uponor

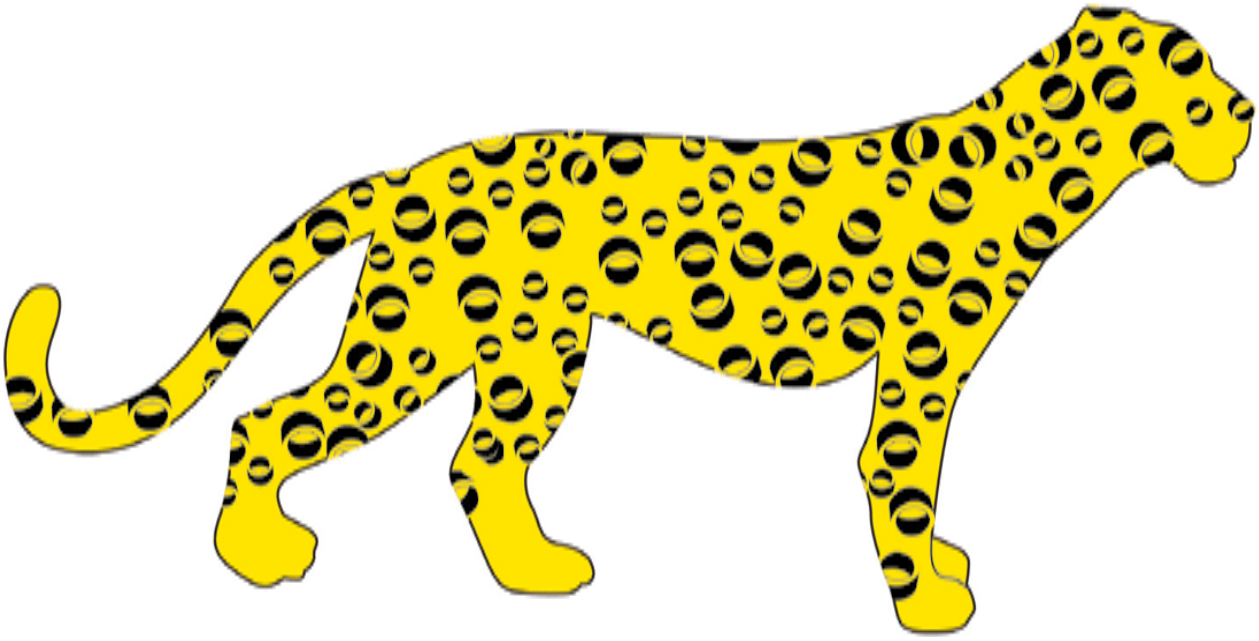
PLUMBING SOLUTIONS

PEX PLUMBING

April 2008

PEX pipe system for heating, hot water and cold water services

RRP £15 - €22



Not for cheaters!

Uponor's PEX Plumbing System; a strong, secure connection

Designed for radiator heating and potable water applications, Uponor PEX Plumbing systems combine speed of installation, with our new expander tool, and the security of the connection. Once an Uponor PEX Q&E connection is made, the joint is permanent and will not leak. In fact, joint integrity increases over time.
A system for Professionals, not for Cheaters!

For further information about our new range of Manifold's, please visit our website at **www.uponorhousingsolutions.co.uk**

Uponor Housing Solutions Ltd
Snapethorpe House
Rugby Road
Lutterworth
Leicestershire LE17 4HN
T 01455 550355
F 01455 550366
E hsenquiries@uponor.co.uk
W www.uponorhousingsolutions.co.uk

Contents:

Introduction

Uponor PEX Plumbing

The Uponor PEX Plumbing System is a completely flexible plastic plumbing and heating system adapted specifically for the UK market by Uponor. The Uponor PEX Plumbing system is manufactured to BS7291-1 : 2001 (Class 'S') and BS7291-3 : 2001.

Uponor PEX pipe is approved for use with the secure Uponor Q&E fittings – a concept unique to Uponor. Already successfully sold throughout Europe and the USA for over 10 years, Uponor Q&E fittings are available in a range of Engineered Plastic (EP) and DZR brass fittings for pipe dimensions 12, 15, 22 and 28 mm. Uponor PEX pipe may also be used with Uponor's range of compression fittings.

Uponor PEX Pipe

The Uponor PEX pipe offers benefits to both specifiers and to the professional plumber.

Key advantages are:

- One pipe for all heating and potable water applications
- Pipe available in UK dimensions: 12 mm, 15 mm, 22 mm, 28 mm
- Smooth bore to prevent scaling
- Choice of either the unique Uponor Q&E fittings or traditional compression fittings.
- Choice of straight and coil lengths to minimize wastage
- Available in pipe-in-conduit to meet Water Regulations

Uponor Q&E Jointing System

The Uponor Q&E fitting is a tried and tested concept with over 70 million fittings already sold world-wide. The jointing concept relies on the unique elastic features of Uponor PEX pipe to give a joint that is stronger than the pipe itself. A large range of plastic and DZR brass fittings are available.

Key advantages are:

- Quicker than soldering and suitable for immediate handling
- Safe and no fire risks – no heat guns or naked flames are used
- Clean – no messy fluxes are required.
- Simple – no rubber seals or moving parts reducing the chance of leakage
- Internal jointing – external pipe damage on site does not influence joint integrity
- Pipe continues to contract onto the fitting after the joint has been made – increasing the joint integrity over time

Available in sizes:
12, 15, 22, & 28mm (BS EN 1057)

Uponor PEX Pipe

Table 1 : PEX Pipe Product Range

Item Detail				
Nominal outer diameter	12	15	22	28
Nominal wall thickness	1.5	1.5	2.0	2.6
Lengths available (m)				
3 m		●	●	●
25 m		●	●	
50 m		●	●	●
75 m		●		
100 m	●	●		
120 m		●		
200 m		●		
500 m		●		
Pipe-in-Conduit (m)				
50 m		●	●	●

Marking and Identification

Uponor PEX pipes are always marked with the product name, outer diameter, wall thickness, date of manufacture, and continuous metre marks. They are also marked with the current standard, together with a type approval label and depending on the type of pipe, with the relevant production monitoring authority.

Application

Uponor PEX pipe is a white opaque barrier pipe with a special outer protective PEX layer designed for:

1. Indirect and direct cold water mains services
2. Vented and unvented hot water systems
3. Vented and sealed central heating systems
4. Underfloor heating systems
5. Chilled water systems. This pipe is designed for various operating conditions depending on the particular application (see table opposite). The pipe can tolerate a malfunction temperature of 114°C for a short period of time.

Why Barrier Pipe?

Barrier pipe is designed for use in central heating and underfloor heating systems and incorporates an oxygen diffusion barrier to protect the system from oxygen permeation.

Uponor PEX pipe is a barrier pipe that meets the oxygen diffusion requirements of DIN 4726.

The pipe is approved for use in the service conditions given in Table 2 (on page 6)

Uponor PEX pipe has, according to the table overleaf, a design life not less than 50 years. Please contact Uponor for further information on maximum temperatures and pressures.

Application Areas

Table 2 : Classification of Service Conditions (BS7291:2001 Class S)

Application	Nominal System flow temperature (T_f) ºC	Maximum system service temperature (T_s) ºC	System malfunction temperature (T_m) ºC	System maximum working pressure (bar)
A Indirect cold water systems	20	20	-	3½
B Direct mains-fed cold water systems	20	20	-	12
C Subsurface heating systems	60	83	100	3½
D Vented hot water systems	65	83	100	3½
E Unvented hot water systems (including instantaneous heaters and/or incorporating storage)	65	95	100	6
F Vented central heating systems	82	95	100	3½
G Sealed central heating systems	82	105	114	3

Table 3 : Maximum Working Temperatures/Pressures for Uponor PEX pipes

Temperature (ºC)	20	83	105
Pressure (bar)	12	3½	3

Fitting Systems Guide

Introduction

Uponor PEX pipe is manufactured to BS7291 Class S, for use with Uponor Q&E fittings – the unique system concept from Uponor. Q&E fittings are available in selection of plastic fittings and DZR brass fittings. The Uponor Q&E joint is formed due to the unique elasticity of Uponor PEX and the final joint is stronger than the pipe.

Uponor PEX pipe can also be used with compression fittings which conform to BS EN 1254 when used together with the Uponor pipe insert. This gives the installer the choice to use a traditional jointing method. Uponor also have their own range of compression fittings for connection to manifolds.

Uponor Q&E Fittings

Uponor PEX pipe can be joined using the unique Uponor Q&E jointing system. The following points must be strictly observed.

- All installations should be made by a Uponor trained and certificated installer.
- Always use the Uponor Q&E expander tool.
- Always use the correct sized Q&E ring.
- Always use the correct sized Q&E fitting.
- Please observe that the Uponor Q&E joint needs a longer waiting time before testing the joint at lower temperatures (see Table 5, page 18).
- The Uponor Q&E fitting must only be used with Uponor PEX pipe.

Uponor Q&E Components

When making a Q&E joint it is important to use the correct sized ring and fitting, the correct sized expander head and not to exceed the maximum number of expansions. Observing these requirements will ensure that a good joint is always achieved.

