

1.

RAUPEX® O₂ BARRIER PIPE



RAUPEX O₂ Barrier Pipe is manufactured using REHAU's high-pressure peroxide method for cross-linked polyethylene (Engel method, PEXa). RAUPEX O₂ Barrier Pipe has a co-extruded oxygen diffusion barrier that exceeds the strict requirements of DIN 4726. All RAUPEX O₂ Barrier Pipe meets or exceeds the requirements of ASTM F 876, F 877, CSA B 137.5 and PPI TR-3, and is certified to NSF Standards 61. RAUPEX O₂ Barrier Pipe also meets the requirements of ASTM F 2023 for chlorine resistance and is produced in REHAU's ISO 9001 certified manufacturing facilities.

RAUPEX O₂ Barrier Pipe is rated for continuous operation of:

- 160 psi @ 73.4°F (1105 kPa @ 23°C)
- 100 psi @ 180°F (690 kPa @ 82.2°C)
- 80 psi @ 200°F (550 kPa @ 93.3°C)

RAUPEX O₂ Barrier Pipe is compatible with RAUPEX compression nut fittings and EVERLOC compression-sleeve fittings certified to ASTM F 2080 and CSA B 137.5.

3/8" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136008-500	3/8" RAUPEX O ₂ Barrier Pipe, 500 ft coil (152.4 m)	1 coil	10.5	23.1
136008-000	3/8" RAUPEX O ₂ Barrier Pipe, 1000 ft coil (304.8 m)	1 coil	21.0	46.2

Pipe inside diameter is 0.350 inches (9 mm). 3/8" pipe capacity is 0.0050 US gallons per foot (0.0624 l/m).

1/2" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136031-300	1/2" RAUPEX O ₂ Barrier Pipe, 300 ft coil (91.4 m)	1 coil	7.8	17.2
136031-500	1/2" RAUPEX O ₂ Barrier Pipe, 500 ft coil (152.4 m)	1 coil	13.1	28.9
136031-000	1/2" RAUPEX O ₂ Barrier Pipe, 1000 ft coil (304.8 m)	1 coil	26.3	57.9

Pipe inside diameter is 0.475 inches (12 mm). 1/2" pipe capacity is 0.0098 US gallons per foot (0.1222 l/m).

5/8" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136880-400	5/8" RAUPEX O ₂ Barrier Pipe, 400 ft coil (121.8 m)	1 coil	16.3	35.9
136880-000	5/8" RAUPEX O ₂ Barrier Pipe, 1000 ft coil (304.8 m)	1 coil	35.9	79.1

Pipe inside diameter is 0.575 inches (15 mm). 5/8" pipe capacity is 0.0134 US gallons per foot (0.1671 l/m).

3/4" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136051-100	3/4" RAUPEX O ₂ Barrier Pipe, 100 ft coil (30.5 m)	1 coil	4.9	10.9
136051-500	3/4" RAUPEX O ₂ Barrier Pipe, 500 ft coil (152.4 m)	1 coil	24.6	54.3
136051-000	3/4" RAUPEX O ₂ Barrier Pipe, 1000 ft coil (304.8 m)	1 coil	49.2	108.5

Pipe inside diameter is 0.675 inches (17 mm). 3/4" pipe capacity is 0.0189 US gallons per foot (0.2356 l/m).

1" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136011-100	1" RAUPEX O ₂ Barrier Pipe, 100 ft coil (30.5 m)	1 coil	7.9	17.5
136011-500	1" RAUPEX O ₂ Barrier Pipe, 500 ft coil (152.4 m)	1 coil	39.7	87.5

Pipe inside diameter is 0.870 inches (22 mm). 1" pipe capacity is 0.0316 US gallons per foot (0.3939 l/m).

1 1/4" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136283-100	1 1/4" RAUPEX O ₂ Barrier Pipe, 100 ft coil (30.5 m)	1 coil	11.4	25.0

Pipe inside diameter is 1.070 inches (27 mm). 1 1/4" pipe capacity is 0.0467 US gallons per foot (0.5827 l/m).

