

uponor

# PP-RCT Piping Systems Manual

for domestic water, heating, cooling,  
and industrial applications



**Uponor PP-RCT Piping Systems Manual**

is published by

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Uponor has used reasonable efforts in collecting, preparing, and providing quality information and material in this manual. However, system enhancements may result in modification of features or specifications without notice.

Uponor is not liable for installation practices that deviate from this manual or are not acceptable practices within the mechanical trades.



# Table of contents

<b>Foreword</b> . . . . .	<b>ii</b>
<b>Chapter 1: PP-RCT properties and approvals</b> . . . . .	<b>1</b>
Overview . . . . .	1
Expansion and contraction control. . . . .	2
Listings and code approvals. . . . .	2
System advantages . . . . .	3
Installer benefits . . . . .	4
Engineer/designer benefits . . . . .	5
<b>Chapter 2: Connections and tools.</b> . . . . .	<b>7</b>
Training . . . . .	7
Fittings offering . . . . .	7
Prefabrication . . . . .	8
Planning . . . . .	8
Safety . . . . .	8
Power supply. . . . .	8
Fusion procedures . . . . .	9
Socket fusion using mechanically assisted machines . . . . .	10
Saddle outlet fusion . . . . .	11
Butt fusion . . . . .	12
Fusion tool recommendations . . . . .	15
Shipping, storage, and handling . . . . .	18
<b>Chapter 3: Fire-resistive construction.</b> . . . . .	<b>19</b>
Overview . . . . .	19
Return-air plenums . . . . .	19
Fire-rated assemblies and penetrations. . . . .	19
Future testing and approvals . . . . .	19
<b>Chapter 4: System design</b> . . . . .	<b>21</b>
Thermal conductivity . . . . .	21
Fittings . . . . .	21
Piping overview . . . . .	21
Mechanical pipe . . . . .	22
Potable pipe . . . . .	22
Operating temperature and pressure for mechanical and cold potable piping . . . . .	23
Operating temperature, pressure, and velocity for hot potable piping . . . . .	23
Pipe sizing. . . . .	24

<b>Chapter 5: Installation and pressure testing</b> . . . . .	<b>25</b>
Pipe support . . . . .	25
Linear expansion and contraction . . . . .	26
Vertical installation. . . . .	29
Insulation . . . . .	30
System care . . . . .	32
System disinfection . . . . .	32
Water additive guidelines . . . . .	33
Pressure testing . . . . .	34
Test record . . . . .	35
<b>Appendix A: Head loss and flow rates tables</b> . . . . .	<b>37</b>
SDR 7.4 pipe . . . . .	37
SDR 9 pipe . . . . .	38
SDR 11 pipe . . . . .	43
SDR 17.6 pipe . . . . .	48
Head loss vs. flow rates based on the Hazen-Williams principle . . . . .	51
<b>Appendix B: Equivalent length of fittings</b> . . . . .	<b>53</b>
Equivalent length of fittings charts . . . . .	53
<b>Appendix C: Pipe and fittings dimensions and weights</b> . . . . .	<b>59</b>
Mechanical pipe . . . . .	59
Cold potable pipe . . . . .	61
Hot potable pipe . . . . .	62
Fittings. . . . .	63
Transitions . . . . .	77

# Foreword

This manual is published for architects, building officials, engineers and mechanical contractors interested in designing and/or installing Uponor PP-RCT pipe and fitting systems. It describes general installation recommendations that use Uponor PP-RCT pipe and fittings products.

Uponor has made reasonable efforts to collect, prepare and provide quality information and material in this manual. However, system enhancements may result in modification of features or specifications without notice. Always follow local codes for additional requirements.

Uponor is not liable for installation practices that deviate from this manual or are not acceptable practices within the mechanical trades, codes or standards of practice.

Prior to installing Uponor PP-RCT systems, Uponor requires all installers to attend Uponor PP-RCT piping systems installation training performed by an Uponor trainer or manufacturer's representative. To schedule a training session at your business or job site, contact your local Uponor representative or call 800.321.4739.

Direct any questions regarding the suitability of an application or a specific design to Uponor Technical Services at 888.594.7726.

## Important safety information

To reduce the risk of injury, read and understand this PP-RCT piping systems manual before beginning work. Also, read all product safety warnings and operator's manuals for the heat-fusion tools to ensure proper and safe operation. Always wear safety goggles or safety glasses with side shields when performing work.



**WARNING:** Cancer and Reproductive Harm  
P65Warnings.ca.gov

## Chapter 1:

# PP-RCT properties and approvals

### Overview

With more than 30 years of proven performance, polypropylene random copolymer (PP-R) pipe and fittings have been used throughout the world in plumbing, mechanical and industrial applications. Pipes made from PP-R are lightweight, do not corrode, rust, or scale and they are joined via heat fusion for permanent, leak-free joints.

These pipes may be used inside the building, outside the building with UV (ultraviolet) protection or direct buried.

Applications include, but are not limited to, the following systems:

- Domestic water
- Heating hot water
- Chilled water
- Geothermal
- Industrial

For additional application information, contact Uponor Technical Services at 888.594.7726.

Based on the success of PP-R, the next generation of polypropylene-random copolymer was developed with a special crystalline structure that exhibits an improved pressure rating at elevated temperatures. It is called Polypropylene, Random copolymer with Crystallinity and Temperature resistance (PP-RCT).

Its enhanced crystalline structure is created through a special nucleation process that enables the pipe to operate at higher pressures at elevated temperatures. This advanced resin is used in Uponor's PP-RCT mechanical pipes and fittings.

In long-term pressure tests, the outstanding performance characteristics of PP-RCT vs. standard PP-R is apparent:

- PP-RCT: 50-year strength at 158°F (70°C) = 725 psi (5 MPa)
- PP-R: 50-year strength at 158°F (70°C) = 464 psi (3.21 MPa)

Offering more than 50% improved long-term strength, PP-RCT enables designers to achieve higher pressure ratings than with traditional PP-R pipes of the same wall thickness, or they can utilize PP-RCT's higher pressure rating and down-gauge to a thinner-wall pipe, offering higher hydraulic capacities and cost savings.

### Material stability

Processing and fabrication does not affect the integrity of the PP-RCT raw material. More importantly, the material is engineered to withstand long-term service life even at high temperatures.

### Premium quality

Uponor's strict policy on quality control requires the use of premium PP-RCT resins produced by the world's premier resin manufacturers. Material formulations and processing parameters are continuously monitored for compliance and consistency.

### Indoor and outdoor UV protection

PP-RCT pipe and fittings are not stabilized for direct ultraviolet (UV) exposure.

Over time, UV exposure causes degradation, resulting in decreases in the pipe's physical properties and chemical resistance as well as affecting the long-term performance.

For outdoor applications, encase pipes in a protective wrap or insulation. For protective coatings information, contact Uponor Technical Services at 888.594.7726.



**Figure 1-1: Storing PP-RCT piping**

### Hydrolysis

Uponor PP-RCT pipes are completely resistant to hydrolysis, meaning they will not react with water. The pipe will not break down and no chemicals will leach into the water throughout its lifecycle.



### Corrosion resistance

Unlike metal piping systems that have to be upsized due to corrosion, PP-RCT systems do not corrode, rust or scale. No corrosion means long-term consistent flow, no decrease in pipe inside diameter, lower pumping costs and a better quality of water.

### Chemical resistance and special applications

Because of the non-polar characteristics of polypropylene and a specially designed additive package, PP-RCT systems are also suitable for the distribution of most chemicals.\* Although PP-RCT is resistant to a wide variety of chemicals, it is very important to select appropriate transition fittings (fittings with metal inserts).

To determine if Uponor piping is suitable for your desired application, please contact Uponor Technical Services at 888.594.7726.

**Note:** According to the ANSI/ASME B31.3 process piping code, thermoplastic piping should not be used in flammable fluid service aboveground, in nominal sizes above 1" (32 mm). With sizes 1" and below, secondary containment should be provided.

\*For more information about chemical compatibility, contact Uponor Technical Services at 888.594.7726.

### Expansion and contraction control

Temperature changes cause thermoplastic pipes to expand and contract in the linear direction. However, the fiber composite layer in Uponor's PP-RCT mechanical and hot potable pipes helps to control linear expansion and contraction. The fiber layer, co-extruded into the mid-wall of the pipe, is comprised of oriented fibers encapsulated in PP-RCT, which does not expand when exposed to temperature changes. Not only does the fiber layer reduce the need for additional expansion control, it also provides rigidity and stability.

### Heat fusion connections

Uponor PP-RCT piping systems use the heat fusion process to create the homogeneous connections between the pipe and the fittings. The connections use no added solders, solvents, glues or similar products. When heat fusing PP-RCT components, extra material is collected at the joint which makes fusion joints the strongest points of the system. Properties of the material do not change when heat fused, so connections between pipes and fittings are strong and safe.

### Reliable performance

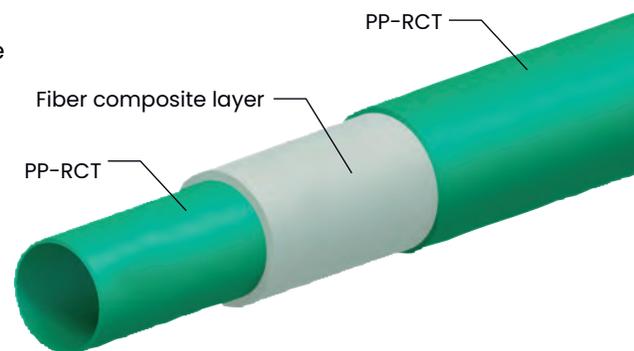
Uponor has developed reliable piping systems produced from proprietary resin formulations for long-term performance. The pipes resist scaling and corrosion, and the pipe walls are extremely smooth for a low friction coefficient, eliminating abrasion. Furthermore, the heat-fusion mechanical joints eliminate the concern of traditional piping systems where the joints are the weakest point in the system. With heat-fused joints, physical stresses will not damage the joints' integrity.

### Natural sound insulation

Because of the integrated natural sound insulation, pressure billow and water flow noise are lessened by PP-RCT pipes, enhancing the quality of living for the occupants of the buildings.

### Prevention of biological growth

Light transmission through PP-RCT pipe is less than 0.2%. Therefore, it does not support the attachment of algae and other biofilm.



**Figure 1-2: Fiber composite layer in Uponor PP-RCT mechanical and hot potable pipe**

### Listings and code approvals

Uponor products are listed to the following standards:

- ASTM F2389 Standard Specification for Pressure Rated Polypropylene (PP) Piping System
- ASTM E814 Standard Test Method for Fire Tests of Penetration Firestop Systems
- UL 1479 Standard for Through-penetration Firestops
- CAN/ULC S115 Standard Method of Fire Tests of Firestop Systems
- NSF/ANSI 14 Plastic Piping Systems Components and Related Materials
- NSF/ANSI 61 Drinking Water System Components – Health Effects
- NSF/ANSI 51 Food Equipment Materials
- ICC-ES-PMG 1106 Polypropylene (PP-R) and (PP-RCT) Pipe and Fitting System
- CSA B137.11 Polypropylene (PP-R) Pipe and Fittings for Pressure Applications
- IAPMO K-12775 Research and Testing – Pressure Rated Polypropylene Piping Systems
- QAI P321-5 Water Pipe Systems – PP-RCT Pipe and Fittings ASTM E84

**Uponor PP-RCT is approved for use under the following codes:**

- International Residential Code (IRC)
- International Mechanical Code (IMC)
- Uniform Mechanical Code (UMC)
- California Mechanical Code (CMC)
- International Plumbing Code (IPC)
- Uniform Plumbing Code (UPC)
- California Plumbing Code (CPC)
- National Plumbing Code of Canada

**Uponor manufacturing plant is listed to the following standards:**

- ISO 9001:2007 for Quality Management
- ISO 14001 for Environmental Management
- OSHA 18001:2007 for Occupational Health and Safety Management

**System advantages**

**No maintenance**

Uponor PP-RCT piping systems are more cost effective to operate and maintain compared to traditional metal piping systems. The heat-fusion joining method means there are no mechanical fittings or gaskets to fail.

The pipes resist corrosion and scaling, eliminating the need for chemical treatments, and they have a better coefficient of friction than metal pipes, resulting in lower pumping costs.

**No toxic elements**

Uponor pipes and fittings do not contain toxic materials and do not emit VOCs or other dangerous compounds, even when exposed to fire.

**Reduced heat-transfer values**

Uponor PP-RCT pipes have a lower thermal conductivity value than traditional metal pipes.

- 1.67 Btu·in/(hr·ft<sup>2</sup>·°F)
- 0.241 W/(m·°K)

This provides several advantages.

- Minimized loss or gain of heat improves energy savings
- Less insulation is required
- Less condensation when used for chilled water
- Reduced chance of injury around exposed hot-water piping

**Freezing conditions**

Although not designed to be installed in applications that repeatedly freeze and thaw, the ductility of Uponor PP-RCT makes it less likely to rupture than metal pipes during one of these events. If installed in areas with the potential for freezing, use anti-freeze solutions, such as glycols, or keep the minimum constant flow through the pipes to protect proper system function and integrity. If using heat tapes, refer to Uponor's installation guidelines.



**Figure 1-3: PP-RCT mechanical-room piping**



**Figure 1-4: PP-RCT suspended piping**

**Extended service life**

Uponor PP-RCT pipes are both chemically and physically durable and offer advanced performance over other piping systems. They can provide building owners with a long, low-maintenance service life.

**Product warranty**

Uponor offers a 25-year warranty that covers product replacement, incidental and property damages caused by product failure due to manufacturing defects. Systems must be installed and successfully tested by Uponor-trained installers and a properly recorded pressure test form must be submitted.

See pressure testing section for proper procedure.

**Installer benefits**

**Compatible piping systems**

Uponor offers a full line of PP-RCT fittings, keeping installation simple and providing an easy transition to other piping systems and equipment.

**Lightweight material**

Weighing up to 80% less than traditional metal pipes, Uponor



**Figure 1-5: PP-RCT mechanical-room piping**

PP-RCT pipes are easy to handle and more cost-effective to transport. Their lighter weight provides safer, easier, more efficient installations.

**Non-shattering**

Under normal operating temperatures, PP-RCT pipes will not shatter when impacted or crushed. However, when

temperatures fall near or below freezing, the pipes' impact resistance decreases, so installers must use caution when handling.

**Heat fusion**

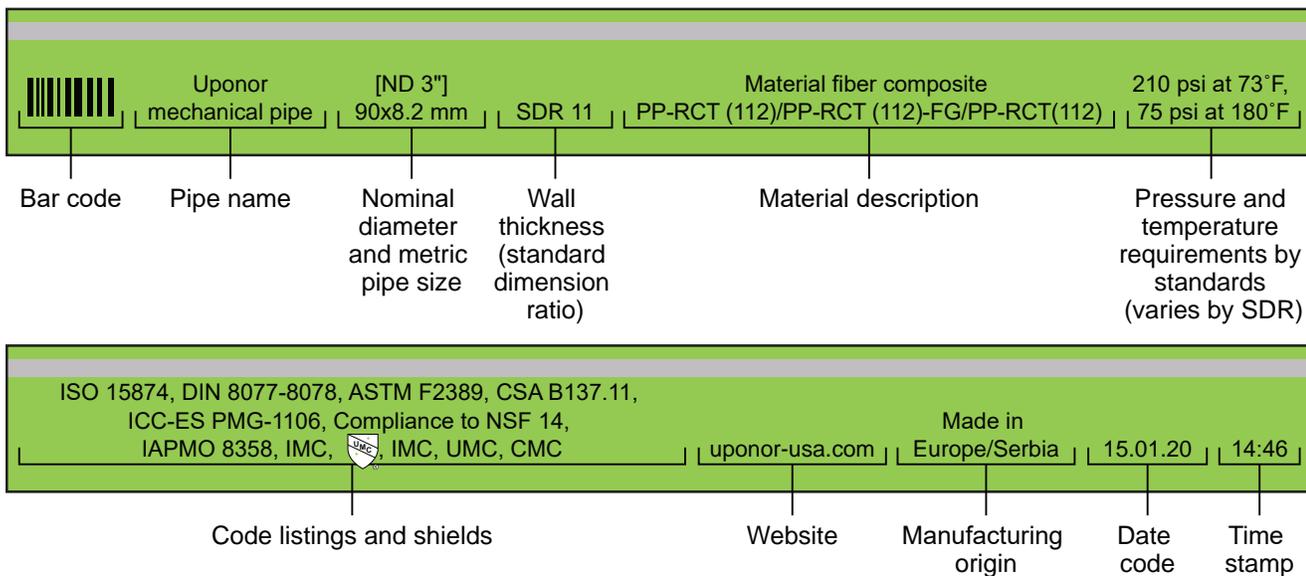
PP-RCT is joined via a process known as heat fusion, which eliminates soldering, solvents and glues. During the heat-fusion process, the pipe and fittings are heated under controlled temperatures and then joined. The molecules of the polymer flow together creating a seamless, permanent bond. No open flames are required and no toxic volatile organic compounds (VOCs) are emitted during the process.

**Direct burial**

Uponor's PP-RCT piping system is the ideal choice for direct-burial installations. This can often reduce insulation for many applications, such as chilled-water lines. Always follow local code requirements or seek alternate approval from the authority having jurisdiction (AHJ).

**Saddle outlet fusion joints**

Even after the mains are set, branch lines can be easily added using



**Figure 1-6: Uponor PP-RCT mechanical pipe print stream**

saddle outlet joints. With saddle outlets, the branch is fused directly on and into the wall of the main. Furthermore, saddle outlets are a great solution for easy fabrication and modification of manifolds. It is a time saver and provides lower pressure drop as compared to traditional tee fittings.

**Note:** "Hot" tapping can be used in certain applications for live water lines. Contact McElroy for more information.

### Easy to identify

Uponor PP-RCT mechanical pipe features the following color coding.

- SDR 7.4 – green with gray stripes
- SDR 9 – green with gray stripes
- SDR 11 – solid green
- SDR 17.6 – solid green

Uponor PP-RCT hot potable pipe features the following color coding.

- SDR 7.4 – green with red stripes
- SDR 9 – green with red stripes

Uponor PP-RCT cold potable pipe features the following color coding.

- SDR 7.4 – green with blue stripes
- SDR 11 – green with blue stripes

Uponor PP-RCT pipes are available in the following lengths.

- 13-ft. straight lengths, ½" (20 mm) to 2" (63 mm)
- 19-ft. straight lengths, 2½" (75 mm) to 12" (315 mm)

The straight lengths of pipe are bundled by size and packaged in UV-resistant bags. If temporarily storing

pipe outside, bags will protect pipe from UV exposure for up to 30 days.

The bundles feature labels specifying the pipe type, size, dimension and number of pipes per bundle. Fittings are packaged in plastic bags with labels featuring the product description, part number and total number of fittings per bag. Both pipe bundles and fitting labels have bar codes for easy identification when shipping and receiving.

### Integrated expansion control

Unlike other plastic piping systems, the integrated linear expansion control of Uponor PP-RCT mechanical fiber-layer pipe can potentially reduce or eliminate expansion controls.

Additionally, buried PP-RCT mechanical pipe does not require thrust blocking (unless connected to another type of piping product which would require thrust blocking at the transition point).

### Environmental advantages

- No toxic substances (BPA or dioxins)
- No heavy metals
- Long service life
- Recyclable
- Non-corrosive with a low friction factor for less required pumping energy
- Lightweight, facilitating easier transportation, handling, and installation
- No VOCs released during production or fusion

### Engineer/designer benefits

- Efficient system that will not corrode and will not reduce inner diameter
- Minimal heat transfer values as compared to metal pipes
- Natural sound insulation of water flow and pressure effects
- Complete piping system components readily available
- Easy to transition to and from existing piping systems
- Cooler boiler rooms
- Reduction of weight in structures



## Chapter 2:

# Connections and tools

Use heat fusion for permanent, reliable Uponor PP-RCT connections. Note that only trained installers holding a current qualification from Uponor and/or the fusion tool manufacturer can make Uponor PP-RCT fusion connections. Installers must make connections in accordance with DVS 2207-11: 2017 and the guidelines in this manual.

Uponor recommends the use of McElroy fusion tools, which comply with DVS 2207-11, *Welding of Thermoplastics – Machines and Devices for Heating Element Welding of Pipes, Pipeline Parts and Sheets*. However, Uponor also allows the

use of fusion tools from Widos and Ritmo that are designed for fusing PP-RCT products. Contact an Uponor representative for more information.

### Training

Uponor offers factory or field training through sales professionals or manufacturer's representatives. Installers must be properly trained and qualified for the system to be covered under warranty. The Uponor PP-RCT warranty is only valid when installers are properly trained and qualified and when the system is properly installed, pressure tested, documented and submitted.

### Fittings offering

Uponor offers molded socket fusion fittings in tees, couplings, elbows and adapters for ½" (20 mm) to 4" (125 mm) pipe along with fabricated butt-fusion fittings for 6" (160 mm) to 12" (315 mm) SDR-specific pipe. In addition, Uponor offers various transition fittings for ProPEX expansion, threaded and flange adapters. Refer to the tables below for details.



Fitting type	Saddle outlet fusion	Socket fusion	Fabricated (butt fusion)
Sizes	½" to 4" (20 mm to 125 mm)	½" to 4" (20 mm to 125 mm)	6" to 12" (160 mm to 315 mm)
SDR pipe	9, 11, 17.6	7.4, 9, 11, 17.6	9, 11, 17.6
Material	PP-RCT (molded)	PP-RCT (molded)	PP-RCT pipe

**Table 2-1: Uponor PP-RCT saddle outlet, socket and fabricated fittings**



Fitting type	ProPEX® adapters	Threaded adapters	Flange adapters
Sizes	½" to 1" (20 mm to 32 mm)	½" to 2" (20 mm to 63 mm)	1½" to 12" (50 mm to 315 mm)
SDR pipe	N/A	N/A	9, 11, 17.6
Material	PP-RCT pipe	PP-RCT pipe	PP-RCT pipe

**Table 2-2: Uponor PP-RCT transition fittings**

## Prefabrication

Uponor PP-RCT is ideal for prefabrication. Rather than making assemblies on the job site, installers can prefabricate PP-RCT piping systems offsite in a more controlled environment to help improve overall system integrity and reduce on-site labor.

## Planning

Begin with a solid plan to best utilize the advantages of Uponor PP-RCT to save time and prevent waste.

- Ensure the required system components are on hand.
- Create a convenient work space to cut and fabricate the pipe.
- Plan connections in advance to accommodate for fusion equipment placement.
- Utilize prefabrication and pre-assembly of components and connections whenever possible.

## Flange connections

Use a full-face, rubber gasket with an equivalent ID to the Uponor flange adapter. Tighten all bolts in a star pattern to one-third of the specifications in **Table 2-3**. Continue tightening in a star pattern until full-torque spec has been met. Check and re-torque bolts 24 to 48 hours after initial install and tightening. Re-torque after temperature fluctuations due to seasonal change or other heating/cooling.

Pipe size	# of bolts	Bolt size	Washer required	Torque (ft-lb)	Torque (N-m)
1½" (50 mm)	4	½"	Yes	25	34
2" (63 mm)	4	¾"	Yes	30	41
2½" (75 mm)	4	⅝"	Yes	40	54
3" (90 mm)	8	⅝"	Yes	40	54
4" (125 mm)	8	⅝"	Yes	40	54
6" (160 mm)	8	¾"	Yes	55	75
8" (200 mm)	8	¾"	Yes	75	102
10" (250 mm)	12	7/8"	Yes	90	122
12" (315 mm)	12	7/8"	Yes	105	142

**Table 2-3: Torque requirements for flange bolts**

## Safety

The heat-fusion connection method requires tool temperatures up to 518°F (270°C). It is extremely important to refer to the following safety guidelines to prevent potential injury.

- Only persons qualified in heat fusion shall perform heat fusion connections.
- Always post a warning sign before beginning the fusion process.
- Always wear personal protective equipment (PPE) which may include safety glasses, long sleeves, gloves, footwear and hard hat.
- Be aware of your environment and verify that it is a safe space to operate fusion equipment.
- Understand proper operation and safety procedures for the fusion equipment.

- Ensure all fusion tools are in good working order.
- Never leave heated fusion tools unattended.
- When unplugged, store fusion tools properly.
- When using electric fusion tools, follow recommended electrical safety practices.

## Power supply

It is imperative that adequate power is available for the fusion equipment. Insufficient power can result in cold fusions that will fail. If using extension cords, ensure the cords are capable of delivering the required power and that you are within a reasonable distance from the power source. Refer to the tool manufacturer's operating manual for specific power requirements.



**Figure 2-1: Heat-fusion connection**

## Fusion procedures

**Note:** The following steps are abbreviated and for reference only. Installers must be trained and carry a current qualification from the tool manufacturer or Uponor for the specific fusion tool(s) being used.

### Socket fusion – ½" (20 mm) to 4" (125 mm) pipe and fittings

**Required heating and fusion temperature:** 482°F (250°C) to 518°F (270°C)

Follow the seven steps below to fuse ½" (20 mm) to 4" (125 mm) Uponor PP-RCT pipe and socket fittings.

**Note:** Hand-held irons are ideal for pipe sizes up to 1½" (50 mm) while larger pipe sizes should use mechanically assisted machines.

1. **Clean** – Using a dry, lint-free cloth, clean the pipe and fitting ends with 94% or greater isopropyl alcohol.
2. **Chamfer [2" (63 mm) and smaller connections only]** – Using a chamfer tool, chamfer the pipe end to aid in insertion.
3. **Mark weld depth** – Using the chamfer tool or depth gauge, mark the required welding depth in a minimum of two places on the pipe.
4. **Heat** – Clean the heater adapters with a clean, dry, lint-free cloth. Do NOT use isopropyl alcohol on the heater adapters. Verify the heater temperature with a contact pyrometer to ensure it is within the range shown in **Table 2-4**. Firmly seat the fitting onto the male adapter of the tool, while



**Figure 2-2: Mark weld depth**

simultaneously inserting the pipe into the female end of the tool. Once both are fully inserted, heat for the required time shown in **Table 2-4**.

5. **Fuse** – After waiting the appropriate time, remove the pipe and fitting from the tool and quickly inspect the melts before connecting the pieces together to the required depth. Do not twist!
6. **Cool** – Let the assembly cool undisturbed for the required time shown in **Table 2-4**.
7. **Inspect** – After cooling is complete, inspect the weld. Look for two distinct beads, free of any voids, gaps or debris.



**Figure 2-3: Heating the pipe and fitting**



**Figure 2-4: Connecting the pipe and fitting**



**Figure 2-5: Allowing the fused joint to cool undisturbed**

Pipe size	Welding depth		Heating time (sec)		Welding time (sec)	Cooling time (min)
	mm	Inches	Above 40°F	Below 40°F		
½" (20 mm)	13	½"	5	8	4	2
¾" (25 mm)	14	9/16"	5	8	4	2
1" (32 mm)	15	5/8"	7	11	4	2
1¼" (40 mm)	16.5	1/16"	8	12	6	4
1½" (50 mm)	18	¾"	12	18	6	4
2" (63 mm)	24	5/16"	24	36	8	6
2½" (75 mm)	26	1"	30	45	8	6
3" (90 mm)	29	1 1/8"	40	60	8	8
4" (125 mm)	40	1 9/16"	60	90	10	8

**Table 2-4: Socket fusion specifications as defined in DVS 2207-11:2017, ½" (20 mm) to 4" (125 mm)**

### Socket fusion using mechanically assisted machines

For socket fusion connections of 2" (63 mm) and larger, Uponor recommends the use of mechanically assisted fusion machines to aid the installer and provide faster, more precise connections. The primary types of socket fusion machines are jigs, portable machines and stationary bench tops.

#### Jigs and portable machines

Use jigs and portable machines for jobsite connections of 2" (63 mm) to 4" (125 mm) pipe and fittings. Along with a hand-iron and the appropriate-size adapters, portable socket fusion tools are ideal for overhead connections as well as vertical piping and branches.

**Figure 2-6** shows a socket fusion using a jig.



**Figure 2-6: Socket fusion using a jig**

#### Ovaling in machine-assisted fusions

Ovaling can occur when a mechanical-assist tool's clamps exert too much force on the socket fitting. Use caution when tightening the clamps. The clamps should be snug, but not so tight that they distort the fitting.

#### Stationary bench-top machines

Bench-top socket fusion machines connect 2" (63 mm) to 4" (125 mm) pipe and fittings. These machines assist the installer by holding the pipe and/or fitting in place, providing precise and consistent fusion joints. They also create a platform for prefabrication of smaller spools like offsets and expansion loops. **Figure 2-7** shows the McElroy SmartFab™ 125 tool in use.



**Figure 2-7: McElroy SmartFab™ 125**

## Saddle outlet fusion

One of the greatest benefits of PP-RCT piping is the ability to use saddle outlets in place of traditional tees. Saddle outlet fusions are created by welding a curved saddle outlet fitting to the pipe's sidewall, providing a branch connection for various needs, including pipe and gauges. Saddle outlets also produce less pressure loss than traditional reducing tees, resulting in better system performance.

Saddle outlets are available in ½" (20 mm) to 4" (125 mm) outlet sizes for up to 12" (315 mm) pipe in various transition types, including PP-RCT, ProPEX and NPT.

### Saddle outlet fusion – ½" (20 mm) to 4" (125 mm) outlet fittings

#### Required heating and fusion

**temperature:** 482°F (250°C) to 518°F (270°C)

Follow the steps below to fuse ½" (20 mm) to 4" (125 mm) Uponor PP-RCT pipe and socket fittings.

**Note:** Hand-held irons are ideal for pipe sizes up to 1½" (50 mm) while larger pipe sizes should use mechanically assisted machines.

1. **Clean** – Using a dry, lint-free cloth, clean the pipe and saddle outlet ends with 94% or greater isopropyl alcohol.
2. **Mark** the outlet location on the pipe.
3. **Drill** the outlet hole with the proper-sized bit for the outlet.
4. **Check alignment** of the saddle outlet to the pipe sidewall. Mark a reference line for ease of locating when fusing.

## 5. Heat

- Clean the heater adapters with a clean, dry, lint-free cloth. Do NOT use isopropyl alcohol on the heat plates.
  - Verify the heater temperature with a contact pyrometer to ensure it is within the range shown in **Table 2-4**.
  - Firmly seat the male end of the heater into the hole while simultaneously inserting the saddle outlet into the female end of the tool.
  - Once both are fully inserted, heat until a full bead appears on the pipe sidewall.
  - Do not twist!
6. **Fuse** – After the appropriate bead has been met, separate the pipe and fitting. Quickly inspect the melts and then connect the pieces.
  7. **Cool** – Let the assembly cool undisturbed for the required time shown in **Table 2-4**.
  8. **Inspect** – After cooling is complete, inspect the weld. Look for two distinct beads, free of any voids, gaps or debris.

**Note:** Use caution when torquing threaded fusion outlets. Be sure to hold the fusion outlet while applying torque and tightening a threaded adapter.



**Figure 2-8: Heating a saddle outlet**

## Butt fusion

Butt fusion, in its simplest form, is the process of joining two pipes (or pipe and fitting) of the same SDR together using heat and pressure. The machines used for butt fusion can be either manual or hydraulic, with the primary difference being how pressure is regulated (e.g., manual force vs. hydraulic). Butt fusion tools are typically designed for a specific pipe size range, so verify compatibility before performing fusions.

An important detail that needs to be taken into account when performing butt fusions is **drag**. Drag is defined as the forces acting in the opposite direction of the fusion process (e.g., friction between the pipe being fused and the pipe stands or supports). Therefore, pressure may need to be added to the fusion calculations to ensure adequate pressure is achieved.

