

Uponor

Uponor Q&E PE-Xa for drinking water and heating installations

Technical Information



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Uponor Q&E PE-Xa system for domestic water services and heating & cooling applications



More than 4 billion meters of Uponor PE-Xa pipes now ensure fresh drinking water and cozy warmth worldwide.

Depending on the area of application, Uponor have a range of pipes to suit the use. A Combi-pipe (sizes 16-40mm) can be used for hygienic drinking water applications or for low temperature heating systems. Uponor Aqua Pipe (50-63mm) is specifically for use with a drinking water installation or the Uponor Radi Pipe evalPEX (50-63mm) are solely for use in low temperature heating systems.

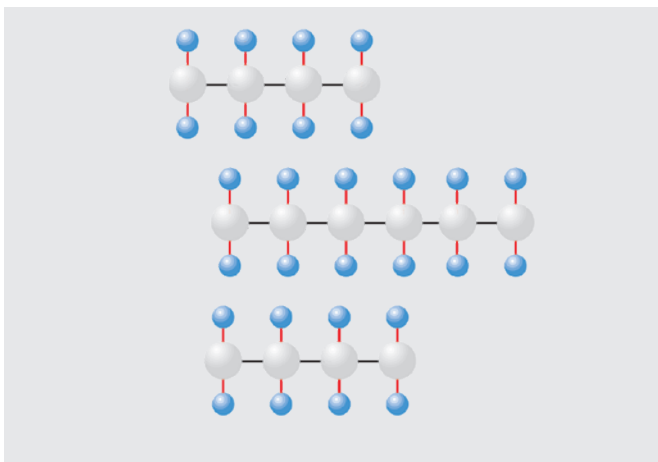
The innovative Q&E (Quick & Easy) connection technology uses the resilience of cross-linked polyethylene pipes for quick and uncomplicated pipe connections. With this connection, the pipe material becomes the sealing material. It connects with the Q&E fitting in a force-fitting and form-fitting manner.

The corrosion resistance and the wide range of fittings and accessory components make the Uponor PE-Xa installation system Q&E a safe and economical complete system.

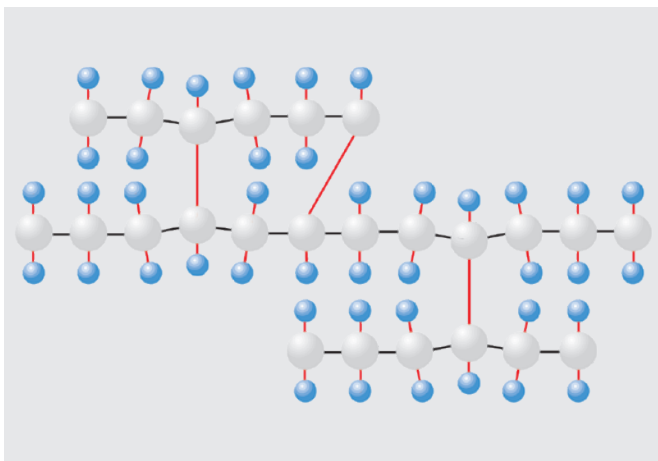
Uponor Q&E PEX pipe system

- Pipe dimensions from 12-63mm
- Lightweight and fast to install
- No hot-works
- Perfect for in-wall installations
- Ideal for use with manifold installations
- Fittings made from either PPSU and brass materials
- Corrosion resistant
- Low pipe roughness, resulting in lower pipe friction and less pressure loss

1. Uponor PE-Xa – proven pipe material with over 50 years of experience



Molecular structure of uncrosslinked polyethylene pipes. The individual molecular chains are not linked to one another.



Crosslinked molecular structure of the robust Uponor PE-Xa pipes. Connecting the individual macro-molecules to form a network, the PE-Xa pipe material is extremely strong and thermally resilient.

Temperature and pressure resistant due to cross-linking

The basis of the Uponor Q&E Shrink-fit installation system is the high-quality Uponor PE-Xa pipes. Due to the cross-linking, they are particularly pressure and temperature resistant, flexible and wear-resistant.

When manufacturing the PE-Xa pipes, high-density polyethylene molecules are connected to form a three-dimensional network. This cross-linking gives the pipe excellent thermal and mechanical properties, making it the first choice for drinking water installations and radiator connections.

Depending on the dimension, Uponor PE-Xa pipes are available as coils, rods or in protective tubes. The Uponor Combi Pipes and Radi Pipes for heating are coated to be oxygen-tight in accordance with DIN 4726



Proven quality

The Uponor Q&E system is subject to strict quality controls and is tested and approved to many national and international standards including both KIWA and WRAS in the UK..



2. Material and pipe properties

Note

Technical specifications for mechanical, thermal and electrical pipe properties are available in the chapter "Technical data".

2.1 Hygienic and non-toxicological

Uponor Combi and Aqua pipes have been tested at a number of laboratories throughout the world and are approved for hygienic tap water distribution.

Tests in laboratories have shown that Uponor Combi and Aqua pipes do not provide any growth environment for bacteria. The pipes comply to the requirements for microbiological growth according to the BS 6920 and DVGW standard W270.

2.2 Long-term stability

Few materials have undergone such extensive endurance testing as Uponor PEX. Ten years of continuous pressure testing at 95 °C and an uninterrupted endurance test since 1972 are just a couple of examples. Stress tests show that at a temperature of 70 °C and a pressure level of 1 MPa in continuous operation, the pipe has an estimated service life of more than 50 years.

2.3 Thermal memory

Regardless of how much an Uponor PEX pipe is bent or kinked, when heated to its softening temperature (129-131 °C), the material returns back to its original form. This characteristic is used with the Q&E Shrink-fit connection technology to give a fast, reliable method of making connections.

2.4 Temperature resistance

The pipes can be used at a temperature up to 100 °C within time and pressure limits - please refer to the operating conditions on page 10.

Freezing

However, Uponor PEX pipes, like all water filled pipes, must be protected against freezing. The material is elastic and can normally tolerate some expansion due to freezing.

Uponor PEX pipes cast in concrete without conduit, will not tolerate freezing. Small air bubbles or cavities are always present in concrete. If the cavities are touching the pipe and freezing occurs, the pipe wall is forced into these cavities sometimes causing the pipe to become perforated, potentially resulting in leakage.

2.5 Low friction

The extremely low friction coefficient of Uponor PEX yields low pressure drops and also minimises the risk of deposits such as limescale from forming within the pipe.

2.6 Resistance of abrasion

The abrasion characteristics are very good: erosion corrosion does not occur even at high water velocity.

2.7 Chemical resistance

The Uponor PEX pipe has a very high resistance to chemicals.

Building materials such as concrete, mortar, plaster, etc. do not affect the pipes negatively.

Tape, paint or sealing compounds containing softening agent must not be used directly on the pipe; softening agents have a negative effect on the pipe's long-term properties.

If in doubt about the chemical resistance, please consult Uponor for further information.

2.8 Scratch resistant

Uponor PEX can withstand minor scratches without being weakened, because the material is resistant to crack growth. This property makes it possible to lay pipes directly in stony ground without costly preparation.

2.9 Sound absorbing

The material in Uponor PEX pipes is elastic and provides a shock-absorbing function in the event of small pressure shocks in the system.

2.10 Vibration absorbing

Uponor PEX can absorb and withstand vibrations. Thanks to the elasticity of the PEX material, the surge can be reduced by as much as 30%.

2.11 Electrical insulation

The electrical insulation properties of Uponor PEX are in the same class as the best insulating materials. The material is non-polar and totally free of impurities.

2.12 Low environmental impact

Uponor PEX is a material with minimal environmental impact in both production and energy recovery. So that you can assess the benefits to the environment of using Uponor Q&E PE-x, please visit our website where full EPD's (Environmental Product Declaration) are available.

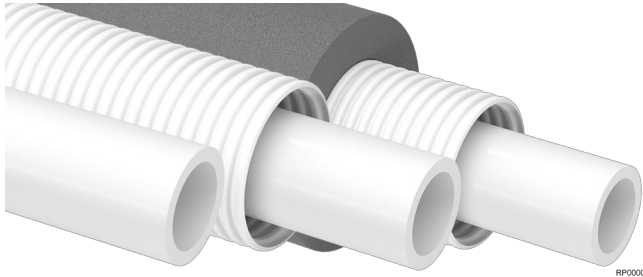
The composition of PE-Xa is Carbon and Hydrogen (C2 H4). During combustion in an oxygenated environment the components bond with the oxygen to form CO2 and H2O along with some short chain carbon residues. No hazardous materials are used in the production of our system so there should be no toxic vapours or fumes released during combustion.

2.13 UV light

Uponor PEX pipes must not be stored or fitted where they are exposed to direct sunlight. UV radiation affects the material, impairing its long-term properties.

3. Pipe descriptions

3.1 Uponor Combi Pipe



Uponor Combi Pipes are used for tap water systems and supply lines for heating systems. Combi pipes are produced by using the Engel process and are also manufactured with an oxygen diffusion barrier of EVOH (Ethyl Vinyl Alcohol). This layer is extruded seamless on the outside of the Uponor Combi Pipe.

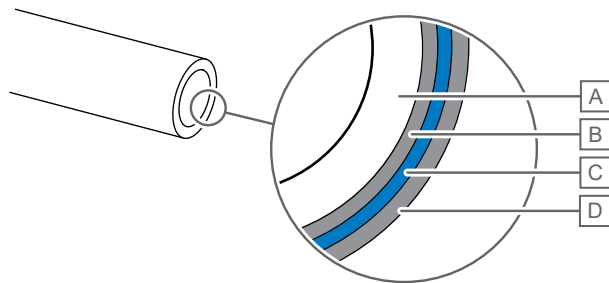
Uponor Combi Pipes are treated in accordance with the hygienic requirement in the Positive Lists for Organic Materials, 4MS Common Approach.

The Uponor Combi Pipes fulfil the requirements for oxygen diffusion resistance as per DIN 4726 and ISO 17455.

Applications

Pipe	Application
Uponor Combi Pipe	Tap water and heating systems
Uponor Combi Pipe in conduit	Tap water and heating systems in concealed installations with conduit

Pipe layers



Item	Description
A	Basic pipe of cross-linked polyethylene (PE-Xa)
B	Adhesive layer of modified polyethylene (PE)
C	Diffusion barrier of ethyl vinyl alcohol (EVOH)
D	Adhesive layer of modified polyethylene (PE)

Fittings

Note
Only use fittings recommended by Uponor

Uponor Q&E and Wipex fittings have been specially developed for use with Uponor pipes.

Press fittings and compression fittings designed for these Uponor pipes are also available. Ensure that the compression fitting has a split compression ring.

Pipe dimensions

Note
Detailed information about the range of components, dimensions etc is available upon request

OD = outer diameter, ID = inner diameter.

Uponor Combi Pipe

Pipe OD x material thickness, mm	Pipe ID, mm	Weight, kg/100 m	Volume, l/100 m
16x1.8	12.4	7.5	12.1
20x1.9	16.2	10.1	20.6
25x2.3	20.4	15.4	32.7
32x2.9	26.2	24.9	53.9
40x3.7	32.6	39.6	83.4

Uponor Combi Pipe in conduit

Pipe OD x material thickness, mm	Conduit OD/ID, mm	Weight, kg/100 m	Volume, l/100 m
16x1.8	25/20	11.9	12.1
20x1.9	28/23	24.4	20.6
25x2.3	34/28	25.4	32.7

3.2 Uponor Aqua Pipe



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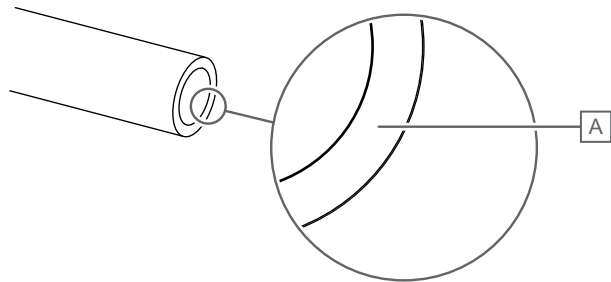
Uponor Aqua pipes are used in tap water systems. The pipes are produced according to BS EN ISO 15875 class 2 (see Operating Conditions on page 10).

Uponor Aqua Pipes are treated in accordance with the new hygienic requirement in the Positive Lists for Organic Materials, 4MS Common Approach.

Applications

Pipe	Application
Uponor Aqua Pipe	Tap water systems

Pipe layers



ED0000007

Item	Description
A	Basic pipe of cross-linked polyethylene (PE-Xa)

Fittings

!

