

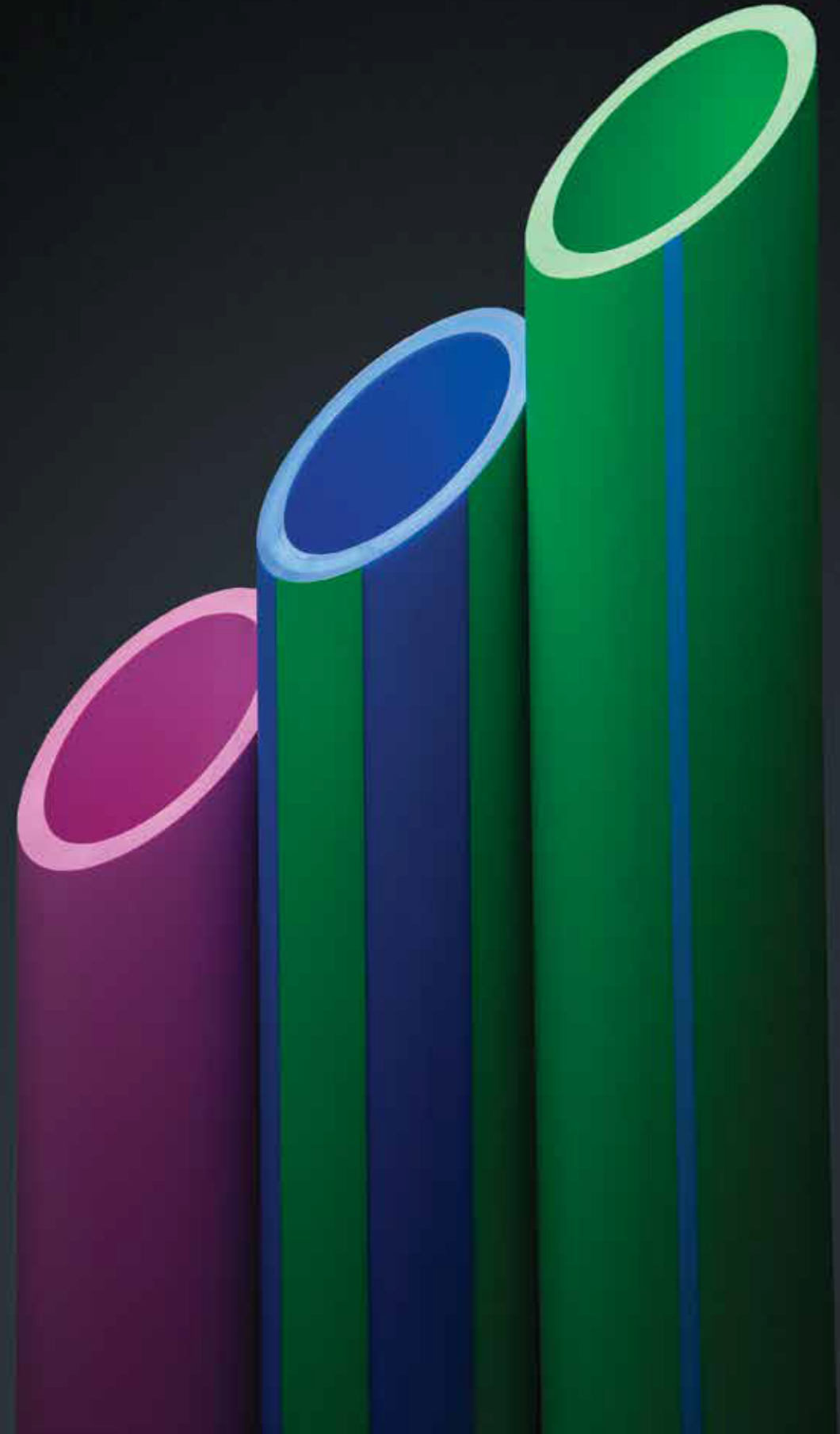


Product Catalog

aquatherm green pipe aquatherm blue pipe aquatherm lilac pipe Aquatherm Piping Systems

aquatherm 2015

NA Edition



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WELCOME TO AQUATHERM

WE MAKE THE BEST POLYPROPYLENE PRESSURE PIPING SYSTEMS IN THE WORLD. PERIOD.

As we have grown from one man working out of his home garage in Germany forty years ago to the world's largest and most advanced PP-R pressure pipe manufacturer, Aquatherm has found success through constant improvement and by adapting to customer needs.

Aquatherm's products were first introduced to the North American market in 2005 and have been widely used in a variety of projects since.

We stand by the philosophy that a better product is better for everyone, including our planet.

This catalog provides an introduction to our products and services as well as detailed design and engineering information.

Please contact us with any questions or comments you have regarding our piping systems.

Aquatherm GmbH founder Gerhard Rosenberg (middle left) and his sons (from left), Managing Directors Maik, Cristof, and Dirk.

1973

Aquatherm founded by Gerhard Rosenberg

1978

Transfer to the first factory in Attendorf, Germany

1985

Factory 1 in Attendorf, Germany completed

1996

Founding of the metal processing company, Aquatherm Metal, in Attendorf

1999

Main campus in Attendorf completed as one complex (factories 1+2, storage, assembly, laboratory and training center)

2002

Logistics center in Attendorf completed

2005

Aquatherm launched in Canada

2007

Aquatherm launched in the United States

2012

Aquatherm North American logistics center established in Lindon, Utah

2015

Ground broken for new production facility in Attendorf

<http://aquatherm-pipesystems.com/index.php?id=623&L=2>

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Note: This version of the Aquatherm catalog has been modified for distribution in Canada and the United States by Aquatherm NA, L.C. The text has been translated and edited for greater clarity and the data has been converted from metric to imperial units. Some content has been added to address issues specific to North America. As such, Aquatherm GmbH assumes no responsibility for these modifications, and assumes no liability for any problems that may arise from them. In addition, Aquatherm NA, L.C. does not warranty the accuracy, reliability or completeness of any information contained herein. In the case of discrepancies between this document and any information published or produced by Aquatherm GmbH, the material published by Aquatherm GmbH shall be considered the authoritative source. This edition supersedes all previous editions of the Aquatherm catalog, and will be replaced by the next edition.



aquatherm

1 FEATURES

Aquatherm pipe systems

Standard dimension ratio

aquatherm green pipe®

aquatherm blue pipe®

Multilayer fiber technology

aquatherm lilac pipe®

fusiolen® PP-R

Ecological advantages

System features

Installation advantages



aquatherm pipe systems



AQUATHERM PP-R PIPING SYSTEMS

Aquatherm piping systems are ideal for many pressurized applications due to their durability and versatility.

To accommodate projects of nearly any size, Aquatherm pipe is available from ½” to 24” in diameter.

All of Aquatherm’s pipes and fittings are made from polypropylene-random (PP-R), a thermoplastic that provides many advantages in piping systems, including heat-fused connections and naturally corrosion-resistant properties.

To facilitate integration with other systems, a wide range of transitions are available such as flanges, PEX adapters, brass and steel threads, and copper stub outs.

SYSTEM SPECIALIZATION

Each of the PP-R systems developed by Aquatherm share the same material benefits, but are also engineered for specific applications.

aquatherm green pipe is our signature product, suitable for potable and food-grade applications and much more.

aquatherm blue pipe is the best choice for high-performance pressure piping systems for a wide range of non-potable applications.

aquatherm lilac pipe is ideal for water conservation and gray water systems, with coloring and markings to conform to local codes.

FIELDS OF APPLICATION FOR AQUATHERM PIPING SYSTEMS

System is ideal for this application: ✓

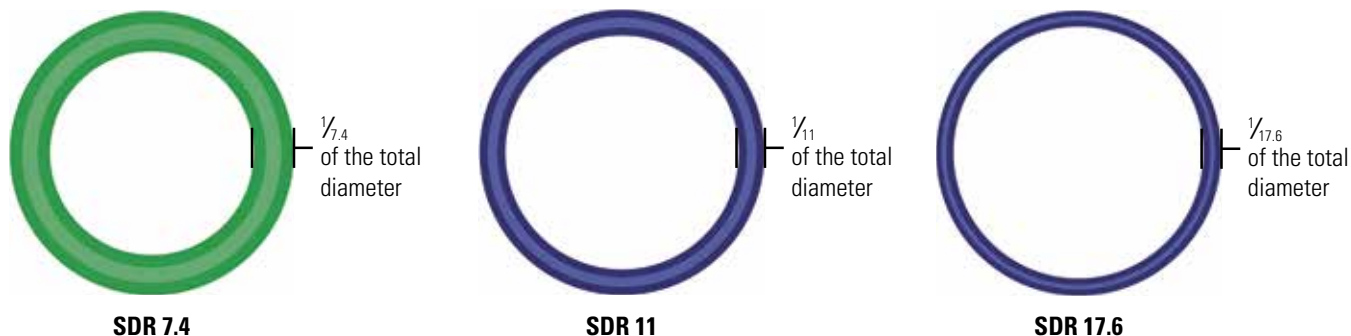
System is suitable for this application, but not ideal: ● **aquatherm green pipe®** **aquatherm blue pipe®** **aquatherm lilac pipe®**

Potable water and food-grade	✓		
Swimming pools	●	✓	
Compressed air systems	✓	✓	
Heating distribution	●	✓	
Marine applications	✓	✓	✓
Chilled water distribution	●	✓	
Direct-buried applications	✓	✓	✓
Recycled, reclaimed, and rainwater			✓
Irrigation	●	●	✓
Industrial and chemical transport	●	✓	
In-floor heating systems	●	✓	
Multipurpose fire sprinkler	✓		

STANDARD DIMENSION RATIO

Aquatherm's pipes are manufactured using a standard dimension ratio (SDR), meaning the wall thickness is a ratio of the total diameter. This is different from schedules, which are commonly used in North America, but is typical of fusible plastics. As a result, all pipe sizes in a given SDR have the same pressure ratings. The ratings do not decrease with larger size SDR pipe as they do with schedule-based pipe.

Each SDR provides its own advantages. The SDR is one of the major factors used in engineering an Aquatherm piping system for a specific application.



A heavy wall provides increased pressure and temperature ratings for high-stress applications such as hot water recirculation.

aquatherm green pipe MF
(all ½" and ¾" pipes are SDR 7.4 unless otherwise indicated)

A balanced wall thickness to provide higher flow rates while maintaining high pressures. Suitable for most applications.

aquatherm green pipe S
aquatherm blue pipe MF
aquatherm lilac pipe S

A thinner wall provides maximum flow rate while minimizing material weight, cost, and fusion times. For chilled, cooling, and condenser applications.

aquatherm blue pipe MF

MF: multi-layered faser-composite pipe (see page 1.7)
S: single-layered pipe (non-faser)

NOMINAL IMPERIAL SIZING

All Aquatherm piping systems are manufactured in metric sizes. In order to make the systems more intuitive to the North American market, Aquatherm has converted each of its standard pipe sizes into an imperial nominal diameter based on comparable size and flow rate.

The below tables give a standard nominal diameter for each metric size of pipe. Use the flow rate tables given in chapter 3 to verify proper selection for an application based on SDR and flow rate. The metric outside diameter (OD) is printed on the pipe and fitting bags in addition to the nominal diameter.

Actual metric OD	Nominal diameter	Actual metric OD	Nominal diameter
20 mm	½"	160 mm	6"
25 mm	¾"	200 mm	8"
32 mm	1"	250 mm	10"
40 mm	1 ¼"	315 mm	12"
50 mm	1 ½"	355 mm	14"
63 mm	2"	400 mm	16"
75 mm	2 ½"	450 mm	18"
90 mm	3"	500 mm	20"
110 mm	3 ½"	560 mm	22"
125 mm	4"	630 mm	24"

COMPARISON OF WATER CAPACITY (GAL/FT)

Nominal diameter	SDR 7.4	SDR 11	SDR 17.6
½"	0.013	0.017	-
¾"	0.024	0.026	-
1"	0.034	0.043	-
1 ¼"	0.053	0.067	-
1 ½"	0.083	0.105	-
2"	0.133	0.167	-
2 ½"	0.187	0.237	-
3"	0.270	0.343	-
3 ½"	0.402	0.512	-
4"	0.521	0.661	0.776
6"	0.854	1.082	1.272
8"	1.333	1.692	1.986
10"	2.084	2.646	3.105
12"	3.340	4.201	4.930
14"	4.242	5.340	6.267
16"	-	6.787	7.952
18"	-	8.573	10.068
20"	-	-	12.422
22"	-	-	15.596
24"	-	-	19.733

aquatherm green pipe®

As our signature PP-R pipe, Green Pipe is the

SAFEST, MOST RELIABLE CHOICE FOR POTABLE APPLICATIONS

and many other projects.



THE ULTIMATE IN POTABLE WATER PIPING TECHNOLOGY

aquatherm green pipe is a pressure piping system with a wide range of applications. Exceptional chemical purity and outstanding physical strength have made **aquatherm green pipe** successful in over 70 countries worldwide.

aquatherm green pipe can be used in almost every aspect of the piping industry, but is best suited for potable and food-grade applications, where the combination of chemical safety and physical durability can truly perform. **aquatherm green pipe** can be used for multipurpose residential sprinkler applications per NFPA 13D.

With over 400 fittings, transitions, and valves, **aquatherm green pipe** easily fits into any design or space. The dimensions range from ½" to 18" nominal diameter (ND). **aquatherm green pipe** is also available with UV protection for outdoor installations and multi-layer fiber-composite (MF) technology, which reduces linear expansion.

NON-LEACHING COMPOSITION

PP-R is a hydrophobic material, meaning it repels polarized molecules like H₂O and makes **aquatherm green pipe** the perfect fit for potable systems.

Using a material that does not interact with water or most other fluids ensures that chemicals from the pipe walls and fittings will never leach into drinking water or the underground water table. This makes the pipe healthier for the people who use it and safer for the environment they live in.

ADVANTAGES

- Leak-free connections
- Resistant to hard water and aggressive chemicals
- Does not leach, corrode or erode
- Environmentally friendly material
- Natural sound and heat insulation
- Excellent flow rate
- Potable water (NSF 61) and food rated (NSF 51)
- Fast and easy assembly
- Suitable for direct-buried and trenchless applications
- Flame, smoke, and fume-free installation
- Dampens water hammer and vibration and decreases noise

Sample specifications for **aquatherm green pipe** can be found at www.aquatherm.com/specifications-and-submittals.

Fields of application





POTABLE WATER AND FOOD-GRADE

aquatherm green pipe is approved for direct contact with food and potable water and is an ideal distribution main system used in hospitals, schools, high-rise buildings, hotels, shipbuilding, sports facilities, residences, and many other projects.

COMPRESSED AIR SYSTEMS

Both **aquatherm green pipe** and **aquatherm blue pipe** can be safely used in light industry, heavy industry, automotive mechanic shops and more. Because **aquatherm green pipe** is also available in the thicker-walled SDR 7.4, it provides superior pressure ratings and resistance to shattering. Additionally, Aquatherm piping systems do not corrode, protecting the attached equipment from rust and debris.

MULTIPURPOSE FIRE SPRINKLERS (NFPA 13D)

For light hazard occupancies, **aquatherm green pipe** can be integrated with the potable water system to provide fire protection. The high flow rates allow for mains and branches to be run through the building rather than many individual pipes, keeping the system simple and efficient.

MARINE APPLICATIONS

aquatherm green pipe is made from a hydrophobic, low-friction material that is unaffected by the dissolved minerals contained in seawater, freshwater, and brine.

OTHER APPLICATIONS

Although **aquatherm green pipe** can also be used in chilled water distribution, industrial projects and in-floor heating systems, **aquatherm blue pipe** is better suited for these applications.

Similarly, **aquatherm green pipe** may be used for irrigation and other gray water systems, but **aquatherm lilac pipe** is specifically designed for these applications.



aquatherm blue pipe®

This alternative to metal is

EXPANSION CONTROLLED, CORROSION-FREE, AND BETTER

than the piping material it replaces.



A BETTER CHOICE FOR HYDRONICS, COMPRESSED AIR, AND INDUSTRIAL APPLICATIONS

aquatherm blue pipe is specifically engineered for applications beyond potable water installations. It offers a tougher, longer lasting, more environmentally responsible solution to other non-potable pressure systems.

In addition to the general advantages of the PP-R pipe system, **aquatherm blue pipe** offers higher volumetric flow rates due to thinner walls and is high-heat stabilized for short exposures to temperatures beyond the intended design. PP-R piping is also extremely resistant to impact, corrosion, and seismic stresses.

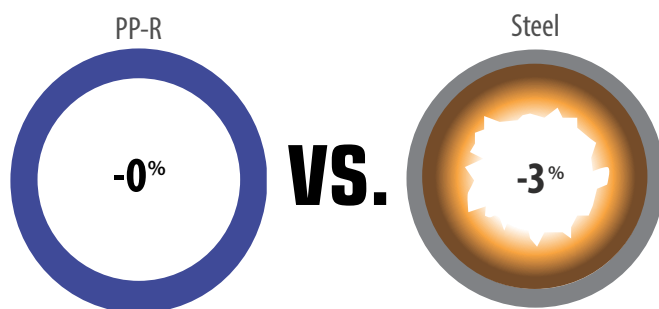
aquatherm blue pipe uses the same socket fittings and tools as **aquatherm green pipe**, making installation simple and easy. The dimensions range from ½" to 24" ND. **aquatherm blue pipe** is also available with UV protection for outdoor installations and fiber-composite (MF) technology, which reduces linear expansion.

CORROSION AND SCALE RESISTANCE

While other piping materials lose performance over time to scaling and corrosion, Aquatherm's PP-R material resists any form of change to the material wall. Even after decades of use, the Aquatherm pipe will retain its original flow characteristics. This prevents the loss of efficiency that occurs when using a pipe that can scale or corrode and will save energy over the life of the system. No chemical treatments are needed to protect the **aquatherm blue pipe**, saving maintenance costs and reducing waste.

ADVANTAGES

- Resistant to most chemicals
- Excellent flow rate
- Fast, welded connections
- Light, impact-resistant material
- Corrosion-free pipe and fittings
- Natural sound and heat insulation
- Long lasting
- Fully recyclable
- High-heat stabilized



Corrosion and scaling can reduce the inside of steel pipes by an average of 3% per year, resulting in lost efficiency and up to 10% increased pumping energy annually. This can add up to thousands of dollars in hidden energy costs over the life of the system.

Aquatherm's PP-R pipes don't corrode or scale, so they continue delivering efficiency and performance year after year.

Sample specifications for **aquatherm blue pipe** can be found at www.aquatherm.com/specifications-and-submittals.

Fields of application





HEATING DISTRIBUTION

For commercial, industrial and residential use, **aquatherm blue pipe** with faser-composite (MF) is an ideal choice due to its reduced linear expansion and resistance to corrosion, which increases performance and extends service life. Non-faser coils are also available for use in snow-melt applications in concrete or asphalt.

CHILLED WATER DISTRIBUTION

For residential, commercial, and industrial use, **aquatherm blue pipe** has a natural insulation value that helps reduce heat gain and often eliminates problems with condensation, making it an excellent choice for cooling towers and condenser water.

INDUSTRIAL APPLICATIONS

For the processing and transport of aggressive mediums and materials, **aquatherm green pipe** and **aquatherm blue pipe** resist many types of chemicals.

IN-FLOOR HEATING SYSTEMS

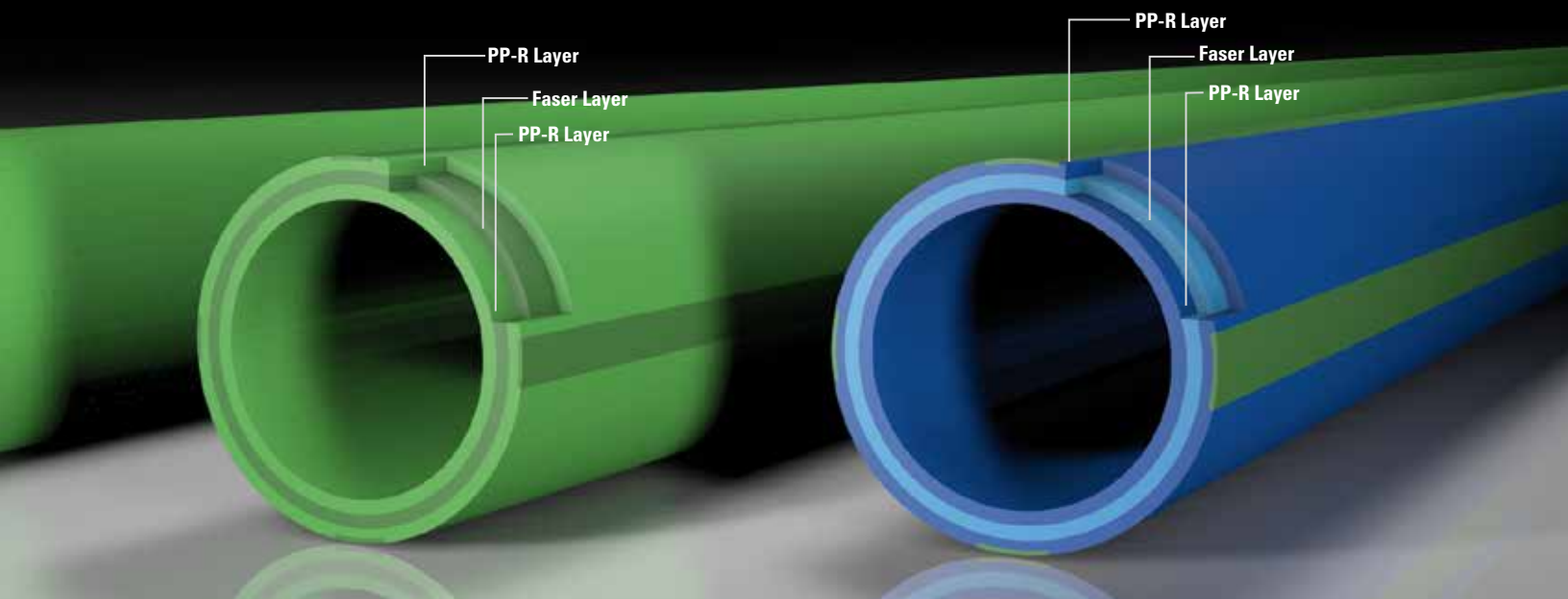
Aquatherm's fused connections, low pressure drops, and 8-to-1 bending radius (non-faser only) make for a safe and efficient installation. Aquatherm's fusion outlets allow for an extended manifold layout, which helps reduce costs and improve performance.

