



**PEX-a**

**PEX-b**



**PE-RT**



**INTEGRATED/COMPLETE/COMPREHENSIVE/EXTENSIVE/AMALGAMATED  
PIPING SOLUTIONS FOR YOUR RESIDENTIAL & COMMERCIAL APPLICATIONS**

Giacomini manufactures piping solutions which suit best for all your Radiant, HVAC & Plumbing needs with all the variants namely PEX-a, PEX-b & PE-RT. This gives us an ultra-edge over our competitors as all the variants are manufactured in-house.

**Our passion  
never stops growing.  
Just like our Group.**

To be the best you need the **right numbers**.  
Such numbers make our **group** one of today's **world leaders** in the  
production of heating, conditioning and sanitary water distribution  
components and systems for the residential, industrial and commercial  
sectors. **A reality constantly expanding**, just like our goals.

**1951**

COMPANY  
ESTABLISHMENT

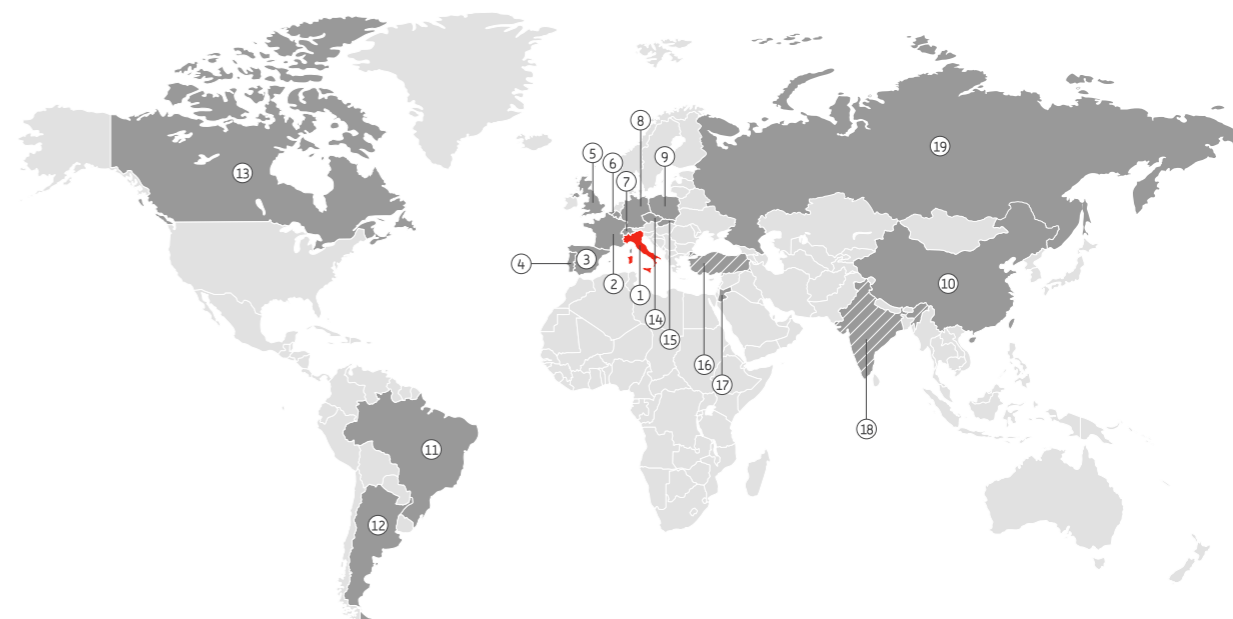
More than **900 EMPLOYEES**

**70** TONS  
OF BRASS DAILY

**130,000** m<sup>2</sup> PRODUCTION PLANTS

A TURNOVER  
CLOSE TO **170** millions

**80 %** EXPORT



**BRANCHES, REPRESENTATIVE OFFICES AND EXCLUSIVE PARTNERS**

- |            |               |             |                  |            |
|------------|---------------|-------------|------------------|------------|
| ① ITALY    | ⑤ ENGLAND     | ⑨ POLAND    | ⑬ CANADA         | ⑰ JORDANIA |
| ② FRANCE   | ⑥ BELGIUM     | ⑩ CHINA     | ⑭ CZECH REPUBLIC | ⑱ INDIA    |
| ③ SPAIN    | ⑦ SWITZERLAND | ⑪ BRAZIL    | ⑮ SLOVAKIA       | ⑲ RUSSIA   |
| ④ PORTUGAL | ⑧ GERMANY     | ⑫ ARGENTINA | ⑯ TURKEY         |            |

### What is PE-Xa?

Pe-Xa is produced by the peroxide (Engel) method. This method performs cross linking above the crystal melting point. However, the process takes slightly longer than the other two methods as the polymer has to be kept at high temperature and pressure for long periods during the extrusion process. The cross-linked bonds are between carbon atoms.

### What are the advantages of PEXa systems?

1. Highest flexibility (softness) among all PEX types.
2. Kinks can be repaired with a heat gun.
3. Highest degree of cross-linking.
4. No coil memory.
5. Speed and ease of installation
6. Energy efficiency
7. Long-term hydrostatic strength stability
8. Corrosion resistance
9. Tuberculation resistance
10. Durability and toughness
11. Flexibility, even at cold temperatures
12. Resistance to chlorine and chloramines
13. Noise and water hammer resistance
14. No solvent or chemical joining required

## PIPES MADE OF PEX - a WITH OXYGEN BARRIER R996G



### Versions and product code

Product code	Size [mm]	Packaging [m]
R996GY012	16x2	240
R996GY021	17x2	100
R996GY022	17x2	240
R996GY023	17x2	600
R996GY032	20x2	240
R996GY033	20x2	500

### Reference standards

- DIN 16892  
Cross-linked high-density polyethylene (PEX) pipes. General quality requirements and testing.
- EN ISO 15875  
Plastic piping for hot and cold water installation – Cross-linked polyethylene (PEX).