Table 4 : Marking on Q&E Components

Pipe Size	Ring	Marking on metal fitting	Marking on plastic fitting	Expander head	Max number expansions
12x1.5	Q&E 12	12 BS	⅜"	12x1.5 BS	5
15x1.5	Q&E 15	15 BS	½"	15x1.5 BS	5
22x2.0	Q&E 22	22 BS	¾"	22x2.0 BS	6
28x2.6	Q&E 28	28 BS	1"	28x2.6 BS	10

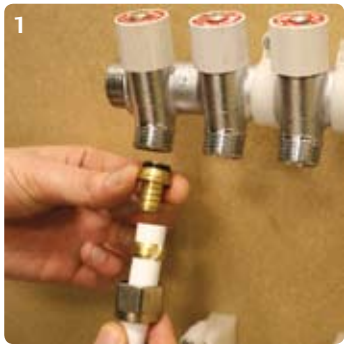
Making a Q&E Joint

Firstly, lightly grease the cone of the expander tool (1004051) then hand tighten the auto-rotation adaptor (Q6323810) in a clockwise direction. Then, after lightly greasing the cone of the auto-rotation adaptor, hand tighten the appropriately sized expander head (see previous table regarding fitting markings), again in a clockwise direction. Finally check the battery has sufficient charge and then the expander tool is ready for use.

1. Cut the pipe at right angles, using appropriate plastic pipe cutters (e.g. 010620). The pipe end should be dry and free from grease and dirt before a joint should be attempted.
2. Place the correct size of jointing ring onto the end of the pipe (see previous table regarding ring markings), ensuring that the lugs are flush with the end of the pipe.
3. Gently insert the expander head into the end of the pipe and depress the trigger on the expander tool; the expander head will begin to splay and expand the end of the pipe. When it has reached the end of its expansion, pull the expander head away from the end of the pipe (and away from the pipe wall) and release the trigger (this will allow the head to rotate). N.B. **Failure to remove the head when releasing the trigger or excessive forcing of the head into the pipe end may result in the auto-rotation function not working**.
4. Reinsert the expander head into the pipe end and repeat the above procedure until the jointing ring (and pipe end) is snug against the shoulder of the expander head. Carry out ONE MORE expansion and once the expander head has finished its cycle, remove the tool from the pipe end and set to one side.
5. Immediately push the pipe onto the nipple of the suitably sized fitting; there should be some resistance but the pipe should come up to the shoulder of the fitting. N.B. **If the pipe goes very easily onto the fitting or if the fitting is loose inside the pipe, over-expansion may have occured and the joint may take much longer to contract**.
6. Hold the pipe in place for a few seconds (no longer than 10 seconds should be sufficient). The Uponor PEX Plumbing system Q&E joint is now complete but will only be watertight after the appropriate 'curing' time (see 'Time to Pressure Test' table on P18).

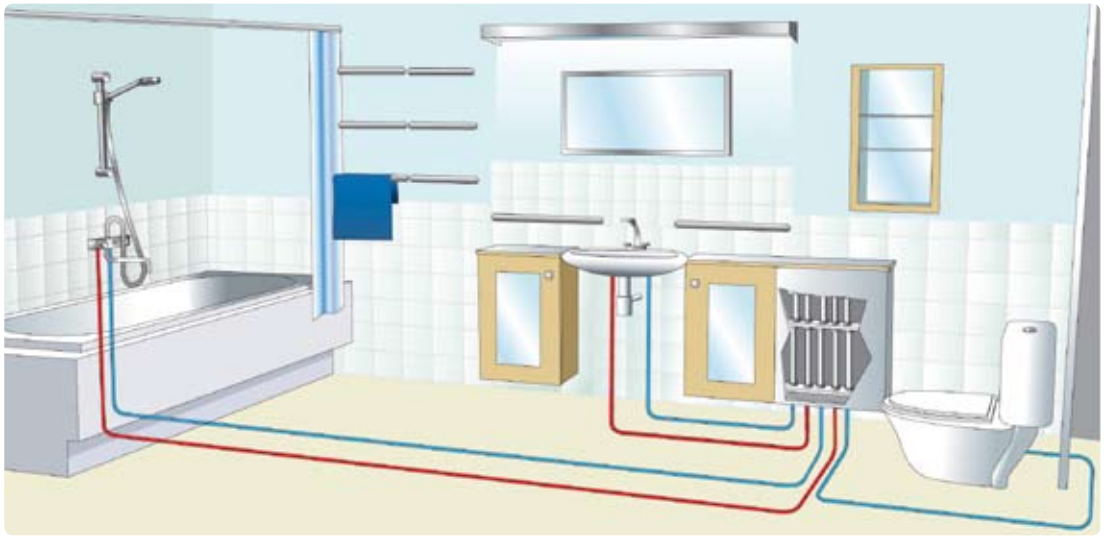
Good practice dictates that the head and autorotation adaptor are removed and the cone of the adaptor and expander tool are cleaned at the end of each day's usage.

Making a Compression Joint



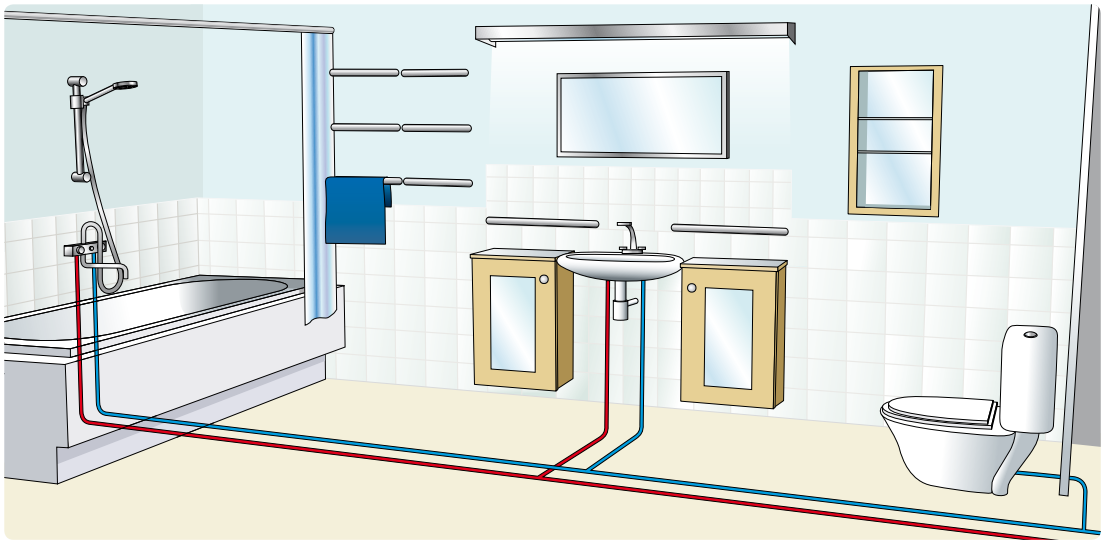
- Uponor PEX Plumbing System pipe may be used with compression fittings for connection in both ½" and ¾" manifold outlet threads (e.g. 152025). Although standard copper compression fittings (i.e. nut, olive and insert to BS EN 1254) may be used with Uponor PEX pipe, we will always recommend our specially manufactured compression range of fittings as they come with the addition of a specially designed olive and insert, as well as having the benefit of an additional o-ring around the seat of the insert.
- Cut the pipe at right angles, using appropriate plastic pipe cutters (e.g. 010620). The pipe end should be dry and free from grease and dirt before a joint should be attempted.
- Slide the nut and olive of the compression fitting onto the pipe, (1) finally pushing the insert fully into the pipe end (2). Ensure this is pressed in as far as possible, right up to the flange of the insert, in order to get a secure joint.
- Push the pipe end (with insert) into the body of the fitting/manifold outlet. When using Uponor's own range of compression adaptors the end of the insert should fit snugly into the body of the fitting or manifold outlet.
- Slide both the ring and the nut onto the fitting/manifold body then tighten the nut onto the threads of the fitting/manifold, (3) making sure that you do not over tighten. For most applications, hand tighten then continue with a spanner for a maximum of 1½ turns. (4)
- The compression joint is now complete and ready for pressure testing.

Installation Methods



Manifold System

The basic principle of the Uponor manifold system is to provide joint free pipe runs from a centrally positioned manifold to each radiator valve or tap or water outlet. The system can be designed with one single pipe dimension from the manifold to the draw-off point, which simplifies design and installation work. With joints only at the manifold and the radiator/taps, the risk of leakage from joints is considerably reduced and there are no connections within the walls or floors . Since also there are no other draw-off points on the same pipe, pressure and temperature variations are minimal when taps are turned on and off. Small pipe diameters and fewer fittings save on installation time and labour costs.



Branch System

The Uponor PEX Plumbing System can be installed in the same fashion as a traditional "Tee" system using the various range of Q&E fittings. The advantage with this installation method is that it uses less piping than the manifold system. However, the traditional method has some inherent disadvantages that should be taken into consideration. There are more joints than with the manifold system and these are often inaccessible within the floors or walls. There are temperature and pressure variations due to the fact that one pipe has more than one draw-off point. The design work is more complicated, as most engineers wish to reduce the pipe diameter, from the beginning of the system to the end, which is why more careful calculations are needed to determine the various pipe sizes.

All in all, branch plumbing would be the best choice for installers who are more used to traditional installation methods using traditional materials such as copper pipe and fittings.

