



Water Management

EW0014  JUL24

Domestic water systems

Components
and devices for
domestic water
distribution lines

Folder

Domestic water systems

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Water Management

Water has always been our greatest passion. Whether hot or cold, it is our most valuable resource. That is why our main goal is to distribute and manage it expertly to provide health protection, safety and energy savings.

Health and energy efficiency in drinking water distribution

Drinking water represents one of the most precious resources for man's life. As ancient Romans used to say, *Salus per Aquam*, health through water. Today, as in the past, drinking water contains essential healthy and nutritional values.

Even if 70.9% of the Earth's surface is water, only 0.03% of this is suitable for human consumption, accessible and not excessively polluted.

Protection of such a precious resource (now known as 'blue gold') must be entrusted to the cooperation between public administration, technical operators of the sector (distribution organizations, planners and installers) and end users, based on the following steps:

Quality control of public water networks: governments, based on indications by the World Health Organization (WHO), set the guidelines (European Community directives, laws, regulations) to regulate water parameters which distributors should monitor and test on a regular basis. They are responsible for public lines up to building inlets at delivery point (water meter).

Design and dimensioning of domestic systems: planners design and dimension domestic systems based on customers' needs, technical standards and existing guidelines.

State-of-the-art assembly and commissioning: the installer uses suitable systems and products that do not alter the quality of the water, from the building inlet up to each distribution point.

Mindful use: end users must periodically carry out maintenance on the system (in addition to hygiene safety, energy saving is becoming another important aspect in hot water production and distribution).

Giacomini drinking water products and systems offer professional operators cutting-edge technologies to realize domestic cold (DCW) and domestic hot (DHW) water systems for a wide variety of residential situations.

PEX-b pipes: high resistance to chlorine

Chlorine-based disinfectants are by now one of the most commonly used antibacterial products, in spite of the corrosive effects of chlorine on domestic distribution systems. PEX-b, a polymeric material used by Giacomini to produce water distribution pipes, is particularly recommended for its resistance to the increasing rates of chlorine in drinking water, thus being the best choice for domestic water distribution systems.



Drinking water – one of the millennium development goals

The UN Millennium declaration signed by all UN member states in 2000 aimed at achieving eight fundamental development goals for the world population. The seventh goal (Millennium Development Goals or MDG) set an 88% target as the proportion of people with access to safe drinking water. In 2015, data showed that over 91% could enjoy improved water sources. Despite this significant progress, technologic development in this sector must continue to universally guarantee suitable hygienic services.



The Legionella hazard

Bacteria responsible for harmful human infections may proliferate in drinking water. The most famous and dangerous is the Legionella pneumophila bacterium, responsible for the pulmonary infection of Legionnaires' disease. Humans contract the infection through aerosol, i.e. inhalation of small water droplets (1-5 micron) contaminated by a sufficient quantity of bacteria; pulmonary infection sets in when this water reaches the lungs of subjects at risk.

Domestic water systems have critical zones that must be properly considered immediately at the planning stage and up to installation and maintenance. A careful selection of the materials is just as important. The EN 806 European standard, applying to Legionella, requires every Member State to establish preventive measures against the proliferation of this bacterium, i.e. to set specific actions such as: careful selection of the materials, proper pipe insulation so the cold water never exceeds 22°C and the hot water is never lower than 55°C, prevent stagnation, enable hot water recirculation and check the system on a regular basis.

Lead, public health enemy

Lead in drinking water may cause serious risks for human health. In fact, the scientific community agrees on a possible correlation between lead exposure and various types of pathologic effects, even severe ones.

Such contamination is basically caused by transfer of lead from pipe materials, taps and fittings and/or its release by welding, connections or other materials that make up the domestic water distribution systems.

The use of lead in pipes and other water distribution components, both in aqueducts and domestic distribution systems, was quite popular in the past in various European countries, including Italy. However, it started to drastically drop around the 1960s. The use of lead in materials in contact with drinking water is subject to very strict standards and regulations.



Types of domestic distribution installations

Domestic cold and hot water distribution systems may vary based on the building and the application needed. In single-family houses, "individual" systems are the most widespread, i.e. the ones where DHW production and distribution are performed inside the house unit. On the other hand, multi-family buildings, offices, etc. generally present "collective" distribution systems with DHW centralized production.

The table below will help in selecting the most suitable system based on the user's needs. It includes all the most important characteristics of the various systems in terms of material, hygiene and hot water comfort. The table also shows correspondence between the various types of domestic water distribution and Giacomini's systems.

	material		hygiene		DHW comfort			Giacomini systems				
	required pipe quantity	one-size pipe	frequent use of usage points	rare use of usage points	available flow rate	waiting time	available pressure	PEX and multi-layer system with tee fitting	PEX and multi-layer system with manifolds	expansion PEX system - GX	PEX systems with crimp ring	PPR welding system
manifold systems												
connection to single-inlet terminals	■ ■ ■ ■ ■	☑	☑	☒	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☑	☑	☑	☒
connection to single-and double-inlet terminals	■ ■ ■ ■ ■	☑	☑	☒	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☑	☑	☒	☒
closed-loop connection	■ ■ ■ ■ ■	☑	☑	☑	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☑	☑	☒	☒
manifold-free systems												
tee connection (tee outlets)	■ ■ ■ ■ ■	☒	☑	☒	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☒	☑	☑	☑
series distribution	■ ■ ■ ■ ■	☒	☑	☑	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☒	☑	☒	☒
loop distribution	■ ■ ■ ■ ■	☒	☑	☑	■ ■ ■ ■ ■	■ ■ ■ ■ ■	■ ■ ■ ■ ■	☑	☒	☑	☒	☒

