Multilayer pipes



WELCOFLEX

Datasheet WELCOFLEX

Multi-layer pipes for water-based heating systems

GENERAL FITTINGS
YOUNIQUE · ITALIAN

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Datasheet WELCOFLEX

Multi-layer pipes for water-based heating systems



WELCOFLEX

DESCRIPTION

WELCOFLEX is a white PEX-c/Al/PEX-b multi-layer pipe, available in rolls. It is characterised by a high-thickness aluminium layer and is also supplied with medium-density PE insulation with closed cells of different thicknesses.
WELCOFLEX can be used in water-based heating systems, Type A, class 5.
The presence of aluminium makes it possible to shape the pipe very easily in order to greatly speed up installation and prevent the passage of oxygen inside the pipe.

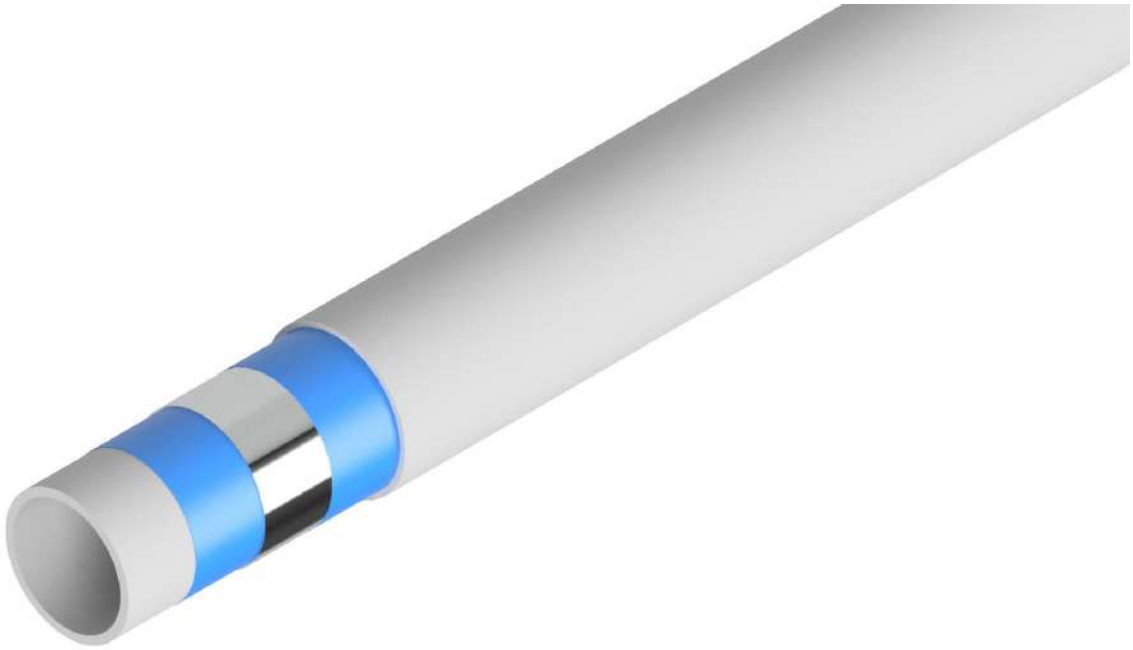
ADVANTAGES

- STRENGTH: the thickness of the intermediate aluminium layer varies from 0.4 mm (DN16) to 1.5 mm (DN63). The elevated thickness of the aluminium allows the pipe to withstand the stresses and vibrations of seismic activity.
- FLEXIBILITY: the union of cross-linked polyethylene and aluminium guarantees excellent flexibility when bending. WELCOFLEX can also be bent by hand with very small bending radii (1.5xDe).
- LIGHTNESS: the specific weights of the materials that make up the pipe are very low. Assuming the same diameter, WELCOFLEX is seven times lighter than iron pipe and three times lighter than copper pipe.
- LOW TEMPERATURES: WELCOFLEX can be used in very harsh climatic conditions (-45°C) as low temperatures do not weaken the mechanical and physical characteristics of the pipe. (However, all necessary precautions must be taken to avoid the formation of ice)
- SMOOTHNESS: the inner surface of the pipe is practically smooth and free of limescale and/or rust. Pressure drops are low and above all remain unchanged over time, as no encrustations can form on the walls.
- DURABILITY: laboratory tests guarantee that WELCOFLEX pipe will last for at least 50 years. During this period, it can be used at pressures of 10 bar and temperatures up to 95°C with maximum peaks at 110°C.