GEOHERMAL

While all Aquatherm pipe can be safely buried in soil, sand or concrete, **aquatherm blue pipe** is available in larger diameters and has heat stabilization, making it a perfect match for geothermal applications. Aquatherm pipe is also suitable for directional boring.



FASER-COMPOSITE TECHNOLOGY



MULTILAYER FASER (MF) TECHNOLOGY

To increase maximum operating temperatures and improve overall performance, Aquatherm has developed a multilayer faser-composite (MF) extrusion process.

The result is a middle layer in the pipe that is a mixture of glass fibers and Aquatherm's proprietary **fusiolen**. This layer allows the pipe to remain rigid at high temperatures and significantly reduce linear expansion.

Along with the benefit of reduced expansion, Aquatherm MF pipes are still flexible and require fewer and smaller expansion controls. They can also be buried without any expansion controls or thrust blocking, as the weight of the soil will restrict any movement. Anchors may be required where the pipe penetrates a wall or foundation.

The MF technology allows for improved systems without sacrificing any of the other advantages of the pipe.

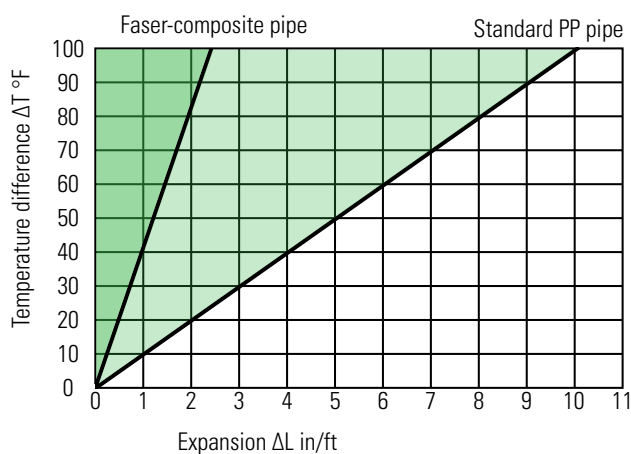
ADDITIONAL BENEFITS

In addition to reduced linear expansion, pipes made using the MF process also have the following advantages:

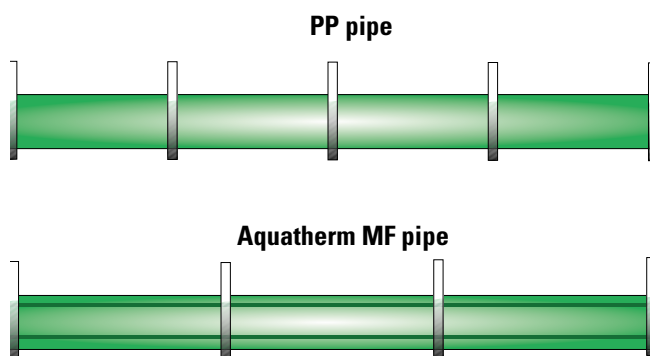
- Higher flow rate due to increased inner diameter
- Fewer supports needed
- Less weight

The low concentration of glass fibers in the pipe does not interfere with the fusion process or the recycling process, so all other aspects of installation and use remain the same as with non-MF Aquatherm pipes.

Linear expansion: PP pipe and Aquatherm MF pipe



Support spacing for PP pipe and Aquatherm MF pipe



aquatherm lilac pipe®

Lilac Pipe is the ideal solution for

WATER CONSERVATION AND GRAY WATER SYSTEMS

with specialized coloring and marking.



THE PERFECT SOLUTION FOR RECYCLED, RECLAIMED, & RAINWATER APPLICATIONS

Water conservation systems are being specified and installed much more frequently as building and plumbing codes are updated to encourage more responsible water use. Most codes require that these systems be kept entirely separate from the potable water supply and that the piping be color coded and labeled to identify it as non-potable.

aquatherm lilac pipe is ideally suited for non-potable service water due to its resistance to corrosion, scaling, and microbiological growth and distinct purple coloring.

The water from reclaimed, recycled and rainwater sources can be used for flushing, irrigation, cleaning and other applications. **aquatherm lilac pipe** is available from ½" to 10" sizes and uses the same fittings as other Aquatherm systems.

aquatherm lilac pipe is designed exclusively for these applications. The piping uses the same durable, corrosion-resistant PP-R material that has been successfully used for hot and cold water distribution for over 35 years. This, combined with design modifications, coloring, marking, and independent third-party certification by NSF International, make **aquatherm lilac pipe** the ideal choice for water conservation.

IRRIGATION

For gray water applications where the system is exposed to varying water quality and the potential of freezing, **aquatherm lilac pipe** is corrosion resistant and can withstand isolated instances of freezing.

ADVANTAGES

- Uses **aquatherm green pipe** fittings
- Fast, welded connections
- Light, impact-resistant material
- Corrosion-free pipe and fittings
- Coloring prevents cross-contamination with potable lines
- Long lasting
- Fully recyclable

Sample specifications for **aquatherm lilac pipe** can be found at www.aquatherm.com/specifications-and-submittals.



Fields of application



MATERIAL

ADVANTAGES OF FUSIOLEN PP-R

- Optimized melt index for better fusion connections
- Opaque coloring prevents microbiological buildup
- Non-leaching
- Natural insulation properties
- Non-corroding
- Heat stabilized

fusiolen® PP-R

All Aquatherm pipes and fittings are made with a specialized polypropylene-random (PP-R) resin, **fusiolen** PP-R.

fusiolen PP-R is both physically and chemically resistant to the abuse that can damage other materials. It is also a low friction material, protecting it from abrasion and reducing pressure loss.

The superior fusion properties of **fusiolen** PP-R result in a permanent, homogeneous connection that is chemically indistinguishable from the rest of the material.

MATERIAL BENEFITS

Polypropylene is a thermoplastic polymer that is made up of chains of carbon and hydrogen.

Polypropylene-random (PP-R) is a blend of long and short hydrocarbon chains, resulting in a material that is both tough and flexible. This allows it to resist physical impact and stress.

As a hydrophobic material, PP-R does not interact with water. It does not corrode or erode and will not leach into the water supply.

PP-R has natural insulation properties that allow it to absorb the force from pressure surges and dampen the noise created by water flow and hydraulic shock.

SUPERIOR FUSION PROPERTIES

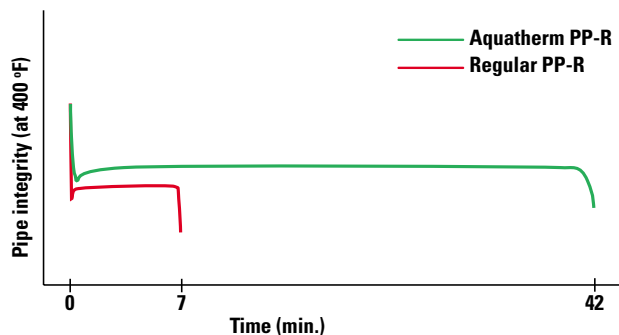
fusiolen PP-R is engineered to have an ideal melt index for socket fusion and butt welding, resulting in connections that are strong and homogeneous.

fusiolen PP-R does not burn or change during fusion, so the actual point of fusion is chemically indistinguishable from the rest. This prevents weaknesses and cracking in the joints.

HIGH TEMPERATURE STABILIZATION

fusiolen PP-R is heat stabilized, giving it a much higher safety factor than traditional polypropylene.

Under extreme temperatures, **fusiolen** PP-R will last six times longer without material degradation. **fusiolen**® PP-R C, the material used in **aquatherm blue pipe**®, is high-heat stabilized to last even longer. This means that occasional exposure to high temperatures due to mechanical failure won't damage the Aquatherm pipe systems.





ECOLOGICAL ADVANTAGES

- Improved efficiency
- No toxic materials such as PVC, BPAs, dioxins, phthalates or VOCs
- Fully recyclable pipe and fittings
- Extended service life
- Free of heavy metals
- Chemically inert
- Emission-free installation

HIGH-OPACITY PIGMENTATION

fusiolen PP-R is intentionally pigmented to be opaque, preventing light from entering the pipe. This helps protect the pipe from microbiological build-up and increases the service life of the system.

LOW-IMPACT LIFECYCLE

fusiolen PP-R is fully recyclable and can be ground, melted, and re-used in car parts, home products, food packaging, medical equipment, and other applications.

There are no harmful waste products created by the processing or disposal of **fusiolen** PP-R. The pipe and fittings made with **fusiolen** PP-R have an estimated service life of over 60 years. As a result, Aquatherm's pipe systems rarely require maintenance or costly repairs.

PROVEN WORLDWIDE

Aquatherm piping systems have been tested, listed, and certified by numerous national and international organizations, including:

- NSF, ICC, IAPMO, ASTM, FM, BNQ, CFIA (North America)
- DVGW, SKZ (Germany)
- WRAS (UK)
- SVGW (Switzerland)
- SAI-Global (Australia)
- SITAC (Sweden) ... and many more!

ENVIRONMENTAL SAFETY

Since its founding in 1973, Aquatherm has worked hard to ensure that our products and manufacturing processes do not pollute the earth's sensitive ecosystems. Being green isn't just a fad with Aquatherm; it's our way of doing business.

Aquatherm believes that ecological and economic interests should go hand-in-hand, both in the production and installation of our products. Aquatherm's PP-R pipes and fittings are even fully recyclable, minimizing their impact from start to finish.

To ensure its environmental compatibility, the base PP-R material and additives (color pigments and stabilizers) are extensively tested by Aquatherm's own laboratory as well as independent researchers to ensure that nothing harmful is ever put into our pipes.

AQUATHERM AND LEED CREDITS

Aquatherm pipe has been used in many LEED certified projects. Although there are no direct LEED credits for using a particular piping material, there are several points which the right piping system can address.

Please refer to the Aquatherm LEED Planning Guide on our website at www.aquatherm.com/technical-documents for further details. Information regarding LEED projects that have used Aquatherm pipes can be found in the Case Studies section.

EXTENDED SERVICE LIFE

Aquatherm pipes will last for over 60 years within the design parameters provided in this catalog. This eliminates the environmental impact of repairs, mold, leaks, and other problems caused by piping failure.

By using components that last longer, buildings can be made safer and more sustainable.



SYSTEM FEATURES

HEAT FUSION CONNECTIONS

The connections in an Aquatherm piping system are made using heat fusion, a simple process which actually turns the pipe and fitting into a single piece of PP-R.

There are no solders, solvents, or glues added to the connection, eliminating weak points and harmful chemicals from the system.

60+ YEAR LIFESPAN

Aquatherm piping systems resist the scaling and corrosion that reduce the performance of other piping systems.

The walls of the PP-R piping systems generate less friction than other systems, eliminating the abrasion that can cause pinhole leaks and shorten the life cycle of the pipe.

The heat fusion joints maintain the same properties as the pipe itself, so physical stresses will not damage their integrity.

Aquatherm piping systems last longer with less maintenance than other systems, adding greater value to each installation. With proper design, Aquatherm systems can last for over 60 years.

POTABLE WATER RATING

Aquatherm piping systems meet the requirements of NSF Standard 14 and **aquatherm green pipe** meets NSF Standard 61, showing that it is safe for direct contact with drinking water.

aquatherm green pipe has been tested to NSF 51 and is acceptable for direct food contact and food processing applications up to 212 °F.

Aquatherm piping systems meet the stringent requirements for strength, material quality, dimension, damage resistance, marking, and quality control of ASTM F2389 and CSA B137.11.

ADVANTAGES

- Chemically inert material
- Application-specific engineering
- Corrosion and scale resistant
- Incidental freezing tolerance
- Shatter-resistant material
- 10-year warranty
- Natural sound insulation
- Consistent quality

APPLICATION-SPECIFIC ENGINEERING

Aquatherm piping systems are engineered for optimal performance based on the application type.

- **aquatherm green pipe** is rated for potability, and comes with MF and non-MF variations to optimize efficiency and economics.
- **aquatherm blue pipe** is high-heat stabilized to have a higher safety factor while maintaining superior flow rates.
- **aquatherm lilac pipe** is designed without fiber-composite, providing the highest value for gray water installations.

FULL SYSTEM RANGE

Aquatherm piping systems can be used in nearly any pressure application and range in size from ½" to 24". This allows installers to use one type of pipe for an entire system rather than mixing multiple materials and joining methods.

An entire project can be done using Aquatherm pipes, eliminating the need for multiple tool sets and maintenance programs.

Transitions to ANSI flanges, NPT threads, PEX piping, and copper tube make combining Aquatherm pipe with other systems and components simple and easy.



AN UNMATCHED GUARANTEE

As proof of Aquatherm's demanding quality standards, all properly installed Aquatherm pipe systems carry a 10-year warranty for property damage liability coverage of up to €15 million per damage event. This warranty pertains to the system itself, and stays in effect even if ownership of the building changes hands

Aquatherm's warranty covers the pipes, the fittings, and any incidental damage caused by material failure from manufacturer defect. The policy also provides coverage for personal injury and for financial loss.

The Aquatherm warranty only applies to material failures from manufacturer's defect. Systems must be properly installed by an Aquatherm-trained installer. Improper installation or fusing to non-**fusio**len parts will void the warranty for those connections. Following all the procedures in the Aquatherm Installer manual will minimize the risk of material failure and help ensure coverage in the event of a problem. Pressure testing is required to verify proper installation.

The Aquatherm warranty does not cover the following issues*:

- Improperly assembled transitions (threads, flanges, copper stub outs, etc.) unless the fitting was originally defective.
- Time lost due to poor planning, supplier issues, or failure to order the proper parts/tools.
- Connections that have not been properly fused.
- Failures in systems that were not pressure tested before operation (evaluated on a case-by-case basis).
- Damage to pipe or fittings from mishandling after they have left Aquatherm's possession.
- Use of defective tools and equipment to make welded joints or fittings connections.

*Not a comprehensive list



INSTALLATION ADVANTAGES

FAST CONNECTION TIMES

Aquatherm pipes and fittings are assembled with heat fusion, a fast and simple process that involves heating the materials and sliding them together for a perfect connection every time.

Heat fusion can save over 50% on labor time compared to traditional welding and soldering and is comparable to the quickest labor-saving connection methods.

FUSION OUTLETS

This innovation allows for branch lines to be added after the mains are already in place, reducing labor times and giving the installer unparalleled flexibility.

Fusion outlets replace standard reducing tees and offer many advantages such as replacing two connections with one, having a lower pressure drop, and using less material.

USA-BASED FABRICATION

As part of ongoing efforts to provide superior service to match its superior products, Aquatherm offers prefabrication options for manifolds and other complicated or large assemblies. Aquatherm's Utah-based fabrication team also builds all the segmented fittings for increased accuracy and reduced lead times.

For a quote and lead time on a custom assembly, please submit your specifications to fabrication@aquatherm.com.

RIGID HANGING PIPE

Aquatherm pipes are designed to remain rigid on hangers, giving the pipe a clean, conventional layout with elbows and tees. This allows installers to create a craftsman's appearance in the final product.

LIGHTWEIGHT MATERIAL

Aquatherm's PP-R pipes and fittings can weigh as little as 1/8th of an equivalent metal part, making it much easier to lift and carry around the jobsite. Installing larger spools and carrying the materials in fewer trips will speed the overall installation process, reduce worker fatigue and increase safety.

FLEXIBLE LENGTHS AND CONNECTIONS

Heat fusion connections have the same properties as the pipes and fittings, so there is a certain level of flexibility in the assembled pipe that makes it easy to prefabricate and move on-site without the risk of the joints cracking and leaking. This flexibility also allows for a wider range of applications and protects the pipe from seismic stresses.

CONSISTENT RESULTS

One of the major advantages of using PP-R and heat fusion is that the results are both reliable and consistent. The double bead of plastic allows for accurate visual inspection.

ADVANTAGES

- Lightweight pipe and fittings
- Durable material
- Full system compatibility
- Rigid hanging pipe
- Flexible lengths and connections
- Easily prefabricated
- Consistent results
- Simple expansion control
- Suitable for air testing*

*Damaged pipe or improper joining may cause the pipe or fittings to break apart during pressure testing. Follow all safety precautions when conducting a pressure test.



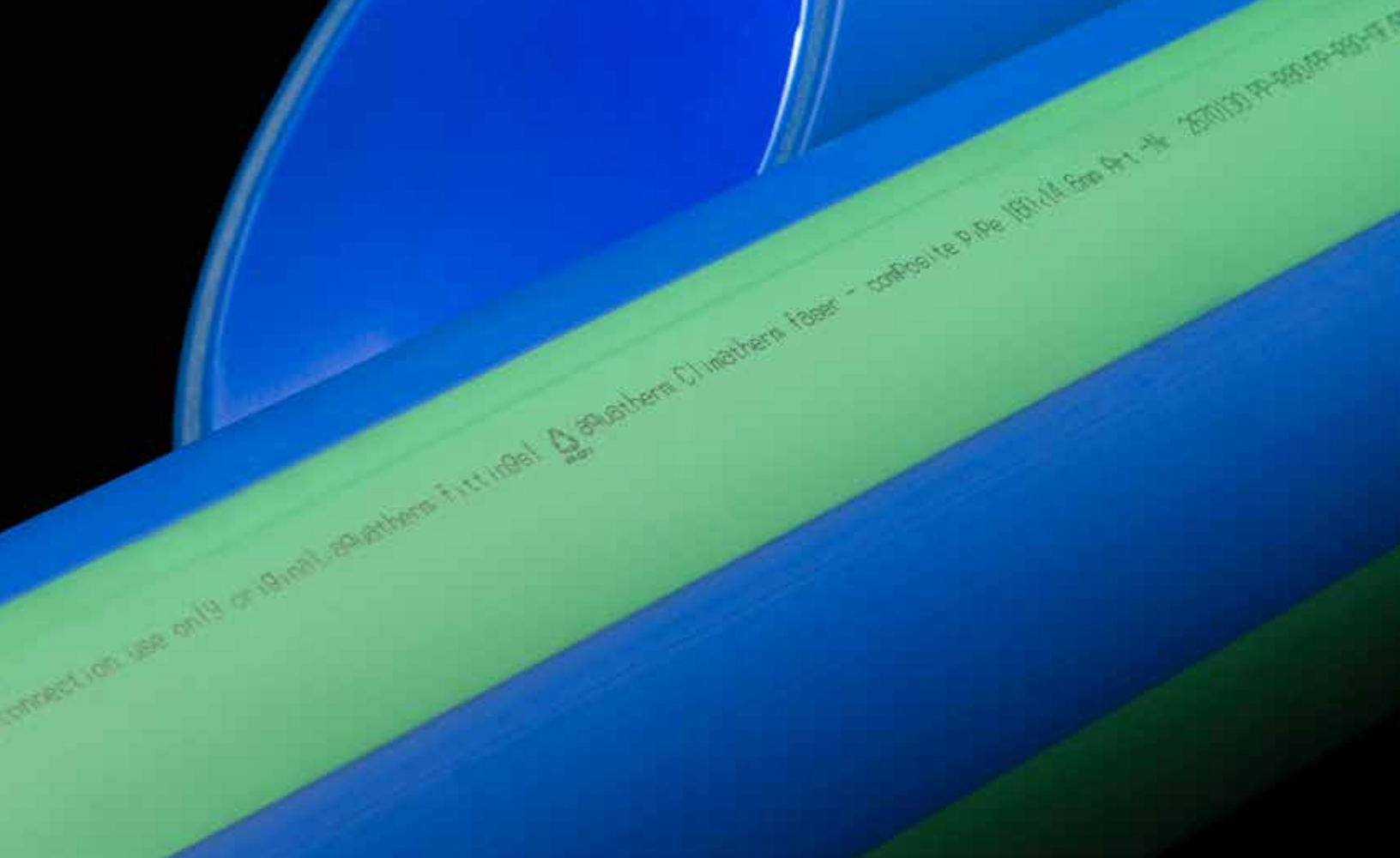
2 QUALITY ASSURANCE

Aquatherm quality control

Labeling, shipping, and handling

Standards, regulations, and listings

Test certificates





QUALITY CONTROL

Aquatherm's products are manufactured and tested at the company headquarters in Attendorn, Germany.

To ensure consistency and quality in our products, Aquatherm has established a thorough production process that includes:

- testing and acceptance of incoming materials
- in-process inspection and testing
- process control at all stages
- final inspection and testing

Aquatherm complies with all relevant regulations and standards for the quality control of potable water pipe systems established by:

- | | |
|--------|---------|
| • NSF | • ICC |
| • CSA | • IAPMO |
| • CFIA | • ISO |
| • ASTM | • DIN |

Our strict manufacturing standards are backed up by decades of experience in the extrusion and injection molding industries.

RAW MATERIALS

The materials used to make Aquatherm products, such as the PP-R granules used to produce **fusiolen®** PP-R and the metal used in transition fittings, are rigorously tested and uniformly sourced.

Preproduction samples are examined in the laboratory to verify structural integrity, dimensional accuracy, and surface finish. This testing ensures that all incoming materials conform to our own rigorous standards prior to production.

INSPECTION AND TESTING

The equipment used in our manufacturing process (e.g., ultrasonic gauges) allows for constant observation and control of production. Any substandard products are isolated and recycled.

Pipes and fittings are only released to stock following the completion of proper testing and inspection. This data is documented and recorded for future reference.

EXTERNAL TESTING

In addition to the extensive quality assurance testing conducted on site by Aquatherm, independent third-party auditing is carried out by several North American certification agencies including NSF International, IAPMO, and ICC.

These agencies perform unannounced plant inspections each year to verify that the materials, processes, quality control, and piping system performance are in accordance with national and international consensus standards.