## Definitions

**Machine pressure** – Minimum pressure required per machine to fuse material before accounting for drag.

**Drag pressure** – The minimum amount of force required to overcome the inertia of the material and machine carriage.

**Full fusion pressure** – Machine pressure plus drag pressure.

## Butt fusion checklist

1. Ensure the tool being used is appropriate for the pipe sizes to be fused.
2. Ensure adequate power is available for the tool. Inadequate power can result in cold fusions that will fail.
3. Verify the tool's inserts are compatible with the pipe and/or fittings to be fused.
4. Familiarize yourself with the tool, and ensure it is in proper working order before performing fusions.

Follow the steps below to fuse 6" (160 mm) to 12" (315 mm) Uponor PP-RCT pipe and/or fittings. Note that all butt fusion connections are made using mechanically assisted machines that use precise pressures for accurate connections.

## Butt fusion – 6" (160 mm) to 12" (315 mm) pipe

**Required heating and fusion temperature:** 392°F (200°C) to 428°F (220°C)

5. **Clean** – Using a dry, lint-free cloth, clean the pipe and fitting ends with 94% or greater isopropyl alcohol. Secure the pipes with the jaws, leaving approximately 1½" of the ends exposed for facing.
6. **Face** – Using a facer, face the ends of the pipe until the jaws reach the facer stops. Look for full ribbons of pipe material as a sign of complete facing.

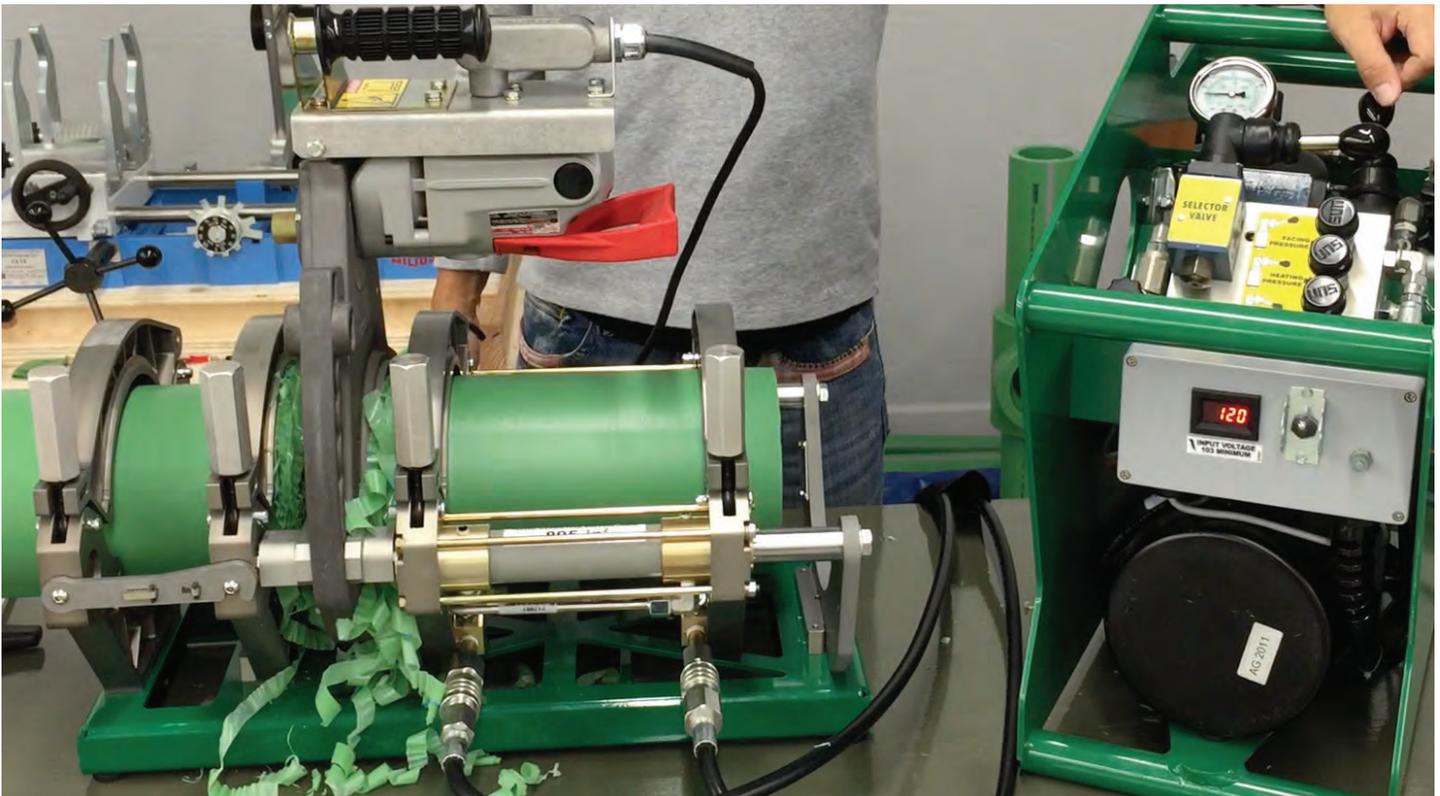
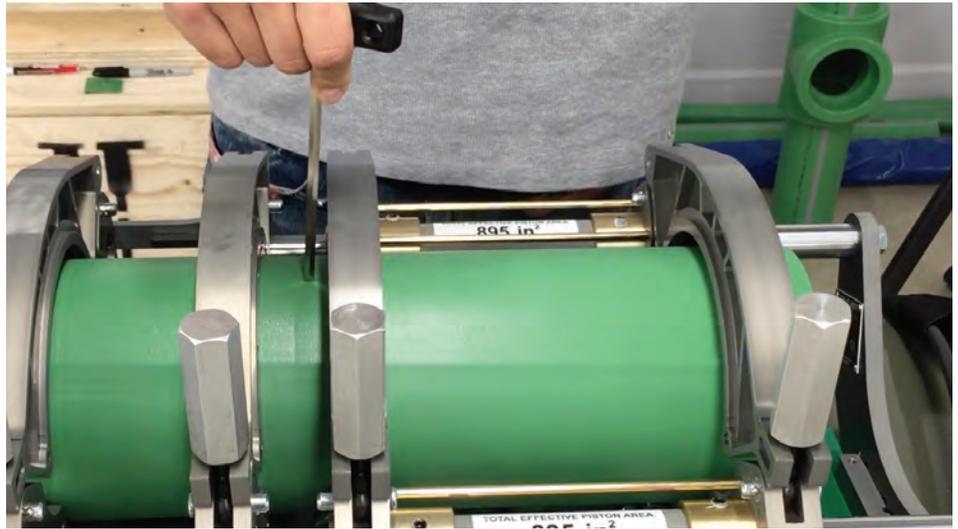


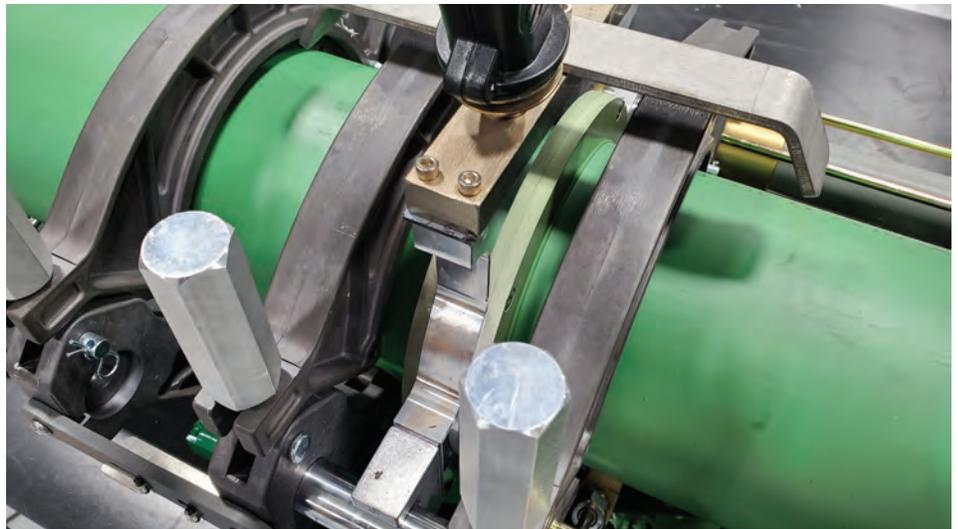
Figure 2-9: Facing PP-RCT pipe

7. **Align** – After facing, bring the pipe ends together to ensure proper alignment. There is a 10% allowance. If adjustment is required, the pipe may need to be refaced.
8. **Heat\*** – Clean the heat plates using a clean, dry, lint-free cloth. Do NOT use isopropyl alcohol to clean the heat plates. Once bead-up is met, switch to heating pressure and allow the pipes to heat soak for the required time shown in **Table 2-5**.
9. **Fuse\*** – After the heat time has been met, separate the pipes. Quickly inspect the melts and connect the pieces under fusion pressure.
10. **Cool** – Let the assembly cool for the required time per **Table 2-5**.
11. **Inspect** – After cooling is complete, inspect the weld. Look for one uniform bead, free of any voids, gaps or debris.

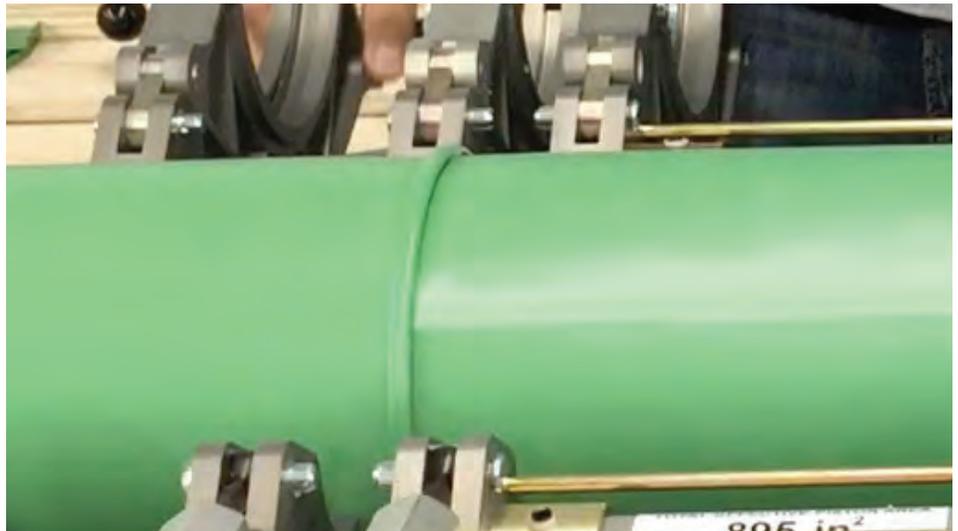
**\*Important!** Be sure to calculate drag pressure for every connection and add that to the theoretical fusion pressure.



**Figure 2-10: Checking pipe alignment**



**Figure 2-11: Butt fusion heat soak process**



**Figure 2-12: Inspecting the fused joint**

**Butt fusion specifications as defined in DVS 2207-11: 2017**

Pipe size	SDR	Bead size (mm)	Heat soak time (min:sec)	Heater removal time (sec)	Cooling times			
					Ambient below 60°F (mins)	Ambient 60°F-80°F (mins)	Ambient 80°F-105°F (mins)	Special conditions* (mins)
4" (125 mm)	9	1	2:34	0:07	11	14	18	9
	11	1	2:08	0:06	9	11	15	8
	17.6	1	1:22	0:06	6	8	10	5
6" (160 mm)	9	1	3:14	0:08	13	17	23	11
	11	1	2:41	0:07	11	14	19	9
	17.6	1	1:44	0:06	7	9	12	6
8" (200 mm)	9	1	3:56	0:09	16	21	28	28
	11	1.5	3:18	0:08	13	17	23	23
	17.6	1	2:08	0:06	9	11	18	15
10" (250 mm)	11	1.5	4:01	0:10	17	21	28	14
	17.6	1	2:37	0:07	11	14	18	9
12" (315 mm)	11	2	4:43	0:11	21	26	35	18
	17.6	1	3:15	0:08	13	17	23	11

\*Special conditions = no load on joint, properly supported for the full duration of the standard cooling time

**Table 2-5: Butt fusion specifications as defined in DVS 2207-11: 2017**

**Note:** For butt fusion specifications smaller than 4", please refer to DVS 2207-11: 2017 for applicable heat soak, cooling times, etc.

## Fusion tool recommendations

The tables in this section represent Uponor's recommendations for fusion tools, by pipe size, for the three most common PP-RCT fusion

tool manufacturers: McElroy, Ritmo, and Widos. Note that there may be additional tools produced by each tool manufacturer that are capable of fusing sizes not listed in

these tables. Contact each specific tool manufacturer with additional questions on tool/pipe size fusion compatibility.

### McElroy

Pipe size	Socket fusion*			Butt fusion*		Outlet fusion*	
	Socket kit	Socket assist	Socket fabrication	Butt fusion	Butt fusion / miters	Outlet (by outlet size)	Outlet assist (by outlet size)
½" - 20 mm	Small/large heater kit		SmartFab 125			Small/large heater kit	Hornet
¾" - 25 mm	Small/large heater kit		SmartFab 125			Small/large heater kit	Hornet
1" - 32 mm	Small/large heater kit		SmartFab 125			Small/large heater kit	Hornet
1¼" - 40 mm	Small/large heater kit		SmartFab 125			Small/large heater kit	Hornet
1½" - 50 mm	Small/large heater kit		SmartFab 125			Small/large heater kit	Hornet
2" - 63 mm	Small/large heater kit	Spider 125/ Polygon	SmartFab 125	Acrobat 160/250	Polygon	Small/large heater kit	Hornet/Hornet XL
2½" - 75 mm	Large heater kit	Spider 125/ Polygon	SmartFab 125	Acrobat 160/250	Polygon	Large heater kit	Hornet XL
3" - 90 mm	Large heater kit	Spider 125/ Polygon	SmartFab 125	Acrobat 160/250	Polygon	Large heater kit	Hornet XL
4" - 125 mm	Large heater kit	Spider 125/ Polygon	SmartFab 125	Acrobat 160/250	Polygon	Large heater kit	Hornet XL
6" - 160 mm				Acrobat 160/250	Polygon		Hornet XL
8" - 200 mm				Acrobat 250/315			
10" - 250 mm				Acrobat 250/315			
12" - 315 mm				Acrobat 315			
14" - 355 mm				Acrobat QuickFit			
16" - 400 mm				Acrobat QuickFit			
18" - 450 mm				Acrobat QuickFit			
20" - 500 mm				Acrobat QuickFit			
24" - 630 mm				Acrobat QuickFit			

**Table 2-6: McElroy tool recommendations**

\*Note that when multiple tools are listed, separated by a slash, the first tool is the primary recommendation. The second is also compatible, but not required.

\*Ensure that you have properly sized inserts for the pipe that you are using.

## Ritmo

Pipe size	Socket fusion*			Butt fusion*		Outlet fusion*	
	Socket kit	Socket assist	Socket fabrication	Butt fusion	Butt fusion / miters	Outlet (by outlet size)	Outlet assist (by outlet size)
½" - 20 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma jig with reducing jaws			<b>Small</b> /large heater kit	Prisma Up 90 (20MM-90MM)
¾" - 25 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma 125			<b>Small</b> /large heater kit	Prisma Up 90 (20MM-90MM)
1" - 32 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma 125			<b>Small</b> /large heater kit	Prisma Up 90 (20MM-90MM) or UP 125 (32MM-125MM)
1¼" - 40 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma 125			<b>Small</b> /large heater kit	
1½" - 50 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma 125			<b>Small</b> /large heater kit	
2" - 63 mm	<b>R-63 TFE Hand Held</b> /R125q TFE Hand Held	Prisma jig with reducing jaws	Prisma 125			<b>Small</b> /large heater kit	
2½" - 75 mm	R125q TFE Hand Held	Prisma jig – standard set up	Prisma 125			Large heater kit	
3" - 90 mm	R125q TFE Hand Held	Prisma jig – standard set up	Prisma 125	<b>Easy Life 160</b> / GAMMA 160	GAMMA 160 – Manual BF	Large heater kit	
4" - 125 mm	R125q TFE Hand Held	Prisma jig – standard set up	Prisma 125	<b>Easy Life 160</b> / GAMMA 160	GAMMA 160 – Manual BF	Large heater kit	UP 125 (32MM-125MM)
6" - 160 mm				<b>Easy Life 160</b> / GAMMA 160	GAMMA 160 – Manual BF		
8" - 200 mm				<b>Easy Life 200</b> /250/315			
10" - 250 mm				<b>Easy Life 250</b> /315			
12" - 315 mm				<b>Easy Life 315</b> /355			
14" - 355 mm				<b>Easy Life 355</b> /500			
16" - 400 mm				<b>Easy Life 500</b> /630			
18" - 450 mm				<b>Easy Life 500</b> /630			
20" - 500 mm				<b>Easy Life 500</b> /630			
24" - 630 mm				Easy Life 630			

**Table 2-7: Ritmo tool recommendations**

\*Note that when multiple tools are listed, separated by a slash, the first tool is the primary recommendation. The second is also compatible, but not required.

\*Ensure that you have properly sized inserts for the pipe that you are using.

## Widos

Pipe size	Socket fusion*			Butt fusion*		Outlet fusion*	
	Socket kit	Socket assist	Socket fabrication	Butt fusion	Butt fusion / miters	Outlet (by outlet size)	Outlet assist (by outlet size)
½" - 20 mm	Weld-it small/ large		W3511			Weld-it small/ large	
¾" - 25 mm	Weld-it small/ large		W3511			Weld-it small/ large	
1" - 32 mm	Weld-it small/ large		W3511			Weld-it small/ large	
1¼" - 40 mm	Weld-it small/ large		W3511			Weld-it small/ large	
1½" - 50 mm	Weld-it small/ large		W3511			Weld-it small/ large	
2" - 63 mm	Weld-it small/ large	Socket jig	W3511			Weld-it small/ large	
2½" - 75 mm	Weld-it large	Socket jig	W3511			Weld-it large	
3" - 90 mm	Weld-it large	Socket jig	W3511			Weld-it large	
4" - 125 mm	Weld-it large	Socket jig	W3511	4400/4600	Maxiplast	Weld-it large	
6" - 160 mm				4400/4600	Maxiplast		
8" - 200 mm				4600/4900			
10" - 250 mm				4600/4900			
12" - 315 mm				4900/5100			
14" - 355 mm				5100/5500			
16" - 400 mm				5100/5500			
18" - 450 mm				5100/5500			
20" - 500 mm				5500/6100			
24" - 630 mm				6100			

**Table 2-8: Widos tool recommendations**

\*Note that when multiple tools are listed, separated by a slash, the first tool is the primary recommendation. The second is also compatible, but not required.

\*Ensure that you have properly sized inserts for the pipe that you are using.

## Shipping, storage, and handling

### Shipping

It is the customer's responsibility to verify the product against the packing slip and visually inspect it for damage. Document and report any variations in the shipment or any damaged product.

### Storage

PP-RCT pipe is shipped in 13-ft. and 19-ft. straight lengths packaged in plastic bags to protect from UV exposure and debris. Uponor recommends keeping the pipes in their protective packaging until ready for use.

Store pipe on a flat surface. If storing on racks, ensure a minimum of four evenly spaced supports. Uponor recommends placing plywood or a similar form of backing across the supports to prevent the pipe from deforming. Maximum stacking height for the pipe is 3 ft.

Uponor recommends storing PP-RCT pipe indoors. Avoid storage in areas where solvents, paints, glues or similar products are kept.

If stored outside for an extended period, keep the pipes in their UV-resistant bags and place them in a shaded area. If storing outside with a cover, use a light-colored tarp as darker colors can cause heat damage. If pipes are exposed to UV radiation for more than 30 days, it will void the warranty.

### Handling

Refer to the following guidelines to ensure proper pipe handling.

1. Protect the ends of the pipe. Dropping them on a hard surface or stepping on them can cause micro-fractures in the pipe wall.
2. If the pipe is dropped or crushed, check it for damage. Identify, mark and eliminate any damaged pipe. Damage may not be visible so better to discard potentially damaged pipe.
3. Cold weather makes the pipe less flexible and more susceptible to impact damage. Use caution when handling in cold temperatures. Uponor does not recommend handling PP-RCT products in temperatures below  $-5^{\circ}\text{F}$  ( $-20.5^{\circ}\text{C}$ ).
4. Use caution when using a forklift to move the pipe. Do not drape the pipe over the fork. Instead, place the pipe on a pallet for support and then transport. Do not insert the forks into the end of the pipe.
5. When shipping, load on a flat or supported surface and only strap in supported areas to prevent pipe deformation.
6. Keep the fittings in their original bags for ease of identification.

## Chapter 3:

# Fire-resistive construction

### Overview

PP-RCT pipes will burn, but are not classified as flammable. The NFPA classifies these products as a 1 (slow burning) on a scale of 0 to 4, with 4 being the quickest to burn. When burning, these pipes emit CO<sub>2</sub> and H<sub>2</sub>O vapor. In an underdeveloped combustion situation, small amounts of CO can be emitted, just as it is from wood or wood-based products.

### Return-air plenums

Uponor PP-RCT, when installed with approved rated insulation, complies with code requirements for combustibles installed within ducts or plenums. Uponor's listing can be found at [uponor.com](http://uponor.com) under the listing QAI P321-5. This listing certifies that Uponor PP-RCT pipe and accessories up to 12" nominal diameter, when installed with approved rated ½" pipe insulation, does not exceed a

maximum flame spread index (FSI) of 25 and a maximum smoke-developed index (SDI) of 50 when tested in accordance with ASTM E84. Always be sure to review project and local code requirements before beginning installation.

### Fire-rated assemblies and penetrations

For projects requiring Uponor PP-RCT to penetrate through or run within fire-rated assemblies, take care to use the appropriate approved materials.

Uponor PP-RCT is tested and listed to ASTM E814/UL 1479 and CAN/ULC S115 for use with HILTI firestop systems. For complete details, visit the UL website for the [ASTM E814/UL 1479](#) and [CAN/ULC S115](#) listings for Uponor PP-RCT.

If encountering a special requirement, contact Uponor Technical Services at 888.594.7726.

### Future testing and approvals

Uponor will continue to work with the major firestop manufacturers, as well as third-party testing agencies, to conduct and obtain listings specific to Uponor PP-RCT products.



Figure 3-1: Ceiling penetration



## Chapter 4: System design

### Thermal conductivity

The thermal conductivity of PP-RCT piping is 1.67 Btu-in/(hr-ft<sup>2</sup>-°F). This low conductivity value, combined with the thickness of the pipe and fitting wall, act as a natural insulator. Traditional metal piping systems have much higher thermal conductivity values. Under normal operating conditions, non-insulated PP-RCT pipes have less heat loss or gain and greater resistance to condensation compared to metal and other types of plastic piping systems.

One of the objectives of energy and building codes is to improve operating efficiencies through piping insulation recommendations. Because Uponor PP-RCT piping systems have much lower heat losses and heat gains than traditional metal systems, they are capable of operating at an equal or, in most cases, more efficient levels than other metal systems under the same code. Using Uponor PP-RCT piping systems has the potential to save both space and materials. For piping insulation details, refer to **Chapter 5**.

### Fittings

Sizes: ½" to 12" (20 mm to 315 mm)  
Color: Molded – green  
Fabricated – green with markers

Uponor PP-RCT piping systems are compatible with and connect easily to other piping systems and equipment. For these applications, Uponor offers injection-molded fittings, transition fittings and fabricated fittings.

### Injection-molded fittings

Uponor PP-RCT injection-molded fittings feature a heavy wall and offer a greater safety factor to allow pressure ratings even higher than the pipe itself, making them the strongest part of the piping system. This design significantly reduces heat transfer and may eliminate the need for insulation in certain applications (always follow local code).

### Transition fittings

Uponor transition fittings for PP-RCT systems are made of injection-molded PP-RCT and are available in sizes up to 2" with integrated brass inserts (threads, nipples, stubs). The inserts are available in both brass and lead-free (LF) brass. Flange adapters and back-up rings are also available in pipe sizes as small as ½" (50 mm).

### Fabricated fittings

Fabricated fittings are designed for 6" (160 mm) pipe sizes and larger. These fittings are specific to the application and type of pipe. The engineer and installer must match the fitting, end-use application, pipe size and wall thickness of the fitting to the pipe in the application.

### Piping overview

Although all Uponor PP-RCT pipes are metric, Uponor has assigned imperial pipe-size equivalents for compatibility with the North American market. When designing Uponor PP-RCT systems, it is important to understand standard dimension ratio (SDR) values and keep in mind that these pipes are produced in metric sizes.

Nominal pipe diameter (imperial)	Manufactured outside diameter (metric)
½"	20 mm
¾"	25 mm
1"	32 mm
1¼"	40 mm
1½"	50 mm
2"	63 mm
2½"	75 mm
3"	90 mm
4"	125 mm
6"	160 mm
8"	200 mm
10"	250 mm
12"	315 mm

**Table 4-1: Nominal imperial and metric pipe conversions**



**Figure 4-1: PP-RCT NPT adapters**

## Standard dimension ratio (SDR)

Standard dimension ratio is defined as the outside diameter of a pipe divided by the pipe's wall thickness.

The SDR of the pipe is important as it is used as a design parameter of the pipe. The lower the SDR number, the thicker the pipe wall. A thicker wall increases the pipe's ability to hold pressure. A thinner pipe wall increases the amount of flow through the pipe.

## Mechanical pipe

### Sizes and identification:

- ½" to ¾" (20 mm to 25 mm)  
SDR 7.4 green with gray stripes  
(packaged in blue bags)
- 1" to 12" (32 mm to 315 mm)  
SDR 9 green with gray stripes  
(packaged in blue bags)
- 1" to 12" (32 mm to 315 mm)  
SDR 11 solid green  
(packaged in blue bags)
- 4" to 12" (125 mm to 315 mm)  
SDR 17.6 solid green  
(packaged in gray bags)

**Material:** PP-RCT/fiber composite/  
PP-RCT

Uponor PP-RCT mechanical pipes feature a unique middle fiber layer technology to control linear expansion and contraction. The middle layer is made of oriented fibers encapsulated in PP-RCT resin.

When this special fiber-composite layer is co-extruded, the outer and inner layers of PP-RCT remain unaltered. When exposed to heat, the fibers prevent the PP-RCT material from expanding in a linear direction. Therefore, the overall expansion and contraction of the pipe is reduced by 75% to 80% compared to non-fiber plastic pipes.

The fiber layer improves the pipe's properties when exposed to higher heat and, as a result, requires less support compared to other plastic piping systems.

Uponor's composite pipes do not require any additional expansion control when compared to traditional metal piping systems. Furthermore, the pipe absorbs its own stresses and does not require thrust blocking.

**Applications:** Use Uponor PP-RCT mechanical pipe in pressure applications with temperatures up to 180°F (82.2°C). The pipe is appropriate for use in heating and cooling systems, compressed air and vacuum, industrial, geothermal and transportation of a variety of chemicals.\*

\*For information about PP-RCT chemical compatibility, contact Uponor Technical Services at 888.594.7726.

**Note:** For temperatures and conditions other than those stated in **Table 4-2**, submit a special application inquiry to Uponor Technical Services

**Note:** When using synthetic oils in the compressor, install filters to prevent oil from leaking into the system.

**Note:** Uponor PP-RCT mechanical pipe is not rated for transporting drinking water or for use in food-processing applications. For more information on food-processing applications, please contact Uponor Technical Services at 888.594.7726.

## Potable pipe

Because Uponor PP-RCT pipes are made of hydrophobic material, they do not react with water and most other fluids.\* Furthermore, the pipe is stabilized to resist the effects of chlorine in the potable water. Uponor PP-RCT pipes have been tested in the most prestigious laboratories and certified by the world's elite third-party compliance agencies as having **Class 3** chlorine resistance. It is also tested and certified to NSF/ANSI 61 and NSF/ANSI 51, confirming its suitability for use in drinking water and food-grade applications.

From extrusion to installation and throughout the entire service life, Uponor PP-RCT pipes help conserve energy. It takes less energy to extrude PP-RCT than to make metal pipes, the low coefficient of friction and

resistance to scaling means lower pumping costs, and the natural insulating features of the pipe mean less heat loss or gain.

## Cold potable pipe

### Sizes:

½" to ¾" (20 mm to 25 mm) = SDR 7.4  
1" to 8" (32 mm to 200 mm) = SDR 11

**Identification:** Green with blue stripes

**Material:** PP-RCT

**Applications:** Use Uponor PP-RCT cold potable pipe for cold potable water applications. The pipe is also appropriate for other lower-pressure and lower-temperature applications.

## Hot potable pipe

### Sizes:

½" to ¾" (20 mm to 25 mm) = SDR 7.4  
1" to 8" (32 mm to 200 mm) = SDR 9

**Identification:** Green with red stripes

**Material:** PP-RCT/fiber composite/  
PP-RCT

**Applications:** Use Uponor PP-RCT hot potable pipe for hot potable water applications. The fiber layer coextruded into the mid-wall of the pipe to reduce expansion/contraction with temperature changes also makes the pipe acceptable for use in hydronic heating and cooling applications.

\*For information about PP-RCT chemical compatibility, contact Uponor Technical Services at 888.594.7726.

## Operating temperature and pressure for mechanical and cold potable piping

**Note:** Determine the permissible system pressures for water based on the constant operating temperatures and the desired service life.

The following values are derived from an extrapolation method and are based on the conveyance of water at a constant temperature and pressure.

**Table 4-2** shows the hydrostatic temperature and pressure ratings of the pipes using a design factor of 1.5 per ASTM F2389.

In the case of short-term increases in temperature and/or pressure, Uponor assumes no responsibility.

Hydrostatic temperature and pressure ratings for Uponor PP-RCT				
Temperature (°F)	SDR 7.4	SDR 9	SDR 11	SDR 17.6
	Pressure (psi)			
73	340	265	215	130
140	190	150	120	70
180 <sup>1</sup>	100 <sup>2</sup>	100	80 <sup>3</sup>	50 <sup>3</sup>

**Table 4-2: Hydrostatic temperature and pressure ratings for Uponor PP-RCT**

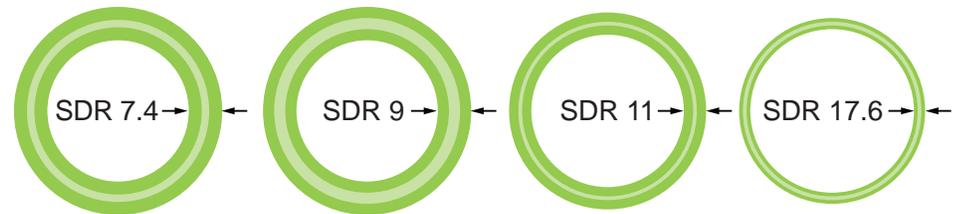
<sup>1</sup> ASTM F2389 requires the pressure rating at 180°F to be calculated based on an application class 5 from ISO 15874-2, hence pressure derived for >158°F results in less than 50 years' service life.

<sup>2</sup> ASTM F2389 limits pressure to 100 psi at 180°F. Actual pressure rating is 130 psi.

<sup>3</sup> SDR 11 and 17.6 products are not typically used or rated at 180°F.

**Note:** For systems with operating temperatures outside the scope of this table, please contact Uponor Technical Services at 888.594.7726.

**Note:** Temperature and pressure ratings in **Table 4-2** are hydrostatic ratings, which are independent of application ratings. For domestic hot-water (DHW) and DHW recirculation installations, operating conditions should not exceed 140°F (60°C) at 80 psi (5.5 bar). Refer to the section below for further details on hot potable piping in DHW systems.



**Figure 4-2: SDR = d/s, where d = pipe outside diameter, s = pipe wall thickness**

**Note:** **Table 4-2** shows pressures for water applications only. When transporting chemicals, it is important to consider the effects that pressure and temperature have on the pipe. For conveyance of chemicals or compressed air, contact Uponor Technical Services at 888.594.7726.

## Operating temperature, pressure, and velocity for hot potable piping

Uponor PP-RCT hot potable pipe is approved for use in domestic hot-water (DHW) systems with a maximum temperature of 140°F (60°C) at 80 psi (5.5 bar) and a velocity of 8 fps [2.4 meters per second (m/s)].

