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PRODUCT DATASHEET

PB Length

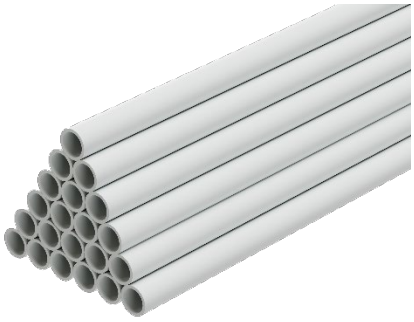
Description

The main use of PB-1 is in flexible pressure piping systems for hot and cold drinking water distribution, pre-insulated district heating networks and surface heating and cooling systems. ISO 15876 defines the performance requirements of PB-1 piping systems. The most striking features are weldability, temperature resistance, flexibility, and high hydrostatic pressure resistance. The material can be classified PB 125 with a minimum required strength (MRS) of 12.5 MPa. Other features include low noise transmission, low linear thermal expansion, no corrosion and calcification.

Polybutylene pipe is widely used for heating and plumbing applications in domestic, commercial and industrial properties. Its principal uses include hot and cold water services, central and underfloor heating installations. As property owners seek increasingly cost and energy efficient methods of controlling internal temperatures within buildings, it is also specified for combined underfloor heating and cooling systems and for embedded coil technologies where pipe systems are incorporated, during manufacture, in pre-cast/moulded wall or ceiling elements.

The pipes are produced according to the international standards EN ISO 15876, DIN 16968/16969 and BS 7291. Approved by the independent German Institute SKZ number "A292" for their mechanical properties, and from MPA according to DIN 4726 for the oxygen barrier pipes. They are also approved by WRAS and are suitable for use with hot water (up to 85°C) and cold water intended for human consumption. Designed and certified for use in hot and cold water distribution systems, for underfloor heating and radiators, according to European norms and German specifications.

Available Colours: WHITE & GREY



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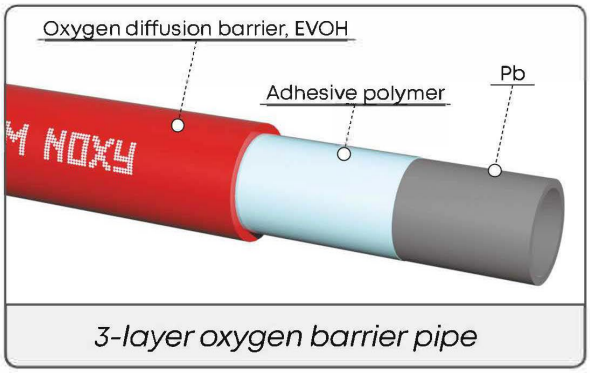
Physical Properties	UNITS	VALUE
Density at 20° C	g/cm^3	0.937
Melt Flow Index (190°C/5kg)	G/10min	2.3
VICAT softening point	°C	113
Coefficient of linear thermal expansion (20°C)	$°C^{-1}$	1.3×10^{-4}
Thermal Conductivity	W/ (m*K)	0.19

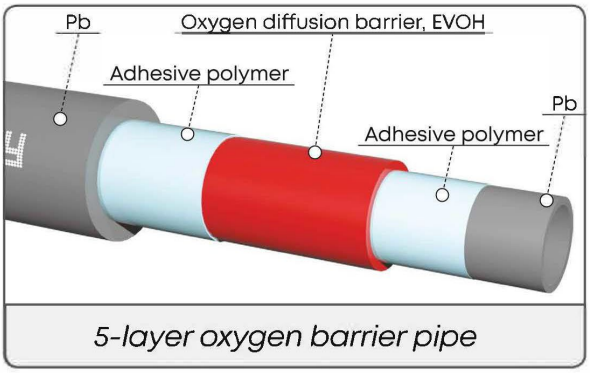
Mechanical Properties	UNITS	VALUE
Tensile strength	MPa	20
Elongation at break	%	300
Glass transition temperature	°c	-18
Tensile modulus of elasticity (20°C)	MPa	450

Specification – Properties:

- High flexibility
- Resists frost damage
- Superior resistance to stress over long period of time at high temperatures
- Low friction
- Lightweight, flexible and economical
- non-corrosive, resistant to chemicals
- High impact strength
- Non-toxic
- Certified by international institutes
- Longevity



3-layer oxygen barrier pipe



5-layer oxygen barrier pipe

Oxygen barrier PB pipes have a layer of polymer laminated to the outside surface (or sandwiched internally between PB layers) that prevents oxygen from penetrating. The polymer film is usually EVOH (ethyl vinyl alcohol copolymer), used in the food industry as an oxygen barrier.