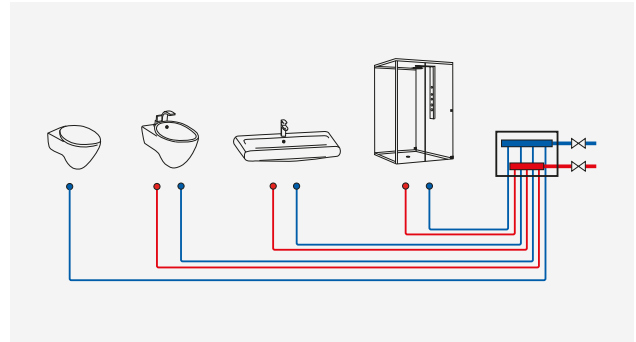
LEGEND: ■ ■ ■ ■ ■ Low level ■ ■ ■ ■ ■ Medium level ■ ■ ■ ■ ■ High level ☑ Suitable ☒ Not suitable



Manifold distribution systems

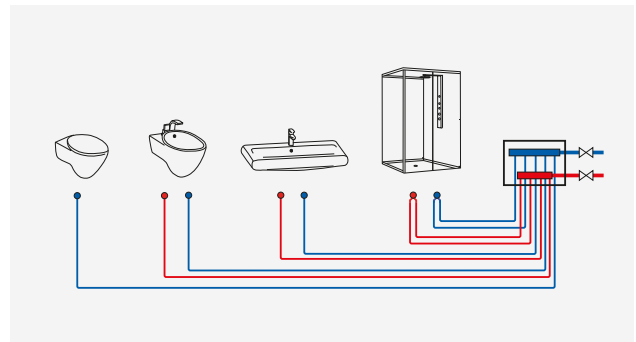
Single-Terminal Connection

Manifold plumbing systems require installation of a distribution element (plumbing manifold) supplying all usage points which are connected to the manifold one by one. This case features a single-terminal connection.



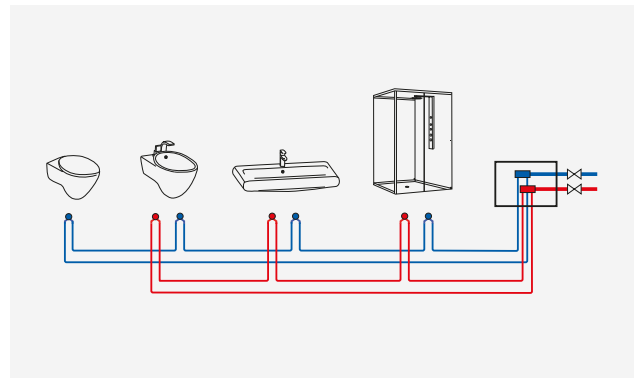
Single + Double-Terminal Connection

This special manifold system is suitable for connection with double-inlet terminals: in case of high flow rates (e.g. Jacuzzi tubs, large shower heads, etc.) two pipes connect the manifold to the distribution point.



Closed Loop Connection

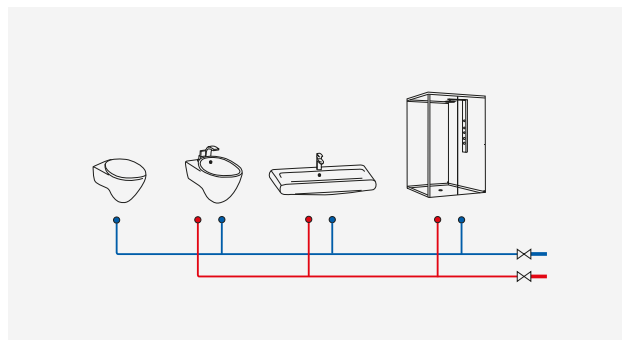
In this connection type, double-inlet terminals connect all circuits, thus providing high flow rates to all usage points.



Manifold-free distribution systems

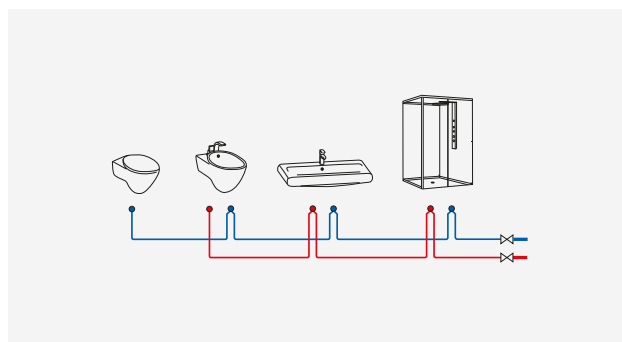
Tee Connection Distribution (Tee Outlets)

Tee connection plumbing systems require installation of a main pipe diverted at every usage point. This is obtained through tee connections and single-terminals.