FINAL INSPECTION

The final inspection and associated tests cover the following:

- dimensional control
- surface finish
- measurement of the melt flow index
- impact bending test
- heat reversion test
- homogeneity of the material
- internal pressure test

Once the final inspection has been completed, pipes and fittings are stocked and shipped worldwide upon request to Aquatherm's international partners.



AQUATHERM IN NORTH AMERICA

In North America, pipe is stored at Aquatherm's Logistics Center in Lindon, UT, and distributed through a network of local and regional wholesalers. The pipe is closely inspected to verify that no damage has occurred in transit.

The Logistics Center allows for reduced shipping times and increased inventory for the US and Canada. It also serves as a training center with tools and equipment to cover a broad range of installation procedures.

PREFABRICATION SERVICES

Larger fittings (6" and greater) are segmented, and are fabricated at the Logistics Center for the North American market.

Our highly trained fabrication technicians cut and fuse the pipe to build everything from basic elbows and tees to complex custom assemblies.

For a quote and lead time on a custom assembly, please submit your specifications to fabrication@aquatherm.com.

After the specifications are provided and the parts built, the prefabricated assembly can be transported to the jobsite and connected in place for a quick and easy installation.

The fittings made at the Logistics Center are built to exacting standards of accuracy, and have their internal beads removed for improved flow performance.

CUSTOMIZED SUPPORT

Aquatherm PP-R piping is still relatively new to the North American market, but has made great strides since its introduction in 2005.

We want to ensure that not only the quality of our pipe is held to the highest standards, but that the quality of every installation is a work of superior craftsmanship. To that end, Aquatherm provides extensive contractor training and engineering support both at our Utah logistics center and regionally throughout the US and Canada.

SHIPPING AND ON-SITE INSPECTION

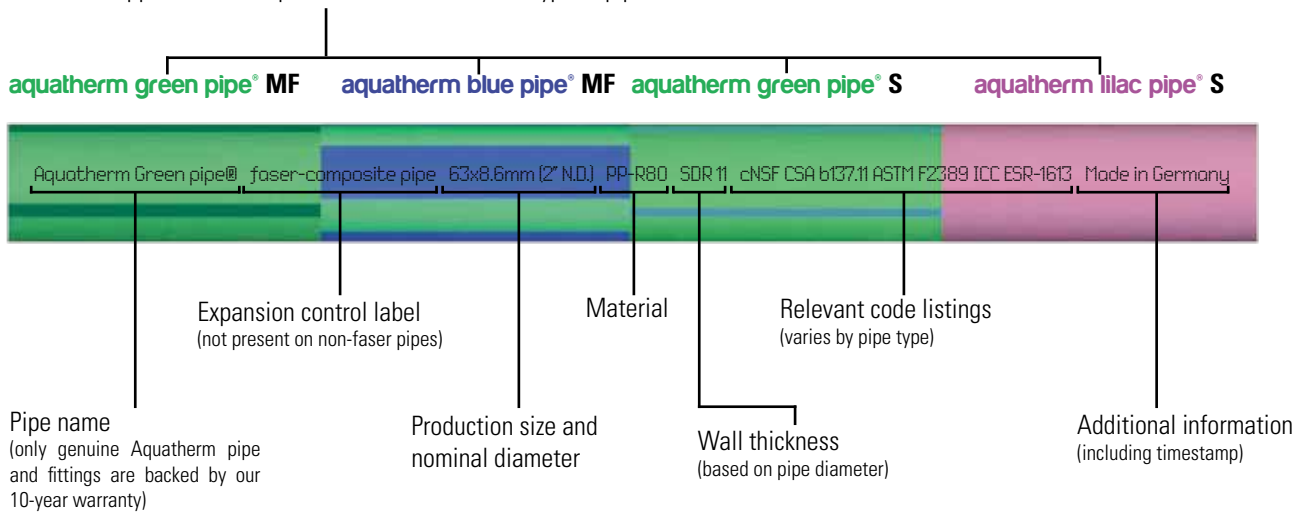
To facilitate projects requiring large amounts of product, containers of pipe can be shipped directly on site.

While Aquatherm takes all available precautions to ensure that pipe and fittings are transported safely, the customer should inspect the pipe upon receipt to ensure that it has not been damaged during shipping. Damaged pipe should be cataloged and returned for replacement, following all of the distributor's procedures for returns.

Aquatherm only accepts responsibility for damage caused to the pipe and fittings while they are still in Aquatherm's possession. Once another party takes possession of the product (i.e., receiving a shipment), Aquatherm will not assume responsibility for incidental damages that happen to the pipe and fittings. Parts that were not reported as damaged upon receipt will be assumed to have been damaged after leaving Aquatherm's possession.

QUALITY ASSURANCE

Aquatherm has several lines of pipe that are specifically engineered for certain applications. Stripes and color indicate the type of pipe.



LABELING

All Aquatherm pipes are labeled every three feet to identify the size and type of pipe and the test standards which they meet. Refer to the diagram above for a thorough explanation.

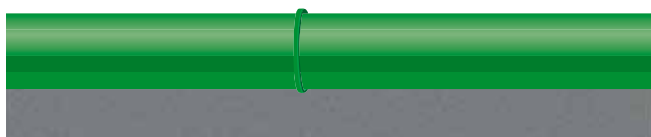
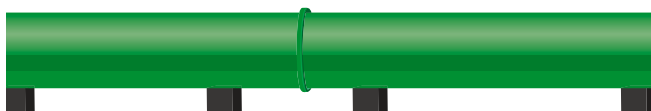
Fittings are sorted according to the designated packing units and are packaged in bags with coded labels to make storage and identification easier.

Fittings also have their size and production run stamped on them for easy identification outside their packaging.

CARE AND HANDLING OF PIPES AND FITTINGS

1. Always handle the ends of the pipe carefully. If the pipe is exposed to impact or stress, inspect it for damage. Damaged ends or sections should be marked and removed before installation. Surface scratches deeper than 10% of the wall thickness are considered damage.
2. Always store the pipe on a flat surface. When storing the pipe on racks, always have at least three supports under 13 ft lengths and four supports under 19 ft lengths.

It is best to place plywood or something similar on top of the supports to keep the pipe from warping.



3. When storing the pipe outdoors, leave it in the factory-issued protective bag as much as possible. This bag will protect the pipe from dust, scratches, and UV damage.

If the pipe is removed from its bag, do not store it uncovered for more than six months. Pipe that is exposed to direct sunlight longer than six months is no longer covered under the warranty. The black-coated UV pipe may be stored outdoors indefinitely.

4. Never place the forks of a forklift into the ends of the pipe. This will damage the pipe and can cause it to crack. Handlers may use a padded rug ram inside the pipe. Otherwise, it is recommended to use a crane or lift to handle larger pipes.
5. In cold weather, take extra care when handling the pipe. Cold temperatures reduce the pipe's flexibility, making it more susceptible to impact damage.
6. Keep the fittings in their original bags. Many of the fittings do not have detailed labels printed on them and can get mixed up if they are not stored with their bags. When storing loose fittings in boxes or bins, attach a label from the packing bag to identify the fittings.
7. When shipping the pipe, always load it onto a flat surface or one which is evenly supported. Only strap the pipe at a place where it is supported to prevent bowing.
8. When covering the pipe, always use a light colored tarp such as blue or white. Do not use a black tarp, as this may cause heat damage to the pipe. Pipe may also be covered with a structure that provides shade.
9. Additional care and handling instructions can be found in the Aquatherm Installer Manual.

STANDARDS, REGULATIONS, AND LISTINGS

The following national and international standards, regulations, and listings are applicable to Aquatherm piping systems.

- **NSF Standard 61 (C.HOT 180 °F/82 °C)**
Suitable for potable water
- **NSF Standard 14**
Meets piping performance requirements
- **NSF Standard 51**
Suitable for food processing up to 212 °F (100 °C)
- **CFIA #A508**
Canadian Food Inspection Agency approval #A508
- **ICC ESR-1613 / PMG Listing 1014**
Polypropylene pipe and fittings meet or exceed North American standards
- **DIN EN ISO 9001**
Quality management systems: requirements
- **IPC 2009 Sec. 605**
Water distribution & Water service
- **IMC 2009 Chapter 12**
Hydronic piping
- **IRC 2009 Chapter 21 & 26**
Hydronic piping & Plumbing
- **UMC 2009 Chapter 12**
Hydronic piping
- **UPC 2012 Chapter 6**
Water distribution & Building supply
- **IAPMO File M-6022**
Mechanical
- **IAPMO File 5053**
Plumbing
- **ASTM F2389**
Standard specification for pressure rated polypropylene (PP) piping systems
- **CSA B137.11**
Polypropylene (PP-R) pipe and fittings for pressure applications
- **CSA B214**
Polypropylene (PP-R) pipe and fittings for hydronic applications
- **BNQ 3660-950**
Safety of products and materials in contact with drinking water
- **ISO 15874**
Plastic pipe system for hot and cold water installation: polypropylene
- **ASTM F2023**
Standard test method for evaluating the oxidative resistance of plastic piping to hot chlorinated water
- **ASTM D 635**
Standard test method for rate of burning and/or extent and time of burning of plastics in a horizontal position
- **FM 1635**
For wet pipe automatic sprinkler systems in light-hazard occupancies
- **NFPA 13, 13D and 13R**
Standard for the installation of sprinkler systems in one/two-family dwellings & manufactured homes
- **DIN EN ISO 14001**
Standard for environmental management
- **ASME B31.3**
Standard for process piping
- **ASME B31.9**
Standard for building services piping



IAPMO RESEARCH AND TESTING, INC.

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CERTIFICATE OF LISTING

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The most updated information on this Certificate of Listing is available online at pld.iapmo.org

Effective Date: June 2015 Void After: June 2016
Product: Pressure Rated Polypropylene Piping Systems File No. 5053

Issued To: AQUATHERM GMBH
Biggen 5
D-57439 Attendorn,
Germany

Identification: Pipe shall be marked at intervals of not more than 5 ft. with the manufacturer's name or trademark, nominal size, for metric series pipe - the term "metric" and the dimension ratio or both the outside diameter and wall thickness, IPS series pipe shall include "Schedule 80" or "SCH 80", type of material (PP-R) and classification number (80 or 100), pressure rating and temperature for which pressure rating is valid, the designation "F2389", manufacturer's production code, and pipe intended for the transport of potable water shall bear the mark of the lab making such evaluation. Fittings shall be marked with the manufacturer's name or trademark, nominal size, dimension ratio or schedule for corresponding pipe and type of material (PP-R). The fitting or packaging shall be marked with "Metric" or "NPT" for threaded fittings, and the designation "F2389". All products shall bear the UPC® certification mark.

Characteristics: Pressure rated polypropylene pipe and fittings manufactured in accordance with ASTM F2389. To be installed per the manufacturer's instructions and the latest edition of the Uniform Plumbing Code.

David McKinney
Chairman, Product Certification Committee

Russ Chang
CEO, The IAPMO Group



This listing period is based upon the last date of the month indicated on the Effective Date and Void After Date shown above. Any change in material, manufacturing process, marking or design without having first obtained the approval of the Product Certification Committee, or any evidence of non-compliance with applicable codes and standards or of inferior workmanship, may be deemed sufficient cause for revocation of this listing. Production of or reference to this form for advertising purposes may be made only by specific written permission of IAPMO Research and Testing, Inc. Any alteration of this certificate could be grounds for revocation of the listing.

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DIVISION: 22 00 00—PLUMBING
SECTION: 22 11 16—DOMESTIC WATER PIPING
DIVISION: 23 00 00—HVAC
SECTION: 23 21 13—HYDRONIC PIPING

REPORT HOLDER:

AQUATHERM GMBH
BIGGEN 5
ATTENDORN D-57439 GERMANY

EVALUATION SUBJECT:

AQUATHERM GREEN PIPE, GREEN PIPE MF, BLUE PIPE, BLUE PIPE MF, LILAC PIPE, FUSIOTHERM® AND CLIMATHERM® POLYPROPYLENE (PP-R) PIPE AND FITTINGS, AQUATHERM ADVANCED



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3 PLANNING

Planning and engineering with Aquatherm

Working pressure

Integration with other systems

Flame spread and smoke developed

Using the I-Codes/Using the IAPMO codes

Special applications

System considerations

Pipe sizing by flow rate

Flow velocity and head loss

Equivalent lengths of fittings

Maximum pull force





PLANNING AND ENGINEERING WITH AQUATHERM

With unique advantages over both metal and other plastics, Aquatherm piping systems offer new possibilities for design and application.

By combining revolutionary strength and longevity with industry-leading purity and neutrality, Aquatherm manufactures piping systems that can truly address all possible concerns for potable, food-grade, hydronic, chemical, and industrial applications.

When designing with Aquatherm piping systems, it is important to be aware of their unique features such as the fiber-composite (MF) layer for expansion control, the fusion connections, the impact and chemical resistance, and the sound insulation.

The natural R-value and reduced friction factors are especially important because they reduce the amount of energy needed for the system to perform. With careful planning and engineering, it is possible to exceed existing performance standards and maximize a system's efficiency.

Be sure to verify all calculations before installing an Aquatherm piping system. The sizing and insulation recommendations given in this catalog are intended for easy reference and are not a substitute for actual engineering.

DETERMINING COMPATIBILITY

The first step to designing with Aquatherm is to verify that PP-R is an acceptable material choice for a particular application.

Aquatherm pipes are suited to a wide variety of applications and generally perform without the problems that plague other systems. However, PP-R still has some chemical, pressure, and temperature considerations that need to be addressed in order to limit the risk of failure.

Operating outside of the safety parameters provided by Aquatherm can shorten the life of the pipe. By bringing a system's intended load in line with the safety parameters given in this chapter, a designer can ensure that the pipes will last for their entire 60-year lifespan or longer. The recommended operating temperatures and pressures can be found on pages 3.3 and 3.4.

Steam systems, water systems with both high temperature and pressure, or systems with high levels of certain aggressive chemicals will likely not be suitable for use with PP-R. If you are uncertain about a specific application, Aquatherm can perform on-demand testing to determine suitability. To request a test for your project, fill out and submit the special applications form found online at **www.aquatherm.com/chemical-compatibility**.

In some applications, Aquatherm pipe will not last for a full ten years, but may still outlast other piping alternatives. These are considered "sub-10" applications, and are not covered by the warranty. However, they may still be installed at the end user's discretion.



CHOOSING YOUR SYSTEM

Although all Aquatherm systems share similar characteristics, they are also engineered for use in certain applications. Choosing the correct system for the application will maximize performance and minimize material costs.

As a general rule, **aquatherm green pipe®** should be used for potable and food-grade applications while **aquatherm blue pipe®** is used for heating and cooling, compressed air, and a variety of industrial applications. **aquatherm lilac pipe®** is intended for use in gray water systems. A more detailed list of suitable applications can be found in chapter 1.

Only MF (multi-layer fiber-composite) pipes should be used on heated or chilled applications, to reduce linear expansion (see page 4.8). Additionally, Aquatherm recommends using the thinnest-walled pipe that will meet the temperature and pressure ratings required by the system. Aquatherm's recommended operating parameters already contain a significant safety factor.

DETERMINING EFFICIENCY

Aquatherm pipes have a high flow coefficient, and do not suffer from a loss of flow over time due to corrosion. However, due to differences in the OD, flow calculations will need to be done specifically for the Aquatherm pipe.

Information regarding flow rates, flow speed, head loss and flow loss through fittings can be found on page 3.9.

ADDRESSING ADDITIONAL NEEDS

When installing Aquatherm in a plenum space, special considerations need to be taken to meet building codes. Information regarding plenum-rated options can be found on page 3.6.

If the Aquatherm pipe is being installed outside, the pipe will need to be protected from UV radiation. Information regarding UV protection can be found on page 3.8. Information regarding thrust blocking, vibration isolation, direct-boiler connections, and firestopping can also be found there.

WORKING PRESSURE

The working pressure tables illustrate the permissible working pressures of the Aquatherm piping systems. The balance between working pressure and operating temperature varies based on the wall thickness of the pipe as well as the presence of a faser layer. Aquatherm's heat-stabilized PP-R negates the effects of occasional, short-term increases in temperature, so these do not need to be taken into account. The burst pressure for the pipes is much higher.

The tables with "constant operating parameters" assume a steady, year-round load. Their expected minimums are based on negligible material degradation during that time. The "seasonal peaks" table assumes that the system will only operate at full capacity in the coldest winter months and will operate at a lower, more efficient capacity during the rest of the year. The "compressed air" table assumes an air temperature under 100 °F and above 40 °F. For applications outside the parameters shown here, please submit a compatibility report (sample on page 3.7). Aquatherm pipe may be used for vacuum applications up to 29.92 inHg.

These tables are based on the piping system using water or water mixed with propylene, ethylene glycol or glycerin. For applications using different fluids or operating conditions outside those given below please contact your local Aquatherm representative. Aquatherm pipes are not intended for fluid temperatures colder than -5 °F, as the pipes begin to lose their resistance to impact.

Note: Some of the ratings at lower temperatures in these tables have been reduced based on changes required by some European agencies. Others have been modified slightly to round to the nearest 5 psi per typical ratings requirements in North America. There has been no change in the product and this was not the result of any performance-related issue.

SYSTEMS WITH CONSTANT OPERATING PARAMETERS (60-YEAR EXPECTED MINIMUM)

Temperature	aquatherm green pipe® aquatherm lilac pipe® SDR 11 (non-MF)	aquatherm green pipe® SDR 7.4 (MF)	aquatherm blue pipe® SDR 11 (MF)	aquatherm blue pipe® SDR 17.6 (MF)
	Permissible working pressure (psi)			
50 °F	195	380	325	160
80 °F	170	320	255	125
100 °F	135	255	210	95
120 °F	110	215	180	80
140 °F	95	180	150	70
160 °F	-	120	100	45
180 °F	-	100	62	25
200 °F	-	45	30	15

SYSTEMS WITH CONSTANT OPERATING PARAMETERS (25-YEAR EXPECTED MINIMUM)

Temperature	aquatherm green pipe® aquatherm lilac pipe® SDR 11 (non-MF)	aquatherm green pipe® SDR 7.4 (MF)	aquatherm blue pipe® SDR 11 (MF)	aquatherm blue pipe® SDR 17.6 (MF)
	Permissible working pressure (psi)			
50 °F	205	390	335	165
80 °F	180	330	260	130
100 °F	125	260	220	100
120 °F	115	220	185	85
140 °F	100	185	155	70
160 °F	-	140	115	55
180 °F	-	110	75	35
200 °F	-	55	45	20

SYSTEMS WITH SEASONAL PEAKS (60-YEAR EXPECTED MINIMUM)

Temperature		60 days		90 days	
		aquatherm blue pipe® SDR 11 (MF)	aquatherm blue pipe® SDR 17.6 (MF)	aquatherm blue pipe® SDR 11 (MF)	aquatherm blue pipe® SDR 17.6 (MF)
Regular load	Seasonal load	Permissible working pressure (psi)			
160 °F	175 °F	90	55	85	50
160 °F	185 °F	80	50	75	45
160 °F	195 °F	70	40	65	35

COMPRESSED AIR

aquatherm green pipe® SDR 11 (non-MF)	aquatherm green pipe® SDR 7.4 (MF)	aquatherm blue pipe® SDR 11 (MF)	aquatherm blue pipe® SDR 17.6 (MF)
Permissible working pressure (psi)			
125	200	125	50

Note: This chart is good for temperatures up to 100°F. For temperatures and conditions other than those noted in the chart, submit a Special Applications Inquiry.

INTEGRATION WITH OTHER SYSTEMS

When integrating Aquatherm piping systems with other systems, make sure that the operating parameters for PP-R won't damage the other materials or vice versa. Be aware that even if the Aquatherm pipe is compatible with the chemical being transported, other materials in the system may not be. Make sure that all parts of the system are compatible with the medium being carried before installing them. And, while Aquatherm pipe does not require treatment to protect it from corrosion, ferrous metals in the system will. Do not mix Aquatherm pipe with other piping systems in conditions that will cause the other system to fail.

When there is extensive use of copper piping in conjunction with PP-R, care should be taken to ensure the operating conditions will not cause dissolution or corrosion of the copper. Aquatherm recommends following the Copper Development Agency's guidelines for sizing, temperature and flow speed in copper pipe. This will also help ensure that the copper levels in the water do not approach the regulatory action levels. Sustained high levels of copper ions in a water system can damage wetted surfaces within the system, even PP-R. Damage caused by unregulated copper ions may void the warranty.

Alternatively, you can avoid using large amounts of new copper upstream of the PP-R in hot water recirculation lines. If the copper fails, it may degrade the PP-R as well, shortening its service life. Small amounts of copper from valves and other equipment will generally not cause an issue. For maximum longevity, recirculation lines for domestic hot water should not exceed a flow speed of 3 ft/s unless the piping is all PP-R.

If you are adding PP-R to an existing copper system, the level of copper in the water should be tested. These levels should not exceed 0.5 P.P.M., and are considered actionable by the EPA at 1.3 P.P.M. High levels of free copper indicate that the copper pipe is eroding due to system and/or water conditions.

FLAME SPREAD / SMOKE DEVELOPED

Aquatherm piping systems do not produce toxic by-products during combustion. In a fully developed fire, **fusiole[®]** PP-R will only produce CO₂ and H₂O gas. In an under-developed fire trace amounts of CO can be produced, but this is common in all combustible materials including wood and paper.

Many building codes do not consider the toxicity of the smoke produced but focus only on the volume and opacity of the smoke. Therefore, it is important to install only pipe that meets local code requirements. These codes generally reference ASTM E84 in the United States and CAN/ULC S-102.2 in Canada and require that the installed pipe have a Flame Spread Index of 25 or less and Smoke Developed Index of 50 or less.

