Multilayer pipes

Technical data sheet for metal-plastic composite pipes for plumbing and heating/cooling systems (PE-RT II/Al/PE-RT II)

GENERAL FITTINGS
YOUNIQUE · ITALIAN

Contents

PE-RT II/AL/PE-RT II Multilayer pipes

PE-RT II/Al/PE-RT II multilayer pipes for plumbing, heating, cooling and compressed air systems

DESCRIPTION

The multilayer pipe features a 5-layer structure in which a butt-welded aluminium layer is sandwiched between two layers of PE-RT II (advanced high-density polyethylene with enhanced temperature resistance) and bonded to them using two layers of adhesive.
Thanks to this feature, the pipes in the TB00.20 and TB00.90 series represent a perfect combination of the properties of plastic (cross-linked polyethylene with high mechanical strength) and ductile metal (highly flexible aluminium), in which the advantages of PE-RT II are combined with those of aluminium to create a product with extraordinary and wide-ranging qualities.
PE-RT II offers chemical resistance, corrosion resistance, lightness and hygienic properties, and ensures that the surface in contact with the transported fluid is very smooth and polished, thereby reducing pressure drops and preventing scaling.
The presence of aluminum allows the pipe to be modeled very easily in order to significantly speed up installation and prevent the passage of oxygen inside the pipeline. The pipe is suitable for sanitary, heating, cooling and compressed air systems.

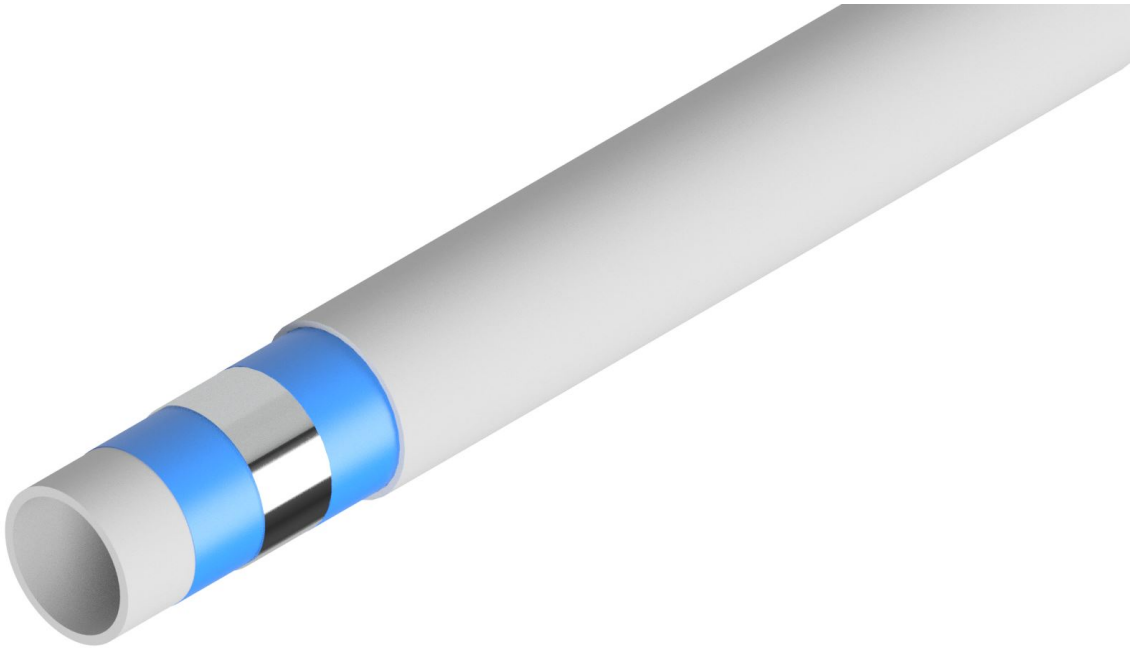
ADVANTAGES

- Excellent sound insulation: the elasticity of advanced polyethylene (PE-RT II) ensures excellent vibration absorption
- Corrosion resistance
- Lightness: pipes are much lighter than metal pipes
- Hygiene: the materials used are non-toxic and certified for the transport of drinking water
- Hygiene, absence of encrustations and fungi (the extreme smoothness of the internal surface reduces the possibility of obstructions caused by the growth of encrustations and fungi)
- Reduced pressure drops: the smooth and polished internal surface reduces pressure drops and avoids the formation of encrustations
- Flexibility: the presence of aluminum with a high degree of yield allows the tube to be modeled very easily
- Reduced thermal expansion: thermal expansion is limited to 0.026mm / m °C
- Chemical and electrochemical resistance (as PE-RT II is a poor electrical conductor, the pipe is not susceptible to damage caused by stray currents)
- Barrier to light and oxygen: the butt-welded aluminum layer forms an oxygen barrier that promotes the formation of algae, fungi and corrosion
- Ideal for seismic areas thanks to its flexibility and ability to attenuate vibrations