Note

Only use fittings recommended by Uponor

Uponor Q&E and Wipex fittings have been specially developed for use with Uponor pipes.

Compression fittings designed for these Uponor pipes are also available.

Pipe dimensions

!

Note

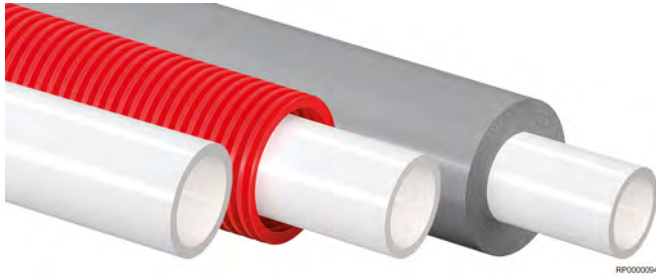
Detailed information about the range of components, dimensions etc is available upon request

OD = outer diameter, ID = inner diameter.

Uponor Aqua Pipe

Pipe OD x material thickness, mm	Pipe ID, mm	Weight, kg/100 m	Volume, l/100 m
50x4.6	40.8	61.5	130.7
63x5.8	51.4	97.7	207.4

3.3 Uponor Radi Pipe



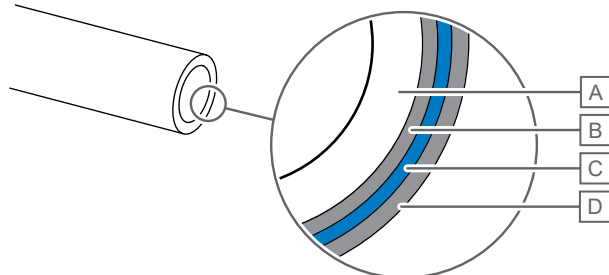
Uponor Radi Pipes are used for tap water systems and supply lines for heating systems, and are produced by Engel process and with an oxygen diffusion barrier of EVOH (Ethyl Vinyl Alcohol). This layer is extruded seamless on the outside of the Uponor Radi Pipe.

The Uponor Radi Pipes fulfil the requirements for oxygen diffusion resistance as per DIN 4726 and ISO 17455.

Applications

Pipe	Application
Uponor Radi Pipe	Heating systems
Uponor Radi Pipe in conduit	Heating systems in concealed installations with conduit

Pipe layers



Item	Description
A	Basic pipe of cross-linked polyethylene (PE-Xa)
B	Adhesive layer of modified polyethylene (PE)
C	Diffusion barrier of ethyl vinyl alcohol (EVOH)
D	Adhesive layer of modified polyethylene (PE)

Fittings

Note
Only use fittings recommended by Uponor

Uponor Q&E and Wipex fittings have been specially developed for use with Uponor pipes.

Compression fittings designed for these Uponor pipes are also available.

Pipe dimensions

Note
Detailed information about the range of components, dimensions etc is available in the price list.

OD = outer diameter, ID = inner diameter.

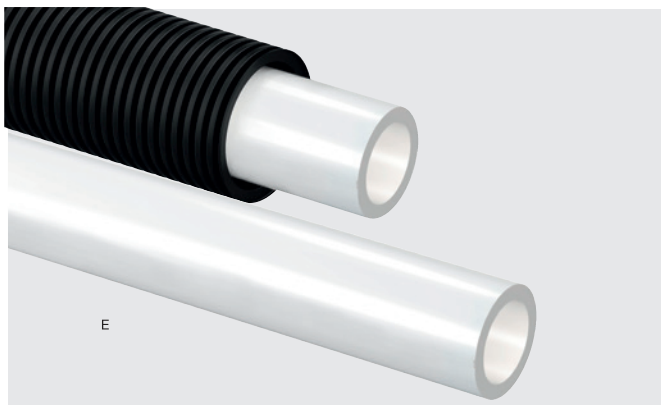
Uponor Radi Pipe

Pipe OD x material thickness, mm	Pipe ID, mm	Weight, kg/100 m	Volume, l/100 m
50x4.6	40.8	61.5	130.7
63x5.8	51.4	97.7	207.4

Uponor PE-Xa Combi and Aqua pipes for drinking water

The hygienic Uponor Combi and Aqua Pipes are tailored to the requirements of the drinking water installation. The Combi pipes for both drinking water and heating (16 - 40mm) are available in either straight bars or coils. Aqua pipes for drinking water only (50 - 63mm) are only available in straight bars.

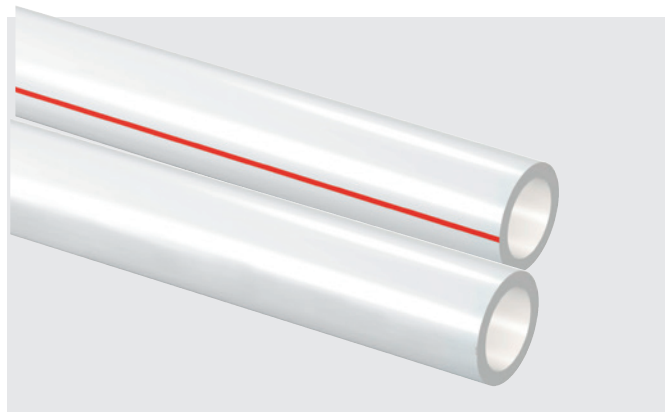
if required, Combi pipes (16 - 25mm) are also available factory-fitted in a protective corrugated conduit.



Uponor PE-Xa Combi and Radi pipe for heating

Uponor Radi pipes (50 - 63mm) have been specially developed for heating water delivery.

In contrast to the Uponor Aqua Pipe drinking water pipes, the pipes for heating water are coated with an oxygen barrier layer. This means that the Uponor Radi Pipes are oxygen-tight in accordance with DIN 4726.



Uponor Combi and Aqua Pipe

- PE-Xa pipe made of cross-linked polyethylene, according to BS EN ISO 15875
- Application class 2 as a drinking water pipe for hot and cold water installations
- Fire class E according to BS EN 13501-1
- Combi - Dimensions 16 – 32mm
- Aqua - Dimensions 50 - 63mm
- 16 – 25mm Combi available ex works in a PE-HD protective corrugated conduit

Uponor Combi and Radi Pipe

- PE-Xa pipe made of cross-linked polyethylene, according to BS EN ISO 15875
- Application class 5 for installation in heating systems
- Oxygen tight according to DIN 4726
- Fire class E according to BS EN 13501-1
- Dimensions 50 - 63mm

Mechanical and physical properties of the base pipe PE-Xa

Tensile strength	at 20 °C 19-26 N/mm ²
Breaking point	at 20 °C 25-30 N/mm ²
Elongation at break	at 20 °C 350-550 %, bei 100 °C 500-700 %
Modulus of elasticity (secant) in a tensile test at 100% min. and 1% elongation	at 0 °C 1000-1400 N/mm ² at 20 °C 800-900 N/mm ² at 80 °C 300-350 N/mm ²
Impact strength	at 20 °C without fracture, and 100 °C without fracture
Resistance to stress fractures	> 20.000 h without fracture
Water absorption	0,01 mg (4d)
Chemical crosslinking	75 %

3.4 Technical Data Uponor PE-Xa pipe systems

Dimension	Unit	Uponor Combi Pipe					Uponor Aqua Pipe	Uponor Radi Pipe (evalPEX) Heating
		Tapwater					Tap water	
		16 x 1.8	20 x 1.9	25 x 2.3	32 x 2.9	40 x 3.7	50 x 4.6	50 x 4.6
Outer diameter d_a	mm	16	20	25	32	40	50	50
Min. Wall thickness	mm	1.8	1.9	2.3	2.9	3.7	4.6	4.6
Nominal bore		DN 12	DN 15	DN 20	DN 25	DN 32	DN 40	DN 40
Material/standard		PE-Xa acc. DIN 16892 and BS EN ISO 15875						
Pipe Colour		White					Natural (white)	
Oxygen Diffusion		Acc. to DIN 4726					---	Acc. to DIN 4726
Weight	Kg/m	0.075	0.101	0.154	0.249	0.396	0.615	0.615
Thermal Conductivity λ	W/mK	0.35						
Coefficient of linear expansion	mm/mK	0.14						
Fire Class to BS EN 13501-1		Class E						
min. Bend Radius:								
- by hand	mm	128	160	200	256	320	400	400
- using pipe guide bend	mm	80	100	125	160	-	-	-
Water volume	l/m	0.121	0.206	0.327	0.539	0.835	1.307	1.307
Pipe absolute roughness	mm	0,007						
Min. Pipe Marking		Uponor Combi Pipe [Dimension] PE-Xa, Class 2 - 6bar 70° C / Class 4 - 6bar 60°C / Class 5 - 6bar 80°C / EN ISO 15875 [Identity Code] Made in Sweden						
Pipe Connections		Uponor Q&E fittings or Uponor compression fittings						
UV-Protection		All components of the Q&E system must be stored away from direct sunlight						
Approvals		WRAS / KIWA						---
Optimum Assembly Temperature °C		5 to 25°C						

3.5 Temperature ranges (Operating Conditions)

• **Domestic services** - 10°C to 70°C where the water temperature does not continuously exceed 70°C, 6 bar (Conditions to application Class 2 - BS EN ISO 15875-1:2003). The maximum short-term malfunction temperature is 95°C for an accumulative 100 hours over the working life of the system.

• **Heating systems (high temperature radiators)** - where the water temperature does not continuously exceed 80°C, 6 bar (Conditions to application Class 5 - BS EN ISO 15875-1:2003). The maximum short-term malfunction temperature is 100°C for an accumulative 100 hours over the working life of the system.

• **Chilled water** - -10°C to 10°C at a maximum pressure of 10 bar. If risk of damage from freezing, a suitable anti-freeze additive must be used. Any additive must be suitable for use with Polyethylene, PPSU, EPDM and CW625N brass

Uponor multi-layer pipe can be used for DHW recirculating systems, provided the operating temperatures and pressures do not exceed the maximum conditions detailed under 'Domestic Services'

4. Component descriptions

Note

This section briefly describes some of the components in the Uponor PEX product family.

For more detailed information, product range and documentation please visit the Uponor website: www.uponor.com.

4.1 Uponor Q&E fittings



The Uponor Q&E fitting is developed based on a method where a Uponor PEX pipe is gradually expanded with a Q&E (PEX) ring fitted on the outside, and then allowing it to shrink back onto a fitting nipple. The technique can be used due to the fact that the Uponor PEX material is capable of shrinking back to its original size, even after a very large amount of expansion or elongation.

Due to the special connection process, the reduction of inner diameter of the connection is much less than on ordinary fittings. In fact, it is almost the same as the inner diameter on the pipe.

The components of the Uponor Q&E system have been very carefully designed to ensure a fast, easy installation. The whole system, combined with the high performance Uponor Milwaukee expander tool, ensures a reliable fast connection, combined with the best possible sealing performance.

The system is so simple that each connection only requires a pair of appropriate pair of pipe cutters and an expander tool.

Testing and approvals

The manufacturing of both fittings and pipes is subject of periodic inspections by international approvals bodies.

Uponor Q&E fittings got their first certifications in 1995. Since then they have been tested in performance and certified by several independent official accredited laboratories, such as KIWA (UK)UTG (Belgium), DVGW (Germany), KIWA (the Netherlands), MPA (Germany), SP (Sweden), TGM (Austria), QAS (Australia) as well as in Uponor's own laboratories. For the UK, we apply either a WRAS or a KUK Reg4 approval, and sometimes both certifications are applied to our products.

4.2 Range of fittings

Uponor Q&E fittings are available in brass, dezincification resistant brass (DR) and a durable, proven plastic called polyphenylsulphone (PPSU).

Brass



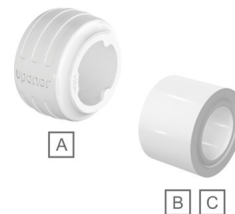
Depending on the fitting, Q&E metal fittings are made from one of two types of brass material. Either a standard brass or a dezincification (DZR) brass.

Plastic (PPSU)



Many fittings in the Uponor Q&E range are made of polyphenylsulfone (PPSU) which has a low weight and very low internal roughness. They are hygienic with very good chemical resistance.

