

R977, R977I

PE-RT/AL/PE-RT multilayer Pipes



Water Management Radiant Systems Energy Management

Datasheet
1016EN 10/2019



R977

Multilayer pipes R977 consist of an inner PE-RT layer (Polyethylene with increased Temperature Resistance), an aluminum middle layer welded lengthwise (head-head) with laser/TIG technology and an outer white PE-RT layer. The adhesive middle layers join the aluminum and PE-RT layers homogeneously.

The PE-RT used for both the outer layer and the inner layer is type II, which is of the type with superior mechanical properties as defined in the ISO 24033, ISO 22391 and DIN 16833 standards.

The aluminum layer provides a safe barrier against oxygen and other gases along with an outstanding resistance to crushing.

Multilayer pipes R977 are fit for domestic water, heating and cooling systems according to standard EN 21003.

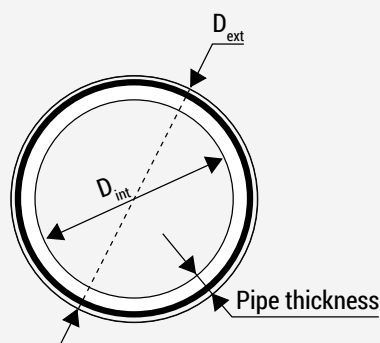
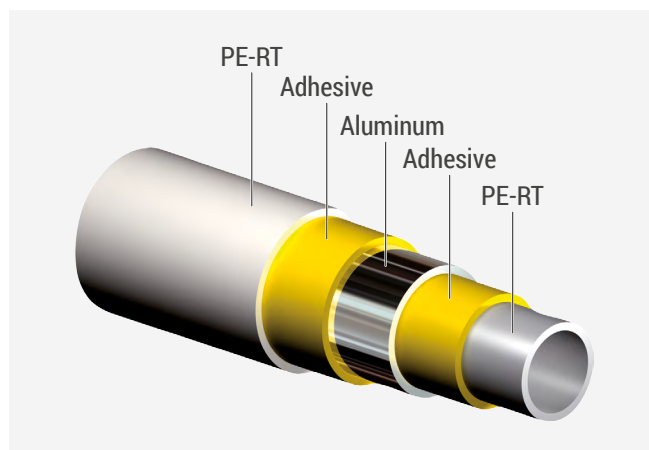
Versions and product codes R977

Pipe rolls

PRODUCT CODE	SIZE [mm]	PACK [m]
R977Y122	16 x 2	100
R977Y123	16 x 2	200
R977Y125	16 x 2	240
R977Y142	20 x 2	100
R977Y173	26 x 3	50
R977Y184	32 x 3	25

➤ Technical data R977

- Application classes (EN ISO 21003-1): 2, 4, 5
- Max. working temperature (EN ISO 21003-1): 95 °C
- Max. working pressure (EN ISO 21003-1): 10 bar
- Density: 0,941 g/cm³ (ASTM D1505)
- Thermal expansion coefficient: 0,026 mm/m K
- Thermal conductivity: 0,43 W/m K
- Surface roughness: 0,007 mm
- Permeability to oxygen: 0 mg/l



PIPE [mm]	D _{ext} [mm]	D _{int} [mm]	PIPE THICKNESS [mm]	ALUMINUM THICKNESS [mm]	WEIGHT [g/m]	WATER VOLUME [l/m]	BENDING MINIMUM RADIUS	
							without pipe bender [mm]	with pipe bender [mm]
16x2	16	12	2	0,20	107	0,113	5 x D _{ext}	4 x D _{ext}
20x2	20	16	2	0,25	146	0,201	5 x D _{ext}	4 x D _{ext}
26x3	26	20	3	0,30	256	0,314	5 x D _{ext}	4 x D _{ext}
32x3	32	26	3	0,40	349	0,531	5 x D _{ext}	4 x D _{ext}



R977I

Multilayer pipes with insulation coating R977I consist of an inner PE-RT layer (Polyethylene with increased Temperature Resistance), an aluminum middle layer welded lengthwise (head-head) with laser/TIG technology and an outer white PE-RT layer. The adhesive middle layers join the aluminum and PE-RT layers homogeneously.

The PE-RT used for both the outer layer and the inner layer is type II, which is of the type with superior mechanical properties as defined in the ISO 24033, ISO 22391 and DIN 16833 standards.

