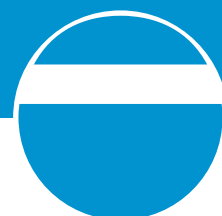


TECHNICAL DATA SHEET

VALSIR® SUPPLY SYSTEMS

MIXAL

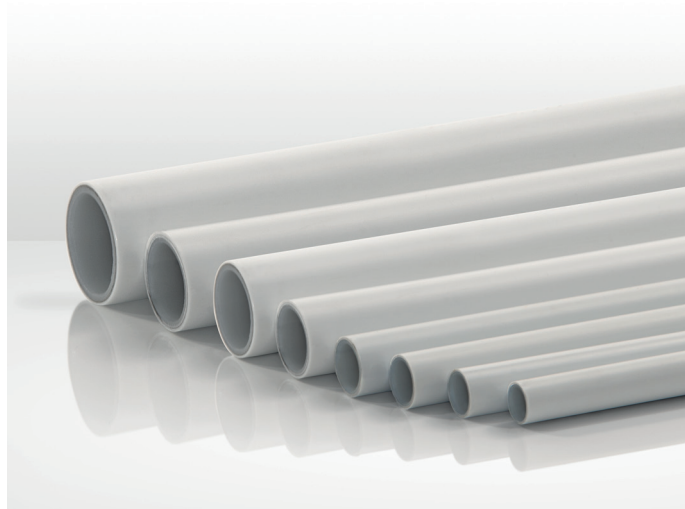


valsir®
QUALITY FOR PLUMBING

The product

Mixal® is an extremely flexible multilayer pipe and is therefore ideal for the creation of floor, wall and ceiling radiant heating and cooling systems. Thanks to its excellent performances it can also be used for hot and cold potable water supply, for convector and radiator heating systems, in industrial plants as well as for compressed air distribution systems.

Mixal® combines the advantages of synthetic materials (crosslinked polyethylene and high density polyethylene) such as resistance to abrasion and corrosion, chemical resistance and hygiene with those of the aluminium such as resistance to high temperatures and pressures, dimensional stability, impermeability to oxygen and light, and low thermal expansion.



The result is a product consisting of different layers of materials that combined together allow excellent properties to be obtained which can not be reached by a pipe made of only one material.

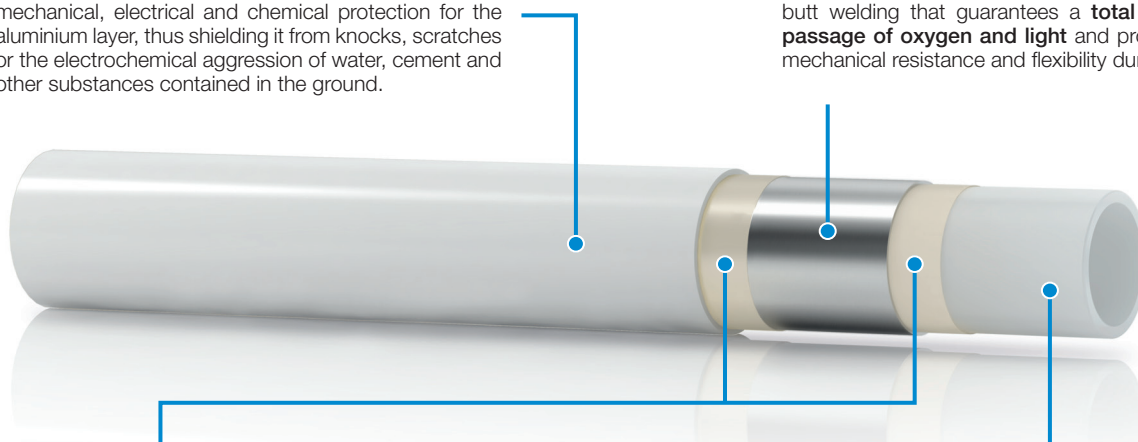
Figure Layering of the pipe.

External layer

Produced with high density polyethylene, it provides a mechanical, electrical and chemical protection for the aluminium layer, thus shielding it from knocks, scratches or the electrochemical aggression of water, cement and other substances contained in the ground.

Intermediate layer

This is made up of an aluminium alloy with longitudinal butt welding that guarantees a **total barrier to the passage of oxygen and light** and provides excellent mechanical resistance and flexibility during installation.



Bonding layers

These are made up of a powerful adhesive that bonds the intermediate aluminium layer with the internal and external layers.

Internal layer

The internal layer of the pipe is made up of a crosslinked polyethylene PE-Xb pipe that has been approved for the transport of consumable liquids and drinking water. It is also characterised by an **extremely smooth surface** that reduces pressure loss.

Features

The characteristics of Mixal® pipes are such as to make this a highly reliable product and extremely easy to install.

Durability and mechanical strength

The system has a durability of at least 50 years guaranteed by the product standards at pressures of 10 bar and temperatures up to 95°C. For operating temperatures lower than 95°C, the pipes can withstand pressures above 10 bar while maintaining a high degree of reliability over time. The mechanical characteristics of the Mixal® pipes are such that the bursting pressure at room temperature (in relation to the pipe diameter) is more than 100 bar!

Resistance to corrosion

The total resistance to corrosion, to building materials and to the main chemical compounds allows them to be used for various applications even industrial ones.

Smoothness and resistance to scales

The extreme smoothness of the inner surface (roughness of 0.007 mm) prevents the formation of deposits such as limescale and also ensures low pressure drops over time.

Resistance to abrasion

Crosslinked polyethylene is abrasion resistant, and this is a synonym of durability, since the pipes are not affected by the abrasive action of impurities that are carried by the water at high speed.

Flexibility and shape stability

The combination of crosslinked polyethylene, aluminium and high density polyethylene guarantees excellent flexibility during the bending phase (manual bending also). The Mixal® pipe can be bent manually or mechanically with bending radii of up to 2.5 times its diameter.

Once bent and installed, the Mixal® pipe maintains the configuration over time allowing to reduce the number of anchoring clips needed, which in surface mounting is reduced by 40% of the clips required for plastic pipes such as PE-X, PE-RT, PP-R, PB, PVC-C etc.

Thanks to these features, the Mixal® pipe is also the ideal solution in areas subject to earthquakes.

Thermal expansion

Thermal expansion is about 8 times lower than that of plastic pipes and is comparable to that of metal pipes. A 10 m long Mixal® pipe subjected to a 50°C temperature difference will expand by 13 mm in contrast to a plastic pipe (crosslinked polyethylene) that expands by 90 mm.

Lightweight

The pipes are extremely lightweight compared to metal pipes: the weight is 1/3 compared to that of a corresponding copper pipe and 1/10 compared to that of a corresponding steel pipe.

Acoustic insulation

Crosslinked polyethylene is elastic and absorbs vibrations and therefore offers excellent acoustic insulation.

Oxygen and light barrier

The butt-welded aluminium layer represents a permanent oxygen and light barrier, avoiding in this way the two main causes of algae formation and corrosion in plastic pipes.

Thermal conductivity

The thermal conductivity of the pipe is 0.42 - 0.52 W/m·K (in relation to the diameter), approximately 900 times lower than that of copper, an aspect which is extremely important to ensure reduced temperature losses.

Hygiene

Non-toxic materials are used for the pipes and fittings and the system is certified for drinkable water distribution.

Ecology

Mixal® is manufactured with fully recyclable materials, the production processes are energy efficient in order to have a low impact on the environment. Valsir adopts Green Building principles, with an eye on environmental protection and the conservation of resources.

Technical data

Table Typical technical data.

Features	Values	Testing methods
Material	Crosslinked polyethylene PE-Xb internal layer, internal bonding layer, intermediate aluminium layer, external bonding layer, high density polyethylene HDPE external layer.	-
Colour	RAL white 9003	-
Dimensions	14÷32 mm	-
Application	Hot and cold potable water distribution, convector and radiator heating systems, radiant heating and air cooling systems, compressed air distribution systems, industrial installations.	-
Fittings	Pexal® Brass, Bravopress® and Pexal® Twist	-
Minimum operating temperature ⁽¹⁾	-60°C	-
Maximum temperature ⁽²⁾	+95°C/+100°C	EN ISO 21003-1
Maximum pressure	+10 bar	EN ISO 21003-1
Density at 23°C	> 0.950 g/cm ³ (crosslinked polyethylene)	-
Softening temperature	135°C	-
Thermal expansion coefficient	0.026 mm/m·K	-
Thermal conductivity	0.42÷0.52 W/m·K	-
Internal roughness	0.007 mm	-
Oxygen permeability	0 mg/l	-
UV Resistance	Yes, if protected with UV-resistant paint	-
Halogen levels	Halogen-free	-
Fire resistance class	B-s2,d0	EN 13501-1

(1) At any rate above the freezing temperature of the transported fluid.