### Installation

For laying operations of the R996G pipes, it is necessary to follow some easy practical rules concerning the choice of the fittings, the respect of the minimum radius of curvature, the protection from sun rays and from possible accidental damage. The connection to the distribution manifolds and to the system terminals is made by means of Giacomini adaptors for synthetic pipes. To carry out a correct connection, it is essential to cut off the pipes with tools able to make a clean cut, without deburring and perpendicular to its axis. In the pipe laying operations, it is necessary to make curves with minimum radius equal to 5 times the external diameter of the pipe itself. After laying the pipe, it is opportune to carry out a pressure test of the system, so as to immediately underline eventual fluid losses. In case of radiant panel systems, be careful when laying the covering foundation over the pipe, paying attention not to scratch the pipes, or crush them when using other tools or items such as a wheel barrow. You have to avoid the pipes remaining exposed for long periods to the sun radiation or to fluorescent lamps, keeping the unused coils in their cartons, to prevent the ultraviolet rays from altering the chemical and physical characteristics. In case of radiant panel systems, it is good practise to lay above the pipes a foundation of at least 3 cm, to avoid cracks due to thermal expansion. While crossing eventual expansion joints, it is important to protect the pipe with a sleeve, to prevent excessive mechanical stresses.

### Precautions

- The use of R996G pipes requires the observance of certain requirements, needed to guarantee the lifetime and the operation. The principal precautions to be followed are:
1. Store the pipes in the appropriate packaging, avoiding their direct exposure to sun rays, and store in covered and dry places, preventing the humidity damaging the boxes.
  2. Avoid the pipes coming into contact with sharp edges or articles able to scratch them and trigger a cogging phenomenon, paying particular care in the installation and transport phases.
  3. Avoid the ice formation inside the pipes and the packaging, because the expansion due to the status passage could cause a crack.
  4. Prevent the pipes coming into contact with free flames or with other heat sources, able to provoke fusions, even partial.
  5. During the eventual fixing to electrowelded network, use plastic material clamps, instead of metallic, to avoid the pipe damage.
  6. Avoid the contact with chemical solvents or paints that could damage the pipes.



PEX-b

PEX-a

PE-RT



### Guarantee

All products and components supplied by Giacomini S.p.A. are subjected to the European norms in force as regards to guarantee and responsibility (1994/44/CE Directive, 2001/95/CE Directive and CEE 85/374).

The guarantee is not valid in the following cases:

1. If the working conditions are different from the prescribed ones;
2. If the pipes are used to distribute fluids that are not compatible with the material;
3. If the installation instructions are not scrupulously followed;
4. If the pipe shows defects already present at the installation time due to accidental factors, visually perceivable in the laying phase, or at the system pressure test;
5. If the pipe is installed using components not produced by Giacomini S.p.A. or anyway different from the allowed ones.

### ADD ON

#### EN ISO 15875

#### Table 1 - Classification of the working conditions

The performance requirements for pipe systems complying with EN ISO 15875 are specified for a project operation lifetime of 50 years.

Application field	Oper. Time (°C)	Time at oper. T (years)	Tmax (°C)	Time at Tmax (years)	malT (°C)	Time at malT (h)
Class 4 Floor heating and low temperature radiators	20 plus 40 plus 60	2,5 plus 20 plus 25	70	2,5	100	100
Class 5 Heating with high temperature radiators	20 plus 60 plus 80	14 plus 25 plus 10	90	1	100	100

- Working temperature (oper.T). Operating temperature expected for the application field, expressed in °C.
  - Max working temperature (Tmax). Higher value of the temperature, allowed for a short period of time only.
  - Malfunctioning time (mal T). The highest temperature value that you can have when the control systems are in breakdown (the possible and permitted time period for that value is 100 h in a period of 50 years of continuous operation).
- For each application, the parts involved shall agree with in the selection of the class. Each application class shall moreover be associated to a working pressure.

Size	Class 4	Class 5
16 x 1,5	8 bar	6 bar
16 x 2,0	10 bar	8 bar
17 x 2,0	10 bar	8 bar
18 x 2,0	10 bar	8 bar
20 x 2,0	8 bar	6 bar
25 x 2,3	8 bar	6 bar

All pipes are suitable to the transport of water for a period of 50 years at a temperature of 20°C and a working pressure of 10 bar. All heating systems shall use as transfer fluid only water or treated water.

## GIACOTHERM PIPES IN PEX - b WITH ANTI-OXYGEN BARRIER R996T

### What is PE-Xb?

The Silane method, also called the “moisture cure” method, results in PE-Xb. In this method, cross-linking is performed in a secondary post extrusion process, producing cross-links between a cross-linking agent. The process is accelerated with heat and moisture with heat and moisture. The cross-linked bonds are formed through silanol condensation between two grafted vinyltrimethoxysilane (VTMS) units, connecting the polyethylene chains with C-C- Si-O- Si-C- C bridges.