FIELDS OF APPLICATION

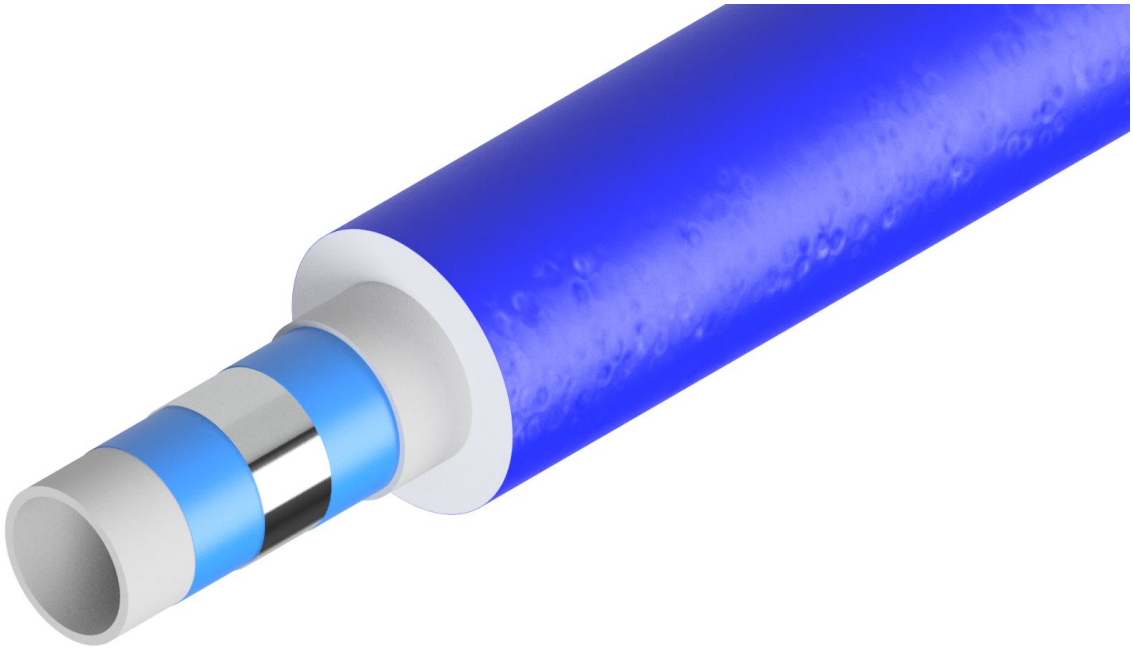
APPLICATIONS		T. of the system	Press. Max
	drinking water	-20°C/+95°C	10 bar
	hot sanitary water	-20°C/+95°C	10 bar
	cooling	-20°C/+95°C	10 bar
	conditioning	-20°C/+95°C	10 bar
	heating	-20°C/+95°C	10 bar
	floor heating	-20°C/+95°C	10 bar
	irrigation	-20°C/+95°C	10 bar

COMPOSITION OF BARE PIPE



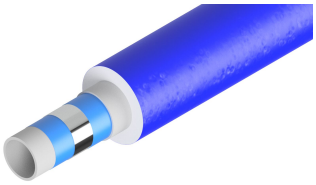
LAYER COMPOSITION
An inner pipe made of advanced high-density polyethylene with enhanced temperature resistance (PE-RT II)
A layer of high-quality adhesive to ensure a seamless bond between the aluminium pipe and the PE-RT II inner pipe
An aluminum tube, longitudinally welded and electronically controlled
A layer of high-quality adhesive to ensure a seamless bond between the aluminium pipe and the PE-RT II inner pipe
An external pipe made of cross-linked polyethylene produced using an advanced high-density polyethylene catalyst, with enhanced temperature resistance (PE-RT II)

COATED PIPE COMPOSITION

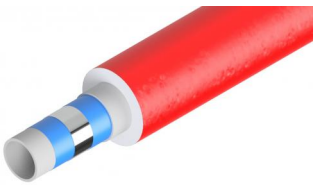


LAYER COMPOSITION
An advanced high-density polyethylene pipe with enhanced temperature resistance (PE-RT II)
A layer of high-quality adhesive to ensure a seamless bond between the aluminium pipe and the PE-RT II inner pipe
An aluminum tube, longitudinally welded and electronically controlled
A layer of high-quality adhesive to ensure a seamless bond between the aluminium pipe and the PE-RT II inner pipe
An external pipe made of high-density polyethylene with enhanced temperature resistance (PE-RT II)
Coating: layer of insulating material, made of closed cell expanded polyethylene, which increases the energy efficiency of the installation, and further improves the already reduced noise level.