(2) For more details see the "Application fields" section.

Application fields

The conditions of use of Mixal® pipes are shown in the technical data tables outlined above, however, according to the international standard EN ISO 21003-1 there are four classes of application that need to be laboratory tested in combination with the operating pressure p_D chosen by the producer, which can be 4, 6, 8, 10 bar. These application classes are given in the table below. **The Mixal® pipes are certified for all four classes of application for pressures up to 10 bar.**

Table Application fields and operating conditions in compliance with EN ISO 21003-1.

Application class	Operating temperature T_D	Duration of T_D	Maximum operating temperature T_{max}	Duration of T_{max}	Malfunctioning temperature T_{mal}	Duration of T_{mal}	Typical application
	[°C]	[years]	[°C]	[years]	[°C]	[hours]	
1 ^a	60	49	80	1	95	100	Domestic hot water (60°C)
2 ^a	70	49	80	1	95	100	Domestic hot water (70°C)
4 ^a	20 + 40 + 60	2,5 + 20 + 25	70	2,5	100	100	Floor heating and low temperature systems
5 ^a	20 + 60 + 80	14 + 25 + 10	90	1	100	100	High temperature heating systems

Range

The Mixal® pipes are available in coils or straight lengths from a 14 mm diameter to a 32 mm diameter, with a 6 , 10 and 13 mm insulating sheath or with a corrugated protective sheath.

Pipe dimensions	Mixal® pipe in coils	Mixal® pipe in straight lengths	Mixal® pipe with 6 mm insulating sheath	Mixal® pipe with 10 mm insulating sheath	Mixal® pipe with 13 mm insulating sheath	Mixal® pipe with corrugated protective sheath
14x2	100 m	5 m	50 m (grey)	-	-	50 m (red, blue)
16x2	100, 120, 200, 240, 500 m	5 m	50 m (grey, red, blue)	50 m (blue)	50 m (grey)	50 m (red, blue)
18x2	100 m	5 m	50 m (grey)	-	-	50 m (red, blue)
20x2	100, 120, 240, 400 m	5 m	50 m (grey, red, blue)	50 m (blue)	50 m (grey)	50 m (red, blue)
20x2.25	100 m	5 m	50 m (grey)	-	-	-
25x2.5	50 m	5 m	50 m (grey)	-	-	-
26x3	50 m	5 m	50 m (grey, red, blue)	50 m (blue)	50 m (grey)	-
32x3	50 m	5 m	-	25 m (grey)	25 m (grey)	-

Mixal® pipe features

Mixal® pipes without insulation are suitable for a multitude of applications and if necessary can be suitably insulated once installation has been completed.



Table Mixal® pipe features.

External diameter	[mm]	14	16	18	20	20	25	26	32
Thickness	[mm]	2	2	2	2	2.25	2.5	3	3
Internal diameter	[mm]	10	12	14	16	15.5	20.5	20	26
Water volume	[l/m]	0.078	0.113	0.154	0.201	0.188	0.329	0.314	0.53
Weight	[g/m]	90	105	120	141	147	223	256	332
Weight with water	[g/m]	168	218	274	342	335	551	569	861
Operating temperature	[°C]	0÷80	0÷80	0÷80	0÷80	0÷80	0÷80	0÷80	0÷80
Maximum operating temperature	[°C]	95	95	95	95	95	95	95	95
Maximum operating pressure	[bar]	10	10	10	10	10	10	10	10
Thermal expansion coefficient	[mm/m·K]	0.026	0.026	0.026	0.026	0.026	0.026	0.026	0.026
Thermal conductivity	[W/m·K]	0.42	0.42	0.42	0.43	0.42	0.44	0.43	0.44
Internal roughness	[mm]	0.007	0.007	0.007	0.007	0.007	0.007	0.007	0.007
Oxygen permeability	[mg/l]	0	0	0	0	0	0	0	0

Multilayer Mixal® insulated pipe features

Mixal® pipes that are covered in the factory with thermal insulating sleeves are suitable in all applications that require a certain degree of insulation against condensation and against energy loss combined with an extremely practical and economic installation.

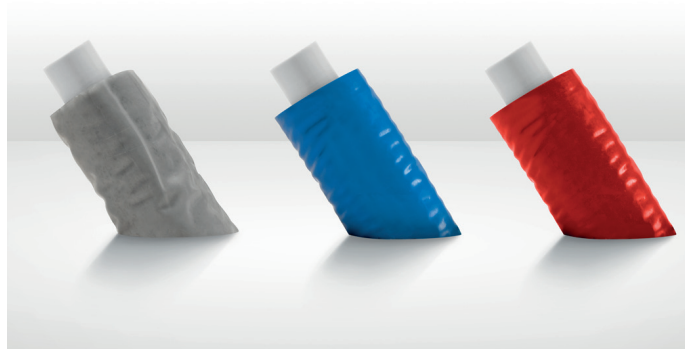


Table Multilayer Mixal® insulated pipe features.

Pipe	Insulating layer thickness	External diameter of the insulated pipe	Weight	Thermal conductivity of the insulated pipe
	[mm]	[mm]	[g/m]	[W/m·K]
14x2	6	26	97	0,059
16x2	6	28	113	0,058
16x2	10	36	125	0,052
16x2	13	42	134	0,050
18x2	6	30	129	0,057
20x2	6	32	150	0,056
20x2	10	40	163	0,051
20x2	13	46	174	0,049
20x2,25	6	32	161	0,058
25x2,5	6	37	233	0,059
26x3	6	38	266	0,063
26x3	10	46	282	0,056
26x3	13	52	295	0,053
32x3	10	52	370	0,055
32x3	13	58	385	0,052

The features of the material used for the production of the insulating sheath are indicated in the table.

Table Features of the material used for the production of the insulating sheath.

Features	Unit	Value
Material	-	High density closed cell polyethylene
Flame-retardant	-	B _L -s1,d0
Density	[kg/m ³]	33
Thermal conductivity	[W/m·K]	0.0397
Traction resistance	[N/mm ²]	>0.18
Ultimate elongation	[%]	>80
Steam permeability	[mg/Pa·s·m]	<0.15

Features of the multilayer Mixal® pipe with corrugated protective sheath

Mixal® pipes that are covered in the factory with a protective corrugated insulating sleeve are generally used in domestic water supply systems that require protection or the possibility of removing or replacing the pipes.

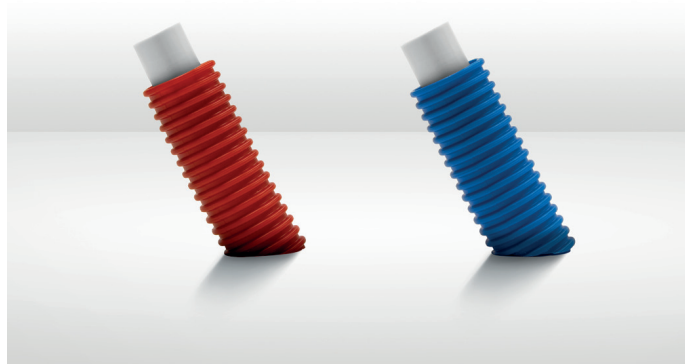


Table Features of the multilayer Mixal® pipe with corrugated protective sheath.

Pipe	Sheath thickness	External diameter sheathed pipe	Weight	Crushing
	[mm]	[mm]	[g/m]	[N/m]
14x2	0.75	24.5	139	320
16x2	0.85	26.5	164	320
18x2	0.95	28.5	189	320
20x2	1.05	30.5	219	320

The features of the material used for the production of the corrugated protective sheath are indicated in the table.

Table Features of the corrugated protective sheath.

Features	Unit	Value
Material	-	High density polyethylene
Flame retardant	-	No
Density	[kg/m ³]	961
Thermal conductivity	[W/m·K]	0.38
Traction resistance	[N/mm ²]	> 22
Ultimate elongation	[%]	> 350
Steam permeability	-	> 100,000

Connection systems

The Mixel® pipes can be combined with the different types of Valsir fittings.