### What are the advantages of PEXb systems?

1. Highest chlorine and oxidative resistance
2. Highest bursting pressure.
3. Lower price vs. PEX-A.
4. Lowest dimensional tolerances.
5. Speed and ease of installation
6. Cost effectiveness vs. PEXa
7. Energy efficiency
8. Elevated temperature capability
9. Long-term hydrostatic strength stability
10. Corrosion resistance
11. Tuberculation resistance
12. Durability and toughness
13. Flexibility, even at cold temperatures
14. Resistance to chlorine and chloramines
15. Noise and water hammer resistance
16. No solvent or chemical joining required

### What are the applications for PEX?

- PEX is typically used in the following applications:
- Potable cold- and hot-water distribution systems, both residential and commercial
  - Hydronic radiant heating and cooling, using warm or chilled fluids
  - Hot-water distribution piping
  - Warm- and hot-water radiator connection piping
  - Potable water service pipes
  - Geothermal ground loop heat exchangers
  - Chilled water piping



### Versions and product code

Product code	Size	Packaging
R996Y048	16 x 1,5	240 m
R996Y065		500 m
R996TY227	16 x 2	100 m
R996TY219		240m
R996TY264		600 m
R996TY054	17 x 2	100 m
R996TY033		240 m
R996TY052		600 m
R996TY249	18 x 2	100 m
R996TY220		240 m
R996TY250		500 m
R996TY221	20 x 2	100 m
R996TY222		240 m
R996TY253		400 m
R996TY068	25 x 2,3	320 m
R996Y132	25x3,5	50 m
R996Y135	32x4,4	4 m
R996Y134	40x5,5	4 m

### Technical data

- Application: class 4 and class 5 (EN ISO 15875)
- Not for potable water
- Density: 0,939 g/c
- Thermal conductivity: 0,38 W/
- Coefficient of linear expansion: ( 1,9 x 10<sup>-4</sup>)/K
- Breaking road: 31 MP
- Breaking elongation: 520 %
- Elasticity module at 23 °C: 540 MPa

R996T pipes in PEX-b comply with EN ISO 15875 standard, which defines the physical and dimensional features, and are verified following EN ISO 15875 and DIN 16892 standards, that allow evaluation of the resistance to the combined pressure and temperature stress, with reference to the relevant regression curves.

Resistance to combined pressure and temperature stress with respect to regression curves

$$\text{Series (S) of pipes} \quad \text{Standard Dimension Ratio (SDR)}$$

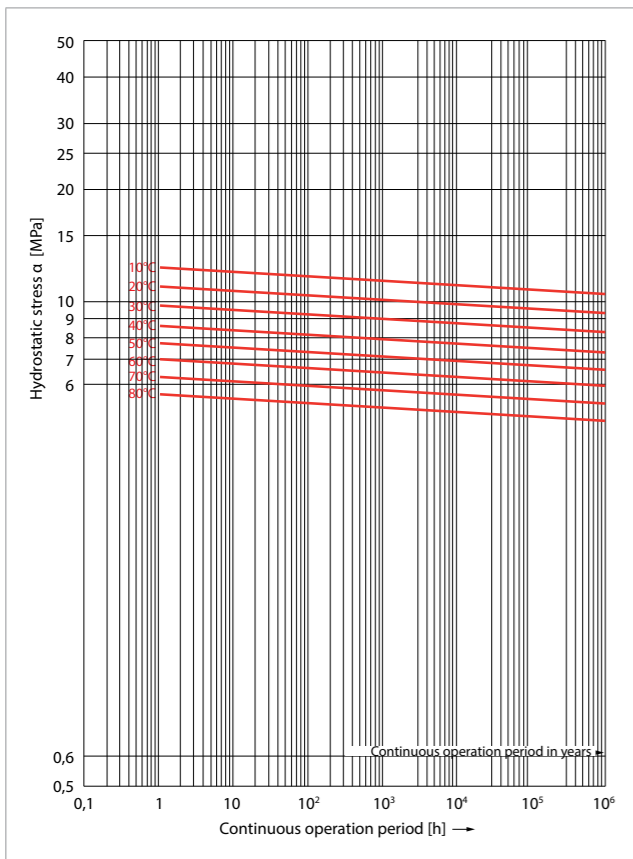
$$S = \frac{d - s}{2 \cdot s} \quad \text{SDR} = 2 \cdot S + 1 \approx \frac{d}{s}$$

where  $s$  is the nominal pipe thickness  
 $d$  is the nominal pipe diameter

Regression curves

$$\alpha = p \cdot \frac{d - s}{2 \cdot s}$$

where  $\alpha$  is the hydrostatic stress  
 $p$  is the induced hydrostatic pressure



### Ease of laying

By comparing the traction elastic module of R996T pipes, calculated at 23 °C in room, with an average of the values reported in literature for the different types of PEX and considering that “ lower is the elastic module, higher is the pipe flexibility”, it shows the advantage in terms of obtainable flexibility by using this kind of product.

Elastic module at 23 °C (MPa)	
R996T	540
(media) PEX	623 ÷ 890

### Installation

For laying operations of the R996T pipes, it is necessary to follow some easy practical rules concerning the choice of the fittings, the respect of the minimum radius of curvature, the protection from sun rays and from possible accidental damage. The connection to the distribution manifolds and to the system terminals is made by means of Giacomini adaptors for synthetic pipes. To carry out a correct connection, it is essential to cut off the pipes with tools able to make a clean cut, without deburring and perpendicular to its axis. In the pipe laying operations, it is necessary to make curves with minimum radius equal to 5 times the external diameter of the pipe itself.

After laying the pipe, it is opportune to carry out a pressure test of the system, so as to immediately underline eventual fluid losses.

In case of radiant panel systems, be careful when laying the covering foundation over the pipe, paying attention not to scratch the pipes, or crush them when using other tools or items such as a wheel barrow.

You have to avoid the pipes remaining exposed for long periods to the sun radiation or to fluorescent lamps, keeping the unused coils in their cartons, to prevent the ultraviolet rays from altering the chemical and physical characteristics.