The insulation coating, made with closed-cell polyethylene foam, enhances the system energy efficiency and further reduces the noise level of systems made with synthetic materials.

The insulation section consists of a closed-cell polyethylene foam layer (CFC-free) protected by a red special outer film.

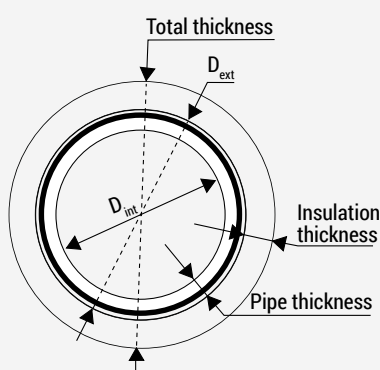
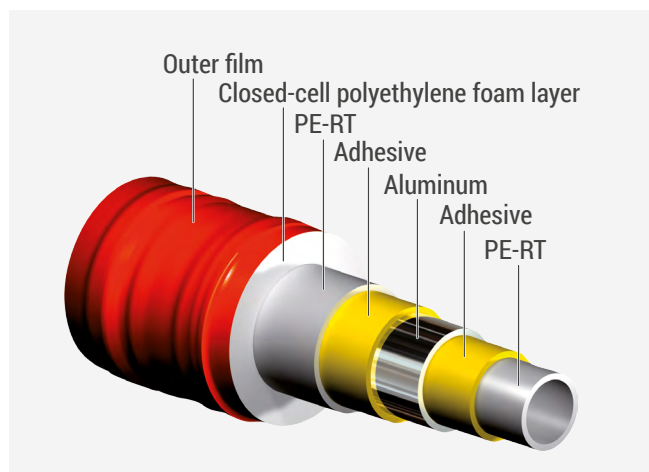
➤ Versions and product codes R977I

Pipe rolls

PRODUCT CODE	SIZE [mm]	PACK [m]	INSULATION THICKNESS [mm]
R977IY220	16 x 2	50	6
R977IY240	20 x 2	50	10
R977IY270	26 x 3	25	10
R977IY280	32 x 3	25	10

► Technical data R977I

- Application classes (EN ISO 21003-1): 2, 4, 5
- Max. working temperature (EN ISO 21003-1): 95 °C
- Max. working pressure (EN ISO 21003-1): 10 bar
- Densità: 0,941 g/cm³ (ASTM D1505)
- Thermal expansion coefficient: 0,026 mm/m K
- Thermal conductivity: 0,43 W/m K
- Surface roughness: 0,007 mm
- Permeability to oxygen: 0 mg/l
- Resistance to water vapor diffusion: $\mu > 5000$
- Reaction to fire: class 1 (UNI 9177)



PIPE [mm]	D _{ext} [mm]	D _{int} [mm]	PIPE THICKNESS [mm]	TOTAL THICKNESS [mm]	INSULATION THICKNESS [mm]	INSULATION R [m ² K/W]	WEIGHT [g/m]	WATER VOLUME [l/m]	BENDING MINIMUM RADIUS	
									without pipe bender [mm]	with pipe bender [mm]
16x2	16	12	2	28	6	0,150	144	0,113	5 x D _{ext}	4 x D _{ext}
20x2	20	16	2	40	10	0,225	204	0,201	5 x D _{ext}	4 x D _{ext}
26x3	26	20	3	46	10	0,225	328	0,314	5 x D _{ext}	4 x D _{ext}
32x3	32	26	3	52	10	0,225	420	0,531	5 x D _{ext}	4 x D _{ext}

► Fittings

PE-RT/AL/PE-RT multilayer pipes can be combined to mechanical-pressure, compression or press fittings. All fittings include a separator that insulates the pipe aluminum from the fitting to prevent galvanic corrosion.

NOTE. Given the wide range of fittings available, we recommend referring to the latest version of our catalog for sizes and product codes along with the corresponding range of application.

► Thermal expansions

Always take into account thermal expansion for planning and installation of PE-RT/AL/PE-RT multilayer pipes. Use the chart below to carry out proper evaluations.