Mixel® pipe	Pexal® Brass Brass press fittings	Bravopress® Multi-press PPSU fittings	Pexal Easy® Full bore PPSU fittings	Pexal® Twist Brass compression fittings
14x2	•			•
16x2	•	•		•
18x2	•			•
20x2	•	•		•
20x2.25	•	•		
25x2.5	•	•		
26x3	•	•		•
32x3	•	•		•

Approvals:

The approvals of Valsir® supply systems are available on the website: www.valsir.com

Potability

The Mixel® system is suitable and has been certified by international institutes for applications in water supply distribution systems: Belarus, France, Hungary, Italy, Poland, Romania, Serbia, Russia, and Ukraine.

Marking

The marking of the Mixel® pipes contains all the information required by current regulations as well as all the data necessary to trace the product.

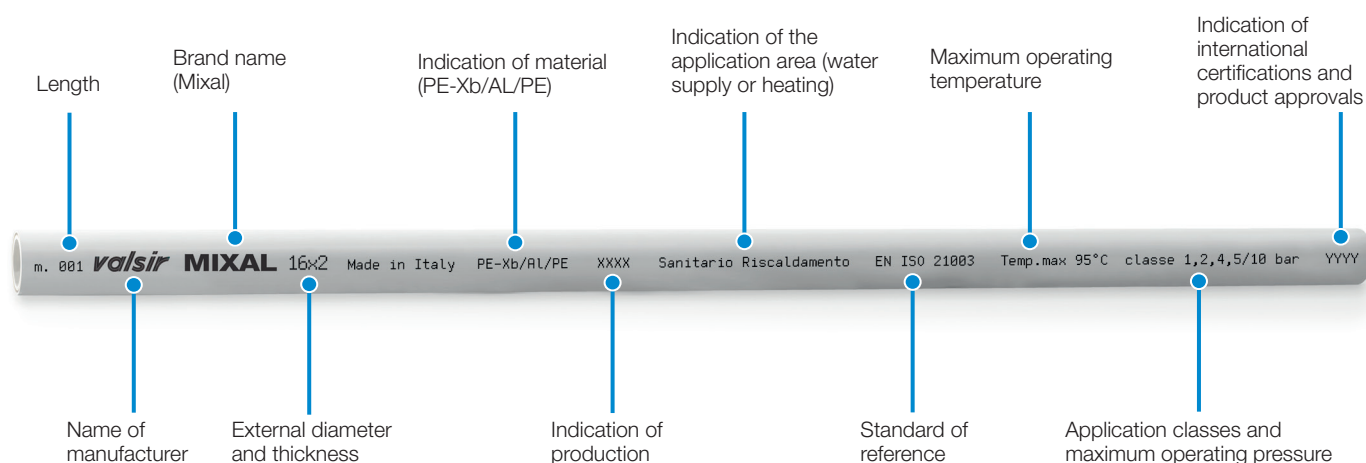


Figure Continuous pressure losses for conveyance of water at 10°C.

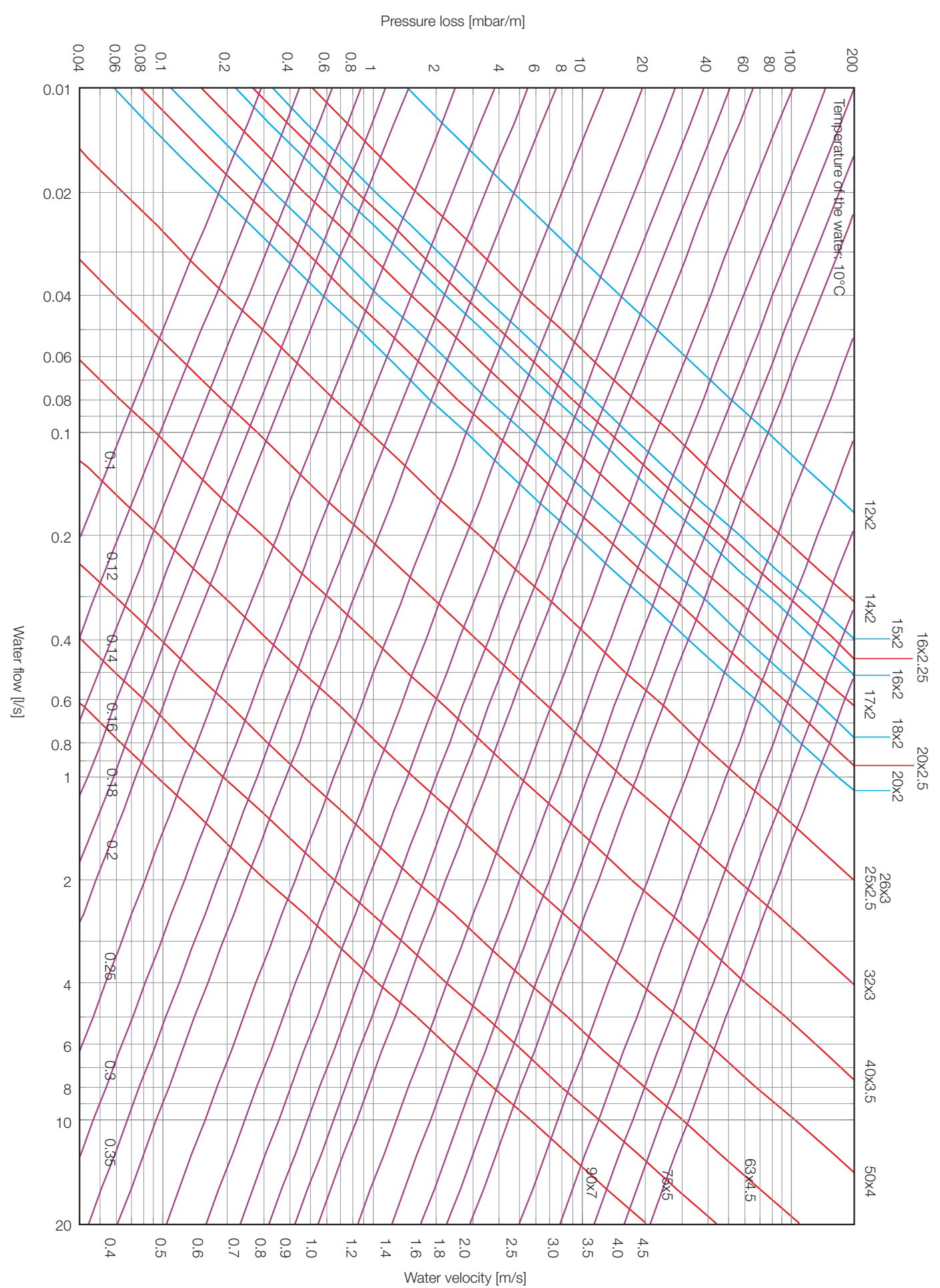


Figure Continuous pressure losses for conveyance of water at 60°C.