Installation Methods

Uponor Pipe-in-Conduit System

Although a properly installed Uponor system is secure from leakage, there may be occasions when extra precautions against damage to the construction of a building from leakage is required. Uponor Pipe-in-Conduit allows the pipe to be withdrawn and replaced particularly in solid floors or walls where compliance with the requirements of The Water Regulations 1999 is required. Supplied to site with the pipe already threaded into the conduit, this system saves time and money on site. Any leakage is retained within the conduit and can be detected. In addition, in a concealed pipe run without any Tee-joints, an accidentally damaged section of pipe can be withdrawn and replaced whilst minimizing structural damage.

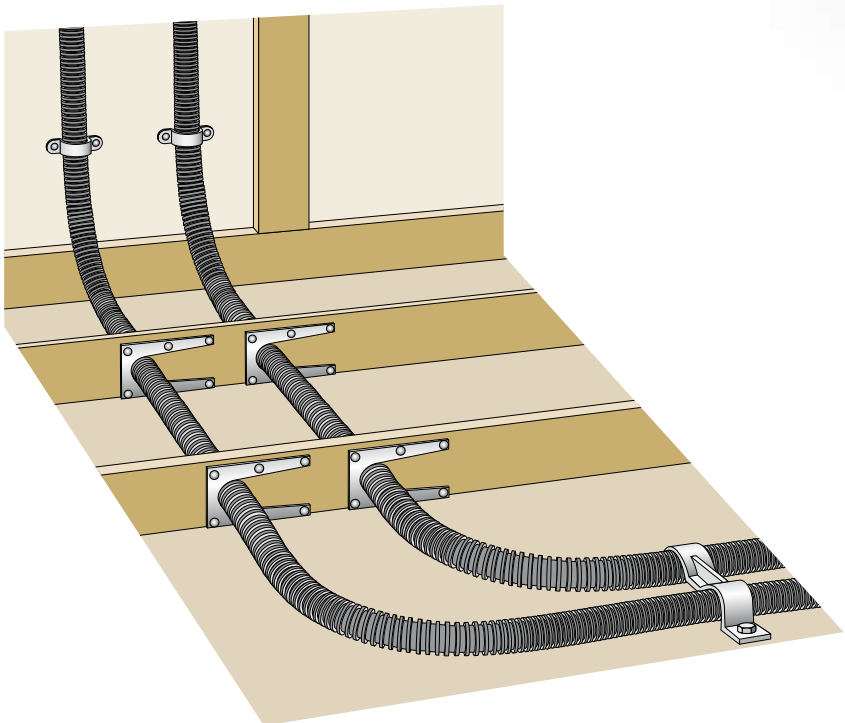
Uponor Pipe-in-Conduit comes in ready-to-install, pre-inserted lengths. However, the conduit may also be installed initially and the pipe inserted at a later stage.

Securing the conduit

Conduits should be properly secured to simplify any subsequent pipe replacement. Uponor Pipe-in - Conduit should be laid with the fewest possible bends and the largest possible bend radii. This will also make it easier to remove the pipe at a later stage if necessary. In concrete structures, conduits should be secured to the reinforcing steel with metal or plastic ties. In a floor screed, conduits should be secured to the surface of the concrete slab with suitably sized plastic clips. In timber constructions, conduits may be secured to timber studs and joists using suitable clips placed at recommended intervals. Fixings must not deform or damage the pipe or the conduit.

Where the pipe bends, the conduit should be supported using a pipe bend support or fixed at either side of the bend using suitable clips.

A conduit run through joist with pipe clips and securing plates.



Installation Methods

Water Regulations 1999

Some key items in the Water Regulations 1999 Schedule 2 Section 3: Paragraph 7 can be summarised as:

> *Water pipes and fittings must be installed so that they can be readily removed and replaced.*
>
> *Pipes may be installed in conduits so that any leaks become apparent and so that the pipe can be withdrawn and replaced.*
>
> *Properly formed openings should be provided for the inspection and dismantling of pipe joints.*

Installations in solid floors using Uponor PEX Pipe-in-Conduit systems and Uponor Radiator Connection Guides will conform to the Water Regulations.

The Water Regulations also require that all concealed metal fittings are resistant to dezincification. Uponor Q&E brass fittings are made from dezincification resistant brass (DZR) and are marked CR.

Solid Floors

Uponor PEX Pipe-in-Conduit should be used in solid floors to comply with the Water Regulations 1999. With Uponor PEX Pipe-in-Conduit no ducting is necessary and pipes can subsequently be withdrawn and replaced if required.

Always allow some extra piping at the beginning and at the end of the runs to simplify connection to manifolds and fittings. Lay the pipe in smooth serpentine bends to allow for expansion and contraction. Lay pipes with no sharp bends or kinks to ensure pipes can be easily withdrawn and replaced if necessary. The conduits should be fixed in position at a maximum spacing of 750 mm.

Use pipe bend supports for perpendicular upturns from the floor to the manifold, radiator or to a temporary stand. Temporary stands are often used to hold a loose pipe end or manifold in place if the pipe work is installed before the wall is built.

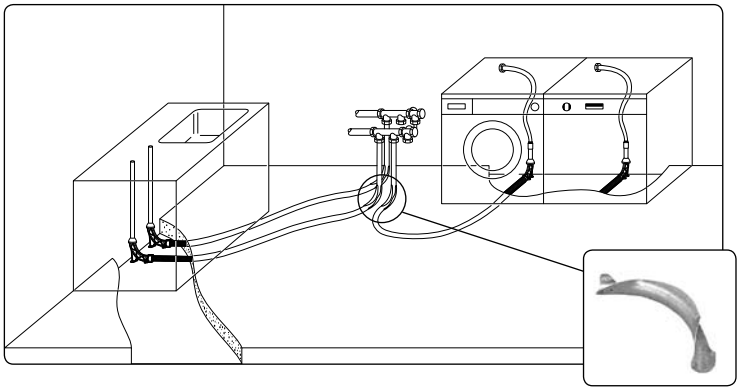
Use Radiator Connection Guides to take the pipe to the finished floor level and connect to the radiator or tap using a connection pipe after screeding.

Alternatively, use single bend guides to take the pipe directly to the radiator or tap above the finished floor level. Once the manifold and radiators and taps have been fixed into position, simply connect the pipe at both ends.

Notes

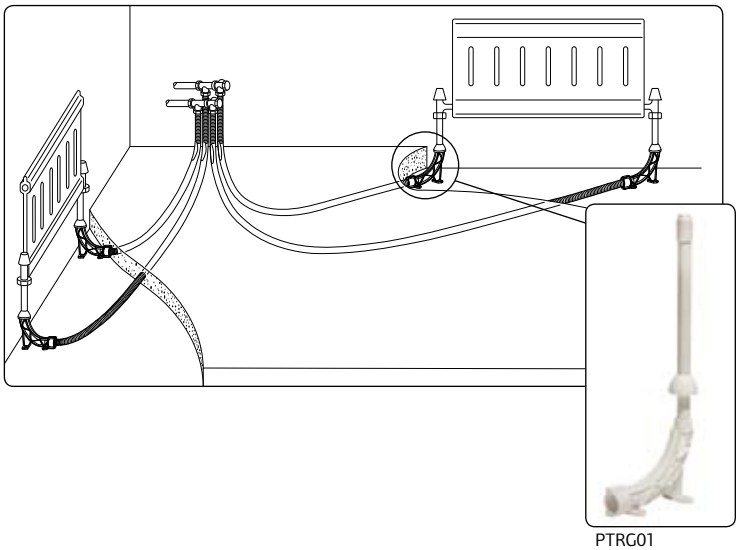
- Uponor pipes are not affected by concrete or screeds. However, when installing Uponor PEX Pipe-in-Conduit ensure that no concrete or screed forces its way into or between the pipe or the conduit.
- Before screeding or otherwise concealing the conduit, check that it has not been deformed or blocked. An obstruction may affect later removal and replacement of the pipe.
- All installations must comply with latest Building Regulations, Water Regulations and with the requirements of BS6700 and BS5955.

Screeded Floors (tap water system)



020610

Screeded Floors (radiator system)



PTRG01

Installation Methods

Joist Floors

Pipes should be laid in runs which are simple to locate in order to help prevent any puncturing with nails or screws. Decide where to locate the manifold and the position of the radiators or taps. Then decide the route from the manifold to each radiator or tap and notch or drill the joists in accordance with Building Regulations Part A and BS6700. Pull the pipes through the drilled holes or lay them in the prepared notches. Once the manifold and the radiators or taps have been fixed into position, simply connect the pipes at both ends. In timber joist floors, use a pipe bend support, bend the pipe through 90° out of the floor directly onto the radiator valve or tap. Alternatively, use an elbow under the floorboards and make the final connection to the radiator valve or to the tap using a copper connection pipe.

For a uniform finish above surface, Uponor recommend using Radiator Connection Guides for Joisted Floors (PTRG02)

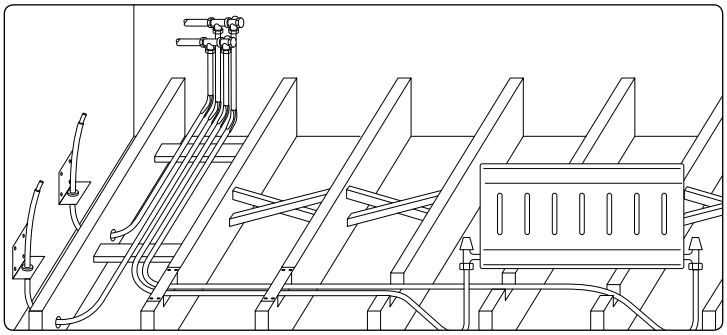
Expansion and Contraction

As is common with all plastic materials, Uponor PEX has a higher coefficient of expansion than metal. This must be considered when installing plastic pipework. All hot water pipes should be laid in soft serpentine bends or with expansion loops or bellows to accommodate the expansion.