In case of radiant panel systems, it is good practise to lay above the pipes a foundation of at least 3 cm, to avoid cracks due to thermal expansion.

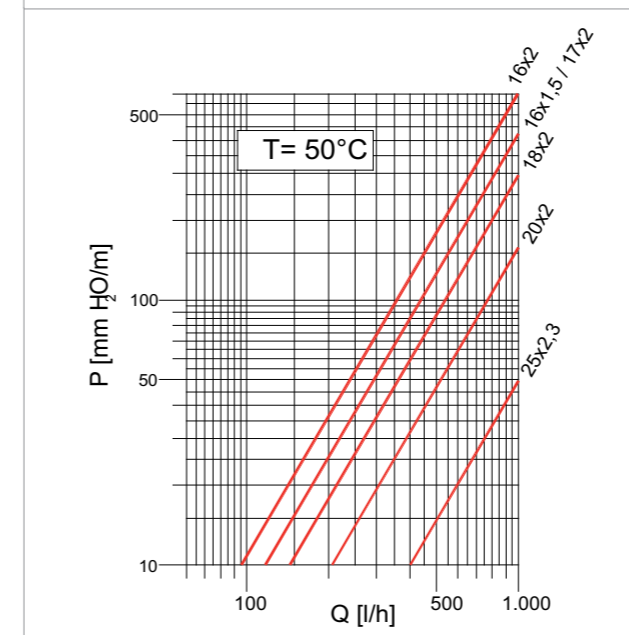
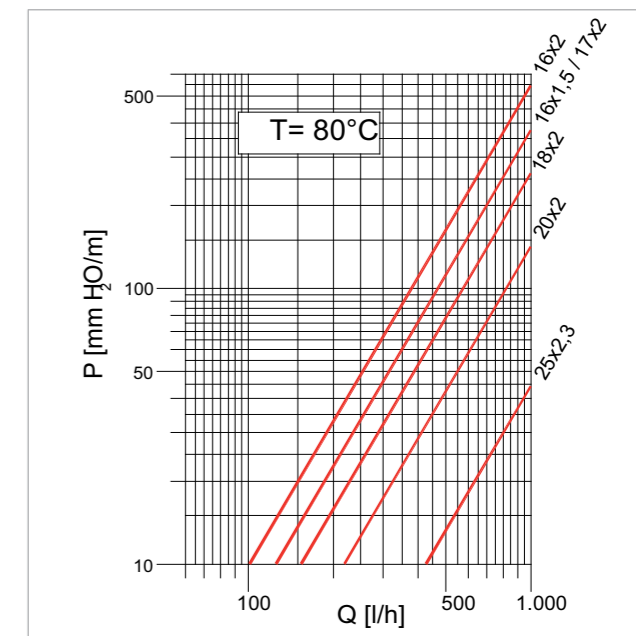
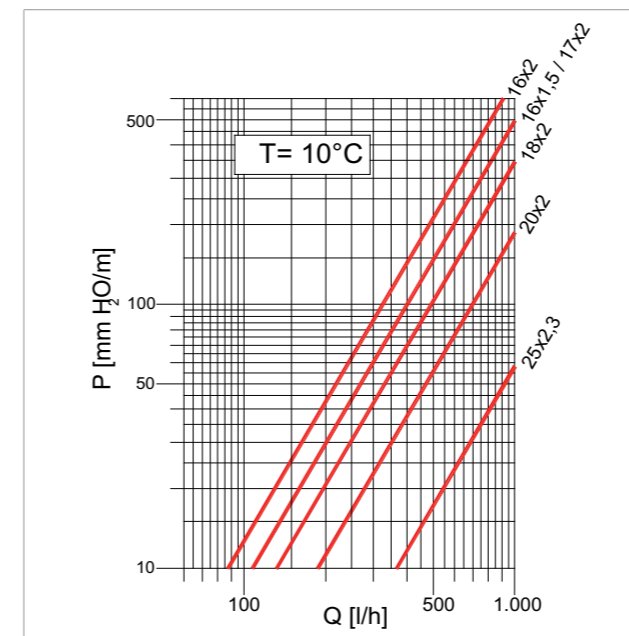
While crossing eventual expansion joints, it is important to protect the pipe with a sleeve, to prevent excessive mechanical stresses.

### Precautions

The use of R996T pipes requires the observance of certain requirements, needed to guarantee the lifetime and the operation.

- 1) Store the pipes in the appropriate packaging, avoiding their direct exposure to sun rays, and store in covered and dry places, preventing the humidity damaging the boxes.
- 2) Avoid the pipes coming into contact with sharp edges or articles able to scratch them and trigger a cogging phenomenon, paying particular care in the installation and transport phases.
- 3) Avoid the ice formation inside the pipes and the packaging, because the expansion due to the status passage could cause a crack.
- 4) Prevent the pipes coming into contact with free flames or with other heat sources, able to provoke fusions, even partial.
- 5) During the eventual fixing to electrowelded network, use plastic material clamps, instead of metallic, to avoid the pipe damage.
- 6) Avoid the contact with chemical solvents or paints that could damage the pipes.

### Pressure losses



### Guarantee

All products and components supplied by Giacomini S.p.A. are subjected to the European norms in force as regards to guarantee and responsibility (1994/44/CE Directive, 2001/95/CE Directive and CEE 85/374).

The guarantee is not valid in the following cases:

1. If the working conditions are different from the prescribed ones;
2. If the pipes are used to distribute fluids that are not compatible with the material;
3. If the installation instructions are not scrupulously followed;
4. If the pipe shows defects already present at the installation time due to accidental factors, visually perceivable in the laying phase, or at the system pressure test;
5. If the pipe is installed using components not produced by Giacomini S.p.A. or anyway different from the allowed ones.