BLUE-COATED PIPE (PE-RT/AL/PE-RT)



RED-COATED PIPE (PE-RT/AL/PE-RT)



PE-RT II

PE-RT II is an advanced type of high-density polyethylene designed to withstand high temperatures and pressures over long periods.
Unlike PE-X, PE-RT II has a unique cross-linked molecular structure formed during polymerisation.
The main features are:
- Thermal resistance: it can operate continuously with high emergency peaks, making it ideal for heating and domestic hot water
- Flexibility: as it is very pliable, it is easy to install
- Sustainability: 100% recyclable as it does not undergo irreversible chemical cross-linking processes
- Durability: designed to last over 50 years, with excellent resistance to corrosion and limescale build-up

PERMEABILITY TO OXYGEN

General Fittings pipe is impermeable to any diffusion phenomenon, as the intermediate aluminum structure guarantees a zero passage of gases inside the tube itself.
This feature makes it the perfect solution in any heating system that includes aluminum exchangers or metal tube bundles sensitive to oxygen diffusion.
General Fittings multilayer pipes can also be used in underfloor heating systems in compliance with the provisions of the UNI EN1264 standard which prescribes an oxygen diffusion barrier on the pipes for radiant floor heat systems, limiting it to 0.32 mg / m2 per day in order to avoid the reduction of the useful life of the pipe itself.

ADHESIVE PRIMER

The aluminium foil is bonded to the inner and outer PE-RT II layers using two layers of adhesive.
The latter has been specifically developed to maximise adhesion between PE-RT II and aluminium and to ensure that the bond strength does not deteriorate over time or at high temperatures.
Thanks to the adhesive, the two layers of PE-RT II and the aluminium layer form a single unit with superior properties compared to the individual components.

COVERING (in case of coated pipe)

The layer of insulating material, made of closed cell polyethylene foam, in addition to increasing the energy efficiency of the installation, further improves the already reduced noise level of systems made of synthetic materials.
The insulating section is made up of a layer of closed cell expanded polyethylene (CFC-free) protected by a characteristic red, blue, gray and white external covering film.
N.B. It is strongly recommended to always consult a technician to define the insulation thicknesses.

APPLICATION CLASSES

Class	Design Temperature	TIMEb at TD	T max	Time at T max	T mal	Time at T mal	Typical Field of application
1a	60	49	80	1	95	100	Hot water (60 °C)
2a	70	49	80	1	95	100	Hot water (70 °C)
4b	20 plus cumulative	2.5	70	2.5	100		Underfloor heating and low temperatures radiators
4b	40 plus cumulative	20	70	2.5	100		Underfloor heating and low temperatures radiators
4b	60	25	70	2.5	100		Underfloor heating and low temperatures radiators
5b	20 plus cumulative	14	90	1	100		High-temperature radiators
5b	60 plus cumulative	25	90	1	100		High-temperature radiators
5b	80	10	90	1	100		High-temperature radiators

TECHNICAL DATA

TECHNICAL DATA	
Type of material	PE-RT II/Al/PE-RT II
Application class (EN ISO 21003)	CL 1,2,4,5/10 bar
Maximum temperature	-20 °C (with the use of glycol in a maximum percentage of 35%)
Maximum operating temperature (EN ISO 21003-1)	90 °C
Peak temperature (EN ISO 21003-1)	95°C
Maximum working pressure (EN ISO 21003-1)	10 bar
Thermal expansion coefficient	0,026 mm/m K
Thermal conductivity	0,45 W/m K
Inner pipe surface roughness	0,007 mm
Permeability to oxygen	0 mg/l
Resistance to water vapor diffusion	μ > 5000
insulation (EN 13501-1 LNE P126686)	BL-s1,d0

DIMENSIONS

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
TYPE OF PLASTIC MATERIAL (5 layers)	PE-RT II/AL/PE-RT II	
EXTERNAL DIAMETER mm	16	20
INTERNAL DIAMETER mm	12	16
THICKNESS mm	2	2

VOLUME AND WEIGHT

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
VOLUME CONTENT OF WATER l / m	0.113	0.201

CONDUCTIVITY AND EXPANSION

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
COEFFICIENT OF THERMAL CONDUCTION w / mk	0.45	
COEFFICIENT OF LINEAR THERMAL EXPANSION mm / m • k	0.026	
INNER PIPE SURFACE ROUGHNESS mm	0.007	

TEMPERATURE AND PRESSURE

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
MAXIMUM WORKING PRESSURE BAR °C	90	
MINIMUM OPERATING TEMPERATURE °C	-20	
PEAK TEMPERATURE (malfunction) °C	95	
MAXIMUM OPERATING PRESSURE (bar) AT 20°C (when used with 5T00 series fittings)	10	