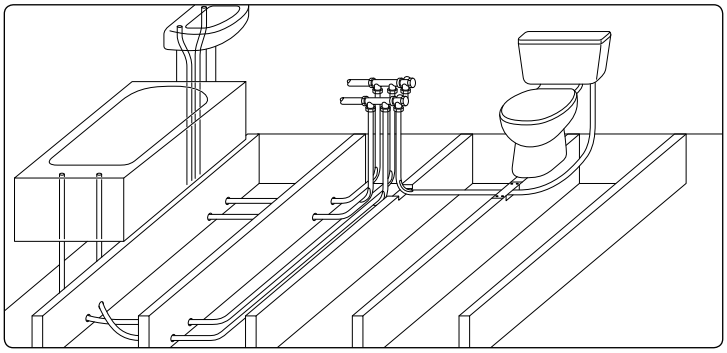
Allow for 1.5% expansion & contraction of the pipe when installed at 20°C for use at 80°C.

Contraction or shrinkage up to 1.5% of the pipe length occurs when the pipes have been in use and the temperature and pressure drops. The grip of a correctly installed fitting is greater than that of the shrinkage force, and if the pipe has been installed allowing for expansion, there should be no problem. After 10-15 temperature cycles the pipe will stabilise and no more shrinkage will occur.

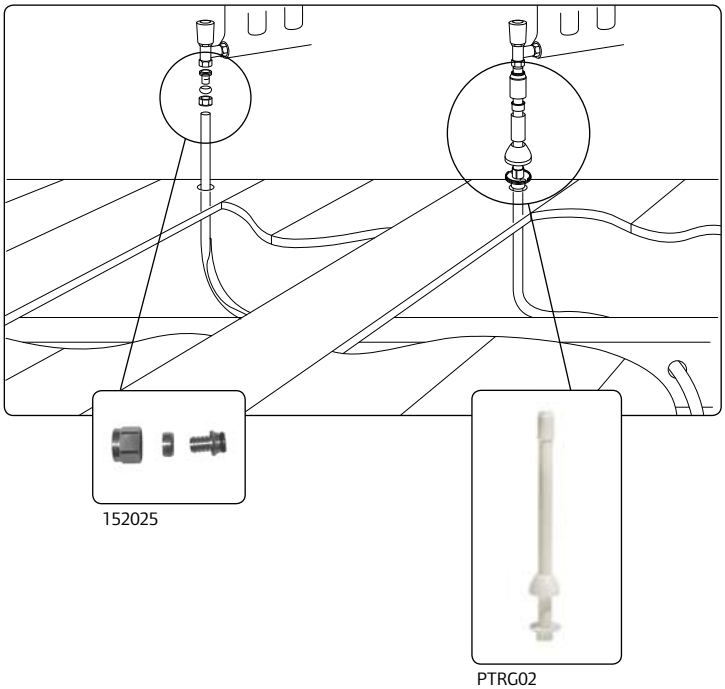
Joist Floors (radiator system)



Joist Floors (tap water system)



Connections in Joist Floors



Notes

All installations must comply with latest Building Regulations, Water Regulations and with the requirements of BS6700 and BS5955.

Radiator Connection Guides

A professional finish to your heating installation

The Uponor Radiator Connection Guides give the plastic pipe installation a tough yet aesthetic finish to above floor connections. With a common appearance to the viewable part of the guides, the two different designs may be used on the same installation (e.g. ground floor screed and first floor joisted) with any colour of flexible plastic pipe.

Universally adaptable

Both of the Uponor Radiator Connection Guides may be used with any flexible plastic piping system of suitable outside diameter and can be installed quickly and easily using standard tool-box equipment. Each pack comes complete with polypropylene riser tube inserts to suit plastic pipe with outside diameter 12mm, 14mm and 15mm. The metal riser tube can be cut to suit.

Take full advantage of the benefits of plastic piping systems

By using a plastic piping system such as Uponor's 12mm or 15mm PEX or 12mm MLCP, the installer saves time by not having to joint the pipework below the floor surface. In fact, when used with manifold plumbing, the only two joints to be made are one at the radiator and one at the manifold. Plastic pipe in conjunction with conduit sleeving (pipe-in conduit system) offers the installer a quick and simple installation but also offers the end user the security of a fully extractable pipe, should there be a requirement for repair or replacement.

Additional benefits

By utilising the flexibility of the plastic pipe and the support of the Uponor Solid Floor Guide (PTRG01), 90º elbows may be avoided. This provides an increased efficiency in water flow due to reduced frictional resistance, which in turn benefits the end user by extending the life of the circulating pump. The reduction in water velocity can result in a generally quieter system.

Chromed Guides

When installers would prefer to have a chrome finish above the floor (e.g for towel rails) then they may wish to use the Uponor Chrome Upstand Pipe packs. These packs are available in pairs and contain chromed versions of the base cone, gaiter and pipe (either 250mm long or 750mm long) for use with either the radiator connection guides for joisted floors or for solid floors. Both are suitable for use with plastic pipe in dimensions 12mm, 14mm or 15mm.

PTRG04

PTRG02

PTRG01

Radiator Connection Guides

Data and Facts:

Product Code: PTRG01

Pack Qty:	2
Application:	screeded floors
Plastic Pipe Sizes:	12mm, 14mm, 15mm (O.D.)
Guide:	white polypropylene
Riser Tube:	RAL 9016 (white) powder coated aluminium
Length:	250mm
Min. Screed/Insulation Depth:	75mm (to cover guide)

Product Code: PTRG02

Pack Qty:	2
Application:	joisted floors
Plastic Pipe Sizes:	12mm, 14mm, 15mm (O.D.)
Base:	white polypropylene
Riser Tube:	RAL 9016 (white) powder coated aluminium
Length:	250mm

Product Code: PTRG03

Pack Qty:	2
Application:	screeded or joisted floors
Plastic Pipe Sizes:	12mm, 14mm, 15mm (O.D.)
Base:	chromed polypropylene
Riser Tube:	chromed aluminium
Length:	750mm

Product Code: PTRG04

Pack Qty:	2
Application:	screeded or joisted floors
Plastic Pipe Sizes:	12mm, 14mm, 15mm (O.D.)
Base:	chromed polypropylene
Riser Tube:	chromed aluminium
Length:	250mm

General Instructions

Storage and general care

Uponor pipes should be stored in a clean dry environment and must not be stored or installed in areas where prolonged exposure to UV radiation (sunlight) is likely. Do not store Uponor pipes in direct sunlight. Pipes should be kept clean from dirt, grease, mortar etc. To prevent dirt entering the pipe system, end caps should be used on free pipe ends until final connections are made. For conduit systems, no concrete or screed should be allowed between the pipe and the conduit.

Handling

Uponor pipes will withstand all normal handling but as with all plastic pipes, care should be taken to avoid any damage. Avoid dragging pipes across rough surfaces, e.g. concrete, and do not tug pipes which have become trapped. Avoid any action which may cause the pipe to be punctured, kinked or cut. Avoid walking on pipes.

Uncoiling the pipe

A Uponor pipe decoiler is available (010622). This should be located in the working area to avoid dragging pipe across floor surfaces and around corners.

Cutting Uponor pipes

Pipes must only be cut using plastic pipe cutters to ensure a clean square cut with no internal or external burrs. Hacksaws must not be used to cut plastic pipes.

Bending

Uponor PEX pipes may normally be bent without the need for any special tool. To make a bend in Uponor PEX pipe, fix the pipe at one end and gently curve the pipe by hand and fix the pipe at the other end. Use pipe bend supports to hold the pipe in position. The minimum bend radius is given in Table 5 and care should be taken not to bend the pipe beyond this radius since this may cause the pipe to kink. Pipes that have been damaged during bending should not be used.

Uponor supplies a variety of metal and plastic pipe bend supports for pipe diameters 12–28 mm. No heat or special tools are required and the pipe support should be left in place during the life of the system.

Table 5 : Minimum bend radius (mm)

Dimension	Bend Radius Without fixture
12	60
15	75
22	110
28	140

Table 6 : Recommended spacing of support centres for internal pipework

Diameter (mm)	Horizontal runs (m)	Vertical runs (m)
12	0.3	0.5
15	0.3	0.5
22	0.5	0.8
28	0.8	1.0

Pipe Fixing

Uponor PEX pipes are not self supporting and should be fixed using pipe clips to provide adequate support whilst allowing for thermal expansion. A certain degree of sagging is to be expected in horizontal pipe runs – this will not affect the performance of the product. Uponor supply a variety of plastic pipe clips to fix Uponor pipe products into position.

Supports should always be installed at either side of a bend. It is recommended that pipes be supported at not more than 150 mm from connections, junctions, valves and other controls. Additional support must always be provided for pumps and other heavy items.

