

# R999-R999I



Water  
Management



Radiant  
Systems



Energy  
Management

## PEX/AL/PEX multilayer Pipes

Datasheet  
0168EN 06/2019



R999

Multilayer pipes R999 consist of an inner PEX-b layer (polyethylene mesh), an aluminum middle layer welded lengthwise (head-head) with laser/TIG technology and an outer white PEX-b layer. The adhesive middle layers join the aluminum and PEX-b layers homogeneously.

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

Multilayer pipes R999 are fit for domestic water, heating and cooling systems according to standard EN 21003.

### R999 versions and product codes

#### Pipe rolls

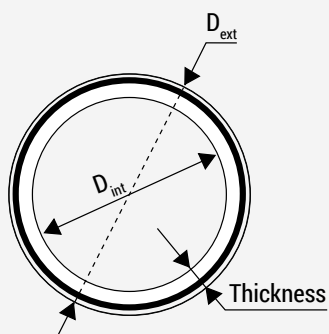
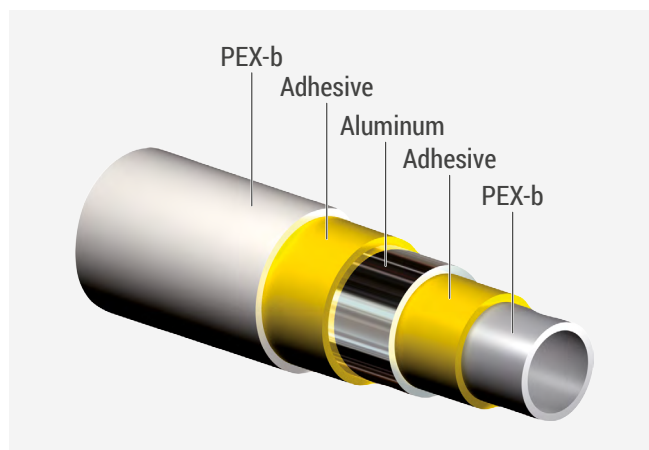
PRODUCT CODE	SIZE [mm]	PACK [m]
R999Y122	16 x 2	100
R999Y123	16 x 2	200
R999Y124	16 x 2	500
R999Y132	18 x 2	100
R999Y133	18 x 2	200
R999Y142	20 x 2	100
R999Y143	20 x 2	200
R999Y173	26 x 3	50
R999Y183	32 x 3	50

#### 5 m pipe bars

PRODUCT CODE	SIZE [mm]	PACK [m]
R999Y125	16 x 2	24 bars (120 m)
R999Y145	20 x 2	24 bars (120 m)
R999Y174	26 x 3	10 bars (50 m)
R999Y184	32 x 3	10 bars (50 m)
R999GY140	40 x 3,5	5 bars (25 m)
R999GY150	50 x 4	5 bars (25 m)
R999GY163	63 x 4,5	3 bars (15 m)
R999GY175	75 x 5	1 bar (5 m)
R999GY190	90 x 7	1 bar (5 m)

## ➤ R999 technical data

- Application classes (EN ISO 21003-1): 1, 2, 4, 5
- Min. working temperature: -60 °C (but always above freezing temperature of transfer fluid)
- Max. working temperature (EN ISO 21003-1): 95±100 °C
- Max. working pressure (EN ISO 21003-1): 10 bar
- Density at 23 °C: > 0,950 g/cm<sup>3</sup> (polyethylene mesh)
- Softening temperature: 135 °C
- Thermal expansion coefficient: 0,026 mm/m K
- Thermal conductivity: 0,42±0,52 W/m K
- Surface roughness: 0,007 mm
- Permeability to oxygen: 0 mg/l
- Reaction to fire (EN 13501-1): C-s2,d0



PIPE [mm]	D <sub>ext</sub> [mm]	D <sub>int</sub> [mm]	THICKNESS [mm]	WEIGHT [g/m]	WATER VOLUME [l/m]	BENDING MINIMUM RADIUS without pipe bender [mm]
16x2	16	12	2	113	0,113	80
18x2	18	14	2	130	0,154	90
20x2	20	16	2	156	0,201	100
26x3	26	20	3	286	0,314	130
32x3	32	26	3	390	0,530	160
40x3,5	40	33	3,5	545	0,854	- *pipe bars
50x4	50	42	4	833	1,383	- *pipe bars
63x4,5	63	54	4,5	1232	2,286	- *pipe bars
75x5	70	65	5	1603	3,312	- *pipe bars
90x7	90	76	7	2403	4,528	- *pipe bars



R999I

Multilayer pipes with insulation coating R999I consist of an inner PEX-b layer (polyethylene mesh), an aluminum middle layer welded lengthwise (head-head) with laser/TIG technology and an outer white PEX-b layer. The adhesive middle layers join the aluminum and PEX-b layers homogeneously.