BENDING RADIUS

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
MANUAL mm	80	100
WITH INTERNAL SPRING mm	45	60
WITH BENDER mm	X	

FEATURES

FEATURES	
Structure	Non-cross-linked (more flexible)
Heat resistance	Excellent (up to 95°C)
Flexibility	High
Fatigue resistance	Very high
Ideal application	Underfloor heating, sanitary

SHEATH TECHNICAL CHARACTERISTICS

NOMINAL DIAMETER OF THE PIPE	16x2.0	20x2.0
OPERATING TEMPERATURE	-30 °C ; + 95°C	
DENSITY	33 Kg/m3	
COEFFICIENT OF THERMAL CONDUCTIVITY (at 40 °C)	0.0397 W/(m*K)	
RESISTANCE TO THE DIFFUSION OF WATER VAPOR	> 6000	
FIRE RESISTANCE CLASSIFICATION	class 1	

REGULATIONS

• ISO 21003-2
It is the European standard for multilayer pipes for hot and cold water in installations inside homes. This legislation specifies the general characteristics of pipes and multilayer systems for conveying hot and cold water inside homes in heating and drinking water systems

CERTIFICATIONS

KIWA-DVGW in accordance with UNI EN ISO 21003.

The new regulation requires the marking to report only the classes of applications and temperatures of the pipe project. Any other indication of temperature and pressure is confusing

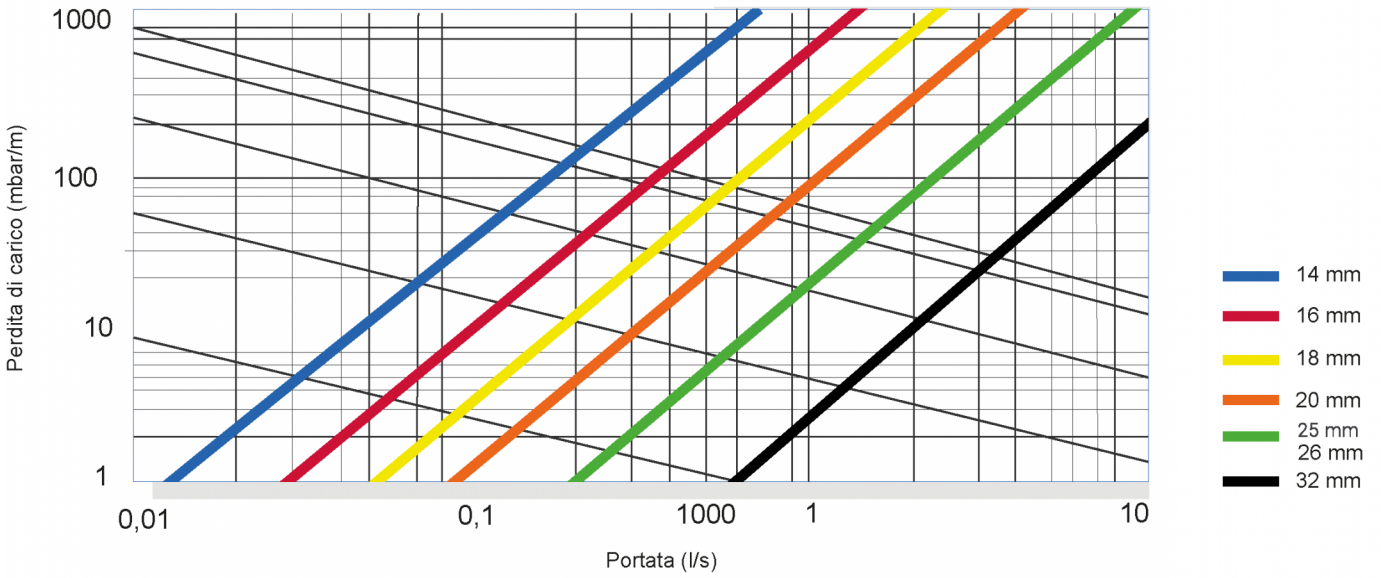
General Fittings pipe, certified by prestigious bodies, finds its application in continuous hot water supplies at 70 °C.

General Fittings pipe is therefore guaranteed for continuous operation of hot water supply at 70 °C for 49 years and, for one year at 80 °C, for 100h at 95 °C, the latter considered as a malfunction temperature.