Pipework

- Pipes which pass through walls, floors, concrete or brickwork must be protected by a suitable pipe sleeve, e.g. Uponor conduit.
- Pipes laid in floors or walls should be run in soft serpentine bends to allow for thermal movement of the pipe. This also applies to pipe-in-pipe products.
- Where pipes cross-over, do not allow hot and cold water pipes to come into contact with each other.
- The relative positions of cold water pipes to hot water pipes should be such that the cold water pipes are not warmed, particularly when pipes are running parallel.
- Do not allow pipe to make contact with any sharp or abrasive surfaces which could damage the pipe.
- Pipe at high level or in ceiling voids can be laid on a metal tray which will allow for thermal movement.

Pressure Testing

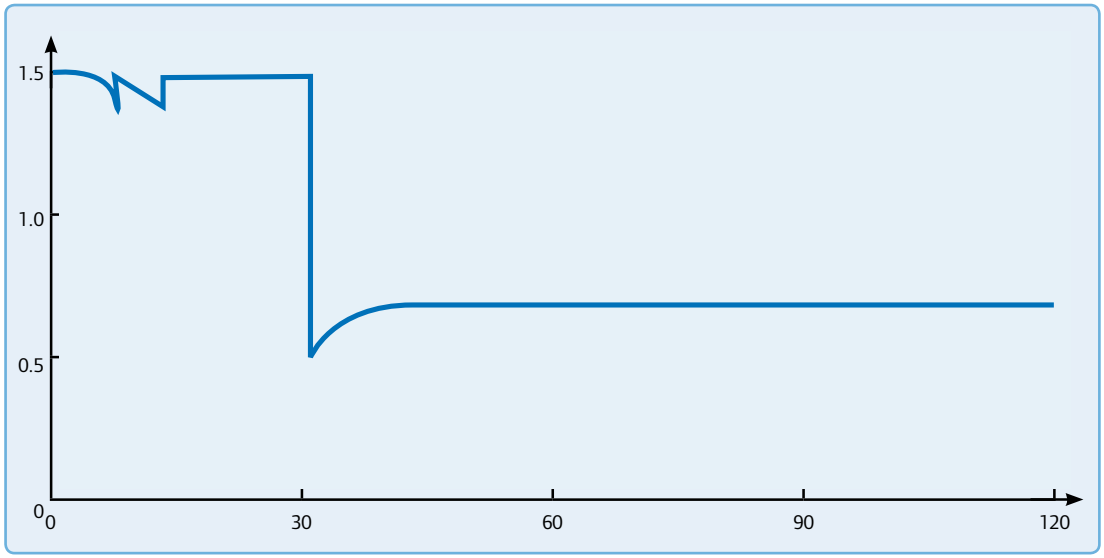
Hydraulic pressure testing shall be undertaken in accordance with BS 6700 :1997 or Water Regulations 1999 using cold potable water BEFORE the system is taken into operation. Hydraulic pressure testing is not a substitute for the correct installation of the PEX pipe and associated fittings. It is essential that the correct size fittings are used for the pipe and that thermal movements are taken into account when installing the pipe.

The test pressure applied to the system should be 10 bar or 1.5 x the maximum pressure rating of the lowest rated component in the system. The maximum test pressure applied to Uponor Q&E pipe should not exceed 18 bar at 20°C. For higher ambient water temperatures apply the values in the table on page 6. Other equipment in the system, such as boilers, cylinders, radiators, valves, etc. should be checked with the manufacturer as to their maximum pressure rating BEFORE any pressure test of the complete system is performed. If in any doubt, isolate all other equipment before pressure testing and only test the Uponor PEX pipe with the Uponor Q&E joint or Uponor compression fittings.

Method

- Vent and fill the system with potable drinking water.
- Visually inspect the whole system for leaks.
- Pressurise the installation to a test pressure of not less than 1.5 times the maximum working pressure.
- Apply the test pressure by pumping for a period of 30 minutes. Inspect for leaks.
- Reduce the pressure in the pipework by bleeding water from the system to 0.5 times the maximum working pressure.
- Close the bleed valve. Visually check for leakage and monitor for 90 minutes. If there is no reduction in pressure the system is regarded as leak tight.
- Flush the system as required

Pressure testing graph



Pressure Testing

Special notes for pressure testing Q&E joints

Uponor Q&E joints depend on the elasticity of the Uponor PEX material to form a tight joint. At low temperatures, the elasticity of the material is reduced. This means that in cold conditions, it will take a longer period of time for the joint to become tight. The pipe will always shrink back to it's original dimensions and the joint will always eventually become leak tight.

Please observe the minimum waiting time **after making the last joint** before making the system pressure test. The joint can be pressure tested after 1 hour at ambient temperatures above 15°C. At lower temperatures allow more time before testing the joints, as shown in the table below.

The maximum test pressure for Uponor PEX pipe with Uponor Q&E joints **which must not be exceeded** is 18 bar.

Table 7 : Time to pressure testing with Q&E Joints

Ambient Temperature	Time to pressure test
15°C above	1 hour
10°C to14 °C	2 hours
5°C to 9 °C	4 hours
0°C to 4 °C	8 hours

Special Instructions

Electrical Continuity
Like all plastics, Uponor PEX pipe is non-conductive and does not need to be bonded to earth.

In new installations which do not use any sections of metal pipes, there is no requirement to bond the pipe work to earth. However, it is still necessary to bond all electrical components such as pumps, boilers and heaters and other exposed metallic components of the plumbing and heating system. Uponor PEX pipe itself is not suitable for electrical earthing. Pipe systems should be earthed in accordance with current IEE Regulations. In case of doubt, seek advice from a qualified electrician.

Gas
Uponor PEX pipes must not be used to carry gas inside a domestic building or to carry compressed air.

Corrosion Inhibitors
Corrosion inhibitors should be used in central heating systems in the normal way to prevent corrosion of steel radiators and other components. Uponor PEX pipes are not affected by proprietary anti-corrosion compounds such as Fernox or Sentinel at the normal recommended dosing levels.

Antifreeze
Ethylene glycol central heating anti-freeze mixtures have no adverse effect on Uponor PEX pipes.

Where systems are left with residual water in unheated and unprotected buildings in freezing conditions, there is a risk of frost damage to the pipe. In all cases where there is a risk of freezing, add a glycol-based antifreeze to the water to avoid ice damage to the pipe. The % mixture should be in accordance with the particular brand of anti-freeze being used and the expected temperature level.

After freezing conditions have lifted and before the system is started, the anti-freeze mixture should be fully flushed-out of the loops and disposed of properly in accordance with local regulations.

Solvents
Solvent based cellulose or adhesive products must not come into contact with Uponor PEX pipes.

Disinfecting
The system should be disinfected after installation and pressure testing in accordance with the procedure in BS 6700 : 1990. Care should be taken to ensure that the chlorine level does not exceed the permitted maximum for Uponor PEX pipe work of 5 ppm. Potable water which contains chlorine at levels which is safe for human consumption will not adversely affect Uponor PEX pipe work, i.e. concentrations below 2 ppm for continuous use. Uponor pipes must not be used for conveying high levels of chlorine such as in swimming pools.

Household Chemicals
Uponor PEX pipes have good chemical resistance to most household chemicals. In the event of spillage, the pipe work should be washed with clean water.

Painting
Uponor PEX pipe is specially manufactured in white to obviate the need for onsite painting. It is not recommended to paint Uponor PEX pipe.

Vermin
Vermin are not attracted to Uponor PEX pipes. However, any products which are softer than rodents teeth are liable to be gnawed in vermin infested property, including electric cables and conduits. Vermin present a health risk. Buildings should be constructed and maintained to exclude vermin and if vermin infestation is suspected then a reputable rodent exterminator should be consulted.

Pipe and Material Data

Uponor PEX Properties Mechanical Properties	Conditions	Value	Unit	Standard
Density	-	0.938	g/cm^3	-
Tensile strength	(at 20^oC)	19-26	N/mm^2	EN ISO 527
	(at 100^oC)	9-13	N/mm^2	-
Modulus of elasticity E	(at 20^oC)	800-900	N/mm^2	EN ISO 527
	(at 80^oC)	300-350	N/mm^2	-
Elongation on failure	(at 20^oC)	350-550	%	EN ISO 527
	(at 100^oC)	500-700	%	-
Impact strength	(at 20^oC)	No failure	kJ/m^2	ISO 179
	(at -140^oC)	No failure	kJ/m^2	-
Moisture absorption	(at 22^oC)	0.01	mg/4d	-
Pipe roughness	-	$5x10^{-4}$	mm	-
Surface energy	-	$34x10^{-3}$	N/m	-
Minimum Bend radius	(at 20^oC)	5xOD	mm	-
Thermal properties		**Value**	**Unit**	**Standard**
Temperature range	-	-100 to +110	^oC	-
Coefficient of linear expansion	(at 20^oC)	$1.4x10^{-4}$	m/m^oC	-
Coefficient of linear expansion	(at 100^oC)	$2.05x10^{-4}$	m/m^oC	-
Softening temperature	-	+130	^oC	-
Specific heat	-	2.3	kJ/kg^oC	-
Coefficient of thermal conductivity	-	0.35	W/m^oC	DIN 4725
Electrical properties		**Value**	**Unit**	**Standard**
Specific internal resistance	(at 20^oC)	10^{15}	Ω m	-
Dielectric constant	(at 20^oC)	2.3	-	-
Dielectric loss factor	(at 20^oC/50 Hz)	$1x10^{-3}$	-	-
Rupture voltage	(at 20^oC)	100	kV/mm	-
Pipe properties		**Value**	**Unit**	**Standard**
Oxygen diffusion resistance	-	Oxygen-tight($\leq$0.10)	$g/(m^3d)$	DIN 4726
Min laying temperature	-	-15	^oC	-
Max operating temperature	-	+92	^oC	BS 7291-3 : 2001
Uponor PEX – outer layer properties **Mechanical properties**		**Value**	**Unit**	**Standard**
Density	-	0.952	g/cm^3	ASTM D792
Tensile strength 20^oC	-	26	MPa	ASTM D638
Elongation at break	-	200	%	-
Modulus of elasticity 20^oC	-	1000	MPa	ASTM D638
Specific heat	-	2.3	$kJ/kg\ ^oC$	-
Impact strength	-	140	J/m	BS 2782 306A

