

A person in a white lab coat is working in a laboratory or industrial setting. They are standing next to a large piece of equipment, possibly a washing machine or a large container, and are handling a large, dark, textured object. The background shows a clean, white environment with a door and a large pipe. The overall scene is brightly lit and has a blue tint.

Uponor

UPONOR PEX
PRODUCTION
INDUSTRIAL
TECHNICAL
INFORMATION

Uponor Industrial Applications Technical information



Uponor Industrial Applications - made to measure

Uponor Industrial Applications stand for Wirsbo-inPEX pipes, pipe systems, pipe components, band, moulded articles, etc. for industrial applications. Items that are tailor made to customer specifications and are produced in addition to our production of standard pipes. These are manufactured at a reasonable cost, thanks to the favourable characteristics of the material.

The basic pipe in Uponor Industrial Application consists of HD-polyethylene that has extra high molecular weight. With the aid of peroxide, high pressure and high temperature, chemical bonding is achieved between the long molecular chains in the polyethylene, resulting in "netting" or cross-linking. A three-dimensional network is built up in this way. The result is a material with improved characteristics. The Engel process, improved by Uponor (former Wirsbo), is the basis for cross-linking of the molecular chains. The material is the same as that used in Wirsbo-PEX pipes. It is approved in most countries for the distribution of hot water at temperatures up to a maximum of 95°C. Wirsbo-PEX is also at the heart of underfloor heating systems throughout the world.







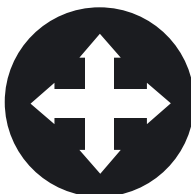
Long-term stability

Few materials have undergone such extensive long-term testing as one in the Wirsbo-inPEX pipes. Ten years continuous pressure testing at 95°C and an uninterrupted long-term test since 1972 are just two examples. The material has been well tried and tested in many different applications over a long period of time.



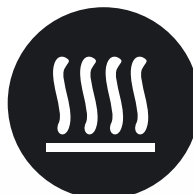
Thermal memory

When the pipes is heated to its softening temperature, the material reverts to its original shape. This characteristic is used to give a very reliable method for shrink-mounting sealing devices, for example.



Flexible

The flexibility of Wirsbo-inPEX pipe is yet another advantage compared with metal pipes. There is no need for expensive expansion bellows or their equivalents. expansion bellows or their equivalents.



Withstands high temperature

The pipes can be used at a working temperature of 95°C, but withstand 120°C within time and pressure limits.



Sound-absorbing

The pipes absorbs sound, which means you can transport solid materials, e.g. wood-chips, without the risk of loud noise levels.



Low weight

Wirsbo-inPEX pipes weighs just a fraction of an equivalent metal pipe. This is often an advantage, and sometimes a crucial one.



Clean

The pipe does not release any harmful substances. That's why it's also approved for transporting drinking water. The material's exceptional cleanness is also utilized in medical equipment.



Withstands corrosive chemicals

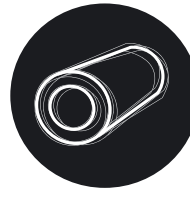
Chemicals that can cause cracks in ordinary plastic pipes do not affect Wirsbo-inPEX pipes. The material is resistant to the majority of chemicals, even at high temperatures.





Low friction

The extremely low friction coefficient in Wirsbo-inPEX pipes reduces the pressure-drop in the pipework and minimizes the risk of deposits.



Vibration-absorbing

The pipes absorbs and withstands vibrations. There's no need to combine metal pipes with vibration-absorbing hoses or connectors, giving you higher reliability and lower costs, particularly during installation.



Electrically insulating

The electrical insulating characteristics of the pipe are on a par with the best insulating materials. The material is nonpolar and also totally free from impurities.



Withstands extreme cold

The pipe material has unchanged impact strength even at temperatures below -100°C . This characteristic is exploited in refrigeration systems for ice rinks, for example.



Scratch-resistant

The pipe withstands scratches without being weakened because it is resistant to crack growth. This characteristic makes it possible, for example, to locate pipes directly in stony ground without expensive groundworks.