- EXPANSION: the linear expansion coefficient of WELCOFLEX pipe remains 0.024 mm/m°K, regardless of its diameter. No special devices are required when the pipe is covered in concrete.
- POTABILITY: there are no special precautions in relation to the use of WELCOFLEX piping for any type of installation where the fluid is drinking water.
- WATERPROOF: the head-to-head welded metal coating is a perfect barrier to the passage of oxygen and light. The pipe is absolutely opaque, so there is no possibility of algae formation.
- CLEANLINESS: in order for algae to grow, the presence of ultraviolet rays is required. The aluminium layer protects the inner layer from UV radiation and thus prevents the formation of algae.
- CORROSION RESISTANCE: the surface does not become corroded and no rusty particles detach. The PEX outer layer protects against the corrosion that can be caused by some cement mortars and against possible mechanical deterioration.
- RESISTANT TO INTERNAL ABRASION due to the abrasive action of impurities suspended in the carrier fluid (especially in bends), even when the flow rate is very high.
- FIRE RESISTANCE: the metal layer makes the pipe difficult to ignite, but combustion can still take place, developing a thin smoke (class 1).
- SOUNDPROOFING: good sound-absorbing properties for noises caused by the operation of electric pumps and fluid flow. The inner and outer PE-X coating attenuates sounds not absorbed by the metal layer.
- RECYCLABILITY: WELCOFLEX multi-layer pipe is completely recyclable; any unusable residual fragments can be recycled and used for other purposes.
- Can be used in MIXED INSTALLATIONS.

FIELDS OF APPLICATION

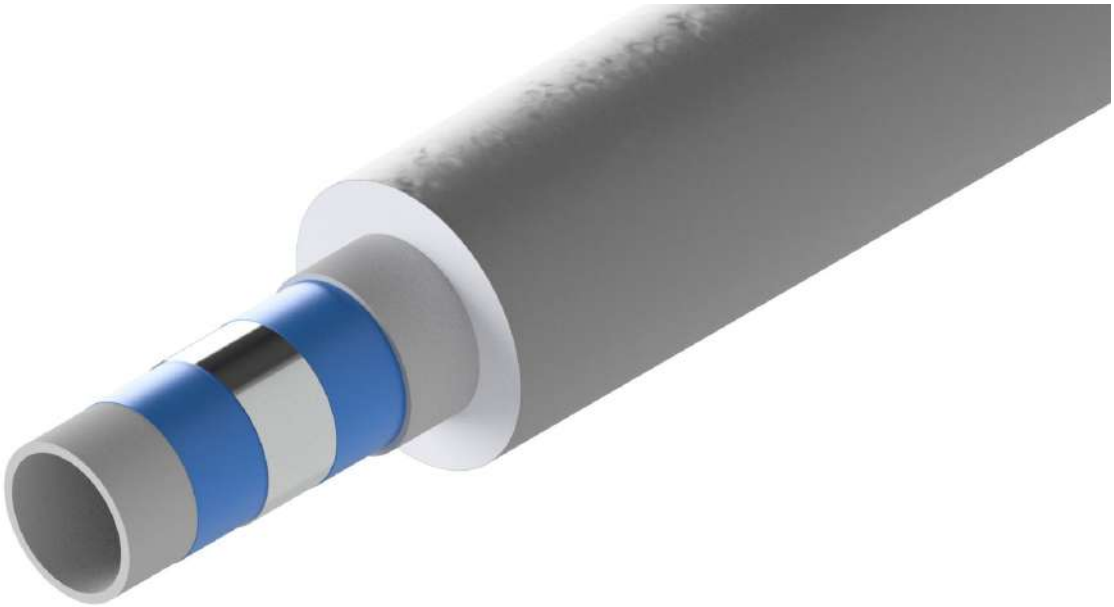
APPLICATIONS		T. of the system	Max. pressure
	drinking water	-45°C/+90°C	10 bar
	sanitary hot water	-45°C/+90°C	10 bar
	heating	-45°C/+90°C	10 bar
	floor heating	-45°C/+90°C	10 bar
	irrigation	-45°C/+90°C	10 bar