MARKINGS

Pex/Sheath	MARKING
PE-RT II/Al/PE-RT II pipe	>I< m A03 General Fittings Ø PE-RT||/AL/PE-RT|| Produced according to EN ISO 21003 Cl 1,2,4,5/10 bar T max 90°C - Sanitary and Heating - Made in Italy Data/Time/Machine Nr./Batch Nr.
Codes: TB0090B162000A, TB0090B202000A, TB0090R162000A, TB0090R202000A TB0020B202000H, TB0020B263000H	>I< m A03 General Fittings Dn. - 6mm L10/91 CL.1 - Made in Italy - DATA ORA – Lotto MARCATURA TUBO/MARKING PIPE

PRESSURE DROPS



FITTINGS

Both radial press fittings and compression fittings with a nut and cone are available for use with PE-RT II/AL/PE-RT II multilayer pipe.
Given the wide range of fittings offered by General Fittings, we recommend that you refer to the commercial catalogue or the website www.generalfittings.it.

THERMAL EXPANSION

During the design and installation phases of PE-RT II/Al/PE-RT II multilayer pipes, the phenomenon of thermal expansion must not be overlooked.
Through the table below it is possible to make the appropriate assessments. Thermal expansion can be evaluated using the formula: $\Delta L = \alpha a \times L \times \Delta t$ where
ΔL = expansion expressed in mm
$a\alpha$ = coefficient of linear thermal expansion, which corresponds to 0.026 mm / m K
L = length of the pipe expressed in m
Δt = temperature variation expressed in degrees Kelvin [K] or Celsius [°C]

PIPE LENGTH (m)	TEMPERATURE DIFFERENCE (K)							
PIPE LENGTH (m)	10	20	30	40	50	60	70	80
1	0.26	0.52	0.78	1.04	1.3	1.56	1.82	2.08
2	0.52	1.04	1.56	2.08	2.6	3.12	3.64	4.16
3	0.78	1.56	2.34	3.12	3.9	4.68	5.46	6.24
4	1.04	2.08	3.12	4.16	5.2	6.24	7.28	8.32
5	1.3	2.6	3.9	5.2	6.5	7.8	9.1	10.4
6	1.56	3.12	4.68	6.24	7.8	9.359	10.92	12.48
7	1.82	3.64	5.46	7.28	9.1	10.92	12.74	14.56
8	2.08	4.16	6.24	8.32	10.4	12.48	14.56	16.64
9	2.34	4.68	7.02	9.359	11.7	14.04	16.38	18.72
10	2.6	5.2	7.8	10.4	13	15.6	18.2	20.8
	LINEAR EXPANSION (mm)							

THERMAL AND ACOUSTIC INSULATION

The multilayer pipes for hot and cold water (or other heat transfer fluid) must be adequately insulated to comply with specific regulations in terms of thermal and acoustic insulation as well as to absorb in cases where any expansion of the pipeline is possible. Since the thickness and sizing varies according to the concerned environments, the minimum thickness for the insulation materials is shown in the table.
Once the diameter of the pipe and the value of the useful thermal conductivity of the insulation (expressed in W / m ° C at a temperature of 40 ° C) are known, the minimum thicknesses to be applied in the most common cases can be obtained.
All ducts must be acoustically insulated to avoid the transmission of noise; it is always suggested to detach the risers from the building, where possible use specific support collars and bandage them with materials suitable for reducing acoustic bridges.

Thermal conductivity of the insulation (W / m °C)	Outside diameter of the pipe (mm)					
Thermal conductivity of the insulation (W / m °C)	< 20	From 20 to 39	From 40 to 59	From 60 to 79	From 80 to 99	> 100
0.030	13	19	26	33	37	40
0.032	14	21	29	36	40	44
0.034	15	23	31	39	44	48
0.036	17	25	34	43	47	52
0.038	18	28	37	46	51	56
0.040	20	30	40	50	55	60
0.042	22	32	43	54	59	64
0.044	24	35	46	58	63	69
0.046	26	38	50	62	68	74
0.048	28	41	54	66	72	79
0.050	30	42	56	71	77	84

FLUIDS AND REAGENTS

Fluid	%	20°C	60°C	80°C
Acetic acid	60	C		
Glacial acetic acid	>96	C	L	
Vinager	-	C		-
Acetone	liquid	S	-	L
Adipic acid	Sol. Sat.	C		-
Air	-	C		
Acetate silver	Sol. Sat.	C		-
Nitrate silver	Sol. Sat.	C		-
Allyl Alcohol	liquid	-	NC	-
Methyl alcohol	5	C		-
Methyl alcohol	liquid	C		-
Alum	Sol. Sat.	C		-
Aluminium (chlorate)	Sol. Sat.	C		-
Aluminum (fluorinated)	Sol. Sat.	C		-
Aluminum (nitrate)	Sol. Sat.	C		-
Aluminum (potassium sulf.)	Sol. Sat.	C		
Ammonia	Sol. Sat.	C		-
Ammonia	gas	C		-
Ammonium Carbonate	Sol. Sat.	C		-
Ammonium (chloride)	Sol. Sat.	C		-
Ammonium (carbonate)	Sol. Sat.	C		-
Ammonium (nitrate)	Sol. Sat.	C		
Ammonium (sulfate)	Sol. Sat.	C		
Amyl Acetate	liquid	L		
Amile alcohol	liquid	C		-
aqua regia	HCl/HNO33/1	NC		
Barium (bromate)	Sol. Sat.	C		
Barium (carbonate)	Sosp.	C		
Barium (chloride)	Sol. Sat.	C		
Barium (hydroxide)	Sol. Sat.	C		