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 special outer film - red or blue for heating systems and light grey for cooling systems.

## ➤ R999I versions and product codes

### Pipe rolls, for heating

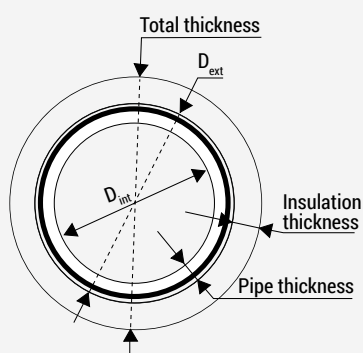
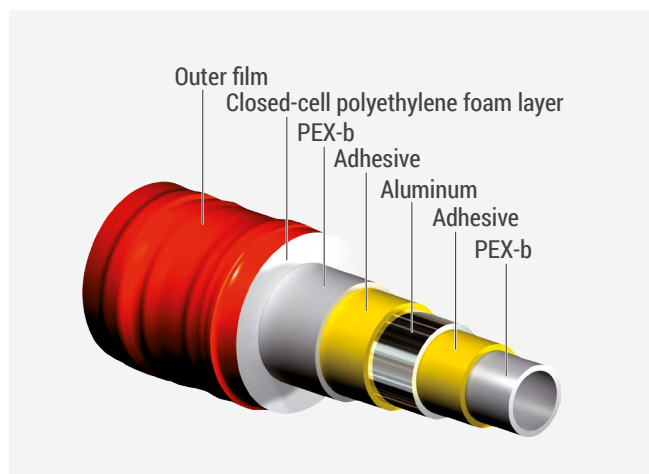
PRODUCT CODE	SIZE [mm]	PACK [m]	INSULATION THICKNESS [m]	INSULATION COLOR [m]
R999IY220	16 x 2	50	6	Red
R999IY222	16 x 2	100	6	Red
R999IY225	16 x 2	50	6	Blue
R999IY227	16 x 2	100	6	Blue
R999IY230	18 x 2	50	6	Red
R999IY240	20 x 2	50	10	Red
R999IY245	20 x 2	50	10	Blue
R999IY270	26 x 3	25	10	Red
R999IY272	26 x 3	50	10	Red
R999IY275	26 x 3	50	10	Blue
R999IY280	32 x 3	25	10	Red
R999IY285	32 x 3	25	10	Blue

### Pipe rolls, for heating and cooling

PRODUCT CODE	SIZE [mm]	PACK [m]	INSULATION THICKNESS [m]	INSULATION COLOR [m]
R999IY120	16 x 2	50	10	Grey
R999IY130	18 x 2	50	10	Grey
R999IY140	20 x 2	50	13	Grey
R999IY170	26 x 3	25	13	Grey
R999IY180	32 x 3	25	13	Grey

## ➤ R999l technical data

- Application classes (EN ISO 21003-1): 1, 2, 4, 5
- Min. working temperature: -60 °C (but always above freezing temperature of transfer fluid)
- Max. working temperature (EN ISO 21003-1): 95±100 °C
- Max. working pressure (EN ISO 21003-1): 10 bar
- Density at 23 °C: > 0,950 g/cm<sup>3</sup> (polyethylene mesh)
- Softening temperature: 135 °C
- Thermal expansion coefficient: 0,026 mm/m K
- Thermal conductivity: 0,40 W/m K
- Surface roughness: 0,007 mm
- Permeability to oxygen: 0 mg/l
- Resistance to water vapor diffusion:  $\mu > 5000$
- Reaction to fire:
  - bare pipe (EN 13501-1): C-s2,d0
  - insulation (EN 13501-1 LNE P126686): C<sub>L</sub>-s1,d0