COMPOSITION OF BARE PIPE



LAYER COMPOSITION
Inner layer in HD (high density) polyethylene cross-linked with the PE-Xc electronic system
A high-quality adhesive layer to ensure the homogeneous connection between the aluminium pipe and the PEX-c inner pipe
Longitudinal head-head welded aluminium layer, from 0.4 mm (14x2.0 pipe) to 1.5 mm (63x4.5 pipe) in thickness.
A high-quality adhesive layer to ensure the homogeneous connection between the aluminium pipe and the PE-Xb outer pipe
Outer layer in PE-Xb cross-linked polyethylene

COATED PIPE COMPOSITION



LAYER COMPOSITION
Inner layer in HD (high density) polyethylene cross-linked with the PE-Xc electronic system
A high-quality adhesive layer to ensure the homogeneous connection between the aluminium pipe and the PEX-c inner pipe
Longitudinal head-head welded aluminium layer, from 0.4 mm (14x2.0 pipe) to 1.5 mm (63x4.5 pipe) in thickness.
A high-quality adhesive layer to ensure the homogeneous connection between the aluminium pipe and the PEX-b pipe
Outer layer in PE-Xb cross-linked polyethylene
Coating: layer of insulation made of closed-cell medium-density polyethylene, which increases the energy efficiency of the system, and further reduces noise.

CROSS-LINKED POLYETHYLENE (PEX)

Polyethylene is a thermoplastic polymeric material composed of numerous long molecules that, even at moderately high temperatures (still below the melting point), begins to have a significant degree of fluidity.
With the cross-linking process, the polyethylene molecules are bonded together to form a more complex three-dimensional structure: the chemical cross-linking reaction transforms the product from thermoplastic to thermosetting.
The material undergoes a structural modification that improves its characteristics such as abrasion, chemical resistance, mechanical resistance over time, resistance to ageing and high temperatures. The mechanical performance of the material is significantly increased.
Cross-linked polyethylene can be produced by different technologies recognised by international standards and identified by methods A (peroxides), B (silanes), and C (radiation). The method used is indicated after the abbreviation of the material: PE-Xa, PE-Xb, PE-Xc.
All the above methods are valid: it is not the cross-linking process that defines the quality of the product, but its ability to pass the physical and mechanical tests defined by the standards.
In the case of PE-Xc, the PE layer is electronically cross-linked uniformly over the entire thickness; gamma rays trigger the cross-linking process without any toxic and/or harmful residues. The uniformity of the degree of cross-linking increases the strength of the PE-X layer and thus of the pipe.
The PEX-b outer layer ensures high resistance to breakage and offers advanced and permanent protection to the underlying aluminium layer. In addition, the pipe (often subjected to high stresses both during transport and installation) is protected from abrasion and wear by the outer layer.

WATERPROOFING

The metal coating of the pipe is a perfect barrier to the passage of gaseous molecules: that means no risk of corrosion due to oxygen infiltration.
The aluminium layer is welded at the head with the WIG system: the metal layer therefore not only serves to make the pipe waterproof, but also to adequately withstand thermal and pressure stresses, especially in sanitary installations.

PRE-INSULATED PIPE IN ROLLS

Some diameters of WELCOFLEX pipe in rolls also come complete with insulation.
This insulation is made of closed cell medium density polyethylene with thermal conductivity (CSI certified) of 0.040 W/m°K with a density of 21.4 kg/m3.
The insulation impermeability index (CSI certificate) detected has an average value of μ = 11450 (based on three samples) while the standard deviation is μ = 614.
The insulation is protected by a tear-resistant, low-density polyethylene film. The fire resistance class is 1.
The sole function of the insulation is not only thermal insulation, but also the attenuation of noise; in addition, it absorbs elongations due to expansion without damaging the pipe, and is therefore advisable in cases where

the pipe is placed inside the wall or under the floor.