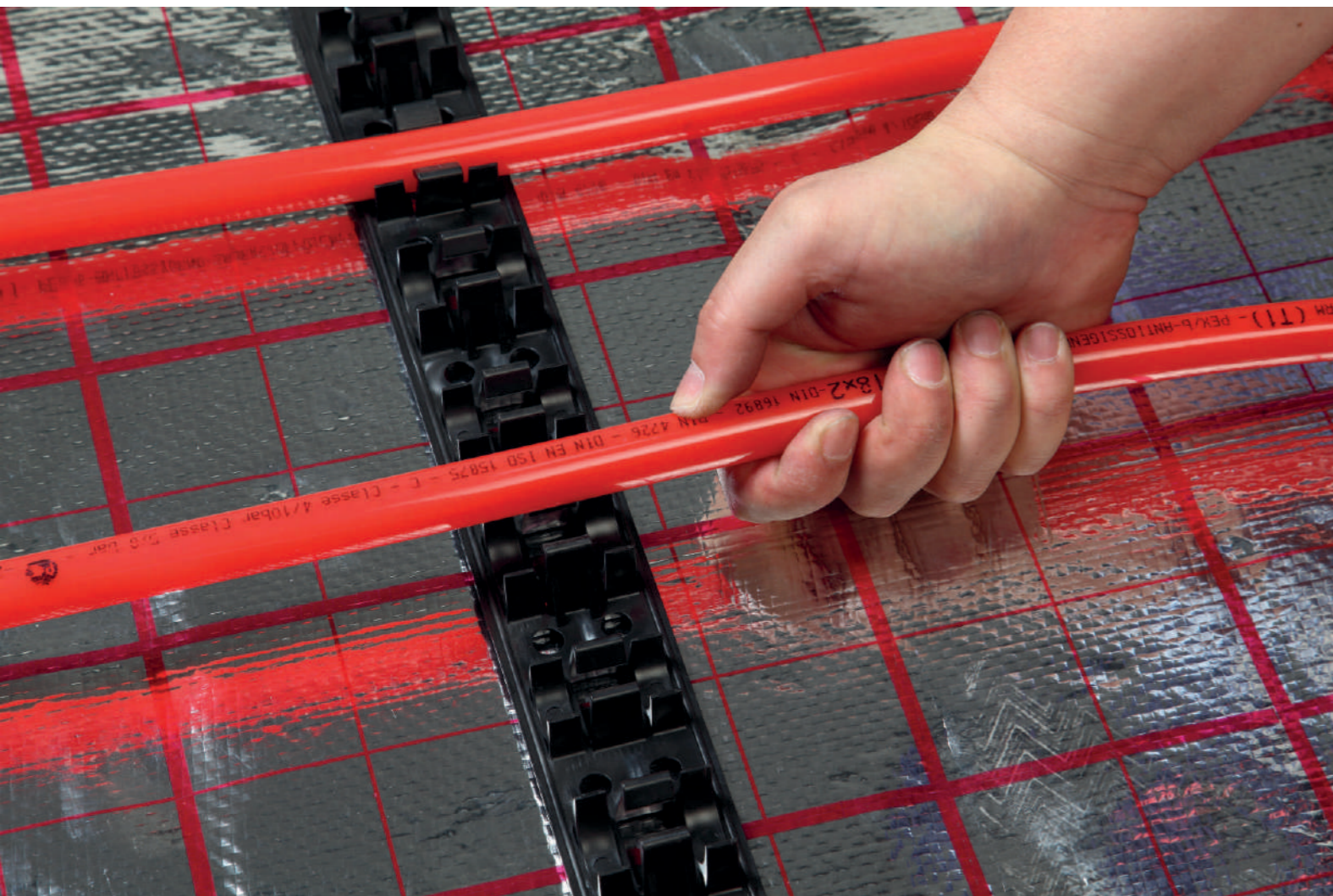
### Reference standards

• DIN 16892

Cross-linked high-density polyethylene (PEX) pipes. General quality requirements and testing.

• EN ISO 15875

Plastic piping for hot and cold water installation – Cross-linked polyethylene (PEX).



## ADD ON

### EN ISO 15875

#### Classification of the working conditions

Performance requirements for pipe systems complying with EN ISO 15875 are specified for an operating lifespan of 50 years.

Application range	$T_{oper}$ [°C]	Time at $T_{oper}$ [years]	$T_{max}$ [°C]	Time at $T_{max}$ [years]	$T_{mal}$ [°C]	Time at $T_{mal}$ [h]
<b>CLASS 1</b> Sanitary hot water (60 °C)	60	49	80	1	95	100
<b>CLASS 2</b> Sanitary hot water (70 °C)	70	49	80	1	95	100
<b>CLASS 4</b> Underfloor heating and low-temperature radiators	20	2,5	70	2,5	100	100
	40 plus	20				
	60 plus	25				
<b>CLASS 5</b> Radiator heating at a high tem- perature	20	14	90	1	100	100
	60 plus	25				
	80 plus	10				

- Operating temperature ( $T_{oper}$ ): operating temperature envisaged for the application range, expressed in °C.
- Max. working temperature ( $T_{max}$ ): the highest value of the operating temperature, only allowed for a short period of time.
- Malfunctioning temperature ( $T_{mal}$ ): the highest temperature value that can occur when the control systems are not working (the time period possible and allowed for this value is 100 h over 50 years of continuous operation).