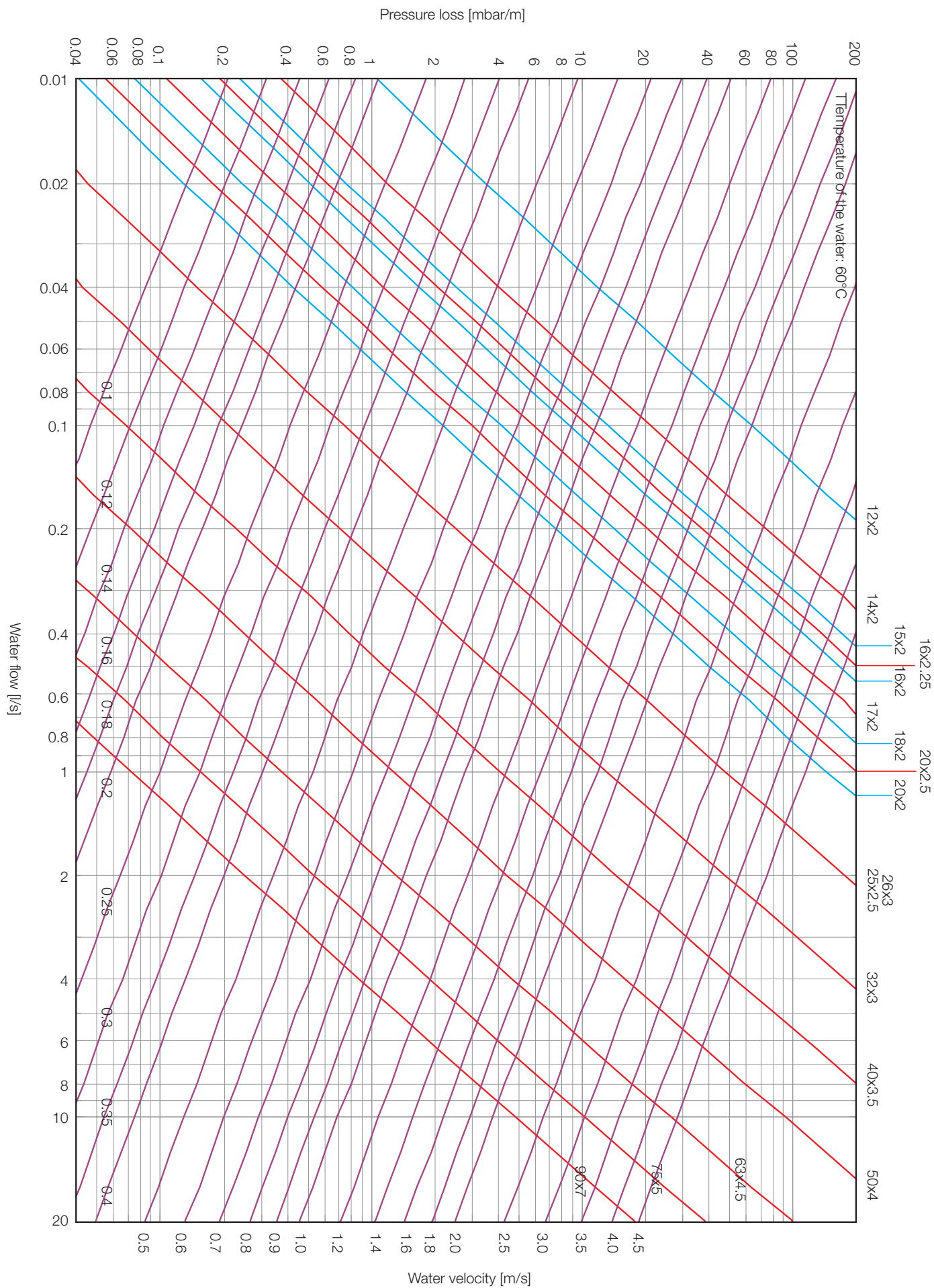


Figure Continuous pressure losses for conveyance of water at 80°C.

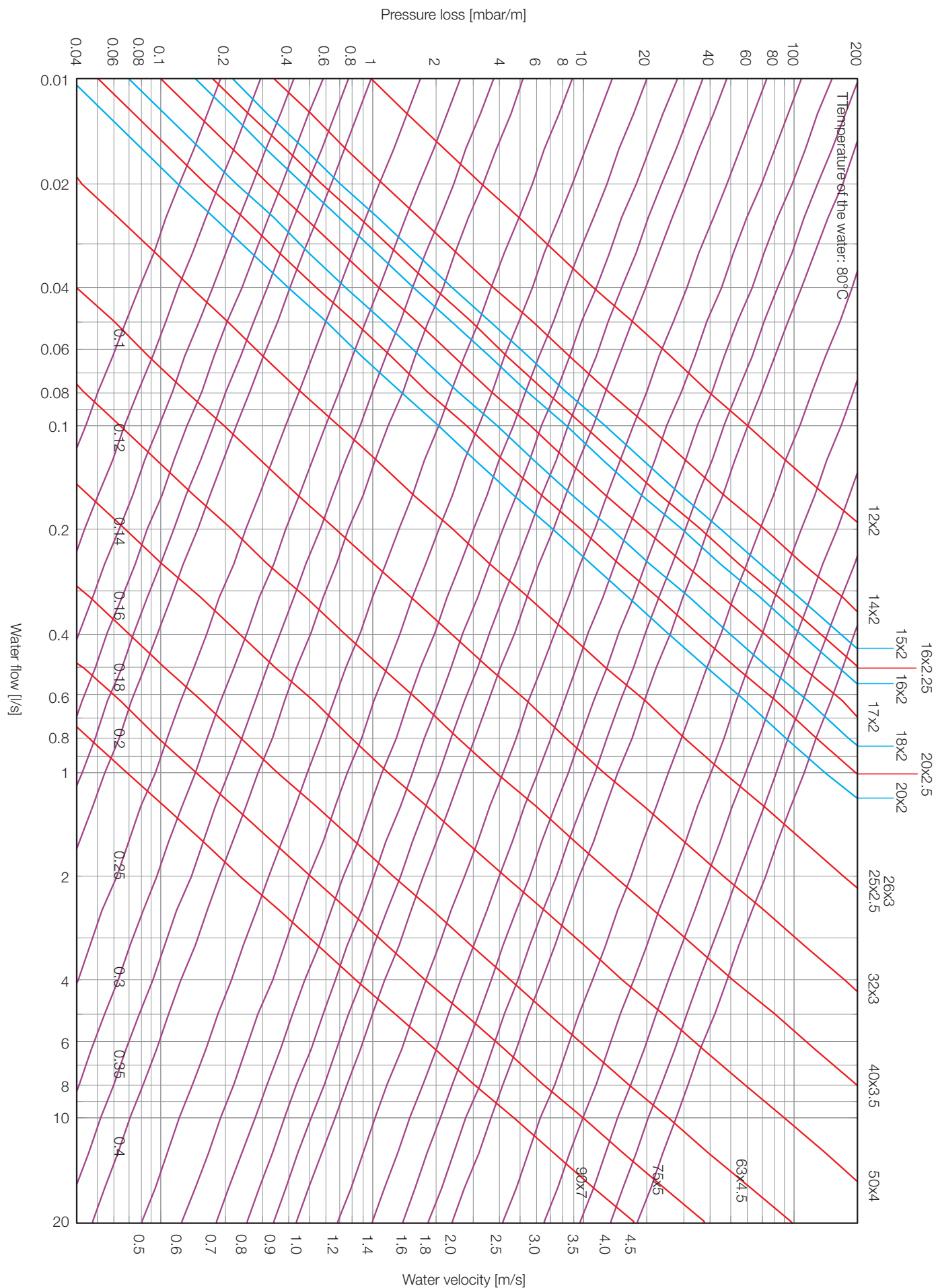


Table Continuous pressure losses for conveyance of water at 10°C.

Pipe	12x2		14x2		15x2		16x2.25		16x2		17x2		18x2		20x2.8		20x2.5	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01	0.2	1.5	0.1	0.5	0.1	0.3	0.1	0.3	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
0.02	0.4	4.7	0.3	1.6	0.2	1.0	0.2	0.8	0.2	0.7	0.2	0.5	0.1	0.3	0.1	0.3	0.1	0.2
0.03	0.6	9.3	0.4	3.2	0.3	2.1	0.3	1.7	0.3	1.4	0.2	0.9	0.2	0.7	0.2	0.6	0.2	0.5
0.04	0.8	15.3	0.5	5.3	0.4	3.4	0.4	2.7	0.4	2.2	0.3	1.5	0.3	1.1	0.2	0.9	0.2	0.8
0.05	1.0	22.5	0.6	7.8	0.5	4.9	0.5	4.0	0.4	3.3	0.4	2.2	0.3	1.6	0.3	1.4	0.3	1.1
0.06	1.2	30.9	0.8	10.7	0.6	6.8	0.6	5.5	0.5	4.5	0.5	3.1	0.4	2.2	0.4	1.9	0.3	1.6
0.07	1.4	40.5	0.9	13.9	0.7	8.8	0.7	7.2	0.6	5.9	0.5	4.0	0.5	2.8	0.4	2.5	0.4	2.0
0.08	1.6	51.2	1.0	17.6	0.8	11.2	0.8	9.0	0.7	7.4	0.6	5.0	0.5	3.5	0.5	3.1	0.5	2.6
0.09	1.8	63.0	1.1	21.6	0.9	13.7	0.9	11.1	0.8	9.1	0.7	6.2	0.6	4.3	0.6	3.8	0.5	3.1
0.10	2.0	76.0	1.3	26.0	1.1	16.5	1.0	13.3	0.9	10.9	0.8	7.4	0.6	5.2	0.6	4.6	0.6	3.8
0.15	3.0	156.7	1.9	53.2	1.6	33.7	1.4	27.2	1.3	22.2	1.1	15.1	1.0	10.6	0.9	9.3	0.8	7.6
0.20	4.0	263.4	2.5	89.0	2.1	56.1	1.9	45.3	1.8	36.9	1.5	25.1	1.3	17.6	1.2	15.4	1.1	12.6
0.25	5.0	395.3	3.2	132.9	2.6	83.7	2.4	67.5	2.2	54.9	1.9	37.3	1.6	26.1	1.5	22.8	1.4	18.7
0.30	6.0	552.0	3.8	184.9	3.2	116.2	2.9	93.6	2.7	76.2	2.3	51.7	1.9	36.1	1.8	31.6	1.7	25.9
0.35			4.5	244.7	3.7	153.6	3.4	123.7	3.1	100.6	2.6	68.2	2.3	47.6	2.1	41.6	2.0	34.1
0.40			5.1	312.3	4.2	195.8	3.9	157.6	3.5	128.1	3.0	86.7	2.6	60.5	2.5	52.8	2.3	43.3
0.45			5.7	387.6	4.7	242.8	4.3	195.3	4.0	158.6	3.4	107.3	2.9	74.9	2.8	65.3	2.5	53.6
0.50					5.3	294.4	4.8	236.7	4.4	192.2	3.8	130.0	3.2	90.6	3.1	79.0	2.8	64.8
0.55					5.8	350.7	5.3	281.9	4.9	228.7	4.1	154.6	3.6	107.7	3.4	93.9	3.1	76.9
0.60							5.8	330.7	5.3	268.3	4.5	181.2	3.9	126.1	3.7	109.9	3.4	90.1
0.65									5.7	310.8	4.9	209.8	4.2	145.9	4.0	127.2	3.7	104.2
0.70											5.3	240.3	4.5	167.1	4.3	145.6	4.0	119.2
0.75											5.7	272.8	4.9	189.6	4.6	165.1	4.2	135.2
0.80													5.2	213.4	4.9	185.9	4.5	152.2
0.85													5.5	238.6	5.2	207.7	4.8	170.0
0.90													5.8	265.0	5.5	230.7	5.1	188.8
0.95															5.8	254.9	5.4	208.5
1.0																	5.7	229.2
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Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