For DHW recirculation (DHW-R) systems, Uponor PP-RCT hot potable pipe is approved for use at a maximum temperature of 140°F (60°C) at 80 psi (5.5 bar) and a velocity of 2 fps (0.6 m/s).

### System velocity

Uponor recommends and promotes a complete polymer solution using PP-RCT and PEX-a products. When installing metallic materials in conjunction with Uponor PP-RCT, use proper velocity design limits for the respective material.

### DHW-R systems

Uponor PP-RCT hot potable pipe has been tested to and meets the requirements to achieve a chlorine rating of CL-TD, as per ASTM F2389. Uponor has also performed additional testing to evaluate chlorine resistance as per ASTM F2023.

Test results show Uponor PP-RCT meets the "Class 3" rating. Based on this data, Uponor approves PP-RCT for use in DHW-R line applications for temperatures up to 140°F (60°C) for 50% of the time, or 12 hours per day.

### Combined-use systems

Uponor does not recommend using PP-RCT in combined-use systems unless the return lines are sized for DHW-R limits of 2 fps. A combined-use system is defined as when the plumbing system is designed entirely for potable use (lead free, etc.) and is piped in combination with the heating

system, where all heating components meet the requirements of a plumbing system.

### Mixed PP-RCT and copper systems

When possible, replace all copper piping in a system with Uponor PP-RCT. If limited copper piping remains as part of the system, strictly follow the rules and guidelines of the Copper Development Association (CDA Publication A4015-14/16: Copper Tube Handbook) regarding flow rates and water conditions.

Also, ensure the operating conditions do not cause degradation, erosion, or corrosion of the copper. Test the level of copper in the water and ensure the copper levels do not exceed 0.1 ppm (mg/L). Higher levels indicate erosion/corrosion of the copper pipe due to system and/or water conditions.

Note that high levels of copper in a piping system with Uponor PP-RCT

will void the warranty. However, small amounts of copper or brass in valves or other equipment will typically not cause an issue.

### Velocity in mixed PP-RCT and copper systems

In DHW systems with both Uponor PP-RCT and copper, strictly follow the rules and guidelines of the Copper

Development Association (CDA Publication A4015-14/16: Copper Tube Handbook). Do not exceed 5 fps (1.5 m/s). In DHW-R systems with both PP-RCT and copper piping, do not exceed 1.5 fps (0.5 m/s).

### Copper concentrations with unknown velocity

For re-pipe applications where Uponor PP-RCT is replacing and connecting

to copper lines and the design or actual system velocity is unknown, copper concentrations found in the water stream should not exceed 0.1 parts per million (ppm) during annual maintenance and water sampling.

## Pipe sizing

### Mechanical and cold potable pipe sizing by flow rate

Uponor PP-RCT mechanical and cold potable pipes are designed for velocities at 8 fps. The pipe diameter and wall thickness determine the flow rate shown in gallons per minute (gpm). Refer to **Table 4-3** for approximate flow rates based on 8 fps.

### Hot potable pipe sizing by flow rate

Ensure the correct pipe size for the DHW and/or DHW-R application. Refer to the Uponor Online Pipe Sizing Calculator at [uponor.com/calculator](http://uponor.com/calculator) for details.

**DHW** – If the design requires booster pumps to increase system pressure, ensure the delivered pressure does not exceed 80 psi (5.5 bar). If higher pressures are necessary, implement pressure zones or contact Uponor Construction Services at [design.services@uponor.com](mailto:design.services@uponor.com) for recommendations.

**DHW-R** – Ensure proper sizing of pumps for the 2 fps limit stated above for DHW-R lines. Uponor recommends installing balancing valves to ensure the velocity limit is not exceeded. Balancing valves also help reduce energy consumption and increase service life.

### Determining pipe size by head loss

After determining the required pipe sizes, calculate the pressure drop of the system and size up the pump. When calculating for pressure loss, the recommended safety factor is 20%, taking into account the age of the pipe and quality of workmanship.

Flow rates for PP-RCT mechanical and cold potable pipe based on flow velocity of 8 fps					
Dimension		SDR 7.4	SDR 9	SDR 11	SDR 17.6
N.D.	O.D.				
½"	20 mm	6.20			
¾"	25 mm	9.68			
1"	32 mm				
1¼"	40 mm		18.38	20.51	
1½"	50 mm		28.71	31.76	
2"	63 mm		44.98	49.74	
2½"	75 mm		71.16	78.94	
3"	90 mm		101.21	112.65	
4"	125 mm		145.58	161.86	
6"	160 mm		281.14	312.09	366.83
8"	200 mm		460.90	512.00	600.80
10"	250 mm		719.73	801.70	938.23
12"	315 mm		1,126.90	1,248.40	1,467.32
			1,793.56	1,982.80	2,329.24

**Table 4-3: Flow rates for PP-RCT mechanical and cold potable pipes at 8 fps**

The Hazen-Williams formula is designed for water systems and may be used to calculate pressure loss, the conversion of pressure loss to head loss and the calculation of flow velocity.

$$P_L = \frac{452}{d_i^{4.87}} \cdot \left( \frac{Q}{C} \right)^{1.85}$$

Consult Uponor Technical Services if designing a system using fluids other than water.

Where:

$P_L$  = Pressure loss, psi/100 ft. of pipe

$Q$  = Flow rate (gpm)

$d_i$  = Inside diameter of pipe, inches

$C$  = Flow coefficient = 150 for PP-RCT piping

### Conversion from pressure loss to head loss (ft. of head loss per 100 ft. of pipe)

Where  $H_L$  = Head loss, ft./100 ft. of pipe

$$H_L = 2.31 \cdot P_L$$

### Calculation of flow velocity

Where  $v$  = Flow velocity, ft./sec

$$V = 0.4084 \cdot \left( \frac{Q}{d_i^2} \right)$$

## Chapter 5:

# Installation and pressure testing

### Pipe support

When selecting pipe support, it is important to choose products which have been proven safe for use in the given application.

**Note:** Uponor recommends using rubber or felt-lined clamps and supports for all hot-water and cold-water piping.

**Note:** Uponor recommends using metric clamps. If metric clamps are unavailable, refer to **Table 5-1** for the actual inch and millimeter pipe sizing for guidance on choosing the proper clamp size.

### Clamp and hanger sizing

**Table 5-1** provides nominal and actual pipe sizes for Uponor PP-RCT to provide guidance when purchasing hangers and clamps. If insulating the pipe, consider the pipe's total diameter including insulation.

**Note:** Uponor's warranty does not cover damage caused by hangers or clamps.

Nominal Size		Actual (Inch)		Actual (Metric)	
Inch	Metric	Min.	Max.	Min.	Max.
½	20	0.787	0.799	20	20.3
¾	25	0.984	0.996	25	25.3
1	32	1.26	1.272	32	32.3
1¼	40	1.575	1.591	40	40.4
1½	50	1.969	1.988	50	50.5
2	63	2.48	2.504	63	63.6
2½	75	2.953	2.98	75	75.7
3	90	3.543	3.579	90	90.9
4	125	4.921	4.969	125	126.2
6	160	6.299	6.358	160	161.5
8	200	7.874	7.945	200	201.8
10	250	9.842	9.941	250	252.5
12	315	12.401	12.5	315	317.5

**Table 5-1: Nominal vs. actual pipe sizes**



**Figure 5-1: Making overhead PP-RCT connections**



**Figure 5-2: Supporting Uponor PP-RCT piping**

### Support spacing for PP-RCT mechanical and hot potable pipe

General rules apply to the positioning of pipe support for both fixed and sliding points. Maximum support spacing depends on the pipe's outside diameter and anticipated temperature difference between ambient and operating temperature of the fluid. Refer to the table below for maximum recommended support spacing for Uponor PP-RCT mechanical and hot potable pipe.

### Support interval for Uponor PP-RCT mechanical and hot potable pipe

Nominal pipe size <sup>1</sup>	Maximum horizontal support spacing <sup>2</sup>	Maximum vertical support spacing
1½" (50 mm) and smaller	6 feet (1.8 m)	5 feet (1.5 m)
2" (63 mm) to 3" (90 mm)	8 feet (2.4 m)	10 feet (3 m)
4" (125 mm) and larger	10 feet (3 m)	

**Notes:**

<sup>1</sup>Applies to all SDRs (7.4, 9, 11, and 17.6).

<sup>2</sup>Applies to systems with Delta Ts ( $\Delta T$ ) up to 100°F. For systems outside of that range, contact Uponor Technical Services.

**Table 5-2: Support interval for Uponor PP-RCT mechanical and hot potable pipe**

### Support spacing for PP-RCT cold potable pipe

**Note:** This is for cold-water applications with the ambient temperatures below 85°F (29.4°C).

Outside pipe diameter N.D. and O.D.												
½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm
Maximum support spacing – distance in feet												
4	4	4	4	4	4.5	5	5	6.5	7	7.5	8	8.5

**Table 5-3: Support spacing for PP-RCT cold potable pipe**

### Linear expansion and contraction

Linear expansion and contraction is an important factor when designing a piping system. It is the responsibility of the engineer or designer to dictate the allowable amount of linear growth over a set distance. Pipe expansion and contraction is based on the difference between ambient temperature and the maximum temperature of the fluid in the pipe.

$$\Delta T = T \text{ operating temperature} - T \text{ installation temperature}$$

When transporting cold fluids, the  $\Delta T$  value is minimal and the contraction of the pipe caused by the cold fluid will have no impact on the fused connections.

Piping systems transporting hot fluids, however, typically experience a greater  $\Delta T$  value. Therefore, the system may require compensating devices, such as expansion loops and sliding elbows, to prevent pipe deformation. It is suggested that for high  $\Delta T$  systems, the PP-RCT pipe should be guided at the standard support points, with an expansion compensator added mid-run to compensate for the movement. The size of the expansion compensator depends on the  $\Delta T$  and length of run. See **Table 5-3** for detailed information on linear expansion of Uponor PP-RCT mechanical and hot potable pipe. These pipes feature a fiber composite layer to help minimize linear expansion and contraction.

### Linear expansion of Uponor PP-RCT mechanical and hot potable pipe with fiber layer

Uponor PP-RCT mechanical and hot potable pipe with fiber composite has a high level of stability. The linear expansion decreases to almost one-fifth the value of non-fiber composite PP-RCT pipes.

Linear expansion  $\Delta L$  (inches)

Uponor pipes with fiber  $-\alpha = 0.035 \text{ mm/mK} = 2.367 \times 10^{-4} \text{ in./ft. } ^\circ\text{F}$

### Linear expansion of Uponor PP-RCT mechanical and hot potable pipe with fiber layer

Pipe length (ft.)	Difference in temperature $\Delta T$ ( $^\circ\text{F}$ )							
	10	20	30	40	50	60	80	100
	Linear expansion $\Delta L$ (in)							
10	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
20	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5
30	0.1	0.1	0.2	0.3	0.3	0.4	0.6	0.7
40	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.9
50	0.1	0.2	0.3	0.5	0.6	0.7	0.9	1.2
60	0.1	0.3	0.4	0.6	0.7	0.8	1.1	1.4
70	0.2	0.3	0.5	0.7	0.8	1.0	1.3	1.6
80	0.2	0.4	0.6	0.7	0.9	1.1	1.5	1.9
90	0.2	0.4	0.6	0.8	1.0	1.3	1.7	2.1
100	0.2	0.5	0.7	0.9	1.2	1.4	1.9	2.3
150	0.3	0.7	1.0	1.4	1.7	2.1	2.8	3.5
200	0.5	0.9	1.4	1.9	2.3	2.8	3.7	4.7

**Table 5-4: Linear expansion of Uponor PP-RCT mechanical and hot potable pipe with fiber layer**

#### Pipe movement

Based on the application and environment, calculate the pipe's linear expansion and contraction and select the proper pipe supports to compensate for the movement.

In concealed installations, allow enough additional pipe to compensate for expansion and contraction. In open installations, use expansion or sliding elbows to enhance the visual uniformity of the system.

#### Open-pipe and transitions through pipe duct installations

Both open-pipe installations and installations through pipe ducts use point supports for supporting the pipe. There are two types of point supports – fixed and sliding. Fixed points allow the pipe to move to or from the fixed point. Sliding points allow pipe movement and expansion through the support without damaging the pipe. It is important to control linear expansion at one point via branch lines or expansion loops.

**Accommodating pipe expansion with directional changes**



**Figure 5-3: Expansion with directional changes**

Calculate linear expansion with directional changes using the formula below:

$$LBS = K \times \sqrt{d \times \Delta l}$$

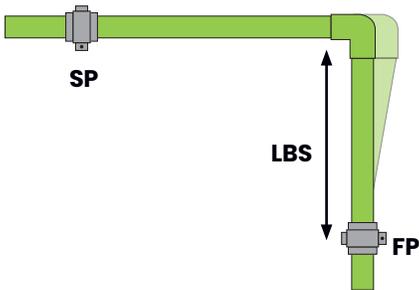
Where

**LBS** is the length of bending side in inches

**K** is material-specific dimensionless constant (constant of Uponor PP-RCT pipes is 2.98)

**d** is outside pipe diameter in millimeters

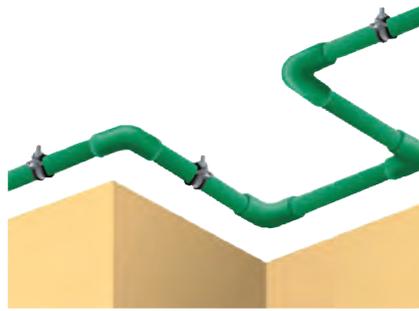
**Δl** is previously estimated longitudinal pipe expansion in inches



**Figure 5-4: Linear expansion with directional changes**

The figure above shows correct accommodation of linear expansion with directional changes (SP stands for sliding point, FP for fixed point and LBS is necessary length of bending side).

**Note:** Install branch lines at 90° angles as shown in **Figure 5-4**.



**Figure 5-5: Using expansion loops**

Install expansion loops when linear expansion cannot be controlled through directional changes in the piping system. Use four 90° elbows and refer to the following formula for the necessary expansion-loop parameters.

$$LBS = K \times \sqrt{d \times \frac{\Delta l}{2}}$$

Where

**LBS** is the length of bending side in inches

**K** is material-specific dimensionless constant (Uponor PP-RCT pipes constant is 2.98)

**d** is outside pipe diameter in millimeters

**Δl** is previously estimated longitudinal pipe expansion in inches

It is also important to estimate the expansion loop width ( $A_{min}$ ) using the following equation:

$$A_{min} = 2 \times \Delta l + SA$$

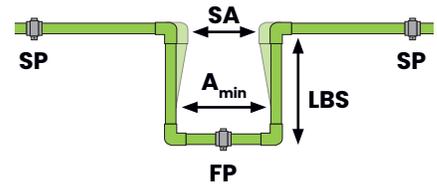
Where

**A<sub>min</sub>** is the width of expansion loop in inches

**Δl** is previously estimated longitudinal pipe expansion in inches

**SA** is a safety distance of 6" (152.44 mm)

**Note:** Install a compensating branch line at 90° angles as shown in **Figure 5-6**.



**Figure 5-6: Expansion loops**

Correct accommodation of linear expansion with expansion loops (SP stands for sliding point, FP for fixed point, LBS is necessary length of bending side,  $A_{min}$  is the width of the pipe bow and SA is safety distance).

Pipe dimension N.D. to O.D.		Linear expansion (inches)											
		1	2	3	4	5	6	7	8	9	10	11	12
		Minimum length of bending side (inches)											
½"	20 mm	13	19	23	27	30	33	35	38	40	42	44	46
¾"	25 mm	15	21	26	30	34	37	40	42	45	47	50	52
1"	32 mm	17	24	29	34	38	42	45	48	51	54	56	59
1¼"	40 mm	19	27	33	38	42	46	50	54	57	60	63	66
1½"	50 mm	21	30	37	42	47	52	56	60	64	67	70	73
2"	63 mm	24	34	41	48	53	58	63	67	71	75	79	82
2½"	75 mm	26	37	45	52	58	64	69	73	78	82	86	90
3"	90 mm	28	40	49	57	64	70	75	80	85	90	94	99
4"	125 mm	34	47	58	67	70	82	89	95	101	106	111	116
6"	160 mm	38	54	66	76	85	93	100	107	114	120	126	131
8"	200 mm	42	60	73	85	95	104	112	120	127	134	141	147
10"	250 mm	47	67	82	95	106	116	125	134	142	150	157	164
12"	315 mm	53	75	92	106	119	130	141	151	160	168	177	184

**Table 5-5: Minimum length of bending side in expansion arms/directional changes**

Pipe dimension N.D. to O.D.		Linear expansion (inches)											
		1	2	3	4	5	6	7	8	9	10	11	12
		Minimum length of bending side (inches)											
½"	20 mm	9	13	16	19	21	23	25	27	28	30	31	33
¾"	25 mm	11	15	18	21	24	26	28	30	32	34	35	37
1"	32 mm	12	17	21	24	27	29	32	34	36	38	40	42
1¼"	40 mm	13	19	23	27	30	33	35	38	40	42	44	46
1½"	50 mm	15	21	26	30	34	37	40	42	45	47	50	52

**Table 5-6: Minimum length of bending side for expansion loops**

### Vertical installation

Uponor recommends supporting vertical PP-RCT piping:

- At the base and at each floor penetration
- Every 5 ft. for 2" (63 mm) and smaller pipe

Supports shall be free of sharp edges and sized appropriately. Uponor requires lined clamps or supports for all hot-water piping. If using unlined clamps and/or supports for cold-water piping, ensure the clamps and supports are free of sharp edges.



**Figure 5-8: Vertical piping**

## Insulation

Piping insulation is often necessary to prevent condensation and heat loss. Using Uponor PP-RCT pipe with its relatively low thermal transmission coefficient can significantly improve energy savings compared to traditional metal piping. Refer to the tables below for recommendations on minimum required pipe insulation.

**ASHRAE 189.1-2010 C11**

Fluid operating temperature range and usage (°F)	Insulation conductivity (Btu · in./ (h · ft <sup>2</sup> · °F))	Nominal pipe or tube size				
		<1	1 to <1½	1½ to <4	4 to <8	≥8
141 to 200	0.25 to 0.29	1.5	1.5	1.5	2.0	2.0
105 to 140	0.22 to 0.28	1.0	1.0	1.5	1.5	1.5
40 to 60	0.22 to 0.28	1.0	1.0	1.5	1.5	1.5

**Table 5-7: ASHRAE 189.1-2010 C11 pipe insulation recommendations**

### Heat gain and loss calculations

Uponor PP-RCT pipe has a low thermal conductivity (k)\* value, especially when compared to metal piping. Metals are considered to be conductors of heat, which results in the loss of energy, lower system efficiencies and increased costs. The following are comparisons of the thermal conductivity (K factors) expressed in Btu·in/(hr·ft<sup>2</sup>·°F):

$$k_{PP-RCT} = 0.139 \text{ at } 68^{\circ}\text{F}$$

$$k_{copper} = 227 \text{ at } 75^{\circ}\text{F}$$

$$k_{steel} = 31 \text{ at } 75^{\circ}\text{F}$$

\*The thermal conductivity (K factor) of a material is based on the number of BTUs per hour which passes through a 1" thick by 1 sq. ft. section of material, with a 1°F temperature difference between the two surfaces. Materials with a lower K-factor are better insulators.

The R-value is the capacity of an insulating material to resist heat flow. The higher the R-value, the greater the insulating power.

Heat loss or gain characteristics can also be expressed through R-value, which has a direct relationship with the

$$R - \text{value} = \frac{\text{Equivalent thickness (inches)}}{k - \text{factor} \left( \frac{\text{Btu} \cdot \text{inch}}{\text{hr} \cdot \text{ft}^2 \cdot ^{\circ}\text{F}} \right)}$$

K-values, as shown in the following equations:

$$\text{Equivalent thickness} = r_2 \times \ln \left( \frac{r_2}{r_1} \right)$$

Where  $r_1$  = inner radius and  $r_2$  = outer radius

### Insulation thickness calculations

For applications not covered in the ASHRAE and IECC tables, refer to the following formulas to determine thermal resistance values and heat/loss gain:

$$k_{ins} = 0.0208333 \text{ (for typical .25" up to 1" closed cell foam insulation)}$$

$$k_{ins} = 0.02375 \text{ (for typical 1.50 up to 2" closed cell foam insulation)}$$

$$\Delta T = 50^{\circ}\text{F} \text{ (typical temperature difference between hot water and room temperature)}$$

**IECC 2018-C403.11.3**

Fluid operating temperature range and usage (°F)	Insulation conductivity (Btu · in./ (h · ft <sup>2</sup> · °F))	Nominal pipe or tube size				
		<1	1 to <1½	1½ to <4	4 to <8	≥8
141 to 200	0.25 to 0.29	1.5	1.5	2.0	2.0	2.0
105 to 140	0.21 to 0.28	1.0	1.0	1.5	1.5	1.5
40 to 60	0.21 to 0.27	0.5	0.5	1.0	1.0	1.0

**Table 5-8: IECC 2018-C403.11.3 pipe insulation recommendations**

### Heat transfer coefficients [Btu·in/(hr·ft<sup>2</sup>·°F)]

The heat transfer coefficients are affected by factors including average temperature, pipe wall temperature and wind speed. It is calculated using the Zukauskas Equation and typically falls in the range of 0.5 to 4 [Btu·in/(hr·ft<sup>2</sup>·°F)]. To calculate, determine the Nusselt number for the set of conditions, then calculate the outdoor heat transfer coefficient.

Example:

Air heat transfer coefficient = 2 at average temperature = 100° F, pipe wall temperature = 80° F and wind speed at 5 mph.

For this given set of conditions, the heat transfer coefficient is:  $h_o = 1.6$

**Calculated thermal resistance values**

$R_{pipe}$  = Thermal resistance of pipe wall

$$R_{pipe} = \frac{\ln\left(\frac{r_{pipe, o}}{r_{pipe, i}}\right)}{2\pi k_{ins}}$$

$R_o$  = Thermal resistance of outer air

$$R_o = \frac{1}{2\pi r_o h_o L}$$

Where  $r_o$  = layer radius and  $L$  = length of pipe/insulation

$R_{ins}$  = Thermal resistance of pipe insulation

$$R_{ins} = \frac{\ln\left(\frac{r_{ins, o}}{r_{pipe, o}}\right)}{2\pi k_{ins}}$$

$R_{total}$  = Total thermal resistance of pipe and pipe installation

$$R_{total} = R_{pipe} + R_{ins} + R_o$$

**Calculated heat loss**

$q_{pipe}$  = Heat loss through a non-insulated pipe,

$$q_{pipe} = \frac{\Delta T}{R_{pipe}}$$

$q_{total}$  = Total heat loss through an insulated pipe,

$$q_{total} = \frac{\Delta T}{R_{total}}$$

Where  $\Delta T$  is the temperature difference between ambient temperature and liquid in the pipe

**Note:** Uponor recommends installing the entire piping system first, then insulating with a specific material.

Recommended size of pre-formed insulation	
Pipe dimension N.D. to O.D.	Insulation size best fit (other solution)
½" (20 mm)	½" IPS
¾" (25 mm)	¾" IPS
1" (32 mm)	1" IPS
1¼" (40 mm)	1½" CTS (1¼" IPS)
1½" (50 mm)	1½" IPS
2" (63 mm)	2" IPS
2½" (75 mm)	2½" IPS
3" (90 mm)	3" CTS (3" IPS)
4" (125 mm)	5" CTS (5" IPS)
6" (160 mm)	6" IPS
8" (200 mm)	8" CTS (8" IPS)
10" (250 mm)	10" CTS (10" IPS)
12" (315 mm)	12" IPS

**Table 5-9: Recommended size of insulation**

## R-values based on the outside diameter and wall thickness of the pipe

Pipe wall thickness	Nominal pipe size	Wall thickness	R-value
SDR	in	mm	Btu-in/(hr-ft <sup>2</sup> -°F)
SDR 7.4	½"	2.8	0.08
	¾"	3.5	0.10
SDR 9	1"	3.6	0.10
	1¼"	4.5	0.12
	1½"	5.6	0.15
	2"	7.1	0.19
	2½"	8.4	0.23
	3"	10.1	0.27
	4"	14	0.38
	6"	17.9	0.48
	8"	22.4	0.60
	10"	27.9	0.75
SDR 11	12"	35.2	0.94
	1"	2.9	0.08
	1¼"	3.7	0.10
	1½"	4.6	0.12
	2"	5.8	0.15
	2½"	6.8	0.18
	3"	8.2	0.21
	4"	11.4	0.30
	6"	14.55	0.38
	8"	18.3	0.48
SDR 17.6	10"	22.7	0.59
	12"	28.6	0.75
	4"	7.1	0.18
	6"	9.1	0.23
	8"	11.4	0.29
	10"	14.2	0.36
	12"	17.9	0.45

**Table 5-10: Pipe R-values**

### Pre-formed insulation

The natural insulating properties of Uponor PP-RCT pipes help reduce the amount of necessary insulation to control heat loss/gain and condensation compared to metal piping systems. Always follow local code requirements.

Uponor recommends using metric-sized, pre-formed insulation. If this is not available, refer to **Table 5-9** for the appropriate IPS or CTS pre-formed insulation sizes.

### System care

Building owners and management are encouraged to provide an annual maintenance program to provide safe, healthy water to the building occupants. For this reason,

it is important to keep in check these following items:

- Valves (pressure-relief, balancing, reducing, etc.)
- Tanks (expansion, surge, bladder, etc.)
- Ensure acceptable levels of chlorine and copper
- Hydraulically balance system to ensure required flow rate for each area of the building
- Avoid water hammer and excessive surge pressures from valves and pumps
- Provide air release/elimination valves to reduce entrapped and dissolved air in the system
- Maintain recommended temperature and pressure limits

### Flushing the pipeline

If flushing the piping system after installation, ensure the flushing medium is approved for use with PP-RCT piping systems and is specified under local codes, engineering specifications and/or by the needs of the mechanical equipment in the system. If no flushing methods are specified, use water, air or a mixture of both. Refer to the Uponor Chemical Compatibility form for more information on compatible flushing agents.

### System disinfection

When system disinfection is required, treatment can be accomplished through chemical disinfection methods. Uponor does not recommend use of its PP-RCT pipe and fittings as part of any potable-water distribution system in buildings where thermal disinfection is employed.

### Chemical disinfection

When adding chemicals to a plumbing system, disinfection chemicals are strong oxidizing agents and have the potential to reduce system life of the piping system. See **Table 5-11** for recommended maximum concentration of common chemicals used for disinfection, and corresponding duration and temperature.

**Important:** Flush the system with clean, potable water after disinfection in an effort to avoid long-term pipe performance issues.

Chemical disinfection treatment methods should not exceed 80 psi system pressure or the maximum guidelines stated in **Table 5-11**.

### Chemicals not for use

Do not use chlorine dioxide, ozone, bromine, copper-silver, or on-site copper ion generation for disinfection. Specifically, Uponor does not recommend using PP-RCT as part of any potable-water distribution system in buildings where **chlorine dioxide** is used as a secondary disinfection or where injection systems using chlorine dioxide are utilized.

Uponor issues this recommendation despite the limited industry data available for the long-term effects of chlorine dioxide on PP-RCT where the system is properly maintained and operated. This does not include the

system disinfection, which is addressed on this page.

In certain isolated instances, particular characteristics of the potable water can impact the long-term performance of PP-RCT system components, even when water quality levels are within the permissive range set forth by the EPS National Drinking Water Standards and the Guidelines for Canadian Drinking Water Quality by Health Canada.

The installing contractor should have experience in the region of the intended use of the product. In addition, consultation with the local plumbing authority and local water authority regarding the performance of PP-RCT system components should occur before the selection and installation of the system.

**Note:** For questions about any other chemicals or cleaning agents, contact Uponor Technical Services at 888.594.7726 or [support.una@uponor.com](mailto:support.una@uponor.com) to ensure compatibility.

Chemical	Symbol	Concentration of free chlorine	Maximum	
			Duration	Temperature
Sodium hypochlorite	NaOCl	200 mg/L (ppm)	3 hours	77°F (25°C)
		50 mg/L (ppm)	24 hours	
Chlorine (liquid or gas)	Cl <sub>2</sub>	200 mg/L (ppm)	3 hours	
		50 mg/L (ppm)	24 hours	
Hydrogen peroxide	H <sub>2</sub> O <sub>2</sub>	200 mg/L (ppm)	3 hours	
		50 mg/L (ppm)	24 hours	
Chloramines	NH <sub>2</sub> Cl	200 mg/L (ppm)	3 hours	
		50 mg/L (ppm)	24 hours	

**Table 5-11: Uponor disinfection guidelines**



**Important system disinfection notes**

- Uponor does NOT recommend long-term or continuous-dosing chemical treatments.
- Do not allow disinfection solutions to remain in the system longer than 24 hours. Flush the system with potable water after disinfection.
- Limit chemical disinfection to four cycles over life of the piping system.
- Avoid combining disinfectants.
- Do not use chlorine dioxide, ozone, bromine, copper-silver, or on-site copper ion generation for disinfection.
- These guidelines are for disinfection treatment and do not supersede normal operating parameters.
- Do not utilize the water from chemical disinfection and the subsequent rinsing for consumption (e.g. drinking water etc.).

These guidelines are set forth for informational purposes only, and it remains the responsibility of the facility manager, water management contractor, and end user to maintain system health and to ensure compatibility and effectiveness of the disinfection treatment with the entirety of the plumbing system. If other treatments or chemicals not included in this document are intended for use, contact Uponor Technical Services for compatibility prior to system exposure. If necessary, have the chemical manufacturer approve the suitability of the disinfectant for all components of the plumbing system and installation. Note that these guidelines are subject to change. Please contact Uponor Technical Services at 888.594.7726 to confirm the latest guideline information.

**Water additive guidelines**

The building industry widely uses Uponor PP-RCT-based systems in hydronic piping applications, mostly for conveying water between water heating/cooling devices (e.g., boilers, chillers) and terminal units such as fan coils. Uponor PP-RCT pipe offers advantages such as lightweight, corrosion resistance, ease-of-assembly and cost effectiveness. In addition to Uponor PP-RCT pipe, these applications also use various configurations of Uponor fittings (e.g., tees, ells, couplings, etc.) made from brass or EP for connection purposes.

Most hydronic piping systems incorporate metallic components supplied by third parties, which require corrosion protection. When possible, replace all copper piping in a system with Uponor PP-RCT. If limited copper piping remains as part of the system, strictly follow the rules and guidelines of the Copper Development Association (CDA Publication A4015-14/16: Copper Tube Handbook) regarding flow rates and water conditions. Also, ensure the operating conditions do not cause degradation, erosion, or corrosion of the copper. Test the level of copper in the water and ensure the copper levels do not exceed 0.1 ppm (mg/L). Higher levels indicate erosion/corrosion of the copper pipe due to system and/or water conditions.

Note that high levels of copper in a piping system with Uponor PP-RCT will void the warranty. However, small amounts of copper or brass in valves or other equipment will typically not cause an issue.

Consideration must also be given to external factors, such as temperature and induced stresses, in addition to water conditions, such as pH, impurity control, and buffering. Thus, various additives are typically added to the water being conveyed throughout hydronic piping systems. To avoid damage to Uponor PP-RCT pipe and fittings, all of these variables must be considered, and only additives that are chemically compatible with the Uponor components should be employed.

Refer to **Table 5-12** for guidance in selecting an additive that is chemically compatible with Uponor PP-RCT pipe and fittings.

Attribute
pH
Nitrite
Soluble metal – iron
Soluble metal – copper
Azole – TTA
Molybdate

**Table 5-12: Recommended attributes of treated water**

It is also important to give consideration when selecting a cleaning agent. Cleaning the hydronic system is common upon initial startup. With Uponor PP-RCT-based systems, the cleaning process should:

- Not exceed 72 hours
- Use non-petroleum based cleaners
- Not exceed a pH of 11
- Have water temperatures less than 140°F (60°C)

**Note:** Prior to cleaning the hydronic system, ensure the water management contractor is informed of the above guidelines.