For each application class, maximum usage pressure can be evinced from the table below:

Size	CLASS 4	CLASS 5
16 x 1,5	8 bar	6 bar
16 x 2,0	10 bar	8 bar
17 x 2,0	10 bar	8 bar
18 x 2,0	10 bar	8 bar
20 x 2,0	8 bar	6 bar
25 x 2,3	8 bar	6 bar

All pipes are suitable for carrying water for a period of 50 years at a temperature of 20 °C and an operating pressure of 10 bar.  
All heating systems shall use as transfer fluid only water or treated water.

## 5-LAYER PE-RT PIPES WITH ANTI-OXYGEN BARRIER R978

### What is PE-RT?

PE-RT / Polyethylene for Raised temperatures is a specially modified polyethylene of medium density, the molecular structure and composition of which ensures very good thermal stability and a high degree of mechanical strength up to temperatures of 90°C. The five-layer pipe structure is manufactured by means of extrusion in one single process. The EVOH layer provides a very good oxygen barrier while the outer PE-RT layer protects the entire layer structures against exterior influences. The layers are connected permanently using force-fit methods via an adhesive.

### What are the advantages of PE-RT?

- Oxygen-tight with co-extruded EVOH layer
- Operational range max. 90°C, max. 6 bar, constant temperature 70°C.
- Pipes made of PE-RT are corrosion free.
- Excellent stress crack resistance
- Suitable for particularly rough laying conditions due to 5-layer technology
- Flexible and easy to lay – can be laid cold
- Tight bending radius possible
- No incrustation due to smooth inner pipe surface.
- Low weight



### Technical Data

- Application range: class 4 (ISO 22391)
- Not for potable water
- Density: 0,941 g/cm<sup>3</sup>
- Thermal conductivity: 0,40W/(m K)
- Linear expansion coefficient (1,8x10<sup>-4</sup>)/K
- Breaking load: 36 MPa
- Breaking elongation: 760 %
- Elastic modulus: 650 MPa

R978 pipes are dimensioned and verified according to ISO 22391 norm, that define the physical and dimensional features, as well as the evaluation of the resistance to the combined stress of pressure and temperature, with reference to the related regression curves.

Resistance to combined pressure and temperature stress with respect to regression curves

Series (S) of pipes Standard Dimension Ratio (SDR)  
 $S = \frac{d - s}{2 \cdot s}$        $SDR = 2 \cdot S + 1 = \frac{d}{s}$

where  $s$  is the nominal pipe thickness  
 $d$  is the nominal pipe diameter

Regression curves

$$\alpha = p \cdot \frac{d - s}{2 \cdot s}$$

where  $\alpha$  is the hydrostatic stress  
 $p$  is the induced hydrostatic pressure

### Versions and product codes

Product code	Size	Packaging [m]
R978Y223	16 x 2	100
R978Y226		240
R978Y227		600
R978Y233	17 x 2	100
R978Y235		240
R978Y237		600
R978Y255	20 x 2	240
R978Y256		400



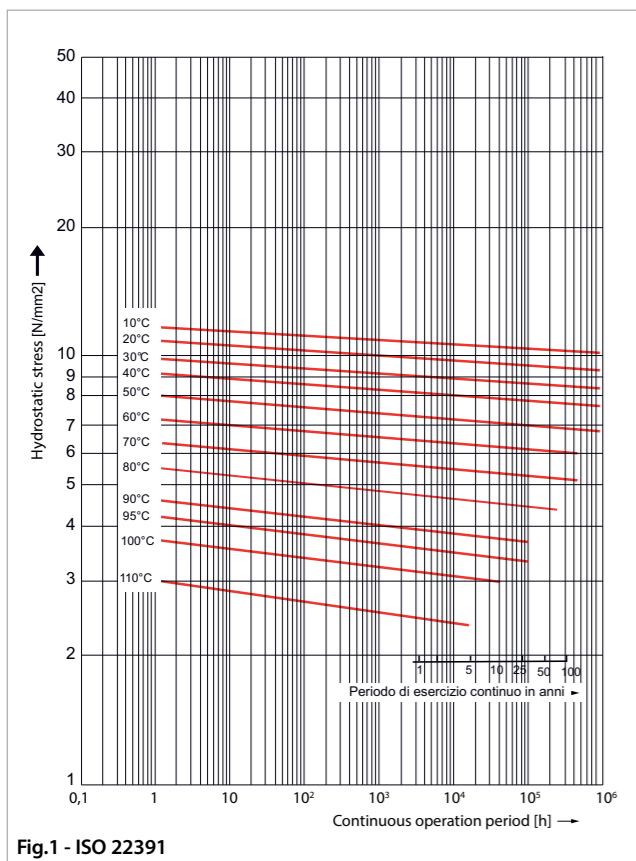


Fig.1 - ISO 22391

### Installation

For the laying operations of R978 pipes, it is necessary to follow some simple practical rules concerning the choice of the fittings, the respect of the minimum radius of curvature and the protection from the sun rays and from possible fortuitous damages.

The connection to distribution manifolds and to the system terminals shall be made by means of Giacomini's adaptors for synthetic pipes.

In order to make a correct connection, it is essential to cut off the pipes with tools that can make a clean cut without deburring and perpendicular to its axis. During the pipe laying operations, it is necessary making curvatures with a minimum radius equal to five times the external diameter of the pipe itself.

After the pipe laying, it is opportune making a pressure test of the system, in order to underline immediately possible fluid losses.

In case of radiant panel systems, the laying of the pipe covering shall occur with care, by paying attention not to scratch the pipes with spatulas or crush them in the passages with wheel barrow.