Classification of Service conditions

Application class	Design temperature T_D °C	Time at T_D years	T_{max} °C	Time at T_{max} years	T_{mal} °C	Time at T_{mal} hr	Typical field of application
1	60	49	80	1	95	100	Hot water supply (60°C)
2	70	49	80	1	95	100	Hot water supply (70°C)
4	20 + 40 + 60	2.5 + 20 + 25	70	2.5	100	100	Underfloor heating and low temperature radiators
5	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature radiators

where: T_D - design temperature

T_{max} - maximum temperature
T_{mal} - malfunction temperature

Note 1: For any of the above application class the times should be aggregated.
Note 2: All systems which satisfy the conditions specified in the above table shall also be suitable for the conveyance of cold water for a period of 50 years at a temperature of 20°c and a design pressure of 10 bar.

P_D bar	Application class			
	Class 1	Class 2	Class 4	Class 5
	Scalc,max -values[a]			
4	10,9	10,9	10,9	10,9
6	9,5	8,4	9,1	7,2
8	7,1	6,3	6,8	5,4
10	5,7	5,0	5,4	4,3

Note: Scalc ≤ Scalc,max

Example of classification:

Pipe 16x2:

Calculation Scale= (D-s)/2 * s = (16-2)/2 * 2 = 3,5

Based on this value, the pipe is suitable for use in Class 2 under constant pressure l0bar for a period of 49 years in 70°C, followed by one year in so0c, 100 hours at 95°C (malfunction).
Respectively in Class l under 10 bar pressure, in Class 4 under 10 bar pressure, in Class 5 under 10 bar pressure.

Calculation of line of thermal expansion

The calculation of the change in length of the tube as a function of the temperature change is made using the following equation:

$$dL = a \times L \times dT$$

where:

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dL = Linear change of the pipe in mm
α= linear coefficient of thermal expansion, for PB= l,3X10-4 mm/ mm °C-l L = pipe length in mm
dT = difference between initial and final temperature in °C

Pb chemical resistance chart			
Chemical	22°C		66°C
Acetaldehyde	L		U
Acetone	E		G
Acetic acid 80%, CH_3COOH	E		E
Ammonia, dry gas	E		E
Ammonia, liquid	G		L
Aniline, $C_6H_5NH_2$	L		L
Arsenic acid, 60%	E		E
Asphalt	E		G
Beer	E		E
Benzoic acid, C_5H_6COOH	E		E
Benzene, C_6H_6	U		U
Bleach – 12,5% active Cl	G		G
Butane	U		U
Bromic acid	E		E
Caustic Potash	G		L
Caustic Soda	G		L
Citric acid	E		E
Ethers	U		U
Ethyl Alchohol, 50-98%	E		E
Food products such as milk, salad oils, buttermilk, fruits	E		E
Formaldehyde	E		E
Freon -12	E		G
Fuel oil	U		U
Gasoline	U		U
Gas – Natural (dry)	E		L
Glucose	E		E
Glycol	E		E
Hydrogen	E		E
Kerosene	L		U
Methyl Alcohol, CH_3OH	E		E
Methyl Ethyl Ketone (MEK)	E		L
Mineral oil	L		U
Nitric acid 20%, HNO_3	U		U
Phenol	E		L
Propane	E		-
Sulfur	E		E
Sulfuric acid 30-50%, H_2SO_4	E		E
Sulfuric acid 50-75%, H_2SO_4	L		U
Toluene, $CH_3C_6H_5$	U		U
Vinegar	E		E
Whiskey	E		E
Wines	E		E

where:
E ➤ Excellent
G ➤ Good
L ➤ Limited
U ➤ Unsuitable

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