Fluid	%	20°C	60°C	80°C
Barium (sulfate)	Sosp.	C		
Barium (sulphite)	Sol. Sat.	C		
Benzaldehyde	liquid	L	NC	
Benzene	liquid	C	-	
Benzoic (acid)	Sol. Sat.	C		-

Fluid	%	20°C	60°C	80°C
Beer	-	C		
Bismuth carbonate	Sol. Sat.	C		
Borax	Sol.	C		
Borax	Sol. Sat.	C		
Boric (acid)	Sol. Sat.	C		
Bromine	gas	NC		
Bromine	liquid	NC		
Butane	gas	C		-
n-Butane	liquid	C	L	-
Butyl (acetate)	Liquid	L		-
Butyl (glycol)	liquid	C		-
Butyric (acid)	liquid	L		-
Calcium (carbonate)	Sosp.	C		
Calcium (chlorate)	Sol. Sat.	C		
Calcium (hydroxide)	Sol. Sat.	C		-
Calcium (hypochlorite)	Solution	C		-
Calcio (nitrato)	Sol. Sat.	C		
Calcium (sulfate)	Sosp.	C		
Camphor (oil)	Liquid	NC		
Carbon (dioxide)	Sol. Sat.	C		-
Carbon (dioxide)	gas	C		-
Carbon (monoxide)	gas	C		-
Carbon (tetrachloride)	Liquid	L	NC	
Chlorine	gas	NC		-
Chlorine	Sol. Sat.	NC		-
Chloroform	liquid	NS		-
Hydrochloric acid	<25	C		
Hydrochloric acid	<36	C		-
Acid chromium	Sol. Sat.	C		-
Acid chromium	50	C	L	-
Citric acid	Sol. Sat.	C		

Fluid	%	20°C	60°C	80°C
Ferric chloride	Sol. Sat.	C		
Ferric nitrate	Sol. Sat.	C		-
Ferric sulfate	Sol. Sat.	C		-
Ferrous chloride	Sol. Sat.	C		-
Ferrous sulfate	Sol. Sat.	C		-
Fluorine gas	Sol. Sat.	NC		
Formic (acid)	10-100	C		-
Phosphoric (acid)	Up to 50	C		-
Freon	Sol.	C	-	
Diesel fuel	liquid	C	L	-
Glucose	Sol.	C		
Glycerine	liquid	C		-
Hydrogen	gas	C		-
Hydrogen peroxide	10	C		-
Hydrogen peroxide	30	C	L	-
Hydrogen peroxide	90	C	NC	-
Hydrogen sulphide	gas	C		-
Iodine	Sol. Sat.	NC		-
Milk	Sol.	C		
Lactic (acid)	liquid	C		-
Magnesium carbonate	Sosp.	C		-
Magnesium chlorate	Sol. Sat.	C		-
Magnesium hydroxide	Sol. Sat.	C		-
Magnesium nitrate	Sol. Sat.	C		-
Magnesium sulfate	Sol. Sat.	C		-
Naphtha	Sol.	C		L
Nitric acid	0-35	C	L	-
Nitric acid	>40	NC		-
Mineral oils	Sol.	C		L
Vegetable oils	liquid	C	L	-
Oxygen	gas	C	L	-
Ozone	Sol. Sat.	L	NS	-

Fluid	%	20°C	60°C	80°C
Picric (acid)	Sol. Sat.	C	L	-
Potassium dichromate	Sol. Sat.	C		-