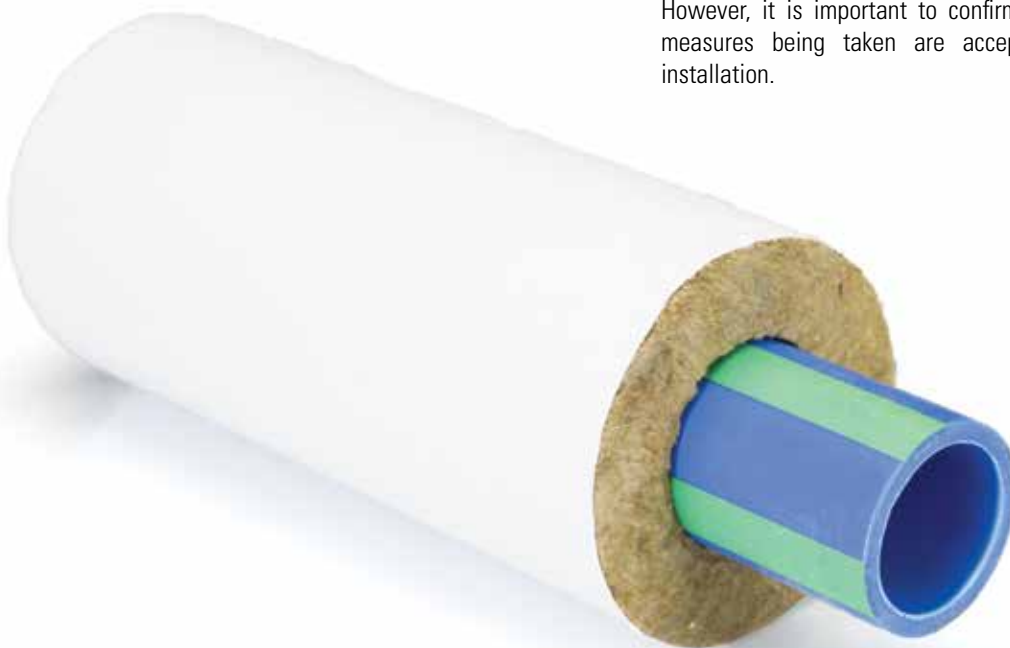
According to the IMC and UMC building codes, materials that are completely enclosed in a fire rated material, such as pipe insulation, are considered fire rated as well, as they are not technically exposed in the plenum.

FLAME AND SMOKE RATED OPTIONS

For applications where the code requires the pipe to meet an FSI of 25 and SDI of 50, Aquatherm recommends one of the following solutions:

1. Aquatherm Advanced is a listed solution for meeting the E84 and S-102.2 ratings. Aquatherm Advanced is a combination of Aquatherm pipe and a fire-rated insulation. Aquatherm Advanced may also provide sufficient insulation value for hot and cold applications, but the thermal values are dependent on the manufacturer of the insulation. An Aquatherm Advanced system does not require the fittings to be insulated for fire-rating purposes, but the fittings may still need to be insulated to prevent condensation.
2. Encasing the pipe inside of any insulation that meets the 25/50 flame spread and smoke development requirements (see page 3.6). This solution requires that the fittings be insulated as well and is subject to adoption of the relevant IMC and UMC codes, as well as the local authority having jurisdiction. Alternatively, the pipe can be enclosed in a fire-rated chase.
3. Avoid using a ceiling return air plenum. Using ducted or dedicated outdoor air eliminates the health and safety risks introduced by a return air plenum. It also eliminates the need for a large number of fire-retardant chemicals within the building. Pipe that is not inside a return air plenum generally does not need to meet flame spread and smoke development requirements.

With these options, the engineer should be able to comply with all local codes involving flame spread and smoke development. However, it is important to confirm with local officials that the measures being taken are acceptable before beginning the installation.



USING THE I-CODES

Under the IMC, materials exposed within plenums are required to meet the ASTM E 84 test for flame spread and smoke development. As given in the 2006 edition:

602.2.1 Materials exposed within plenums

Except as required by Sections 602.2.1.1 through 602.2.1.5, materials within plenums shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84.

Exceptions:

5. Combustible materials enclosed in noncombustible raceways or enclosures, approved gypsum board assemblies or enclosed in materials listed and labeled for such application.

Exception 5 excluded materials that were enclosed within noncombustible (or otherwise approved) materials, as the enclosed materials are technically concealed, rather than exposed. This exception was further detailed in the 2012 edition, making the intent of the previous editions clear:

602.2.1 Materials exposed within plenums

Except as required by Sections 602.2.1.1 through 602.2.1.5, materials within plenums shall be noncombustible or shall have a flame spread index of not more than 25 and a smoke-developed index of not more than 50 when tested in accordance with ASTM E 84 or UL 723.

Exceptions:

5. Combustible materials fully enclosed within one of the following:
 - 5.1 Continuous noncombustible raceways or enclosures
 - 5.2 Approved gypsum board assemblies
 - 5.3 Materials listed and labeled for installation within a plenum.

Under the IMC, Aquatherm pipe may be safely installed in a plenum if the pipe and fittings are contained within an insulation that meets the ASTM E 84 test requirements. This is due to the fact that pipes enclosed within the insulation are no longer considered exposed inside the plenum. Where insulation is not needed, a plenum-rated wrap will also suffice.

USING THE IAPMO CODES

The UMC contains similar requirements to the IMC in regards to plenums. In turn, the exceptions are similar, although the UMC does not offer as detailed of an exception. In the 2009 edition, it reads:

602.2 Combustibles within Ducts or Plenums

Materials exposed within ducts or plenums shall be noncombustible or shall have a flame spread index not greater than twenty five (25) and a smoke developed index not greater than fifty (50), when tested as a composite product in accordance with one of the following test methods: NFPA 255, *Method of Test of Surface Burning Characteristics of Building Materials*, ASTM E 84, *Surface Burning Characteristics of Building Materials*, or UL 723, *Test for Surface Burning Characteristics of Building Materials* except as indicated below.

In this case, materials that are exposed are required to be non-combustible or meet flame spread and smoke developed requirements. Materials that are not exposed within the plenum are therefore excluded. This follows the logic and intent of the IMC.

More recent versions maintain this language, but simplify the associated test methods. In the 2012 edition:

602.2 Combustibles within Ducts or Plenums

Materials exposed within ducts or plenums shall be noncombustible or shall have a flame spread index not greater than twenty five (25) and a smoke developed index not greater than fifty (50), when tested as a composite product in accordance with ASTM E 84 or UL 723, except as indicated below.

In short, under the UMC, Aquatherm pipe may be safely installed in a plenum as long as the pipe is not exposed to the plenum space. This is easily solved by encasing the pipe and fittings in a plenum-rated insulation. Where insulation is not required, a plenum-rated wrap may be used instead.

OTHER SOLUTIONS

If the plenum-rating options discussed here will not suffice for a particular installation, please contact Aquatherm's Engineering Support department in Lindon, Utah by phone (801-805-6657) or email (engineering@aquatherm.com).

SPECIAL APPLICATIONS

Due to their special material properties, Aquatherm pipes and fittings are generally chemical resistant. However, there are certain applications where PP-R may not be acceptable.

To find out if the pipe is suitable for a specific application, fill out the inquiry form at www.aquatherm.com/compatibility and submit it to Aquatherm by email or fax. An example form is shown below.

The form can also be used to verify compatibility for chemical, high-heat, high-pressure, or other non-standard applications.

Transition fittings with brass inserts may not be compatible for all media. Stainless steel inserts are available and may be used in some applications in place of brass. Specialty transition fittings made entirely of polypropylene are available for some limited applications.

Special application inquiry for Aquatherm pipe systems

Send to:

Aquatherm Technical Department

500 S 500 W London, UT 84042

Phone: (801) 805-6657

Fax: (801) 847-6554

E-mail: technical@aquatherm.com

Web site: www.aquatherm.com

Inquirer:

Position:

Company

Contact

Street

City/State/Zip

Phone

Fax

E-mail

Building Project:

Street

City

State/Province

Date / Signature

Field of application:

Fluid transported:

Operating temperature [°C and/or °F]*: _____

Working pressure [mbar and/or psi]: _____

Service life [h/d]: _____

Concentration [%]: _____

External medium:

External temperature [°C and/or °F] _____

External pressure [mbar and/or psi] _____

MSDS

attached

not
attached

Fluid transported

☐
☐

External medium

☐
☐

* If operating temperature and/or pressure vary over the year, please indicate typical monthly conditions below.

use online version only

FIRE STOPPING

Polypropylene is a combustible material and must be treated as such. Generally, when penetrating a fire-rated assembly, fire stopping must be used to give the penetration a fire rating that matches the rating of the assembly. However, building code requirements vary greatly between areas.

It is critical that fire stopping issues be addressed early in the design and construction of a project. Please contact your fire stopping manufacturer for current listing and installation requirements.

Visit www.aquatherm.com/firestopping for a current list of manufacturers who have tested and listed their products for use with Aquatherm piping systems.

SYSTEM PROTECTION

Allowing a pump to operate for an extended period of time with zero flow passing through it can result in the pump and adjoining piping system reaching temperatures and pressures far above those recommended by Aquatherm (see pages 3.3 and 3.4).

While Aquatherm's heat stabilization will protect the pipe from brief exposure to extreme conditions, prolonged exposure can weaken the pipe and fittings considerably, potentially causing them and other components to fail.

It is recommended that the designer provide a sensor system that will warn of temperatures over 180 °F, an automatic temperature and pressure relief valve at the pump discharge, or a similar preventative measure.

To protect the pipe from exposure to unacceptably high temperatures and pressures that could occur due to prolonged "dead heading" (pump operating at full speed with flow completely restricted), Aquatherm recommends temperature and pressure relief valves at the discharge of 3-hp-and-larger pumps.

THRUST BLOCKING

Due to the inherent strength and integrity of fused connections, thrust blocking is not required.

Anchors may still be necessary where buried pipe enters a building foundation or other locations to minimize pipe movement.

UV RESISTANCE

Pipes made from **fusiolen® PP-R** and **fusiolen® PP-R C** are normally not installed where they will be subject to UV radiation. UV radiation can damage and weaken the polypropylene chains over time. UV-rated solutions can be found on page 4.19.

ISOLATING PUMP-TO-PIPE CONNECTORS

PP-R can absorb small vibrations, so isolators are not required if the pipe has some limited mobility on either side of the pump.

NOISE AND WATER HAMMER

To avoid noise generation and water hammer, the calculated flow rate should not exceed 8 ft/s. Buried pipe may run up to 12 ft/s, as noise generation is not an issue.

The surge pressure created in systems operating at 8 ft/s or lower velocity will be less than 50% of the maximum shock pressure the Aquatherm piping can withstand (725 psi). At higher flow velocity, the design engineer must still account for surge pressures and design accordingly.

RECOMMENDED FLOW RATES

The table below provides a quick reference for determining the highest recommended flow rate based on the diameter and SDR of the pipe.

Nominal diameter	GPM SDR 7.4	GPM SDR 11	GPM SDR 17.6
½"	6	7	-
¾"	9	12	-
1"	16	20	-
1 ¼"	25	32	-
1 ½"	40	50	-
2"	63	80	-
2 ½"	89	114	-
3"	129	164	-
3 ½"	193	245	-
4"	250	317	372
6"	409	519	610
8"	800	1015	1191
10"	1251	1588	1863
12"	2405	3026	3550
14"	3000	3846	4513
16"	-	4887	5726
18"	-	6174	7250
20"	-	-	10436
22"	-	-	13103
24"	-	-	16579

FLOW VELOCITY AND HEAD (FRICTION) LOSS

The head loss (friction pressure loss) due to the flow of water through the Aquatherm PP-R piping is given in the following tables. The water velocity is also provided. These values are calculated from the equations below. The Hazen-Williams formula is widely used in water piping applications, but it does not account for differences in fluid viscosity (different fluids) and fluid temperature. Consult your Aquatherm representative for information on other applications such as chemical process piping or compressed gases.

Hazen-Williams formula for pressure loss (psi/100 ft of pipe):

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

Where: PL = pressure loss, psi /100 ft of pipe
Q = flow rate, gpm
d_i = inside diameter of pipe, inches
C = flow coefficient = 150 for PP-R piping

Conversion to head loss (ft of head loss per 100 ft of pipe):

HL = 2.31(PL)

Where: HL = head loss, ft / 100 ft of pipe

Calculation of flow velocity:

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

Where: v = flow velocity, ft/sec

PIPE SIZING BY HEAD LOSS

This section includes charts on the head loss of SDR 7.4, SDR 11, and SDR 17.6 systems as well as the estimated flow speed based on the chosen flow rate. It is important to note the differences between the standard dimensional ratios as the actual IDs for each vary slightly.

Aquatherm pipes can safely run at higher flow speeds in certain sizes, as shown in the Maximum Flow Rates table. A complete breakdown of head loss by pipe size and velocity can be found in the charts on the following pages.

RECOMMENDED SIZING AND FLOW VELOCITY

The following table provides the recommended design velocity for the range of pipe sizes.

Pipe size	Recommended design velocity
½" (20mm) – 6" (160 mm)	8 ft/sec (2.44 m/sec)
8" (200mm) – 10" (250 mm)	10 ft/sec (3.05 m/sec)
12" (315 mm) – 18" (450 mm)	12 ft/sec (3.66 m/sec)
20" (500 mm) – 24" (630 mm)	14 ft/sec (4.27 m/sec)

In certain cases velocities higher than the above recommended values can be used. Some codes allow up to 10 ft/sec (3.05 m/sec) for plumbing if the manufacturer recommends it. There is also the possibility of the codes allowing up to 12 ft/sec (3.66 m/sec) for plastic piping.

Aquatherm has allowed engineers to design with velocities as high as 15 – 20 ft/sec (4.57 – 6.10 m/sec) depending on the job and design. This allowance comes with a caveat to ensure that there will not be any quick-acting valves or other sources of surge pressures in the system. So in some cases, it is permissible to design to the higher velocities for the pipe material, but the system may not be able to handle the higher velocities in terms of pressure surges, water hammer or noise issues.

One of the advantages to designing with higher velocities is overcoming the decreased volumetric flow rates (gpm) that can result from using a lower velocity with a smaller internal diameter of some Aquatherm pipe dimensions compared to copper and steel.

Aquatherm recommends not exceeding the flow velocities shown in the following table without first consulting Aquatherm.

Pipe size	Maximum design velocity
½" (20mm) – 8" (200 mm)	10 ft/sec (3.05 m/sec)
10" (250 mm) – 12" (315 mm)	12 ft/sec (3.66 m/sec)
14" (355 mm) – 24" (630 mm)	14 ft/sec (4.27 m/sec)

The tables on the following pages give the head loss and flow rates of the pipe based on the pipe size and the desired GPM. Reducing head loss on the critical leg of the system can allow for downsizing on other sections of pipe. Lower velocities may be necessary depending on the aggressiveness of the fluid and operating conditions.

The yellow cells in each column indicate where flow rates begin to exceed the recommended velocities for a particular size while the red cells denote where flow rates exceed the maximum velocities.

PIPE FRICTION FACTOR (R) IN FEET OF HEAD PER 100 FT AND CALCULATED VELOCITY (V) IN FEET PER SECOND BASED ON THE FLOW RATE (Q)

SDR 11 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"	16"	18"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm
0.1 US gpm	R	0.0																
	v	0.1																
0.2 US gpm	R	0.0	0.0															
	v	0.2	0.1															
0.3 US gpm	R	0.1	0.0	0.0														
	v	0.3	0.2	0.1														
0.4 US gpm	R	0.2	0.1	0.0	0.0													
	v	0.4	0.3	0.2	0.1													
0.5 US gpm	R	0.2	0.1	0.0	0.0													
	v	0.5	0.3	0.2	0.1													
0.6 US gpm	R	0.3	0.1	0.0	0.0													
	v	0.6	0.4	0.2	0.2													
0.7 US gpm	R	0.5	0.2	0.0	0.0	0.0												
	v	0.7	0.4	0.3	0.2	0.1												
0.8 US gpm	R	0.6	0.2	0.1	0.0	0.0												
	v	0.8	0.5	0.3	0.2	0.1												
0.9 US gpm	R	0.7	0.2	0.1	0.0	0.0												
	v	0.9	0.6	0.4	0.2	0.1												
1 US gpm	R	0.9	0.3	0.1	0.0	0.0												
	v	1.0	0.6	0.4	0.3	0.2												
2 US gpm	R	3.2	1.0	0.3	0.1	0.0	0.0											
	v	2.0	1.3	0.8	0.5	0.3	0.2											
3 US gpm	R	6.7	2.2	0.6	0.2	0.1	0.0	0.0										
	v	3.0	1.9	1.2	0.7	0.5	0.3	0.2										
4 US gpm	R	11.4	3.7	1.1	0.4	0.1	0.0	0.0	0.0									
	v	4.0	2.5	1.5	1.0	0.6	0.4	0.3	0.2									
5 US gpm	R	17.2	5.6	1.7	0.6	0.2	0.1	0.0	0.0									
	v	5.0	3.2	1.9	1.2	0.8	0.5	0.4	0.2									
6 US gpm	R	24.1	7.8	2.3	0.8	0.3	0.1	0.0	0.0	0.0								
	v	6.0	3.8	2.3	1.5	1.0	0.6	0.4	0.3	0.2								
7 US gpm	R	32.0	10.4	3.1	1.1	0.4	0.1	0.1	0.0	0.0								
	v	7.0	4.4	2.7	1.7	1.1	0.7	0.5	0.3	0.2								
8 US gpm	R	41.0	13.4	4.0	1.4	0.5	0.2	0.1	0.0	0.0	0.0							
	v	8.0	5.1	3.1	2.0	1.3	0.8	0.6	0.4	0.3	0.2							
9 US gpm	R	50.9	16.6	4.9	1.7	0.6	0.2	0.1	0.0	0.0	0.0							
	v	9.0	5.7	3.5	2.2	1.4	0.9	0.6	0.4	0.3	0.2							
10 US gpm	R	61.9	20.2	6.0	2.1	0.7	0.2	0.1	0.0	0.0	0.0							
	v	10.0	6.3	3.8	2.5	1.6	1.0	0.7	0.5	0.3	0.3							
11 US gpm	R	73.8	24.1	7.1	2.5	0.8	0.3	0.1	0.1	0.0	0.0							
	v	11.0	7.0	4.2	2.7	1.7	1.1	0.8	0.5	0.4	0.3							
12 US gpm	R	86.7	28.3	8.4	2.9	1.0	0.3	0.1	0.1	0.0	0.0							
	v	12.0	7.6	4.6	3.0	1.9	1.2	0.8	0.6	0.4	0.3							

Q = flow rate (US gpm)

R = feet of head per 100 ft

v = velocity (ft/sec)

◊ = recommended velocity cutoff

◊ = maximum velocity cutoff

SDR 11 pipe

Q	Direction	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm
13 US gpm	R		32.8	9.7	3.3	1.1	0.4	0.2	0.1	0.0	0.0							
	v		8.2	5.0	3.2	2.1	1.3	0.9	0.6	0.4	0.3							
14 US gpm	R		37.6	11.1	3.8	1.3	0.4	0.2	0.1	0.0	0.0							
	v		8.9	5.4	3.5	2.2	1.4	1.0	0.7	0.5	0.4							
15 US gpm	R		42.7	12.6	4.4	1.5	0.5	0.2	0.1	0.0	0.0	0.0						
	v		9.5	5.8	3.7	2.4	1.5	1.1	0.7	0.5	0.4	0.2						
16 US gpm	R		48.1	14.2	4.9	1.7	0.5	0.2	0.1	0.0	0.0	0.0						
	v		10.1	6.1	4.0	2.5	1.6	1.1	0.8	0.5	0.4	0.3						
17 US gpm	R		53.8	15.9	5.5	1.8	0.6	0.3	0.1	0.0	0.0	0.0						
	v		10.8	6.5	4.2	2.7	1.7	1.2	0.8	0.6	0.4	0.3						
18 US gpm	R		59.8	17.7	6.1	2.1	0.7	0.3	0.1	0.0	0.0	0.0						
	v		11.4	6.9	4.5	2.9	1.8	1.3	0.9	0.6	0.5	0.3						
19 US gpm	R		66.1	19.6	6.7	2.3	0.7	0.3	0.1	0.1	0.0	0.0						
	v		12.0	7.3	4.7	3.0	1.9	1.3	0.9	0.6	0.5	0.3						
20 US gpm	R		72.7	21.5	7.4	2.5	0.8	0.3	0.1	0.1	0.0	0.0						
	v		12.7	7.7	5.0	3.2	2.0	1.4	1.0	0.7	0.5	0.3						
22 US gpm	R		86.7	25.6	8.9	3.0	1.0	0.4	0.2	0.1	0.0	0.0						
	v		13.9	8.4	5.5	3.5	2.2	1.5	1.1	0.7	0.6	0.3						
24 US gpm	R			30.1	10.4	3.5	1.1	0.5	0.2	0.1	0.0	0.0						
	v			9.2	6.0	3.8	2.4	1.7	1.2	0.8	0.6	0.4						
26 US gpm	R			34.9	12.1	4.0	1.3	0.6	0.2	0.1	0.1	0.0						
	v			10.0	6.5	4.1	2.6	1.8	1.3	0.9	0.7	0.4						
28 US gpm	R			40.1	13.8	4.6	1.5	0.6	0.3	0.1	0.1	0.0	0.0					
	v			10.8	6.9	4.4	2.8	2.0	1.4	0.9	0.7	0.4	0.3					
30 US gpm	R			45.5	15.7	5.3	1.7	0.7	0.3	0.1	0.1	0.0	0.0					
	v			11.5	7.4	4.8	3.0	2.1	1.5	1.0	0.8	0.5	0.3					
32 US gpm	R			51.3	17.7	5.9	1.9	0.8	0.3	0.1	0.1	0.0	0.0					
	v			12.3	7.9	5.1	3.2	2.2	1.6	1.0	0.8	0.5	0.3					
34 US gpm	R			57.4	19.8	6.6	2.2	0.9	0.4	0.1	0.1	0.0	0.0					
	v			13.1	8.4	5.4	3.4	2.4	1.7	1.1	0.9	0.5	0.3					
36 US gpm	R			63.8	22.0	7.4	2.4	1.0	0.4	0.2	0.1	0.0	0.0					
	v			13.8	8.9	5.7	3.6	2.5	1.8	1.2	0.9	0.6	0.4					
38 US gpm	R			70.5	24.3	8.2	2.7	1.1	0.5	0.2	0.1	0.0	0.0					
	v			14.6	9.4	6.0	3.8	2.7	1.9	1.2	1.0	0.6	0.4					
40 US gpm	R			77.5	26.7	9.0	2.9	1.2	0.5	0.2	0.1	0.0	0.0					
	v			15.4	9.9	6.3	4.0	2.8	2.0	1.3	1.0	0.6	0.4					
45 US gpm	R				33.2	11.2	3.6	1.5	0.6	0.2	0.1	0.0	0.0					
	v				11.2	7.1	4.5	3.2	2.2	1.5	1.1	0.7	0.4					
50 US gpm	R				40.4	13.6	4.4	1.9	0.8	0.3	0.2	0.1	0.0	0.0				
	v				12.4	7.9	5.0	3.5	2.4	1.6	1.3	0.8	0.5	0.3				
55 US gpm	R				48.2	16.2	5.3	2.2	0.9	0.3	0.2	0.1	0.0	0.0				
	v				13.6	8.7	5.5	3.8	2.7	1.8	1.4	0.9	0.5	0.4				
60 US gpm	R				56.6	19.0	6.2	2.6	1.1	0.4	0.2	0.1	0.0	0.0				
	v				14.9	9.5	6.0	4.2	2.9	2.0	1.5	0.9	0.6	0.4				
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec) ◊ = recommended velocity cutoff ◈ = maximum velocity cutoff																		