Ductile

The great freedom to shape Wirsbo-inPEX pipes makes them an excellent replacement for e.g. shaped metal pipes.



Resistance to abrasion

The abrasion characteristics are very good; erosion corrosion does not occur even at high water speeds. That's why our pipes are used to transport highly abrasive sand slurry, for example.



Low environmental load

Wirsbo-inPEX is a material with low environmental impact during both manufacturing and energy recovery.



Plasticity

Custom-made manufacturing may bring to mind expensive tooling and long periods of development. However, we dare claim that PEX material combined with our extensive experience of many applications gives just the opposite. We will gladly exchange your sketch for a prototype. This will save you both time and money by enabling you to make tests on-site with a real pipe. In our development laboratory we can also test the product according to the harsh reality it is going to be exposed to; bursting pressure, pressure drop, temperature cycling, climate, abrasion, etc.

Uponor Industrial Application is very suitable in applications with strict requirements for cleanliness. The products are also used where a media pipe is required to provide durability to pressure, temperature and chemicals, and/or where an electrically insulating material is needed.

Furthermore, insensitivity to vibration and lower weight than equivalent parts made of metal are other features that have become more and more important. Recently we have been developing new cost-reducing solutions by integrating several functions into one part (eg. it is possible to eliminate separate hose clips).

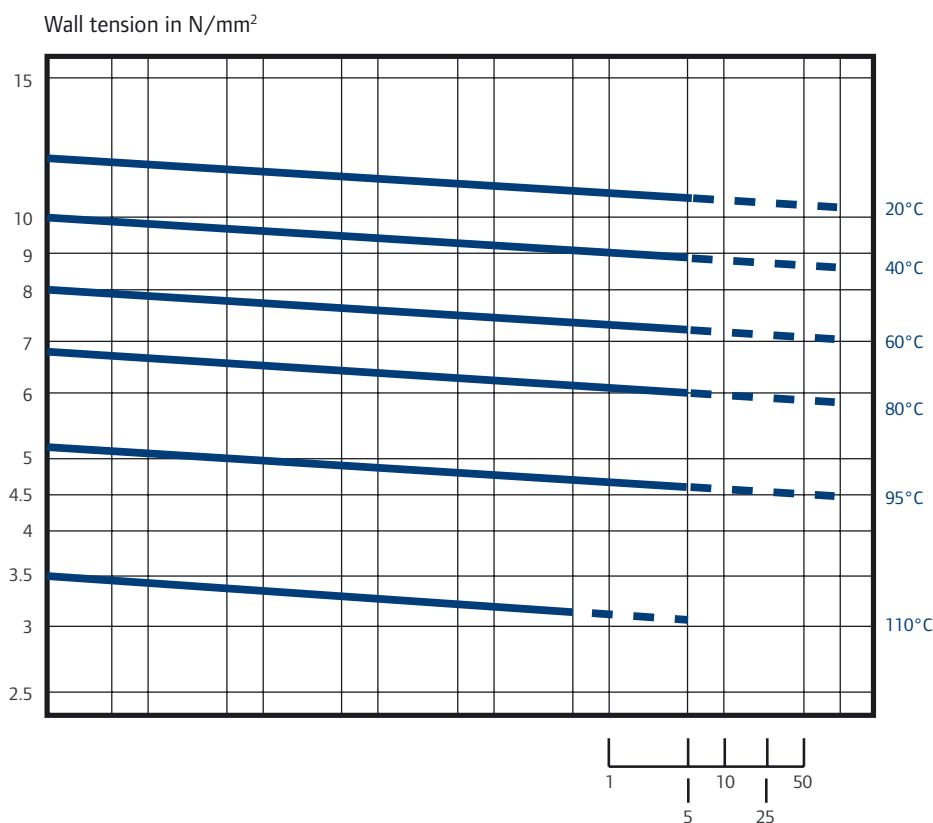
Custom-made products are a question of cooperation and the sharing of know-how. Get in touch with us at an early stage, we will be happy to listen. If Wirsbo-PEX is the right material, we will surely have the right solution.