1 1/2" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136293-100	1 1/2" RAUPEX O ₂ Barrier Pipe, 100 ft coil (30.5 m)	1 coil	16.0	35.0

Pipe inside diameter is 1.263 inches (32 mm). 1 1/2" pipe capacity is 0.0650 US gallons per foot (0.8118 l/m).

2" RAUPEX O₂ Barrier Pipe

Article #	Description	Package Quantity	Unit Weight	
			kg	lb
136303-100	2" RAUPEX O ₂ Barrier Pipe, 100 ft coil (30.5 m)	1 coil	27.4	60.0

Pipe inside diameter is 1.653 inches (42 mm). 2" pipe capacity is 0.1114 US gallons per foot (1.3906 l/m).



RAUPEX O₂ Barrier Pipe 20 ft Straight Lengths

Article #	Description	Package Quantity Outer Bag	Unit Weight	
			kg	lb
136051-020	3/4" RAUPEX O ₂ Barrier Pipe, 20 ft long (6.1 m)	25 (500 ft)	0.98	2.2
136011-020	1" RAUPEX O ₂ Barrier Pipe, 20 ft long (6.1 m)	25 (500 ft)	1.6	3.5
136283-020	1 1/4" RAUPEX O ₂ Barrier Pipe, 20 ft long (6.1 m)	5 (100 ft)	2.3	5.0
136293-020	1 1/2" RAUPEX O ₂ Barrier Pipe, 20 ft long (6.1 m)	5 (100 ft)	3.2	7.0
136303-020	2" RAUPEX O ₂ Barrier Pipe, 20 ft long (6.1 m)	5 (100 ft)	5.5	12.0

Same dimensions and capacities as RAUPEX O₂ Barrier Pipe sold in coils.

2.1 RAUPEX heating tube

The tube used in hydronic heating systems must be easy and efficient to install, must disperse heat well and must be durable.

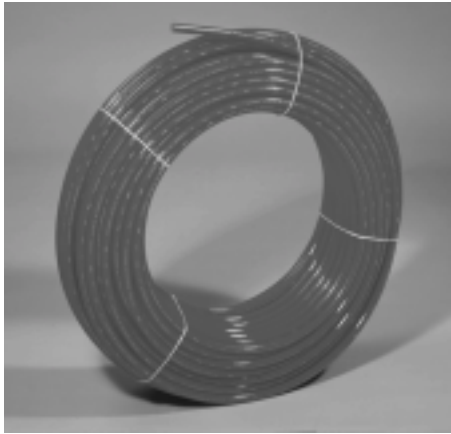


Fig. 2.2:
RAUPEX coil.

RAUPEX hydronic heating tube with and without EVAL oxygen diffusion barrier conforms to CSA B137.5 and to ASTM F876/F877 for up to 100 psi (6.9 bar) water service and to a maximum working temperature of 180°F (82°C). RAUPEX tubing is independently certified by the Plastic Pipe Institute (PPI), the Canadian Standards Association (CSA), and the International Congress of Building Officials (ICBO).

2.1.1 Tube material

RAUPEX tube is extruded in cross-linked, high-density polyethylene. The base material is a high-density polyethylene (HDPE) with a molecular weight considerably higher than that of normal HDPE types. This material is notable for its particularly high endurance limit, impact resistance and thermal stability.

These properties provide the ideal basis for optimum tube behavior when exposed to high temperatures and pressure. Processing under extreme pressure and simultaneously cross-linking with the aid of organic peroxides eliminate the otherwise normal steep fall in long-term stress rupture found in conventional polyethylenes. This is because during the cross-linking process the polymer chains are linked to form a three-dimensional structure. In addition to creating outstanding long-term stress rupture resistance, cross-linking also produces maximum environmental stress cracking resistance.

Resistance to aging is also a decisive factor in determining the service life of tubes made of RAUPEX. Aging is a material change caused by temperature and oxidization and may negatively influence the long-term tube behavior.

To counteract these influences, special heat-stabilizing agents are added during the manufacturing process to enhance the innately stable properties of RAUPEX tube. This increases resistance to aging.