INSTALLATION

WELCOFLEX can be used both in visible and chased in installations.
In combined installations where pipes of different materials (for example, copper or steel) are used in the same system, there is no need to take any precautions to avoid electro-corrosion. WELCO pipes are not electrically conductive.
WELCOFLEX pipes cannot be installed to transport refrigerant gases used in air conditioners.

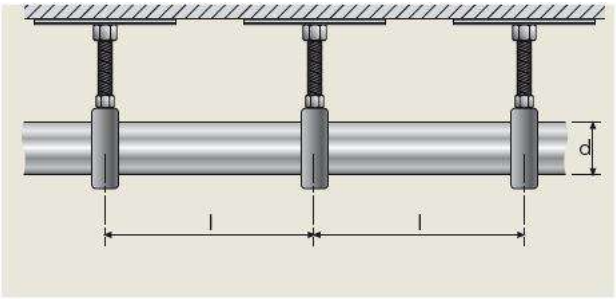
BENDING



When bent, the section remains constant instead of being reduced. WELCOFLEX pipe thus allows for the installation of long sections without joints, with a reduction in the use of fittings. It can also be bent by hand with very small bending radii (1.5xDe) using a spring and a special pipe bending machine.
Once bent, the pipe remains in the desired position, just like a metal pipe.

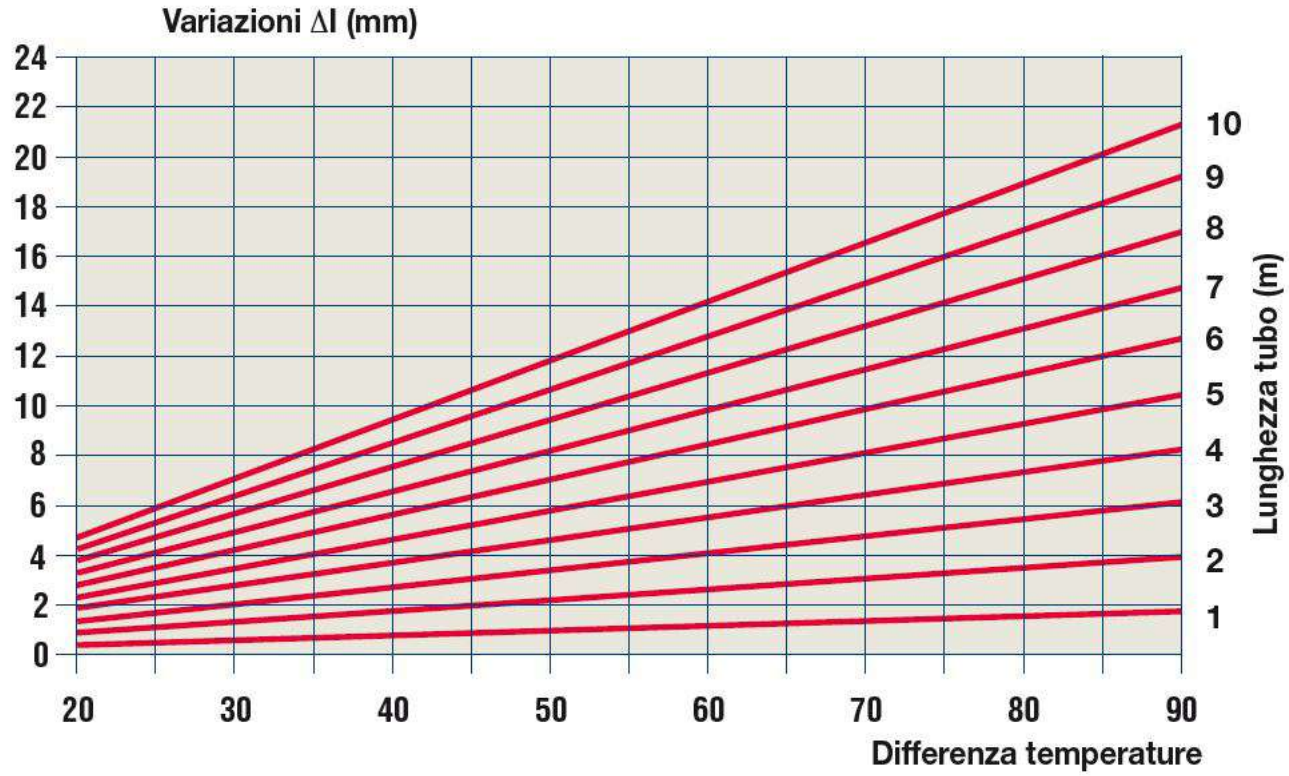
ANCHORING

Advanced dimensional stability and limited elongation allow the distance between the anchors to be greatly reduced when the pipe is installed externally.
The recommended fixing distances according to the diameter of the pipe are shown in the table below.