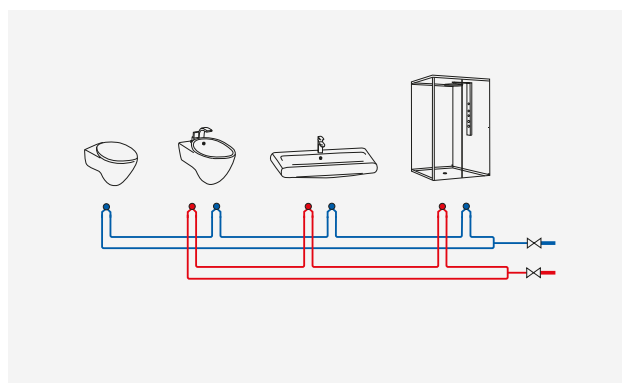
Series Distribution

In this type of connection, each usage point is connected to both the previous and the subsequent one through pipes. The most used usage point is the last of the series connected through a single terminal, while the others use double ones.



Loop Distribution

This type of distribution includes a closed-loop connection without manifold. All circuits are thus connected to the usage points through double-inlet end pieces. This provides higher flow rates for all usage points.



Pipes

Domestic water in residential systems flows through metal or plastic pipes. In modern installations, plastic pipes are popular due to their special characteristics: long-term reliability, i.e. mechanic resistance to pressure- and temperature-based stress, no corrosion typical of metals (a desirable feature, as the pipes are "drowned" in the floor), installation versatility, contained costs thanks to the growing production capacity of modern systems.

Giacomini manufactures its pipes in house

using sophisticated machines – extruders – which start with the base polymer in pellets to produce the pipes in line and then wind them into coils.

The pictures show some of the extrusion phases, carried out in compliance with current law and technically tested as set forth by the regulatory standards.

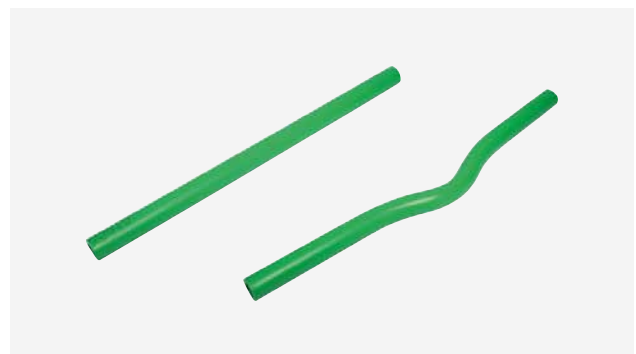
The range of Giacomini pipes used in hot water systems include: PEX-b Cross-Linked Polyethylene, PEX-b/Al/PEX-b Multilayer, PPR.

PPR pipe

Made of polypropylene (PP) obtained through random polymerization, also known as PPR. The material technical characteristics make it suitable for drinking water distribution systems, even when highly calcareous.

PPR shares some of its main benefits with other plastic pipes: durability, thanks to its high resistance to aggressive agents; no perforations caused by stray currents, not transferred by the

material which is a poor electric vector; fewer pressure drops and low surface roughness.



PEX-b pipe

The level of cohesion among molecules forming PE polyethylene, the base polymer used to produce PEX pipes, is not sufficient to guarantee resistance and duration: that is why cross linking becomes important for the molecular chemical bonds it adds to the already existing ones, enhancing its resistance to mechanical stress and high temperatures. Giacomini produces cross-linked PEX-b pipes using catalyzers known as silanes. The cross-linking process is accelerated after extrusion by immersing the pipe in water at controlled temperature or in steam.

This method offers outstanding performances as a 65% cross linking (against 70% required by PEX-a) is enough to achieve resistance to temperature and high-pressure. PEX-b pipes are available with a sleeve (PE-HD) or sleeveless.



PEX-b/AL/PEX-b multilayer pipes R999

Multilayer pipes are made by two PEX-b layers, internal and external, and an intermediate aluminum layer longitudinally welded with laser technology. Special intermediate glue layers homogeneously connect the aluminum to the internal and external PEX-b. It combines the mechanical properties of metal pipes with remarkable resistance to wear and tear and possible electrochemical interactions, typical of plastic pipes. The intermediate aluminum layer limits linear dilation and provides a safe protection barrier against oxygen and other

gases. PEX-b/AL/PEX-b multilayer pipes are suitable for the distribution of drinking water (hot and cold) in compliance with the regulations in force and for heating and cooling systems.



PEX and multilayer systems with Tee connections

PEX and multilayer systems with tee connections **do not require distribution manifolds** but the installation of a main pipe diverted at each usage point with the use of a tee fitting to crimp into underfloor positions. Giacomini's PEX-b or multilayer pipes can solve any installation problem due to space limits and technical/economical choices. All components guarantee a final non-toxic product in full compliance with **directive 98/83/EC** for drinking water quality.