Uponor Q&E rings



Item	Description	Colour	Dimension, mm
A	Uponor Q&E evolution ring	White; Blue; Red	16, 20, 25, 32
B	Uponor Q&E ring with stop edge	Natural	16, 20, 25, 32, 40, 50, 63
		Blue; Red	12, 16, 25
C	Uponor Q&E ring with stop edge	Natural	12, 16, 25

The function of the Q&E ring is to enhance the shrinking force after expansion and strengthen the tightness of the connection.

4.3 Versatile Q&E connections

The Uponor Q&E installation system consists of coordinated, high-quality components. They can be used to carry out a variety of connections in both drinking water installations and heating systems.

Uponor Q&E fittings are predominantly in high-performance plastic polyphenylsulfone (PPSU) or in brass. Both materials have been tested and are certificated for use in hygienic applications.

Uponor Q&E fittings made of PPSU offer extremely high mechanical strength and temperature resistance, whilst offering a wide variety of connection types within the Q&E system.

In addition to standard fittings, the Uponor Q&E brass fitting range also includes special fittings for threaded connections and for direct transition to other pipe systems such as the Uponor Multilayer Composite Pipe system (MLCP).

Whatever material suits your needs best, all fittings use the same Uponor Q&E connection technology and the same tools and accessories.



Uponor Q&E Fittingsystem PPSU



Uponor Q&E Fittingsystem Messing DR



Q&E rings are sold separately

Uponor Q&E components for drinking water installations

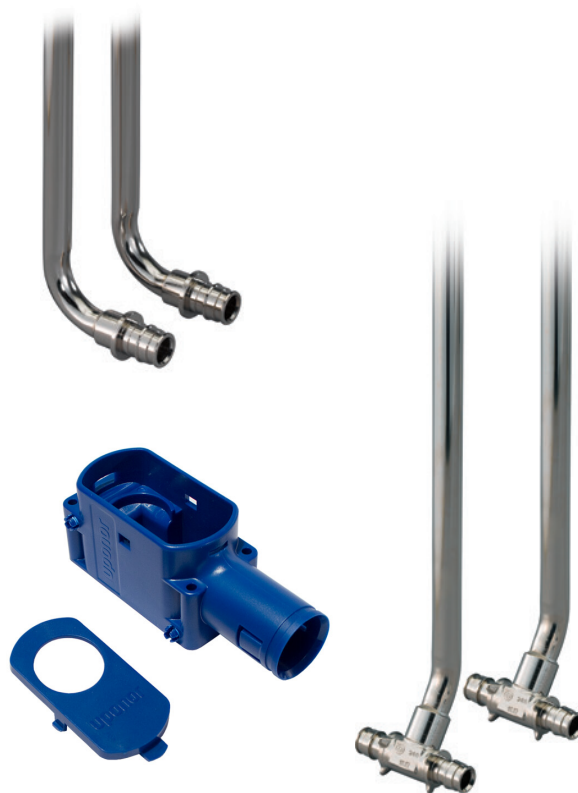
Regardless of whether it is a manifold, T-piece, series or loop installation - the Q&E system has many connection options to make your installation as quick and as efficient as possible.

In addition to the basic range of fittings, the Uponor Q&E PE-Xa system includes special fittings such as back-plate elbows and brackets for use in drinking water installations. The range of accessories, consisting of a variety of mounting rails and sound insulation components is compatible with standard dry-wall and pre-fabricated wall systems.



Uponor Q&E components for heating installations

The Uponor PE-Xa installation system Q&E also contains many specialist connections for heating systems. Whether your connections are from within a wall void, floor void or a screed floor, the Q&E system will have the necessary connections.



4.4 Uponor Wipex fittings



RP0000104

The Uponor Wipex fitting is a very safe fitting produced by Uponor. It is specifically designed for connecting PE-X pipes for hot and cold water for domestic supply and heating for district energy installations.

The fitting is robust and extremely simple to install. These fittings are ideal where access to use tools is restricted, such as confined spaces. No bulky tools are required. All that is needed is a ring spanner and an Allen key.

The Uponor Wipex fitting is designed to give an excellent tight grip. The connection strength between the fitting and the pipe is higher than the tensile strength of the pipe itself, and the sealing performance is unaffected by temperature fluctuations.

Testing and approvals

The Uponor Wipex fittings are WRAS approved and have been tested in performance by several independent official accredited laboratories such as KIWA (UK), DVGW (Germany), NKB (Sweden), CSTB (France) and KIWA (the Netherlands).

Range of fittings



RP0000105

The Uponor Wipex fittings are available in dezincification resistant brass (DR) or gun metal (Rg). EPDM O-rings are used to sealing element of the connection.

The only tools needed are a spanner and an Allen key.

Dimensions

Note

Detailed information about the range of components, dimensions etc is available in the price list.

Uponor Wipex fittings are available for pipe dimensions 25-63mm, and must be from the PN6 series when connecting Uponor Q&E PEX pipes.

4.5 Compression fittings



RP0000110

Note

Ensure that the Uponor compression fitting is compatible with the compression body being used for the connection - specifically thread length

A wide range of compression type fittings are available to connect Uponor PE-X pipes to various general plumbing items such as manifolds and compression bodies to BS EN 1254-2.

To ensure a warranted, safe connection, Uponor Q&E PE-X pipes should only be connected to compression type connections using Uponor's approved fittings.

The Uponor recommended fittings have been tested for security in performance by several independent official accredited laboratories, as well as in Uponor's own laboratories.

4.6 Manifolds



Manifold type installations can provide a range of performance benefits when compared to a traditional T-type installation. A manifold installation is usually more hygienic, more efficient, offers a faster delivery of hot water and can provide easy isolation of each service if necessary.

Uponor offers manifolds in brass and plastic with a wide range of connections suitable for both tap water and heating applications

Brass manifolds can be non-valved, or with valves on each outlet to allow isolation of each service or heating loop.

The valved manifolds come with Identification discs with pictograms of outlet types to distinguish each service on each port, and the cover disc can be swapped for red or blue to identify hot and cold services.

Manifolds come with either 2, 3 or 4 ports and can be assembled together to make the required number of outlets 3, 4, 5, 6, 7, 8, 9, etc

A manifold installation with Uponor components offers the following advantages:

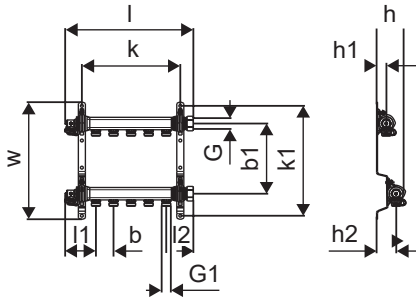
- Manifold to outlet - connection free
- Valved (brass) or non-valved (brass or PPSU)
- Smaller pipe sizes, fast hot water delivery
- Quick installation

Manifolds for heating

Uponor Vario S Manifold L/S

The Uponor stainless steel Vario S L/S manifold enables the connection of between 2 to 16 radiators using 3/4" Euro cone screw connections. Flow and return connections are equipped with a flat-sealing screw connection 1" G. Fill and drain valves are provided on the opposite ends to the supply pipe connections.

Dimensions



Art-Nr.	Outlets	l [mm]	l1 [mm]	l2 [mm]	b [mm]	b1 [mm]	k [mm]	k1 [mm]	h [mm]	h1 [mm]	h2 [mm]	w [mm]	G [""]	G1 [""]	VE	ME
1088045	2-port	210	87	73	50	215	135	336	80	30	50	355	1	¾ Euro	1	St.
1088046	3-port	260	87	73	50	215	185	336	80	30	50	355	1	¾ Euro	1	St.
1088047	4-port	310	87	73	50	215	235	336	80	30	50	355	1	¾ Euro	1	St.
1088048	5-port	360	87	73	50	215	235	336	80	30	50	355	1	¾ Euro	1	St.
1088049	6-port	410	87	73	50	215	335	336	80	30	50	355	1	¾ Euro	1	St.
1088050	7-port	460	87	73	50	215	385	336	80	30	50	355	1	¾ Euro	1	St.
1088051	8-port	510	87	73	50	215	435	336	80	30	50	355	1	¾ Euro	1	St.
1088052	9-port	560	87	73	50	215	485	336	80	30	50	355	1	¾ Euro	1	St.
1088053	10-port	610	87	73	50	215	535	336	80	30	50	355	1	¾ Euro	1	St.
1088054	11-port	660	87	73	50	215	585	336	80	30	50	355	1	¾ Euro	1	St.
1088055	12-port	710	87	73	50	215	635	336	80	30	50	355	1	¾ Euro	1	St.

5. Uponor Q&E shrink-fit connection technology for Uponor PE-Xa pipes

5.1 How the shrink-fit system works

First, the Q&E ring is placed on the end of the pipe until the pipe meets the stops on the end of the ring.

Next, the combined pipe and ring assembly is then expanded together using either M12 or M18 cordless expanding tools with the appropriate sized expanding head.

Finally, remove the tool and insert the Uponor Q&E fitting before the pipe shrinks back to its original size.

Within minutes the pipe and ring assembly will shrink on to the Q&E fitting and will create a secure watertight connection.

Depending on the ambient temperature during installation, a leak test can usually be carried out shortly after completion of the pipe system.

Especially useful in tight spaces

Connections in cramped conditions are easy to make using Uponor Q&E. If required, the pipe end and ring assembly can also be expanded away from the assembly and then added onto the fitting or connection.

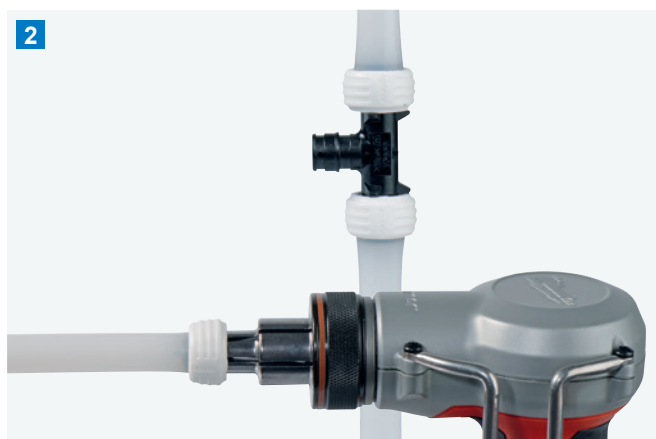
Uponor Q&E

- Innovative connection technology with minimum installation effort
- Very high pull-out strength of up to 13,000 N
- Safe, flame-free installation with no soldering or welding
- No O-rings, sealants, grab rings or moving parts

Secure assembly in 3 simple steps



Add the Q&E ring on to the end of the pipe



The pipe and ring assembly is then expanded using the tool



Remove the expanded assembly from the tool and place on to the fitting, holding the whole assembly for a few seconds until the pipe starts to shrink down on to the fitting.

5.2 Uponor Q&E Expansion tools

The Milwaukee Q&E expansion tools M12 (12v battery and M18 (18v battery, specially developed for the Uponor Q&E system, are used to make connections on Uponor PE-Xa pipe dimensions from sizes 16 - 40mm

Each tool has an integrated mechanism for automatically rotating the expander head (approx. 1/8 turn per expansion cycle). This system ensures an even expansion profile around the inner surface of the pipe and also enables convenient one-handed operation of the tool during installation.

M12 tools are available either standard or with the improved Milwaukee Fuel options. The Fuel tool uses a faster brush-less engine technology and has an improved expander drive system

The tools

- Available either standard or Milwaukee Fuel configuration
- Right-angle design for use in tight spaces.
- Compatible with all Milwaukee M12 batteries
- Metal frame construction for durability.
- M12 expanding tool, kit (not the Fuel version) lithium-ion battery x 2, charger, expanding heads and grease in a compact case.



Uponor Q&E M12 kit with standard M12 tool, 16mm Rapid Seal, 20mm and 25mm heads

Choosing a tool – PE-Xa pipes

PE-Xa pipe OD size	Aufweitwerkzeug			
	M12	M12 Fuel	M18	M18 VLD
16	●	●	●	
16 Rapid Seal	●	●	●	
20	●	●	●	
20 Rapid Seal	●	●	●	
25	●	●	●	
25 Rapid Seal	●	●	●	
32		●	●	
32 Rapid Seal		●	●	
40				●
50				●
63				●

Uponor Q&E standard expander heads



Uponor Q&E Rapid Seal expander heads



Uponor Q&E standard M12 Expansion tool

Uponor Q&E M18 Expander tool

6. General planning principles for drinking water and heating installations

6.1 Fire protection requirements

Building regulations in the United Kingdom are statutory instruments or statutory regulations that seek to ensure that the policies set out in the relevant legislation are carried out. Building regulations approval is required for most building work in the UK.