Recommended fixing distance in mm	
l	d
1250	16
1500	20
1750	26
2000	32
2250	40
2500	50
3000	63

EXPANSION



Thermal expansion assumes minimum linear values (0.024 mm/m°k) similar to those of metal pipes; all annoying noises due to thermal variations (for example, in zone heating systems and in couplings connected to heating bodies) are eliminated.
As with any other type of pipe, expansion (contraction and elongation) must also be considered for WELCOFLEX.
The linear expansion coefficient of WELCOFLEX remains 0.024 mm/m°k, regardless of the pipe size.
The following diagram indicates the elongation in mm as a function of the length of the pipe and the temperature difference between the fluid and the environment where the pipe is located.
The expansion force due to dilation within WELCOFLEX pipes is relatively low, so no special devices are required when the pipe is covered in concrete.
When installed under plaster, it is always advisable to use the insulated pipe (6-9 mm of expanded polyethylene) which, in addition to providing insulation, allows any expansions to be absorbed without damage.

TECHNICAL DATA

Dimensioni WELCO-Flex	14x2,0	16x2,0	16x2,25	20x2,0	20x2,5	26x3,0	32x3,0	40x3,5	50x4,0	63x4,5	Unità
Diametro nominale esterno	14	16	16	20	20	26	32	40	50	63	mm
Spessore nominale	2	2	2,25	2	2,50	3	3	3,5	4	4,5	mm
Diametro nominale interno	10	12	11,5	16	15	20	26	33	42	54	mm
Peso solo tubo (4)	104	125	134	155	185	285	393	605	870	1315	g/m
Peso tubo pieno d'acqua	183	238	238	356	362	599	924	1460	2255	3605	g/m
Volume interno	0,079	0,113	0,104	0,201	0,177	0,314	0,531	0,855	1,385	2,290	l/m
Conduttività termica solo tubo	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43	0,43	W/m°K
Conduttività termica tubo isolato	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	0,040	W/m°K
Coefficiente espansione lineare	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	0,024	mm/m°K
Scabrosità interna	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	1,5	µm
Diffusione ossigeno	0	0	0	0	0	0	0	0	0	0	mg/ld
Min. temp. d'esercizio	(1)	-45	-45	-45	-45	-45	-45	-45	-45	-45	-45
Max temp. d'esercizio	(2)	95	95	95	95	95	95	95	95	95	95
Max pressione esercizio a 95°C	10	10	10	6	10	10	10	10	10	10	bar
Picchi di pressione a 95°C	15	15	15	10	15	15	15	15	15	15	bar
Raggio di curvatura (curva libera)	5xD	5xD	5xD	5xD	5xD	5xD	5xD	(5xD)	(5xD)	(5xD)	–
Raggio di curvatura (con piegatubi)	3,5xD	1,5xD(3)	1,5xD(3)	3,5xD	3,5xD	3,5xD	3,5xD	3,5xD	3,5xD	3,5xD	–