Table Continuous pressure losses for conveyance of water at 10°C (continues).

Pipe	20x2		25x2.5 - 26x3		32x3		40x3.5		50x4		63x4.5		75x5		90x7	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01	0.0	0.1														
0.02	0.1	0.2	0.1	0.1												
0.03	0.1	0.4	0.1	0.1	0.1	0.0										
0.04	0.2	0.6	0.1	0.2	0.1	0.1										
0.05	0.2	0.8	0.2	0.3	0.1	0.1	0.1	0.0								
0.06	0.3	1.2	0.2	0.4	0.1	0.1	0.1	0.0								
0.07	0.3	1.5	0.2	0.5	0.1	0.2	0.1	0.0	0.1	0.0						
0.08	0.4	1.9	0.3	0.7	0.2	0.2	0.1	0.1	0.1	0.0						
0.09	0.4	2.3	0.3	0.8	0.2	0.2	0.1	0.1	0.1	0.0						
0.10	0.5	2.8	0.3	1.0	0.2	0.3	0.1	0.1	0.1	0.0						
0.15	0.7	5.6	0.5	1.9	0.3	0.6	0.2	0.2	0.1	0.1	0.1	0.0				
0.20	1.0	9.3	0.6	3.2	0.4	0.9	0.2	0.3	0.1	0.1	0.1	0.0	0.1	0.0		
0.25	1.2	13.8	0.8	4.7	0.5	1.4	0.3	0.4	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0
0.30	1.5	19.0	1.0	6.5	0.6	1.9	0.4	0.6	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0
0.35	1.7	25.0	1.1	8.6	0.7	2.4	0.4	0.8	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0
0.40	2.0	31.7	1.3	10.8	0.8	3.1	0.5	1.0	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0
0.45	2.2	39.2	1.4	13.4	0.8	3.8	0.5	1.2	0.3	0.4	0.2	0.1	0.1	0.0	0.1	0.0
0.50	2.5	47.4	1.6	16.1	0.9	4.6	0.6	1.5	0.4	0.5	0.2	0.1	0.2	0.1	0.1	0.0
0.55	2.7	56.2	1.8	19.1	1.0	5.4	0.6	1.7	0.4	0.5	0.2	0.2	0.2	0.1	0.1	0.0
0.60	3.0	65.8	1.9	22.3	1.1	6.3	0.7	2.0	0.4	0.6	0.3	0.2	0.2	0.1	0.1	0.0
0.65	3.2	76.1	2.1	25.8	1.2	7.3	0.8	2.3	0.5	0.7	0.3	0.2	0.2	0.1	0.1	0.0
0.70	3.5	87.0	2.2	29.5	1.3	8.3	0.8	2.6	0.5	0.8	0.3	0.3	0.2	0.1	0.2	0.0
0.75	3.7	98.7	2.4	33.4	1.4	9.4	0.9	3.0	0.5	0.9	0.3	0.3	0.2	0.1	0.2	0.1
0.80	4.0	111.0	2.5	37.5	1.5	10.5	0.9	3.4	0.6	1.1	0.3	0.3	0.2	0.1	0.2	0.1
0.85	4.2	124.0	2.7	41.8	1.6	11.8	1.0	3.7	0.6	1.2	0.4	0.4	0.3	0.1	0.2	0.1
0.90	4.5	137.6	2.9	46.4	1.7	13.0	1.1	4.1	0.6	1.3	0.4	0.4	0.3	0.2	0.2	0.1
0.95	4.7	151.9	3.0	51.1	1.8	14.3	1.1	4.6	0.7	1.4	0.4	0.4	0.3	0.2	0.2	0.1
1.0	5.0	166.9	3.2	56.1	1.9	15.7	1.2	5.0	0.7	1.6	0.4	0.5	0.3	0.2	0.2	0.1
1.1	5.5	198.9	3.5	66.7	2.1	18.7	1.3	5.9	0.8	1.9	0.5	0.6	0.3	0.2	0.2	0.1
1.2	6.0	233.5	3.8	78.2	2.3	21.8	1.4	6.9	0.9	2.2	0.5	0.7	0.4	0.3	0.3	0.1
1.3			4.1	90.5	2.4	25.2	1.5	8.0	0.9	2.5	0.6	0.8	0.4	0.3	0.3	0.1
1.4			4.5	103.7	2.6	28.9	1.6	9.1	1.0	2.9	0.6	0.9	0.4	0.4	0.3	0.2
1.5			4.8	117.7	2.8	32.7	1.8	10.3	1.1	3.2	0.7	1.0	0.5	0.4	0.3	0.2
1.6			5.1	132.5	3.0	36.8	1.9	11.6	1.2	3.6	0.7	1.1	0.5	0.4	0.4	0.2
1.7			5.4	148.1	3.2	41.1	2.0	12.9	1.2	4.0	0.7	1.2	0.5	0.5	0.4	0.2
1.8			5.7	164.6	3.4	45.6	2.1	14.3	1.3	4.5	0.8	1.3	0.5	0.6	0.4	0.3
1.9					3.6	50.3	2.2	15.8	1.4	4.9	0.8	1.5	0.6	0.6	0.4	0.3
2.0					3.8	55.2	2.3	17.3	1.4	5.4	0.9	1.6	0.6	0.7	0.4	0.3
2.1					4.0	60.4	2.5	18.9	1.5	5.9	0.9	1.8	0.6	0.7	0.5	0.3
2.2					4.1	65.8	2.6	20.6	1.6	6.4	1.0	1.9	0.7	0.8	0.5	0.4
2.3					4.3	71.3	2.7	22.3	1.7	6.9	1.0	2.1	0.7	0.9	0.5	0.4
2.4					4.5	77.1	2.8	24.1	1.7	7.5	1.0	2.2	0.7	0.9	0.5	0.4
2.5					4.7	83.1	2.9	26.0	1.8	8.1	1.1	2.4	0.8	1.0	0.6	0.5
2.6					4.9	89.4	3.0	27.9	1.9	8.7	1.1	2.6	0.8	1.1	0.6	0.5
2.7					5.1	95.8	3.2	29.9	1.9	9.3	1.2	2.8	0.8	1.1	0.6	0.5
2.8					5.3	102.4	3.3	31.9	2.0	9.9	1.2	2.9	0.8	1.2	0.6	0.6
2.9					5.5	109.3	3.4	34.0	2.1	10.6	1.3	3.1	0.9	1.3	0.6	0.6
3.0					5.7	116.3	3.5	36.2	2.2	11.2	1.3	3.3	0.9	1.4	0.7	0.6
3.5							4.1	48.0	2.5	14.8	1.5	4.4	1.1	1.8	0.8	0.8
4.0							4.7	61.4	2.9	18.9	1.7	5.6	1.2	2.3	0.9	1.1
4.5							5.3	76.3	3.2	23.5	2.0	6.9	1.4	2.8	1.0	1.3
5.0							5.8	92.7	3.6	28.4	2.2	8.4	1.5	3.4	1.1	1.6
5.5									4.0	33.9	2.4	10.0	1.7	4.1	1.2	1.9
6									4.3	39.7	2.6	11.7	1.8	4.8	1.3	2.2
7									5.1	52.8	3.1	15.5	2.1	6.3	1.5	2.9
8									5.8	67.6	3.5	19.7	2.4	8.0	1.8	3.8
9											3.9	24.5	2.7	9.9	2.0	4.7
10											4.4	29.8	3.0	12.0	2.2	5.6
11											4.8	35.5	3.3	14.3	2.4	6.7
12											5.2	41.7	3.6	16.8	2.6	7.9
13											5.7	48.4	3.9	19.5	2.9	9.1
14													4.2	22.3	3.1	10.4
15													4.5	25.4	3.3	11.8
16													4.8	28.6	3.5	13.3
18													5.4	35.6	4.0	16.5
20															4.4	20.1
22															4.8	23.9
24															5.3	28.1
26															5.7	32.6

Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

Table Continuous pressure losses for conveyance of water at 60°C.