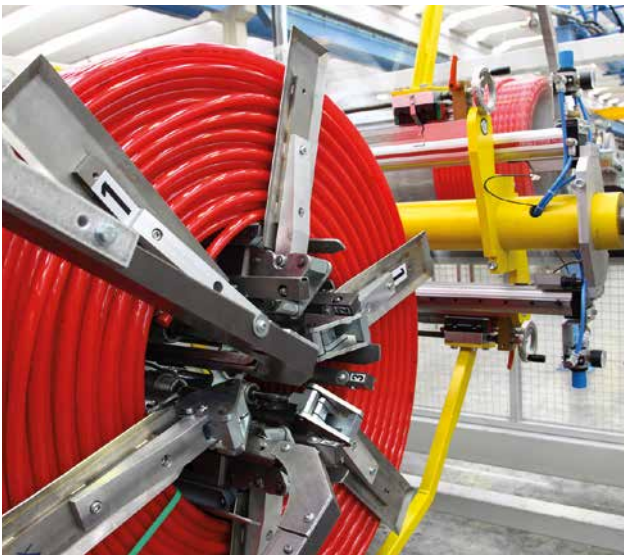
👍 WHY CHOOSE IT?

- Multilayer and/or PEX-b pipes
- Press and compression fittings
- Multi-tong press fittings
- Component compliance with key reference regulation
- PEX-b pipes with low surface roughness, chlorine-resistant

more details at giacomini.com

Fittings and pipes used

The fittings used for this system include the RM crimp and compression fitting ranges. Both types are made of CW617N brass (CuZn40Pb2) in compliance with standard EN 12165 and the UBA list (according to DIN50930-6 and provided for by the 4MS European Initiative) for use in domestic water systems. The double black O-ring is made of EPDM, in compliance with EN 681-1 and suitable for drinking water distribution lines. Giacomini's R993 and R994 domestic water pipes are made of PEX-b and are available with sizes 16x2,2 and 20x2,8 mm in neutral color, supplied with a blue (R993) or red (R994) PE-HD sleeve. Available are also multilayer pipes with sizes ranging from 16x2 to 63x4,5 mm that may also be supplied with closed-cell polyethylene foam insulation.



System components

PEX-b pipes with sleeve

Formed by two PEX-b layers, internal and external, and by an intermediate aluminum layer welded longitudinally with laser technology.



RM press fittings

Compared to the previous RP series, they feature a new profile with enhanced sealing and enable pressing with most tongs (TH-H-U).



Compression fittings

Two models available: with assembled components (fitting body and all other adapter components are pre-assembled) and with single components (fitting body and adapter not assembled and sold separately).



Pressing machine and tongs for press fittings

Electric or battery-powered presses are used to install the RM press fittings: they may be provided with various tongs profiles (TH-H-U) to carry out safe and rapid connections.



Multilayer pipes

Formed by two PEX-b layers, internal and external, and by an intermediate aluminum layer welded longitudinally with laser technology.



PEX multilayer system with manifolds

In multilayer PEX systems with manifolds, all usage points, both for cold and hot water, are individually connected to a distribution manifold equipped with a shut-off valve for every single circuit.

Its main benefit consists of the **installation of entire pipes or pipes without underfloor connections.**

In fact, the only connections found are inside the wall-mounted cabinet, where the manifold is generally installed, and at the end piece. Specifically, with the new R585C modular manifolds equipped with shut-off valves, Giacomini has designed an **easy-to-install and extremely reliable** product.





👍 WHY CHOOSE IT?

- Interception of single usage points through manifold
- Suitable for removable systems having PEX-b pipes
- Components in compliance with main reference regulations
- PEX-b pipes with low surface roughness, chlorine-resistant

more details at giacomini.com

R585CS synchronized modular manifolds

Manufactured by Giacomini with a molded body, a feature that makes them exceptionally sturdy and reduces the roughness of all internal surfaces. Connection sections are designed to offer the broadest port. The R585CS manifold stoppers feature an extremely reliable front seal thanks to an EPDM gasket. The shut-off cock is made of two pieces so that the stopper position does not affect the overall dimensions of the manifold and the correct closing of the cabinet door.

Available with 3/4", 1" and 3/4" Eurocone adapters connection.

Combine the various modules to find the most suitable configuration for your installation needs. In addition, the convenient shut-off handwheels may be customized using stacking plates to identify the corresponding usage point and determine if the domestic water flowing through the manifold is hot or cold.



System Components

PEX-b pipes with sleeve

Manufactured by Giacomini through in-line extrusion of the base polymer (Polyethylene -PE) and subsequent chemical cross-linking with catalyzers known as silanes.



RM press fittings

Compared to the previous RP series, they feature a new profile with enhanced sealing and enable pressing with most tongs (TH-H-U).



Compression fittings

Two models available: with assembled components (fitting body and all other adapter components are pre-assembled) and with single components (fitting body and adapter not assembled and sold separately).



Modular manifold

Available with 3/4" connections and 2 - 3 - 4 outlets Ø 1/2" (center distance 35 mm).

The handwheels have two plates: one showing the corresponding usage point, the other one colored (blue or red) on top of the first, to instantaneously display when hot or cold water is circulating.



Multilayer pipes

Formed by two PEX-b layers, internal and external, and by an intermediate aluminum layer longitudinally welded with laser technology.