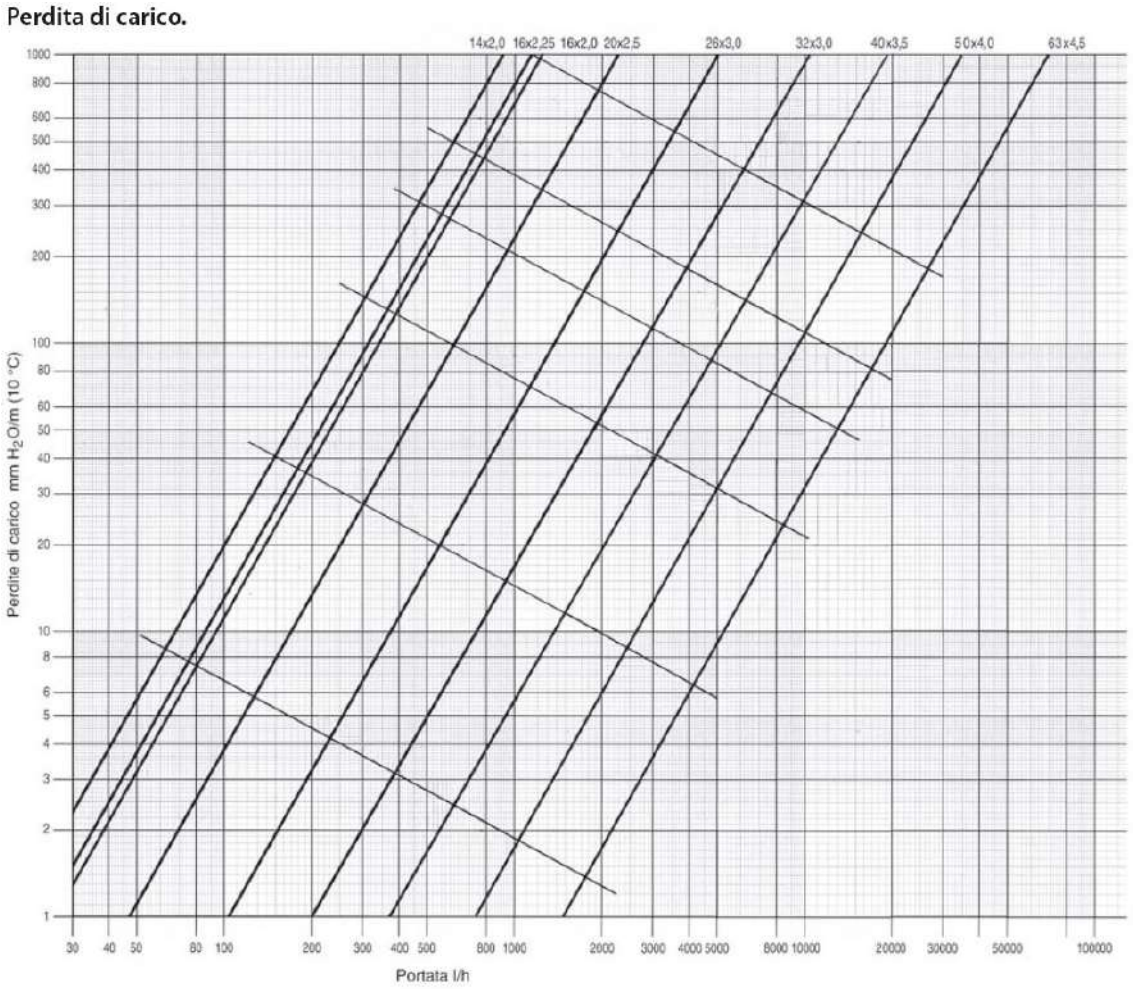
REGULATIONS

WELCOFLEX pipes comply with the following regulations and provisions:
- UNI 10954-1
- DVGW (U448)
- Italian Ministerial Decree of 21 March 1973
- Italian Ministerial Decree No. 220 of 26 April 1993
- Ministerial Memorandum no. 102, enclosure . II, part A, part B, in Italy's Official Gazette 1978
- Italian Law 46/90: rules for the safety of systems
- Italian Presidential Decree 447 of 6/12/91
- Italian Law 10/91
- Italian Legislative Decree No. 174 of 6 April 2004

CERTIFICATIONS

WELCOFLEX pipes are tested according to the new DVGW EW542 provisions and registered under the number U448, which guarantees the perfect hygienic quality of the pipe.

