) made from polyol and isocyanate.

Core density	50 kg/m <sup>3</sup>	3.12 lb/ft <sup>3</sup>
Closed cells	> 88%	> 88%
Water absorption	10% (vol)	10% (vol)
Compressive strength, 10% deformation	0.15 N/mm <sup>2</sup>	22.72 lb/in <sup>2</sup>
Thermal conductivity at 50°C	< <b>0.025</b> W/m K	< 0.017 BTU/h·ft·°F

### 4) Diffusion Barrier (patented)

A gold coloured proprietary barrier foil is incorporated between the PUR foam and PE outer jacket to avoid the migration of cell gases through the jacket over the long term. This foil material is made up of a special polymer with PEL on both sides.

### 5) Jacket

Mechanical properties of LDPE (low density polyethylene)

	Metric	Imperial
Density	> 931 kg/m <sup>3</sup>	>58 lb/ft <sup>3</sup>
Elongation at rupture	> 600%	> 600%
Hardness, shore D	- 50	- 50
Thermal conductivity	0.13 Wm K	0.248 BTU/h·ft·°F

### 6) Velocity, temperature and pressure

To avoid noise and erosion of the couplings the sustained velocity in PexFlex is not to exceed 2 m/s (6.6 ft/sec).

PexFlex can be used for temperatures up to 95°C (203°F); and up to a pressure of 6 bar (87 lb/in<sup>2</sup>).

With an operating pressure of 6 bar (87 lb/in<sup>2</sup>) the expected service life of the pipes is minimum 30 years under the following operating conditions:

- continuous operating temperature of 85°C (185°F)
- continuous operating temperature of 80°C (176°F) with 90°C (194°F) one month per year and 95°C (203°F) for 100 hours per year.

At 70°C (158°F) the allowable continuous operating pressure is 8.5 bar (123 lb/in<sup>2</sup>).

A 16 bar (232 lb/in<sup>2</sup>) pressure test can be applied to the pipe with 20°C (68°F) water. When pressure testing the PEX pipe will expand thus gradually relieving the pressure.

### 7) PexFlex for district heating

Nominal pipe size inches	Carrier pipe O.D. mm (in)	Carrier pipe wall thickness mm (in)	Jacket pipe O.D. mm (in)	Minimum/Maximum coil length m (ft)	Weight kg/m(lb/ft)
¾	25 (0.98)	2.5 (0.098)	77 (3.0)	50/300 (164/800)	1.0 (0.7)
1	32 (1.26)	2.9 (0.114)	77 (3.0)	50/300 (164/800)	1.0 (0.7)
1 ¼	40 (1.26)	3.7 (0.145)	90 (3.5)	50/300 (164/800)	1.3 (0.9)
1 ½	50 (1.97)	4.6 (0.181)	110 (4.3)	50/200 (164/800)	1.9 (1.3)
2	63 (2.48)	5.8 (0.228)	125 (5.0)	50/200 (164/656)	2.4 (1.6)
2 ½	75 (2.95)	6.9 (0.272)	140 (5.5)	50/100 (164/328)	3.3 (2.2)
3	90 (3.54)	8.2 (0.323)	160 (6.3)	50/100 (164/328)	4.2 (2.8)
4	110 (4.33)	10.0 (0.393)	160 (6.3)	50/100 (164/328)	5.5 (3.7)

*Note: All sizes are metric, neither IPS nor CTS sizes; imperial adapters are supplied as required.*