The pipes must not remain exposed for long time to the sun radiations or to fluorescent lamps. Keep the coils that are not used in the suitable boxes, to avoid that the ultraviolet rays will alter the chemical and physical features. In case of radiant panel systems, it is good to lay over the pipes a foundation of 3 cm at least, to avoid cracks due to thermal expansion.

While crossing possible expansion joints, it is important to protect the pipe with a protecting covering in order to avoid excessive mechanical stress.

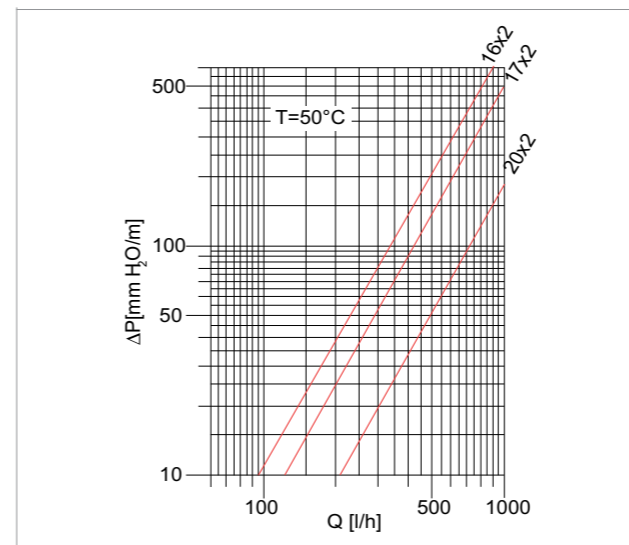
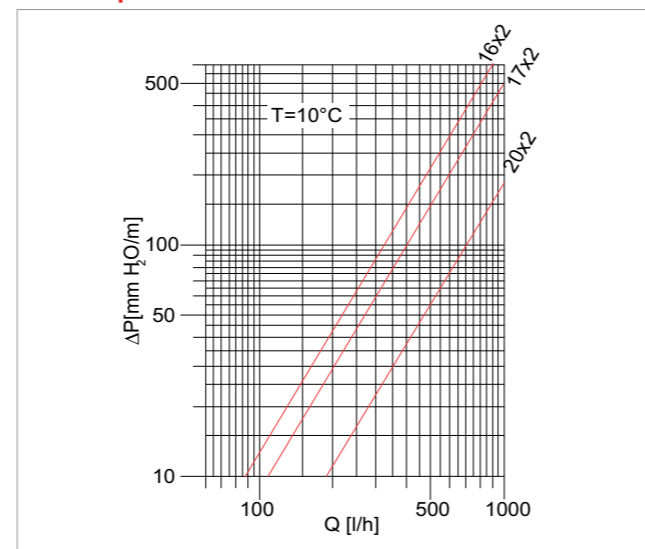
### Precautions

The use of R978 PE-RT pipes requires the observance of some prescriptions, needed to guarantee the life time and the functional character.

The principal precautions to be followed are:

1. Store the pipes in the appropriate packaging, by avoiding their direct exposition to sun rays, and in covered and dry places to prevent damages to the boxes caused by the humidity.
2. Prevent the pipes from coming into contact with sharp bodies able to scratch and trigger carving phenomenon – pay particular care during the installation and transport phases.
3. Prevent icing inside the pipes and in the packaging, because the expansions due to the state change could cause cracking.
4. Prevent the pipe from coming into contact with open flames or other heat sources, that could provoke melting, even partial.
5. If a fixing to electrically welded networks is needed, use plastic material instead of metallic bands, to avoid damages to the pipes.
6. Prevent the contact with chemical solvents or paints that can damage the pipes.

### Loss of pressure



### Guarantee

The guarantee is not valid in the following cases:

- 1) if the working conditions are different from those prescribed;
- 2) if the pipes are used to distribute fluids, that are not compatible with the material;
- 3) if the installation instructions are not scrupulously followed
- 4) if at the installation time, during the laying phase or at the pressure testing of the system, the pipe shows visually perceivable defects caused by accidental factors;
- 5) if the pipe is installed by using components not produced by Giacomini S.p.A., or in any case different from the permitted ones.

### Normative references

- ISO 22391  
Plastics piping systems for hot and cold water installations.  
Polyethylene of raised temperature resistance (PE-RT)