Pipe and Material Data

Force of expansion and contraction

These can appear when a pipe has been installed at an ambient temperature of about 20°C and is then suddenly exposed to a water temperature of 80°C. Forces can appear during both expansion and contraction. However if the temperature changes gradually or if the pipe can give sideways, the strength of the forces will diminish. Naturally sideways movement can be influenced by pipe length and by clamping, but note that the length of the pipe has no bearing on the size of the force. The maximum force of contraction remaining in the pipe at installation temperature due to the longitudinal shrinkage when a fixed pipe has been under maximum pressure and temperature for some time is given in the table on the right.

Dimension mm mm	Max force of contraction N
12x1.5	90
15x1.5	120
22x2.0	200
28x2.6	320

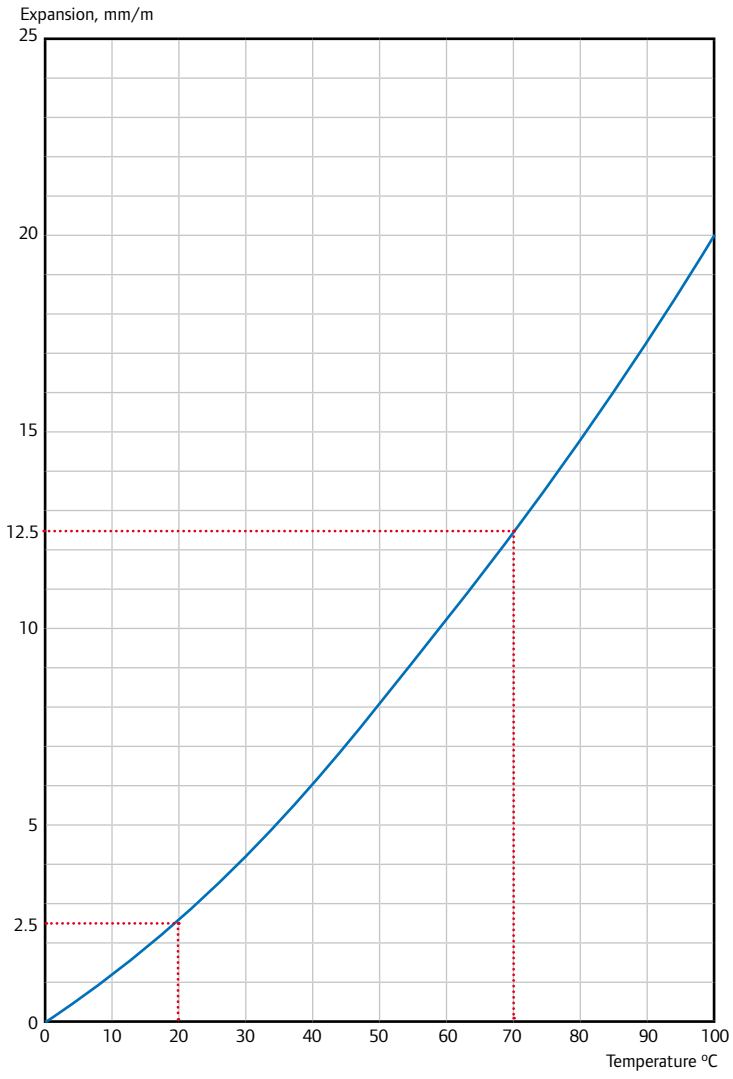
Pipe Weights and Volumes

Dimension mm	Weight kg/m	Volume l/m	Weight kg/50 m
12x1.5	0.051	0.059	2.55
15x1.5	0.075	0.108	3.75
22x2.0	0.141	0.246	7.05
28x2.6	0.224	0.397	11.20

Longitudinal Shrinkage and Expansion

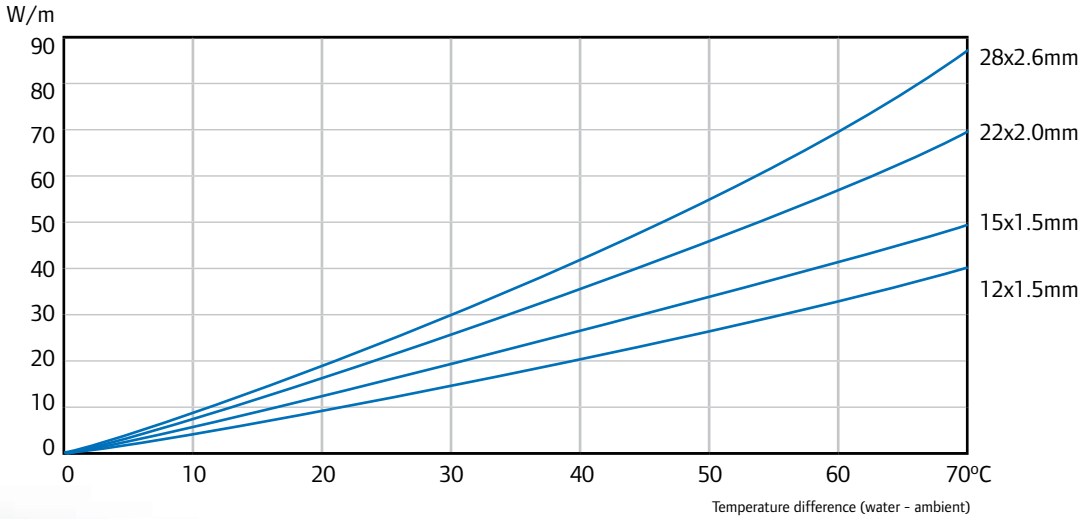
Example:
A riser conveying hot water is installed at ambient temperature 20°C. How much will the riser expand if the conveyed water has a temperature of 70°C?

According to the diagram at 20°C the thermal expansion is 2.5 mm/m. At 70°C the expansion is 12.5mm/m. The expansion of the pipe when conveying hot water will be 12.5 mm/m -2.5 mm/m = 10 mm/m.