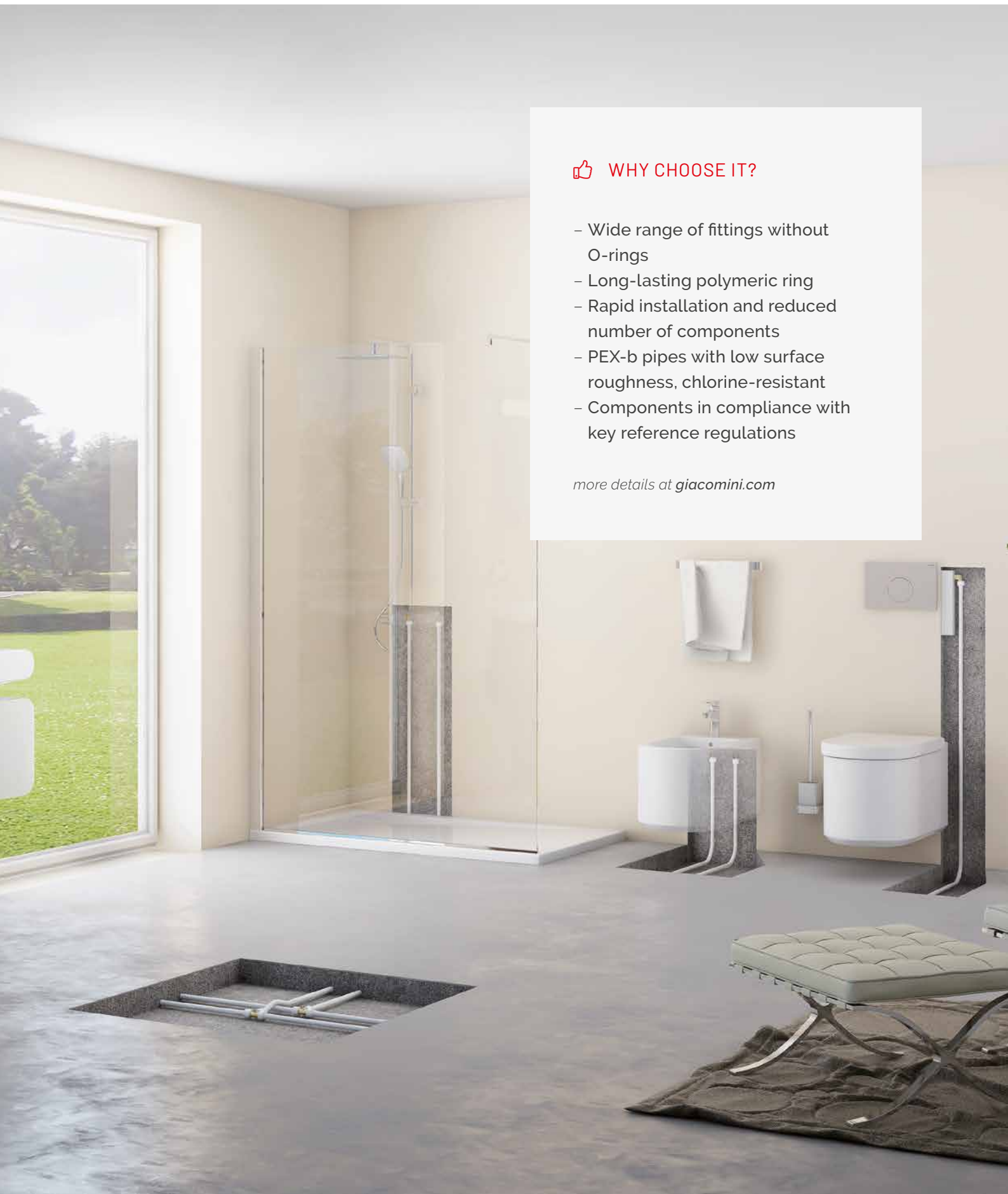


GX Expansion PEX system

The GX PEX Expansion System -Giacomini Expansion System - is a domestic water distribution system (also for use in traditional or radiant heating and cooling systems) made with PEX-b pipes and brass fittings with a special sealing profile provided by a polymeric ring. Gradual expansion of the pipes coupled with the ring enables insertion of the fitting which is quickly locked by the force generated by the elastic return of the polymeric element. Once the process is completed, the connection has better mechanical characteristics than those of a single pipe and is reliable for the system's entire life cycle.

Its special characteristics enable **rapid installation of the system** and, along with the smaller number of components, concur to **reduce overall costs** while offering enhanced safety.





 **WHY CHOOSE IT?**

- Wide range of fittings without O-rings
- Long-lasting polymeric ring
- Rapid installation and reduced number of components
- PEX-b pipes with low surface roughness, chlorine-resistant
- Components in compliance with key reference regulations

more details at giacomini.com

Installation

Follow the instructions below to install the GX system: cut the pipe 90° to its axis. Fit the plastic ring on the pipe till it is flush with the top edge. Insert the open expander – complete with expansion head – all the way into the pipe without forcing it. Close the expander to enlarge the pipe. Each click of the expansion head will enlarge the pipe; during these steps, turn the pipe or the expander (10°-45°) till the expansion head is completely inside the pipe. Carry out at least two other enlargements. Promptly insert the GX fitting inside the dilated pipe. The previously dilated ring and pipe will start gripping on the fitting. After one minute, the connection will be completed.



System Components

PEX-b pipe

Produced by Giacomini through inline extrusion of the base polymer (polyethylene-PE) and subsequent chemical cross-linking using catalyzers known as silanes.



Polymeric rings

Designed to both support installation expansion stress and guarantee component connection in time. Available with 16-20-25-32-40 mm external diameter.



Fittings

Made of CW617N brass (CuZn40Pb) in compliance with standard EN 12165 and the UBA list. Giacomini designed one single fitting range with a special O-ring-free profile and enhanced to guarantee perfect sealing for all classes and working pressures.