Long-term strength of PEX

Bodycote Polymer AB, Sweden, where the pipe has been subjected to a life-length test equivalent to 50 years, has performed the most extensive testing. Uponor Wirsbo has tests ongoing since 1974. Wirsbo-PEX has excellent long-term strength. In contrast to non-cross linked thermoplastic material such as PP (polypropylene) and PB (polybutylene) the strength graphs for PEX demonstrate a linear relationship at increased temperatures.

When testing plastic pipes for long-term strength the following factors must be included: media, pressure, temperature, environment, fittings, pressure cycling, temperature cycling, effect of bends and scratches. In addition to in-house testing and testing by the suppliers of material, the following official institutes have carried out extensive tests:

- Bodycote Polymer AB, Sweden**
 - Long-term strength, effect of bends and scratches
- Materialprüfungsanstalt Darmstadt (MPADA), Germany**
 - Temperature cycling and fittings testing
- Plastic Pipe Institute, US**
 - Material testing
- Engineering and Water Supply Department Adelaide, Australia**
 - Temperature and pressure cycling
- Centre Scientifique et Technique du Bâtiment (CSTB), France**
 - Pipes and fittings testing
- Statens provningsanstalt (SP), Sweden**
 - Temperature cycling of flange fitting



Technical information

Some key characteristics of Wirsbo-PEX are included in the following tables. Observe, however, that many mechanical characteristics are dependent on how the tests are performed.

Wirsbo-PEX pipes are divided into classes indicating the highest recommended working pressure in bar at 90°C. Double the pressure can be permitted at room temperature (22°C).

The pipes can be made in most diameters and wall thickness. The most common diameters are noted below:

Outer diameter mm	Wall thickness mm			
	Class 15	Class 12	Class 10	Class 6
6		1.0		
8	1.5		1.0	
10	1.8	1.5		1.0
12	2.2	2.0	1.5	1.0*
15		2.5	2.0	
16			2.2	2.0
17				2.0
18			2.5	2.0
20			2.8	2.0
22			3.0	2.0
25			3.5	2.3
28			4.0	
32			4.5	3.0
40			5.5	3.7
50			6.9	4.6
63			8.7	5.8
75			10.3	6.9
90			12.3	8.2
110			15.1	10.0

* class 5

Mechanical characteristics	Value	Unit	Test Standard
Density	938	kg/m ³	
Yield stress			
(23°C)	18.1	N/mm ²	ISO 527
(95°C)	6.7	N/mm ²	
Tensile modulus			
(23°C)	425	N/mm ²	ISO 527
(95°C)	89	N/mm ²	
Strain at break			
(23°C)	400	%	ISO 527
Impact strength			
(23°C)	118	kJ/m ²	ISO 179
(-20°C)	149	kJ/m ²	
Moisture absorption			
(22°C)	0,01	mg/4d	DIN 53472
Coefficient of friction against steel	0,08-0,1	-	
Surface energy	34x10 ⁻³	N/m	
Oxygen permeability			
(20°C)	0,8x10 ⁻⁹	g m/m ² s bar	ASTM
(55°C)	3,0x10 ⁻⁹	g m/m ² s bar	D1434

Thermal characteristics	Value	Unit
Temperature range	-100 till +110	°C
Linear coefficient of expansion		
(20°C)	1.4x10 ⁻⁴	m/m°C
(100°C)	2.05x10 ⁻⁴	m/m°C
Softening temperature	+133	°C
Specific heat	2.3	kJ/kg°C
Coefficient of thermal conductivity	0.35	W/m°C

Electrical characteristics	Value	Unit
Spec. internal resistance (20°C)	10 ¹⁵	Ω x m
Dielectric constant (20°C)	2.3	
Dielectric loss factor (20°C/50Hz)	1x10 ⁻³	
Disruptive voltage (20°C)	30	kV at 1 mm

Uponor AB, Sweden reserves the right to change specifications in keeping with our policy of continuous improvement and development without prior notice.

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