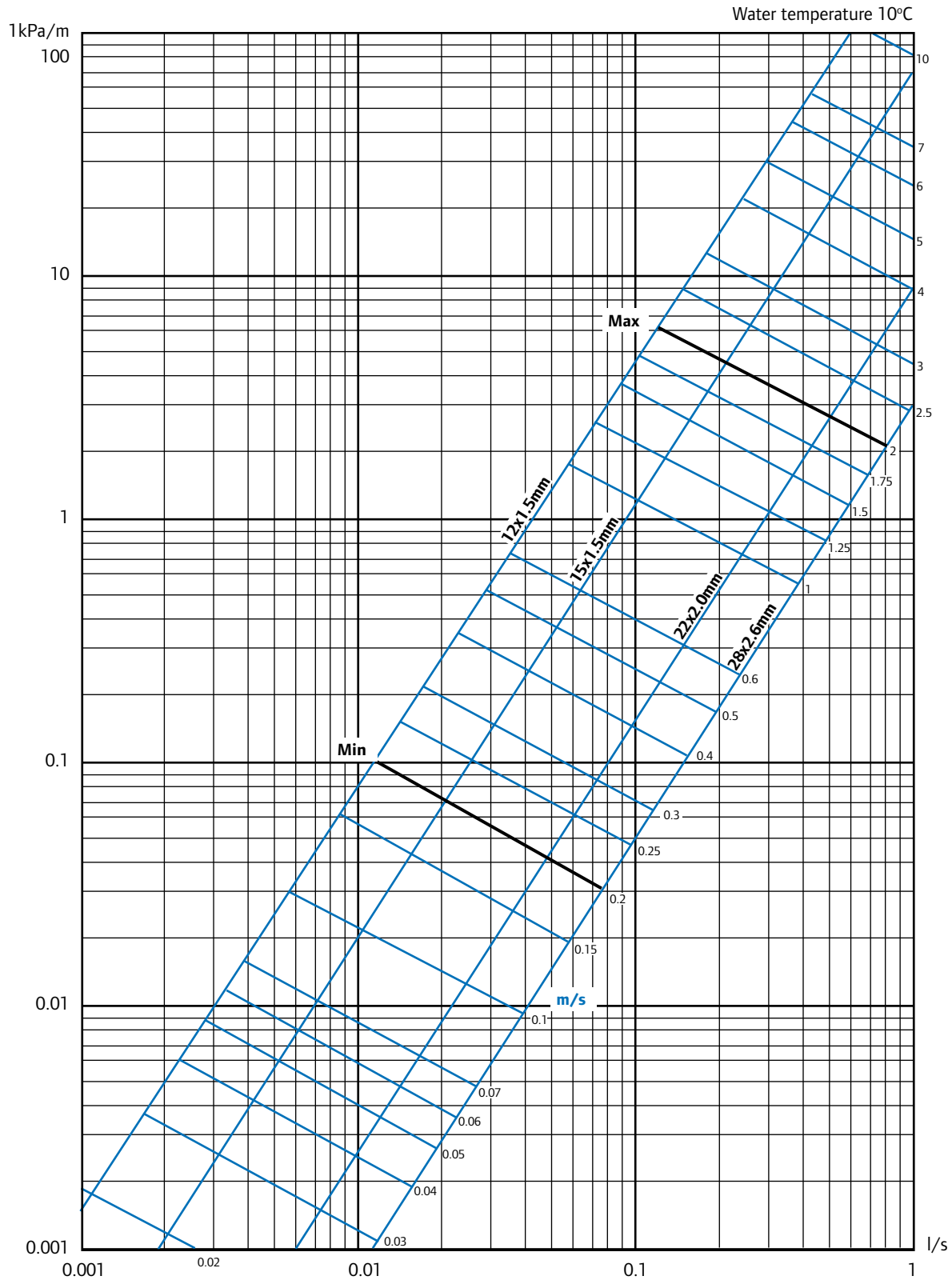


Pipe and Material Data

Heat emission loss Uponor PEX Pipe



Pressure Drop Diagram for Uponor PEX pipe

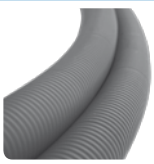


Correction factors for other temperatures

Temperature °C	90	80	70	60	50	40	30	20	10
Factor	0.76	0.78	0.80	0.82	0.84	0.87	0.91	0.96	1.00

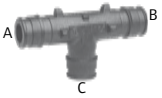
Uponor PEX Piping Systems Product Range

Uponor PEX Pipe

	Description	Code	Pack Qty
PEX Pipe white, supplied in straight lengths Diffusion-resistant PEX pipes, five-layer (PEX – adhesive agent – oxygen barrier – adhesive agent – PEX), for general plumbing and radiator connection applications. Manufactured and BSi Kitemarked to BS7291 Class S for hot and cold water and heating applications with full WRAS approval.			
	15x1.5mm	350150028	3m
	22x2mm	350220036	3m
	28x2.6mm	350280040	3m
PEX Pipe white, supplied in coils Diffusion-resistant PEX pipes, five-layer (PEX – adhesive agent – oxygen barrier – adhesive agent – PEX), for general plumbing and radiator connection applications. Manufactured and BSi Kitemarked to BS7291 Class S for hot and cold water and heating applications with full WRAS approval.			
	12x1.5mm	0120050	100m
	15x1.5mm	350150029	25m
	15x1.5mm	350150030	50m
	15x1.5mm	350150043	75m
	15x1.5mm	350150031	100m
	15x1.5mm	350150044	120m
	15x1.5mm	350150045	200m
	15x1.5mm	350150046	500m
	22x2mm	350220037	25m
	22x2mm	350220038	50m
	28x2.6mm	350280041	50m
PEX Pipe-in-Pipe Uponor pipe-in-pipe system is designed to be integrated into the building structure and to be covered by screeds. Pipe can be withdrawn without damage to the building structure. Uponor pipe-in-pipe complies with the requirements of the Water Regulations 1999. Longer lengths available on request.			
	15mm - Red	320150081	50m
	15mm - Blue	320150082	50m
	22mm - Red	320220083	50m
	22mm - Blue	320220084	50m
	28mm - Red	320280085	50m
	28mm - Blue	320280086	50m
PEX conduit Made of high-density polyethylene. Supplied in coils. Details and prices of a wide range of other sizes of conduit are available on request. First number shown in description refers to O.D. of the protective tube. The second is the size of PEX pipe suitable. **N.B. Does not include PEX Pipe.**			
	25 Black (15mm)	020591	50m
	34 Black (22mm)	020595	50m
	42 Black (28mm)	020589	25m

All fittings are supplied without Uponor PEX Rings which must be ordered separately.
All non-compression joints must be made using Uponor PEX tooling.

Uponor PEX Rings, Inserts & Plastic Fittings

	Description	Code	Pack Qty
Uponor PEX rings Must be used on all Uponor PEX plumbing system joints.			
	12mm	00120063	20
	15mm	00150063	20
	22mm	00220063	20
	28mm	00280063	10
Uponor PEX inserts Are used with Uponor PEX pipe brass compression fittings for copper pipe.			
	15mm	020436	20
	22mm	020437	20
	28mm	020438	20
Coupling Made from Engineered Plastic (EP). Uponor PEX plumbing system on both ends.			
	12x12mm	Q4773838	25
	15x15mm	Q4775050	25
	22x22mm	Q4777575	25
	28x28mm	Q4771010	10
Elbow 90° Made from Engineered Plastic (EP). Uponor PEX plumbing system on both ends.			
	15x15mm	Q4760500	25
	22x22mm	Q4760750	25
	28x28mm	Q4761000	10
Tee Made from Engineered Plastic (EP). Uponor PEX plumbing system on all ends.			
	15x15x15mm	Q4755050	25
	22x22x22mm	Q4757575	25
	28x28x28mm	Q4751010	10
Tee with reducer Made from Engineered Plastic (EP). Uponor PEX plumbing system on all ends.			
	**A B C**		
	22x15x15mm	Q4757555	25
	22x15x22mm	Q4757557	25
	22x22x15mm	Q4757550	25
	28x22x22mm	Q4751775	10
	28x22x28mm	Q4751751	10
	28x28x15mm	Q4751150	10
	28x28x22mm	Q4751175	10
Stop end Made from Engineered Plastic (EP). Uponor PEX plumbing system on one end.			
	15mm	Q4350500	25
	22mm	Q4350750	25
	28mm	Q4351000	10

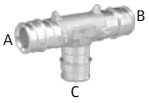
Uponor PEX Piping Systems Product Range

Uponor PEX Brass Fittings

	Description	Code	Pack Qty
Compression connection Uponor PEX plumbing system x copper compression fitting adaptor.			
	15x15mm	04242432	1
	22x22mm	04242453	1
	28x28mm	04242464	1
Connection with male thread Uponor PEX plumbing system on one end. With BSP male-threaded adaptor for screw connections.			
	12x½" MT	04241012	1
	15x½" MT	04241022	1
	22x¾" MT	04241053	1
	22x1" MT	04241054	1
	28x1" MT	04241064	1
Connection with female thread Uponor PEX plumbing system on one end. With BSP female-threaded adaptor for screw connections.			
	15x½" FT	04241222	1
	22x¾" FT	04241253	1
	28x1" FT	04241264	1
Connection with female thread (swivel nut) Uponor PEX plumbing system on one end. With BSP female-threaded adaptor for screw connections. Washer included.			
	15x½" FT	04241422	1
	15x ¾" FT	04241423	1
	22x¾" FT	04241453	1
	28x1" FT	04241464	1
Elbow 90° with male thread Uponor PEX plumbing system on one end. With BSP male-threaded adaptor for screw connections.			
	15x½" MT	04243022	1
	22x¾" MT	04243053	1
	28x1" MT	04243064	1
Elbow 90° with female thread Uponor PEX plumbing system on one end. With BSP female-threaded adaptor for screw connections.			
	15x½" FT	04243222	1
	22x¾" FT	04243253	1
Elbow 90° with female thread (swivel nut) Uponor PEX plumbing system on one end. With BSP female-threaded adaptor for screw connections. Washer included.			
	12x½" FT	04243412	1
	15x½" FT	04243422	1
	28x1" FT	04243464	1

All fittings are supplied without Uponor PEX Rings which must be ordered separately.
All non-compression joints must be made using Uponor PEX tooling.

Uponor PEX Brass Fittings

	Description	Code	Pack Qty
Wall plate elbow Uponor PEX plumbing system on one end. With BSP female-threaded adaptor for screw connections.			
	15x½"	04246222	1
Coupling/reducer Uponor PEX plumbing system on both ends.			
	15x15mm	04242020	1
	22x22mm	04242050	1
	28x28mm	04242060	1
	15x12mm	04242121	1
	22x15mm	04242152	1
	28x15mm	04242162	1
	28x22mm	04242165	1
Elbow 90° Uponor PEX plumbing system on both ends.			
	12x12mm	04243510	1
	15x15mm	04243520	1
	22x22mm	04243550	1
	28x28mm	04243560	1
Tee Uponor PEX plumbing system on all ends.			
	12x12x12mm	04244410	1
	15x15x15mm	04244420	1
	22x22x22mm	04244450	1
	28x28x28mm	04244460	1
Tee with reducer Uponor PEX plumbing system on all ends.			
	**A B C**		
	12x12x15mm	04244812	1
	12x12x22mm	04244815	1
	15x12x12mm	04244721	1
	15x15x12mm	04244521	1
	15x15x22mm	04244825	1
	22x12x12mm	04244751	1
	22x15x15mm	04244752	1
	22x15x22mm	04244652	1
	22x22x12mm	04244551	1
	22x22x15mm	04244552	1
	22x22x28mm	04244856	1
	28x22x22mm	04244765	1
	28x22x28mm	04244665	1
	28x28x22mm	04244565	1
Stop end Made from DZR brass. Uponor PEX plumbing system on one end.			
	12mm	04241010	10