Tools

GX system tools enable to connect the entire product range in a rapid and flexible way while reducing possible errors. They also include all types of expanders (manual, battery-powered, electric) and adapters to combine the various expansion heads.



PEX system with crimp ring

The PEX system with crimp ring is a domestic water distribution system also used for traditional or radiant heating and cooling systems. It includes PEX-b pipes with imperial dimensions of 1/2" – 3/4" – 1" and brass fittings with a special sealing profile provided by a ductile and heat-treated black copper ring. After being pressed in the correct position, the ring locks the pipe and the fitting permanently and reliably for the system's entire life cycle. All PEX components with crimp rings are totally non-toxic and **suitable for water distribution**.





👍 WHY CHOOSE IT?

- Rapid and easy installation
- Fittings without O-rings
- PEX-b pipes with extremely reduced roughness, chlorine resistant
- Pipes available in most commonly used dimensions (1/2"-3/4"-1")
- Components in compliance with key reference regulations

more details at giacomini.com

Installation

Follow the instructions below to install the system: cut the pipe at 90° from its axis and manually install the ring on the pipe. Insert the fitting till it is flush with the pipe edge. Fit the ring at 3-6 mm from the pipe end and tighten it slightly with traditional pliers. Position the GZ200 crimping tool so that the ring is completely covered by its jaws. Starting from a 90° open position, close it completely. Check with the GZ211 "Go/No Go" template, 90° from the pipe axis in the corresponding slot of the template: the ring must slide smoothly. In no case should the ring go through the "No Go" template.



System Components

PEX-b pipe with sleeve

GZ996 pipes are made of PEX-b, available in imperial dimensions 1/2" - 3/4" - 1"; in rolls or bars of neutral color. Sleeveless, they must be sleeved or insulated in case of in-wall installation.

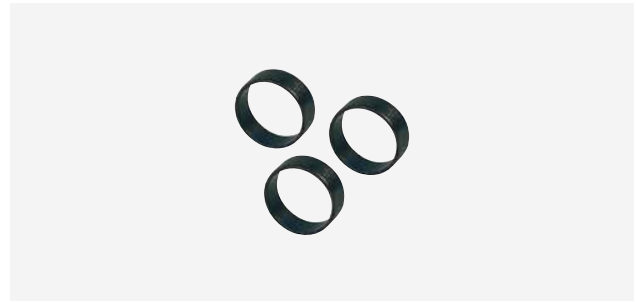


Copper rings

Ductile black heat-treated copper.

Designed for easy installation on pipes.

After being pressed in its correct position, the ring locks the pipe and the fitting permanently.



Fittings

Made of CW617N brass (CuZn40Pb) in compliance with standard EN 12165 and the UBA list for use in domestic water systems. Giacomini designed one single fitting range with a special profile without O-rings and enhanced to provide perfect sealing for all classes and working pressures.



Tools

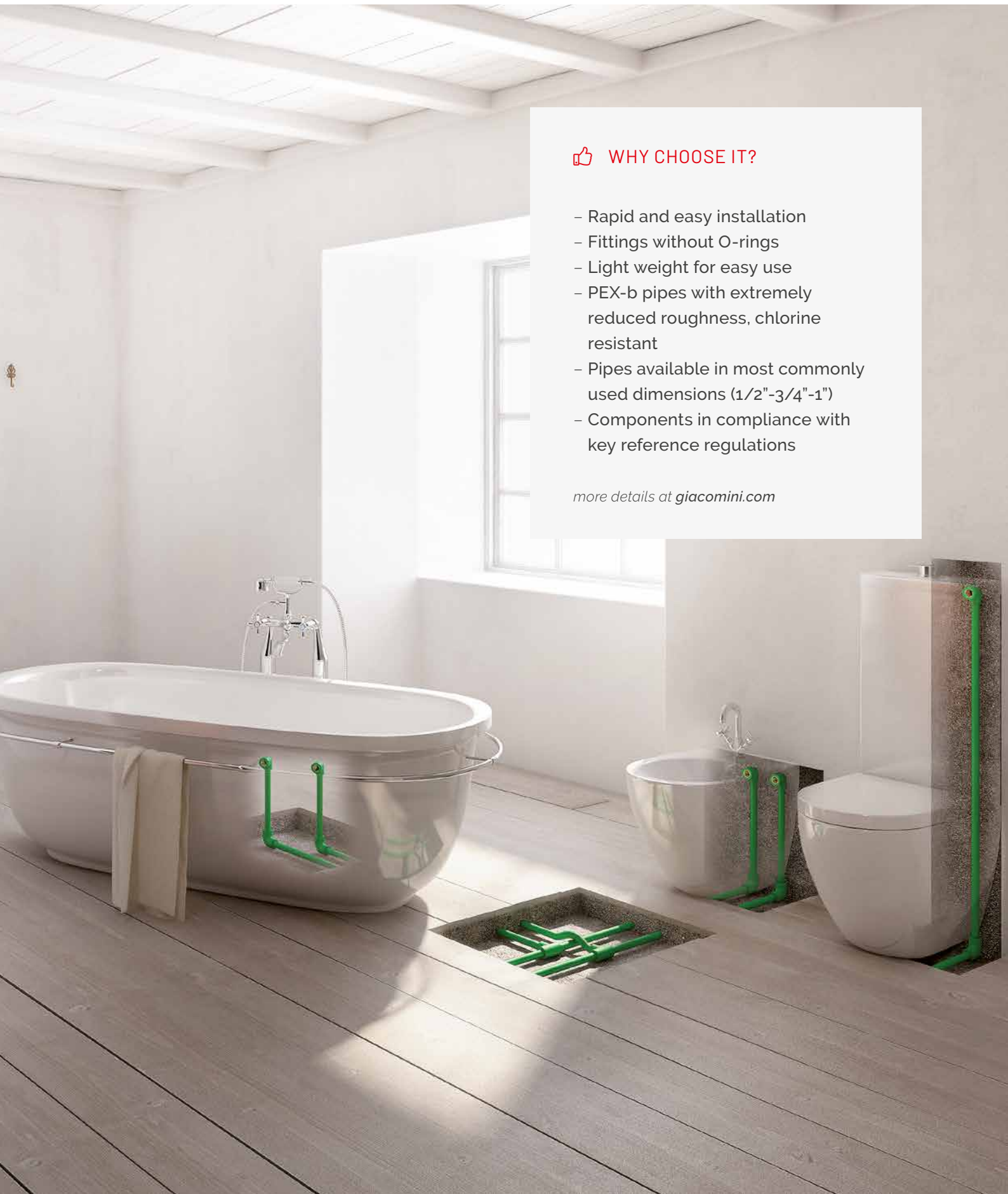
System tools enable rapid and flexible connection of the entire product range while reducing possible errors.