Note that these guidelines are subject to change. Please contact Uponor Technical Services at 888.594.7726 to confirm the latest guideline information.

**Important:** When pressure testing hybrid systems (i.e., those that include both thermoplastic piping materials, such as CPVC or PP-R, and Uponor PEX and ProPEX fittings), isolate the Uponor system from the other thermoplastic materials in the system before following the recommended procedure. Also, consult the appropriate pipe manufacturer’s installation recommendations when testing systems comprised of other thermoplastic materials.

## Pressure testing

### Approved methods of pressurizations

A **hydrostatic** pressure test utilizes water as the test medium. **It is Uponor’s preferable choice** of pressurization, as it does not store high levels of energy given its incompressibility nature.

A **pneumatic** pressure test utilizes non-toxic, non-flammable gas (**e.g., air, nitrogen**). Uponor is aware a hydrostatic test is not always feasible, and factors can play a role in choosing a pneumatic test over a hydrostatic such as: availability of supply or disposal of water, freeze vulnerability, and/or structural support (water weights more than gas). For these reasons, **Uponor has approved pneumatics as an alternative pressurization method.**

### Safety first

**Perform a thorough visual inspection** with extra attention on the joints prior to a pneumatic pressure test. A pressurized gas contains high levels of stored energy that can instantaneously damage its surroundings given the chance to escape. **Isolate equipment (or parts)** not integral to the test which cannot withstand the pressure. **Include vents, drains, relief valves** as needed to mitigate against overpressure.

### Maximum design pressure vs. maximum working pressure

**Maximum design pressure** indicates **the maximum pressure the system will see in its lifetime.** *It is the design pressure designated by the engineer or person in charge of the project.*

**Maximum working pressure** indicates **the maximum pressure that the system can handle.** *It is the maximum pressure designated by the engineer who designed the system.*

### Determining test pressure

Method	Test pressure	Pipe system
Hydrostatic	1.5 x Design Pressure	SDR 7.4, 9, 11
Pneumatic	1.25 x Design Pressure; <i>Maximum: 150 psi</i>	
Hydrostatic	1.5 x Design Pressure	SDR 17.6
Pneumatic	1.5 x Design Pressure if > 65 psi, 100 psi if ≤ 65 psi	

If the system contains multiple-size SDRs, use the test pressure corresponding to the largest SDR (thinnest-wall pipe).

## Procedure guidelines

1. **Ensure safety prior to starting the pressure test.**
  - Refer to the “Safety First” section for examples.
2. **Apply low pressurization and gradually increase until the test pressure is reached.**
  - If pneumatic, increase in stages of no more than 25% of the test pressure.
  - If pressure cannot be reached, locate the leak, repair, and start over.
3. **Once test pressure is met, sustain for two hours or the time required by the local authority having jurisdiction, whichever is more stringent.**

### **If there is a reduction in pressure, refer to the following guidelines.**

- If hydraulic, inspect for leakages of the piping and at all joints and connections.
  - If pneumatic, inspect for leaks by utilizing soap bubbles or other suitable means.
4. **If no leakage is detected, then the pressure test is complete. If not, start over.**

## Estimate for total number of compressed gas containers

Use the following equation to estimate how many containers will be needed for your project:

# of compressed gas containers =

$$\frac{(\text{Desired pressure})_{\text{psi}} \times 0.068 \times (\text{Total Volume})_{\text{cubic feet}}}{(\text{Container size})_{\text{cubic feet}}}$$

Total Volume =

$$0.785 \times (\text{inside pipe diameter}_{\text{feet}})^2 \times (\text{total length of pipe})_{\text{feet}}$$

## Test record

All Uponor installations must be pressure tested and documented on the official Uponor PP-RCT Pressure Testing Instruction Form found on [uponor.com/pprct](http://uponor.com/pprct). The pressure test is required in order to identify any potential issues, including manufacturing defects and installation errors. It is acceptable to pressure test the system in phases, providing every heat-fused connection is tested and each phase is properly documented on the Uponor PP-RCT pressure test form. The entire form must be completed and signed by the Uponor-trained installer. Both the client and contractor should keep a copy of the completed Uponor PP-RCT pressure test form. Completion and submittal of the pressure test form is required by Uponor in order for the warranty to be valid. It does not replace any local legal requirements or supersede them. Uponor requires this test to be performed, documented on the form and emailed to [warrantyclaims@uponor.com](mailto:warrantyclaims@uponor.com) within 30 days of completing the installation.



# Appendix A: Head loss and flow rates tables

## SDR 7.4 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gallons per minute (gpm).

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	½" (20 mm)	¾" (25 mm)
	di (in)	0.567	0.709
0.1	R	0	0
	V	0.1	0.1
0.2	R	0.1	0
	V	0.3	0.2
0.3	R	0.2	0.1
	V	0.4	0.2
0.4	R	0.3	0.1
	V	0.5	0.3
0.5	R	0.4	0.1
	V	0.6	0.4
0.6	R	0.6	0.2
	V	0.8	0.5
0.7	R	0.8	0.3
	V	0.9	0.6
0.8	R	1	0.3
	V	1	0.6
0.9	R	1.3	0.4
	V	1.1	0.7
1	R	1.6	0.5
	V	1.3	0.8
2	R	5.6	1.9
	V	2.5	1.6
3	R	11.9	4
	V	3.8	2.4
4	R	20.3	6.8
	V	5.1	3.2
5	R	30.7	10.2
	V	6.4	4
6	R	43	14.3
	V	7.6	4.9
7	R	57.2	19
	V	8.9	5.7
8	R	73.2	24.4
	V	10.2	6.5
9	R		30.3
	V		7.3
10	R		36.8
	V		8.1
11	R		43.9
	V		8.9

Q (gpm)	Dimension	½" (20 mm)	¾" (25 mm)
	di (in)	0.567	0.709
12	R		51.6
	V		9.7
13	R		59.9
	V		10.5
14	R		
	V		
15	R		
	V		
16	R		
	V		
17	R		
	V		
18	R		
	V		
19	R		
	V		
20	R		
	V		
22	R		
	V		
24	R		
	V		
26	R		
	V		
28	R		
	V		
30	R		
	V		
32	R		
	V		
34	R		
	V		
36	R		
	V		
38	R		
	V		
40	R		
	V		
45	R		
	V		

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 9 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1¼" (40 mm)	1½" (50 mm)	2" (63 mm)	2½" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	0.98	1.22	1.53	1.92	2.30	2.75	3.82	4.90	6.12	7.65	9.63
0.1	R											
	V											
0.2	R	0.0	0.0									
	V	0.1	0.1									
0.3	R	0.0	0.0	0.0								
	V	0.1	0.1	0.1								
0.4	R	0.0	0.0	0.0								
	V	0.2	0.1	0.1								
0.5	R	0.0	0.0	0.0	0.0							
	V	0.2	0.1	0.1	0.1							
0.6	R	0.0	0.0	0.0	0.0							
	V	0.3	0.2	0.1	0.1							
0.7	R	0.1	0.0	0.0	0.0	0.0						
	V	0.3	0.2	0.1	0.1	0.1						
0.8	R	0.1	0.0	0.0	0.0	0.0						
	V	0.3	0.2	0.1	0.1	0.1						
0.9	R	0.1	0.0	0.0	0.0	0.0						
	V	0.4	0.2	0.2	0.1	0.1						
1	R	0.1	0.0	0.0	0.0	0.0	0.0					
	V	0.4	0.3	0.2	0.1	0.1	0.1					
2	R	0.4	0.1	0.0	0.0	0.0	0.0	0.0				
	V	0.9	0.6	0.4	0.2	0.2	0.1	0.1				
3	R	0.9	0.3	0.1	0.0	0.0	0.0	0.0	0.0			
	V	1.3	0.8	0.5	0.3	0.2	0.2	0.1	0.1			
4	R	1.5	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0		
	V	1.7	1.1	0.7	0.4	0.3	0.2	0.1	0.1			
5	R	2.2	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
	V	2.2	1.4	0.9	0.6	0.4	0.3	0.1	0.1	0.1		
6	R	3.1	1.0	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	
	V	2.6	1.7	1.1	0.7	0.5	0.3	0.2	0.1	0.1		
7	R	4.1	1.4	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	
	V	3.0	1.9	1.2	0.8	0.5	0.4	0.2	0.1	0.1		
8	R	5.3	1.8	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	V	3.5	2.2	1.4	0.9	0.6	0.4	0.2	0.1	0.1	0.1	
9	R	6.6	2.2	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	V	3.9	2.5	1.6	1.0	0.7	0.5	0.3	0.2	0.1	0.1	
10	R	8.0	2.7	0.9	0.3	0.1	0.1	0.0	0.0	0.0	0.1	
	V	4.3	2.8	1.8	1.1	0.8	0.5	0.3	0.2	0.1	0.1	
11	R	9.5	3.2	1.1	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	V	4.8	3.0	1.9	1.2	0.9	0.6	0.3	0.2	0.1	0.1	

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 9 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1¼" (40 mm)	1½" (50 mm)	2" (63 mm)	2½" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	0.98	1.22	1.53	1.92	2.30	2.75	3.82	4.90	6.12	7.65	9.63
12	R	11.2	3.8	1.3	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	5.2	3.3	2.1	1.3	0.9	0.6	0.3	0.2	0.1	0.1	0.1
13	R	13.0	4.3	1.5	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	5.6	3.6	2.3	1.4	1.0	0.7	0.4	0.2	0.1	0.1	0.1
14	R	14.9	5.0	1.7	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	6.1	3.9	2.5	1.5	1.1	0.8	0.4	0.2	0.2	0.1	0.1
15	R	16.9	5.7	1.9	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	6.5	4.1	2.6	1.7	1.2	0.8	0.4	0.3	0.2	0.1	0.1
16	R	19.1	6.4	2.1	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	6.9	4.4	2.8	1.8	1.2	0.9	0.4	0.3	0.2	0.1	0.1
17	R	21.3	7.1	2.4	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	7.4	4.7	3.0	1.9	1.3	0.9	0.5	0.3	0.2	0.1	0.1
18	R	23.7	7.9	2.7	0.9	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	V	7.8	5.0	3.2	2.0	1.4	1.0	0.5	0.3	0.2	0.1	0.1
19	R	26.2	8.8	2.9	0.9	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	V	8.2	5.2	3.3	2.1	1.5	1.0	0.5	0.3	0.2	0.1	0.1
20	R	28.8	9.7	3.2	1.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	V	8.6	5.5	3.5	2.2	1.6	1.1	0.6	0.3	0.2	0.1	0.1
22	R	34.4	11.5	3.9	1.2	0.5	0.2	0.0	0.0	0.0	0.0	0.0
	V	9.5	6.1	3.9	2.4	1.7	1.2	0.6	0.4	0.2	0.2	0.1
24	R	40.4	13.5	4.5	1.5	0.6	0.3	0.1	0.0	0.0	0.0	0.0
	V	10.4	6.6	4.2	2.7	1.9	1.3	0.7	0.4	0.3	0.2	0.1
26	R		15.7	5.3	1.7	0.7	0.3	0.1	0.0	0.0	0.0	0.0
	V		7.2	4.6	2.9	2.0	1.4	0.7	0.4	0.3	0.2	0.1
28	R		18.0	6.0	1.9	0.8	0.3	0.1	0.0	0.0	0.0	0.0
	V		7.7	4.9	3.1	2.2	1.5	0.8	0.5	0.3	0.2	0.1
30	R		20.4	6.8	2.2	0.9	0.4	0.1	0.0	0.0	0.0	0.0
	V		8.3	5.3	3.3	2.3	1.6	0.8	0.5	0.3	0.2	0.1
32	R		23.0	7.7	2.5	1.1	0.4	0.1	0.0	0.0	0.0	0.0
	V		8.8	5.6	3.5	2.5	1.7	0.9	0.5	0.4	0.2	0.1
34	R		25.8	8.6	2.8	1.2	0.5	0.1	0.0	0.0	0.0	0.0
	V		9.4	6.0	3.8	2.7	1.8	1.0	0.6	0.4	0.2	0.1
36	R		28.6	9.6	3.1	1.3	0.5	0.1	0.0	0.0	0.0	0.0
	V		9.9	6.3	4.0	2.8	1.9	1.0	0.6	0.4	0.3	0.2
38	R		31.6	10.6	3.4	1.5	0.6	0.1	0.0	0.0	0.0	0.0
	V		10.5	6.7	4.2	3.0	2.1	1.1	0.6	0.4	0.3	0.2
40	R			11.7	3.8	1.6	0.7	0.1	0.0	0.0	0.0	0.0
	V			7.0	4.4	3.1	2.2	1.1	0.7	0.4	0.3	0.2
45	R			14.5	4.7	2.0	0.8	0.2	0.0	0.0	0.0	0.0
	V			7.9	5.0	3.5	2.4	1.3	0.8	0.5	0.3	0.2

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 9 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1 1/4" (40 mm)	1 1/2" (50 mm)	2" (63 mm)	2 1/2" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
		di (in)	0.98	1.22	1.53	1.92	2.30	2.75	3.82	4.90	6.12	7.65
50	R			17.6	5.7	2.4	1.0	0.2	0.1	0.0	0.0	0.0
	V			8.8	5.5	3.9	2.7	1.4	0.9	0.5	0.3	0.2
55	R			21.0	6.8	2.9	1.2	0.2	0.1	0.0	0.0	0.0
	V			9.7	6.1	4.3	3.0	1.5	0.9	0.6	0.4	0.2
60	R			24.7	8.0	3.4	1.4	0.3	0.1	0.0	0.0	0.0
	V			10.6	6.6	4.7	3.2	1.7	1.0	0.7	0.4	0.3
65	R				9.2	3.9	1.6	0.3	0.1	0.0	0.0	0.0
	V				7.2	5.1	3.5	1.8	1.1	0.7	0.5	0.3
70	R				10.6	4.5	1.9	0.4	0.1	0.0	0.0	0.0
	V				7.7	5.5	3.8	2.0	1.2	0.8	0.5	0.3
75	R				12.0	5.1	2.1	0.4	0.1	0.0	0.0	0.0
	V				8.3	5.8	4.1	2.1	1.3	0.8	0.5	0.3
80	R				13.6	5.8	2.4	0.5	0.1	0.0	0.0	0.0
	V				8.9	6.2	4.3	2.2	1.4	0.9	0.6	0.4
85	R				15.2	6.5	2.7	0.5	0.2	0.1	0.0	0.0
	V				9.4	6.6	4.6	2.4	1.5	0.9	0.6	0.4
90	R				16.9	7.2	3.0	0.6	0.2	0.1	0.0	0.0
	V				10.0	7.0	4.9	2.5	1.5	0.9	0.6	0.4
95	R					8.0	3.3	0.7	0.2	0.1	0.0	0.0
	V					7.4	5.1	2.7	1.5	1.0	0.6	0.4
100	R					8.7	3.6	0.7	0.2	0.1	0.0	0.0
	V					7.8	5.4	2.8	1.6	1.1	0.7	0.4
110	R					10.4	4.3	0.9	0.3	0.1	0.0	0.0
	V					8.2	6.0	3.1	1.9	1.2	0.8	0.5
120	R					12.3	5.0	1.0	0.3	0.1	0.0	0.0
	V					9.4	6.5	3.4	2.1	1.3	0.8	0.5
130	R					14.2	5.8	1.2	0.4	0.1	0.0	0.0
	V					10.1	7.0	3.6	2.2	1.4	0.9	0.6
140	R						6.7	1.3	0.4	0.1	0.0	0.0
	V						7.6	3.9	2.4	1.5	1.0	0.6
150	R						7.6	1.5	0.5	0.2	0.1	0.0
	V						8.1	4.2	2.6	1.6	1.0	0.7
160	R						8.6	1.7	0.5	0.2	0.1	0.0
	V						8.7	4.5	2.7	1.8	1.1	0.7
170	R						9.6	1.9	0.6	0.2	0.1	0.0
	V						9.2	4.8	2.9	1.9	1.2	0.7
180	R						10.6	2.1	0.6	0.2	0.1	0.0
	V						9.7	5.0	3.1	2.0	1.3	0.8
190	R						11.8	2.4	0.7	0.2	0.1	0.0
	V						10.3	5.3	3.2	2.1	1.3	0.8

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 9 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"	10"	12"
		(32 mm)	(40 mm)	(50 mm)	(63 mm)	(75 mm)	(90 mm)	(125 mm)	(160 mm)	(200 mm)	(250 mm)	(315 mm)
	di (in)	0.98	1.22	1.53	1.92	2.30	2.75	3.82	4.90	6.12	7.65	9.63
200	R							2.6	0.8	0.3	0.1	0.0
	V							5.6	3.4	2.2	1.4	0.9
220	R							3.1	0.9	0.3	0.1	0.0
	V							6.2	3.8	2.4	1.5	1.0
240	R							3.6	1.1	0.4	0.1	0.0
	V							6.7	4.1	2.6	1.7	1.1
260	R							4.2	1.3	0.4	0.1	0.0
	V							7.3	4.4	2.8	1.8	1.1
280	R							4.8	1.5	0.5	0.2	0.1
	V							7.8	4.8	3.1	2.0	1.2
300	R							5.5	1.7	0.6	0.2	0.1
	V							8.4	5.1	3.3	2.1	1.3
320	R							6.2	1.9	0.6	0.2	0.1
	V							9.0	5.5	3.5	2.2	1.4
340	R							6.9	2.1	0.7	0.2	0.1
	V							9.5	5.8	3.7	2.4	1.5
360	R							7.7	2.3	0.8	0.3	0.1
	V							10.1	6.2	3.9	2.5	1.6
380	R								2.6	0.9	0.3	0.1
	V								6.5	4.2	2.7	1.7
400	R								2.8	1.0	0.3	0.1
	V								6.8	4.4	2.8	1.8
450	R								3.5	1.2	0.4	0.1
	V								7.7	4.9	3.1	2.0
500	R								4.3	1.4	0.5	0.2
	V								8.5	5.5	3.5	2.2
550	R								5.1	1.7	0.6	0.2
	V								9.4	6.0	3.8	2.4
600	R								6.0	2.0	0.7	0.2
	V								10.3	6.6	4.2	2.6
650	R									2.3	0.8	0.3
	V									7.1	4.5	2.9
700	R									2.7	0.9	0.3
	V									7.7	4.9	3.1
750	R									3.0	1.0	0.3
	V									8.2	5.2	3.3
800	R									3.4	1.2	0.4
	V									8.8	5.6	3.5

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 9 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1¼" (40 mm)	1½" (50 mm)	2" (63 mm)	2½" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	0.98	1.22	1.53	1.92	2.30	2.75	3.82	4.90	6.12	7.65	9.63
850	R									3.8	1.3	0.4
	V									9.3	5.9	3.7
900	R									4.3	1.4	0.5
	V									9.8	6.3	4.0
950	R									4.7	1.6	0.5
	V									10.4	6.6	4.2
1,000	R										1.7	0.6
	V										7.0	4.4
1,100	R										2.1	0.7
	V										7.7	4.8
1,200	R										2.4	0.8
	V										8.4	5.3
1,300	R										2.8	0.9
	V										9.1	5.7
1,400	R										3.2	1.0
	V										9.8	6.1
1,500	R										3.7	1.2
	V										10.5	6.6
1,600	R											1.3
	V											7.0
1,700	R											1.5
	V											7.5
1,800	R											1.7
	V											7.9
1,900	R											1.8
	V											8.3
2,000	R											2.0
	V											8.8
2,200	R											2.4
	V											9.7
2,400	R											2.8
	V											10.5
2,600	R											
	V											
2,800	R											
	V											
3,000	R											
	V											

## SDR 11 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1 1/4" (40 mm)	1 1/2" (50 mm)	2" (63 mm)	2 1/2" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	1.03	1.28	1.61	2.02	2.42	2.90	4.02	5.15	6.43	8.06	10.15
0.1	R											
	V											
0.2	R	0.0										
	V	0.1										
0.3	R	0.0	0.0									
	V	0.1	0.1									
0.4	R	0.0	0.0	0.0								
	V	0.2	0.1	0.1								
0.5	R	0.0	0.0	0.0								
	V	0.2	0.1	0.1								
0.6	R	0.0	0.0	0.0	0.0							
	V	0.2	0.1	0.1	0.1							
0.7	R	0.0	0.0	0.0	0.0							
	V	0.3	0.2	0.1	0.1							
0.8	R	0.1	0.0	0.0	0.0	0.0						
	V	0.3	0.2	0.1	0.1	0.1						
0.9	R	0.1	0.0	0.0	0.0	0.0						
	V	0.4	0.2	0.1	0.1	0.1						
1	R	0.1	0.0	0.0	0.0	0.0						
	V	0.4	0.2	0.2	0.1	0.01						
2	R	0.3	0.1	0.0	0.0	0.0	0.0	0.0				
	V	0.8	0.5	0.3	0.2	0.1	0.1	0.1				
3	R	0.7	0.2	0.1	0.0	0.0	0.0	0.0				
	V	1.2	0.7	0.5	0.3	0.2	0.1	0.1				
4	R	1.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0			
	V	1.6	1.0	0.6	0.4	0.3	0.2	0.1	0.1			
5	R	1.7	0.6	0.2	0.1	0.0	0.0	0.0	0.0			
	V	2.0	1.2	0.8	0.5	0.4	0.2	0.1	0.1			
6	R	2.4	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0		
	V	2.3	1.5	1.0	0.6	0.4	0.3	0.2	0.1	0.1		
7	R	3.2	1.1	0.4	0.1	0.0	0.0	0.0	0.0	0.0		
	V	2.7	1.7	1.1	0.7	0.5	0.3	0.2	0.1	0.1		
8	R	4.1	1.4	0.5	0.1	0.1	0.0	0.0	0.0	0.0	0.0	
	V	3.1	2.0	1.3	0.8	0.6	0.4	0.2	0.1	0.1	0.1	
9	R	5.1	1.7	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	
	V	3.5	2.2	1.4	0.9	0.6	0.4	0.2	0.1	0.1	0.1	
10	R	6.2	2.1	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	
	V	3.9	2.5	1.6	1.0	0.7	0.5	0.3	0.2	0.1	0.1	
11	R	7.4	2.5	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	
	V	4.3	2.7	1.7	1.1	0.8	0.5	0.3	0.2	0.1	0.1	

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 11 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1"	1¼"	1½"	2"	2½"	3"	4"	6"	8"	10"	12"
		(32 mm)	(40 mm)	(50 mm)	(63 mm)	(75 mm)	(90 mm)	(125 mm)	(160 mm)	(200 mm)	(250 mm)	(315 mm)
	di (in)	1.03	1.28	1.61	2.02	2.42	2.90	4.02	5.15	6.43	8.06	10.15
12	R	8.7	2.9	1.0	0.3	0.1	0.1	0.0	0.0	0.0	0.0	
	V	4.7	3.0	1.9	1.2	0.8	0.6	0.3	0.2	0.1	0.1	
13	R	10.1	3.4	1.1	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	5.1	3.2	2.1	1.3	0.9	0.6	0.3	0.2	0.1	0.1	0.1
14	R	11.6	3.9	1.3	0.4	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	5.5	3.5	2.2	1.4	1.0	0.7	0.4	0.2	0.1	0.1	0.1
15	R	13.2	4.4	1.5	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	5.9	3.7	2.4	1.5	1.1	0.7	0.4	0.2	0.1	0.1	0.1
16	R	14.9	5.0	1.7	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	V	6.2	4.0	2.5	1.6	1.1	0.8	0.4	0.2	0.2	0.1	0.1
17	R	16.6	5.6	1.9	0.6	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	6.6	4.2	2.7	1.7	1.2	0.8	0.4	0.3	0.2	0.1	0.1
18	R	18.5	6.2	2.1	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	7.0	4.5	2.9	1.8	1.3	0.9	0.5	0.3	0.2	0.1	0.1
19	R	20.5	6.8	2.3	0.7	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	7.4	4.7	3.0	1.9	1.3	0.9	0.5	0.3	0.2	0.1	0.1
20	R	22.5	7.5	2.5	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0
	V	7.8	5.0	3.2	2.0	1.4	1.0	0.5	0.3	0.2	0.1	0.1
22	R	26.8	9.0	3.0	1.0	0.4	0.2	0.0	0.0	0.0	0.0	0.0
	V	8.6	5.5	3.5	2.2	1.6	1.1	0.6	0.3	0.2	0.1	0.1
24	R	31.5	10.6	3.5	1.1	0.5	0.2	0.0	0.0	0.0	0.0	0.0
	V	9.4	6.0	3.8	2.4	1.7	1.2	0.6	0.4	0.2	0.2	0.1
26	R	36.5	12.2	4.1	1.3	0.6	0.2	0.0	0.0	0.0	0.0	0.0
	V	10.2	6.5	4.1	2.6	1.8	1.3	0.7	0.4	0.3	0.2	0.1
28	R		14.0	4.7	1.5	0.6	0.3	0.1	0.0	0.0	0.0	0.0
	V		7.0	4.5	2.8	2.0	1.4	0.7	0.4	0.3	0.2	0.1
30	R		15.9	5.3	1.7	0.7	0.3	0.1	0.0	0.0	0.0	0.0
	V		7.5	4.8	3.0	2.1	1.5	0.8	0.5	0.3	0.2	0.1
32	R		18.0	6.0	1.9	0.8	0.3	0.1	0.0	0.0	0.0	0.0
	V		8.0	5.1	3.2	2.3	1.6	0.8	0.5	0.3	0.2	0.1
34	R		20.1	6.7	2.2	0.9	0.4	0.1	0.0	0.0	0.0	0.0
	V		8.5	5.4	3.4	2.4	1.7	0.9	0.5	0.3	0.2	0.1
36	R		22.3	7.5	2.4	1.0	0.4	0.1	0.0	0.0	0.0	0.0
	V		9.0	5.7	3.6	2.5	1.8	0.9	0.6	0.4	0.2	0.1
38	R		24.7	8.3	2.7	1.1	0.5	0.1	0.0	0.0	0.0	0.0
	V		9.5	6.0	3.8	2.7	1.9	1.0	0.6	0.4	0.2	0.2
40	R		27.1	9.1	2.9	1.3	0.5	0.1	0.0	0.0	0.0	0.0
	V		10.0	6.4	4.0	2.8	2.0	1.0	0.6	0.4	0.3	0.2
45	R			11.3	3.7	1.6	0.6	0.1	0.0	0.0	0.0	0.0
	V			7.2	4.5	3.2	2.2	1.1	0.7	0.4	0.3	0.2

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 11 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1½" (40 mm)	1¾" (50 mm)	2" (63 mm)	2½" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	1.03	1.28	1.61	2.02	2.42	2.90	4.02	5.15	6.43	8.06	10.15
50	R			13.8	4.4	1.9	0.8	0.2	0.0	0.0	0.0	0.0
	V			8.0	5.0	3.5	2.4	1.3	0.8	0.5	0.3	0.2
55	R			16.4	5.3	2.3	0.9	0.2	0.1	0.0	0.0	0.0
	V			8.7	5.5	3.9	2.7	1.4	0.8	0.5	0.3	0.2
60	R			19.3	6.2	2.7	1.1	0.2	0.1	0.0	0.0	0.0
	V			9.5	6.0	4.2	2.9	1.5	0.9	0.6	0.4	0.2
65	R			22.3	7.2	3.1	1.3	0.3	0.1	0.0	0.0	0.0
	V			10.3	6.5	4.6	3.2	1.6	1.0	0.6	0.4	0.3
70	R				8.3	3.5	1.4	0.3	0.1	0.0	0.0	0.0
	V				7.0	4.9	3.4	1.8	1.1	0.7	0.4	0.3
75	R				9.4	4.0	1.6	0.3	0.1	0.0	0.0	0.0
	V				7.5	5.3	3.7	1.9	1.2	0.7	0.5	0.3
80	R				10.6	4.5	1.9	0.4	0.1	0.0	0.0	0.0
	V				8.0	5.6	3.9	2.0	1.2	0.8	0.5	0.3
85	R				11.9	5.1	2.1	0.4	0.1	0.0	0.0	0.0
	V				8.5	6.0	4.2	2.2	1.3	0.8	0.5	0.3
90	R				13.2	5.6	2.3	0.5	0.1	0.0	0.0	0.0
	V				9.0	6.3	4.4	2.3	1.4	0.9	0.6	0.4
95	R				14.6	6.2	2.5	0.5	0.2	0.1	0.0	0.0
	V				9.5	6.7	4.6	2.4	1.5	1.0	0.6	0.4
100	R				16.0	6.8	2.8	0.6	0.2	0.1	0.0	0.0
	V				10.0	7.0	4.9	2.5	1.5	1.0	0.6	0.4
110	R					8.1	3.3	0.7	0.2	0.1	0.0	0.0
	V					7.8	5.4	2.8	1.7	1.1	0.7	0.4
120	R					9.6	3.9	0.8	0.2	0.1	0.0	0.0
	V					8.5	5.9	3.0	1.8	1.2	0.8	0.5
130	R					11.1	4.6	0.9	0.3	0.1	0.0	0.0
	V					9.2	6.4	3.3	2.0	1.3	0.8	0.5
140	R					12.7	5.2	1.1	0.3	0.1	0.0	0.0
	V					9.9	6.8	3.5	2.2	1.4	0.9	0.6
150	R					14.5	5.9	1.2	0.4	0.1	0.0	0.0
	V					10.6	7.3	3.8	2.3	1.5	0.9	0.6
160	R						6.7	1.3	0.4	0.1	0.0	0.0
	V						7.8	4.0	2.5	1.6	1.0	0.6
1.0	R						7.5	1.5	0.4	0.2	0.1	0.0
	V						8.3	4.3	2.6	1.7	1.1	0.7
180	R						8.3	1.7	0.5	0.2	0.1	0.0
	V						8.8	4.6	2.8	1.8	1.1	0.7
190	R						9.2	1.8	0.6	0.2	0.1	0.0
	V						9.3	4.8	2.9	1.9	1.2	0.8

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 11 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1" (32 mm)	1¼" (40 mm)	1½" (50 mm)	2" (63 mm)	2½" (75 mm)	3" (90 mm)	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	1.03	1.28	1.61	2.02	2.42	2.90	4.02	5.15	6.43	8.06	10.15
200	R						10.1	2.0	0.6	0.2	0.1	0.0
	V						9.8	5.1	3.1	2.0	0.1	0.0
220	R						12.1	2.4	0.7	0.2	0.1	0.0
	V						10.8	5.6	3.4	2.2	1.4	0.9
240	R							2.8	0.8	0.3	0.1	0.0
	V							6.1	3.7	2.4	1.5	1.0
260	R							3.3	1.0	0.3	0.1	0.0
	V							6.6	4.0	2.6	1.6	1.0
280	R							3.8	1.1	0.4	0.1	0.0
	V							7.1	4.3	2.8	1.8	1.1
300	R							4.3	1.3	0.4	0.1	0.0
	V							7.6	4.6	2.9	1.9	1.2
320	R							4.8	1.4	0.5	0.2	0.1
	V							8.1	4.9	3.1	2.0	1.3
340	R							5.4	1.6	0.5	0.2	0.1
	V							8.6	5.2	3.3	2.1	1.4
360	R							6.0	1.8	0.6	0.2	0.1
	V							9.1	5.5	3.5	2.3	1.4
380	R							6.7	2.0	0.7	0.2	0.1
	V							9.6	5.8	3.7	2.4	1.5
400	R							7.3	2.2	0.7	0.2	0.1
	V							10.1	6.2	3.9	2.5	1.6
450	R								2.7	0.9	0.3	0.1
	V								6.9	4.4	2.8	1.8
500	R								3.3	1.1	0.4	0.1
	V								7.7	4.9	3.2	2.0
550	R								3.9	1.3	0.4	0.1
	V								8.5	5.4	3.5	2.2
600	R								4.6	1.6	0.5	0.2
	V								9.2	5.9	3.8	2.4
650	R								5.4	1.8	0.6	0.2
	V								10.0	6.4	4.1	2.6
700	R									2.1	0.7	0.2
	V									6.9	4.4	2.8
750	R									2.3	0.8	0.3
	V									7.4	4.7	3.0
800	R									2.6	0.9	0.3
	V									7.9	5.0	3.2