PIPE [mm]	D <sub>ext</sub> [mm]	D <sub>int</sub> [mm]	PIPE THICKNESS [mm]	TOTAL THICKNESS [mm]	INSULATION THICKNESS [mm]	INSULATION R [m <sup>2</sup> K/W]	WEIGHT [g/m]	WATER VOLUME [l/m]	BENDING MINIMUM RADIUS without pipe bender [mm]
16x2	16	12	2	28 36	6 10	0,150 0,225	121 133	0,113	80
18x2	18	14	2	30 38	6 10	0,150 0,225	139 160	0,154	90
20x2	20	16	2	40 46	10 13	0,225 0,325	179 190	0,201	100
26x3	26	20	3	46 52	10 13	0,225 0,325	320 334	0,314	130
32x3	32	26	3	52 58	10 13	0,225 0,325	430 445	0,530	160

Range recommended for heating systems  
 Range recommended for cooling systems

## ➤ Fittings

PEX-b/AL/PEX-b 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 PEX-b/AL/PEX-b multilayer pipes. Use the chart below to carry out proper evaluations.

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

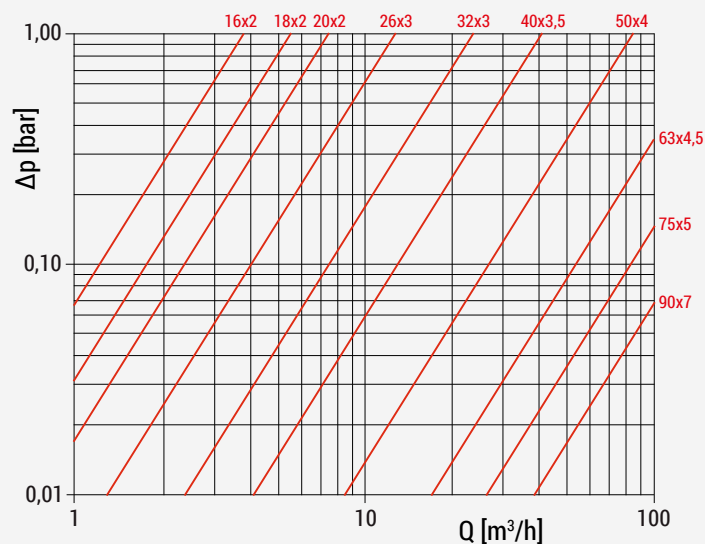
where:

- $\Delta l$  = expansion expressed in mm
- $a$  = linear thermal expansion coefficient corresponding to 0,026 mm/m K
- $L$  = pipe length expressed in m
- $\Delta t$  = temperature variation expressed in Kelvin [K] or Celsius [°C] degrees

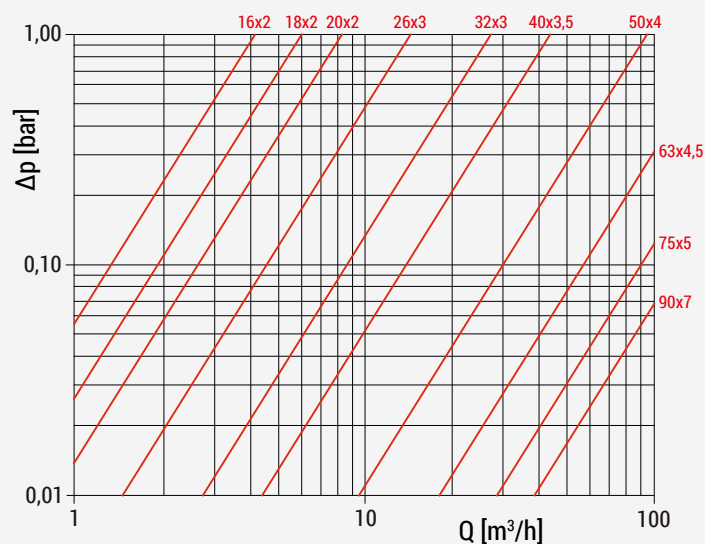
PIPE LENGTH [m]	TEMPERATURE DIFFERENCE [K]							
	10	20	30	40	50	60	70	80
1	0,26	0,52	0,78	1,04	1,3	1,56	1,82	2,08
2	0,52	1,04	1,56	2,08	2,6	3,12	3,64	4,16
3	0,78	1,56	2,34	3,12	3,9	4,68	5,46	6,24
4	1,04	2,08	3,12	4,16	5,2	6,24	7,28	8,32
5	1,3	2,6	3,9	5,2	6,5	7,8	9,1	10,4
6	1,56	3,12	4,68	6,24	7,8	9,36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