Fluid	%	20°C	60°C	80°C
Potassium bicarbonate	Sol. Sat.	C		-
Potassium dichromate	Sol. Sat.	C		-
Potassium bisulfate	Sol. Sat	C		-
Potassium bromide	Sol, Sat.	C		-
Potassium carbonate	Sol. Sat.	C		-
Potassium chlorate	Sol. Sat.	C		-
Potassium chloride	Sol. Sat.	C		-
Potassium hydroxide	Up to 50	C		
Potassium hypochlorite	Sol.	C	L	-
Potassium nitrate	Sat. Sol.	C		-
Potassium orthophosphate	Sat. Sol.	C		-
Potassium permanganate	Sat. Sol.	C		-
Potassium sulfate	Sat. Sol.	C		-
Propionic (acid)	Up to 50	C		-
Copper chloride	Sol. Sat.	C		
Cyanate copper	Sol. Sat.	C		-
Copper nitrate	Sol. Sat.	C		-
Copper sulfate	Sol. Sat.	C		-
Salicylic (acid)	Sol. Sat.	C		-
Sodium acetate	Sol. Sat.	C		-
Sodium benzoate	Sol. Sat.	C		-
Sodium bicarbonate	Sol. Sat.	C		-
Sodium bicarbonate	Sol. Sat.	C		-
Sodium bisulfate	Sol. Sat.	C		-
Sodium bromide	Sol. Sat.	C		-
Sodium carbonate	Up to 50	C		-

Fluid	%	20°C	60°C	80°C
Sodium chloride	Sol. Sat.	C		-
Sodium chromate	Sol. Sat.	C		-
Sodium hydroxide	From 1 to 60	C		-
Sodium hypochlorite	From 10 to 15	C		-

Fluid	%	20°C	60°C	80°C
Sodium nitrate	Sat. Sol.	C		-
Sodium nitrite	Sat. Sol.	C		-
Sodium phosphate	Sol. Sat.	C		-
Sodium silicate	Sol. Sat.	C		-
Sodium sulfate	Sol. Sat.	C		-
Sodium sulfate	Sol. Sat.	C		-
Sulfuric acid	Up to 50	C		-
Sulfuric acid	From 50 to 98	C	L	NC
Fruit juice	Sol.	C		-
Photographic development	Sol.	C		-
Acid tannic	Sol.	C		-
Toluene	liquid	C	L	-
Trichlorethylene	Liquid	L	NC	
Urea	Sol. Sat.	C		-
Urine	Sol.	C		-
Wine	Sol.	C		-
Zinc carbonate	Sosp.	C		-
Chlorinated zinc	Sol. Sat.	C		-
Zinc nitrate	Sol. Sat.	C		-
Zinc oxide	Sosp.	C		-
Zinc sulfate	Sol. Sat.	C		-

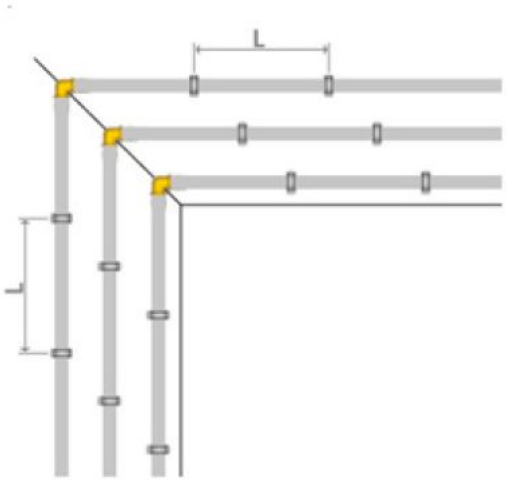
LEGEND	
C	compatible
L	limitedly compatible
NC	Incompatible

PIPES INSTALLATION

To facilitate quick sizing of the sanitary water network, an hypothesis is reported below (load units serving the various users).
In the case of above-average adduction for connection to individual users, check with the pressure drop diagrams that the minimum requirements for flow rate, pressure drop and water speed are met.

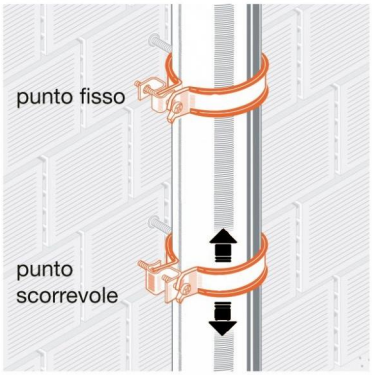
CONSUMPTION	CONNECTOR	Ø EXTERNAL PIPE	Ø INTERNAL PIPE
Kitchen sink	1/2"	16x2.0 mm	Ø 12mm
Service sink	1/2"	16x2.0 mm	Ø 12mm
Bathroom sink	1/2"	16x2.0 mm	Ø 12mm
Bidet	1/2"	16x2.0 mm	Ø 12mm
Shower	3/4"	20x2.0 mm	Ø 16mm
Cabinet	3/4"	20x2.0 mm	Ø 16mm
Distribution rising columns	3/4"	20x2.0 mm	Ø 16mm

To lay the pipes, it is necessary to follow some simple precautions concerning the connection of the pipe using the appropriate fittings and adapters, the bends of the pipes, the protection from sunlight and possible damage:
- the connection of the pipes to the distribution manifolds or to the elbows for the connection of taps must be made by means of fittings and adapters of suitable size for the pipe used
- the connection of the pipes to the manifold must be carried out in such a way as to avoid that the components are subjected to permanent mechanical stress
- all the materials used to manufacture the pipes expand when heated and shrink when cooled: for this reason, the length variation (ΔL) generated by temperature variations must always be taken into account during installation (see paragraph " Thermal expansion ")
- When installing exposed pipes, the length of the pipes must be calculated based on the system requirements, and the distances between the pipe supports must be carefully evaluated. The maximum distance between each support (L) depends on the diameter of the pipe used and is summarized in the following table.