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 11 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	6"	8"	10"	12"
		(32 mm)	(40 mm)	(50 mm)	(63 mm)	(75 mm)	(90 mm)	(125 mm)	(160 mm)	(200 mm)	(250 mm)	(315 mm)
	di (in)	1.03	1.28	1.61	2.02	2.42	2.90	4.02	5.15	6.43	8.06	10.15
850	R									3.0	1.0	0.3
	V									8.4	5.4	3.4
900	R									3.3	1.1	0.4
	V									8.8	5.7	3.6
950	R									3.6	1.2	0.4
	V									9.3	6.0	3.8
1,000	R									4.0	1.4	0.4
	V									9.8	6.3	4.0
1,100	R									4.8	1.6	0.5
	V									10.8	6.9	4.4
1,200	R										1.9	0.6
	V										7.6	4.8
1,300	R										2.2	0.7
	V										8.2	5.2
1,400	R										2.5	0.8
	V										8.8	5.6
1,500	R										2.9	0.9
	V										9.5	6.0
1,600	R										3.2	1.0
	V										10.1	6.4
1,700	R											1.2
	V											6.8
1,800	R											1.3
	V											7.1
1,900	R											1.4
	V											7.5
2,000	R											1.6
	V											7.9
2,200	R											1.9
	V											8.7
2,400	R											2.2
	V											9.5
2,600	R											2.6
	V											10.3
2,800	R											
	V											
3,000	R											
	V											

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 17.6 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	4.36	5.58	6.98	8.72	10.99
2	R					
	V					
3	R	0.0				
	V	0.1				
4	R	0.0	0.0			
	V	0.1	0.1			
5	R	0.0	0.0			
	V	0.1	0.1			
6	R	0.0	0.0	0.0		
	V	0.1	0.1	0.1		
7	R	0.0	0.0	0.0		
	V	0.2	0.1	0.1		
8	R	0.0	0.0	0.0		
	V	0.2	0.1	0.1		
9	R	0.0	0.0	0.0		
	V	0.2	0.1	0.1		
10	R	0.0	0.0	0.0	0.0	
	V	0.2	0.1	0.1	0.1	
11	R	0.0	0.0	0.0	0.0	
	V	0.2	0.1	0.1	0.1	
12	R	0.0	0.0	0.0	0.0	
	V	0.3	0.2	0.1	0.1	
13	R	0.0	0.0	0.0	0.0	
	V	0.3	0.2	0.1	0.1	
14	R	0.0	0.0	0.0	0.0	
	V	0.3	0.2	0.1	0.1	
15	R	0.0	0.0	0.0	0.0	0.0
	V	0.3	0.2	0.1	0.1	0.1
16	R	0.0	0.0	0.0	0.0	0.0
	V	0.3	0.2	0.1	0.1	0.1
17	R	0.0	0.0	0.0	0.0	0.0
	V	0.4	0.2	0.1	0.1	0.1
18	R	0.0	0.0	0.0	0.0	0.0
	V	0.4	0.2	0.2	0.1	0.1
19	R	0.0	0.0	0.0	0.0	0.0
	V	0.4	0.2	0.2	0.1	0.1
20	R	0.0	0.0	0.0	0.0	0.0
	V	0.4	0.3	0.2	0.1	0.1

Q (gpm)	Dimension	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	4.36	5.58	6.98	8.72	10.99
22	R	0.0	0.0	0.0	0.0	0.0
	V	0.5	0.3	0.2	0.1	0.1
24	R	0.0	0.0	0.0	0.0	0.0
	V	0.5	0.3	0.2	0.1	0.1
26	R	0.0	0.0	0.0	0.0	0.0
	V	0.6	0.3	0.2	0.1	0.1
28	R	0.0	0.0	0.0	0.0	0.0
	V	0.6	0.4	0.2	0.2	0.1
30	R	0.0	0.0	0.0	0.0	0.0
	V	0.6	0.4	0.3	0.2	0.1
32	R	0.0	0.0	0.0	0.0	0.0
	V	0.7	0.4	0.3	0.2	0.1
34	R	0.1	0.0	0.0	0.0	0.0
	V	0.7	0.4	0.3	0.2	0.1
36	R	0.1	0.0	0.0	0.0	0.0
	V	0.8	0.5	0.3	0.2	0.1
38	R	0.1	0.0	0.0	0.0	0.0
	V	0.8	0.5	0.3	0.2	0.1
40	R	0.1	0.0	0.0	0.0	0.0
	V	0.9	0.5	0.3	0.2	0.1
45	R	0.1	0.0	0.0	0.0	0.0
	V	1.0	0.6	0.4	0.2	0.2
50	R	0.1	0.0	0.0	0.0	0.0
	V	1.1	0.7	0.4	0.3	0.2
55	R	0.1	0.0	0.0	0.0	0.0
	V	1.2	0.7	0.5	0.3	0.2
60	R	0.1	0.0	0.0	0.0	0.0
	V	1.3	0.8	0.5	0.3	0.2
65	R	0.2	0.1	0.0	0.0	0.0
	V	1.4	0.9	0.5	0.3	0.2
70	R	0.2	0.1	0.0	0.0	0.0
	V	1.5	0.9	0.6	0.4	0.2
75	R	0.2	0.1	0.0	0.0	0.0
	V	1.6	1.0	0.6	0.4	0.3
80	R	0.3	0.1	0.0	0.0	0.0
	V	1.7	1.0	0.7	0.4	0.3
85	R	0.3	0.1	0.0	0.0	0.0
	V	1.8	1.1	0.7	0.5	0.3

 Recommended sizing based on flow rate (approximately 8 ft./sec.)

 Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 17.6 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	4.36	5.58	6.98	8.72	10.99
90	R	0.3	0.1	0.0	0.0	0.0
	V	1.9	1.2	0.8	0.5	0.3
95	R	0.3	0.1	0.0	0.0	0.0
	V	2.0	1.2	0.8	0.5	0.3
100	R	0.4	0.1	0.0	0.0	0.0
	V	2.1	1.3	0.8	0.5	0.3
110	R	0.5	0.1	0.0	0.0	0.0
	V	2.4	1.4	0.9	0.6	0.4
120	R	0.5	0.2	0.1	0.0	0.0
	V	2.6	1.6	1.0	0.6	0.4
130	R	0.6	0.2	0.1	0.0	0.0
	V	2.8	1.7	1.1	0.7	0.4
140	R	0.7	0.2	0.1	0.0	0.0
	V	3.0	1.8	1.2	0.8	0.5
150	R	0.8	0.2	0.1	0.0	0.0
	V	3.2	2.0	1.3	0.8	0.5
160	R	0.9	0.3	0.1	0.0	0.0
	V	3.4	2.1	1.3	0.9	0.5
170	R	1.0	0.3	0.1	0.0	0.0
	V	3.6	2.2	1.4	0.9	0.6
180	R	1.1	0.3	0.1	0.0	0.0
	V	3.9	2.4	1.5	1.0	0.6
190	R	1.2	0.4	0.1	0.0	0.0
	V	4.1	2.5	1.6	1.0	0.6
200	R	1.4	0.4	0.1	0.0	0.0
	V	4.3	2.6	1.7	1.1	0.7
220	R	1.6	0.5	0.2	0.1	0.0
	V	4.7	2.9	1.8	1.2	0.7
240	R	1.9	0.6	0.2	0.1	0.0
	V	5.2	3.1	2.0	1.3	0.8
260	R	2.2	0.7	0.2	0.1	0.0
	V	5.6	3.4	2.2	1.4	0.9
280	R	2.5	0.8	0.3	0.1	0.0
	V	6.0	3.7	2.4	1.5	0.9
300	R	2.9	0.9	0.3	0.1	0.0
	V	6.4	3.9	2.5	1.6	1.0
320	R	3.3	1.0	0.3	0.1	0.0
	V	6.9	4.2	2.7	1.7	1.1

Q (gpm)	Dimension	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	4.36	5.58	6.98	8.72	10.99
340	R	3.6	1.1	0.4	0.1	0.0
	V	7.3	4.5	2.9	1.8	1.1
360	R	4.0	1.2	0.4	0.1	0.0
	V	7.7	4.7	3.0	1.9	1.2
380	R	4.5	1.3	0.5	0.2	0.0
	V	8.2	5.0	3.2	2.0	1.3
400	R	4.9	1.5	0.5	0.2	0.1
	V	8.6	5.2	3.4	2.1	1.4
450	R	6.1	1.8	0.6	0.2	0.1
	V	9.7	5.9	3.8	2.4	1.5
500	R	7.4	2.2	0.8	0.3	0.1
	V	10.7	6.6	4.2	2.7	1.7
550	R		2.7	0.9	0.3	0.1
	V		7.2	4.6	3.0	1.9
600	R		3.1	1.1	0.4	0.1
	V		7.9	5.0	3.2	2.0
650	R		3.6	1.2	0.4	0.1
	V		8.5	5.5	3.5	2.2
700	R		4.2	1.4	0.5	0.2
	V		9.2	5.9	3.8	2.4
750	R		4.7	1.6	0.5	0.2
	V		9.8	6.3	4.0	2.5
800	R		5.3	1.8	0.6	0.2
	V		10.5	6.7	4.3	2.7
850	R			2.0	0.7	0.2
	V			7.1	4.6	2.9
900	R			2.2	0.8	0.2
	V			7.6	4.8	3.0
950	R			2.5	0.8	0.3
	V			8.0	5.1	3.2
1,000	R			2.7	0.9	0.3
	V			8.4	5.4	3.4
1,100	R			3.2	1.1	0.4
	V			9.2	5.9	3.7
1,200	R			3.8	1.3	0.4
	V			10.1	6.4	4.1
1,300	R				1.5	0.5
	V				7.0	4.4

Recommended sizing based on flow rate (approximately 8 ft./sec.)

Recommended size of the critical leg of the system based on the head loss (average 3 ft./100 ft. or less)

## SDR 17.6 pipe

The following table provides head loss and flow rate for Uponor PP-RCT pipes according to size and specified gpm.

Q = Flow rate (U.S. gpm) R = Head loss (ft.<sub>H<sub>2</sub>O</sub>/100 ft.) V = Flow velocity (ft./sec.)

Q (gpm)	Dimension	4" (125 mm)	6" (160 mm)	8" (200 mm)	10" (250 mm)	12" (315 mm)
	di (in)	4.36	5.58	6.98	8.72	10.99
1,400	R				1.7	0.67
	V				7.5	4.7
1,500	R				1.9	0.6
	V				8.1	5.1
1,600	R				2.2	0.7
	V				8.6	5.4
1,700	R				2.4	0.8
	V				9.1	5.7
1,800	R				2.7	0.9
	V				9.7	6.1
1,900	R				3.0	1.0
	V				10.2	6.4
2,000	R					1.1
	V					6.8
2,200	R					1.3
	V					7.4
2,400	R					1.5
	V					8.1
2,600	R					1.7
	V					8.8
2,800	R					2.0
	V					9.5
3,000	R					2.3
	V					10.1
3,200	R					
	V					
3,400	R					
	V					
3,600	R					
	V					
3,800	R					
	V					
4,000	R					
	V					
4,200	R					
	V					

## Head loss vs. flow rates based on the Hazen-Williams principle

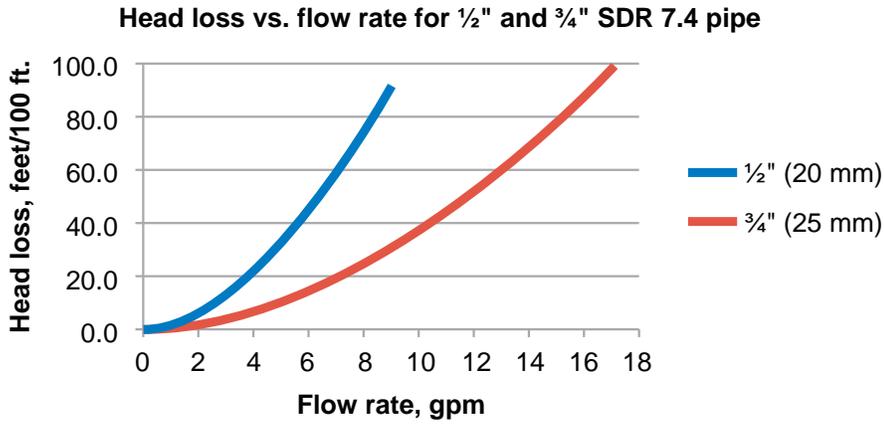


Figure A-1: Head loss vs. flow rate for ½" and ¾" SDR 7.4 pipe

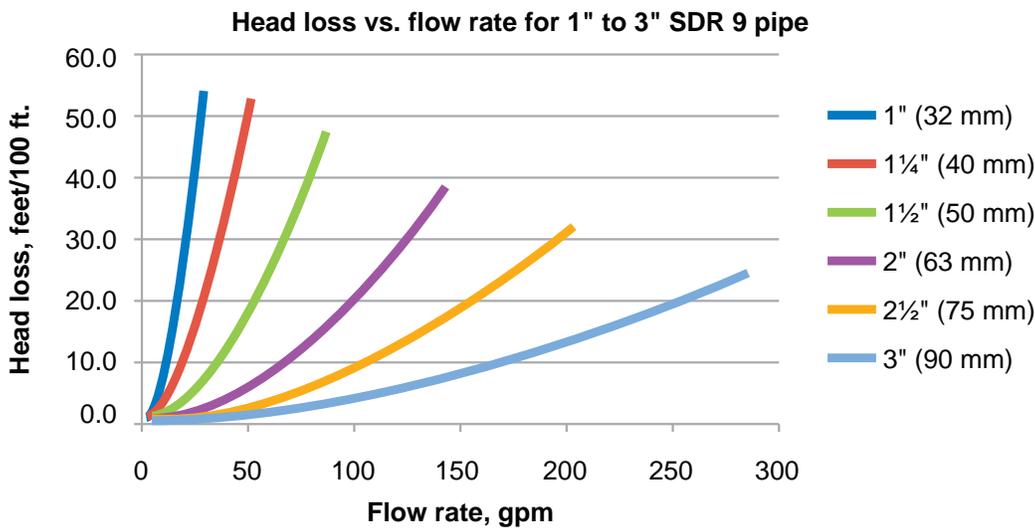


Figure A-2: Head loss vs. flow rate for 1" to 3" SDR 9 pipe

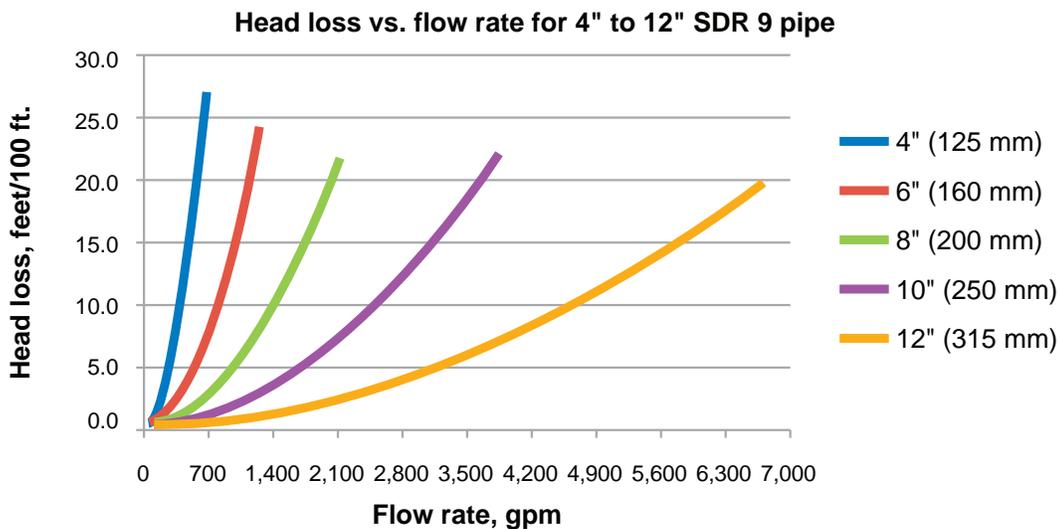
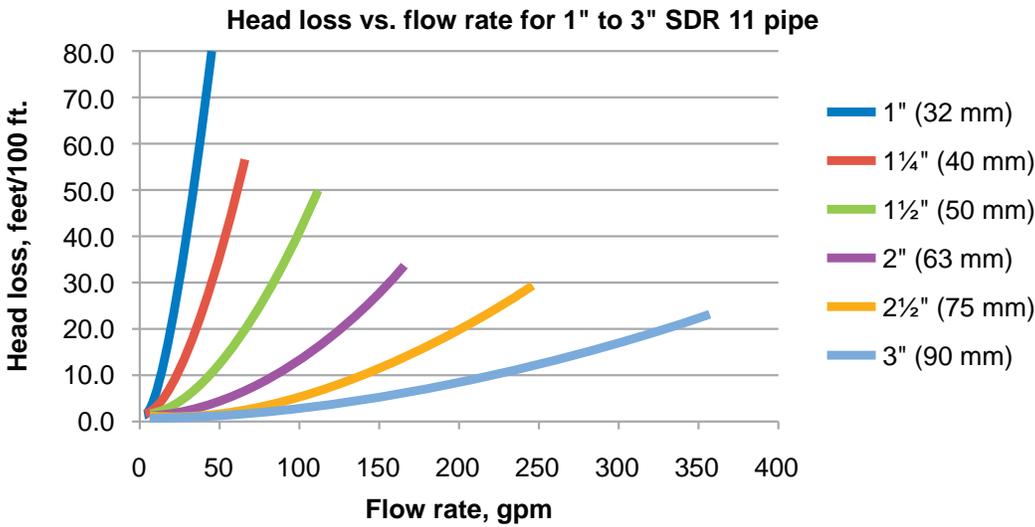
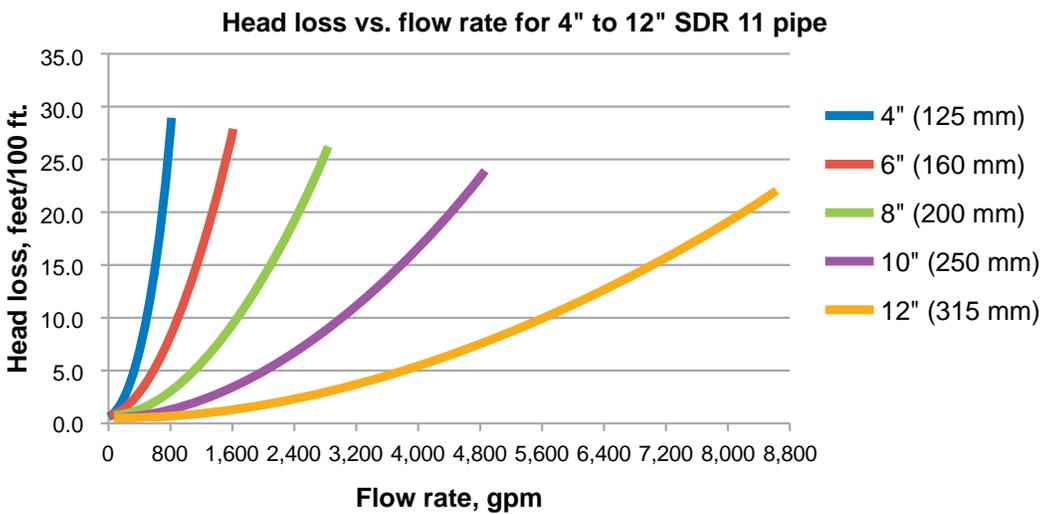


Figure A-3: Head loss vs. flow rate for 4" to 12" SDR 9 pipe

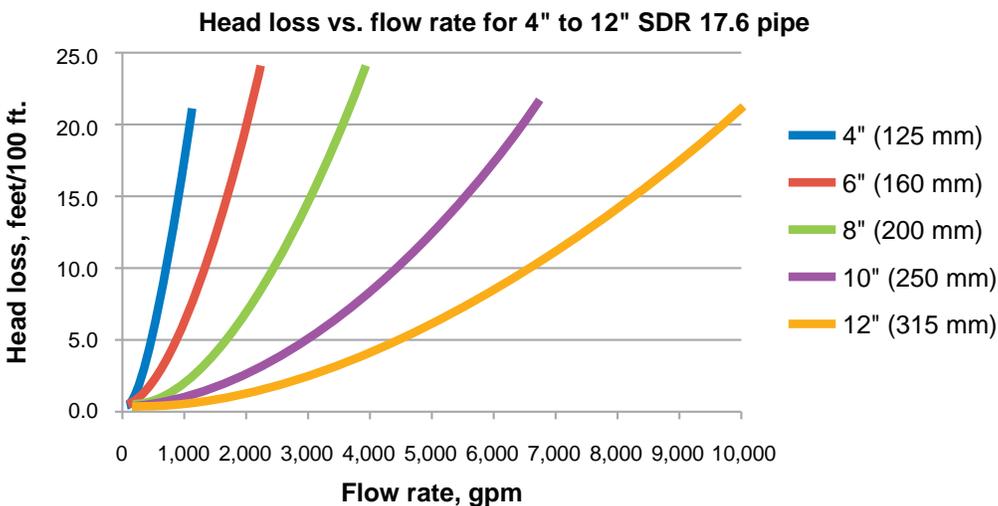
## Head loss vs. flow rates based on the Hazen-Williams principle



**Figure A-4: Head loss vs. flow rate for 1" to 3" SDR 11 pipe**



**Figure A-5: Head loss vs. flow rate for 4" to 12" SDR 11 pipe**

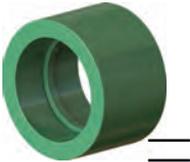


**Figure A-6: Head loss vs. flow rate for 4" to 12" SDR 17.6 pipe**

## Appendix B: Equivalent length of fittings

### Equivalent length of fittings charts

Use the following tables to calculate pressure drop across fittings. The amount of pressure drop is equivalent to the length of pipe that will have the same pressure loss under the same flow conditions. These equivalents are added to your total piping footage for use when calculating pressure loss of your system.

Coupling	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		0.5	0.7	0.9	1.1	1.4	1.7	2.1	2.5	4.2

Butt fusion bead	Butt fusion	Dimension N.D. – O.D.								
		6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	2.0	1.5	1.9	2.4					
	SDR 11	2.2	1.7	2.1	2.7					
	SDR 17.6	3.0	1.9	2.3	2.9					

Reducer (by 1 dimension)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	6.7
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	7.6	10	12.7	16					
	SDR 11	8.6	10.7	13.4	16.9					
	SDR 17.6	9.3	11.6	14.5	18.3					

Reducer (by 2 dimensions)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		–	1.4	1.7	2.2	2.7	3.4	4.1	4.9	8.4
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	9.5	12.7	15.9	20.1					
	SDR 11	10.7	13.4	16.8	21.1					
	SDR 17.6	11.6	14.5	18.2	22.9					

Reducer (by 3 dimensions)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		–	–	2.1	2.6	3.3	4.1	4.9	5.9	10.1
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	11.5	15.0	18.6	23.5					
	SDR 11	12.9	16.1	20.1	25.4					
	SDR 17.6	14	17.4	21.8	27.5					

Reducer (by 4 dimensions)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		–	–	–	3.1	3.8	4.8	5.7	6.9	11.7
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	13.7	17.5	21.8	27.3					
	SDR 11	15.0	18.8	23.5	29.6					
	SDR 17.6	16.3	20.3	25.4	32.1					

Reducer (by 5 dimensions)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		–	–	–	–	4.4	5.5	6.6	7.9	13.4
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	15.2	19.1	23.8	30					
	SDR 11	17.2	21.5	26.8	33.8					
	SDR 17.6	18.6	23.3	29.1	36.6					

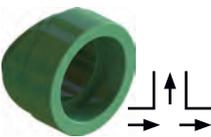
Reducer (by 6 dimensions)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		–	–	–	–	–	6.2	7.4	8.9	15.1
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	17.2	21.4	26.8	33.8					
	SDR 11	19.3	24.2	30.2	38.1					
	SDR 17.6	20.9	26.2	32.7	41.3					

90 elbow	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		1.6	2	2.6	3.3	4.1	5.2	6.2	7.4	12.6
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	18	21.5	25.5	32.2					
	SDR 11	17.2	20.4	26.8	33.8					
	SDR 17.6	19.8	23.3	29.1	36.6					

90 street elbow	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		1.6	2	2.6	-	-	-	-	-	-

45 elbow	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	6.7
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	6.0	7.6	9.6	12.0					
	SDR 11	6.4	8.1	10.1	12.7					
	SDR 17.6	7.0	8.7	10.9	13.7					

45 street elbow	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		0.9	1.1	1.4	-	-	-	-	-	-

Saddle outlet	Outlet fusion	Dimension N.D. – O.D.									
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm	6" 160 mm
		0.6	0.8	1	1.3	1.7	2.1	2.5	3	5	5.8

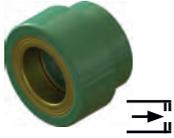
Tee (through flow)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
		0.5	0.7	0.9	1.1	1.4	1.7	2.1	2.5	4.2
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	5	6.2	7.7	9.1					
	SDR 11	5.4	6.7	8.4	10.6					
	SDR 17.6	5.8	7.3	9.1	11.5					

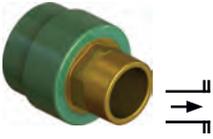
Tee (separation of flow)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
 		2.6	3.3	4.2	5.2	6.6	8.3	9.8	11.8	20.1
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	23.9	30.6	38.2	48.2					
	SDR 11	25.8	32.2	40.3	50.7					
	SDR 17.6	27.9	34.9	43.6	55					

Tee (separation of flow – counter current)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
 		3.9	4.9	6.3	7.9	9.9	12.4	14.8	17.7	30.2
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	34.4	42.9	53.6	67.5					
	SDR 11	38.7	48.3	60.4	76.1					
	SDR 17.6	41.9	52.3	65.4	82.4					

Tee (conjunction of flow)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
 		1.7	2.2	2.8	3.5	4.4	5.5	6.6	7.9	13.4
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	15.2	19.1	33.8	30					
	SDR 11	17.2	21.5	26.8	33.8					
	SDR 17.6	18.6	23.3	29.1	36.6					

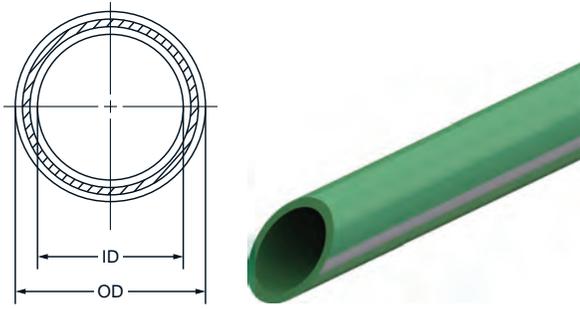
Tee (conjunction of flow – counter current)	Socket fusion	Dimension N.D. – O.D.								
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm	2½" 75 mm	3" 90 mm	4" 125 mm
 		5.2	6.5	8.2	10.4	13.1	16.4	24.6	29.5	50.3
	Butt fusion	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm					
	SDR 9	57.2	76.5	95.6	120.6					
	SDR 11	64.4	80.5	100.7	126.9					
	SDR 17.6	69.8	87.2	109.1	137.4					

Brass female threaded adapter (socket fusion)	Outlet fusion	Dimension N.D. – O.D.					
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm
		1.1	1.4	1.7	2.2	2.7	3.4

Brass male threaded adapter (socket fusion)	Outlet fusion	Dimension N.D. – O.D.					
		½" 20 mm	¾" 25 mm	1" 32 mm	1¼" 40 mm	1½" 50 mm	2" 63 mm
		1.5	1.9	2.4	3.1	3.8	4.8



## Appendix C: Pipe and fittings dimensions and weights



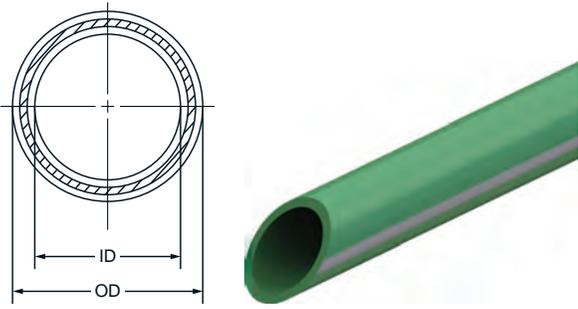
### Mechanical pipe

**Material:** PP-RCT with fiber composite layer

**Identification:** SDR 7.4 and SDR 9, green with gray stripes; SDR 11 and SDR 17.6, solid green

**Applications:** Hydronic heating and cooling and industrial

Part no.	Description	I.D.	O.D.	Volume (gal./ft.)	Weight (lbs./ft.)	Weight with water (lbs./ft.)
<b>SDR 7.4</b>						
PR7231350	½" Uponor PP-RCT Mechanical Pipe, SDR 7.4 with Fiber, 13-ft. straight length	0.57"	0.79"	0.013	0.11	0.22
PR7231375	¾" Uponor PP-RCT Mechanical Pipe, SDR 7.4 with Fiber, 13-ft. straight length	0.71"	0.98"	0.021	0.17	0.34
<b>SDR 9</b>						
PR9231310	1" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 13-ft. straight length	0.98"	1.26"	0.039	0.22	0.55
PR9231313	1¼" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 13-ft. straight length	1.22"	1.58"	0.061	0.34	0.85
PR9231315	1½" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 13-ft. straight length	1.53"	1.97"	0.095	0.53	1.33
PR9231320	2" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 13-ft. straight length	1.92"	2.48"	0.150	0.85	2.10
PR9231925	2½" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 19-ft. straight length	2.29"	2.95"	0.214	1.19	2.97
PR9231930	3" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 19-ft. straight length	2.75"	3.54"	0.308	1.72	4.29
PR9231940	4" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 19-ft. straight length	3.82"	4.92"	0.595	3.28	8.24
PR9231960	6" Uponor PP-RCT Mechanical Pipe, SDR 9 with Fiber, 19-ft. straight length	4.89"	6.30"	0.979	5.37	13.53



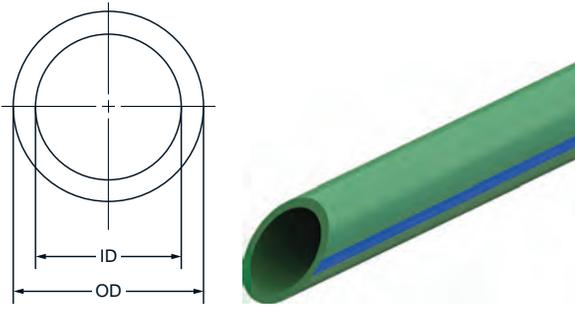
## Mechanical pipe (continued)