In the UK, the requirements for fire protection are detailed in the relevant government documents :

England - Fire Safety, Approved Document B (fire safety volume 1: Dwellings, 2019 edition incorporating 2020 amendments **or** Fire Safety Approved Document B (fire safety volume 2: Buildings other than dwellings, 2019 edition incorporating 2020 amendments

Scotland - Building standards technical handbook 2019: domestic (2. Fire **or** Building standards technical handbook 2019: non-domestic (2.Fire

Wales - Welsh Building Regulations 2010, Volume 1 - Dwellings, Approved Document incorporating 2010, 2016 and 2020 amendments **or** Welsh Building Regulations 2010, Volume 2 - Buildings other than Dwellings, Approved Document incorporating 2010, 2013, 2016, 2017 and 2020 amendments

In modern buildings, there are strict regulations governing fire safety and the protection of all areas of a building.

It is sometimes necessary for pipes and other services to pass through fire-separating elements. If a fire-separating element is to be effective, every opening to allow services to pass through should be adequately protected by sealing with appropriate fire-stopping methods so that the fire resistance of the element is not impaired.

In order to guarantee preventive fire protection, the choice of the right building materials is very important. The selection of building materials is regulated and detailed in the above national standards and these standards also contain a list of technical building regulations which must be observed.

In addition to the relevant national standards, product information to the European standard BS EN 13501-1 'Fire Classification of Construction Products and Building Elements' and the British National standard BS 476 'Fire tests on building materials and structures - methods of test to determine the classification of the surface spread of flame of products' are also important information required by the projects' engineers.

With regards to Uponor pipe systems and the use fire stopping measures, our advice is to always follow the guidance from the project's engineers. If deemed suitable by the engineers, fire collars and fire bandages may be used as long as any adhesive or methods of application do not damage or compromise the materials of the Uponor system.

In many projects, intumescent sealants need to be applied. Unless the sealant has been approved by Uponor for use in direct contact with our products, we do not recommend they are applied directly onto our pipe systems. In some cases, these sealants can damage our pipe materials and may restrict movement.

In all instances, any fire-stopping solutions used must demonstrate the ability to provide the correct fire rating by means of certificated 3rd party fire test data.

In a fire situation, different types of plastics perform differently. Any fire stop solutions must therefore be tested on specific pipe types, and this performance testing can then provide engineers with the necessary evidence and information to maintain the correct fire rating for that specific sealing element.

Whatever system is to be used, in order to comply to the relevant regulations, every element must be 'installed as tested' and fire-stopping engineers must seek the correct certification and installation detail from the chosen products' manufacturer.



Caution!

All decisions relating to fire safety of any building must be the responsibility of the appointed, trained fire safety professional. Always seek advice from an appropriately qualified engineer.

6.2 Pipe insulation



Note

Insulation of the individual services must be added to ensure that the performance of the system is not adversely affected. Requirements for the insulation performance must follow the guidance of the project specification and should comply with the relevant national standard.

Insulation of pipelines is primarily used to reduce heat loss from DHW and LTHW systems and also to prevent unwanted thermal transfer that can heat cold drinking water in DCW/BCW pipes. However, insulation or cladding can also be useful, or even necessary, to avoid freezing, corrosion, condensation and sound transmission. The insulation requirements for new and existing buildings, for both hot and cold pipes, are described in various guidance standards such as BS 5422 and BS EN 806, and insulation must be applied as required by the Building regulations Part L 'Conservation of fuel and power' (or equivalent national standard for Scotland and Wales).

7. Dimensioning of sections (design tables) PE-Xa

The selection of the pipe dimension for a particular part of a system section can be determined from the following pipe friction pressure gradient tables described as functions of peak flow rate for cold tap water (10 °C), or from the pressure loss diagram.

D _e (mm) Esp (mm) D _i (mm)	16 1,8 12,4		20 1,9 16,2		25 2,3 20,4	
	R (mbar/m)	Vel (m/s)	R (mbar/m)	Vel (m/s)	R (mbar/m)	Vel (m/s)
0,01	0,125	0,083	0,032	0,049	0,011	0,031
0,02	0,434	0,166	0,113	0,097	0,038	0,061
0,03	0,900	0,248	0,236	0,146	0,078	0,092
0,04	1,511	0,331	0,396	0,194	0,130	0,122
0,05	2,258	0,414	0,593	0,243	0,194	0,153
0,06	3,136	0,497	0,824	0,291	0,266	0,184
0,07	4,138	0,580	1,086	0,340	0,352	0,214
0,08	5,263	0,662	1,384	0,388	0,447	0,245
0,09	6,506	0,745	1,712	0,437	0,515	0,275
0,10	7,865	0,828	2,070	0,485	0,664	0,306
0,15	16,319	1,242	4,303	0,728	1,366	0,459
0,20	27,392	1,656	7,230	0,970	2,278	0,612
0,25	40,934	2,070	10,815	1,213	3,387	0,765
0,30	56,837	2,484	15,027	1,455	4,684	0,918
0,35	75,016	2,898	19,845	1,698	6,162	1,071
0,40	95,401	3,312	25,252	1,941	7,813	1,224
0,45	117,934	3,726	31,231	2,183	9,633	1,377
0,50	142,565	4,140	37,769	2,426	11,618	1,530
0,55	169,251	4,554	44,856	2,678	13,764	1,683
0,60	197,952	4,968	52,480	2,911	16,067	1,836
0,65	228,633	5,382	6,634	3,154	18,525	1,989
0,70	261,264	5,796	69,308	3,396	21,134	2,142
0,75	295,815	6,244	78,495	3,639	23,893	2,295
0,80	332,261	6,625	88,189	3,881	26,798	2,448
0,85	370,577	7,039	98,362	4,124	29,848	2,601
0,90	410,740	7,453	109,069	4,366	33,042	2,754
0,95	452,729	7,867	120,245	4,609	36,376	2,907
1,00			131,904	4,852	39,850	3,059
1,05			144,042	5,094	43,462	3,212
1,10			156,653	5,337	47,210	3,365
1,15			169,735	5,579	51,093	3,518
1,20			183,281	5,822	55,110	3,671
1,25			197,290	6,064	59,259	3,824
1,30			211,757	6,307	63,539	3,977
1,40			242,050	6,792	72,849	4,283
1,50			274,135	7,277	81,950	4,589
1,60			307,989	7,762	91,916	4,895
1,70			343,588	8,248	102,379	5,201
1,80			380,912	8,733	113,332	5,507
1,90			419,942	9,218	124,768	5,813
2,00			460,661	9,703	136,684	6,119
2,10					149,072	6,425
2,20					161,927	6,731
2,30					175,246	7,037
2,40					189,023	7,343
2,50					203,255	7,649
2,60					217,936	7,955
2,64					223,934	8,077
2,70					233,064	8,261
2,80					248,634	8,567
2,90					264,642	8,873
3,00					281,087	9,178
3,10					297,963	9,484
3,20					315,269	9,790

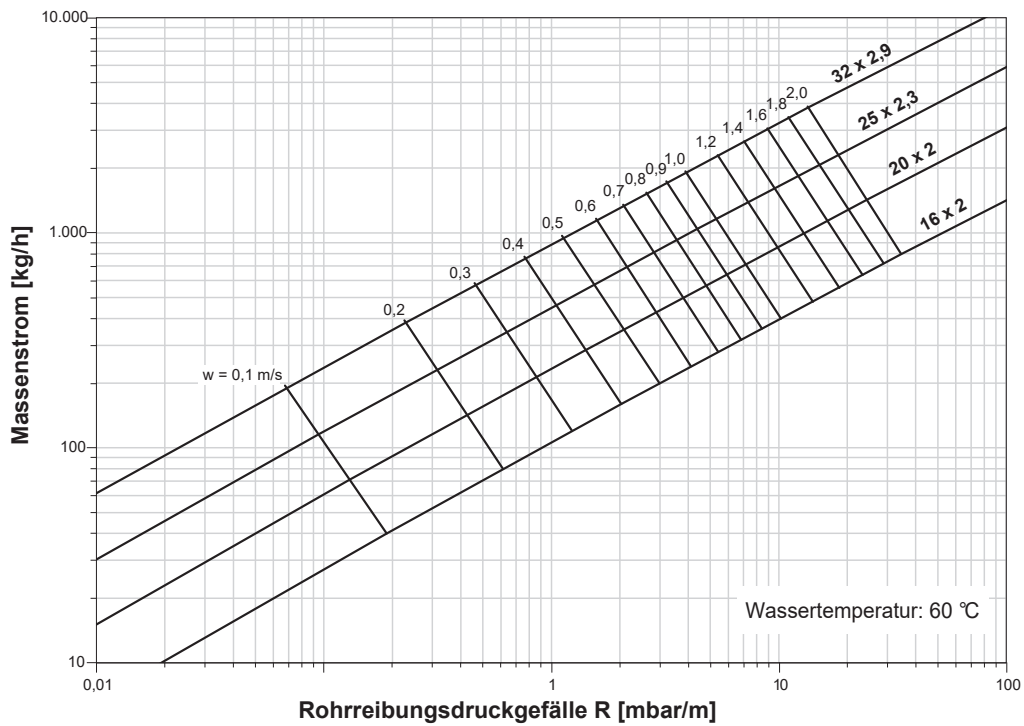
D_e: Outside diameter (mm) Q: Flow (l/s)
 Esp: Wall thickness (mm) Vel: Velocity (m/s)
 D_i: Internal diameter (mm) R: Pressure loss (mbar/m)

Correction factors for other water temperatures

Water temperature [°C]	10	15	20	25	30	35	40	45	50	55	60
Conversion factor	1.000	0.983	0.967	0.952	0.938	0.933	0.918	0.904	0.890	0.873	0.861

D _e (mm) Esp (D ₁ mm)	32 2,9 26,2		40 3,7 32,6		50 4,6 40,8	
	Q (l/s)	R (mbar/m)	Vel (m/s)	R (mbar/m)	Vel (m/s)	R (mbar/m)
0,01	0,003	0,019				
0,02	0,010	0,037				
0,03	0,021	0,056				
0,04	0,036	0,074				
0,05	0,053	0,093				
0,06	0,074	0,111				
0,07	0,097	0,130				
0,08	0,123	0,148				
0,09	0,152	0,167				
0,10	0,184	0,185	0,061	0,120	0,021	0,076
0,15	0,381	0,278	0,126	0,180	0,044	0,115
0,20	0,639	0,371	0,212	0,240	0,074	0,153
0,25	0,954	0,464	0,317	0,300	0,110	0,191
0,30	1,324	0,556	0,440	0,359	0,153	0,229
0,35	1,747	0,649	0,580	0,419	0,201	0,268
0,40	2,220	0,742	0,737	0,479	0,256	0,306
0,45	2,743	0,835	0,911	0,539	0,316	0,344
0,50	3,314	0,927	1,102	0,599	0,382	0,382
0,55	3,933	1,020	1,308	0,659	0,453	0,421
0,60	4,598	1,113	1,529	0,719	0,530	0,459
0,65	5,309	1,206	1,766	0,779	0,611	0,497
0,70	6,065	1,298	2,017	0,839	0,698	0,535
0,75	6,865	1,391	2,284	0,899	0,790	0,574
0,80	7,709	1,484	2,565	0,958	0,888	0,612
0,85	8,596	1,577	2,860	1,018	0,990	0,650
0,90	9,525	1,669	3,170	1,078	1,097	0,688
0,95	10,497	1,762	3,494	1,138	1,208	0,727
1,00	11,510	1,855	3,831	1,198	1,325	0,765
1,05	12,564	1,948	4,183	1,258	1,446	0,803
1,10	13,659	2,040	4,548	1,318	1,572	0,841
1,15	14,794	2,133	4,926	1,378	1,703	0,880
1,20	15,969	2,226	5,318	1,438	1,838	0,918
1,25	17,184	2,319	5,723	1,498	1,978	0,958
1,30	18,438	2,411	6,141	1,557	2,122	0,994
1,40	21,063	2,597	7,017	1,677	2,424	1,071
1,50	23,842	2,782	7,944	1,797	2,743	1,147
1,60	26,772	2,968	8,921	1,917	3,080	1,224
1,70	29,852	3,153	9,949	2,037	3,434	1,300
1,80	33,079	3,339	11,026	2,156	3,806	1,377
1,90	36,453	3,524	12,151	2,276	4,193	1,453
2,00	39,970	3,710	13,326	2,396	4,598	1,530
2,10	43,631	3,895	14,548	2,516	5,019	1,606
2,20	47,433	4,081	15,817	2,636	5,456	1,683
2,30	51,375	4,266	17,133	2,756	5,909	1,759
2,40	55,457	4,452	18,496	2,875	6,378	1,836
2,50	59,675	4,637	19,905	2,995	6,863	1,912
2,60	64,031	4,823	21,359	3,115	7,364	1,989
2,64	65,811	4,897	21,954	3,163	7,568	2,019
2,70	68,522	5,082	22,859	3,235	7,880	2,065
2,80	73,147	5,194	24,404	3,355	8,412	2,142
2,90	77,905	5,379	25,994	3,474	8,959	2,218
3,00	82,796	5,565	27,628	3,594	9,521	2,295
3,10	87,819	5,750	29,306	3,714	10,096	2,371
3,20	92,972	5,936	31,025	3,834	10,690	2,448
3,30	98,255	6,121	32,793	3,954	11,297	2,524
3,40	103,667	6,306	34,602	4,073	11,919	2,601
3,50	109,207	6,492	36,454	4,193	12,556	2,677
3,60	114,875	6,677	38,348	4,313	13,207	2,754
3,70	120,670	6,863	40,285	4,433	13,873	2,930
3,80	126,590	7,048	42,264	4,553	14,553	2,907
3,90	132,636	7,234	44,285	4,672	15,248	2,983
4,00	138,807	7,419	46,347	4,792	15,957	3,059
4,10	145,101	7,605	48,452	4,912	16,680	3,136
4,20	151,519	7,790	50,598	5,032	17,418	3,212
4,30	158,060	7,976	52,785	5,152	18,169	3,289
4,40	164,723	8,161	55,012	5,271	18,935	3,365
4,50			57,281	5,391	19,714	3,442
4,60			59,591	5,511	20,508	3,518
4,70			61,940	5,631	21,315	3,595
4,80			64,330	5,751	22,136	3,671
4,90			66,760	5,870	22,971	3,748
5,00			69,230	5,990	23,819	3,824
5,10			71,740	6,110	24,681	3,901
5,20			74,290	6,230	25,557	3,977
5,30			76,878	6,350	26,446	4,054
5,40					27,348	4,130
5,50					28,264	4,207
5,60					29,193	4,283
5,70					30,135	4,360
5,80					31,091	4,436
5,90					32,060	4,513