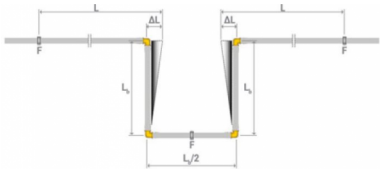
Ø EXTERNAL OF THE PIPE mm	MAX DISTANCE BETWEEN EACH SUPPORT (L) mm
16	1000
18	1100
20	1250
25	1500
26	1500
32	2000
40	2250
50	2500
63	2760
75	2750
90	2750

The supports made in visible installations have two functions: they support the piping and allow its thermal expansion.
The supports can be fixed, when they block the pipe, or sliding, when they allow the pipe to slide caused by thermal expansions.



In long sections of straight piping, to absorb any variations in length, it is advisable to insert at least one expansion elbow every 10m of pipe, as shown in the following diagram. For pipes with a diameter equal to or greater than 32mm, the expansion curves are mandatory.

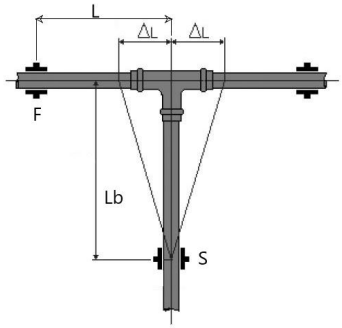
L = Distance between fixed support and expansion curve
ΔL = Change in pipe length
F = Fixed support
Lb = Length of the expansion arm



The minimum length of the expansion arm (Lb) can be calculated using the following formula Lb = C x √ ØxΔL
Lb = minimum length of the expansion arm in mm
C = material constant (for multilayer pipe the value is 33)
Ø = external diameter of the pipe in mm
ΔL = Change in pipe length in mm

When making the expansion bends, it is essential to use fittings and correctly position the fixed supports and sliding supports as shown in the following diagram.
It is advisable to use expansion elbows every time the pipeline undergoes a change of direction

L = Distance between fixed support and expansion curve
ΔL = Change in pipe length
F = Fixed support
S = Sliding support
Lb = Length of the expansion arm



CAUTIONS

Metal-plastic composite pipes require certain precautions to ensure their durability and functionality:
• keep the pipe in the appropriate packaging and store in covered, dry places to prevent moisture from damaging it;
• do not expose directly to sunrays; General Fittings multilayer pipe can be freely laid on sight inside the buildings. However, direct exposure to UV rays must be avoided as they deteriorate the polyethylene by oxidizing the surface;
• always cut the pipe to be installed with the appropriate tools capable of making a clean cut, perpendicular to the axis of the pipe and without burrs;
• after each cutting operation, and before putting on the fitting, calibrate with the appropriate tool and lubricate the sealing elements on the hose holder;
• avoid the formation of ice inside the pipe, because the expansion due to the change of state could damage it irreparably;
• avoid storage at temperatures below -30 °C;
• the pipe must never come into contact with open flames;
• once installation is complete, carry out an acceptance test at a pressure equal to 1.5 times the operating pressure;
• the bending radius when laying the pipes must be greater than 5 times the external diameter of the pipe; this value can drop to 3 times the external diameter of the pipe with pipe bending bender;
• two consecutive fittings must be installed at a sufficient distance not to generate mutual stresses on all components, both during installation and during the operation of the system;
• in visible installations the piping must always be protected from ultraviolet rays, which can alter the chemical-physical characteristics;
• prevent the piping from being exposed for long periods to solar radiation or fluorescent lamps;
• if the pipe is chased without a protective sheath, it must be covered with a screed with a thickness of at least 15 mm to avoid cracks in the plaster due to thermal expansion;
• avoid as much as possible to install concealed fittings. If this is not possible, make the fitting inspectable or protect it from contact with building material and keep track of its position in the project documentation;
• after laying the pipes and before any coverage, a pressure test of the system should be performed in order to immediately highlight any leaks;

• the pressure test must be followed by the protection of the sheaths by covering with cement in order to avoid crushing of the piping or alteration of the laying;

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