Thermal expansion can be determined by applying the formula $\Delta l = \alpha \times L \times \Delta t$

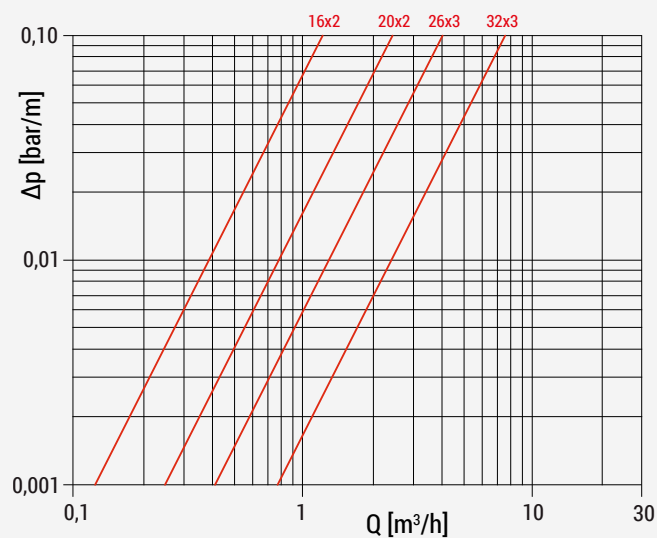
where:

- Δl = expansion expressed in mm
- α = linear thermal expansion coefficient corresponding to 0,026 mm/m K
- L = pipe length expressed in m
- Δt = temperature variation expressed in Kelvin [K] or Celsius [°C] degrees

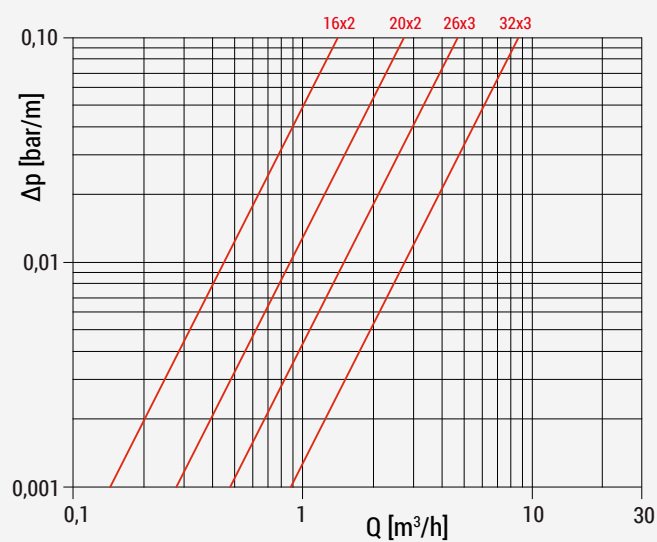
PIPE LENGTH [m]	TEMPERATURE DIFFERENCE [K]							
	10	20	30	40	50	60	70	80
1	0,26	0,52	0,78	1,04	1,3	1,56	1,82	2,08
2	0,52	1,04	1,56	2,08	2,6	3,12	3,64	4,16
3	0,78	1,56	2,34	3,12	3,9	4,68	5,46	6,24
4	1,04	2,08	3,12	4,16	5,2	6,24	7,28	8,32
5	1,3	2,6	3,9	5,2	6,5	7,8	9,1	10,4
6	1,56	3,12	4,68	6,24	7,8	9,36	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	9,36	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]								

➤ Losses of pressure

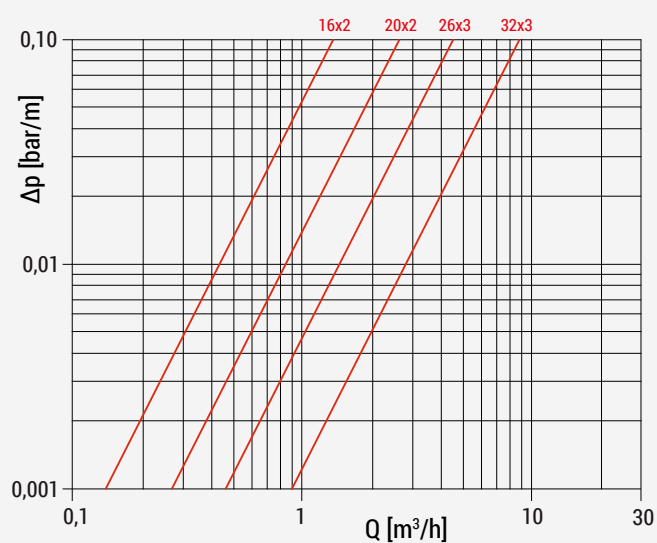
TEMPERATURE = 10 °C



TEMPERATURE = 60 °C



TEMPERATURE = 80 °C



► Classification of working conditions (EN ISO 21003-1)

The performance specifications for pipe-based systems complying with EN ISO 21003-1 refer to a project with a 50-year operational life.