2.1.2 Flammability

RAUPEX is a hydrocarbon and, therefore, burns in a similar way to wax. Cross-linking increases the temperature at which the material begins to liquefy to above the decomposition temperature of 752°F (400°C). In contrast, polymers that have not been cross-linked drip as soon as they are heated beyond 392°F (200°C).

2.1.3 UV resistance

Once removed from their original packaging, RAUPEX tubes must be protected from direct sunlight when exposure time will exceed 3 months. Permanently surface-mounted tubes must be sheathed to protect them from direct sunlight.

Properties	Standard	Unit	Value
Density	ASTM D 1505	g/cm ³	0.93
Thermal Conductivity	DIN 52612	W/mK	0.41
O ₂ Permeability with EVAL Barrier	DIN 4726	mg/l d	<0.025
Coefficient of Linear Thermal Expansion 68°F (20°C) 212°F (100°C)	DIN 42328	F ⁻¹	7.8 x 10 ⁻⁵ 1.1 x 10 ⁻⁴
		K ⁻¹	1.4 x 10 ⁻⁴ 2.0 x 10 ⁻⁴

Table 2.1:
Physical properties of RAUPEX tube.

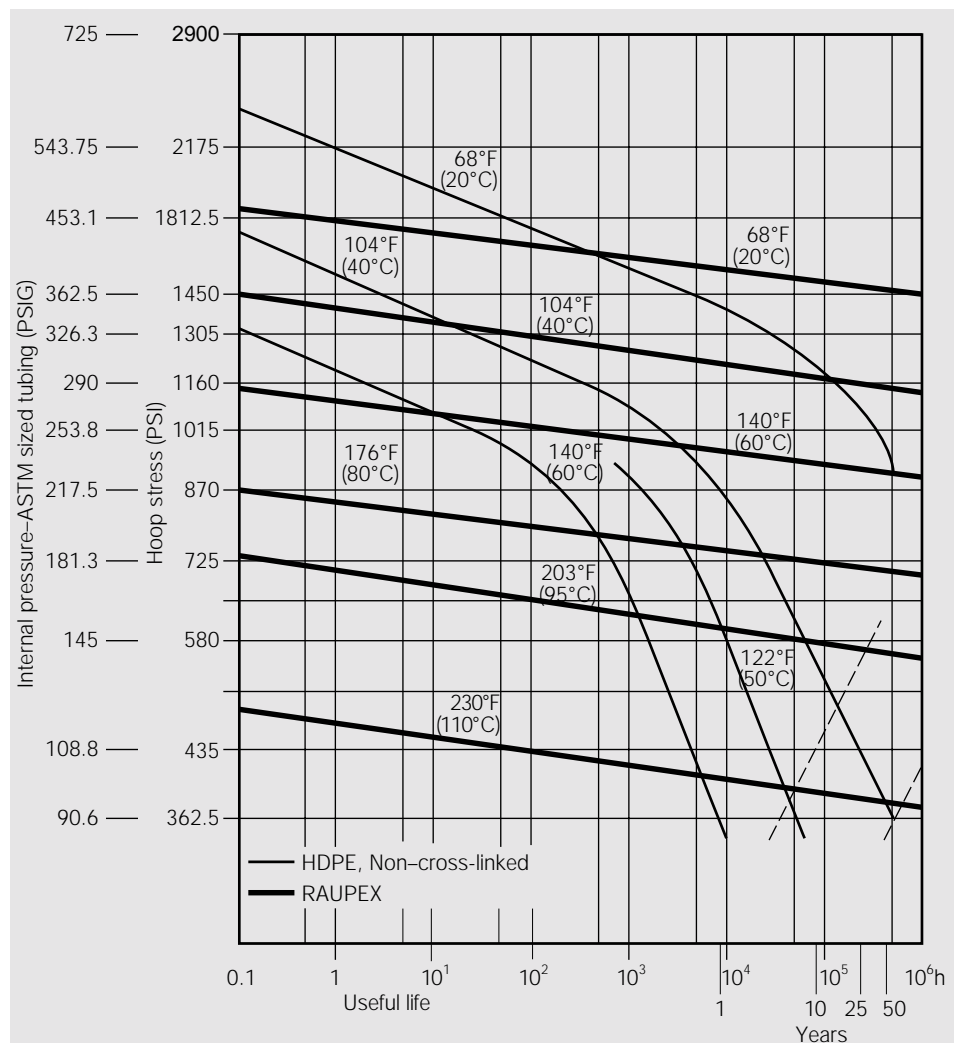


Fig. 2.3:
Useful life of RAUPEX tube.