Pipe	12x2		14x2		15x2		16x2.25		16x2		17x2		18x2		20x2.8		20x2.5	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01	0.2	1.1	0.1	0.4	0.1	0.2	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.02	0.4	3.5	0.3	1.2	0.2	0.8	0.2	0.6	0.2	0.5	0.2	0.3	0.1	0.2	0.1	0.2	0.1	0.2
0.03	0.6	7.2	0.4	2.5	0.3	1.6	0.3	1.3	0.3	1.0	0.2	0.7	0.2	0.5	0.2	0.4	0.2	0.4
0.04	0.8	11.9	0.5	4.1	0.4	2.6	0.4	2.1	0.4	1.7	0.3	1.2	0.3	0.8	0.2	0.7	0.2	0.6
0.05	1.0	17.7	0.6	6.0	0.5	3.8	0.5	3.1	0.4	2.5	0.4	1.7	0.3	1.2	0.3	1.1	0.3	0.9
0.06	1.2	24.6	0.8	8.4	0.6	5.3	0.6	4.3	0.5	3.5	0.5	2.4	0.4	1.7	0.4	1.4	0.3	1.2
0.07	1.4	32.5	0.9	11.0	0.7	6.9	0.7	5.6	0.6	4.6	0.5	3.1	0.5	2.2	0.4	1.9	0.4	1.6
0.08	1.6	41.4	1.0	14.0	0.8	8.8	0.8	7.1	0.7	5.8	0.6	3.9	0.5	2.8	0.5	2.4	0.5	2.0
0.09	1.8	51.4	1.1	17.3	0.9	10.9	0.9	8.8	0.8	7.1	0.7	4.9	0.6	3.4	0.6	3.0	0.5	2.4
0.10	2.0	62.3	1.3	20.9	1.1	13.2	1.0	10.6	0.9	8.6	0.8	5.9	0.6	4.1	0.6	3.6	0.6	2.9
0.15	3.0	131.5	1.9	43.7	1.6	27.4	1.4	22.1	1.3	17.9	1.1	12.1	1.0	8.5	0.9	7.4	0.8	6.1
0.20	4.0	225.0	2.5	74.3	2.1	46.4	1.9	37.3	1.8	30.3	1.5	20.5	1.3	14.3	1.2	12.4	1.1	10.2
0.25	5.0	342.3	3.2	112.4	2.6	70.1	2.4	56.3	2.2	45.6	1.9	30.8	1.6	21.4	1.5	18.6	1.4	15.3
0.30	6.0	483.4	3.8	157.9	3.2	98.3	2.9	78.9	2.7	63.9	2.3	43.0	1.9	29.9	1.8	26.0	1.7	21.3
0.35			4.5	211.0	3.7	131.1	3.4	105.1	3.1	85.1	2.6	57.2	2.3	39.7	2.1	34.6	2.0	28.3
0.40			5.1	271.4	4.2	168.4	3.9	134.9	3.5	109.1	3.0	73.3	2.6	50.8	2.5	44.2	2.3	36.2
0.45			5.7	339.2	4.7	210.2	4.3	168.3	4.0	136.1	3.4	91.4	2.9	63.2	2.8	55.0	2.5	45.0
0.50					5.3	256.5	4.8	205.3	4.4	165.9	3.8	111.3	3.2	77.0	3.1	66.9	2.8	54.7
0.55					5.8	307.3	5.3	245.8	4.9	198.6	4.1	133.1	3.6	92.0	3.4	80.0	3.1	65.3
0.60							5.8	289.9	5.3	234.1	4.5	156.7	3.9	108.3	3.7	94.1	3.4	76.8
0.65									5.7	272.4	4.9	182.3	4.2	125.8	4.0	109.3	3.7	89.2
0.70											5.3	209.7	4.5	144.7	4.3	125.7	4.0	102.5
0.75											5.7	239.0	4.9	164.8	4.6	143.1	4.2	116.7
0.80													5.2	186.2	4.9	161.7	4.5	131.8
0.85													5.5	208.9	5.2	181.4	4.8	147.8
0.90													5.8	232.8	5.5	202.1	5.1	164.7
0.95															5.8	224.0	5.4	182.4
1.0																	5.7	201.1
1.1																		
1.2																		
1.3																		
1.4																		
1.5																		
1.6																		
1.7																		
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Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

Table Continuous pressure losses for conveyance of water at 60°C (continues).