Druckverlustdiagramm Uponor PE-Xa Rohre Radi Pipe PN 6 (Wassertemperatur 60 °C)



8. General installation instructions

8.1 Thermal expansion of Uponor PE-Xa pipes

Like all materials, Uponor PE-Xa pipes change their length depending on the respective installation and operating temperatures (thermal change in length). They either expand (temperature rise) or they contract (cooling). The extent of the change in length is determined by the installed pipe length, the temperature difference and the a value of the pipe material and can be calculated approximately using the following formula or taken from the expansion diagram.

Calculation formula for thermal length change

$$\Delta L = a \cdot L \cdot \Delta\vartheta$$

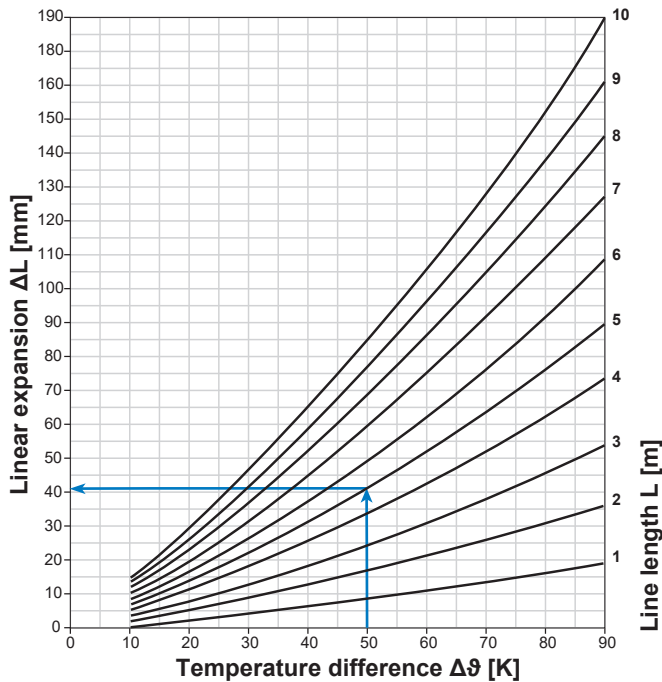
ΔL = Linear expansion in mm

a = Linear coefficient of expansion (0,18 mm/mK)

L = Line length in m

$\Delta\vartheta$ = Temperature difference in K

Table of expansion PE-Xa



Ablesebeispiel Thermische Längenänderung:

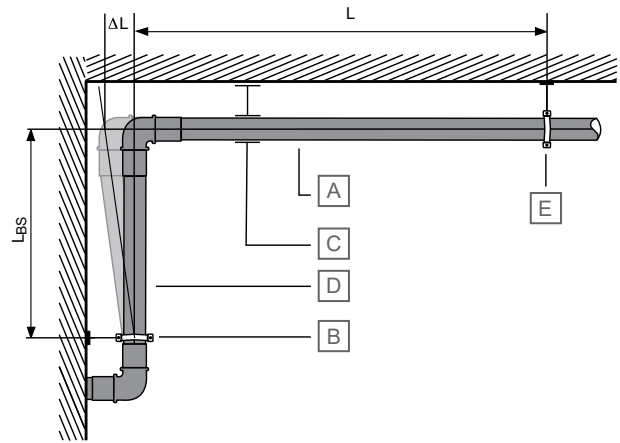
Line length:	5 m
Installation temperature:	20 °C
Operating temperature:	70 °C
Temperature difference $\Delta\vartheta$:	50 K
Linear expansion ΔL :	42 mm

Expansion relief using a bending leg

When planning expansion relief to be made by the use of a bending leg, the correct calculations must be made to ensure that the movement is sufficient to compensate the required expansion movement without placing too much stress on the system components or the building fabric.

Uponor Q&E PE-Xa pipes that are to be used for any heated water service must not be installed rigidly (without expansion relief) between two fixed points. The change in length of the pipes must always be absorbed or guided.

Uponor Q&E PE-Xa pipes which are exposed to full thermal expansion must be provided with a corresponding expansion compensation. This requires knowledge of the location of all fixed points. Compensation is always performed between two fixed points (FP) or changes in direction (bending leg).



ZD0000040

Item	Description
A	Expansion leg
B	Fixed point
C	Sliding clamp
D	Bending leg
E	Fixed point
L	Length of bending leg in m
L_{BS}	Bending leg length in mm

Calculation formula:

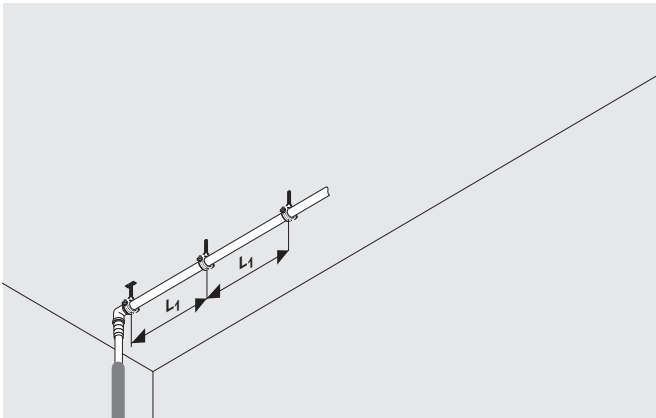
Description	Value
L_{BS}	$k \cdot \sqrt{OD \cdot (\Delta\vartheta \cdot a \cdot L)}$
OD	Pipe outer diameter in mm
L	Length of bending leg in m
L_{BS}	Bending leg length in mm
a	Coefficient of linear expansion [0.025 mm/mK]
$\Delta\vartheta$	Temperature difference in K
k	30 (material constant)

8.2 Fixing distances

Fixing distances of freely laid PE-Xa pipelines (BS EN 806-4).

When fastening pipelines with the possibility of expansion, usually the thermal changes in length of freely installed pipes are compensated by a combination of fixed points, sliding brackets, compensators or changes in direction such as bending legs.

The image below shows the laying of a pipeline where expansion compensation options are installed.



OD d_a [mm]	Fixing distances *	
	Cold water L_1 , max. [mm]	Warm water L_1 , max. [mm]
16	750	400
20	800	500
25	850	600
32	1000	650

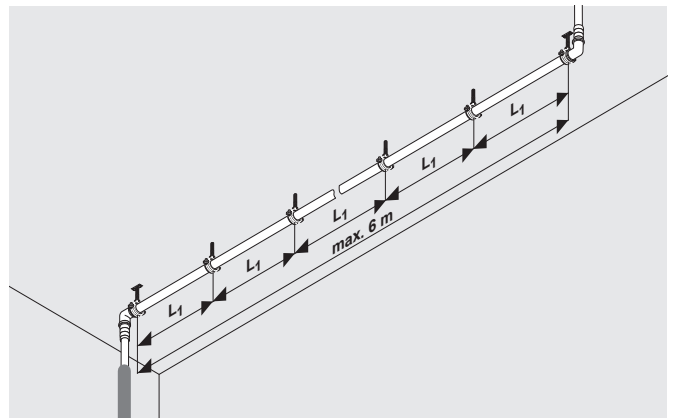
* for vertically mounted pipes, the fixing distances L_1 can be multiplied by a factor of 1.3

Fixing distances without the possibility of expansion (fixed point method).

In special cases, it may be necessary to install pipelines between fixed points. The temperature-related change in length between two fixed points is completely suppressed. The forces occurring as a result of the thermal change in length are transferred to the building structure via the fixed points.

The distance between two fixed points in the axial direction must not exceed 6.0 m.

Sufficiently small fastening distances prevent the pipeline. The image below shows the fixing of a pipeline using the fixed point method.



OD d_a [mm]	Fixing distances	
	Cold water L_1 , max. [mm]	Warm water L_1 , max. [mm]
16	600	250
20	700	300
25	800	350
32	900	400

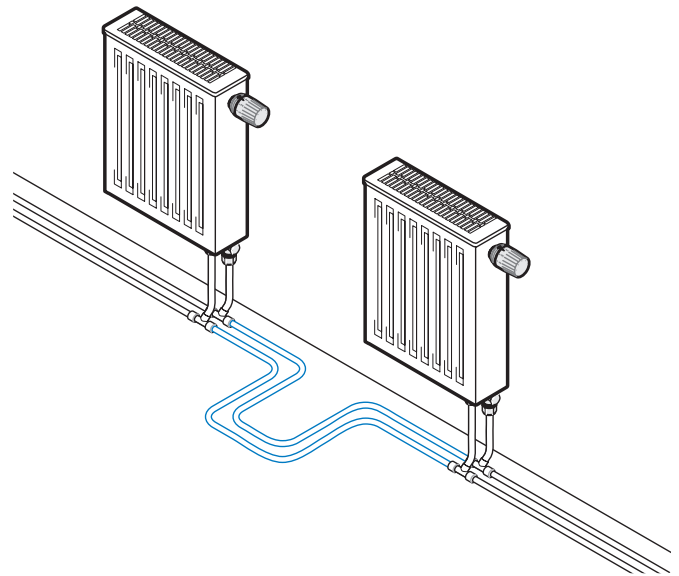
8.3 Laying and fastening of the Uponor PE-Xa pipes on an unfinished floor before a screed layer is added.

If Uponor PE-Xa pipes are laid on the unfinished floor, they must be adequately fastened to the subsurface. In addition, the thermally induced change in length of the pipes must be taken into account, especially when laying hot pipes in PE protective conduit or within thermal insulation (e.g. radiator connection lines).