**Material:** PP-RCT with fiber composite layer

**Identification:** SDR 7.4 and SDR 9, green with gray stripes; SDR 11 and SDR 17.6, solid green

**Applications:** Hydronic heating and cooling and industrial

Part no.	Description	I.D.	O.D.	Volume (gal./ft.)	Weight (lbs./ft.)	Weight with water (lbs./ft.)
<b>SDR 11</b>						
PR11231310	1" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 13-ft. straight length	1.03"	1.26"	0.043	0.19	0.55
PR11231313	1¼" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 13-ft. straight length	1.28"	1.58"	0.067	0.29	0.85
PR11231315	1½" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 13-ft. straight length	1.61"	1.97"	0.106	0.45	1.33
PR11231320	2" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 13-ft. straight length	2.02"	2.48"	0.166	0.72	2.11
PR11231925	2½" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	2.42"	2.95"	0.239	1.00	2.99
PR11231930	3" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	2.90"	3.54"	0.343	1.44	4.30
PR11231940	4" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	4.02"	4.92"	0.659	2.77	8.26
PR11231960	6" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	5.15"	6.30"	1.082	4.52	13.53
PR11231980	8" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	6.44"	7.87"	1.686	7.04	21.08
PR112319100	10" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	8.06"	9.84"	2.649	10.95	33.02
PR112319120	12" Uponor PP-RCT Mechanical Pipe, SDR 11 with Fiber, 19-ft. straight length	10.15"	12.40"	4.201	17.26	52.26
<b>SDR 17.6</b>						
PR17231940	4" Uponor PP-RCT Mechanical Pipe, SDR 17.6 with Fiber, 19-ft. straight length	4.36"	4.92"	0.775	1.80	8.26
PR17231960	6" Uponor PP-RCT Mechanical Pipe, SDR 17.6 with Fiber, 19-ft. straight length	5.58"	6.30"	1.270	2.93	13.51
PR17231980	8" Uponor PP-RCT Mechanical Pipe, SDR 17.6 with Fiber, 19-ft. straight length	6.98"	7.87"	1.987	4.57	21.12
PR172319100	10" Uponor PP-RCT Mechanical Pipe, SDR 17.6 with Fiber, 19-ft. straight length	8.72"	9.84"	3.101	7.11	32.94
PR172319120	12" Uponor PP-RCT Mechanical Pipe, SDR 17.6 with Fiber, 19-ft. straight length	10.99"	12.40"	4.925	11.25	52.28



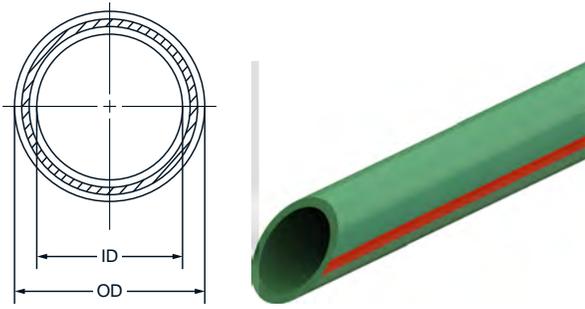
## Cold potable pipe

### Material: PP-RCT

**Identification:** SDR 7.4 and SDR 11, green with blue stripes

**Applications:** Cold potable water and other lower-pressure, lower-temperature applications

Part no.	Description	I.D.	O.D.	Weight (lbs./ft.)
<b>SDR 7.4</b>				
PR72213500	½" Uponor PP-RCT Cold Potable Pipe, SDR 7.4, 13-ft. straight length	0.57"	0.79"	0.10
PR72213750	¾" Uponor PP-RCT Cold Potable Pipe, SDR 7.4, 13-ft. straight length	0.71"	0.98"	0.16
<b>SDR 11</b>				
PR11221310	1" Uponor PP-RCT Cold Potable Pipe, SDR 11, 13-ft. straight length	1.03"	1.26"	0.18
PR11221313	1¼" Uponor PP-RCT Cold Potable Pipe, SDR 11, 13-ft. straight length	1.28"	1.58"	0.28
PR11221315	1½" Uponor PP-RCT Cold Potable Pipe, SDR 11, 13-ft. straight length	1.61"	1.97"	0.43
PR11221320	2" Uponor PP-RCT Cold Potable Pipe, SDR 11, 13-ft. straight length	2.02"	2.48"	0.68
PR11221925	2½" Uponor PP-RCT Cold Potable Pipe, SDR 11, 19-ft. straight length	2.42"	2.95"	0.95
PR11221930	3" Uponor PP-RCT Cold Potable Pipe, SDR 11, 19-ft. straight length	2.90"	3.54"	1.36
PR11221940	4" Uponor PP-RCT Cold Potable Pipe, SDR 11, 19-ft. straight length	4.02"	4.92"	2.63
PR11221960	6" Uponor PP-RCT Cold Potable Pipe, SDR 11, 19-ft. straight length	5.15"	6.30"	4.30
PR11221980	8" Uponor PP-RCT Cold Potable Pipe, SDR 11, 19-ft. straight length	6.44"	7.87"	6.71



## Hot potable pipe

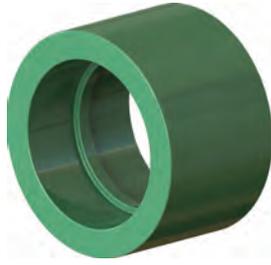
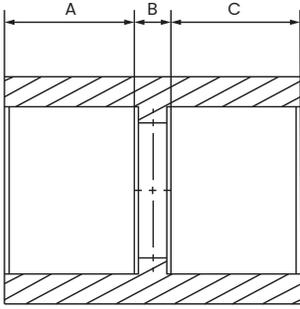
**Material:** PP-RCT with fiber composite layer

**Identification:** SDR 7.4 and SDR 9, green with red stripes

**Applications:** Hot potable water and hydronic heating and cooling applications

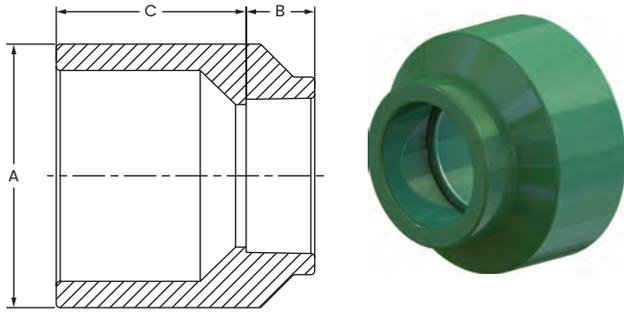
Part no.	Description	I.D.	O.D.	Weight (lbs./ft.)
<b>SDR 7.4</b>				
PR7221350	½" Uponor PP-RCT Hot Potable Pipe, SDR 7.4 with Fiber, 13-ft. straight length	0.57"	0.79"	0.12
PR7221375	¾" Uponor PP-RCT Hot Potable Pipe, SDR 7.4 with Fiber, 13-ft. straight length	0.71"	0.98"	0.17
<b>SDR 9</b>				
PR9221310	1" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	0.98"	1.26"	0.22
PR9221313	1¼" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	1.22"	1.58"	0.34
PR9221315	1½" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	1.53"	1.97"	0.53
PR9221320	2" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	1.92"	2.48"	0.85
PR9221925	2½" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	2.29"	2.95"	1.19
PR9221930	3" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	2.75"	3.54"	1.72
PR9221940	4" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	3.82"	4.92"	3.28
PR9221960	6" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	4.89"	6.30"	5.37
PR9221980	8" Uponor PP-RCT Hot Potable Pipe, SDR 9 with Fiber, 13-ft. straight length	6.11"	7.87"	8.39

## Fittings



### Coupling (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR4775050	Uponor PP-RCT Coupling, ½" x ½"	5/8"	3/16"	5/8"	0.03
PR477575	Uponor PP-RCT Coupling, ¾" x ¾"	11/16"	3/16"	11/16"	0.04
PR4771010	Uponor PP-RCT Coupling, 1" x 1"	¾"	1/8"	¾"	0.07
PR4771313	Uponor PP-RCT Coupling, 1¼" x 1¼"	7/8"	1/8"	7/8"	0.13
PR4771515	Uponor PP-RCT Coupling, 1½" x 1½"	15/16"	3/16"	15/16"	0.20
PR4772020	Uponor PP-RCT Coupling, 2" x 2"	1 1/8"	5/16"	1 1/8"	0.38
PR4772525	Uponor PP-RCT Coupling, 2½" x 2½"	1 ¼"	3/16"	1 ¼"	0.45
PR4773030	Uponor PP-RCT Coupling, 3" x 3"	1 5/16"	5/16"	1 5/16"	0.86
PR4774040	Uponor PP-RCT Coupling, 4" x 4"	1 9/16"	¼"	1 9/16"	1.83

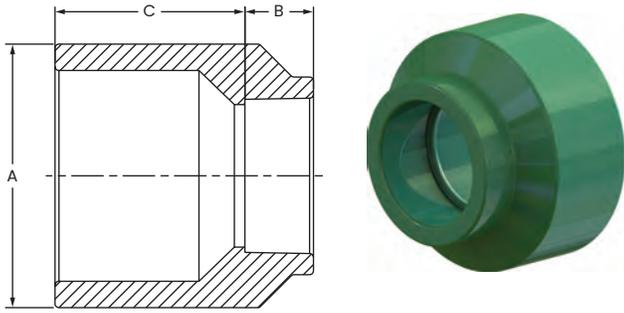


## Fitting reducer (socket fusion)

Fitting reducers feature one socket end and one fitting socket end that **must be used in conjunction with an appropriately sized straight coupling (see page 63) to complete a straight reduction**. These fitting reducers can also be used in conjunction with socket tees or elbows to create a reducing fitting.

**Note:** Fitting reducers, where 4" is the larger end, can also be butt fused (using the 4" end). Ensure that the appropriate SDR is selected to match the pipe it's being fused to.

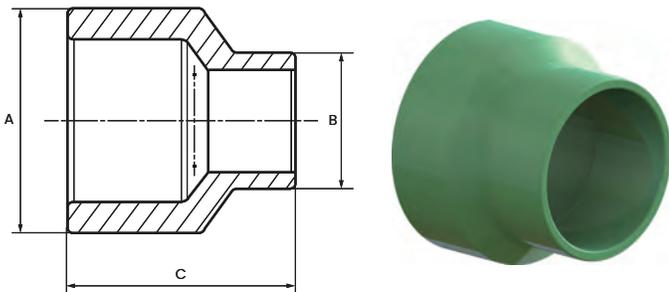
Part no.	Description	A	B	C	Weight (lbs.)
PR4777550	Uponor PP-RCT Fitting Reducer, ¾" x ½"	63/64"	37/64"	39/64"	0.02
PR4771050	Uponor PP-RCT Fitting Reducer, 1" x ½"	17/64"	11/16"	15/16"	0.05
PR4771075	Uponor PP-RCT Fitting Reducer, 1" x ¾"	17/64"	11/16"	15/16"	0.04
PR4771350	Uponor PP-RCT Fitting Reducer, 1¼" x ½"	137/64"	37/64"	15/16"	0.04
PR4771375	Uponor PP-RCT Fitting Reducer, 1¼" x ¾"	137/64"	5/8"	57/64"	0.04
PR4771550	Uponor PP-RCT Fitting Reducer, 1½" x ½"	131/32"	37/64"	13/16"	0.07
PR4771575	Uponor PP-RCT Fitting Reducer, 1½" x ¾"	131/32"	5/8"	15/16"	0.08
PR4772075	Uponor PP-RCT Fitting Reducer, 2" x ¾"	131/64"	21/32"	129/32"	0.19
PR4772550	Uponor PP-RCT Fitting Reducer, 2½" x ½"	281/64"	37/64"	113/64"	0.21
PR4772575	Uponor PP-RCT Fitting Reducer, 2½" x ¾"	281/64"	5/8"	15/16"	0.22
PR4771310	Uponor PP-RCT Fitting Reducer, 1¼" x 1"	137/64"	¾"	11/8"	0.08
PR4771510	Uponor PP-RCT Fitting Reducer, 1½" x 1"	131/32"	23/32"	7/8"	0.08
PR4771513	Uponor PP-RCT Fitting Reducer, 1½" x 1¼"	131/32"	27/64"	1	0.12
PR4772010	Uponor PP-RCT Fitting Reducer, 2" x 1"	231/64"	47/64"	123/32"	0.19
PR4772013	Uponor PP-RCT Fitting Reducer, 2" x 1¼"	231/64"	53/64"	147/64"	0.19
PR4772015	Uponor PP-RCT Fitting Reducer, 2" x 1½"	231/64"	15/16"	115/64"	0.22
PR4772513	Uponor PP-RCT Fitting Reducer, 2½" x 1¼"	281/64"	13/16"	19/64"	0.22
PR4772515	Uponor PP-RCT Fitting Reducer, 2½" x 1½"	281/64"	59/64"	11/32"	0.23
PR4772520	Uponor PP-RCT Fitting Reducer, 2½" x 2"	281/64"	15/64"	135/64"	0.38
PR4772510	Uponor PP-RCT Fitting Reducer, 2½" x 1"	281/64"	23/32"	17/32"	0.22
PR4773015	Uponor PP-RCT Fitting Reducer, 3" x 1½"	335/64"	59/64"	113/64"	0.35
PR4773020	Uponor PP-RCT Fitting Reducer, 3" x 2"	335/64"	15/64"	13/32"	0.36
PR4773025	Uponor PP-RCT Fitting Reducer, 3" x 2½"	39/16"	17/32"	113/16"	0.70
PR94774025	Uponor PP-RCT Fitting Reducer, 4" x 2½", SDR 9	459/64"	13/16"	13/8"	0.82
PR114774025	Uponor PP-RCT Fitting Reducer, 4" x 2½", SDR 11	459/64"	119/64"	111/32"	0.71
PR174774025	Uponor PP-RCT Fitting Reducer, 4" x 2½", SDR 17.6	459/64"	119/64"	111/32"	0.62
PR94774030	Uponor PP-RCT Fitting Reducer, 4" x 3", SDR 9	459/64"	119/64"	129/64"	0.89
PR114774030	Uponor PP-RCT Fitting Reducer, 4" x 3", SDR 11	459/64"	119/64"	111/32"	0.58
PR174774030	Uponor PP-RCT Fitting Reducer, 4" x 3", SDR 17.6	459/64"	119/64"	111/32"	0.44



## Reducer (butt to socket fusion)

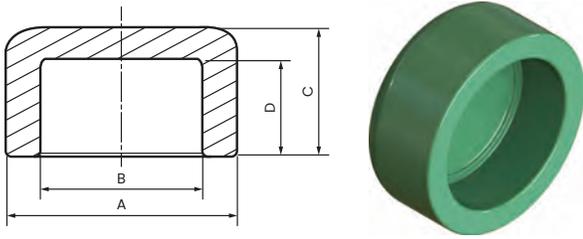
Butt-to-socket fusion reducers feature one (larger) butt end and one (smaller) socket end.

Part no.	Description	A	B	C	Weight (lbs.)
PR94776040	Uponor PP-RCT Reducer, 6" x 4", SDR 9. Butt to Socket Fusion	6 <sup>10</sup> / <sub>64</sub> "	1 <sup>37</sup> / <sub>64</sub> "	1 <sup>40</sup> / <sub>64</sub> "	1.60
PR114776040	Uponor PP-RCT Reducer, 6" x 4", SDR 11, Butt to Socket Fusion	6 <sup>10</sup> / <sub>64</sub> "	1 <sup>37</sup> / <sub>64</sub> "	1 <sup>40</sup> / <sub>64</sub> "	1.49
PR174776040	Uponor PP-RCT Reducer, 6" x 4", SDR 17.6. Butt to Socket Fusion	6 <sup>10</sup> / <sub>64</sub> "	1 <sup>37</sup> / <sub>64</sub> "	1 <sup>40</sup> / <sub>64</sub> "	1.39



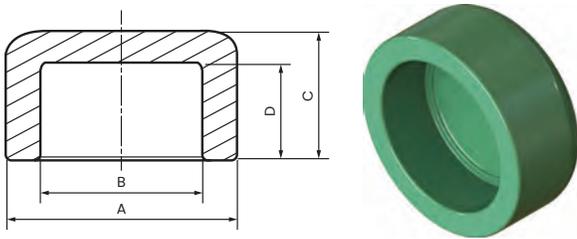
## Reducer (butt fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR94778040	Uponor PP-RCT Reducer, 8" x 4", SDR 9	7 <sup>7</sup> / <sub>8</sub> "	4 <sup>15</sup> / <sub>16</sub> "	6 <sup>1</sup> / <sub>4</sub> "	2.50
PR114778040	Uponor PP-RCT Reducer, 8" x 4", SDR 11	7 <sup>7</sup> / <sub>8</sub> "	4 <sup>15</sup> / <sub>16</sub> "	6 <sup>1</sup> / <sub>4</sub> "	2.21
PR174778040	Uponor PP-RCT Reducer, 8" x 4", SDR 17.6	7 <sup>7</sup> / <sub>8</sub> "	4 <sup>15</sup> / <sub>16</sub> "	6 <sup>1</sup> / <sub>4</sub> "	1.52
PR94778060	Uponor PP-RCT Reducer, 8" x 6", SDR 9	7 <sup>7</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>16</sub> "	2.44
PR114778060	Uponor PP-RCT Reducer, 8" x 6", SDR 11	7 <sup>7</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>16</sub> "	2.11
PR174778060	Uponor PP-RCT Reducer, 8" x 6", SDR 17.6	7 <sup>7</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>16</sub> "	1.39
PR94771060	Uponor PP-RCT Reducer, 10" x 6", SDR 9	9 <sup>27</sup> / <sub>32</sub> "	6 <sup>10</sup> / <sub>64</sub> "	8 <sup>5</sup> / <sub>64</sub> "	4.48
PR114771060	Uponor PP-RCT Reducer, 10" x 6", SDR 11	9 <sup>27</sup> / <sub>32</sub> "	6 <sup>10</sup> / <sub>64</sub> "	8 <sup>5</sup> / <sub>64</sub> "	4.03
PR174771060	Uponor PP-RCT Reducer, 10" x 6", SDR 17.6	9 <sup>7</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	8 <sup>5</sup> / <sub>16</sub> "	2.67
PR94771080	Uponor PP-RCT Reducer, 10" x 8", SDR 9	9 <sup>27</sup> / <sub>32</sub> "	7 <sup>7</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>8</sub> "	4.15
PR114771080	Uponor PP-RCT Reducer, 10" x 8", SDR 11	9 <sup>27</sup> / <sub>32</sub> "	7 <sup>7</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>8</sub> "	3.64
PR174771080	Uponor PP-RCT Reducer, 10" x 8", SDR 17.6	9 <sup>7</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>8</sub> "	2.39
PR94771280	Uponor PP-RCT Reducer, 12" x 8", SDR 9	12 <sup>19</sup> / <sub>32</sub> "	7 <sup>7</sup> / <sub>8</sub> "	8 <sup>15</sup> / <sub>32</sub> "	8.24
PR174771280	Uponor PP-RCT Reducer, 12" x 8", SDR 17.6	12 <sup>7</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	8 <sup>5</sup> / <sub>8</sub> "	4.95
PR174771280	Uponor PP-RCT Reducer, 12" x 8", SDR 17.6	12 <sup>19</sup> / <sub>32</sub> "	7 <sup>7</sup> / <sub>8</sub> "	6 <sup>9</sup> / <sub>16</sub> "	7.46
PR94771210	Uponor PP-RCT Reducer, 12" x 10", SDR 9	12 <sup>19</sup> / <sub>32</sub> "	9 <sup>27</sup> / <sub>32</sub> "	8 <sup>5</sup> / <sub>64</sub> "	7.49
PR114771210	Uponor PP-RCT Reducer, 12" x 10", SDR 11	12 <sup>19</sup> / <sub>32</sub> "	9 <sup>27</sup> / <sub>32</sub> "	8 <sup>5</sup> / <sub>64</sub> "	6.59
PR174771210	Uponor PP-RCT Reducer, 12" x 10", SDR 17.6	12 <sup>7</sup> / <sub>16</sub> "	9 <sup>7</sup> / <sub>8</sub> "	8 <sup>1</sup> / <sub>16</sub> "	4.34



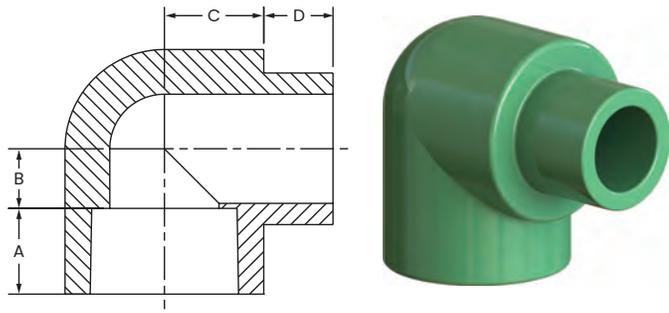
## End cap (socket fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR4350500	Uponor PP-RCT End Cap, ½"	1 1/16"	¾"	¾"	5/8"	0.01
PR4350750	Uponor PP-RCT End Cap, ¾"	1 3/8"	15/16"	7/8"	5/8"	0.03
PR4351000	Uponor PP-RCT End Cap, 1"	1 ¼"	1 ¼"	1 1/16"	¾"	0.05
PR4351250	Uponor PP-RCT End Cap, 1 ¼"	2 ¼"	1 9/16"	1 3/8"	13/16"	0.12
PR4351500	Uponor PP-RCT End Cap, 1 ½"	2 ¾"	1 15/16"	1 3/8"	7/8"	0.18
PR4352000	Uponor PP-RCT End Cap, 2"	3 7/16"	2 7/16"	1 5/8"	1 1/16"	0.33
PR4352500	Uponor PP-RCT End Cap, 2 ½"	3 15/16"	2 15/16"	2"	1 3/16"	0.49
PR4353000	Uponor PP-RCT End Cap, 3"	4 11/16"	3 ½"	2 ¼"	1 5/16"	0.80
PR4354000	Uponor PP-RCT End Cap, 4"	6 9/16"	4 7/8"	3"	1 9/16"	2.04



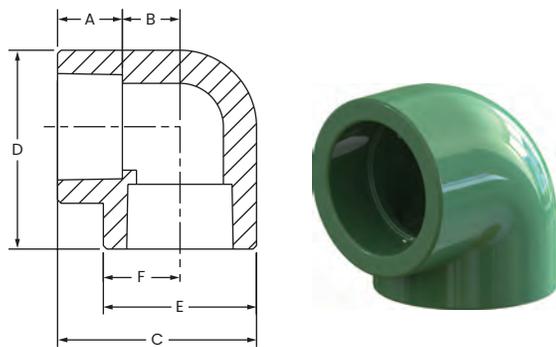
## End cap (butt fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR9435600	Uponor PP-RCT End Cap, 6", SDR 9	6 5/16"	4 7/8"	2 15/16"	1 1/16"	1.67
PR1143560	Uponor PP-RCT End Cap, 6", SDR 11	6 5/16"	5 1/16"	2 15/16"	1 5/8"	1.58
PR1743560	Uponor PP-RCT End Cap, 6", SDR 17.6	6 5/16"	5 ½"	3"	1 1/16"	1.36
PR943580	Uponor PP-RCT End Cap, 8", SDR 9	7 7/8"	6 7/8"	4 23/64"	3 5/32"	3.65
PR1143580	Uponor PP-RCT End Cap, 8", SDR 11	7 7/8"	6 7/16"	4 11/32"	3 5/8"	3.30
PR1743580	Uponor PP-RCT End Cap, 8", SDR 17.6	7 7/8"	6 15/16"	4 3/8"	3 1/8"	2.70
PR9435100	Uponor PP-RCT End Cap, 10", SDR 9	9 27/32"	7 41/64"	4 23/64"	3 23/64"	6.05
PR11435100	Uponor PP-RCT End Cap, 10", SDR 11	9 27/32"	8 1/16"	4 31/64"	3 19/32"	5.56
PR17435100	Uponor PP-RCT End Cap, 10", SDR 17.6	9 7/8"	8 11/16"	4 ½"	2 15/16"	4.68
PR9435120	Uponor PP-RCT End Cap, 12", SDR 9	12 13/32"	9 5/8"	4 43/64"	3 9/32"	10.40
PR11435120	Uponor PP-RCT End Cap, 12", SDR 11	12 13/32"	10 5/32"	4 25/64"	3 ¾"	9.67
PR17435120	Uponor PP-RCT End Cap, 12", SDR 17.6	12 7/16"	10 15/16"	4 11/16"	2 5/8"	8.37



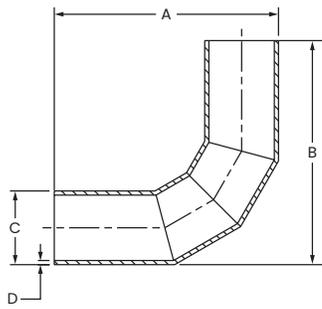
## 90 street elbow (socket fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR4439050	Uponor PP-RCT 90 Street Elbow, ½" x ½"	5/8"	3/8"	3/4"	5/8"	0.05
PR4439075	Uponor PP-RCT 90 Street Elbow, ¾" x ¾"	5/8"	3/8"	5/8"	½"	0.05
PR4439010	Uponor PP-RCT 90 Street Elbow, 1" x 1"	11/16"	½"	13/16"	9/16"	0.10



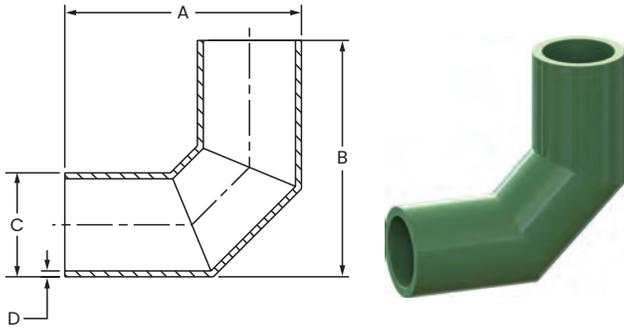
## 90 elbow (socket fusion)

Part no.	Description	A	B	C	D	E	F	Weight (lbs.)
PR4769050	Uponor PP-RCT 90 Elbow, ½" x ½"	37/64"	29/64"	137/64"	137/64"	17/64"	35/64"	0.03
PR4769075	Uponor PP-RCT 90 Elbow, ¾" x ¾"	5/8"	39/64"	159/64"	159/64"	123/64"	43/64"	0.07
PR4769010	Uponor PP-RCT 90 Elbow, 1" x 1"	3/4"	43/64"	219/64"	219/64"	149/64"	57/64"	0.13
PR4769013	Uponor PP-RCT 90 Elbow, 1¼" x 1¼"	13/16"	13/16"	221/32"	221/32"	23/32"	13/64"	0.17
PR4769015	Uponor PP-RCT 90 Elbow, 1½" x 1½"	15/16"	11/8"	313/32"	313/32"	243/64"	11/32"	0.40
PR4769020	Uponor PP-RCT 90 Elbow, 2" x 2"	11/8"	13/8"	411/64"	411/64"	311/32"	143/64"	0.77
PR4769025	Uponor PP-RCT 90 Elbow, 2½" x 2½"	17/32"	1½"	445/64"	445/64"	381/64"	183/64"	1.03
PR4769030	Uponor PP-RCT 90 Elbow, 3" x 3"	13/8"	127/32"	539/64"	539/64"	449/64"	225/64"	1.84
PR4769040	Uponor PP-RCT 90 Elbow, 4" x 4"	137/64"	231/64"	711/32"	711/32"	635/64"	317/64"	4.25



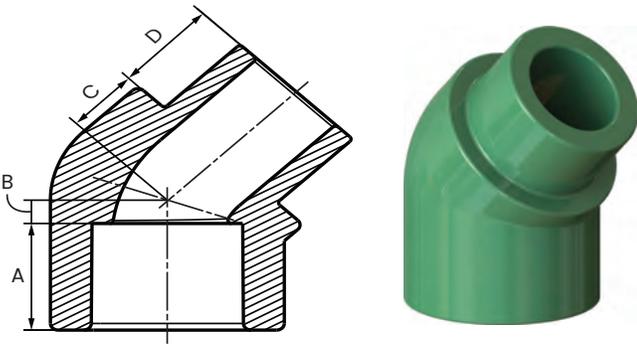
## 90 elbow fabricated (butt fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR94769060	Uponor PP-RCT 90 Elbow, Hot Potable, 6" x 6", SDR 9	$22^{25}/_{64}$ "	$22^{25}/_{64}$ "	$6^{10}/_{64}$ "	$45}/_{64}$ "	15.15
PR947690600	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 9	$22^{25}/_{64}$ "	$22^{25}/_{64}$ "	$6^{10}/_{64}$ "	$45}/_{64}$ "	15.15
PRI147690600	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 11	$22^{25}/_{64}$ "	$22^{25}/_{64}$ "	$6^{10}/_{64}$ "	$37}/_{64}$ "	12.58
PRI14769060	Uponor PP-RCT 90 Elbow, Cold Potable, 6" x 6", SDR 11	$22^{18}/_{32}$ "	$22^{18}/_{32}$ "	$6^{10}/_{64}$ "	$37}/_{64}$ "	12.58
PRI74769060	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 17.6	$22^{25}/_{64}$ "	$22^{25}/_{64}$ "	$6^{10}/_{64}$ "	$23}/_{64}$ "	8.47
PR947690800	Uponor PP-RCT 90 Elbow, Mechanical, 8" x 8", SDR 9	$23^{15}/_{16}$ "	$23^{15}/_{16}$ "	$7^{7}/_{8}$ "	$7^{7}/_{8}$ "	23.90
PR94769080	Uponor PP-RCT 90 Elbow, Hot Potable, 8" x 8", SDR 9	$23^{15}/_{16}$ "	$23^{15}/_{16}$ "	$7^{7}/_{8}$ "	$7^{7}/_{8}$ "	23.90
PRI14769080	Uponor PP-RCT 90 Elbow, Cold Potable, 8" x 8", SDR 11	$23^{15}/_{16}$ "	$23^{15}/_{16}$ "	$7^{7}/_{8}$ "	$23}/_{32}$ "	20.14
PRI74769080	Uponor PP-RCT 90 Elbow, Mechanical, 8" x 8", SDR 17.6	$23^{15}/_{16}$ "	$23^{15}/_{16}$ "	$7^{7}/_{8}$ "	$23}/_{64}$ "	13.34
PRI74769010	Uponor PP-RCT 90 Elbow, Mechanical, 10" x 10", SDR 17.6	$26^{50}/_{64}$ "	$26^{50}/_{64}$ "	$9^{27}/_{32}$ "	$9}/_{16}$ "	23.50
PRI74769012	Uponor PP-RCT 90 Elbow, Mechanical, 12" x 12", SDR 17.6	$31^{13}/_{64}$ "	$31^{13}/_{64}$ "	$12^{13}/_{32}$ "	$5}/_{64}$ "	42.04