SDR 11 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"	16"	18"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm
65 US gpm	R					22.0	7.2	3.0	1.2	0.5	0.3	0.1	0.0	0.0				
	v					10.3	6.5	4.5	3.2	2.1	1.6	1.0	0.6	0.4				
70 US gpm	R					25.2	8.2	3.5	1.4	0.5	0.3	0.1	0.0	0.0				
	v					11.1	7.0	4.9	3.4	2.3	1.8	1.1	0.7	0.4				
75 US gpm	R					28.7	9.3	3.9	1.6	0.6	0.3	0.1	0.0	0.0				
	v					11.9	7.5	5.2	3.7	2.4	1.9	1.2	0.7	0.5				
80 US gpm	R					32.3	10.5	4.4	1.8	0.7	0.4	0.1	0.0	0.0				
	v					12.7	8.0	5.6	3.9	2.6	2.0	1.2	0.8	0.5				
85 US gpm	R					36.2	11.7	4.9	2.0	0.8	0.4	0.1	0.0	0.0				
	v					13.5	8.5	5.9	4.1	2.8	2.1	1.3	0.8	0.5				
90 US gpm	R					40.2	13.1	5.5	2.3	0.9	0.5	0.1	0.1	0.0	0.0			
	v					14.3	9.0	6.3	4.4	2.9	2.3	1.4	0.9	0.6	0.4			
95 US gpm	R					44.4	14.4	6.1	2.5	0.9	0.5	0.2	0.1	0.0	0.0			
	v					15.0	9.5	6.6	4.6	3.1	2.4	1.5	0.9	0.6	0.4			
100 US gpm	R					48.8	15.9	6.7	2.8	1.0	0.6	0.2	0.1	0.0	0.0			
	v					15.8	10.0	7.0	4.9	3.3	2.5	1.5	1.0	0.6	0.4			
110 US gpm	R						18.9	8.0	3.3	1.2	0.7	0.2	0.1	0.0	0.0			
	v						11.0	7.7	5.4	3.6	2.8	1.7	1.1	0.7	0.4			
120 US gpm	R						22.2	9.4	3.9	1.5	0.8	0.2	0.1	0.0	0.0			
	v						12.0	8.4	5.8	3.9	3.0	1.9	1.2	0.8	0.5			
130 US gpm	R						25.8	10.8	4.5	1.7	0.9	0.3	0.1	0.0	0.0			
	v						13.0	9.1	6.3	4.2	3.3	2.0	1.3	0.8	0.5			
140 US gpm	R						29.6	12.4	5.1	1.9	1.0	0.3	0.1	0.0	0.0			
	v						14.0	9.8	6.8	4.6	3.5	2.2	1.4	0.9	0.6			
150 US gpm	R						33.6	14.1	5.8	2.2	1.2	0.4	0.1	0.0	0.0			
	v						15.0	10.5	7.3	4.9	3.8	2.3	1.5	0.9	0.6			
160 US gpm	R						37.8	15.9	6.6	2.5	1.3	0.4	0.1	0.1	0.0			
	v						16.0	11.2	7.8	5.2	4.0	2.5	1.6	1.0	0.6			
170 US gpm	R							17.8	7.4	2.8	1.5	0.5	0.2	0.1	0.0			
	v							11.9	8.3	5.5	4.3	2.6	1.7	1.1	0.7			
180 US gpm	R							19.8	8.2	3.1	1.7	0.5	0.2	0.1	0.0			
	v							12.6	8.8	5.9	4.5	2.8	1.8	1.1	0.7			
190 US gpm	R							21.9	9.1	3.4	1.8	0.6	0.2	0.1	0.0			
	v							13.3	9.2	6.2	4.8	2.9	1.9	1.2	0.8			
200 US gpm	R							24.1	10.0	3.7	2.0	0.6	0.2	0.1	0.0			
	v							14.0	9.7	6.5	5.1	3.1	2.0	1.3	0.8			
220 US gpm	R							28.7	11.9	4.5	2.4	0.7	0.2	0.1	0.0			
	v							15.4	10.7	7.2	5.6	3.4	2.2	1.4	0.9			
240 US gpm	R								13.9	5.2	2.8	0.9	0.3	0.1	0.0			
	v								11.7	7.8	6.1	3.7	2.4	1.5	1.0			
260 US gpm	R								16.2	6.1	3.3	1.0	0.3	0.1	0.0			
	v								12.7	8.5	6.6	4.0	2.6	1.6	1.0			
280 US gpm	R								18.5	7.0	3.8	1.1	0.4	0.1	0.0			
	v								13.6	9.1	7.1	4.3	2.8	1.8	1.1			

Q = flow rate (US gpm)



R = feet of head per 100 ft

v = velocity (ft/sec)



◊ = recommended velocity cutoff

◈ = maximum velocity cutoff

SDR 11 pipe

Q	Direction	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm
300 US gpm	R								21.1	7.9	4.3	1.3	0.4	0.1	0.1			
	v								14.6	9.8	7.6	4.6	3.0	1.9	1.2			
320 US gpm	R								23.7	8.9	4.8	1.4	0.5	0.2	0.1			
	v								15.6	10.4	8.1	4.9	3.2	2.0	1.3			
340 US gpm	R									10.0	5.4	1.6	0.5	0.2	0.1			
	v									11.1	8.6	5.2	3.4	2.1	1.4			
360 US gpm	R									11.1	6.0	1.8	0.6	0.2	0.1			
	v									11.7	9.1	5.5	3.5	2.3	1.4			
380 US gpm	R									12.3	6.6	2.0	0.7	0.2	0.1			
	v									12.4	9.6	5.9	3.7	2.4	1.5			
400 US gpm	R									13.5	7.3	2.2	0.7	0.3	0.1	0.0		
	v									13.0	10.1	6.2	3.9	2.5	1.6	1.2		
450 US gpm	R									16.8	9.0	2.7	0.9	0.3	0.1	0.1		
	v									14.6	11.4	6.9	4.4	2.8	1.8	1.4		
500 US gpm	R										11.0	3.3	1.1	0.4	0.1	0.1		
	v										12.6	7.7	4.9	3.2	2.0	1.6		
550 US gpm	R										13.1	3.9	1.3	0.4	0.1	0.1		
	v										13.9	8.5	5.4	3.5	2.2	1.7		
600 US gpm	R										15.4	4.6	1.6	0.5	0.2	0.1		
	v										15.1	9.2	5.9	3.8	2.4	1.9		
650 US gpm	R											5.4	1.8	0.6	0.2	0.1		
	v											10.0	6.4	4.1	2.6	2.0		
700 US gpm	R											6.1	2.1	0.7	0.2	0.1		
	v											10.8	6.9	4.4	2.8	2.2		
750 US gpm	R											7.0	2.4	0.8	0.3	0.1		
	v											11.6	7.4	4.7	3.0	2.3		
800 US gpm	R											7.9	2.6	0.9	0.3	0.2		
	v											12.3	7.9	5.0	3.2	2.5		
850 US gpm	R											8.8	3.0	1.0	0.3	0.2		
	v											13.1	8.4	5.4	3.4	2.7		
900 US gpm	R											9.8	3.3	1.1	0.4	0.2		
	v											13.9	8.9	5.7	3.6	2.8		
950 US gpm	R											10.8	3.6	1.2	0.4	0.2		
	v											14.6	9.4	6.0	3.8	3.0		
1000 US gpm	R											11.9	4.0	1.3	0.4	0.2	0.1	0.1
	v											15.4	9.8	6.3	4.0	3.1	2.5	1.9
1100 US gpm	R												4.8	1.6	0.5	0.3	0.2	0.1
	v												10.8	6.9	4.4	3.4	2.7	2.1
1200 US gpm	R												5.6	1.9	0.6	0.3	0.2	0.1
	v												11.8	7.6	4.8	3.7	2.9	2.3
1300 US gpm	R												6.5	2.2	0.7	0.4	0.2	0.1
	v												12.8	8.2	5.2	4.1	3.2	2.5
1400 US gpm	R												7.4	2.5	0.8	0.5	0.3	0.1
	v												13.8	8.8	5.6	4.4	3.4	2.7
1500 US gpm	R												8.5	2.9	0.9	0.5	0.3	0.2
	v												14.8	9.4	6.0	4.7	3.7	2.9
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec)  = recommended velocity cutoff  = maximum velocity cutoff																		

SDR 11 pipe



Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"	16"	18"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm
1600 US gpm	R												9.5	3.2	1.0	0.6	0.3	0.2
	v												15.8	10.1	6.3	5.0	3.9	3.1
1700 US gpm	R													3.6	1.2	0.7	0.4	0.2
	v													10.7	6.7	5.3	4.2	3.3
1800 US gpm	R													4.0	1.3	0.7	0.4	0.2
	v													11.3	7.1	5.6	4.4	3.5
1900 US gpm	R													4.4	1.4	0.8	0.4	0.3
	v													12.0	7.5	5.9	4.7	3.7
2000 US gpm	R													4.9	1.6	0.9	0.5	0.3
	v													12.6	7.9	6.2	4.9	3.9
2200 US gpm	R													5.8	1.9	1.1	0.6	0.3
	v													13.9	8.7	6.9	5.4	4.3
2400 US gpm	R													6.8	2.2	1.2	0.7	0.4
	v													15.1	9.5	7.5	5.9	4.7
2600 US gpm	R														2.6	1.4	0.8	0.5
	v														10.3	8.1	6.4	5.1
2800 US gpm	R														2.9	1.6	0.9	0.5
	v														11.1	8.7	6.9	5.4
3000 US gpm	R														3.3	1.9	1.0	0.6
	v														11.9	9.4	7.4	5.8
3200 US gpm	R														3.4	2.1	1.2	0.7
	v														12.7	10.0	7.9	6.2
3400 US gpm	R														4.3	2.4	1.3	0.7
	v														13.5	10.6	8.3	6.6
3600 US gpm	R														4.8	2.6	1.5	0.8
	v														14.3	11.2	8.8	7.0
3800 US gpm	R														5.3	2.9	1.6	0.9
	v														15.1	11.9	9.3	7.4
4000 US gpm	R														5.8	3.2	1.8	1.0
	v														15.9	12.5	9.8	7.8
4500 US gpm	R															4.1	2.2	1.2
	v															14.1	11.1	8.8
5000 US gpm	R															4.9	2.7	1.5
	v															15.6	12.3	9.7
5500 US gpm	R															5.9	3.3	1.8
	v															17.2	13.5	10.7
6000 US gpm	R																3.4	2.1
	v																14.7	11.7
6500 US gpm	R																4.5	2.5
	v																15.9	12.6
7000 US gpm	R																	5.1
	v																	17.2
7500 US gpm	R																	5.8
	v																	18.4
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec)  = recommended velocity cutoff  = maximum velocity cutoff																		

PIPE FRICTION FACTOR (R) IN FEET OF HEAD PER 100 FT AND CALCULATED VELOCITY (V) IN FEET PER SECOND BASED ON THE FLOW RATE (Q)

SDR 7.4 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm
0.1 US gpm	R	0.0	0.0													
	v	0.1	0.1													
0.2 US gpm	R	0.1	0.0	0.0												
	v	0.3	0.2	0.1												
0.3 US gpm	R	0.2	0.1	0.0	0.0											
	v	0.4	0.2	0.2	0.1											
0.4 US gpm	R	0.3	0.1	0.0	0.0											
	v	0.5	0.3	0.2	0.1											
0.5 US gpm	R	0.4	0.2	0.0	0.0											
	v	0.6	0.4	0.2	0.2											
0.6 US gpm	R	0.6	0.2	0.1	0.0	0.0										
	v	0.8	0.5	0.3	0.2	0.1										
0.7 US gpm	R	0.8	0.3	0.1	0.0	0.0										
	v	0.9	0.6	0.3	0.2	0.1										
0.8 US gpm	R	1.0	0.4	0.1	0.0	0.0										
	v	1.0	0.7	0.4	0.3	0.2										
0.9 US gpm	R	1.3	0.4	0.1	0.0	0.0										
	v	1.1	0.7	0.4	0.3	0.2										
1 US gpm	R	1.6	0.5	0.2	0.1	0.0	0.0									
	v	1.3	0.8	0.5	0.3	0.2	0.1									
2 US gpm	R	5.6	1.9	0.6	0.2	0.1	0.0	0.0								
	v	2.5	1.6	1.0	0.6	0.4	0.3	0.2								
3 US gpm	R	11.9	4.0	1.2	0.4	0.1	0.0	0.0	0.0							
	v	3.8	2.4	1.5	0.9	0.6	0.4	0.3	0.2							
4 US gpm	R	20.2	6.8	2.0	0.7	0.2	0.1	0.0	0.0							
	v	5.1	3.3	2.0	1.3	0.8	0.5	0.4	0.3							
5 US gpm	R	30.5	10.3	3.0	1.0	0.3	0.1	0.1	0.0	0.0						
	v	6.4	4.1	2.5	1.6	1.0	0.6	0.5	0.3	0.2						
6 US gpm	R	42.8	14.4	4.2	1.4	0.5	0.2	0.1	0.0	0.0	0.0					
	v	7.6	4.9	2.9	1.9	1.2	0.8	0.5	0.4	0.3	0.2					
7 US gpm	R	56.9	19.2	5.6	1.9	0.6	0.2	0.1	0.0	0.0	0.0					
	v	8.9	5.7	3.4	2.2	1.4	0.9	0.6	0.4	0.3	0.2					
8 US gpm	R	72.8	24.6	7.1	2.4	0.8	0.3	0.1	0.1	0.0	0.0					
	v	10.2	6.5	3.9	2.5	1.6	1.0	0.7	0.5	0.3	0.3					
9 US gpm	R	90.5	30.5	8.9	3.0	1.0	0.3	0.1	0.1	0.0	0.0					
	v	11.4	7.3	4.4	2.8	1.8	1.1	0.8	0.6	0.4	0.3					
10 US gpm	R		37.1	10.8	3.6	1.2	0.4	0.2	0.1	0.0	0.0					
	v		8.1	4.9	3.1	2.0	1.3	0.9	0.6	0.4	0.3					
11 US gpm	R		44.3	12.9	4.3	1.5	0.5	0.2	0.1	0.0	0.0	0.0				
	v		9.0	5.4	3.5	2.2	1.4	1.0	0.7	0.5	0.4	0.2				
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec) ◆ = recommended velocity cutoff ◆ = maximum velocity cutoff																

SDR 7.4 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm
12 US gpm	R		52.0	15.1	5.1	1.7	0.6	0.2	0.1	0.0	0.0	0.0				
	v		9.8	5.9	3.8	2.4	1.5	1.1	0.7	0.5	0.4	0.2				
13 US gpm	R		60.3	17.5	5.9	2.0	0.6	0.3	0.1	0.0	0.0	0.0				
	v		10.6	6.4	4.1	2.6	1.6	1.2	0.8	0.5	0.4	0.3				
14 US gpm	R		69.2	20.1	6.8	2.3	0.7	0.3	0.1	0.1	0.0	0.0				
	v		11.4	6.9	4.4	2.8	1.8	1.3	0.9	0.6	0.5	0.3				
15 US gpm	R		78.6	22.8	7.7	2.6	0.8	0.4	0.2	0.1	0.0	0.0				
	v		12.2	7.3	4.7	3.0	1.9	1.3	0.9	0.6	0.5	0.3				
16 US gpm	R		88.5	25.7	8.7	3.0	0.9	0.4	0.2	0.1	0.0	0.0				
	v		13.0	7.8	5.0	3.2	2.0	1.4	1.0	0.7	0.5	0.3				
17 US gpm	R		99.0	28.8	9.7	3.3	1.1	0.5	0.2	0.1	0.0	0.0				
	v		13.8	8.3	5.3	3.4	2.1	1.5	1.1	0.7	0.5	0.3				
18 US gpm	R			32.0	10.8	3.7	1.2	0.5	0.2	0.1	0.0	0.0				
	v			8.8	5.6	3.6	2.3	1.6	1.1	0.7	0.6	0.4				
19 US gpm	R			35.4	11.9	4.1	1.3	0.6	0.2	0.1	0.1	0.0				
	v			9.3	6.0	3.8	2.4	1.7	1.2	0.8	0.6	0.4				
20 US gpm	R			38.9	13.1	4.5	1.4	0.6	0.3	0.1	0.1	0.0	0.0			
	v			9.8	6.3	4.0	2.5	1.8	1.2	0.8	0.6	0.4	0.3			
22 US gpm	R			46.4	15.6	5.3	1.7	0.7	0.3	0.1	0.1	0.0	0.0			
	v			10.8	6.9	4.4	2.8	2.0	1.4	0.9	0.7	0.4	0.3			
24 US gpm	R			54.5	18.4	6.2	2.0	0.9	0.4	0.1	0.1	0.0	0.0			
	v			11.8	7.5	4.8	3.0	2.1	1.5	1.0	0.8	0.5	0.3			
26 US gpm	R			63.2	21.3	7.2	2.3	1.0	0.4	0.2	0.1	0.0	0.0			
	v			12.7	8.2	5.2	3.3	2.3	1.6	1.1	0.8	0.5	0.3			
28 US gpm	R			72.4	24.4	8.3	2.6	1.1	0.5	0.2	0.1	0.0	0.0			
	v			13.7	8.8	5.6	3.5	2.5	1.7	1.2	0.9	0.6	0.4			
30 US gpm	R			82.3	27.8	9.4	3.0	1.3	0.5	0.2	0.1	0.0	0.0			
	v			14.7	9.4	6.0	3.8	2.7	1.9	1.2	1.0	0.6	0.4			
32 US gpm	R			92.7	31.3	10.6	3.4	1.5	0.6	0.2	0.1	0.0	0.0			
	v			15.7	10.0	6.4	4.0	2.9	2.0	1.3	1.0	0.6	0.4			
34 US gpm	R				35.0	11.9	3.8	1.6	0.7	0.3	0.1	0.0	0.0			
	v				10.7	6.8	4.3	3.0	2.1	1.4	1.1	0.7	0.4			
36 US gpm	R				38.9	13.2	4.2	1.8	0.7	0.3	0.2	0.1	0.0	0.0		
	v				11.3	7.2	4.5	3.2	2.2	1.5	1.2	0.7	0.5	0.3		
38 US gpm	R				43.0	14.6	4.6	2.0	0.8	0.3	0.2	0.1	0.0	0.0		
	v				11.9	7.6	4.8	3.4	2.3	1.6	1.2	0.7	0.5	0.3		
40 US gpm	R				47.3	16.1	5.1	2.2	0.9	0.3	0.2	0.1	0.0	0.0		
	v				12.5	8.0	5.0	3.6	2.5	1.7	1.3	0.8	0.5	0.3		
45 US gpm	R				58.8	20.0	6.4	2.8	1.1	0.4	0.2	0.1	0.0	0.0		
	v				14.1	9.1	5.7	4.0	2.8	1.9	1.4	0.9	0.6	0.4		
50 US gpm	R				71.4	24.3	7.7	3.3	1.4	0.5	0.3	0.1	0.0	0.0		
	v				15.7	10.1	6.3	4.5	3.1	2.1	1.6	1.0	0.6	0.4		
55 US gpm	R					28.9	9.2	4.0	1.6	0.6	0.3	0.1	0.0	0.0		
	v					11.1	6.9	4.9	3.4	2.3	1.8	1.1	0.7	0.4		
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec)  = recommended velocity cutoff  = maximum velocity cutoff																