Pipe	20x2		25x2.5 - 26x3		32x3		40x3.5		50x4		63x4.5		75x5		90x7	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01	0.0	0.0														
0.02	0.1	0.1	0.1	0.0												
0.03	0.1	0.3	0.1	0.1	0.1											
0.04	0.2	0.4	0.1	0.2	0.1											
0.05	0.2	0.6	0.2	0.2	0.1	0.1	0.1	0.0								
0.06	0.3	0.9	0.2	0.3	0.1	0.1	0.1	0.0								
0.07	0.3	1.1	0.2	0.4	0.1	0.1	0.1	0.0	0.1	0.0						
0.08	0.4	1.5	0.3	0.5	0.2	0.1	0.1	0.0	0.1	0.0						
0.09	0.4	1.8	0.3	0.6	0.2	0.2	0.1	0.1	0.1	0.0						
0.10	0.5	2.2	0.3	0.7	0.2	0.2	0.1	0.1	0.1	0.0						
0.15	0.7	4.4	0.5	1.5	0.3	0.4	0.2	0.1	0.1	0.0	0.1	0.0				
0.20	1.0	7.4	0.6	2.5	0.4	0.7	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0		
0.25	1.2	11.1	0.8	3.8	0.5	1.1	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0
0.30	1.5	15.5	1.0	5.2	0.6	1.5	0.4	0.5	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0
0.35	1.7	20.6	1.1	6.9	0.7	1.9	0.4	0.6	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0
0.40	2.0	26.3	1.3	8.8	0.8	2.5	0.5	0.8	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0
0.45	2.2	32.7	1.4	10.9	0.8	3.1	0.5	1.0	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0
0.50	2.5	39.7	1.6	13.3	0.9	3.7	0.6	1.2	0.4	0.4	0.2	0.1	0.2	0.0	0.1	0.0
0.55	2.7	47.4	1.8	15.8	1.0	4.4	0.6	1.4	0.4	0.4	0.2	0.1	0.2	0.1	0.1	0.0
0.60	3.0	55.8	1.9	18.6	1.1	5.1	0.7	1.6	0.4	0.5	0.3	0.2	0.2	0.1	0.1	0.0
0.65	3.2	64.7	2.1	21.5	1.2	6.0	0.8	1.9	0.5	0.6	0.3	0.2	0.2	0.1	0.1	0.0
0.70	3.5	74.4	2.2	24.7	1.3	6.8	0.8	2.1	0.5	0.7	0.3	0.2	0.2	0.1	0.2	0.0
0.75	3.7	84.6	2.4	28.0	1.4	7.7	0.9	2.4	0.5	0.8	0.3	0.2	0.2	0.1	0.2	0.0
0.80	4.0	95.5	2.5	31.6	1.5	8.7	0.9	2.7	0.6	0.8	0.3	0.3	0.2	0.1	0.2	0.0
0.85	4.2	107.1	2.7	35.3	1.6	9.7	1.0	3.0	0.6	0.9	0.4	0.3	0.3	0.1	0.2	0.1
0.90	4.5	119.2	2.9	39.3	1.7	10.8	1.1	3.4	0.6	1.0	0.4	0.3	0.3	0.1	0.2	0.1
0.95	4.7	132.0	3.0	43.5	1.8	11.9	1.1	3.7	0.7	1.2	0.4	0.3	0.3	0.1	0.2	0.1
1.0	5.0	145.5	3.2	47.8	1.9	13.1	1.2	4.1	0.7	1.3	0.4	0.4	0.3	0.2	0.2	0.1
1.1	5.5	174.3	3.5	57.2	2.1	15.6	1.3	4.9	0.8	1.5	0.5	0.4	0.3	0.2	0.2	0.1
1.2	6.0	205.6	3.8	67.3	2.3	18.4	1.4	5.7	0.9	1.8	0.5	0.5	0.4	0.2	0.3	0.1
1.3			4.1	78.3	2.4	21.3	1.5	6.6	0.9	2.0	0.6	0.6	0.4	0.2	0.3	0.1
1.4			4.5	90.0	2.6	24.5	1.6	7.6	1.0	2.3	0.6	0.7	0.4	0.3	0.3	0.1
1.5			4.8	102.5	2.8	27.8	1.8	8.6	1.1	2.6	0.7	0.8	0.5	0.3	0.3	0.2
1.6			5.1	115.8	3.0	31.4	1.9	9.7	1.2	3.0	0.7	0.9	0.5	0.4	0.4	0.2
1.7			5.4	129.9	3.2	35.1	2.0	10.8	1.2	3.3	0.7	1.0	0.5	0.4	0.4	0.2
1.8			5.7	144.8	3.4	39.1	2.1	12.0	1.3	3.7	0.8	1.1	0.5	0.4	0.4	0.2
1.9					3.6	43.3	2.2	13.3	1.4	4.1	0.8	1.2	0.6	0.5	0.4	0.2
2.0					3.8	47.6	2.3	14.6	1.4	4.5	0.9	1.3	0.6	0.5	0.4	0.3
2.1					4.0	52.2	2.5	16.0	1.5	4.9	0.9	1.4	0.6	0.6	0.5	0.3
2.2					4.1	57.0	2.6	17.5	1.6	5.3	1.0	1.6	0.7	0.6	0.5	0.3
2.3					4.3	62.0	2.7	19.0	1.7	5.8	1.0	1.7	0.7	0.7	0.5	0.3
2.4					4.5	67.2	2.8	20.5	1.7	6.3	1.0	1.8	0.7	0.7	0.5	0.4
2.5					4.7	72.5	2.9	22.2	1.8	6.8	1.1	2.0	0.8	0.8	0.6	0.4
2.6					4.9	78.1	3.0	23.9	1.9	7.3	1.1	2.1	0.8	0.9	0.6	0.4
2.7					5.1	83.9	3.2	25.6	1.9	7.8	1.2	2.3	0.8	0.9	0.6	0.4
2.8					5.3	89.9	3.3	27.4	2.0	8.3	1.2	2.4	0.8	1.0	0.6	0.5
2.9					5.5	96.1	3.4	29.3	2.1	8.9	1.3	2.6	0.9	1.1	0.6	0.5
3.0					5.7	102.5	3.5	31.2	2.2	9.5	1.3	2.8	0.9	1.1	0.7	0.5
3.5							4.1	41.7	2.5	12.6	1.5	3.7	1.1	1.5	0.8	0.7
4.0							4.7	53.6	2.9	16.2	1.7	4.7	1.2	1.9	0.9	0.9
4.5							5.3	67.1	3.2	20.2	2.0	5.8	1.4	2.4	1.0	1.1
5.0							5.8	81.9	3.6	24.6	2.2	7.1	1.5	2.9	1.1	1.3
5.5									4.0	29.4	2.4	8.5	1.7	3.4	1.2	1.6
6									4.3	34.7	2.6	10.0	1.8	4.0	1.3	1.9
7									5.1	46.4	3.1	13.3	2.1	5.3	1.5	2.5
8									5.8	59.8	3.5	17.1	2.4	6.8	1.8	3.2
9											3.9	21.3	2.7	8.5	2.0	3.9
10											4.4	26.0	3.0	10.4	2.2	4.8
11											4.8	31.2	3.3	12.4	2.4	5.7
12											5.2	36.8	3.6	14.6	2.6	6.7
13											5.7	42.8	3.9	17.0	2.9	7.8
14													4.2	19.5	3.1	9.0
15													4.5	22.3	3.3	10.2
16													4.8	25.2	3.5	11.6
18													5.4	31.5	4.0	14.4
20															4.4	17.6
22															4.8	21.1
24															5.3	24.9
26															5.7	29.0

Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

Table Continuous pressure losses for conveyance of water at 80°C.

Pipe	12x2		14x2		15x2		16x2.25		16x2		17x2		18x2		20x2.8		20x2.5	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01	0.2	1.0	0.1	0.3	0.1	0.2	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
0.02	0.4	3.3	0.3	1.1	0.2	0.7	0.2	0.6	0.2	0.5	0.2	0.3	0.1	0.2	0.1	0.2	0.1	0.2
0.03	0.6	6.7	0.4	2.3	0.3	1.5	0.3	1.2	0.3	1.0	0.2	0.7	0.2	0.5	0.2	0.4	0.2	0.3
0.04	0.8	11.2	0.5	3.8	0.4	2.4	0.4	2.0	0.4	1.6	0.3	1.1	0.3	0.8	0.2	0.7	0.2	0.5
0.05	1.0	16.8	0.6	5.7	0.5	3.6	0.5	2.9	0.4	2.4	0.4	1.6	0.3	1.1	0.3	1.0	0.3	0.8
0.06	1.2	23.4	0.8	7.9	0.6	5.0	0.6	4.0	0.5	3.3	0.5	2.2	0.4	1.6	0.4	1.4	0.3	1.1
0.07	1.4	31.0	0.9	10.4	0.7	6.6	0.7	5.3	0.6	4.3	0.5	2.9	0.5	2.0	0.4	1.8	0.4	1.5
0.08	1.6	39.5	1.0	13.3	0.8	8.3	0.8	6.7	0.7	5.5	0.6	3.7	0.5	2.6	0.5	2.3	0.5	1.9
0.09	1.8	49.1	1.1	16.4	0.9	10.3	0.9	8.3	0.8	6.8	0.7	4.6	0.6	3.2	0.6	2.8	0.5	2.3
0.10	2.0	59.6	1.3	19.9	1.1	12.5	1.0	10.0	0.9	8.2	0.8	5.5	0.6	3.9	0.6	3.4	0.6	2.8
0.15	3.0	126.8	1.9	41.9	1.6	26.2	1.4	21.0	1.3	17.1	1.1	11.5	1.0	8.0	0.9	7.0	0.8	5.7
0.20	4.0	217.9	2.5	71.4	2.1	44.5	1.9	35.7	1.8	29.0	1.5	19.5	1.3	13.6	1.2	11.8	1.1	9.7
0.25	5.0	332.7	3.2	108.5	2.6	67.4	2.4	54.1	2.2	43.8	1.9	29.5	1.6	20.5	1.5	17.8	1.4	14.6
0.30	6.0	471.2	3.8	152.9	3.2	94.9	2.9	76.0	2.7	61.5	2.3	41.3	1.9	28.7	1.8	24.9	1.7	20.4
0.35			4.5	204.8	3.7	126.9	3.4	101.6	3.1	82.1	2.6	55.1	2.3	38.1	2.1	33.2	2.0	27.1
0.40			5.1	264.0	4.2	163.3	3.9	130.7	3.5	105.6	3.0	70.8	2.6	48.9	2.5	42.5	2.3	34.8
0.45			5.7	330.5	4.7	204.3	4.3	163.3	4.0	131.9	3.4	88.3	2.9	61.0	2.8	53.0	2.5	43.3
0.50					5.3	249.7	4.8	199.5	4.4	161.0	3.8	107.8	3.2	74.4	3.1	64.6	2.8	52.7
0.55					5.8	299.5	5.3	239.3	4.9	193.0	4.1	129.1	3.6	89.0	3.4	77.3	3.1	63.1
0.60							5.8	282.5	5.3	227.9	4.5	152.2	3.9	104.9	3.7	91.1	3.4	74.3
0.65									5.7	265.5	4.9	177.3	4.2	122.1	4.0	106.0	3.7	86.4
0.70											5.3	204.2	4.5	140.6	4.3	122.0	4.0	99.4
0.75											5.7	232.9	4.9	160.3	4.6	139.1	4.2	113.3
0.80													5.2	181.3	4.9	157.3	4.5	128.1
0.85													5.5	203.5	5.2	176.5	4.8	143.7
0.90													5.8	227.0	5.5	196.9	5.1	160.3
0.95															5.8	218.4	5.4	177.7
1.0																	5.7	196.0
1.1																		
1.2																		
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Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

Table Continuous pressure losses for conveyance of water at 80°C (continues).