Uponor PEX Piping Systems Product Range

Uponor PEX Radiator Accessories

	Description	Code	Pack Qty
Termination box set Uponor PEX plumbing system on one end. Connection with BSP female-threaded adaptor for screw connections. Box comes in two parts for easy clipping together and includes screws for securing flanged elbow to box.			
	15x½″ 22x¾″	02246122 02246053	1 1
Termination box set (compression connection) For use with Uponor pipe-in-pipe. Copper compression adaptor with BSP female-threaded adaptor for screw connections. Pipe inserts included. Box comes in two parts for easy clipping together and includes screws for securing flanged elbow to box.			
	15x½″ 22x¾″	020164 02946033	1 1
Radiator connection pipe 15mm copper x ½″ BSP male thread to connect radiator to termination box sets. Approximately 250mm long.			
	½″ MT x 250mm	020195	1
Radiator connection elbow Uponor PEX plumbing system on one end. Plated brass elbow with 15mm plated brass spigot for connecting Uponor PEX plumbing system to radiators.			
	12x300mm 15x20mm	0136403 04283723	2 1
Radiator connection guide (solid floor) Robust bend support and white powder coated aluminium upstand to protect pipe between floor and radiator. For use with both pipe-in-pipe and pipe without conduit. Pack of two guides.			
	12/15mm	PTRG01	1
Radiator connection guide (joisted floor) Robust white powder coated aluminium upstand to protect pipe between floor and radiator. For use with both pipe-in-pipe and pipe without conduit. Pack of two guides.			
	12/15mm	PTRG02	1
Chromed Upstand Pipe Pack (750mm) Chrome upstand to protect pipe between floor and radiator. For use with both pipe-in-pipe and pipe without conduit. Pack of two upstands.			
	12/15mm	PTRG03	1
Chromed Upstand Pipe Pack (250mm) Chrome upstand to protect pipe between floor and radiator. For use with both pipe-in-pipe and pipe without conduit. Pack of two upstands.			
	12/15mm	PTRG04	1

Manifolds, Adpators & Accessories

	Description	Code	Pack Qty
Manifold PEX (EP) - Capped Supplied as a single manifold. Made from Engineered Plastic (EP) with 15mm outlets for Uponor PEX pipe. Uponor PEX plumbing system 22mm and 28mm at manifold ends. For use with suitable PEX jointing rings.			
	4 Port 22x15mm 6 Port 28x15mm	Q2247550 Q2261050	1 1
Manifold PEX (EP) Supplied as a single manifold. Made from Engineered Plastic (EP) with 15mm outlets for Uponor PEX pipe. Uponor PEX plumbing system 22mm and 28mm at one manifold end and capped off at the other. For use with suitable PEX jointing rings.			
	2 Port 22x22mm 3 Port 22x22mm 4 Port 22x22mm 4 Port 22x28mm 6 Port 22x28mm 6 Port 28x28mm	Q2227557 Q2237557 Q2247557 Q2241057 Q2261057 Q2261051	1 1 1 1 1 1
Manifold PEX (brass) Supplied as a single manifold. Made from DZR brass Uponor PEX plumbing system 15mm outlets. ¾″MT and ¾″FT threaded connections at manifold ends. Manifolds can be joined to make the required number of ports. For use with suitable PEX jointing rings.			
	2 port 3 port	04245322 04245323	1 1
Manifold PEX brackets For use with brass and EP Manifold PEX.			
	¾″	58206	2
Compression adaptors (PEX Pipe) Made of plated brass for PEX pipe connection to Uponor Manifold P and Manifold L.			
	12x½″ FT 15x½″ FT	770037 152025	1 1
Manifold PEX (brass) end plug Made from DZR brass with ¾″MT for plugging the ends of the Manifold PEX (brass).			
	¾″MT ¾″MT (bleed valve)	020024 020026	1 1
Manifold PEX (brass) end cap Made from DZR brass with ¾″FT for capping the ends of the Manifold PEX (brass).			
	¾″FT ¾″FT (bleed valve)	436000020 454038201	1 1

Uponor PEX Piping Systems Product Range

Manifolds, Adpators & Accessories

	Description	Code	Pack Qty
Manifold large Bore Ball Valves ¼ turn inline service valve made from plated brass.			
	15x15mm 22x22mm	Q4815050 Q4817575	1 1
Manifold Full Port Ball Valves ¼ turn inline service valve made from plated brass.			
	22x22mm 28x28mm	Q4827575 Q4821010	1 1
Manifold L Supplied as a single manifold. Made of plated brass, ¾"MT x ¾"FT with ½"MT outlets. Valves allow each circuit to be isolated. Delivered with loop labelling discs. Order adaptors separately for connection to Uponor pipe (MLCP/PEX). Manifolds can be joined to make the required number of ports.			
	2 port 3 port 4 port	TE5402 TE5403 TE5404	1 1 1
Manifold L bracket Supplied as a single bracket. Holds manifolds in place at a vertical distance of 220mm apart.			
	¾"	TE2105	1
Manifold L end cap (with sealing washer) Made of plated brass.			
	¾" FT	TE1405	1
Manifold L end plug Made of plated brass, with sealing O-Ring.			
	¾" MT	TE1305	1
Manifold L ball valve (¾") Supplied as a single valve. Made of plated brass. Used to isolate the whole manifold assembly.			
	¾"MT x ¾"FT	TE5105	1

Manifolds, Adpators & Accessories

	Description	Code	Pack Qty
Manifold P Supplied as a single manifold. Made of plated brass, with 1"MT x 1"FT with ½"MT outlets. Order adaptors separately for connection to Uponor pipe (MLCP/PEX). Manifolds can be joined to make the required number of ports.			
	2 port 3 port 4 port	770220 770222 770221	1 1 1
Manifold P bracket Supplied as a single bracket. Made of galvanized steel, for the sound absorbing installation of Manifold P.			
	1"	770230	1
Manifold P cap (with sealing washer) Made of plated brass, for use with Manifold P.			
	½" FT 1" FT	770321 770323	20 20
Manifold ball valve set (1") Pack contains two valves (red handles) for flow and return. Made of plated brass. For use with P/H/FM/FR Manifolds. Use to isolate the whole manifold assembly.			
	1"MTx1"FT	584990	1

PEX Plumbing System Tools

Plastic pipe cutters Cost effective PEX pipe cutters to leave the perfect jointing finish.			
	Pipe cutter 12-28mm Pipe cutter 12-40mm	010620 020812	1 1
New Expander tool Battery driven expander tool. Includes 1x 230V, 50Hz fast battery charger (typically 1 hour), 2x 14.4V / 2.4Ah Nickel Cadmium Batteries, 1x 100g tube of Molykote tool lubricant, 1x operation manual, 1x lightweight black plastic case. Compatible with existing range of expander heads. Expander heads are not included.			
	Expander tool Autorotation head Spare charger Spare battery	1004051 Q6323810 1004052 1004053	1 1 1 1
Expander head			
	12mm 15mm 22mm 28mm	1004007 470230543 470230544 470230545	1 1 1 1

Classifications, Approvals & Affiliations

All Uponor pipes are manufactured in accordance with the international quality standard of ISO9001 and to the environmental standard of ISO14001.

Uponor products have been independently assessed and meet the requirements of the UK Water Regulations.

Uponor hold the BBA certificates 87/1799 and 92/2741

Uponor is affiliated with the following organisations:

The information in this publication is correct at the time of going to press.

Uponor reserves the right to alter specifications and operating parameters for all our Underfloor Heating & Plumbing Systems at any time as part of our policy of continuous product development.

Guarantee
Uponor Housing Solutions Ltd ("Uponor") guarantees [to the original purchaser/ customer] that pipes and fittings sold by it are free of defects in materials or manufacture under normal conditions of use for a period of 25 years and in case of electrical and mechanical products for 1 year from the date of installation. This guarantee only applies to the products stored, installed, tested and operated in accordance with the fitting instructions issued by Uponor and valid at the time the products were installed.

Where a claim is made during the guarantee period and products are proven to be defective in materials and/or manufacture at the time of delivery, Uponor will supply replacement products free of charge. This is the exclusive remedy under this guarantee.

Uponor disclaims any warranty or guarantee not expressly provided for herein, including any implied warranties of merchantability or fitness for a particular purpose. Uponor further disclaims any and all responsibility or liability for losses, damages and expenses, including special, direct, indirect, incidental and consequential damages, whether foreseeable or not, including without limitation any loss of time or use or any inconvenience arising from the ownership, installation or use of the products sold hereunder.

This guarantee does not affect the statutory rights of the consumer.

Uponor Housing Solutions Ltd
Snapethorpe House
Rugby Road
Lutterworth
Leicestershire
LE17 4HN
T 01455 550355
F 01455 550366
E hsenquiries@uponor.co.uk
W www.uponorhousingsolutions.co.uk

Specification Centre, North
Pavillion 3
Buchanan Business Park
Stepps
Glasgow
G33 6HZ
T 0141 7795222

Specification Centre, South
Space House
Satellite Business Village
Crawley
RH10 9NE
T 01293 655488

Uponor (Ireland) Limited
Unit 13, Seatown Business Campus
Seatown Road, Swords
Co. Dublin, Ireland
T 00 353 (0) 1895 7430
F 00 353 (0) 1895 7434
E sales@uponorhousingsolutions.ie
W www.uponorhousingsolutions.ie

UPSIG-PEX-April 2008