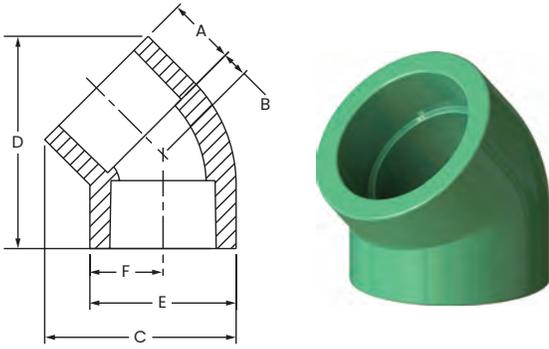
## 90 elbow fabricated – short radius (butt fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR94769061	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 9, Short Radius	14 <sup>9</sup> / <sub>16</sub> "	14 <sup>9</sup> / <sub>16</sub> "	6 <sup>19</sup> / <sub>64</sub> "	4 <sup>6</sup> / <sub>64</sub> "	8.40
PR114769061	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 11, Short Radius	14 <sup>9</sup> / <sub>16</sub> "	14 <sup>9</sup> / <sub>16</sub> "	6 <sup>19</sup> / <sub>64</sub> "	3 <sup>7</sup> / <sub>64</sub> "	6.98
PR1747690600	Uponor PP-RCT 90 Elbow, Mechanical, 6" x 6", SDR 17.6, Short Radius	14 <sup>9</sup> / <sub>16</sub> "	14 <sup>9</sup> / <sub>16</sub> "	6 <sup>19</sup> / <sub>64</sub> "	2 <sup>3</sup> / <sub>64</sub> "	4.70
PR94769081	Uponor PP-RCT 90 Elbow, Mechanical, 8" x 8", SDR 9, Short Radius	19 <sup>15</sup> / <sub>16</sub> "	19 <sup>15</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>8</sub> "	19.51
PR114769081	Uponor PP-RCT 90 Elbow, Mechanical, 8" x 8", SDR 11, Short Radius	19 <sup>15</sup> / <sub>16</sub> "	19 <sup>15</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	2 <sup>3</sup> / <sub>32</sub> "	16.45
PR1747690800	Uponor PP-RCT 90 Elbow, Mechanical, 8" x 8", SDR 17.6, Short Radius	19 <sup>15</sup> / <sub>16</sub> "	19 <sup>15</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	2 <sup>8</sup> / <sub>64</sub> "	10.89
PR94769010	Uponor PP-RCT 90 Elbow, Mechanical, 10" x 10", SDR 9, Short Radius	23 <sup>59</sup> / <sub>64</sub> "	23 <sup>59</sup> / <sub>64</sub> "	9 <sup>27</sup> / <sub>32</sub> "	1 <sup>3</sup> / <sub>32</sub> "	36.72
PR114769010	Uponor PP-RCT 90 Elbow, Mechanical, 10" x 10", SDR 11, Short Radius	23 <sup>59</sup> / <sub>64</sub> "	23 <sup>59</sup> / <sub>64</sub> "	9 <sup>27</sup> / <sub>32</sub> "	5 <sup>7</sup> / <sub>64</sub> "	30.96
PR1747690100	Uponor PP-RCT 90 Elbow, Mechanical, 10" x 10", SDR 17.6, Short Radius	23 <sup>59</sup> / <sub>64</sub> "	23 <sup>59</sup> / <sub>64</sub> "	9 <sup>27</sup> / <sub>32</sub> "	9 <sup>9</sup> / <sub>16</sub> "	20.50
PR947690120	Uponor PP-RCT 90 Elbow, Mechanical, 12" x 12", SDR 9, Short Radius	28 <sup>7</sup> / <sub>32</sub> "	28 <sup>7</sup> / <sub>32</sub> "	12 <sup>19</sup> / <sub>32</sub> "	1 <sup>28</sup> / <sub>64</sub> "	67.85
PR1147690120	Uponor PP-RCT 90 Elbow, Mechanical, 12" x 12", SDR 11, Short Radius	28 <sup>7</sup> / <sub>32</sub> "	28 <sup>7</sup> / <sub>32</sub> "	12 <sup>19</sup> / <sub>32</sub> "	1 <sup>1</sup> / <sub>8</sub> "	56.90
PR1747690120	Uponor PP-RCT 90 Elbow, Mechanical, 12" x 12", SDR 17.6, Short Radius	28 <sup>7</sup> / <sub>32</sub> "	28 <sup>7</sup> / <sub>32</sub> "	12 <sup>19</sup> / <sub>32</sub> "	4 <sup>6</sup> / <sub>64</sub> "	37.24



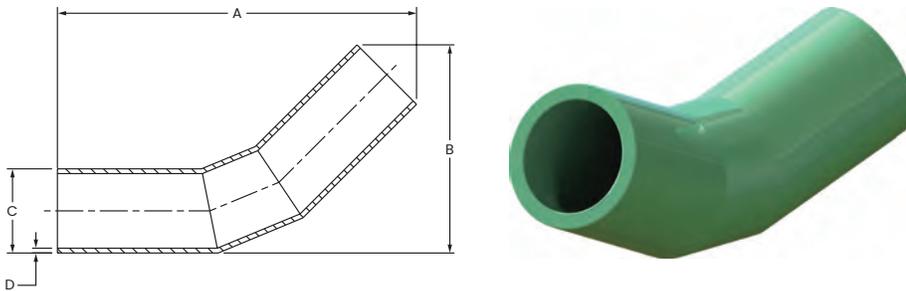
## 45 street elbow (socket fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR4434550	Uponor PP-RCT 45 Street Elbow, 1/2" x 1/2"	9 <sup>1</sup> / <sub>16</sub> "	1/2"	5 <sup>1</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>16</sub> "	0.02
PR4434575	Uponor PP-RCT 45 Street Elbow, 3/4" x 3/4"	5 <sup>1</sup> / <sub>8</sub> "	3 <sup>1</sup> / <sub>16</sub> "	3 <sup>1</sup> / <sub>8</sub> "	1/2"	0.04
PR4434510	Uponor PP-RCT 45 Street Elbow, 1" x 1"	1 <sup>1</sup> / <sub>16</sub> "	3 <sup>1</sup> / <sub>16</sub> "	1/2"	9 <sup>1</sup> / <sub>16</sub> "	0.08



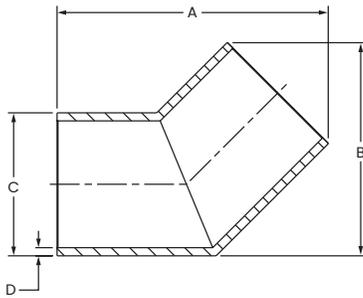
## 45 elbow (socket fusion)

Part no.	Description	A	B	C	D	E	F	Weight (lbs.)
PR4764550	Uponor PP-RCT 45 Elbow, 1/2" x 1/2"	39/64"	7/32"	17/32"	13/16"	17/64"	36/64"	0.03
PR4764575	Uponor PP-RCT 45 Elbow, 3/4" x 3/4"	43/64"	17/64"	125/32"	29/64"	121/64"	21/32"	0.04
PR4764510	Uponor PP-RCT 45 Elbow, 1" x 1"	25/32"	5/16"	213/64"	229/64"	111/16"	27/32"	0.08
PR4764513	Uponor PP-RCT 45 Elbow, 1 1/4" x 1 1/4"	55/64"	3/8"	23/4"	27/8"	23/4"	11/8"	0.18
PR4764515	Uponor PP-RCT 45 Elbow, 1 1/2" x 1 1/2"	59/64"	33/64"	37/32"	311/32"	219/32"	119/64"	0.26
PR4764520	Uponor PP-RCT 45 Elbow, 2" x 2"	15/64"	9/16"	359/64"	315/16"	317/64"	15/8"	0.45
PR4764525	Uponor PP-RCT 45 Elbow, 2 1/2" x 2 1/2"	13/16"	43/64"	45/8"	417/32"	329/32"	181/64"	0.74
PR4764530	Uponor PP-RCT 45 Elbow, 3" x 3"	119/64"	13/16"	515/32"	515/64"	445/64"	211/32"	1.22
PR4764540	Uponor PP-RCT 45 Elbow, 4" x 4"	137/64"	19/64"	729/64"	657/64"	635/64"	317/64"	3.05



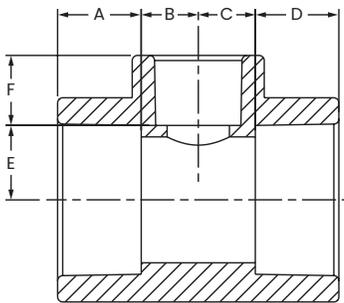
## 45 elbow fabricated (butt fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR94764560	Uponor PP-RCT 45 Elbow, Hot Potable, 6" x 6", SDR 9	19 3/4"	12 41/64"	6 19/64"	4 5/64"	8.43
PR947645600	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 9	19 3/4"	12 41/64"	6 19/64"	4 5/64"	8.43
PR94764580	Uponor PP-RCT 45 Elbow, Hot Potable, 8" x 8", SDR 9	33 39/64"	19 1/2"	7 7/8"	7 7/8"	23.38
PR1147645600	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 11	19 91/64"	12 23/32"	6 19/64"	3 7/64"	7.01
PR114764560	Uponor PP-RCT 45 Elbow, Cold Potable, 6" x 6", SDR 11	19 3/4"	12 41/64"	6 19/64"	3 7/64"	7.01
PR114764580	Uponor PP-RCT 45 Elbow, Cold Potable, 8" x 8", SDR 11	33 39/64"	19 1/2"	7 7/8"	2 3/32"	19.72
PR174764560	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 17.6	19 3/4"	12 41/64"	6 19/64"	2 3/64"	4.72
PR174764580	Uponor PP-RCT 45 Elbow, Mechanical, 8" x 8", SDR 17.6	33 39/64"	19 1/2"	7 7/8"	2 9/64"	13.06
PR174764510	Uponor PP-RCT 45 Elbow, Mechanical, 10" x 10", SDR 17.6	30 19/64"	23 31/64"	9 27/32"	9 9/16"	17.59
PR174764512	Uponor PP-RCT 45 Elbow, Mechanical, 12" x 12", SDR 17.6	35 33/64"	23 31/64"	12 13/32"	4 5/64"	32.06



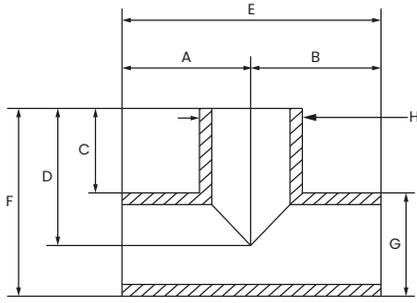
## 45 elbow fabricated – short radius (butt fusion)

Part no.	Description	A	B	C	D	Weight (lbs.)
PR94764561	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 9, Short Radius	14 $\frac{3}{4}$ "	10 $\frac{35}{64}$ "	6 $\frac{19}{64}$ "	4 $\frac{5}{64}$ "	6.48
PR114764561	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 11, Short Radius	15 $\frac{1}{64}$ "	10 $\frac{21}{32}$ "	6 $\frac{19}{64}$ "	3 $\frac{7}{64}$ "	5.39
PR1747645600	Uponor PP-RCT 45 Elbow, Mechanical, 6" x 6", SDR 17.6, Short Radius	15 $\frac{9}{32}$ "	10 $\frac{11}{16}$ "	6 $\frac{19}{64}$ "	2 $\frac{3}{64}$ "	3.63
PR94764581	Uponor PP-RCT 45 Elbow, Mechanical, 8" x 8", SDR 9, Short Radius	23 $\frac{33}{64}$ "	15 $\frac{5}{16}$ "	7 $\frac{1}{8}$ "	7 $\frac{1}{8}$ "	16.58
PR114764581	Uponor PP-RCT 45 Elbow, Mechanical, 8" x 8", SDR 11, Short Radius	23 $\frac{33}{64}$ "	15 $\frac{5}{16}$ "	7 $\frac{1}{8}$ "	2 $\frac{3}{32}$ "	13.98
PR1747645800	Uponor PP-RCT 45 Elbow, Mechanical, 8" x 8", SDR 17.6, Short Radius	23 $\frac{33}{64}$ "	15 $\frac{5}{16}$ "	7 $\frac{1}{8}$ "	2 $\frac{9}{64}$ "	9.26
PR947645100	Uponor PP-RCT 45 Elbow, Mechanical, 10" x 10", SDR 9, Short Radius	20 $\frac{1}{8}$ "	15 $\frac{9}{32}$ "	9 $\frac{27}{32}$ "	1 $\frac{3}{32}$ "	20.84
PR1147645100	Uponor PP-RCT 45 Elbow, Mechanical, 10" x 10", SDR 11, Short Radius	20 $\frac{1}{8}$ "	15 $\frac{9}{32}$ "	9 $\frac{27}{32}$ "	5 $\frac{7}{64}$ "	17.57
PR1747645100	Uponor PP-RCT 45 Elbow, Mechanical, 10" x 10", SDR 17.6, Short Radius	20 $\frac{1}{8}$ "	15 $\frac{9}{32}$ "	9 $\frac{27}{32}$ "	3 $\frac{1}{64}$ "	11.64
PR947645120	Uponor PP-RCT 45 Elbow, Mechanical, 12" x 12", SDR 9, Short Radius	23 $\frac{31}{64}$ "	18 $\frac{31}{64}$ "	12 $\frac{13}{32}$ "	1 $\frac{15}{64}$ "	38.03
PR1147645120	Uponor PP-RCT 45 Elbow, Mechanical, 12" x 12", SDR 11, Short Radius	23 $\frac{31}{64}$ "	18 $\frac{31}{64}$ "	12 $\frac{13}{32}$ "	1 $\frac{1}{8}$ "	31.89
PR1747645120	Uponor PP-RCT 45 Elbow, Mechanical, 12" x 12", SDR 17.6, Short Radius	23 $\frac{31}{64}$ "	18 $\frac{31}{64}$ "	12 $\frac{13}{32}$ "	4 $\frac{5}{64}$ "	19.82



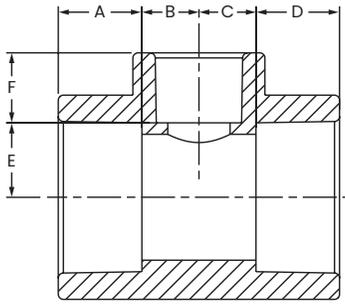
## Tee (socket fusion)

Part no.	Description	A	B	C	D	E	F	Weight (lbs.)
PR4755050	Uponor PP-RCT Tee, 1/2" x 1/2" x 1/2"	5/8"	7/16"	7/16"	5/8"	7/16"	5/8"	0.05
PR4757575	Uponor PP-RCT Tee, 3/4" x 3/4" x 3/4"	11/16"	1/2"	1/2"	11/16"	1/2"	11/16"	0.07
PR4751000	Uponor PP-RCT Tee, 1" x 1" x 1"	3/4"	11/16"	11/16"	3/4"	11/16"	3/4"	0.16
PR4751250	Uponor PP-RCT Tee, 1 1/4" x 1 1/4" x 1 1/4"	13/16"	7/8"	7/8"	13/16"	15/16"	13/16"	0.27
PR4751500	Uponor PP-RCT Tee, 1 1/2" x 1 1/2" x 1 1/2"	15/16"	1 1/8"	1 1/8"	15/16"	1 1/8"	15/16"	0.49
PR4752000	Uponor PP-RCT Tee, 2" x 2" x 2"	1 1/8"	1 3/8"	1 3/8"	1 1/8"	1 3/8"	1 1/8"	0.92
PR4752500	Uponor PP-RCT Tee, 2 1/2" x 2 1/2" x 2 1/2"	1 1/4"	1 9/16"	1 9/16"	1 1/4"	1 9/16"	1 1/4"	1.33
PR4753000	Uponor PP-RCT Tee, 3" x 3" x 3"	1 7/16"	1 13/16"	1 13/16"	1 7/16"	1 7/8"	1 7/16"	2.29
PR4754000	Uponor PP-RCT Tee, 4" x 4" x 4"	1 9/16"	2 1/2"	2 1/2"	1 9/16"	2 1/2"	1 9/16"	5.04



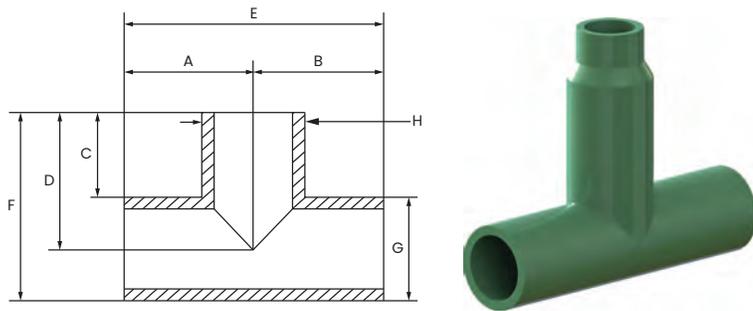
## Tee fabricated (butt fusion)

Part no.	Description	A	B	C	D	E	F	G	H	Weight (lbs.)	Equiv. length (through)	Equiv. length (branch)
PR947560	Uponor PP-RCT Tee, Hot Potable, 6" x 6" x 6", SDR 9	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	8 <sup>5</sup> / <sub>8</sub> "	11 <sup>18</sup> / <sub>16</sub> "	23 <sup>5</sup> / <sub>8</sub> "	14 <sup>18</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	13.76	5.0	23.9
PR9475600	Uponor PP-RCT Tee, Mechanical, 6" x 6" x 6", SDR 9	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	8 <sup>13</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	23 <sup>5</sup> / <sub>8</sub> "	14 <sup>18</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	12.99	5.0	23.9
PR11475600	Uponor PP-RCT Tee, Mechanical, 6" x 6" x 6", SDR 11	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	8 <sup>13</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	23 <sup>5</sup> / <sub>8</sub> "	14 <sup>18</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	10.74	5.4	25.8
PR1147560	Uponor PP-RCT Tee, Cold Potable, 6" x 6" x 6", SDR 11	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	8 <sup>21</sup> / <sub>32</sub> "	11 <sup>18</sup> / <sub>16</sub> "	23 <sup>5</sup> / <sub>8</sub> "	14 <sup>61</sup> / <sub>64</sub> "	6 <sup>18</sup> / <sub>64</sub> "	6 <sup>18</sup> / <sub>64</sub> "	11.390	5.4	25.8
PR17475600	Uponor PP-RCT Tee, Mechanical, 6" x 6" x 6", SDR 17.6	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	8 <sup>13</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	23 <sup>5</sup> / <sub>8</sub> "	14 <sup>18</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	6 <sup>5</sup> / <sub>16</sub> "	6.92	5.8	27.9
PR9475800	Uponor PP-RCT Tee, Mechanical, 8" x 8" x 8", SDR 9	13 <sup>3</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "	9 <sup>13</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	27 <sup>9</sup> / <sub>16</sub> "	17 <sup>11</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>8</sub> "	7 <sup>1</sup> / <sub>8</sub> "	23.35	6.2	30.6
PR1147580	Uponor PP-RCT Tee, Cold Potable, 8" x 8" x 8", SDR 11	13 <sup>3</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "	9 <sup>13</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	27 <sup>1</sup> / <sub>2</sub> "	17 <sup>11</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>8</sub> "	7 <sup>1</sup> / <sub>8</sub> "	21.150	6.7	32.2
PR17475800	Uponor PP-RCT Tee, Mechanical, 8" x 8" x 8", SDR 17.6	13 <sup>3</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "	9 <sup>13</sup> / <sub>16</sub> "	13 <sup>3</sup> / <sub>4</sub> "	27 <sup>9</sup> / <sub>16</sub> "	17 <sup>11</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>8</sub> "	7 <sup>1</sup> / <sub>8</sub> "	12.53	7.3	34.9
PR17475100	Uponor PP-RCT Tee, Mechanical, 10" x 10" x 10", SDR 17.6	17 <sup>11</sup> / <sub>16</sub> "	17 <sup>11</sup> / <sub>16</sub> "	12 <sup>18</sup> / <sub>16</sub> "	17 <sup>11</sup> / <sub>16</sub> "	35 <sup>7</sup> / <sub>16</sub> "	22 <sup>5</sup> / <sub>8</sub> "	9 <sup>13</sup> / <sub>16</sub> "	9 <sup>13</sup> / <sub>16</sub> "	25.18	9.1	43.6
PR17475120	Uponor PP-RCT Tee, Mechanical, 12" x 12" x 12", SDR 17.6	19 <sup>11</sup> / <sub>16</sub> "	19 <sup>11</sup> / <sub>16</sub> "	13 <sup>1</sup> / <sub>2</sub> "	19 <sup>11</sup> / <sub>16</sub> "	39 <sup>3</sup> / <sub>8</sub> "	25 <sup>7</sup> / <sub>8</sub> "	12 <sup>3</sup> / <sub>8</sub> "	12 <sup>3</sup> / <sub>8</sub> "	43.69	11.5	55.0



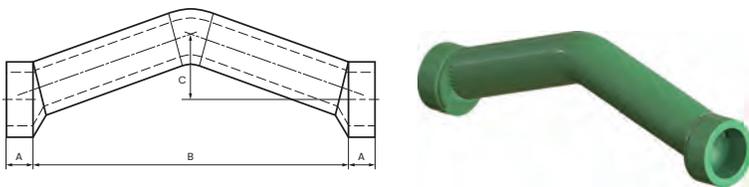
## Reducing tee (socket fusion)

Part no.	Description	A	B	C	D	E	F	Weight (lbs.)
PR4755075	Uponor PP-RCT Reducing Tee, ½" x ½" x ¾"	⅝"	½"	½"	⅝"	⅞"	⅞"	0.06
PR4757550	Uponor PP-RCT Reducing Tee, ¾" x ¾" x ½"	⅝"	⅞"	⅞"	⅝"	½"	⅝"	0.07
PR4751550	Uponor PP-RCT Reducing Tee, 1" x ½" x ½"	⅞"	⅞"	⅞"	⅞"	⅝"	⅞"	0.10
PR4751350	Uponor PP-RCT Reducing Tee, 1¼" x 1¼" x ½"	⅞"	⅞"	⅞"	⅞"	⅞"	⅝"	0.19
PR4751375	Uponor PP-RCT Reducing Tee, 1¼" x 1¼" x ¾"	⅞"	⅞"	⅞"	⅞"	⅞"	⅞"	0.21
PR4751331	Uponor PP-RCT Reducing Tee, 1¼" x 1¼" x 1"	⅞"	⅞"	⅞"	⅞"	⅞"	¾"	0.24
PR4751575	Uponor PP-RCT Reducing Tee, 1½" x 1½" x ¾"	⅞"	⅞"	⅞"	⅞"	1"	⅝"	0.26
PR4751551	Uponor PP-RCT Reducing Tee, 1½" x 1½" x 1"	⅞"	⅞"	⅞"	⅞"	1"	⅞"	0.30
PR4751553	Uponor PP-RCT Reducing Tee, 1½" x 1½" x 1¼"	⅞"	⅞"	⅞"	⅞"	1"	⅞"	0.34
PR4752210	Uponor PP-RCT Reducing Tee, 2" x 2" x 1"	1⅞"	⅞"	⅞"	1⅞"	1¼"	⅞"	0.50
PR4752213	Uponor PP-RCT Reducing Tee, 2" x 2" x 1¼"	1⅞"	⅞"	⅞"	1⅞"	1¼"	⅞"	0.55
PR4752213	Uponor PP-RCT Reducing Tee, 2" x 2" x 1½"	1⅞"	⅞"	⅞"	1⅞"	1¼"	⅞"	0.63
PR4752575	Uponor PP-RCT Reducing Tee, 2½" x 2½" x ¾"	1⅞"	⅞"	⅞"	1⅞"	1½"	⅝"	0.75
PR4752510	Uponor PP-RCT Reducing Tee, 2½" x 2½" x 1"	1⅞"	⅞"	⅞"	1⅞"	1½"	⅞"	0.76
PR4752513	Uponor PP-RCT Reducing Tee, 2½" x 2½" x 1¼"	1⅞"	⅞"	⅞"	1⅞"	1½"	⅞"	0.84
PR4752515	Uponor PP-RCT Reducing Tee, 2½" x 2½" x 1½"	1⅞"	1"	1"	1⅞"	1½"	⅞"	0.91
PR4752520	Uponor PP-RCT Reducing Tee, 2½" x 2½" x 2"	1⅞"	1¼"	1¼"	1⅞"	1½"	1⅞"	1.07
PR4753310	Uponor PP-RCT Reducing Tee, 3" x 3" x 1"	1⅞"	¾"	¾"	1⅞"	1⅞"	⅞"	1.20
PR4753313	Uponor PP-RCT Reducing Tee, 3" x 3" x 1¼"	1⅞"	⅞"	⅞"	1⅞"	1⅞"	⅞"	1.27
PR4753315	Uponor PP-RCT Reducing Tee, 3" x 3" x 1½"	1⅞"	⅞"	⅞"	1⅞"	1⅞"	⅞"	1.41
PR4753320	Uponor PP-RCT Reducing Tee, 3" x 3" x 2"	1⅞"	⅞"	⅞"	1⅞"	1⅞"	1⅞"	1.56
PR4753325	Uponor PP-RCT Reducing Tee, 3" x 3" x 2½"	1⅞"	⅞"	⅞"	1⅞"	1⅞"	⅞"	1.78
PR4754425	Uponor PP-RCT Reducing Tee, 4" x 4" x 2½"	1⅞"	⅞"	⅞"	1⅞"	2½"	⅞"	3.62
PR4754430	Uponor PP-RCT Reducing Tee, 4" x 4" x 3"	1⅞"	⅞"	⅞"	1⅞"	2½"	⅞"	3.94



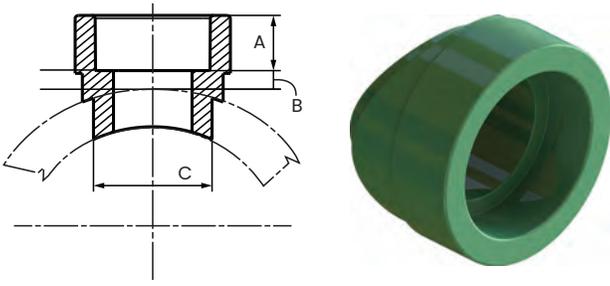
## Reducing tee fabricated (butt fusion)

Part no.	Description	A	B	C	D	E	F	G	H	Weight (lbs.)	Equiv. length (through)	Equiv. length (branch)
PR94756640	Uponor PP-RCT Reducing Tee, Hot Potable, 6" x 6" x 4", SDR 9	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	12 <sup>9</sup> / <sub>8</sub> "	15 <sup>3</sup> / <sub>4</sub> "	23 <sup>5</sup> / <sub>8</sub> "	18 <sup>29</sup> / <sub>32</sub> "	6 <sup>5</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	15.31	5.0	20.1
PR947566400	Uponor PP-RCT Reducing Tee, Mechanical, 6" x 6" x 4", SDR 9	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	12 <sup>9</sup> / <sub>8</sub> "	15 <sup>3</sup> / <sub>4</sub> "	23 <sup>5</sup> / <sub>8</sub> "	18 <sup>5</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	14.08	5.0	25.1
PR1147566400	Uponor PP-RCT Reducing Tee, Mechanical, 6" x 6" x 4", SDR 11	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	12 <sup>9</sup> / <sub>8</sub> "	15 <sup>3</sup> / <sub>4</sub> "	23 <sup>5</sup> / <sub>8</sub> "	18 <sup>5</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	11.73	5.4	25.5
PR114756640	Uponor PP-RCT Reducing Tee, Cold Potable, 6" x 6" x 4", SDR 11	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	12 <sup>19</sup> / <sub>32</sub> "	15 <sup>3</sup> / <sub>4</sub> "	23 <sup>5</sup> / <sub>8</sub> "	18 <sup>29</sup> / <sub>32</sub> "	6 <sup>18</sup> / <sub>64</sub> "	4 <sup>59</sup> / <sub>64</sub> "	12.710	5.4	20.1
PR1747566400	Uponor PP-RCT Reducing Tee, Mechanical, 6" x 6" x 4", SDR 17.6	11 <sup>18</sup> / <sub>16</sub> "	11 <sup>18</sup> / <sub>16</sub> "	12 <sup>9</sup> / <sub>8</sub> "	15 <sup>3</sup> / <sub>4</sub> "	23 <sup>5</sup> / <sub>8</sub> "	18 <sup>5</sup> / <sub>8</sub> "	6 <sup>5</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	7.56	5.8	25.9
PR1747588400	Uponor PP-RCT Reducing Tee, Mechanical, 8" x 8" x 4", SDR 17.6	13 <sup>3</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "	29 <sup>18</sup> / <sub>16</sub> "	33 <sup>3</sup> / <sub>4</sub> "	27 <sup>9</sup> / <sub>16</sub> "	37 <sup>11</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	4 <sup>15</sup> / <sub>16</sub> "	19.42	7.3	27.4
PR114758840	Uponor PP-RCT Reducing Tee, Cold Potable, 8" x 8" x 4", SDR 11	13 <sup>3</sup> / <sub>4</sub> "	13 <sup>3</sup> / <sub>4</sub> "	29 <sup>9</sup> / <sub>64</sub> "	33 <sup>47</sup> / <sub>64</sub> "	27 <sup>1</sup> / <sub>2</sub> "	37 <sup>43</sup> / <sub>64</sub> "	7 <sup>7</sup> / <sub>8</sub> "	4 <sup>59</sup> / <sub>64</sub> "	24.180	6.7	20.1



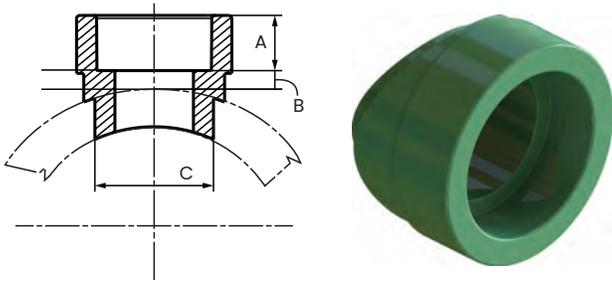
## Crossover (molded) (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR4485050	Uponor PP-RCT Crossover, 1/2" x 1/2"	3/4"	4 <sup>18</sup> / <sub>16</sub> "	7/8"	0.07
PR4487575	Uponor PP-RCT Crossover, 3/4" x 3/4"	3/4"	6 <sup>8</sup> / <sub>8</sub> "	1 <sup>1</sup> / <sub>8</sub> "	0.13
PR4481010	Uponor PP-RCT Crossover, 1" x 1"	1 <sup>1</sup> / <sub>16</sub> "	8 <sup>7</sup> / <sub>16</sub> "	1 <sup>7</sup> / <sub>16</sub> "	0.26



## Saddle (outlet and socket fusion)

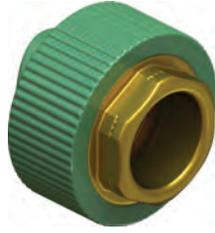
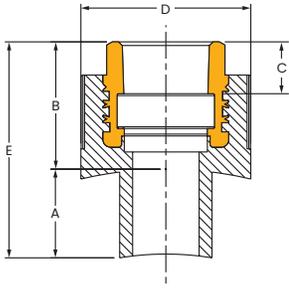
Part no.	Description	A	B	C	Weight (lbs.)
PR4781350	Uponor PP-RCT Saddle, 1¼" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4781375	Uponor PP-RCT Saddle, 1¼" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4781550	Uponor PP-RCT Saddle, 1½" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4781575	Uponor PP-RCT Saddle, 1½" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4782050	Uponor PP-RCT Saddle, 2" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4782075	Uponor PP-RCT Saddle, 2" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4782010	Uponor PP-RCT Saddle, 2" x 1", for Outlet Fusion	11/16"	¼"	1¼"	0.05
PR4782550	Uponor PP-RCT Saddle, 2½" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4782575	Uponor PP-RCT Saddle, 2½" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4782510	Uponor PP-RCT Saddle, 2½" x 1", for Outlet Fusion	11/16"	¼"	1¼"	0.05
PR4782513	Uponor PP-RCT Saddle, 2½" x 1¼", for Outlet Fusion	13/16"	17/64"	137/64"	0.09
PR4783050	Uponor PP-RCT Saddle, 3" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4783075	Uponor PP-RCT Saddle, 3" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4783010	Uponor PP-RCT Saddle, 3" x 1", for Outlet Fusion	11/16"	¼"	1¼"	0.05
PR4783013	Uponor PP-RCT Saddle, 3" x 1¼", for Outlet Fusion	13/16"	17/64"	137/64"	0.09
PR4784050	Uponor PP-RCT Saddle, 4" x ½", for Outlet Fusion	9/16"	3/16"	1"	0.03
PR4784075	Uponor PP-RCT Saddle, 4" x ¾", for Outlet Fusion	5/8"	3/16"	1"	0.03
PR4784010	Uponor PP-RCT Saddle, 4" x 1", for Outlet Fusion	11/16"	¼"	1¼"	0.05
PR4784013	Uponor PP-RCT Saddle, 4" x 1¼", for Outlet Fusion	13/16"	¼"	19/16"	0.09
PR4784015	Uponor PP-RCT Saddle, 4" x 1½", for Outlet Fusion	15/16"	5/16"	116/16"	0.18
PR4784020	Uponor PP-RCT Saddle, 4" x 2", for Outlet Fusion	11/16"	7/16"	2½"	0.33
PR4786050	Uponor PP-RCT Saddle, 6" x ½", for Outlet Fusion	37/64"	5/32"	63/64"	0.03
PR4786075	Uponor PP-RCT Saddle, 6" x ¾", for Outlet Fusion	5/8"	11/64"	63/64"	0.03
PR4786010	Uponor PP-RCT Saddle, 6" x 1", for Outlet Fusion	11/16"	¼"	1¼"	0.05
PR4786013	Uponor PP-RCT Saddle, 6" x 1¼", for Outlet Fusion	13/16"	¼"	19/16"	0.08