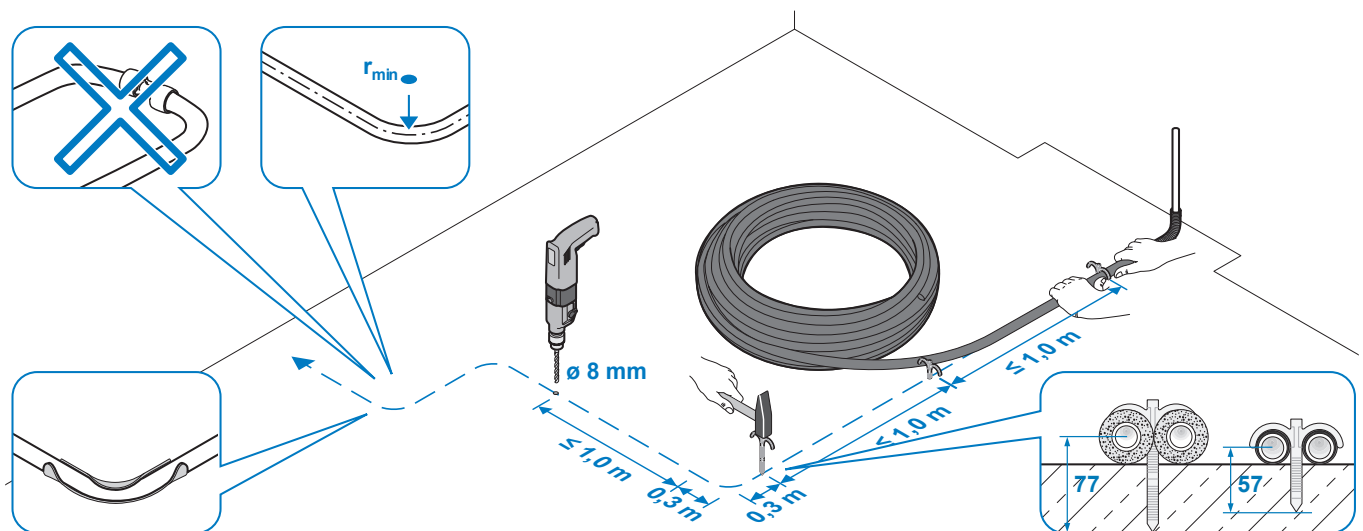
With 90° deflections in front of the radiators and distributors as well as pipe routing parallel to the wall, any stresses that may occur due to thermal changes in length are largely absorbed with the flexible Uponor PE-Xa pipes.

For installation within a protective PE conduit, (straight pipe lengths up to approx. 4 m at a temperature difference of 50 K), the pipe-in-pipe arrangement will absorb the pipe expansion.

If many radiators are planned one after the other, e.g. as a two-pipe ring system with radiator connection T-pieces, additional expansion bends or professionally placed fixed points may need to be provided to absorb the expansion.



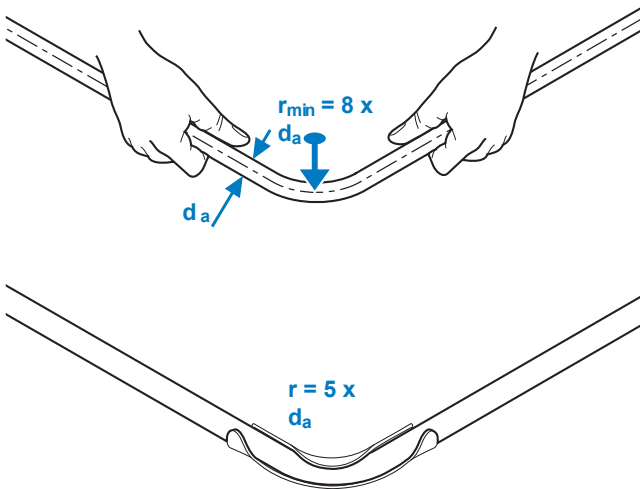
Expansion bends to compensate for the thermal change in length between radiator fixed points.



8.4 Minimum bending radius

Uponor PE-Xa pipes with an outside diameter of up to 32 mm can be used to make cold formed bends with radii $\geq 8 \times$ pipe outer diameter without the use of any tools.

For 90° angles, Uponor pipe guide bends made of plastic or galvanized steel (bending radius $5 \times$ diameter) can be used.




If the minimum bending radius cannot be maintained e.g. in the transition between floor and wall, an appropriate fitting must be installed (e.g. an Uponor Q&E angle 90°).

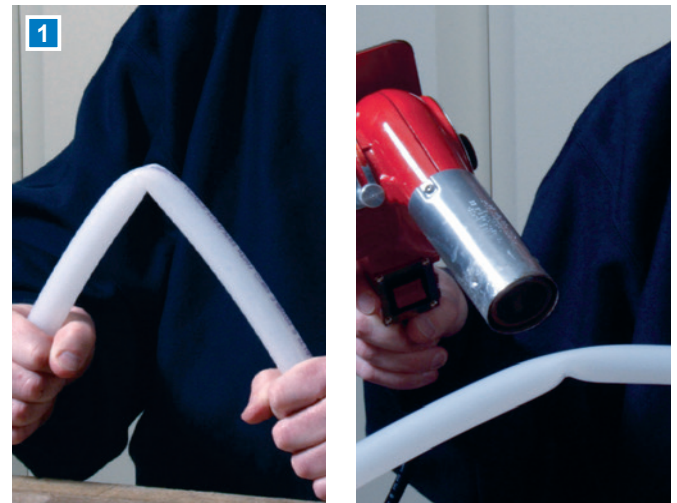
8.5 Repairing kinked PE-Xa pipes

If an Uponor PE-Xa pipe is accidentally kinked at one point, the special material properties of cross-linked polyethylene pipes allow the kinked area to be reshaped using the thermal memory effect of the material.

Caution!



- Do not use an open flame for heating.
- Kinked Combi or Radi pipes should not be heated until they are transparent, as there is a risk that the oxygen barrier layer will be damaged if heated too much.
- If the pipe has clearly changed color in the repair area after it has cooled down, we recommend replacing the pipe section because there is a high probability that it has overheated.



1. Gently heat the area the damaged area with a flame-free heat gun to approximately 130°C. Guide the hot air gun evenly around the pipe until the pipe has returned to its original shape (Combi and Radi pipes) or until the material begins to become transparent (Aqua pipes).
2. Allow the tube to cool, following which the tube will have assumed its original shape and can once again be used in an installation.

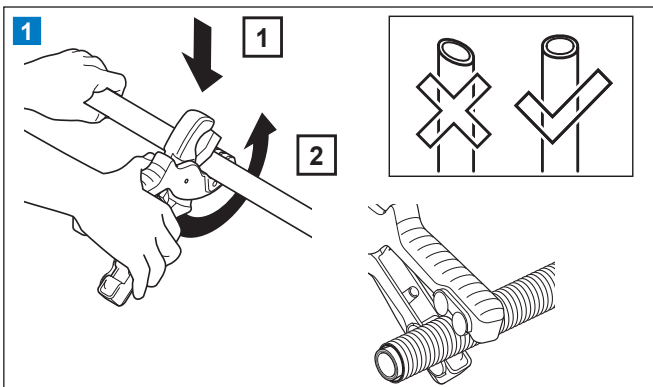
9. Assembly instructions

- Note**
Installation must be performed by a competent person in accordance with national standards and regulations.
- Note**
Installation and operation manuals are included with the products or can be downloaded from the Uponor website: www.uponor.co.uk. For details of Uponor's free, certificated installation training contact : enquiries.uk@uponor.com

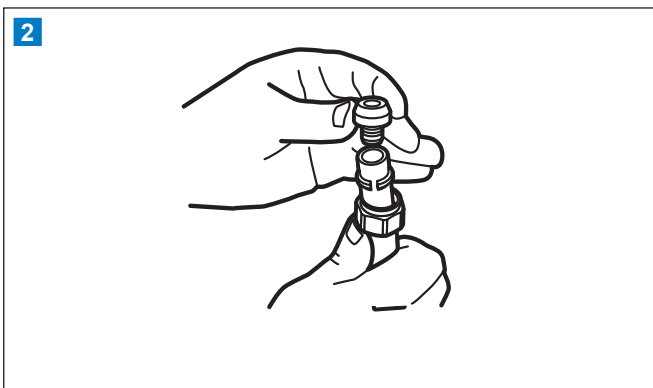
Before installation, the installer must check all components for possible transport damage and must also read, understand and observe the relevant installation and operating manuals.

For the professional use of the Uponor Q&E PE-Xa pipe system, the applicable technical guidance and the building regulations must be observed. The installation must be carried out in accordance with generally recognised engineering practices such as BS EN 806 or BS 8558:2015. In addition, all installation, accident prevention and safety regulations must be observed.

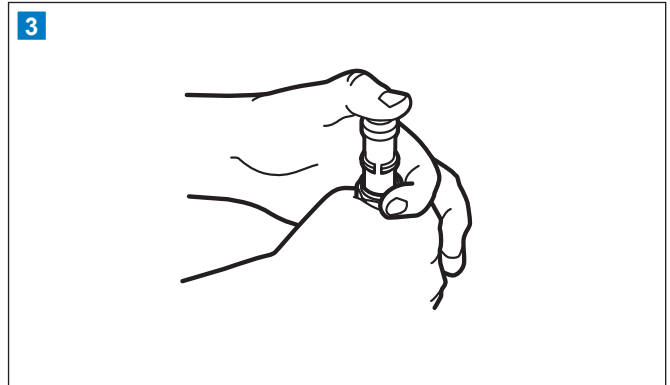
9.1 Connection to a manifold or compression body using Uponor compression adapters



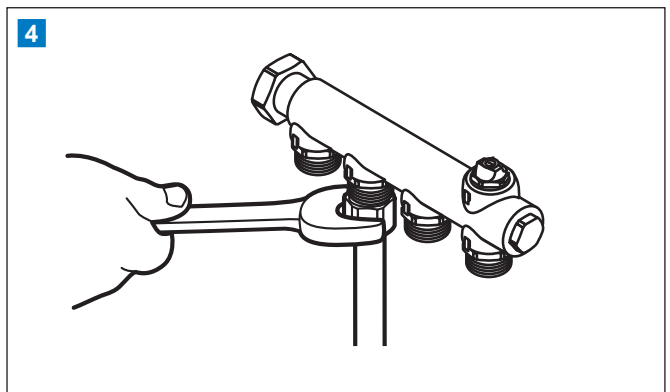
Cut the pipe, or conduit, perpendicular to the axis of the pipe using the appropriate smooth bladed cutting tool



Insert the nut and compression ring on to the pipe



Push the fitting insert into the pipe until the pipe meets the underside of the insert profile. If you don't have enough manual strength, you can use a plastic hammer to seat the insert in to the pipe.



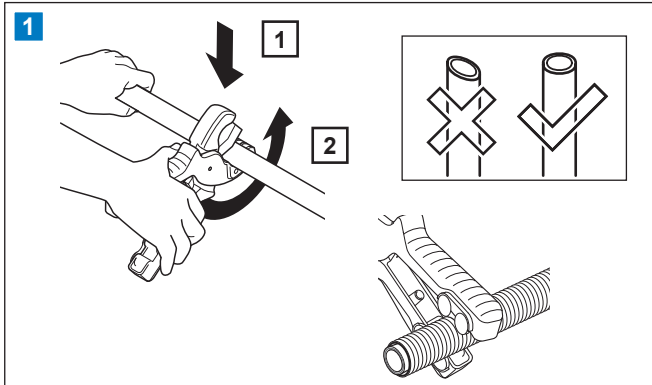
Insert the pipe and insert in to the manifold or compression fitting body and tighten the nut on to the threads by hand. Ensuring that the pipe is still fully inserted, tighten the nut using an appropriate spanner until the tightening torque increases noticeably.

Caution!

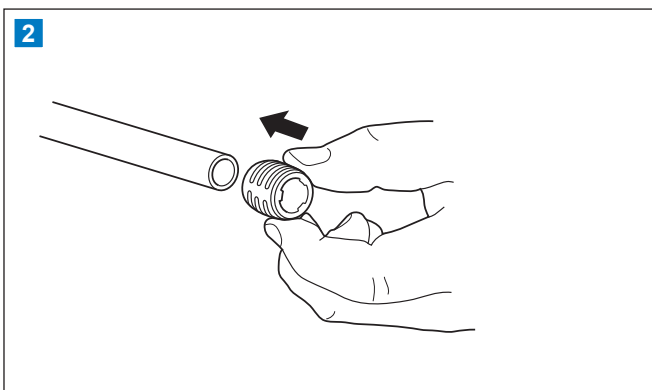
- Only Uponor compression fittings with the correct insert sleeves should be used on Uponor Q&E.
- If the screw connection is loosened, a new compression ring must be used.