SDR 7.4 pipe

Q	Dimension	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm
60 US gpm	R					34.0	10.8	4.7	1.9	0.7	0.4	0.1	0.0	0.0		
	v					12.1	7.5	5.3	3.7	2.5	1.9	1.2	0.8	0.5		
65 US gpm	R					39.4	12.5	5.4	2.2	0.8	0.5	0.1	0.1	0.0		
	v					13.1	8.2	5.8	4.0	2.7	2.1	1.3	0.8	0.5		
70 US gpm	R					45.2	14.4	6.2	2.5	1.0	0.5	0.2	0.1	0.0		
	v					14.1	8.8	6.2	4.3	2.9	2.2	1.4	0.9	0.6		
75 US gpm	R					51.4	16.3	7.1	2.9	1.1	0.6	0.2	0.1	0.0		
	v					15.1	9.4	6.7	4.6	3.1	2.4	1.5	0.9	0.6		
80 US gpm	R						18.4	8.0	3.3	1.2	0.7	0.2	0.1	0.0		
	v						10.1	7.1	4.9	3.3	2.6	1.6	1.0	0.6		
85 US gpm	R						20.6	8.9	3.6	1.4	0.7	0.2	0.1	0.0		
	v						10.7	7.6	5.2	3.5	2.7	1.7	1.1	0.7		
90 US gpm	R						22.9	9.9	4.0	1.5	0.8	0.3	0.1	0.0		
	v						11.3	8.0	5.5	3.7	2.9	1.8	1.1	0.7		
95 US gpm	R						25.3	10.9	4.5	1.7	0.9	0.3	0.1	0.0		
	v						11.9	8.5	5.9	3.9	3.0	1.9	1.2	0.8		
100 US gpm	R						27.8	12.0	4.9	1.9	1.0	0.3	0.1	0.0		
	v						12.6	8.9	6.2	4.1	3.2	2.0	1.3	0.8		
110 US gpm	R						33.2	14.4	5.9	2.2	1.2	0.4	0.1	0.0		
	v						13.8	9.8	6.8	4.6	3.5	2.2	1.4	0.9		
120 US gpm	R						39.0	16.9	6.9	2.6	1.4	0.4	0.1	0.1		
	v						15.1	10.7	7.4	5.0	3.8	2.3	1.5	1.0		
130 US gpm	R							19.6	8.0	3.0	1.6	0.5	0.2	0.1		
	v							11.6	8.0	5.4	4.2	2.5	1.6	1.0		
140 US gpm	R							22.4	9.1	3.5	1.9	0.6	0.2	0.1		
	v							12.5	8.6	5.8	4.5	2.7	1.8	1.1		
150 US gpm	R							25.5	10.4	3.9	2.1	0.6	0.2	0.1		
	v							13.4	9.2	6.2	4.8	2.9	1.9	1.2		
160 US gpm	R							28.7	11.7	4.4	2.4	0.7	0.2	0.1		
	v							14.3	9.9	6.6	5.1	3.1	2.0	1.3		
170 US gpm	R							32.1	13.1	5.0	2.7	0.8	0.3	0.1		
	v							15.1	10.5	7.0	5.4	3.3	2.1	1.4		
180 US gpm	R								14.6	5.5	2.9	0.9	0.3	0.1		
	v								11.1	7.5	5.8	3.5	2.3	1.4		
190 US gpm	R								16.1	6.1	3.3	1.0	0.3	0.1		
	v								11.7	7.9	6.1	3.7	2.4	1.5		
200 US gpm	R								17.7	6.7	3.6	1.1	0.4	0.1		
	v								12.3	8.3	6.4	3.9	2.5	1.6		
220 US gpm	R								21.1	8.0	4.3	1.3	0.4	0.2		
	v								13.6	9.1	7.0	4.3	2.8	1.8		
240 US gpm	R								24.8	9.4	5.0	1.5	0.5	0.2		
	v								14.8	9.9	7.7	4.7	3.0	1.9		
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec) ♦ = recommended velocity cutoff ♦ = maximum velocity cutoff																

SDR 7.4 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm
260 US gpm	R									10.9	5.8	1.8	0.6	0.2		
	v									10.8	8.3	5.1	3.3	2.1		
280 US gpm	R									12.5	6.7	2.0	0.7	0.2		
	v									11.6	9.0	5.5	3.5	2.2		
300 US gpm	R									14.2	7.6	2.3	0.8	0.3	0.1	
	v									12.4	9.6	5.9	3.8	2.4	1.5	
320 US gpm	R									16.0	8.5	2.6	0.9	0.3	0.1	
	v									13.2	10.2	6.2	4.0	2.6	1.6	
340 US gpm	R									17.9	9.6	2.9	1.0	0.3	0.1	
	v									14.1	10.9	6.6	4.3	2.7	1.7	
360 US gpm	R									19.9	10.6	3.2	1.1	0.4	0.1	
	v									14.9	11.5	7.0	4.5	2.9	1.8	
380 US gpm	R									22.0	11.7	3.5	1.2	0.4	0.1	
	v									15.7	12.1	7.4	4.8	3.0	1.9	
400 US gpm	R										12.9	3.9	1.3	0.4	0.1	
	v										12.8	7.8	5.0	3.2	2.0	
450 US gpm	R										16.0	4.8	1.6	0.6	0.2	
	v										14.4	8.8	5.6	3.6	2.3	
500 US gpm	R										19.5	5.9	2.0	0.7	0.2	0.1
	v										16.0	9.8	6.3	4.0	2.5	2.0
550 US gpm	R											7.0	2.4	0.8	0.3	0.1
	v											10.7	6.9	4.4	2.7	2.7
600 US gpm	R											8.2	2.8	0.9	0.3	0.2
	v											11.7	7.5	4.8	3.0	2.4
650 US gpm	R											9.5	3.2	1.1	0.3	0.2
	v											12.7	8.1	5.2	3.2	2.6
700 US gpm	R											10.9	3.7	1.2	0.4	0.2
	v											13.7	8.8	5.6	3.5	2.8
750 US gpm	R											12.4	4.2	1.4	0.5	0.3
	v											14.6	9.4	6.0	3.7	2.9
800 US gpm	R											14.0	4.7	1.6	0.5	0.3
	v											15.6	10.0	6.4	4.0	3.1
850 US gpm	R												5.3	1.8	0.6	0.3
	v												10.6	6.8	4.2	3.3
900 US gpm	R												5.9	2.0	0.6	0.4
	v												11.3	7.2	4.5	3.5
950 US gpm	R												6.5	2.2	0.7	0.4
	v												11.9	7.6	4.7	3.7
1000 US gpm	R												7.1	2.4	0.8	0.4
	v												12.5	8.0	5.0	3.9
1100 US gpm	R												8.5	2.9	0.9	0.5
	v												13.8	8.8	5.5	4.3

Q = flow rate (US gpm)

R = feet of head per 100 ft

v = velocity (ft/sec)

◊ = recommended velocity cutoff

◊ = maximum velocity cutoff

SDR 7.4 pipe

Q	Dimension	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"	10"	12"	14"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm
1200 US gpm	R												10.0	3.4	1.1	0.6
	v												15.0	9.6	6.0	4.7
1300 US gpm	R													3.9	1.2	0.7
	v													10.4	6.5	5.1
1400 US gpm	R													4.5	1.4	0.8
	v													11.2	7.0	5.5
1500 US gpm	R													5.0	1.6	0.9
	v													11.9	7.5	5.9
1600 US gpm	R													5.6	1.8	1.0
	v													12.7	8.0	6.3
1700 US gpm	R														2.0	1.1
	v														8.5	6.7
1800 US gpm	R														2.3	1.3
	v														9.0	7.0
1900 US gpm	R														2.5	1.4
	v														9.5	7.5
2000 US gpm	R														2.8	1.5
	v														10.0	7.9
2200 US gpm	R														3.3	1.8
	v														11.0	8.6
2400 US gpm	R														3.8	2.1
	v														12.0	9.4
2600 US gpm	R														4.6	2.5
	v														13.0	10.2
2800 US gpm	R														5.3	2.9
	v														14.0	11.0
3000 US gpm	R														6.0	3.3
	v														15.0	11.8
3200 US gpm	R														6.8	3.8
	v														16.0	12.6
3400 US gpm	R														7.6	4.2
	v														17.0	13.4
3600 US gpm	R															4.7
	v															14.1
3800 US gpm	R															5.2
	v															14.9

Q = flow rate (US gpm)

R = feet of head per 100 ft



v = velocity (ft/sec)

◀ = recommended velocity cutoff

▶ = maximum velocity cutoff

PIPE FRICTION FACTOR (R) IN FEET OF HEAD PER 100 FT AND CALCULATED VELOCITY (V) IN FEET PER SECOND BASED ON THE FLOW RATE (Q)

SDR 17.6 pipe

Q	Dimension	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
200 US gpm	R	1.4	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	4.3	2.6	1.7	1.1	0.7	0.5	0.4	0.3	0.3	0.2	0.2
220 US gpm	R	1.6	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	4.7	2.9	1.8	1.2	0.7	0.6	0.5	0.4	0.3	0.2	0.2
240 US gpm	R	1.9	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	5.2	3.1	2.0	1.3	0.8	0.6	0.5	0.4	0.3	0.3	0.2
260 US gpm	R	2.2	0.7	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	5.6	3.4	2.2	1.4	0.9	0.7	0.5	0.4	0.3	0.3	0.2
280 US gpm	R	2.5	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	6.0	3.7	2.3	1.5	0.9	0.7	0.6	0.5	0.4	0.3	0.2
300 US gpm	R	2.9	0.9	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	6.4	3.9	2.5	1.6	1.0	0.8	0.6	0.5	0.4	0.3	0.3
350 US gpm	R	3.8	1.2	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	v	7.5	4.6	2.9	1.9	1.2	0.9	0.7	0.6	0.5	0.4	0.3
400 US gpm	R	5.0	1.5	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	v	8.6	5.2	3.4	2.1	1.4	1.1	0.8	0.7	0.5	0.4	0.3
450 US gpm	R	6.2	1.8	0.6	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	v	9.7	5.9	3.8	2.4	1.5	1.2	0.9	0.7	0.6	0.5	0.4
500 US gpm	R		2.2	0.8	0.3	0.1	0.0	0.0	0.0	0.0	0.0	0.0
	v		6.6	4.2	2.7	1.7	1.3	1.0	0.8	0.7	0.5	0.4
550 US gpm	R		2.7	0.9	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	v		7.2	4.6	3.0	1.9	1.5	1.2	0.9	0.7	0.6	0.5
600 US gpm	R		3.1	1.1	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	v		7.9	5.0	3.2	2.0	1.6	1.3	1.0	0.8	0.6	0.5
650 US gpm	R		3.6	1.2	0.4	0.1	0.1	0.0	0.0	0.0	0.0	0.0
	v		8.5	5.4	3.5	2.2	1.7	1.4	1.1	0.9	0.7	0.5
700 US gpm	R		4.2	1.4	0.5	0.2	0.1	0.0	0.0	0.0	0.0	0.0
	v		9.2	5.9	3.8	2.4	1.9	1.5	1.2	0.9	0.7	0.6
750 US gpm	R		4.7	1.6	0.5	0.2	0.1	0.1	0.0	0.0	0.0	0.0
	v		9.8	6.3	4.0	2.5	2.0	1.6	1.2	1.0	0.8	0.6
800 US gpm	R		5.3	1.8	0.6	0.2	0.1	0.1	0.0	0.0	0.0	0.0
	v		10.5	6.7	4.3	2.7	2.1	1.7	1.3	1.1	0.9	0.7
900 US gpm	R		6.8	2.2	0.8	0.2	0.1	0.1	0.0	0.0	0.0	0.0
	v		11.8	7.5	4.8	3.0	2.4	1.9	1.5	1.2	1.0	0.8
1000 US gpm	R		8.24	2.7	0.9	0.3	0.2	0.1	0.1	0.0	0.0	0.0
	v		13.1	8.4	5.4	3.4	2.7	2.1	1.7	1.3	1.1	0.8
1100 US gpm	R			3.2	1.1	0.4	0.2	0.1	0.1	0.0	0.0	0.0
	v			9.2	5.9	3.7	2.9	2.3	1.8	1.5	1.2	0.9
1200 US gpm	R			3.8	1.3	0.4	0.2	0.1	0.1	0.0	0.0	0.0
	v			10.1	6.4	4.1	3.2	2.5	2.0	1.6	1.3	1.0
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec)  = recommended velocity cutoff  = maximum velocity cutoff												

SDR 17.6 pipe

Q	Dimension	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
1300 US gpm	R		4.4	1.5	0.5	0.3	0.2	0.1	0.1	0.0	0.0
	v		10.9	7.0	4.4	3.5	2.7	2.2	1.7	1.4	1.1
1400 US gpm	R		5.1	1.7	0.6	0.3	0.2	0.1	0.1	0.0	0.0
	v		11.7	7.5	4.7	3.7	2.9	2.3	1.9	1.5	1.2
1500 US gpm	R		5.7	1.9	0.6	0.4	0.2	0.1	0.1	0.0	0.0
	v		12.6	8.1	5.1	4.0	3.1	2.5	2.0	1.6	1.3
1600 US gpm	R		6.5	2.2	0.7	0.4	0.2	0.1	0.1	0.0	0.0
	v		13.4	8.6	5.4	4.3	3.3	2.6	2.1	1.7	1.4
1700 US gpm	R		7.2	2.4	0.8	0.4	0.2	0.1	0.1	0.0	0.0
	v		14.3	9.1	5.7	4.5	3.6	2.8	2.3	1.8	1.4
1800 US gpm	R		8.0	2.7	0.9	0.5	0.3	0.2	0.1	0.1	0.0
	v		15.1	9.7	6.1	4.8	3.8	3.0	2.4	1.9	1.5
1900 US gpm	R		8.9	3.0	1.0	0.5	0.3	0.2	0.1	0.1	0.0
	v		15.9	10.2	6.4	5.1	4.0	3.1	2.5	2.0	1.6
2000 US gpm	R		9.8	3.3	1.1	0.6	0.3	0.2	0.1	0.1	0.0
	v		16.8	10.7	6.8	5.3	4.2	3.3	2.7	2.1	1.7
2200 US gpm	R			3.9	1.3	0.7	0.4	0.2	0.1	0.1	0.0
	v			11.8	7.4	5.9	4.6	3.6	3.0	2.4	1.9
2400 US gpm	R			4.6	1.5	0.8	0.5	0.3	0.2	0.1	0.1
	v			12.9	8.1	6.4	5.0	4.0	3.2	2.6	2.0
2600 US gpm	R			5.4	1.7	1.0	0.5	0.3	0.2	0.1	0.1
	v			14.0	8.8	6.9	5.4	4.3	3.5	2.8	2.2
2800 US gpm	R			6.2	2.0	1.1	0.6	0.3	0.2	0.1	0.1
	v			15.0	9.5	7.4	5.9	4.6	3.8	3.0	2.4
3000 US gpm	R			7.0	2.3	1.3	0.7	0.4	0.2	0.1	0.1
	v			16.1	10.1	8.0	6.3	5.0	4.0	3.2	2.5
3200 US gpm	R				2.6	1.4	0.8	0.4	0.3	0.2	0.1
	v				10.8	8.5	6.7	5.3	4.3	3.4	2.7
3400 US gpm	R				2.9	1.6	0.9	0.5	0.3	0.2	0.1
	v				11.5	9.0	7.1	5.6	4.6	3.6	2.9
3600 US gpm	R				3.2	1.8	1.0	0.6	0.3	0.2	0.1
	v				12.2	9.6	7.5	6.0	4.8	3.8	3.0
3800 US gpm	R				3.5	2.0	1.1	0.6	0.4	0.2	0.1
	v				12.8	10.1	8.0	6.3	5.1	4.1	3.2
4000 US gpm	R				3.9	2.2	1.2	0.7	0.4	0.2	0.1
	v				13.5	10.6	8.4	6.6	5.4	4.3	3.4
4250 US gpm	R				4.3	2.4	1.3	0.8	0.5	0.3	0.1
	v				14.4	11.3	8.9	7.0	5.7	4.5	3.6
4500 US gpm	R				4.8	2.7	1.5	0.8	0.5	0.3	0.2
	v				15.2	12.0	9.4	7.4	6.0	4.8	3.8
4750 US gpm	R				5.3	3.0	1.7	0.9	0.6	0.3	0.2
	v				16.1	12.6	9.9	7.9	6.4	5.1	4.0
5000 US gpm	R				5.8	3.3	1.8	1.0	0.6	0.4	0.2
	v				16.9	13.3	10.5	8.3	6.7	5.3	4.2
5250 US gpm	R					3.6	2.0	1.1	0.7	0.4	0.2
	v					14.0	11.0	8.7	7.0	5.6	4.4
5500 US gpm	R					3.9	2.2	1.2	0.7	0.4	0.2
	v					14.6	11.5	9.1	7.4	5.9	4.6
5750 US gpm	R					4.2	2.4	1.3	0.8	0.5	0.3
	v					15.3	12.0	9.5	7.7	6.1	4.9
Q = flow rate (US gpm) R = feet of head per 100 ft v = velocity (ft/sec) ♦ = recommended velocity cutoff ♦ = maximum velocity cutoff											

SDR 17.6 pipe

Q	Dimension	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
6000 US gpm	R					4.6	2.5	1.4	0.9	0.5	0.3
	v					16.0	12.6	9.9	8.0	6.4	5.1
6250 US gpm	R					4.9	2.7	1.5	0.9	0.5	0.3
	v					16.6	13.1	10.3	8.4	6.7	5.3
6500 US gpm	R						2.9	1.7	1.0	0.6	0.3
	v						13.6	10.8	8.7	6.9	5.5
6750 US gpm	R						3.2	1.8	1.1	0.6	0.3
	v						14.1	11.2	9.1	7.2	5.7
7000 US gpm	R						3.4	1.9	1.1	0.7	0.4
	v						14.6	11.6	9.4	7.5	5.9
7250 US gpm	R						3.6	2.0	1.2	0.7	0.4
	v						15.2	12.0	9.7	7.7	6.1
7500 US gpm	R						3.8	2.2	1.3	0.7	0.4
	v						15.7	12.4	10.1	8.0	6.3
7750 US gpm	R						4.1	2.3	1.4	0.8	0.4
	v						16.2	12.8	10.4	8.3	6.5
8000 US gpm	R						4.3	2.4	1.5	0.8	0.5
	v						16.7	13.2	10.7	8.5	6.8
8500 US gpm	R							2.7	1.6	0.9	0.5
	v							14.1	11.4	9.1	7.2
9000 US gpm	R							3.0	1.8	1.0	0.6
	v							14.9	12.1	9.6	7.6
9500 US gpm	R							3.3	2.0	1.2	0.7
	v							15.7	12.7	10.2	8.0
10000 US gpm	R							3.7	2.2	1.3	0.7
	v							16.5	13.4	10.7	8.4
10500 US gpm	R								2.4	1.4	0.8
	v								14.1	11.2	8.9
11000 US gpm	R								2.6	1.5	0.9
	v								14.8	11.8	9.3
11500 US gpm	R								2.9	1.6	0.9
	v								15.4	12.3	9.7
12000 US gpm	R								3.1	1.8	1.0
	v								16.1	12.8	10.1
12500 US gpm	R								3.3	1.9	1.1
	v								16.8	13.4	10.6
13000 US gpm	R									2.1	1.2
	v									13.9	11.0
13500 US gpm	R									2.2	1.3
	v									14.4	11.4
14000 US gpm	R									2.4	1.3
	v									15.0	11.8
15000 US gpm	R									2.7	1.5
	v									16.0	12.7
16000 US gpm	R										1.8
	v										13.5
17000 US gpm	R										2
	v										14.4

Q = flow rate (US gpm)

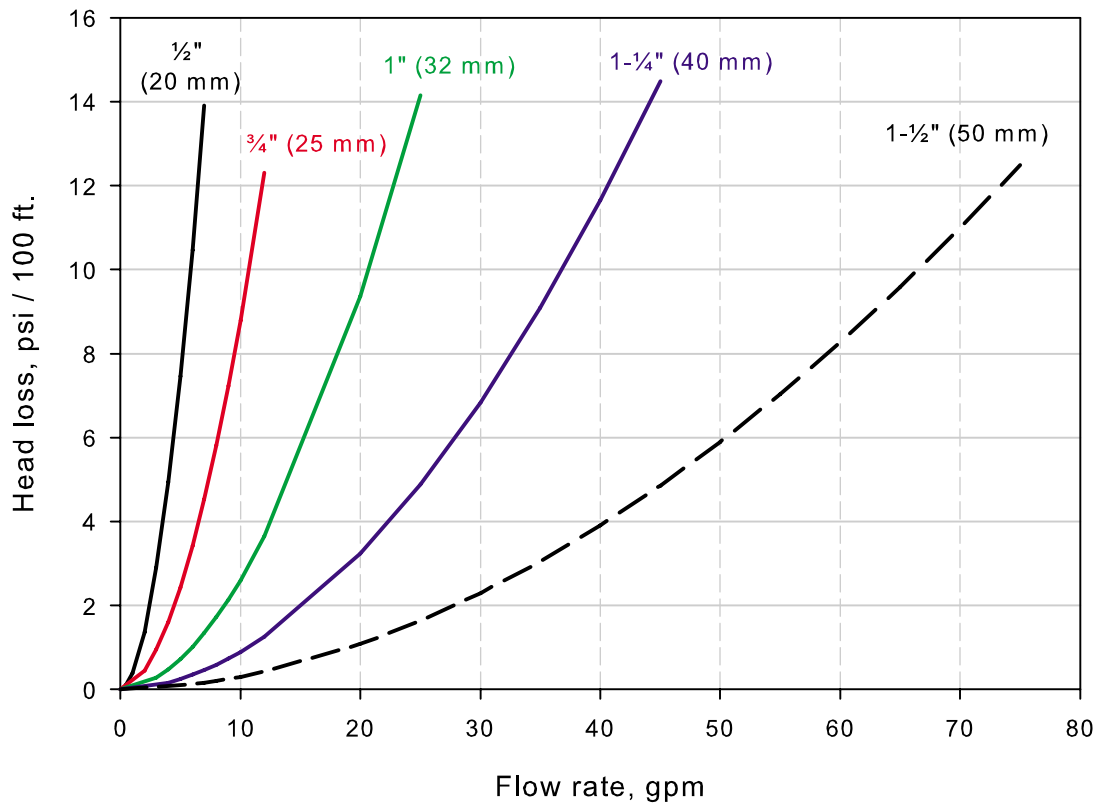
R = feet of head per 100 ft

v = velocity (ft/sec)