### 8) PexFlex, Dual, for district heating

Nominal pipe size inches	Carrier pipe O.D. mm (in)	Carrier pipe wall thickness mm (in)	Jacket pipe O.D. mm (in)	Minimum/Maximum coil length m (ft)	Weight kg/m(lb/ft)
2 x ½	2 x 20 (2 x 0.79)	2.0 (0.079)	90 (3.5)	50/300 (164/800)	1.7 (1.1)
2 x ¾	2 x 25 (2 x 0.98)	2.5 (0.098)	110 (4.3)	50/200 (164/800)	2.1 (1.4)
2 x 1	2 x 32 (2 x 1.26)	2.9 (0.114)	110 (4.3)	50/200 (164/800)	2.2 (1.5)
2 x 1¼	2 x 40 (2 x 1.26)	3.7 (0.145)	125 (5.0)	50/200 (164/656)	2.7 (1.8)
2 x ½	2 x 50 (2 x 1.97)	4.6 (0.181)	160 (6.3)	50/100 (164/328)	4.1 (2.8)

*Note: All sizes are metric, neither IPS nor CTS sizes; imperial adapters are supplied as required.*

### 9) Bends

Wherever a change of direction is required PexFlex can be curved on site to reach a minimum radius depending on the dimension.

Jacket Pipe O.D. mm (in.)	Minimum radius of curvature m (ft.)
77 (3.0)	0.8 (2.6)
90 (3.5)	0.9 (3.0)
110 (4.3)	1.1 (3.5)
125 (4.9)	1.2 (4.0)
140 (5.5)	1.4 (4.5)
160 (6.3)	1.6 (5.2)



## 10) Insulated pipe joints

Insulated pipe joints shall consist of the appropriate pex-to-pex compression or press fitting, prefabricated rigid polyisocyanurate foam half shells supplied complete with wrap around adhesive lined heat-shrink sleeves, as supplied by Urecon. The heat shrink sleeves overlap the insulation jacket by a minimum of 75 mm (3 in.) on either side of the joint. For more demanding or critical applications, a Urecon Mec-Seal® joint kit should be considered.

### A) Compression Fittings

Mechanical Brass fittings are available.

- Pex metric to NPT adapters: 25mm – 110mm
- Pex to Pex Couplings: 20mm – 110 mm
- Straight and Reducing Tees: 25mm – 110mm
- 90° elbows: 25mm – 110mm

*Note: Compression fittings are not approved for direct burial.*

### B) PRESS Fittings

PRESSFIT brass fittings are available.

- PEX metric PRESS to NPT male adapters: 20mm – 110mm
- PEX to PEX PRESS Coupling: 20mm – 110mm
- PEX to STEEL (welding): 20mm – 110mm
- Straight and Reducing Tees: 25mm – 63mm

*Note: PRESS Tool and Hydraulic Pump required for assembly. PRESSFIT system is approved for direct burial.*

## 11) Insulation kits for fittings

Insulation kits for fittings shall consist of rigid polyisocyanurate foam insulation with a fully bonded polymer protective coating on all exterior and interior surfaces, including ends. Kits to be supplied complete with silicone caulking for seams, stainless steel attachment straps and clips, and heat-shrink sleeves or butyl mastic tape to seal between pipe and insulation kit.

### a) Rigid polyisocyanurate foam insulation

1. Density (ASTM D1622) 27 to 32 kg/m<sup>3</sup> (1.7 to 2.0 lbs/ft<sup>3</sup>).
2. Compressive strength (ASTM D1621) 131 to 158 kPa (19 to 23 lbs/in<sup>2</sup>).
3. Closed cell content 90%, minimum.
4. Water absorption: (ASTM C272) 4.0% by volume.
5. K factor: (ASTM C 518) 0,027 W/m<sup>0</sup>C, (0.19 Btu • in/ft<sup>2</sup> • hr • °F).
6. Thickness to match pipe insulation thickness.

### b) Polymer coating, Urecon BL-75-20EP

Two component high density polyurethane coating, black in color.

1. Density 1170 kg/m<sup>3</sup> (73 lbs/ft<sup>3</sup>).
2. Durometer D scale 60.
3. Tensile strength 11,100 kPa (1610 lbs/in<sup>2</sup>).
4. Tear strength 26,5 N/mm (151 lbs/in).
5. Thickness 1,9mm (75 mil) outside surfaces, 0,51 mm (20 mils) inside surfaces.