PPR welding system

The PPR welding system (previously known as Giacogreen) includes **polypropylene pipes** and **fittings to be welded**. The technical characteristics of the material make it the ideal solution for drinking water distribution systems, even with highly calcareous water. Polypropylene (PP) is a versatile thermoplastic polymer, widely used in various industrial applications. Polypropylene Random is the variant used to produce PPR welding system pipes and fittings (PPR). All system components are non-toxic and suitable for domestic water distribution as set forth by the European Directive 98/83/EU for drinking water quality.





👍 WHY CHOOSE IT?

- Rapid and easy installation
- Fittings without O-rings
- Light weight for easy use
- PEX-b pipes with extremely reduced roughness, chlorine resistant
- Pipes available in most commonly used dimensions (1/2"-3/4"-1")
- Components in compliance with key reference regulations

more details at giacomini.com

Component welding with polywelder

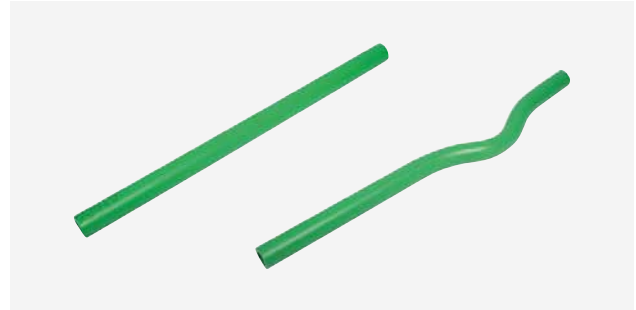
After cutting the pipe at 90° from its axis and properly connecting the instrument with the bushes corresponding to the diameter of the pipe to be welded, turn on the H200 welder and let it heat till it reaches the correct temperature (blinking green light). Mark the insertion depth on the pipe with a pencil. Slide the pipe and fitting simultaneously on the bushes. When the fitting touches the 'male' bush and the pipe in the female bush reaches the marked limit, let elapse the heating time shown on the table for the corresponding diameters, remove the pipe and fitting and then connect them immediately. Make sure the outer edge of the weld runs along the entire pipe outline.



System components

PPR pipes

The raw material used for this system is polypropylene (PP), also known as PPR and obtained through random polymerization. Among its benefits are: remarkable low surface roughness and notable performance in relation to long-term mechanical resistance.



PPR fittings

These fittings are produced based on the injection molding technique. The metallic threads, when present, are obtained through CW617N (CuZn40Pb2) brass spacers, in compliance with standard EN 12165 and the UBA List for use in domestic water systems.



Tools

PPR welding system tools enable making the connections of the entire range rapidly and flexibly, minimizing potential errors. They include two types: the polywelder and the welder for electric sleeves to perform welds in small spaces and positions that cannot be reached by the polywelder.