9.2 Uponor Q&E connection assembly

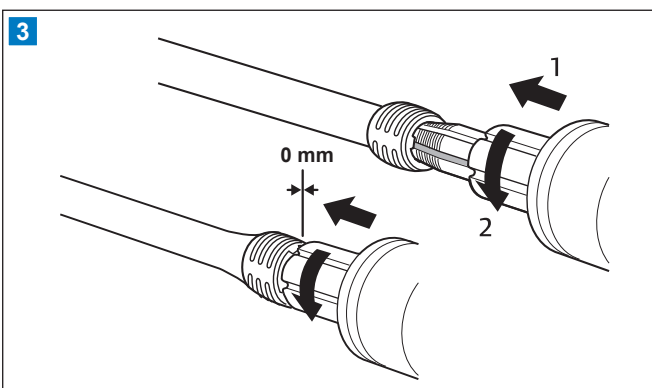
The Uponor Q&E system can be connected quickly and easily using the appropriate battery-powered tools. The operating instructions that accompany the tools must be observed.



Cut the pipe, or conduit, perpendicular to the axis of the pipe using the appropriate smooth bladed cutting tool



Add the appropriate Q&E ring on to the end of the pipe ensuring that the pipe reaches the stops on the inside of the ring.

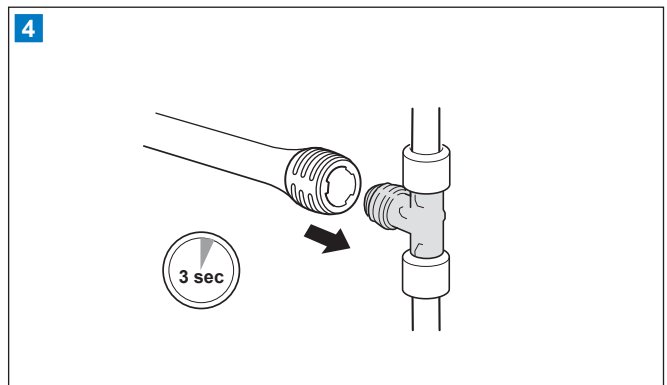


Ensuring you have the correct sized expander head on the expander tool, insert the end of the expander head inside the pipe and Q&E ring assembly. Operate the expander tool allowing the pipe and ring assembly to gently move up the expander head until it reaches the stop on the expander head.

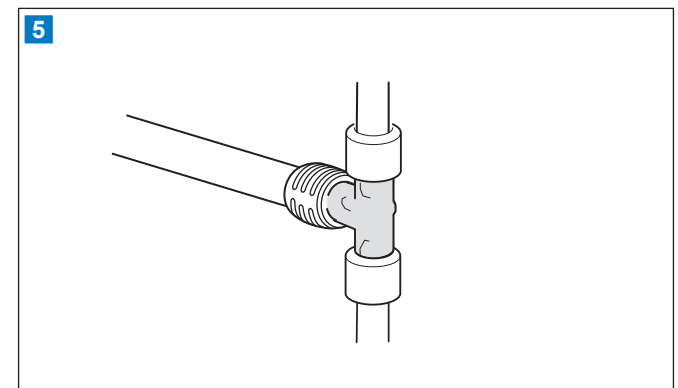


Caution!

- During the expansion process do not force the expander head in to the pipe
- The expander head must be free to auto-rotate each time it closes
- You should follow the required number of expansions (see table). Over expanding the pipe could cause a failure of the connection
- The expansion tool should be maintained and operated as per the instruction manual provided with the tool



After expanding, quickly (max. 3 seconds) push the pipe and ring assembly on to the profiled nipple of the Q&E fitting until the assembly meets the pipe stop on the body of the fitting. Hold the assembly together for a few seconds until the pipe begins to take a firm grip on the fitting.



After a short while, the pipe and ring assembly shrink on to the Q&E fitting to make a strong watertight connection. The length of time until the leak test depends on the material and ambient temperature.



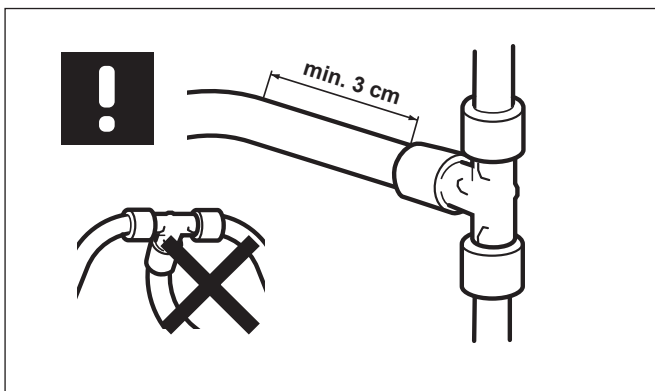
Note

A slight resistance should be felt when pushing the expanded pipe and ring assembly onto the fitting. If the pipe is too loose when first applied to the fitting, it could mean that the assembly has been over expanded and may require additional time to shrink on to the fitting.

9.3 Time until the leak test

Ambient temperature [°C]	Time until leak test [h]
>+10	0,1 - 0,25
+10 - +5	0,25 - 0,5
+5 - ±0	1,0 - 1,5
±0 - -5	2,0 - 3,0
-5 - -10	3,0 - 4,0
-10 - -15	7,0 - 8,0

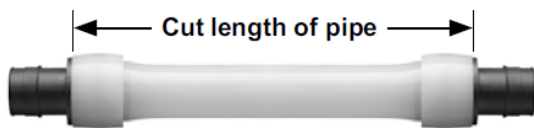
Note
At lower temperatures the shrink effect on the connections is slower so the time until a leak test can be performed successfully is longer.



Do not bend pipes directly at the fitting. There is a minimum distance between the bend and the fitting of 3cm minimum.

9.4 Minimum distance between fittings

The below measurements are given for the minimum cut length of pipe in order to make a safe, trouble free connection. During assembly, the minimum cut length of pipe will then ensure the two fittings will always remain the correct minimum distance apart.



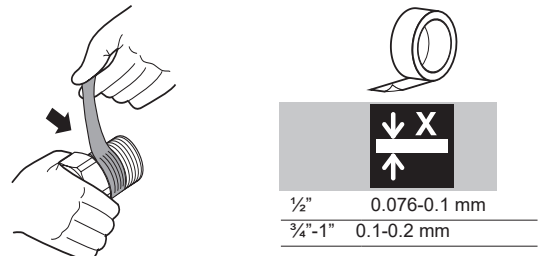
Pipe size [OD]	Minimum cut length of pipe
12mm	58mm
16mm	65mm
20mm	85mm
25mm	110mm
32mm	135mm
40mm	165mm
50mm	194mm
63mm	208mm

At low ambient temperatures, the shrink-back process can be accelerated by heating the Q&E ring with hot air to a maximum of 50 °C.

Note
Do not use an open flame when applying heat to any part of the Q&E system.

9.5 Threaded connections

Q&E PPSU threaded All Q&E fittings use an 'Rp' type thread pattern. For this reason, unless a sealing washer is provided with the fitting, the seal needs to be made on the thread with a suitable sealant.



Caution!
Only flat PTFE sealing tapes to BS EN 751-3 can be used on Q&E PPSU threaded connections

10. General transport, storage and assembly instructions

To protect the Uponor PE-Xa pipes, fittings and the associated system components, the following points must be observed. In addition to these guidelines, the general assembly instructions and the individual operating instructions for all devices and components must be observed.

- The storage temperature for all electrical tools and devices must not fall below 0°C.
- The minimum processing temperature for the pipe system is -15°C.
- The optimal working range for pipe, fittings and tools is between 5 and 25°C.
- Stresses caused by temperature-related expansion or contraction must be taken into account in the design.
- Only fittings approved by Uponor for the respective pipe type may be used; the relevant assembly instructions must be observed.
- During storage, transport and assembly, the pipe and the fittings must not be exposed to strong sources of heat.
- The storage and assembly environment should be dry and clean to ensure the proper functioning of the fittings and tools.
- The pipes must be protected from direct sunlight and exposure to ultraviolet radiation. Completed system parts must be covered accordingly or protected against the effects of UV radiation by other suitable measures (e.g. laying in protective tubes).
- The pipe is to be stored, transported and installed in such a way that damage to the pipe is avoided.
- Avoid contact of the pipe with paint, sealant, adhesive, tape or any chemical that may attack the pipe material.
- To protect them from damage and dirt, the pipes must be left in their original packaging until they are installed.
- If possible, remaining lengths should also be stored in the original packaging until further processing
- Tools should always be transported in the appropriate cases.
- Pipes, fittings and tools must not be thrown during transport and assembly.
- Water-filled systems must be protected from frost by draining or by adding an anti-freeze agent approved by Uponor.

11. Pressure and leak test as well as flushing of Uponor drinking water installations

11.1 Pressure and leak test

Note

Legal notice:

Pressure testing should only be carried out by a trained, competent person

Pressure tests are ancillary services under a work contract and are often part of the Contractor's contractual performance, even if not explicitly mentioned in the description of services.

According to current standards a pressure test must be carried out before the system is put into operation.

It is a requirement of The Water Supply (Water fittings) Regulations 1999 for any water distribution system to undergo, a pressure test in accordance with BS EN 806-4 or an equivalent national standard.

Before the pressure test, it must be ensured that all components of the installation are freely accessible and visible, for example in order to locate incorrectly installed fittings. If the pipeline system is to remain unfilled after a pressure test (for example because regular water replacement cannot be guaranteed within seven days after the pressure test procedure), a pressure test with compressed air or inert gases is recommended.

11.2 Leak test with compressed air or inert gas

After a leak test with water, residual water can remain in some sections of the pipe network despite thorough emptying of the system – in case of prolonged stagnation, this is an ideal breeding ground for bacteria. For this reason, leak testing with oil-free compressed air or inert gas (usually nitrogen or carbon dioxide) is recommended, especially in buildings with high hygiene requirements such as hospitals, retirement homes or sport facilities. Once the system has been tested, the system can remain empty until the first fill with potable water shortly before the commissioning of the installation.

A pressure test with compressed air or inert gases is carried out in two steps, the tightness test and the load test, taking recognised engineering practices into consideration.

For both tests (air or water), it is important to wait for a period of time to allow the system temperature to equalise to provide a steady-state condition after the pressure build-up. Appliances, drinking water heaters, fittings or pressure vessels must be isolated from the pipelines before a pressure test with air if their volume can affect safety and testing accuracy. All lines must be directly sealed using metal plugs, metal washers or blind flanges which can withstand the test pressure. Closed shut-off valves are not advised to be used as tight shut-offs.

Leak test

Before the leak test, all pipe connections must be visually inspected. The manometer used in the test must have a corresponding accuracy of 1 mbar and have suitable scale of accuracy for the pressures to be measured. The system is subjected to a test pressure of 150 mbar (150 hPa). For a system volume of up to 100 liters, the test time must be at least 120 minutes. The required time must be extended by a further 20 minutes per additional 100 litres. No leakage must occur at the connectors during the duration of the test.

Load test

Following the leak test, the load test is carried out. Here the pressure is increased to max. 3 bar (for pipe size OD ≤ 63 mm) or max. 1 bar (for pipe size OD > 63 mm). For a system volume of up to 100 litres, the test time must be at least 10 minutes.

Leak test report

The leak test must be documented in a leak test report by the responsible specialist, taking into account the materials used. The tightness of the system must be verified and confirmed.

This report is available at the Uponor services download center.

<https://www.uponor.com/doc/1120118>



Leak test record for Uponor drinking water installations.

Test medium: Air pressure or inert gases

Following the ZVSHK guideline "Leak tests for drinking water installations using air pressure, inert gas or water"

Note: The accompanying explanations and descriptions in the current technical documentation of Uponor are to be observed.

Building project:

Client represented by:

Contractor/responsible specialist represented by:

Uponor installation system used:

- MLC composite pipe system PE-Xa installation system

System pressure: _____ **bar**

Test medium:

Ambient temperature: _____ **°C**

- Oil-free compressed air Nitrogen Carbon dioxide _____

Test medium temperature: _____ **°C**

The drinking water system was tested

Pipe capacity: _____ **liters**

- as complete system in _____ sections

All the lines have to be closed through metal plugs, covers, gaskets or blind flanges. Apparatuses, pressure vessels or drinking water heaters have to be disconnected from the piping. A visual inspection of all pipe connections for correct implementation was carried out.

1 Leak test

Test pressure 150 mbar (150 hPa)
 Test period up to 100 liters line volume at least 120 minutes. The test period is to be increased by 20 minutes for every further 100 liters.

Test period: _____ **minutes**

The test period begins after the temperature compensation and steady state have set in.

- No pressure loss occurred during the test period.