PRESSURE DROPS



(*) Per temperature superiori ai 10 °C applicare i seguenti fattori di correzione:
40°C : f = 0,898
70°C : f = 0,824
95°C : f = 0,788

TAB. 1 - Perdite di carico lineari R (mm c.d'a/m), localizzate H (mm c.d'a.) per δφγηξκλ κλ=1, velocità V (m/s) e portata Q (l/h) nei tubi WELCO

		DN 16		DN 20		DN 26		DN 32		DN 40		DN 50		DN 63	
H mm c.d'a	V m/s	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h	R mm c.d'a/m	Q l/h
0.5	0,1	2.2	37.4	1.7	63.6	1.2	113.1	0.8	191.1	0.7	307.9	0,48	498,5	0,39	824,0
2	0,2	7.9	74.8	5.8	127.2	4.2	226.2	3.1	382.3	2.4	615.8	1,9	997,0	0,6	1648,1
4.5	0,3	17.8	112.2	13.1	190.9	9.5	339.3	7.1	573.4	5.4	923.7	3,6	1495,5	2,8	2472,1
8	0,4	31.6	149.6	23.2	254.5	16.8	452.4	12.4	764.5	9.6	1,231.6	5,9	1994,0	4,7	3296,2
12.6	0,5	38.2	187.0	28.2	318.1	20.5	565.5	15	955.7	12	1,539.5	8,9	2492,2	7,1	4120,3
18.1	0,6	55	224.4	40.6	381.7	29.5	678.6	21.6	1,146.8	17.3	1,847.4	12,5	2991,0	10,0	4944,3
24.5	0,7	75	261.7	55.2	445.3	40.2	791.7	29.4	1,337.9	23.5	2,155.4	17,4	3489,5	13,0	5768,4
32	0,8	97	299.1	72.2	508.9	52.5	904.8	38.4	1,529.1	30.7	2,463.3	21,2	3988,0	16,2	6592,4
41.1	0,9	120	336.5	91.3	572.6	66.5	1,017.9	48.6	1,720.2	38.9	2,771.2	26,8	4486,5	20,0	7416,5
50	1.0	133	373.9	100	636.2	70	1,131.0	54	1,911.3	41	3,079.1	31,0	4985,0	24,6	8240,6
60	1.1	161	411.3	121	699.8	85	1,244.1	65	2,102.5	50	3,387.0	39,0	5483,5	29,8	9064,6
72	1.2	191	448.7	144	763.4	101	1,357.2	78	2,293.6	59	3,694.9	42,0	5982,0	34,1	9888,7
84	1.3	225	486.1	169	827.0	118	1,470.3	91	2,484.7	69	4,002.8	50,0	6480,5	39,6	10712,8
97	1.4	265	523.5	196	890.6	137	1,583.4	106	2,675.9	80	4,310.7	58,0	6979,0	44,0	11536,8
115	1.5	290	560.9	212	954.3	154	1,696.5	112	2,867.0	86	4,618.6	66,0	7477,5	50,0	12360,9
129	1.6	330	598.3	242	1,017.9	176	1,809.6	128	3,058.2	98	4,926.5	73,0	7976,1	58,0	13184,9
145	1.7	372	635.7	271	1,081.5	197	1,922.7	143	3,249.3	110	5,234.4	82,0	8474,6	64,0	14009,0
161	1.8	418	673.1	305	1,145.1	222	2,035.7	161	3,440.4	124	5,542.3	89,0	8973,1	70,0	14833,1
180	1.9	440	710.5	340	1,208.7	248	2,148.8	172	3,631.6	132	5,850.2	98,0	9471,6	76,0	15657,1
200	2.0	460	747.9	350	1,272.3	290	2,261.9	180	3,822.7	138	6,158.2	114,0	9970,1	83,0	16481,2
242	2.2	550	822.6	417	1,399.6	290	2,488.1	215	4,205.0	167	6,774.0	125,0	10967,1	94,0	18129,3
285	2.4	660	897.4	497	1,526.8	346	2,714.3	256	4,587.2	199	7,389.8	145,0	11967,0	108,0	19777,3
338	2.6	820	972.2	583	1,654.1	406	2,940.5	301	4,969.5	233	8,005.6	170,0	12961,1	134,0	21425,6
390	2.8	880	1,047.0	676	1,781.3	470	3,166.7	349	5,351.8	270	8,621.4	200,0	13958,1	150,0	23073,7
450	3.0	1009	1,121.8	740	1,908.5	520	3,392.9	380	5,734.0	290	9,237.2	235,0	14955,1	174,0	24721,8

FITTINGS

WELCOFLEX pipes can be used with WOFLEX compression fittings and EWOPREX press fittings.
Please refer to the sales catalogue or www.generalfittings.it.

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