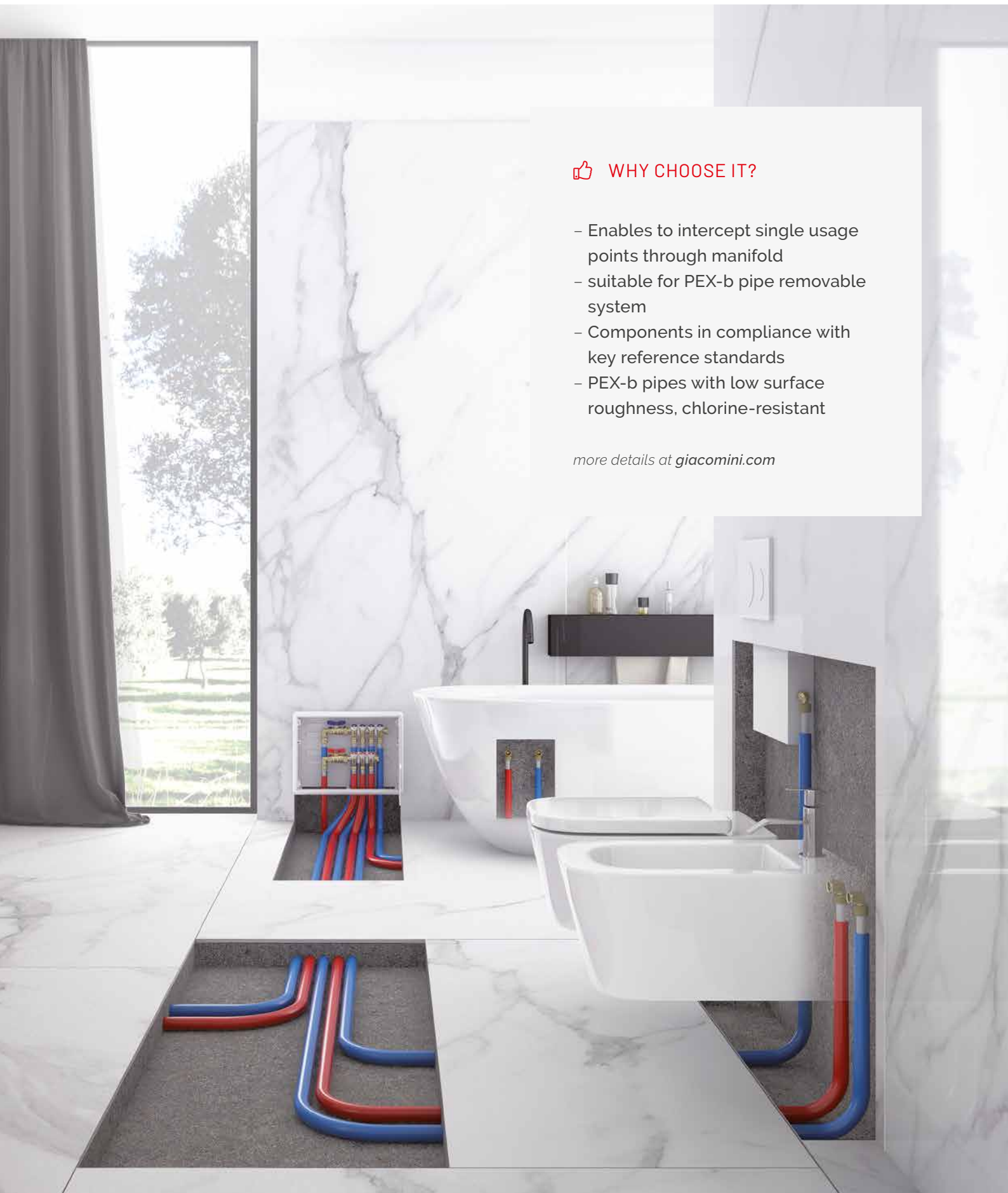
PEX removable system

PEX-b pipes by Giacomini enable to install domestic water systems rapidly and simply.

More specifically, systems using R993, R994, R995 pipes (DN16) are known as **"removable"**, as one can **easily and rapidly replace damaged pipes** with new ones in case of accidental perforation or obstruction of the pipe without damaging floors or walls. These special pipes are provided with a red, blue or black sleeve in 50/75 m rolls.

The pipes can be removed only when the installation curves have a minimum radius eight times greater than the pipe external diameter.





👍 WHY CHOOSE IT?

- Enables to intercept single usage points through manifold
- suitable for PEX-b pipe removable system
- Components in compliance with key reference standards
- PEX-b pipes with low surface roughness, chlorine-resistant

more details at giacomini.com

Replacing the pipe

Shut down the manifold supply, disconnect the pipe with a 16-hex wrench and completely tighten part of the R576 fitting to the pipe to be replaced. Tighten the second part of the fitting to the new pipe, disassembling the R573-1 in-wall elbow. While removing the damaged pipe from the elbow, slide the new pipe inside the sleeve; once the damaged pipe has been completely removed, loosen the R576 fitting and cut the end piece of the new pipe.

Connect the pipe to the in-wall elbow using a new adapter and cut the pipe at the correct distance on the manifold side after reassembling the elbow. Connect the pipe to the manifold using once again a new adapter.

System components

PEX-b pipes with sleeve

Manufactured by Giacomini through in-line extrusion of the base polymer (Polyethylene -PE) and subsequent cross-linking with the B-type silane method, they are provided with a red, blue or black sleeve to make them easy to remove.



R573D-1 fitting

Brass elbow fitting for flush in-wall installation (supplied in a convenient plastic protection shell) used as terminal connection between removable pipes and single usage points.



R576 fitting

Also known as "traction fitting", it is used to connect damaged pipes that need to be replaced.



Modular manifolds

R580M/T and R585M/T modular manifolds use the innovative single module solution; this enables to create the number of connections suitable for the most various construction needs while eliminating stocks, generally required for traditional manifolds.





Benefits of domestic water distribution systems by **Giacomini**



Multiple applications to satisfy
all installation needs



Easy to install



Reduction of bacterial
proliferation



Reduction of domestic water
consumptions



Contained pressure
drops



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