2 Load test

Test pressure: Uponor installation pipe OD ≤ 63 mm max. 3 bar, Uponor installation pipe OD > 63 mm max. 1 bar

Test period: 10 minutes

The test period begins after the temperature compensation and steady state have set in.

- No pressure loss occurred during the test period.
 The pipe system does not leak.

 City, date

 Signature/stamp contractor

 City, date

 Signature/stamp client

11.3 Leak test with water

Preparing for the leak test

Before performing a leak test with water, a visual inspection of all pipe connections should be completed before the pipes are concealed within walls, ceilings, floors and screeds. If possible, the pressure gauge should be connected to the lowest point of the installation. Only pressure gauges which are accurate enough to determine a pressure change of 0.1 bar should be used.

The system must be filled with filtered tap water (particle size $\leq 150 \mu\text{m}$), vented and protected from freezing. Heat sources, equipment and storage tanks should be isolated from the system so that the test pressure is kept away from the rest of the installation being tested.

If there are significant differences ($>10 \text{ K}$) between ambient temperature and the water temperature, wait 30 minutes after applying system test pressure to allow temperature equalisation. The pressure must be maintained for at least 10 minutes. There must be no drop in pressure and no visible indication of leakage.

Carrying out the leak test

The pipe network must first be subjected to a test pressure 1.1 times the system's designed operating pressure (relative to the lowest point of the system). The maximum operating pressure according to BS EN 21003 is 10 bar (1 MPa). Accordingly, a maximum test pressure of 11 bar (1.1 MPa) is required. Following the test, an inspection of the pipe system must be carried out in order to detect possible leaks.

After 30 minutes test time, by draining water, reduce the pressure to 5.5 bar (0.55 MPa), corresponding to half the initial test pressure. The test time at this pressure is 120 minutes. No leakage should be detected during this test period. The test pressure at the manometer must remain constant ($\Delta p = 0$). If a pressure drop occurs during the test period, there is a leak in the system. Maintain pressure and locate the leak. The defect must be repaired and then the leak test must be repeated.

Leak test report

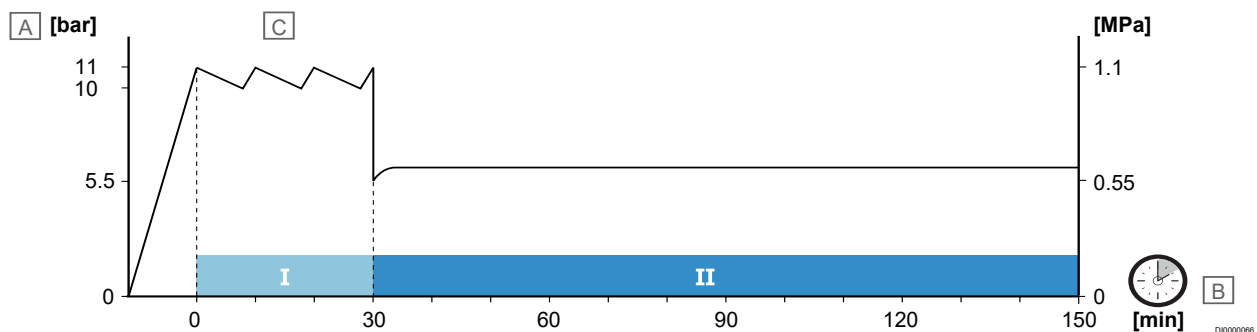
The leak test must be documented in a leak test report by the responsible specialist, taking into account the materials used. The tightness of the system must be verified and confirmed.

This report is available at the Uponor services download center.

<https://www.uponor.com/doc/1120119>



Leak test with water



Item	Description
A	Test pressure [bar]
B	Test time [minutes]
C	Maintain pressure, pump

Leak Test Report for Uponor drinking water installations. Test medium - water *

Note: The accompanying explanations and descriptions in the current technical documentation from Uponor must be observed.

Project: _____

Project phase _____

Contact Person: _____

Uponor system installed: Multilayer system PE-Xa system

All containers, devices and fittings, e.g. B. Safety valve and expansion tanks that are not suitable for the test pressure must be disconnected from the system to be tested during the pressure test. The system is filled with filtered water and completely vented. A visual inspection of all pipe connections was carried out during the test. The temperature equalization between the ambient temperature and the filling water temperature must be taken into account by a corresponding waiting time after the test pressure has been produced. If necessary, the test pressure must be restored after the waiting time.

1 Preliminary test for leak testing of press connections (when using Uponor press connectors "unpressed leaking")

Test pressure: 3 bar
Duration: 15 Minutes

The pipe system is tight (visual inspection)

2 Leak test part I

Test pressure: 11 bar (1,1 MPa), corresponds to 1.1 times the operating pressure according to BS EN 806-4
Duration: 30 Minutes

The pipe system is tight (visual check, no pressure drop on the manometer)

3 Leak test part II

Test pressure: 5,5 bar (0,55 MPa), corresponds to 0.5 times the initial test pressure from the leak test, Part I
Duration: 120 Minutes

The test pressure on the manometer was constant during the test period ($\Delta p = 0$)

The pipe system is tight.

Confirmation of system tightness

Ort, Date

Signature - contractor

Ort, Date

Signature - client

* Based on the ZVSHK leaflet "Leak tests of drinking water installations with compressed air, inert gas or water".

11.4 Flushing Uponor drinking water installations

Note

Uponor tap water lines must be flushed with the local supply pressure and in accordance with BS EN 806-4, Section 6.2.2, unless a different flushing procedure is contractually agreed or required.

The tap water used for flushing must be filtered (filter according to BS EN 13443-1).

Flushing must only take place immediately before the actual start-up of the system.

To ensure the system operates flawlessly, the flushing process must remove contaminants and residues that may have entered the system during installation. This process protects tap water quality, prevents corrosion damage and also prevents malfunctions of valves and equipment.

Flushing with air and water

The procedure is based on a pulsating current of water and air and is described in more detail in the technical rules for drinking water distribution systems, BS EN 806-4 Section 6.2.3. Suitable flushing equipment must be used for this purpose. The flushing procedure should be used when a sufficient flushing effect cannot be expected when flushing with water alone.

Flushing method with water

Uponor tap water lines must be flushed to the local supply pressure using the water flushing procedure in accordance with BS EN 806-4, Section 6.2.2, unless another flushing procedure is contractually agreed or required.

The tap water used for flushing must be filtered (filter according to BS EN 13443-1).

Points to consider:

- Sensitive fittings (such as solenoid valves, flush valves, thermostatic fittings etc.) and apparatus (such as water heaters) should only be installed after flushing which prevents damage caused by contaminants and assembly residues.
- Aerators, jet regulators, flow-limiters, shower heads and hand showers must be removed from a system during flushing if valves are already installed.
- For in-wall thermostatic fittings and other sensitive fittings which cannot be removed during flushing, the installation instructions of the manufacturer must be followed.
- All maintenance fittings, floor shut-offs and preliminary shut-offs (such as corner valves) must be fully open.
- Any built-in pressure reducers must be fully open and are only adjusted after flushing.
- Built-in fine strainers in front of fittings that cannot be removed or bridged must be cleaned after flushing.

Depending on the size of the system and the installed scheme, flushing may be carried out in sections.

Always maintain one flushing direction away from the main inlet valve, flushing each section line by line (from nearest to the most distant).

Starting from the riser, flushing is carried out floor by floor. Fully open the outlets (see table in the following flushing protocol for the minimum number) and the associated supply pipework for at least 5 minutes each, one after the other, starting at the outlet furthest from the riser.

After a flushing time of 5 minutes at the last opened outlet, the taps are now closed one after the other in reverse order.

Flushing protocol

The flushing process must be documented by the responsible specialist in a flushing protocol.

This report is available at the Uponor services download center.

<https://www.uponor.com/doc/11201>



Flushing protocol for Uponor drinking water installations Flushing medium: water

Project: _____

Client representative: _____

Contractor representative: _____

Uponor system installed: Multilayer PE-Xa

Guide value for the minimum number of tapping points to be opened in relation to the largest nominal diameter of the distribution line

Largest outside diameter OD [mm] of the distribution line in the current flushing section		32	40	50	63	75	90	110
Minimum number of tapping points to be opened	DN 15	2	4	6	8	12	18	28
	DN 10	2	4	6	8	14	22	32

Within a floor, the tapping points are fully opened, starting with the tapping point furthest away from the riser.

After a rinsing period of 5 minutes at the last opened rinsing point, the tapping points are closed one after the other.

The drinking water used for flushing is filtered, static pressure $p_w =$ _____ bar

Maintenance fittings (storey shut-offs, preliminary shut-offs) are fully open.

Sensitive fittings and apparatus have been removed and replaced with adapters or bridged with flexible lines.

Aerators and flow limiters were removed.

Built-in dirt strainers and dirt traps in front of fittings were cleaned after the water flush.

The flushing took place starting from the main shut-off valve in the flushing sequence in sections to the furthest remote sampling point.

The flushing of the drinking water system has been carried out properly.

Ort, Date

Signature - contractor

Ort, Date

Signature - client

* Based on the ZVSHK leaflet

12. Pressure and leak test of Uponor heating installations

Note

Pressure testing should only be carried out by a trained, competent person

Pressure tests are ancillary services under a work contract and are often part of the contractor's contractual performance, even if not explicitly mentioned in the description of service

The following procedures describe the pressure and leak test for Uponor Q&E PE-Xa pipe installations for heating systems.

12.1 Leak test with water for heating installations

The heating engineer/installer must subject the heating pipes to a leak test after installation and before closing in the pipes with walls, ceilings, floors, screeds or another covering. As a rule, tap water can be used for the leak test. The water should meet the requirements as detailed by DWI. The heating system must be filled slowly and should be completely purged of any air.

If there is a risk of freezing, suitable measures must be taken (e.g. use of antifreeze or temperature control of the building). If frost protection is no longer required for the intended operation of the system, antifreeze agents must be removed by draining and flushing the system with at least three water changes.

Once filled and pressurised, a period should be allowed to permit the temperature compensation between the ambient temperature and the temperature of the filling water. Once this balancing period has finished, if necessary, restore the test pressure.

Only pressure gauges which are accurate enough to determine a pressure change of 0.1 bar should be used. If possible, the pressure gauge should be placed at the lowest point of the system.

The pipe system and water heating system must be tested at a pressure corresponding to the set pressure of the safety valve. Alternatively, 1.3 times the designed operating pressure can be used as the pressure for the test in accordance with BS EN 14336.

The test pressure must be maintained for two hours and may not drop by more than 0.2 bar. No leaks must occur during that time.

The leak test must be documented by the test engineer in a 'pressure test report' and this document should make a record of the equipment used, the duration of the test and the tightness of the system.

This report is available at the Uponor services download center.

<https://www.uponor.com/doc/1120121>

Leak test for heating installation with compressed air or inert gas

A pressure test for heating installations can be carried out with compressed air or inert gas in accordance with BS EN 14336 or in accordance with another recognised national standard.

To document the test, the "leak test protocol for Uponor drinking water distribution - test medium: Compressed air or inert gases" is applicable.

This report is available at the Uponor services download center.

<https://www.uponor.com/doc/1120118>



Leak Test Report for Uponor heating installations. Test medium: water

Project: _____

Client representative: _____

Contractor representative: _____

Uponor system installed: Multilayer PE-Xa

Permissible max. operating pressure (related to the lowest point of the system): _____ bar

System height: _____ m

Design temperatures: Flow: _____ °C Return: _____ °C

The temperature equalization between the ambient temperature and the filling water temperature must be taken into account after the test pressure has been established by means of a corresponding waiting time. If necessary, the test pressure must be restored after the waiting time.

All containers, devices and fittings, e.g. safety valve and expansion tanks that are not suitable for the test pressure must be disconnected from the system to be tested during the pressure test. The system is filled with filtered water and completely vented. A visual inspection of the pipe connectors was carried out during the test.

Start: _____ Time Date: _____ Test pressure: _____ bar

End: _____ Time Date: _____ Pressure drop: _____ bar

In the above-mentioned system, no leaks and no permanent deformation of components could be determined on _____.

Antifreeze was added to the water prior to pressure testing: Yes No

Antifreeze was removed from the system after the pressure test: Yes No

Process as explained above: Yes No

Confirmation of system tightness

Ort, Date

Signature - contractor

Ort, Date

Signature - client

Uponor

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1142163_July 2023

Uponor reserves the right to make changes, without prior notification, to the specification of incorporated components in line with its policy of continuous improvement and development.



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