## Saddle (outlet and socket fusion) (continued)

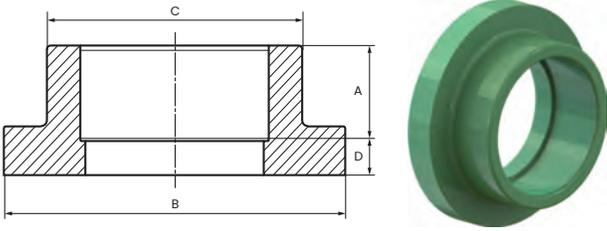
Part no.	Description	A	B	C	Weight (lbs.)
PR4786015	Uponor PP-RCT Saddle, 6" x 1½", for Outlet Fusion	1 <sup>5</sup> / <sub>16</sub> "	1 <sup>5</sup> / <sub>16</sub> "	1 <sup>5</sup> / <sub>16</sub> "	0.16
PR4786020	Uponor PP-RCT Saddle, 6" x 2", for Outlet Fusion	1 <sup>1</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>16</sub> "	2½"	0.30
PR4786025	Uponor PP-RCT Saddle, 6" x 2½", for Outlet Fusion	3 <sup>3</sup> / <sub>16</sub> "	½"	2 <sup>15</sup> / <sub>16</sub> "	0.49
PR4786030	Uponor PP-RCT Saddle, 6" x 3", for Outlet Fusion	3 <sup>3</sup> / <sub>16</sub> "	9 <sup>9</sup> / <sub>16</sub> "	3 <sup>9</sup> / <sub>16</sub> "	0.75
PR4788050	Uponor PP-RCT Saddle, 8" x ½", for Outlet Fusion	3 <sup>7</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	0.02
PR4788075	Uponor PP-RCT Saddle, 8" x ¾", for Outlet Fusion	5 <sup>5</sup> / <sub>8</sub> "	1 <sup>5</sup> / <sub>64</sub> "	6 <sup>3</sup> / <sub>64</sub> "	0.03
PR4788010	Uponor PP-RCT Saddle, 8" x 1", for Outlet Fusion	¾"	¼"	1¼"	0.06
PR4788013	Uponor PP-RCT Saddle, 8" x 1¼", for Outlet Fusion	1 <sup>3</sup> / <sub>16</sub> "	5 <sup>5</sup> / <sub>16</sub> "	1 <sup>37</sup> / <sub>64</sub> "	0.11
PR4788015	Uponor PP-RCT Saddle, 8" x 1½", for Outlet Fusion	1"	5 <sup>5</sup> / <sub>16</sub> "	2"	0.20
PR4788020	Uponor PP-RCT Saddle, 8" x 2", for Outlet Fusion	1 <sup>1</sup> / <sub>8</sub> "	3 <sup>3</sup> / <sub>8</sub> "	2½"	0.32
PR4788025	Uponor PP-RCT Saddle, 8" x 2½", for Outlet Fusion	1¼"	3 <sup>3</sup> / <sub>8</sub> "	2 <sup>15</sup> / <sub>16</sub> "	0.68
PR4788030	Uponor PP-RCT Saddle, 8" x 3", for Outlet Fusion	1 <sup>3</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>16</sub> "	3 <sup>9</sup> / <sub>16</sub> "	0.88
PR4788040	Uponor PP-RCT Saddle, 8" x 4", for Outlet Fusion	1¾"	½"	4 <sup>15</sup> / <sub>16</sub> "	2.18
PR47810050	Uponor PP-RCT Saddle, 10" x ½", for Outlet Fusion	3 <sup>3</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	0.02
PR47810075	Uponor PP-RCT Saddle, 10" x ¾", for Outlet Fusion	4 <sup>5</sup> / <sub>64</sub> "	1 <sup>5</sup> / <sub>64</sub> "	1"	0.03
PR47810010	Uponor PP-RCT Saddle, 10" x 1", for Outlet Fusion	¾"	¼"	1¼"	0.06
PR47810013	Uponor PP-RCT Saddle, 10" x 1¼", for Outlet Fusion	1 <sup>3</sup> / <sub>16</sub> "	5 <sup>5</sup> / <sub>16</sub> "	1 <sup>37</sup> / <sub>64</sub> "	0.11
PR47810015	Uponor PP-RCT Saddle, 10" x 1½", for Outlet Fusion	5 <sup>5</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>64</sub> "	1 <sup>31</sup> / <sub>32</sub> "	0.20
PR47810020	Uponor PP-RCT Saddle, 10" x 2", for Outlet Fusion	1 <sup>1</sup> / <sub>8</sub> "	3 <sup>3</sup> / <sub>8</sub> "	2½"	0.32
PR47810025	Uponor PP-RCT Saddle, 10" x 2½", for Outlet Fusion	1¼"	3 <sup>3</sup> / <sub>8</sub> "	2 <sup>15</sup> / <sub>16</sub> "	0.67
PR47810030	Uponor PP-RCT Saddle, 10" x 3", for Outlet Fusion	1 <sup>3</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>16</sub> "	3 <sup>9</sup> / <sub>16</sub> "	0.87
PR47810040	Uponor PP-RCT Saddle, 10" x 4", for Outlet Fusion	1¾"	½"	4 <sup>15</sup> / <sub>16</sub> "	2.12
PR47812020	Uponor PP-RCT Saddle, 12" x 2", for Outlet Fusion	1 <sup>1</sup> / <sub>8</sub> "	3 <sup>3</sup> / <sub>8</sub> "	2½"	0.34
PR47812025	Uponor PP-RCT Saddle, 12" x 2½", for Outlet Fusion	1¼"	3 <sup>3</sup> / <sub>8</sub> "	2 <sup>15</sup> / <sub>16</sub> "	0.69
PR47812030	Uponor PP-RCT Saddle, 12" x 3", for Outlet Fusion	1 <sup>3</sup> / <sub>8</sub> "	7 <sup>7</sup> / <sub>16</sub> "	3 <sup>9</sup> / <sub>16</sub> "	0.89
PR47812040	Uponor PP-RCT Saddle, 12" x 4", for Outlet Fusion	1¾"	½"	4 <sup>15</sup> / <sub>16</sub> "	2.11

# Transitions



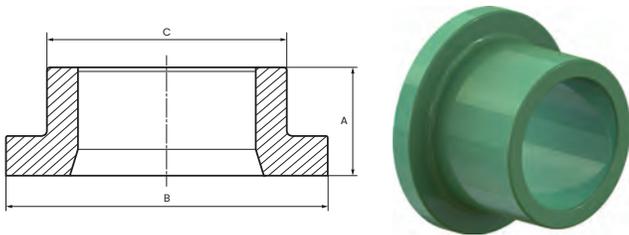
## Transition saddle (outlet fusion)

Part no.	Description	A	B	C	D	E	Weight (lbs.)
PR4791550	Uponor PP-RCT Transition Saddle, 1½" x ½", Female NPT, for Outlet Fusion	13/32"	13/64"	17/32"	1½"	139/64"	0.15
PR4791575	Uponor PP-RCT Transition Saddle, 1½" x ¾", Female NPT, for Outlet Fusion	13/32"	123/64"	35/64"	145/64"	149/64"	0.15
PR4792050	Uponor PP-RCT Transition Saddle, 2" x ½", Female NPT, for Outlet Fusion	27/64"	13/64"	17/32"	1½"	15/8"	0.15
PR4792075	Uponor PP-RCT Transition Saddle, 2" x ¾", Female NPT, for Outlet Fusion	27/64"	123/64"	35/64"	145/64"	125/32"	0.15
PR4792550	Uponor PP-RCT Transition Saddle, 2½" x ½", Female NPT, for Outlet Fusion	7/16"	13/64"	17/32"	1½"	121/32"	0.15
PR4792575	Uponor PP-RCT Transition Saddle, 2½" x ¾", Female NPT, for Outlet Fusion	7/16"	123/64"	35/64"	145/64"	113/16"	0.15
PR4792510	Uponor PP-RCT Transition Saddle, 2½" x 1", Female NPT, for Outlet Fusion	33/64"	1½"	21/32"	223/64"	21/64"	0.16
PR4793050	Uponor PP-RCT Transition Saddle, 3" x ½", Female NPT, for Outlet Fusion	31/64"	13/64"	17/32"	1½"	145/64"	0.17
PR4793075	Uponor PP-RCT Transition Saddle, 3" x ¾", Female NPT, for Outlet Fusion	31/64"	123/64"	35/64"	145/64"	155/64"	0.19
PR4793010	Uponor PP-RCT Transition Saddle, 3" x 1", Female NPT, for Outlet Fusion	35/64"	1½"	21/32"	223/64"	23/64"	0.19
PR4794050	Uponor PP-RCT Transition Saddle, 4" x ½", Female NPT, for Outlet Fusion	39/64"	13/64"	17/32"	1½"	153/64"	0.19
PR4794075	Uponor PP-RCT Transition Saddle, 4" x ¾", Female NPT, for Outlet Fusion	39/64"	123/64"	35/64"	145/64"	163/64"	0.19
PR4794010	Uponor PP-RCT Transition Saddle, 4" x 1", Female NPT, for Outlet Fusion	21/32"	1½"	21/32"	223/64"	25/32"	0.20
PR4796050	Uponor PP-RCT Transition Saddle, 6" x ½", Female NPT, for Outlet Fusion	3/4"	13/64"	17/32"	1½"	131/32"	0.20
PR4796075	Uponor PP-RCT Transition Saddle, 6" x ¾", Female NPT, for Outlet Fusion	3/4"	123/64"	35/64"	145/64"	21/8"	0.20
PR4796010	Uponor PP-RCT Transition Saddle, 6" x 1", Female NPT, for Outlet Fusion	25/32"	1½"	21/32"	223/64"	29/32"	0.21
PR4798050	Uponor PP-RCT Transition Saddle, 8" x ½", Female NPT, for Outlet Fusion	61/64"	19/32"	17/32"	139/64"	27/32"	0.42
PR4798075	Uponor PP-RCT Transition Saddle, 8" x ¾", Female NPT, for Outlet Fusion	61/64"	123/64"	35/64"	113/16"	219/64"	0.43
PR4798010	Uponor PP-RCT Transition Saddle, 8" x 1", Female NPT, for Outlet Fusion	110/21"	1½"	21/32"	223/64"	215/32"	0.43
PR47910050	Uponor PP-RCT Transition Saddle, 10" x ½", Female NPT, for Outlet Fusion	11/8"	121/64"	17/32"	139/64"	215/32"	0.42
PR47910075	Uponor PP-RCT Transition Saddle, 10" x ¾", Female NPT, for Outlet Fusion	11/8"	125/64"	35/64"	113/16"	217/32"	0.44
PR47910010	Uponor PP-RCT Transition Saddle, 10" x 1", Female NPT, for Outlet Fusion	15/32"	1½"	21/32"	223/64"	241/64"	0.44



## Flange adapter (socket fusion)

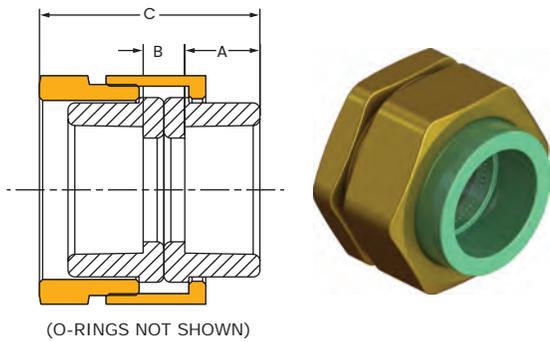
Part no.	Description	A	B	C	D	Weight (lbs.)
PR2981500	Uponor PP-RCT Flange Adapter, 1½"	1 <sup>5</sup> / <sub>16</sub> "	3 <sup>1</sup> / <sub>8</sub> "	2 <sup>3</sup> / <sub>8</sub> "	1 <sup>5</sup> / <sub>16</sub> "	0.16
PR2982000	Uponor PP-RCT Flange Adapter, 2"	1 <sup>7</sup> / <sub>16</sub> "	3 <sup>15</sup> / <sub>16</sub> "	2 <sup>15</sup> / <sub>16</sub> "	7 <sup>1</sup> / <sub>16</sub> "	0.22
PR2982525	Uponor PP-RCT Flange Adapter, 2½", for Butterfly Valves	1 <sup>3</sup> / <sub>8</sub> "	4 <sup>9</sup> / <sub>16</sub> "	3 <sup>9</sup> / <sub>16</sub> "	½"	0.35
PR2983030	Uponor PP-RCT Flange Adapter, 3", for Butterfly Valves	1 <sup>5</sup> / <sub>8</sub> "	5 <sup>1</sup> / <sub>8</sub> "	4 <sup>15</sup> / <sub>16</sub> "	9 <sup>1</sup> / <sub>16</sub> "	0.46



## Flange adapter (butt fusion)

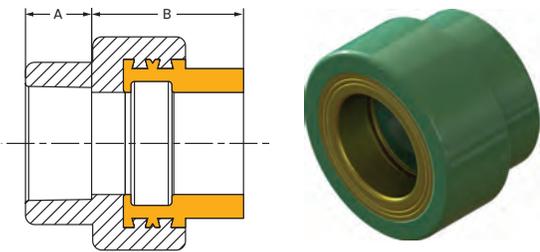
Note that the 4" flange adapters (PR929840, PR1129840 and PR1729840) can be butt fused or socket fused if used in conjunction with the Uponor PP-RCT Coupling, 4" x 4" (PR4774040). All butt fusion flange adapters in sizes 4" to 12", except those noted with (\*), are ANSI butterfly valve compliant.

Part no.	Description	A	B	C	Weight (lbs.)
PR929840	Uponor PP-RCT Flange Adapter, 4", SDR 9, Butt or Socket Fused with Coupling	7 <sup>11</sup> / <sub>16</sub> "	6½"	4 <sup>15</sup> / <sub>16</sub> "	2.77
PR1129840	Uponor PP-RCT Flange Adapter, 4", SDR 11, Butt or Socket Fused with Coupling	7 <sup>11</sup> / <sub>16</sub> "	6 <sup>9</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	2.03
PR1729840	Uponor PP-RCT Flange Adapter, 4", SDR 17.6, Butt or Socket Fused with Coupling	7 <sup>11</sup> / <sub>16</sub> "	6 <sup>9</sup> / <sub>16</sub> "	4 <sup>15</sup> / <sub>16</sub> "	1.43
PR929860	Uponor PP-RCT Flange Adapter, 6", SDR 9	7 <sup>11</sup> / <sub>16</sub> "	8½"	6 <sup>5</sup> / <sub>16</sub> "	4.30
PR1129860	Uponor PP-RCT Flange Adapter, 6", SDR 11	7 <sup>11</sup> / <sub>16</sub> "	8½"	6 <sup>5</sup> / <sub>16</sub> "	3.99
PR1729860	Uponor PP-RCT Flange Adapter, 6", SDR 17.6	7 <sup>11</sup> / <sub>16</sub> "	8½"	6 <sup>5</sup> / <sub>16</sub> "	2.85
PR929880	Uponor PP-RCT Flange Adapter, 8", SDR 9*	5 <sup>5</sup> / <sub>16</sub> "	10 <sup>7</sup> / <sub>16</sub> "	7 <sup>15</sup> / <sub>16</sub> "	5.47
PR1129880	Uponor PP-RCT Flange Adapter, 8", SDR 11*	5 <sup>5</sup> / <sub>16</sub> "	10 <sup>7</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	4.85
PR1729880	Uponor PP-RCT Flange Adapter, 8", SDR 17.6	5 <sup>5</sup> / <sub>16</sub> "	10 <sup>7</sup> / <sub>16</sub> "	7 <sup>7</sup> / <sub>8</sub> "	3.75
PR9298100	Uponor PP-RCT Flange Adapter, 10", SDR 9	5 <sup>5</sup> / <sub>16</sub> "	12 <sup>19</sup> / <sub>32</sub> "	9 <sup>27</sup> / <sub>32</sub> "	8.12
PR11298100	Uponor PP-RCT Flange Adapter, 10", SDR 11	5 <sup>5</sup> / <sub>16</sub> "	12 <sup>19</sup> / <sub>32</sub> "	9 <sup>27</sup> / <sub>32</sub> "	7.16
PR17298100	Uponor PP-RCT Flange Adapter, 10", SDR 17.6	5 <sup>5</sup> / <sub>16</sub> "	12 <sup>5</sup> / <sub>8</sub> "	9 <sup>7</sup> / <sub>8</sub> "	5.46
PR9298120	Uponor PP-RCT Flange Adapter, 12", SDR 9	5 <sup>5</sup> / <sub>16</sub> "	15 <sup>23</sup> / <sub>64</sub> "	12 <sup>13</sup> / <sub>32</sub> "	11.41
PR11298120	Uponor PP-RCT Flange Adapter, 12", SDR 11	5 <sup>5</sup> / <sub>16</sub> "	15 <sup>23</sup> / <sub>64</sub> "	12 <sup>13</sup> / <sub>32</sub> "	9.87
PR17298120	Uponor PP-RCT Flange Adapter, 12", SDR 17.6	5 <sup>5</sup> / <sub>16</sub> "	14 <sup>9</sup> / <sub>16</sub> "	12 <sup>7</sup> / <sub>16</sub> "	7.17



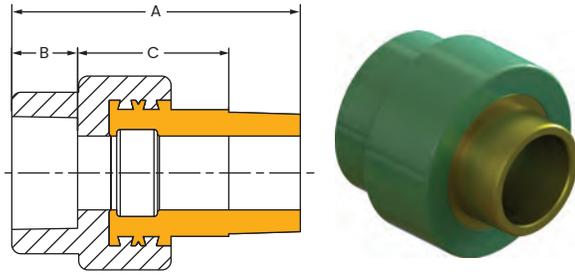
## Brass union (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR4721000	Uponor PP-RCT Brass Union, 1"	$\frac{45}{64}$ "	$\frac{25}{64}$ "	$\frac{23}{32}$ "	0.78
PR4721250	Uponor PP-RCT Brass Union, 1¼"	$\frac{13}{16}$ "	$\frac{25}{64}$ "	$\frac{29}{32}$ "	1.37
PR4721500	Uponor PP-RCT Brass Union, 1½"	$\frac{59}{64}$ "	$\frac{25}{64}$ "	$2\frac{1}{2}$ "	2.01
PR4722000	Uponor PP-RCT Brass Union, 2"	$\frac{17}{64}$ "	$\frac{13}{32}$ "	$2\frac{13}{16}$ "	3.29
PR4720500	Uponor PP-RCT Brass Union, ½"	$\frac{37}{64}$ "	$\frac{7}{16}$ "	$1\frac{13}{16}$ "	.36
PR4720750	Uponor PP-RCT Brass Union, ¾"	$\frac{5}{8}$ "	$\frac{25}{64}$ "	$1\frac{31}{32}$ "	0.52



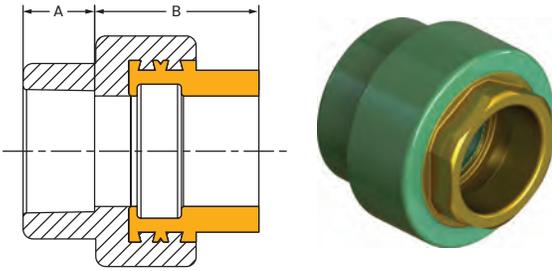
## Brass female threaded adapter (socket fusion)

Part no.	Description	A	B	Weight (lbs.)
PR5571010	Uponor Brass Female Threaded Adapter, 1" PP-RCT x 1" NPT	$\frac{23}{32}$ "	$1\frac{3}{64}$ "	0.42
PR5571313	Uponor Brass Female Threaded Adapter, 1¼" PP-RCT x 1¼" NPT	$\frac{13}{16}$ "	$1\frac{15}{64}$ "	0.65
PR5571075	Uponor Brass Female Threaded Adapter, 1" PP-RCT x ¾" NPT	$\frac{23}{32}$ "	$\frac{7}{8}$ "	0.22
PR5571310	Uponor Brass Female Threaded Adapter, 1¼" PP-RCT x 1" NPT	$\frac{55}{64}$ "	$\frac{61}{64}$ "	0.53
PR5571515	Uponor Brass Female Threaded Adapter, 1½" PP-RCT x 1½" NPT	$\frac{59}{64}$ "	$1\frac{3}{8}$ "	0.91
PR5572020	Uponor Brass Female Threaded Adapter, 2" PP-RCT x 2" NPT	$1\frac{5}{64}$ "	$1\frac{38}{64}$ "	1.17
PR5575050	Uponor Brass Female Threaded Adapter, ½" PP-RCT x ½" NPT	$\frac{37}{64}$ "	$\frac{29}{32}$ "	0.15
PR5577550	Uponor Brass Female Threaded Adapter, ¾" PP-RCT x ½" NPT	$\frac{5}{8}$ "	$\frac{53}{64}$ "	0.15
PR5577575	Uponor Brass Female Threaded Adapter, ¾" PP-RCT x ¾" NPT	$\frac{5}{8}$ "	$\frac{7}{8}$ "	0.20



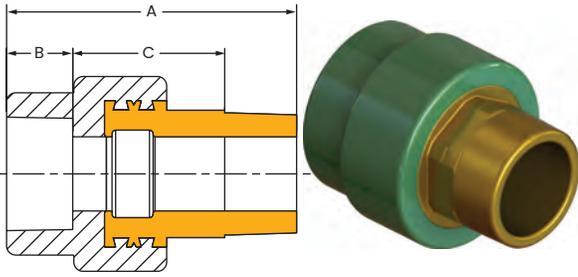
### Brass male threaded adapter (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR5521010	Uponor Brass Male Threaded Adapter, 1" PP-RCT x 1" NPT	2 <sup>7</sup> / <sub>16</sub> "	2 <sup>3</sup> / <sub>32</sub> "	1 <sup>5</sup> / <sub>16</sub> "	0.44
PR5521313	Uponor Brass Male Threaded Adapter, 1 <sup>1</sup> / <sub>4</sub> " PP-RCT x 1 <sup>1</sup> / <sub>4</sub> " NPT	2 <sup>53</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>16</sub> "	1 <sup>7</sup> / <sub>32</sub> "	0.74
PR5521515	Uponor Brass Male Threaded Adapter, 1 <sup>1</sup> / <sub>2</sub> " PP-RCT x 1 <sup>1</sup> / <sub>2</sub> " NPT	3 <sup>1</sup> / <sub>8</sub> "	5 <sup>9</sup> / <sub>64</sub> "	1 <sup>9</sup> / <sub>8</sub> "	0.90
PR5522020	Uponor Brass Male Threaded Adapter, 2" PP-RCT x 2" NPT	3 <sup>29</sup> / <sub>64</sub> "	1 <sup>5</sup> / <sub>64</sub> "	1 <sup>33</sup> / <sub>64</sub> "	1.42
PR5525050	Uponor Brass Male Threaded Adapter, 1/2" PP-RCT x 1/2" NPT	1 <sup>31</sup> / <sub>32</sub> "	3 <sup>7</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	0.16
PR5527575	Uponor Brass Male Threaded Adapter, 3/4" PP-RCT x 1/2" NPT	2 <sup>1</sup> / <sub>16</sub> "	5 <sup>1</sup> / <sub>8</sub> "	1 <sup>3</sup> / <sub>16</sub> "	0.24



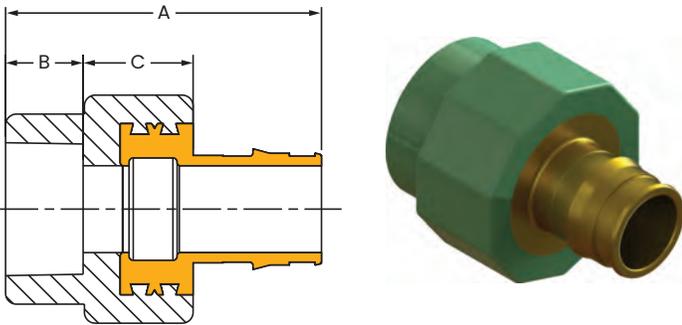
### LF brass female threaded adapter (socket fusion)

Part no.	Description	A	B	Weight (lbs.)
PR4571075	Uponor LF Brass Female Threaded Adapter, 1" PP-RCT x 3/4" NPT	2 <sup>5</sup> / <sub>32</sub> "	5 <sup>3</sup> / <sub>64</sub> "	0.19
PR4571010	Uponor LF Brass Female Threaded Adapter, 1" PP-RCT x 1" NPT	2 <sup>3</sup> / <sub>32</sub> "	1 <sup>9</sup> / <sub>64</sub> "	0.32
PR4571310	Uponor LF Brass Female Threaded Adapter, 1 <sup>1</sup> / <sub>4</sub> " PP-RCT x 1" NPT	5 <sup>3</sup> / <sub>64</sub> "	1 <sup>1</sup> / <sub>64</sub> "	0.40
PR4571313	Uponor LF Brass Female Threaded Adapter, 1 <sup>1</sup> / <sub>4</sub> " PP-RCT x 1 <sup>1</sup> / <sub>4</sub> " NPT	1 <sup>3</sup> / <sub>16</sub> "	1 <sup>41</sup> / <sub>64</sub> "	0.54
PR4571515	Uponor LF Brass Female Threaded Adapter, 1 <sup>1</sup> / <sub>2</sub> " PP-RCT x 1 <sup>1</sup> / <sub>2</sub> " NPT	5 <sup>9</sup> / <sub>64</sub> "	1 <sup>9</sup> / <sub>8</sub> "	0.81
PR4572020	Uponor LF Brass Female Threaded Adapter, 2" PP-RCT x 2" NPT	1 <sup>5</sup> / <sub>64</sub> "	1 <sup>33</sup> / <sub>64</sub> "	1.11
PR4575050	Uponor LF Brass Female Threaded Adapter, 1/2" PP-RCT x 1/2" NPT	3 <sup>7</sup> / <sub>64</sub> "	2 <sup>9</sup> / <sub>32</sub> "	0.11
PR4575075	Uponor LF Brass Female Threaded Adapter, 1/2" PP-RCT x 3/4" NPT	3 <sup>7</sup> / <sub>64</sub> "	4 <sup>9</sup> / <sub>64</sub> "	0.15
PR4577550	Uponor LF Brass Female Threaded Adapter, 3/4" PP-RCT x 1/2" NPT	5 <sup>1</sup> / <sub>8</sub> "	5 <sup>3</sup> / <sub>64</sub> "	0.14
PR4577575	Uponor LF Brass Female Threaded Adapter, 3/4" PP-RCT x 3/4" NPT	5 <sup>1</sup> / <sub>8</sub> "	7 <sup>1</sup> / <sub>8</sub> "	0.15



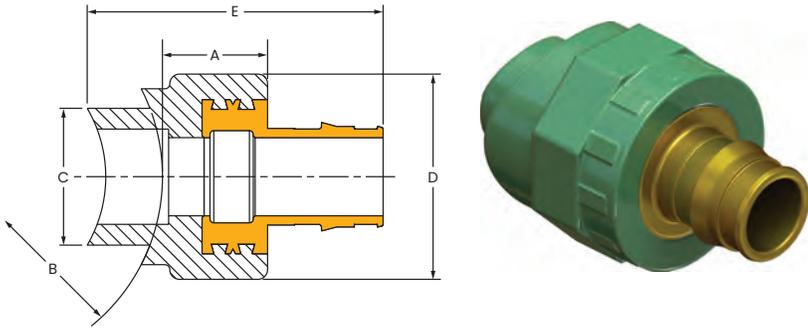
## LF brass male threaded adapter (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR4521010	Uponor LF Brass Male Threaded Adapter, 1" PP-RCT x 1" NPT	2 <sup>7</sup> / <sub>16</sub> "	2 <sup>3</sup> / <sub>32</sub> "	1 <sup>5</sup> / <sub>16</sub> "	0.37
PR4521313	Uponor LF Brass Male Threaded Adapter, 1/4" PP-RCT x 1/4" NPT	2 <sup>53</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>16</sub> "	1 <sup>7</sup> / <sub>32</sub> "	0.64
PR4521515	Uponor LF Brass Male Threaded Adapter, 1/2" PP-RCT x 1/2" NPT	3 <sup>1</sup> / <sub>8</sub> "	5 <sup>9</sup> / <sub>64</sub> "	1 <sup>3</sup> / <sub>8</sub> "	0.87
PR4522020	Uponor LF Brass Male Threaded Adapter, 2" PP-RCT x 2" NPT	3 <sup>29</sup> / <sub>64</sub> "	1 <sup>5</sup> / <sub>64</sub> "	1 <sup>33</sup> / <sub>64</sub> "	1.25
PR4525050	Uponor LF Brass Male Threaded Adapter, 1/2" PP-RCT x 1/2" NPT	1 <sup>31</sup> / <sub>32</sub> "	3 <sup>7</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	0.15
PR4527550	Uponor LF Brass Male Threaded Adapter, 3/4" PP-RCT x 1/2" NPT	2 <sup>1</sup> / <sub>16</sub> "	5 <sup>5</sup> / <sub>8</sub> "	1 <sup>3</sup> / <sub>16</sub> "	0.15
PR4527575	Uponor LF Brass Male Threaded Adapter, 3/4" PP-RCT x 3/4" NPT	2 <sup>1</sup> / <sub>16</sub> "	5 <sup>5</sup> / <sub>8</sub> "	1 <sup>3</sup> / <sub>16</sub> "	0.22
PR4521075	Uponor LF Brass Male Threaded Adapter, 1" PP-RCT x 3/4" NPT	2 <sup>15</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	5 <sup>3</sup> / <sub>64</sub> "	0.24



## ProPEX LF brass adapter (socket fusion)

Part no.	Description	A	B	C	Weight (lbs.)
PR4511010	Uponor ProPEX LF Brass Adapter, 1" PP-RCT x 1" PEX	2 <sup>7</sup> / <sub>8</sub> "	6 <sup>3</sup> / <sub>64</sub> "	2 <sup>23</sup> / <sub>32</sub> "	0.37
PR4515050	Uponor ProPEX LF Brass Adapter, 1/2" PP-RCT x 1/2" PEX	2 <sup>9</sup> / <sub>64</sub> "	4 <sup>9</sup> / <sub>64</sub> "	3 <sup>7</sup> / <sub>64</sub> "	0.12
PR4517575	Uponor ProPEX LF Brass Adapter, 3/4" PP-RCT x 3/4" PEX	2 <sup>23</sup> / <sub>64</sub> "	2 <sup>5</sup> / <sub>32</sub> "	5 <sup>5</sup> / <sub>8</sub> "	0.20



## ProPEX LF brass saddle adapter (socket fusion)

**Note:** The smallest main pipe size that can accept a saddle outlet equals the saddle outlet size times two.

Part no.	Description	A	B	C	D	E	Weight (lbs.)
PR4511550	Uponor ProPEX LF Brass Saddle Adapter, 1½" / ¾" PP-RCT x ½" PEX, for Outlet Fusion	1 <sup>5</sup> / <sub>64</sub> "	1 <sup>31</sup> / <sub>32</sub> "	6 <sup>3</sup> / <sub>64</sub> "	1 <sup>43</sup> / <sub>64</sub> "	2 <sup>27</sup> / <sub>64</sub> "	0.16
PR4512075	Uponor ProPEX LF Brass Saddle Adapter, 2" / ¾" PP-RCT x ¾" PEX, for Outlet Fusion	1 <sup>11</sup> / <sub>64</sub> "	2 <sup>31</sup> / <sub>64</sub> "	6 <sup>3</sup> / <sub>64</sub> "	1 <sup>43</sup> / <sub>64</sub> "	2 <sup>3</sup> / <sub>4</sub> "	0.20

**Moving  
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