Pipe	20x2		25x2.5 - 26x3		32x3		40x3.5		50x4		63x4.5		75x5		90x7	
Q	v	J	v	J	v	J	v	J	v	J	v	J	v	J	v	J
0.01																
0.02	0.1	0.1	0.1	0.0												
0.03	0.1	0.2	0.1	0.1	0.1	0.0										
0.04	0.2	0.4	0.1	0.1	0.1	0.0										
0.05	0.2	0.6	0.2	0.2	0.1	0.1	0.1	0.0								
0.06	0.3	0.8	0.2	0.3	0.1	0.1	0.1	0.0								
0.07	0.3	1.1	0.2	0.4	0.1	0.1	0.1	0.0	0.1	0.0						
0.08	0.4	1.4	0.3	0.5	0.2	0.1	0.1	0.0	0.1	0.0						
0.09	0.4	1.7	0.3	0.6	0.2	0.2	0.1	0.1	0.1	0.0						
0.10	0.5	2.0	0.3	0.7	0.2	0.2	0.1	0.1	0.1	0.0						
0.15	0.7	4.2	0.5	1.4	0.3	0.4	0.2	0.1	0.1	0.0	0.1	0.0				
0.20	1.0	7.1	0.6	2.4	0.4	0.7	0.2	0.2	0.1	0.1	0.1	0.0	0.1	0.0		
0.25	1.2	10.6	0.8	3.6	0.5	1.0	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0
0.30	1.5	14.8	1.0	5.0	0.6	1.4	0.4	0.4	0.2	0.1	0.1	0.0	0.1	0.0	0.1	0.0
0.35	1.7	19.7	1.1	6.6	0.7	1.8	0.4	0.6	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0
0.40	2.0	25.3	1.3	8.4	0.8	2.3	0.5	0.7	0.3	0.2	0.2	0.1	0.1	0.0	0.1	0.0
0.45	2.2	31.4	1.4	10.5	0.8	2.9	0.5	0.9	0.3	0.3	0.2	0.1	0.1	0.0	0.1	0.0
0.50	2.5	38.3	1.6	12.7	0.9	3.5	0.6	1.1	0.4	0.3	0.2	0.1	0.2	0.0	0.1	0.0
0.55	2.7	45.7	1.8	15.1	1.0	4.2	0.6	1.3	0.4	0.4	0.2	0.1	0.2	0.1	0.1	0.0
0.60	3.0	53.8	1.9	17.8	1.1	4.9	0.7	1.5	0.4	0.5	0.3	0.1	0.2	0.1	0.1	0.0
0.65	3.2	62.6	2.1	20.7	1.2	5.7	0.8	1.8	0.5	0.6	0.3	0.2	0.2	0.1	0.1	0.0
0.70	3.5	71.9	2.2	23.7	1.3	6.5	0.8	2.0	0.5	0.6	0.3	0.2	0.2	0.1	0.2	0.0
0.75	3.7	82.0	2.4	27.0	1.4	7.4	0.9	2.3	0.5	0.7	0.3	0.2	0.2	0.1	0.2	0.0
0.80	4.0	92.6	2.5	30.4	1.5	8.3	0.9	2.6	0.6	0.8	0.3	0.2	0.2	0.1	0.2	0.0
0.85	4.2	103.9	2.7	34.1	1.6	9.3	1.0	2.9	0.6	0.9	0.4	0.3	0.3	0.1	0.2	0.1
0.90	4.5	115.8	2.9	37.9	1.7	10.4	1.1	3.2	0.6	1.0	0.4	0.3	0.3	0.1	0.2	0.1
0.95	4.7	128.4	3.0	42.0	1.8	11.4	1.1	3.6	0.7	1.1	0.4	0.3	0.3	0.1	0.2	0.1
1.0	5.0	141.5	3.2	46.2	1.9	12.6	1.2	3.9	0.7	1.2	0.4	0.4	0.3	0.1	0.2	0.1
1.1	5.5	169.8	3.5	55.4	2.1	15.0	1.3	4.7	0.8	1.4	0.5	0.4	0.3	0.2	0.2	0.1
1.2	6.0	200.5	3.8	65.3	2.3	17.7	1.4	5.5	0.9	1.7	0.5	0.5	0.4	0.2	0.3	0.1
1.3			4.1	75.9	2.4	20.5	1.5	6.3	0.9	1.9	0.6	0.6	0.4	0.2	0.3	0.1
1.4			4.5	87.4	2.6	23.6	1.6	7.3	1.0	2.2	0.6	0.7	0.4	0.3	0.3	0.1
1.5			4.8	99.7	2.8	26.8	1.8	8.2	1.1	2.5	0.7	0.7	0.5	0.3	0.3	0.1
1.6			5.1	112.8	3.0	30.3	1.9	9.3	1.2	2.8	0.7	0.8	0.5	0.3	0.4	0.2
1.7			5.4	126.6	3.2	34.0	2.0	10.4	1.2	3.2	0.7	0.9	0.5	0.4	0.4	0.2
1.8			5.7	141.2	3.4	37.8	2.1	11.6	1.3	3.5	0.8	1.0	0.5	0.4	0.4	0.2
1.9					3.6	41.9	2.2	12.8	1.4	3.9	0.8	1.1	0.6	0.5	0.4	0.2
2.0					3.8	46.2	2.3	14.1	1.4	4.3	0.9	1.3	0.6	0.5	0.4	0.2
2.1					4.0	50.7	2.5	15.4	1.5	4.7	0.9	1.4	0.6	0.6	0.5	0.3
2.2					4.1	55.3	2.6	16.9	1.6	5.1	1.0	1.5	0.7	0.6	0.5	0.3
2.3					4.3	60.2	2.7	18.3	1.7	5.6	1.0	1.6	0.7	0.7	0.5	0.3
2.4					4.5	65.3	2.8	19.8	1.7	6.0	1.0	1.8	0.7	0.7	0.5	0.3
2.5					4.7	70.6	2.9	21.4	1.8	6.5	1.1	1.9	0.8	0.8	0.6	0.4
2.6					4.9	76.1	3.0	23.1	1.9	7.0	1.1	2.0	0.8	0.8	0.6	0.4
2.7					5.1	81.7	3.2	24.8	1.9	7.5	1.2	2.2	0.8	0.9	0.6	0.4
2.8					5.3	87.6	3.3	26.5	2.0	8.0	1.2	2.3	0.8	0.9	0.6	0.4
2.9					5.5	93.7	3.4	28.4	2.1	8.6	1.3	2.5	0.9	1.0	0.6	0.5
3.0					5.7	100.0	3.5	30.2	2.2	9.1	1.3	2.6	0.9	1.1	0.7	0.5
3.5							4.1	40.5	2.5	12.2	1.5	3.5	1.1	1.4	0.8	0.7
4.0							4.7	52.2	2.9	15.6	1.7	4.5	1.2	1.8	0.9	0.8
4.5							5.3	65.4	3.2	19.5	2.0	5.6	1.4	2.3	1.0	1.1
5.0							5.8	80.0	3.6	23.8	2.2	6.8	1.5	2.7	1.1	1.3
5.5									4.0	28.6	2.4	8.2	1.7	3.3	1.2	1.5
6									4.3	33.7	2.6	9.6	1.8	3.9	1.3	1.8
7									5.1	45.2	3.1	12.9	2.1	5.1	1.5	2.4
8									5.8	58.4	3.5	16.6	2.4	6.6	1.8	3.0
9											3.9	20.7	2.7	8.2	2.0	3.8
10											4.4	25.3	3.0	10.0	2.2	4.6
11											4.8	30.4	3.3	12.0	2.4	5.5
12											5.2	35.9	3.6	14.2	2.6	6.5
13											5.7	41.8	3.9	16.5	2.9	7.6
14													4.2	19.0	3.1	8.7
15													4.5	21.7	3.3	9.9
16													4.8	24.5	3.5	11.2
18													5.4	30.7	4.0	14.0
20															4.4	17.1
22															4.8	20.6
24															5.3	24.3
26															5.7	28.3

Q = water flow [l/s], v = velocity [m/s], J = pressure loss [mbar/m].

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