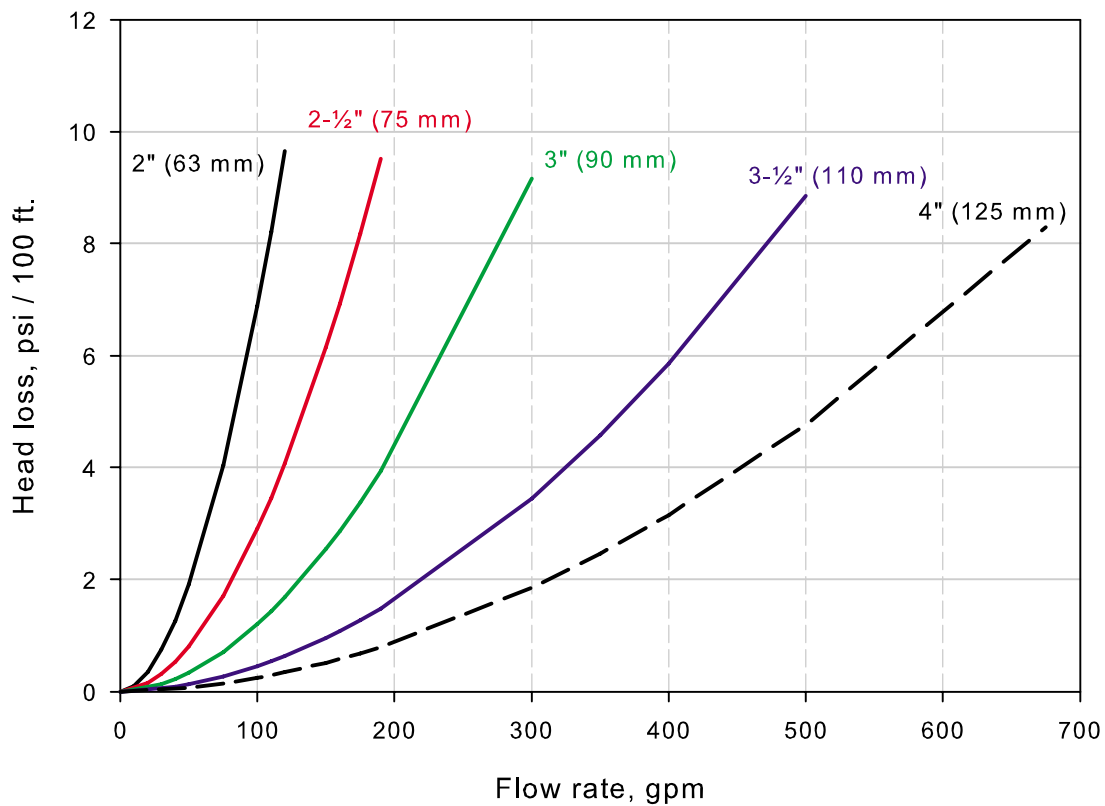
◀ = recommended velocity cutoff

▶ = maximum velocity cutoff

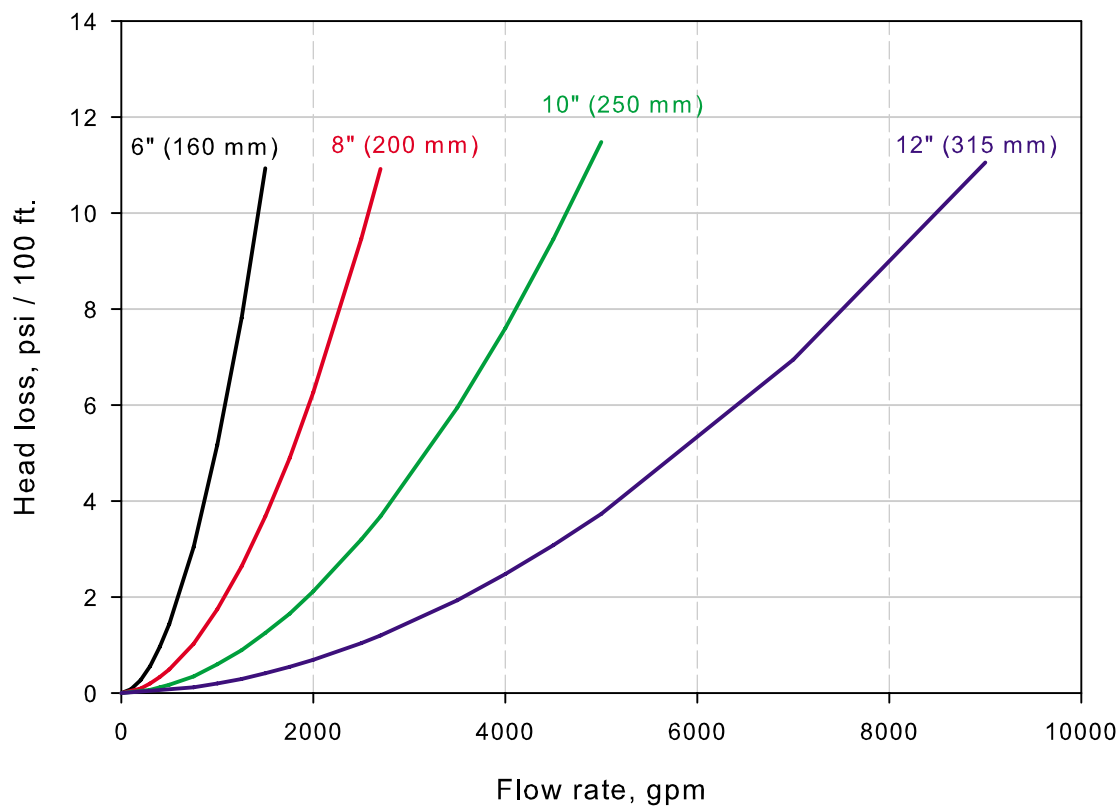
Pressure Loss vs. Flow Rate
1/2" thru 1-1/2", SDR 11



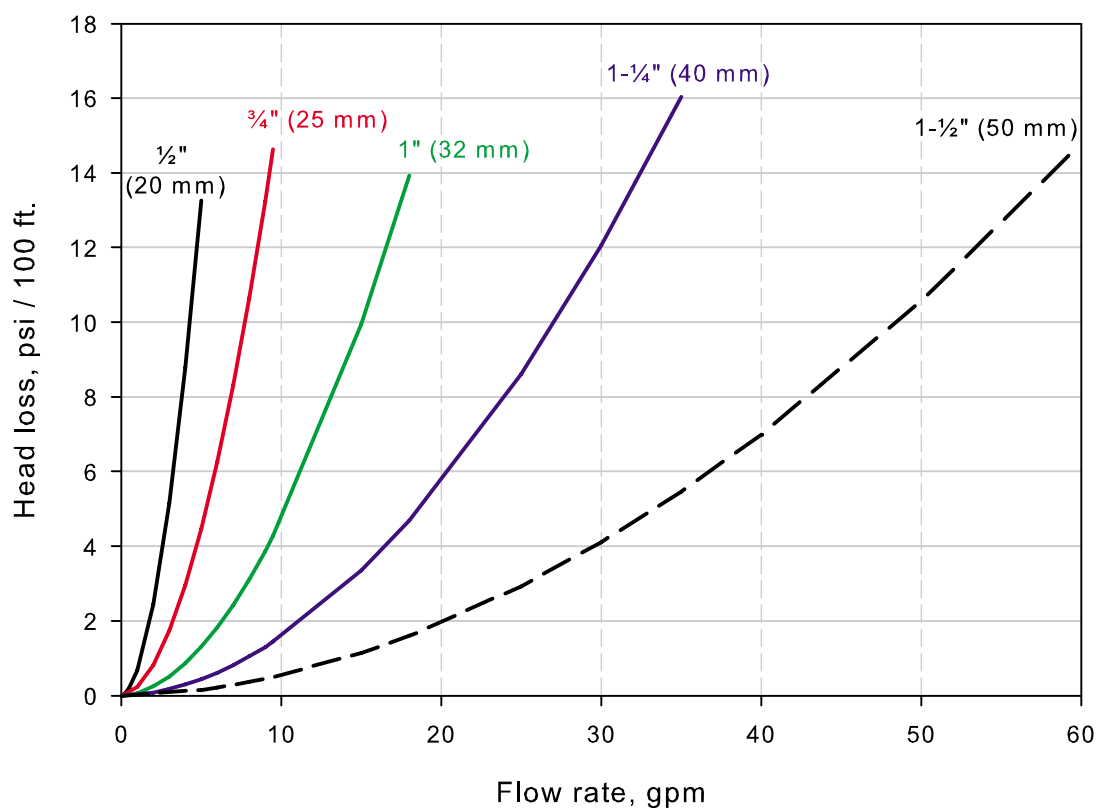
Pressure Loss vs. Flow Rate
2" thru 4", SDR 11



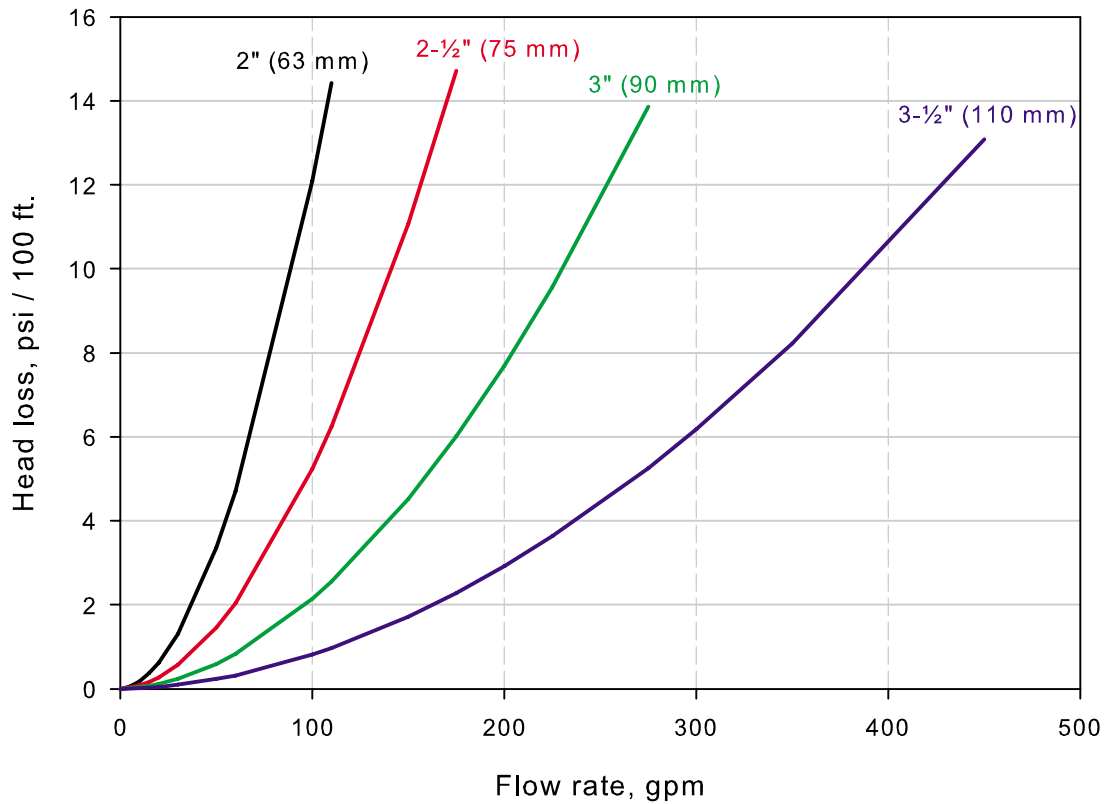
Pressure Loss vs. Flow Rate
6" thru 12", SDR 11



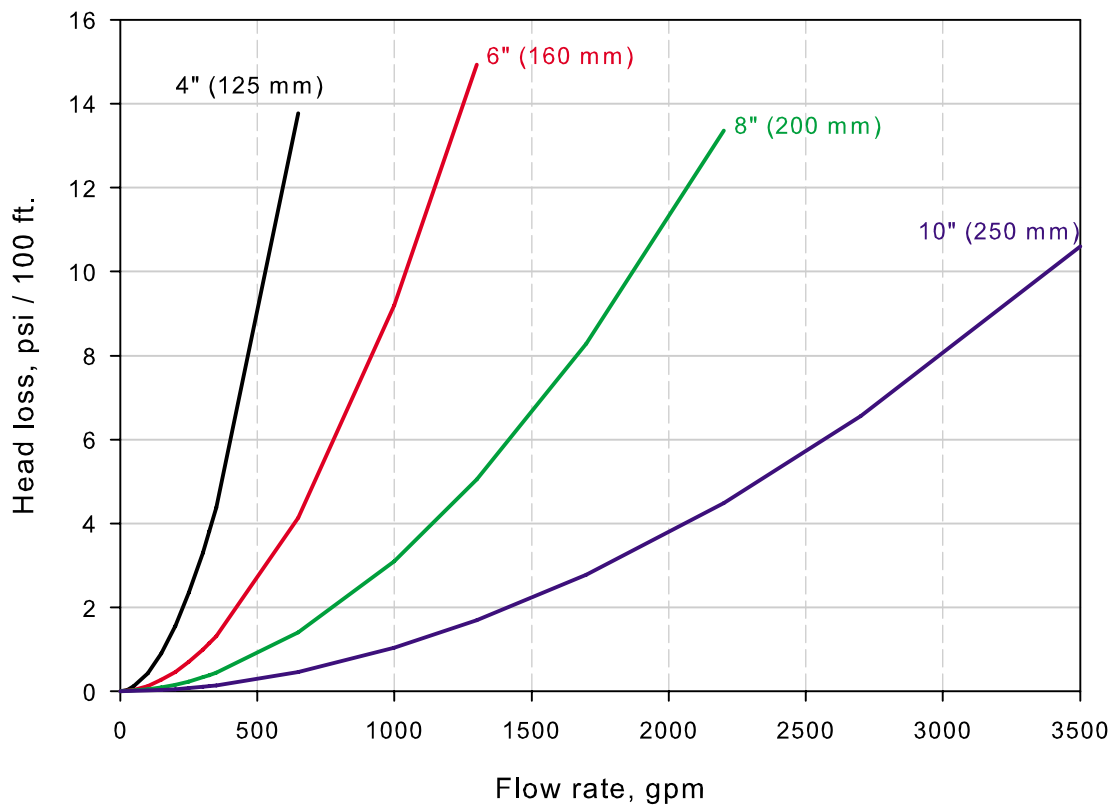
Pressure Loss vs. Flow Rate
½" thru 1-½", SDR 7.4



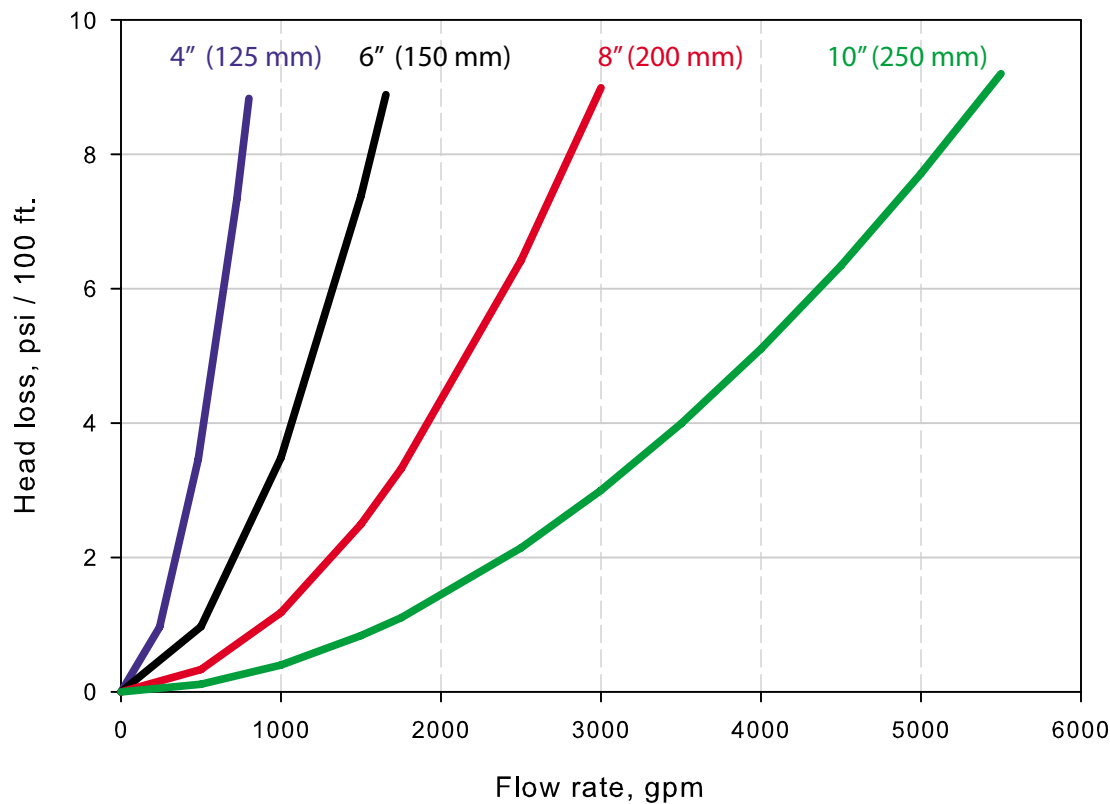
Pressure Loss vs. Flow Rate
2" thru 3-½", SDR 7.4



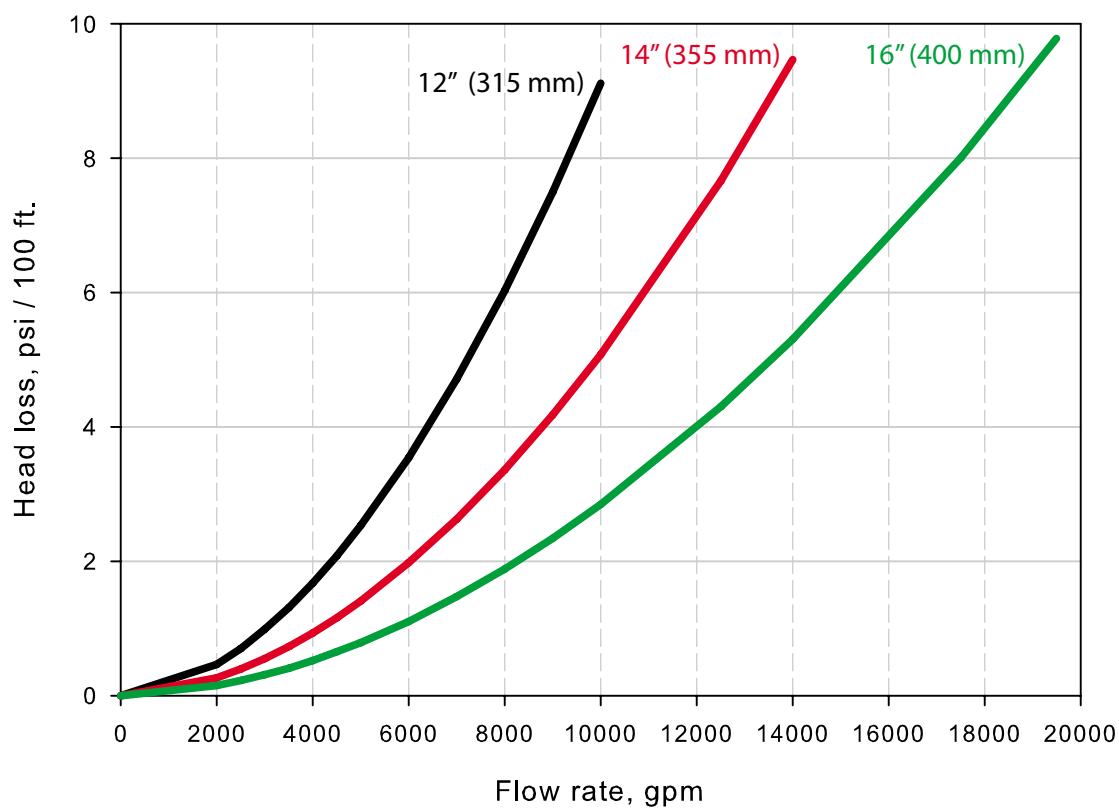
Pressure Loss vs. Flow Rate
4" thru 10", SDR 7.4

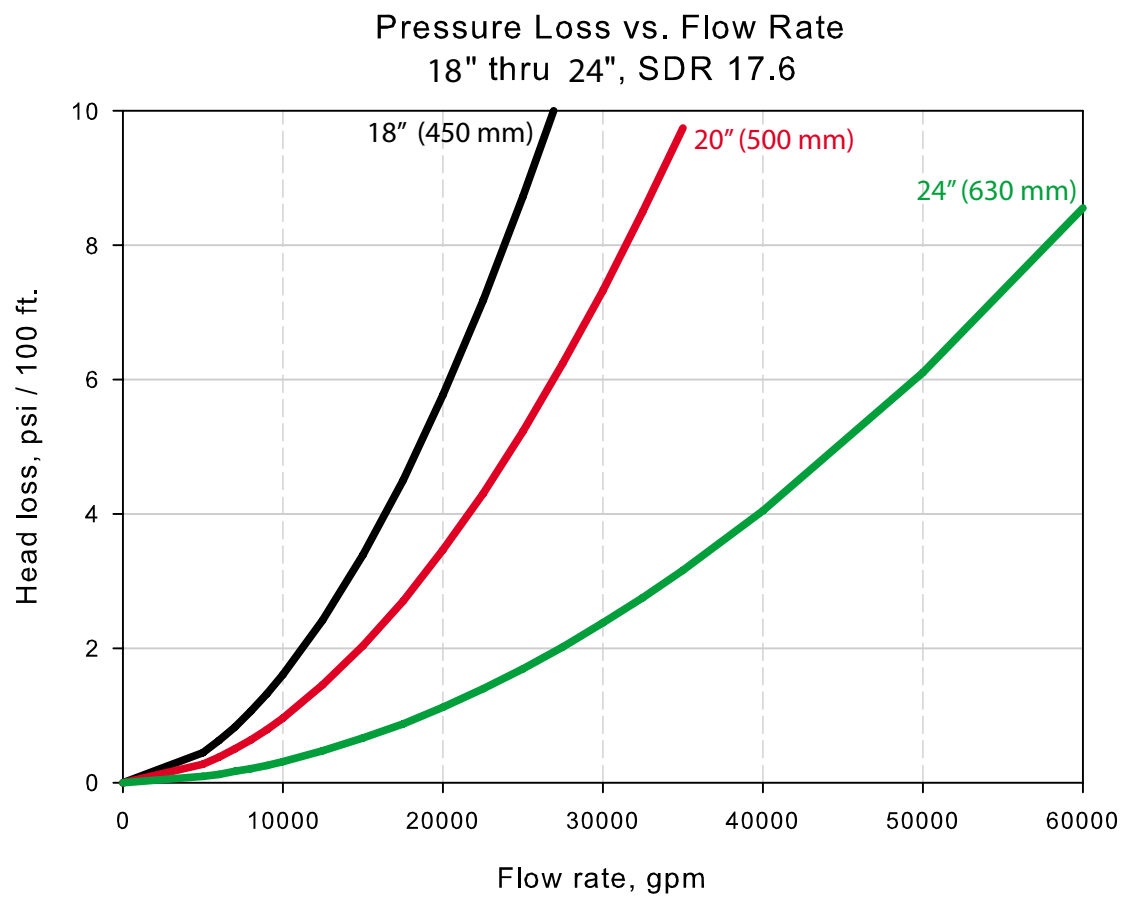


Pressure Loss vs. Flow Rate
4" thru 10", SDR 17.6




Pressure Loss vs. Flow Rate
12" thru 16", SDR 17.6





EQUIVALENT LENGTHS OF FITTINGS (FT)


 Socket	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		0.5	0.7	0.9	1.1	1.4	1.7	2.1	2.5	3.0	4.2


 Butt fusion bead	Butt welded	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
	SDR 7.4	-	1.5	1.9	2.4	3.0	3.4	-	-	-	-	-
	SDR 11	2.2	1.7	2.1	2.7	3.4	3.8	4.3	4.8	-	-	-
	SDR 17.6	3.0	1.9	2.3	2.9	3.7	4.1	4.7	5.2	5.8	6.5	7.3

Note: The friction loss for straight pipe includes the joint between pipe sections every 19 feet. The fabricated fittings also include the losses due to the butt fusion joints between segments and attaching the fitting to the pipe. The butt fusion bead in this table should only be included when additional shorter pipe sections are butt welded together such that there is more than one joint per standard length of pipe.