RANGE OF APPLICATION	WORKING TEMPERATURE T_D [°C]	DURATION OF T_D [years]	MAX WORKING TEMPERATURE T_{MAX} [°C]	DURATION OF T_{MAX} [years]	FAILURE TEMPERATURE T_{FAIL} [°C]	DURATION OF T_{FAIL} [h]
CLASS 2 Domestic hot water (70 °C)	70	49	80	1	95	100
CLASS 4 Floor heating and low-temperature systems	20 + 40 + 60	2,5 + 20 + 25	70	2,5	100	100
CLASS 5 Radiator heating and high-temperature systems	20 + 60 + 80	14 + 25 + 10	90	1	100	100

- Working temperature (T_D): working temperature provided for the range of application, expressed in °C.
- Max. working temperature (T_{MAX}): the working temperature highest value, allowed only for a short time.
- Failure temperature (T_{FAIL}): the highest temperature possible when control systems fail (the time allowed for this value is 100 h over 50 years of uninterrupted operation).

► Precautions

PE-RT/AL/PE-RT multilayer pipes call for a variety of precautions to guarantee their duration in time and functionality:

- keep the pipe in its package and store in dry roofed areas to prevent damages caused by humidity;
- do not expose to direct sunlight;
- always cut the pipe to be installed using the special tools that provide a clean cut, 90 degrees to the pipe axis and free of burrs;
- after each cut, and before assembling the fitting, carry out the calibration using the special tool and lubricate the seals on the hose connection;
- prevent ice build ups inside the pipe as expansions caused by a change of conditions may damage it irreversibly;
- do not store the pipe at temperatures below -30 °C;
- never expose the pipe to open flames;
- after installation, carry out a pressure test at a pressure 1.5 times the working pressure.

► Warranty

The warranty shall be void when:

- 1) the working conditions vary from those provided for;
- 2) the pipe is used to transfer fluids not compatible with the construction material;
- 3) the installation instructions are not fully complied with;
- 4) the pipe shows visible defects caused by accidental factors upon installation or when the system is pressurized;
- 5) the pipe is installed using components not produced by Giacomini or different from the ones allowed.

➤ Product specifications

R977

PE-RT/AL/PE-RT metal multi-layer pipe. Color of outer layer: white. PE-RT (Polyethylene with increased Temperature Resistance) inner layer, aluminum middle layer welded lengthwise (head-head) with laser/TIG technology, PE-RT outer layer. The adhesive middle layers join the aluminum and PEX layers homogeneously. The aluminum layer provides a safe barrier against oxygen and other gases along with an outstanding resistance to crushing. Application classes (EN ISO 21003-1) 2, 4, 5 (fit for transfer of drinking water). Max. working temperature (EN ISO 21003-1): 95 °C. Max. working pressure (EN ISO 21003-1): 10 bar. Thermal conductivity: 0,43 W/m K.

R977I

PE-RT/AL/PE-RT metal multi-layer pipe with thermal insulation. PE-RT (Polyethylene with increased Temperature Resistance) inner layer, aluminum middle layer welded lengthwise (head-head) with laser/TIG technology, PE-RT outer layer. The adhesive middle layers join the aluminum and PEX layers homogeneously. The aluminum layer provides a safe barrier against oxygen and other gases along with an outstanding resistance to crushing. The insulation layer is protected by a red special outer film. Application classes (EN ISO 21003-1) 2, 4, 5 (fit for transfer of drinking water). Max. working temperature (EN ISO 21003-1): 95 °C. Max. working pressure (EN ISO 21003-1): 10 bar. Thermal conductivity: 0,43 W/m K. Reaction to fire: class 1 (UNI 9177).

⚠ Safety Warning. Installation, commissioning and periodical maintenance of the product must be carried out by qualified operators in compliance with national regulations and/or local standards. A qualified installer must take all required measures, including use of Individual Protection Devices, for his and others' safety. An improper installation may damage people, animals or objects towards which Giacomini S.p.A. may not be held liable.

♻ Package Disposal. Carton boxes: paper recycling. Plastic bags and bubble wrap: plastic recycling.

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🗑 Product Disposal. Do not dispose of product as municipal waste at the end of its life cycle. Dispose of product at a special recycling platform managed by local authorities or at retailers providing this type of service.