## ADD ON

### ISO 22391

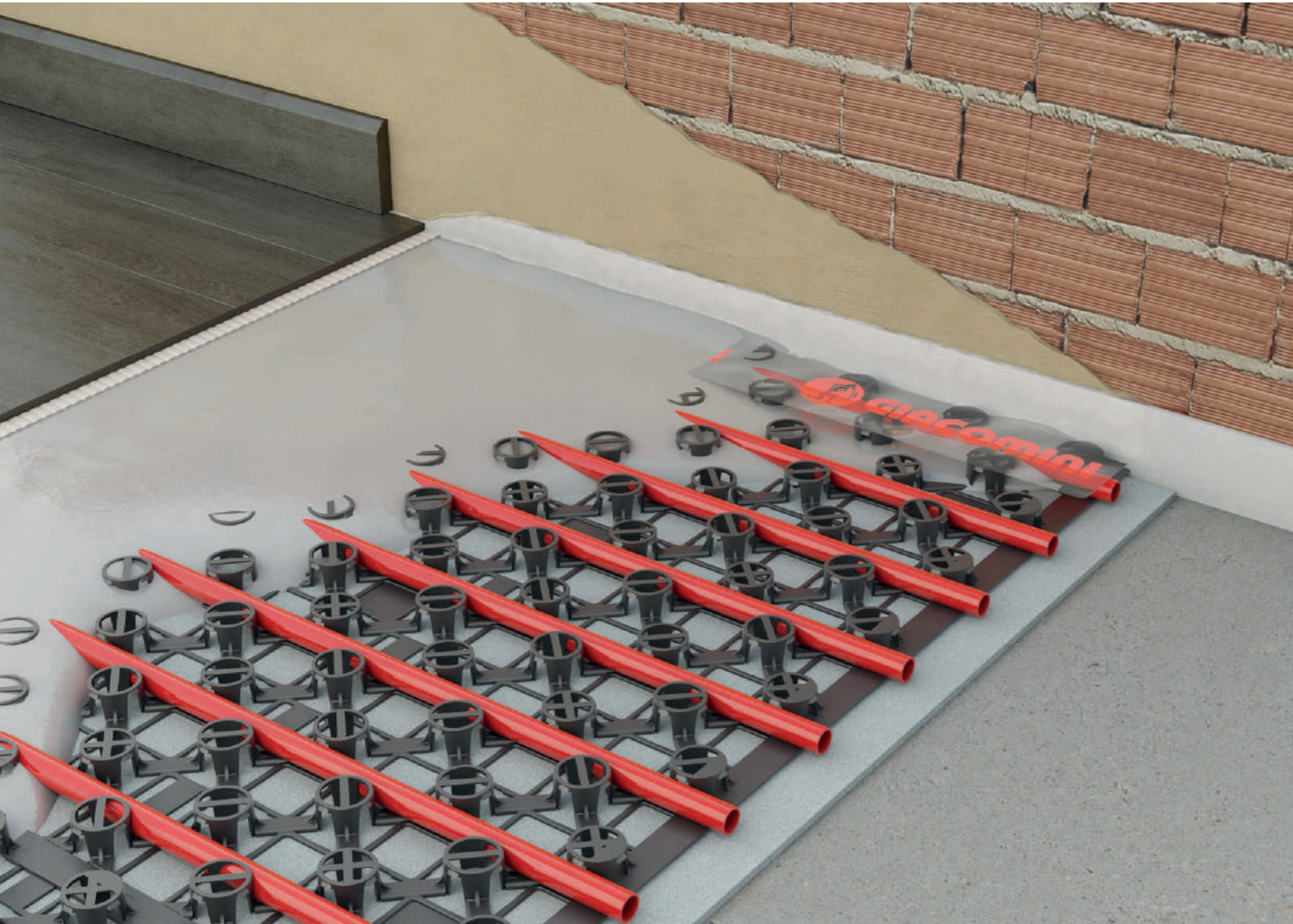
#### Classification of the working conditions

Performance requirements for pipe systems complying with ISO 22391 are specified for an operating lifespan of 50 years.

Application range	T <sub>oper</sub> [°C]	Time at T <sub>oper</sub> [years]	T <sub>max</sub> [°C]	Time at T <sub>max</sub> [years]	T <sub>mal</sub> [°C]	Time at T <sub>mal</sub> [h]
<b>CLASS 4</b>	20	2,5	70	2,5	100	100
Underfloor heating and	40	20				
low-temperature radiators	60	25				

- Operating temperature (T<sub>oper</sub>): operating temperature envisaged for the application range, expressed in °C.
- Max. working temperature (T<sub>max</sub>): the highest value of the operating temperature, only allowed for a short period of time.
- Malfunctioning temperature (T<sub>mal</sub>): the highest temperature value that can occur when the control systems are not working (the time period possible and allowed for this value is 100 h over 50 years of continuous operation).

All the pipes are suitable for transporting water for a period of 50 years at a temperature corresponding at the application range and an operating pressure of 6 bar. All the pipes are suitable for transporting water for a period of 50 years at a temperature of 20 °C and an operating pressure of 10 bar.



## COMPARISON

	PE-Xa	PE-Xb	PE-RT
Application Range	Floor heating and low temperature radiators (class 4) & Heating with high temperature radiators (class 5)	Floor heating and low temperature radiators (class 4) & Heating with high temperature radiators	Floor heating and low temperature radiators (class 4) & Heating with high temperature radiators
Density	0.938 g/cu.cm Δ	0.939 g/cu.cm #	0.941 g/cu.cm*
Thermal Conductivity	0.41 W/(mK) Δ	0.38 W/(mK) *	0.40 W/(mK) #
Softening Temperature		127 °C #	125 °C*
Breaking Load	24 Mpa *	31 Mpa #	36 Mpa Δ
Breaking Elongation	400% *	520% #	760% Δ
Elastic modulus	600-900 Mpa Δ	540 Mpa *	650 Mpa #
Cross Linking Degree	>80% Δ	>70% #	NA
Kink repair	Through thermal gun Δ	Through splicing & coupling #	Not possible
Bursting pressure	Lower than PE-Xb *	Higher than PE-Xa #	Highest Δ
Pricing	100-160% more than PE-Xb	Lower than PE-Xa #	Lowest Δ
Flexibility	Highest Δ*	Lower than PE-Xa #	Lowest *
Usage	Potable water #	Potable water Δ	Non-potable water
Chlorine oxidative resistance	Lower *	Yes #	Yes Δ
Deformation	65% at higher temperatures #	10% at higher temperatures Δ	
Hydro test pressure	Can withstand 17.2 kgf/cm <sup>2</sup> at higher temperatures #	Can withstand 22.8 kgf/cm <sup>2</sup> at higher temperatures Δ	
Durability at 95° C	3-5 years at 10bar #	Exceeds 30 years at 10 bar Δ	
Reference Standards	EN ISO 15875 & DIN 16892	EN ISO 15875, ISO 4065 & DIN 16892	

### Notes:

\*Good choice if that particular parameter is of your design importance.

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Δ Best choice if that particular parameter is of your design importance.