2.1.4 Long term performance

Tests on internal pressure endurance over many years show that RAUPEX tube performs significantly better than tube made of other, similar polymers. RAUPEX has been subjected to more than 100,000 hours of continuous testing at 203°F (95°C) with no deviations in the endurance graphs.

On the basis of these tests the International Standardization Organization (ISO) permits extrapolation of the RAUPEX endurance characteristics for permanent operating temperatures of up to 158°F (70°C) and for a minimum service period of 50 years.

2.1.5 RAUPEX advantages

RAUPEX is distinguished by the following characteristic properties:

Gas and water vapor permeability

The uncontrolled diffusion of gas and vapor into closed hydronic systems has long been a cause of concern among engineers. RAUPEX tube features very low water and oxygen permeability and meets the DIN 4726 standard.

Our RAUPEX B tube with oxygen diffusion barrier eliminates the risk of corrosion damage that oxygen diffusion causes to ferrous components. It is protected against the admission of oxygen by its extruded EVAL barrier which surrounds the tube.

Thermal properties

The high density cross-linking molecular bridges allow it to maintain its elastic properties at temperatures above the crystalline melting point (approx. 266°F (130°C)). In its viscous-elastic range (-248°F to +248°F (-120°C to +120°C)), RAUPEX is softer and more malleable than non-cross-linked base material.

Mechanical properties

RAUPEX is tough and flexible, even under repeated bending. REHAU's method of cross-linking, which occurs at the molten state of tube processing, makes RAUPEX more elastic, and easier to bend than most other cross-linked polyethylene tubes.

Chemical resistance

RAUPEX resists conventional solvents, detergents, anti-freeze agents and corrosion inhibitors. Even at high temperatures, RAUPEX resists hydrous solutions of salts, acids and alkalies.

2.1.6 Tube dimensions

REHAU PEX tube is available in nominal sizes 17mm, 20mm, 25mm and 32mm (RAUTHERM); 1/2", 3/4" and 1" (RAUPEX). Table 2.2 provides dimensional data for REHAU heating tube.

2.1.7 Tube labeling

RAUPEX tube is marked with all information required by ASTM F876/F877 and CSA B137.5.

RAUPEX B - Tube is red and has the DIN 4726 EVAL oxygen diffusion barrier.

RAUPEX - Tube is white and is without oxygen diffusion barrier.

Length is marked at 1 meter or 3 foot intervals along coiled tube spools and straight sections as an aid to installers.

2.1.8 Quality assurance standards

REHAU PEX (cross-linked polyethylene) tube and fitting system are manufactured to meet ASTM F876 and F877 as tested by the NSF and CSA. RAUPEX tube production qualifies and has been independently certified to be in conformance to International Standard 9001.

RAUPEX (ASTM Tube) Sizes				RAUTHERM (Metric Tube) Sizes			
Nominal Diameter in	Wall in* (mm)	O.D. in* (mm)	I.D. in* (mm)	Nominal Diameter mm	Wall mm (in*)	O.D. mm (in*)	I.D. mm (in*)
1/2"	.07 (1.8)	.63 (16)	.49 (12)	17	2 (.079)	17 (.67)	13 (.51)
3/4"	.10 (2.5)	.88 (22)	.68 (17)	20	2 (.079)	20 (.79)	16 (.63)
1"	.13 (3.2)	1.13 (29)	.88 (22)	25	2.3 (0.091)	25 (.98)	20 (.80)
-	-	-	-	32	28 (.110)	32 (1.25)	26 (1.04)

* dimensions converted from metric

Table 2.2:
Tube dimensions.