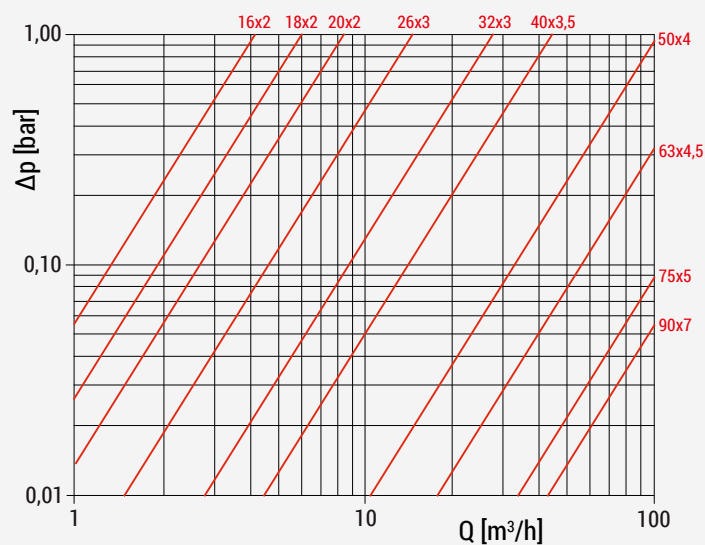
TEMPERATURE = 10 °C



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]
<b>CLASS 1</b> Domestic hot water (60 °C)	60	49	80	1	95	100
<b>CLASS 2</b> Domestic hot water (70 °C)	70	49	80	1	95	100
<b>CLASS 4</b> Floor heating and low-temperature systems	20 + 40 + 60	2,5 + 20 + 25	70	2,5	100	100
<b>CLASS 5</b> 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

PEX-b/Al/PEX-b 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

### R999

PEX-b/AL/PEX-b metal multi-layer pipe. Color of outer layer: white. PEX-b (polyethylene mesh) inner layer, aluminum middle layer welded lengthwise (head-head) with laser/TIG technology, PEX-b (polyethylene mesh) 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) 1, 2, 4, 5 (fit for transfer of drinking water). Min. working temperature: -60 °C (but always above freezing temperature of transfer fluid). Max. working temperature (EN ISO 21003-1): 95+100 °C. Max. working pressure (EN ISO 21003-1): 10 bar. Thermal conductivity: 0,42+0,52 W/m K. Reaction to fire (EN 13501-1): C-s2,d0. Provided in rolls or 5 m bars.

### R999I

Metal multi-layer PEX-b/AL/PEX-b pipe with thermal insulation. PEX-b (polyethylene mesh) inner layer, aluminum middle layer welded lengthwise (head-head) with laser/TIG technology, PEX-b (polyethylene mesh) 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 special outer film - red or blue for the heating pipe and light grey for the heating and cooling pipe. Application classes (EN ISO 21003-1) 1, 2, 4, 5 (fit for transfer of drinking water). Min. working temperature: -60 °C (but always above freezing temperature of transfer fluid). Max. working temperature (EN ISO 21003-1): 95+100 °C. Max. working pressure (EN ISO 21003-1): 10 bar. Thermal conductivity: 0,40 W/m K. Reaction to fire (EN 13501-1): bare pipe (EN 13501-1):C-s2,d0; insulation (EN 13501-1 LNE P126686): C<sub>L</sub>-s1,d0. Provided in rolls.

**⚠ 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.

**ℹ Additional information.** For more information, go to [giacomini.com](http://giacomini.com) or contact our technical assistance service. This document provides only general indications. Giacomini S.p.A. may change at any time, without notice and for technical or commercial reasons, the items included herewith. The information included in this technical sheet do not exempt the user from strictly complying with the rules and good practice standards in force.

**♻ 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.