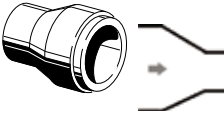
 Electrofusion coupling	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
	Butt welded	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
		SDR 7.4	0.5	0.5	-	-	-	-	-	-	-
		SDR 11	0.5	0.5	-	-	-	-	-	-	-
		SDR 17.6	0.5	0.5	-	-	-	-	-	-	-


 Bushing (by 1 dimension)	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	4.8	6.7
	Butt welded	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
		SDR 7.4	7.6	9.5	11.9	15.0	16.9	-	-	-	-
		SDR 11	8.6	10.7	13.4	16.9	19.1	21.5	24.2	-	-
		SDR 17.6	9.3	11.6	14.5	18.3	20.7	23.3	26.2	29.1	36.7


 Bushing (by 2 dimensions)	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		-	1.4	1.7	2.2	2.7	3.4	4.1	4.9	6.0	8.4
	Butt welded	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
		SDR 7.4	9.5	11.9	14.9	18.8	21.1	-	-	-	-
		SDR 11	10.7	13.4	16.8	21.1	23.8	26.9	30.2	-	-
		SDR 17.6	11.6	14.5	18.2	22.9	25.8	29.1	32.7	36.4	45.8

 Bushing (by 3 dimensions)	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		-	-	2.1	2.6	3.3	4.1	4.9	5.9	7.2	10.1
	Butt welded	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
		SDR 7.4	11.4	14.3	17.9	22.5	25.4	-	-	-	-
		SDR 11	12.9	16.1	20.1	25.4	28.6	32.2	36.2	-	-
		SDR 17.6	14.0	17.4	21.8	27.5	31.0	34.9	39.3	43.6	55.0

EQUIVALENT LENGTHS OF FITTINGS (FT)

Bushing (by 4 dimensions) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	-	-	-	3.1	3.8	4.8	5.7	6.9	8.4	11.7
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	13.3	16.7	20.8	26.3	-	-	-	-	-
		SDR 11	15.0	18.8	23.5	29.6	37.6	42.3	-	-	-
		SDR 17.6	16.3	20.3	25.4	32.1	40.7	45.8	50.9	57.0	64.1

Bushing (by 5 dimensions) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	-	-	-	-	4.4	5.5	6.6	7.9	9.6	13.4
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	15.2	19.1	23.8	30.0	33.8	-	-	-	-
		SDR 11	17.2	21.5	26.8	33.8	38.1	43.0	48.3	-	-
		SDR 17.6	18.6	23.3	29.1	36.6	41.3	46.5	52.4	58.2	73.3

Bushing (by 6 dimensions) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	-	-	-	-	-	6.2	7.4	8.9	10.8	15.1
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	17.2	21.4	26.8	33.8	38.1	-	-	-	-
		SDR 11	19.3	24.2	30.2	38.1	42.9	48.4	54.4	-	-
		SDR 17.6	20.9	26.2	32.7	41.2	46.5	52.4	58.9	65.4	82.5


Elbow 90° 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	1.6	2.0	2.6	3.3	4.1	5.2	6.2	7.4	9.0	12.6
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	14.3	17.9	22.3	18.0	20.3	-	-	-	-
		SDR 11	10.3	12.9	16.1	20.3	22.9	25.8	29.0	-	-
		SDR 17.6	11.2	14.0	17.4	22.0	24.8	27.9	31.4	34.9	44.0


Elbow 90° (male / female) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	1.6	2.0	2.6	3.3	-	-	-	-	-	-

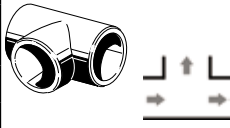
Elbow 45° 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
	-	0.9	1.1	1.4	1.7	2.2	2.8	3.3	3.9	4.8	6.7
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	7.6	9.5	11.9	11.3	12.7	-	-	-	-
		SDR 11	6.4	8.1	10.1	12.7	14.3	16.1	18.1	-	-
		SDR 17.6	7.0	8.7	10.9	13.7	15.5	17.5	19.6	21.8	27.5


(→ = flow direction)

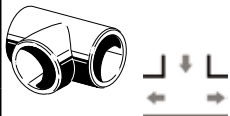
EQUIVALENT LENGTHS OF FITTINGS (FT)

Elbow 45° (male / female) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		0.9	1.1	1.4	1.7	-	-	-	-	-	-

Tee (thru-flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		0.5	0.7	0.9	1.1	1.4	1.7	2.1	2.5	3.0	4.2
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	4.8	6.0	7.4	9.4	10.6	-	-	-	-
		SDR 11	5.4	6.7	8.4	10.6	11.9	13.4	15.1	-	-
		SDR 17.6	5.8	7.3	9.1	11.5	12.9	14.5	16.4	18.2	20.4

Tee (separation of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		2.6	3.3	4.2	5.2	6.6	8.3	9.8	11.8	14.4	20.1
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	22.9	28.6	35.7	45.0	50.7	-	-	-	-
		SDR 11	25.8	32.2	40.3	50.7	57.2	64.5	72.5	-	-
		SDR 17.6	27.9	34.9	43.6	55.0	62.0	69.8	78.5	87.2	97.8


Tee (conjunction of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		1.7	2.2	2.8	3.5	4.4	5.5	6.6	7.9	9.6	13.4
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	15.2	19.1	23.8	30.0	33.8	-	-	-	-
		SDR 11	17.2	21.5	26.8	33.8	38.1	43.0	48.3	-	-
		SDR 17.6	18.6	23.3	29.1	36.6	41.3	46.5	52.4	58.2	65.2

Tee (counter current in case of separation of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		3.9	4.9	6.3	7.9	9.9	12.4	14.8	17.7	21.7	30.2
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	34.3	42.9	53.6	67.5	76.1	-	-	-	-
		SDR 11	38.7	48.3	60.4	76.1	85.8	96.7	108.7	-	-
		SDR 17.6	41.9	52.3	65.4	82.4	93.0	104.7	117.8	130.9	146.6

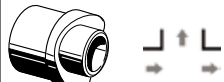
Tee (counter current in case of conjunction of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		5.2	6.5	8.2	10.4	13.1	16.4	24.6	29.5	36.1	50.3
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	57.2	71.5	89.3	112.5	126.8	-	-	-	-
		SDR 11	64.4	80.5	100.7	126.9	143.0	161.2	181.2	-	-
		SDR 17.6	69.8	87.2	109.1	137.4	154.9	174.5	196.4	218.1	244.4

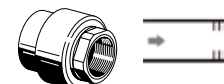
(⇒ = flow direction)

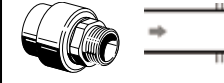
EQUIVALENT LENGTHS OF FITTINGS (FT)


Cross (separation of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		4.5	5.7	7.3	9.2	-	-	-	-	-	-
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	40.0	50.0	62.5	-	-	-	-	-	-
		SDR 11	45.1	56.4	70.5	-	-	-	-	-	-
	SDR 17.6	48.8	61.0	76.3	-	-	-	-	-	-	-

Cross (conjunction of flow) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		8.0	10.1	12.9	16.1	-	-	-	-	-	-
	Butt welded	6"	8"	10"	12"	14"	16"	18"	20"	22"	24"
		160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	500 mm	560 mm	630 mm
		SDR 7.4	70.5	88.1	110.2	-	-	-	-	-	-
		SDR 11	79.5	99.3	124.1	-	-	-	-	-	-
	SDR 17.6	86.1	107.6	134.5	-	-	-	-	-	-	-

Fusion outlet (separation of flow) ^a 	Side-wall fusion (based on branch size)	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"	6"	8"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm	160 mm	200 mm
		0.6	0.8	1.0	1.3	1.7	2.1	2.5	3.0	3.6	5.0	5.8	6.5

Transition (female thread) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		1.1	1.4	1.7	2.2	2.7	3.4	4.1	-	-	-

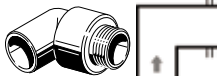
Transition (male thread) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		1.5	1.9	2.4	3.1	3.8	4.8	5.7	6.9	8.4	-


Elbow (female thread) 	Socket fusion	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½"	4"
		20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	110 mm	125 mm
		1.9	2.4	3.0	-	-	-	-	-	-	-

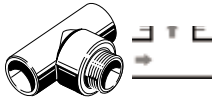
(→ = flow direction)

^a Note: For reducing tees, add the "thru-flow" value in the main line to the configuration value in the branch size. For example, a 4" x 4" x ¾" reducing tee with flow separation would be 4.2 ft + 3.3 ft = 7.5 ft, while a conjunction of flow would be 4.2 ft + 2.2 ft = 6.4 ft.

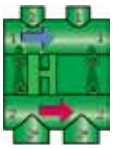
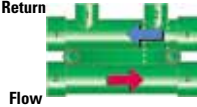

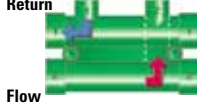
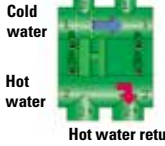
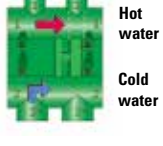
EQUIVALENT LENGTHS OF FITTINGS (FT)

Elbow (male thread) 	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		2.2	2.7	3.5	-	-	-	-	-	-	-

Tee (female thread) 	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		3.5	4.4	5.6	-	-	-	-	-	-	-

Tee (male thread) 	Socket fusion	½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm
		3.9	-	-	-	-	-	-	-	-	-

EQUIVALENT LENGTHS OF DISTRIBUTION BLOCKS

Picture	Comment	Picture	Comment	Equivalent length (ft)
Potable water installation 	Reduced ¾" (25 mm) passage for separation of flow	Heating installation 	Reduced ½" (20 mm) passage for separation of flow	2.0
	¾" (25 mm) passage for separation of flow		½" (20 mm) passage for separation of flow	0.5
Potable water installation 	½" (20 mm) passage for separation of flow	Heating installation 	⅜" (16 mm) branch for separation of flow	1.6
	½" (20 mm) branch for conjunction of flow		⅜" (16 mm) branch in case of conjunction of flow	3.2
	Reduced ½" (20 mm) passage for separation of flow		⅜" (16 mm) branch for separation of flow	4.4
Potable water installation 	¾" (25 mm) branch for separation of flow	Heating installation 	¾" (25 mm) branch for separation of flow	2.4
	⅜" (16 mm) branch for conjunction of flow		⅜" (16 mm) branch for conjunction of flow	1.6

MAXIMUM PULL FORCE

A major advantage of using PP-R is that the pipes have a very high tensile strength. And because Aquatherm uses heat-fused connections, that tensile strength is consistent through the connections. The result is a system that can be assembled in large sections and moved without the risk of damaging the pipe or the connections.

The following tables give the maximum pull force that can be exerted on the pipe before stretching it (and thus weakening it). Vertically, the pull force is based on the weight of the attached pipe and fittings. Horizontally, the friction of the ground must also be considered. Wetting the ground before dragging the pipe can help reduce the friction.

Their physical strength makes Aquatherm pipes exceptionally well suited for directional boring. However, it is important to use pull heads that are compatible with metric pipe. When selecting a pull head, use the metric size of the pipe, not the nominal imperial size.

Pipe diameter	Max pull force (lb)		
	SDR 7.4	SDR 11	SDR 17.6
½" — 20 mm	251	177	115
¾" — 25 mm	392	277	180
1" — 32 mm	642	454	294
1 ¼" — 40 mm	1,003	710	460
1 ½" — 50 mm	1,568	1,109	719
2" — 63 mm	2,489	1,760	1,141
2 ½" — 75 mm	3,528	2,495	1,618
3" — 90 mm	5,080	3,592	2,329
3 ½" — 110 mm	7,589	5,366	3,480
4" — 125 mm	9,800	6,930	4,500
6" — 160 mm	16,055	11,353	7,362
8" — 200 mm	25,087	17,739	11,503
10" — 250 mm	39,198	27,718	17,973
12" — 315 mm	62,230	44,005	28,534
14" — 355 mm	79,038	55,890	36,241
16" — 400 mm	100,346	70,958	46,012
18" — 450 mm	127,001	89,806	58,233
20" — 500 mm	156,791	110,871	71,893
22" — 560 mm	196,678	139,077	90,183
24" — 630 mm	248,921	176,019	114,137

4 INSTALLATION PRINCIPLES

Heat fusion

Training and installation

Fusion techniques

Installation concepts

Supporting the pipe

Linear expansion

Expansion controls

Fusion outlets

Transition fittings

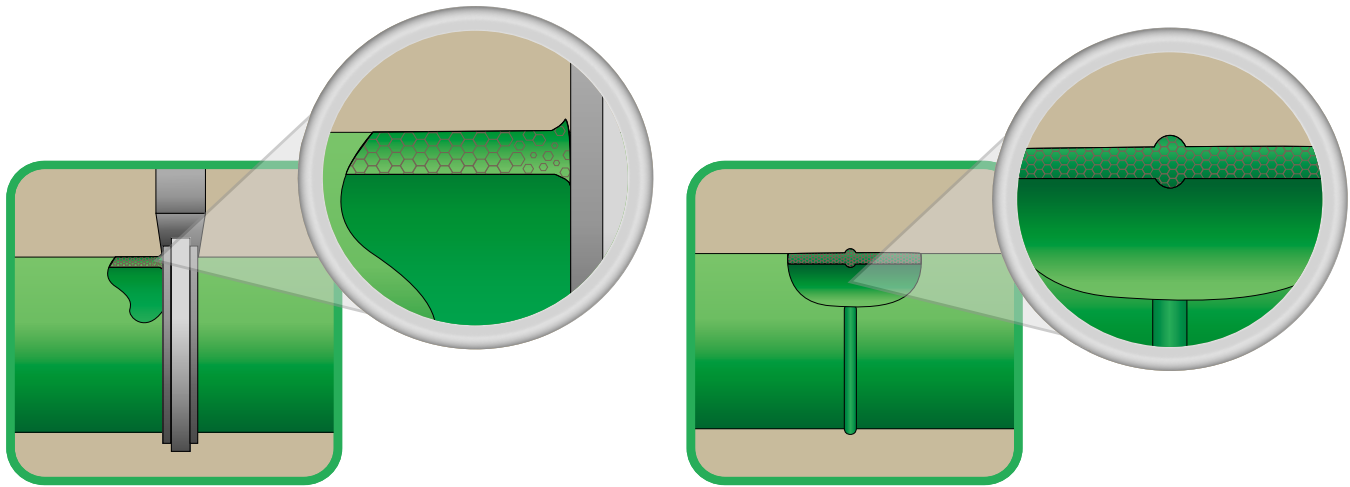
Distribution blocks

Other considerations

Pressure test



HEAT FUSION CONNECTIONS



All Aquatherm piping products are made from the same reliable PP-R material and are engineered to be heat fused together.

Since pipes and fittings come in sizes ranging from ½" to 24" in diameter, the fusion process, equipment required, and installation time will vary, but the principles of heat fusion remain the same.

For a proper heat fusion connection, the two surfaces being fused are heated to a melting temperature, pressed together, and allowed to cool under pressure. This process allows the PP-R chains to re-form as one, joining the pieces together without the need for glues, solders, gaskets, or other foreign materials.

By eliminating the foreign materials in the connection, heat fusion removes the most likely source of leaks and failures. The fused portion of the pipe also retains its flexibility and resistance to impact, making the connection easier and safer to prefabricate and transport. In short, a properly fused joint behaves as if it were manufactured that way.

There are several methods of fusion used in joining Aquatherm pipes. Each of these methods, if properly executed, will provide a connection that is stronger than the pipe itself.

A final pressure test will help verify the integrity of the connections, and drastically reduce the risk of failure due to improper installation. Aquatherm's heat fusion training courses are designed to help installers know when to employ each of these different methods and to become skilled in using them.



TRAINING AND INSTALLATION

Aquatherm offers detailed training courses to prepare installers for using Aquatherm PP-R products and approved tools. These courses are intended to help supplement the skills of licensed plumbers and pipe fitters. They are designed to minimize the learning curve associated with installing a new piping system, and prevent potentially costly on-the-job mistakes.

The available fusion courses are as follows:

- **Aquatherm Installer Course:** a comprehensive course that covers the PP-R material, the heat fusion process, and how to fuse pipe from ½" to 4" OD (those wishing to butt weld 4" pipe will also need to take the Aquatherm Butt Welding Course). The course focuses heavily on socket fusion with hand irons, including fusion outlets, and includes some practice with an assisted fusion machine. This course is required before taking other Aquatherm fusion courses.
- **Aquatherm Butt Welding Course:** this course focuses on fusing pipe sizes 6" OD and larger. It gives a generic explanation of butt fusion, which can be applied to a variety of machine styles. Specific training from the manufacturer for the machines being used is still recommended.
- **Aquatherm Electrofusion Course:** a course designed for an alternative socket fusion method using electrical resistance heat rather than contact heat. A common alternative for risers, retrofits, and other tough-to-reach applications.

These courses are taught by authorized Aquatherm trainers. Installers are required to take the appropriate course for the type of fusions they will be performing. Training is available through local wholesalers and manufacturer's representatives. All coursework should be completed before beginning installation. Failure to follow proper installation procedures will void the warranty.

The information provided in this product catalog regarding proper fusion and installation procedures has been summarized and is for general reference only. It is not intended for use as the installation instructions.

Full installation instructions can be found in the Aquatherm Installer Manual. The information in the Installer Manual is supplemented by Technical Bulletins, which are regularly emailed to certified installers, posted in the Aquatherm e-newsletter, and released in the newsletter and can be found online at www.aquatherm.com/bulletin.

The Aquatherm Installer Manual is distributed with training, and is available upon request. Visit www.aquatherm.com/documents for the most up-to-date version.



INSTALLATION PRINCIPLES

SOCKET FUSION

Socket fusion is used for pipe and fittings from ½" to 4" in diameter. To perform a proper fusion, the pipe is cut, marked for insertion depth, and heated along with the socket fitting for a specified time. The pipe and fitting are then pushed together and allowed to cool. The pressure for these connections comes from the OD of the pipe being slightly larger than the ID of the fitting. Marking the pipe to the proper welding depth helps bring the connection to its maximum strength without flow restriction.

MECHANICALLY ASSISTED FUSIONS

For socket fusions in sizes larger than 2", it can be difficult for one installer to make a proper connection by hand. Fusion machines can act as a second pair of hands to hold the pipe, speed up the connection process, and assist with alignment and insertion depth.

Fusion machines come in a variety of designs. Bench-style machines offer greater support and alignment control. Jig-style machines are lighter and offer more workspace flexibility. Some installers use a variety of machines, depending on the application.

BUTT FUSION

Butt fusion (or butt welding) is used for pipe and fittings from 6" to 24" in diameter. Butt fusion can also be used on 4" pipe (SDR 11 and 17.6 only) with normal socket fittings.

Butt fusion involves planing the ends of the pipe smooth, pressing them against a heating plate, and then pressing them together to cool.

This allows larger sizes of pipe to be assembled without the need for additional couplings. Butt fusion fittings are either made from the pipe itself, or to the same OD as the pipe, so they can be fused directly to the face of the pipe.

OUTLET FUSION

As an easy and reliable alternative to reducing tees, Aquatherm offers fusion outlets that can be installed directly onto the outside of the pipe. This allows for increased design flexibility and simplified installation. Fusion outlets are socket fused using welding heads and heating irons.

ELECTROFUSION

This alternative to socket fusion is commonly used when space is very limited, or the pipe cannot be moved laterally in order to perform a fusion. Heat is generated by a current run through electrical coils inside the fittings.



A NEW WAY OF THINKING

Aquatherm piping systems offer many innovative technologies and advantages that can greatly improve the speed and ease of installation. These advantages include:

- Fusion connections
- Fusion outlets
- Lightweight material
- Resilient, slightly flexible pipe and connections
- Reduced expansion and contraction

To fully utilize these advantages, a different mind-set from metal or even other plastic systems is required.

A CRAFTSMAN'S PIPE

As a company, Aquatherm takes pride in the systems they manufacture and expects the same from those installing it. No matter the quality of the material, the performance of a system will always depend on how carefully and professionally it is installed. Aquatherm piping systems are designed to look neat and clean when installed, making it easier to expand the system or trace lines. Square fittings and rigid pipe provide a traditional layout, such as an installer would use with copper or steel.

PLANNING

As with any piping system, the speed and accuracy of an Aquatherm installation is improved with careful planning. Planning will allow for a greater amount of prefabrication and a lower probability of error.

All fusion connections require a certain amount of space and mobility around each joint. When installing an Aquatherm piping system, it is important to be conscious of the workspace in which each fusion will be performed. The amount of space needed for a fusion machine to operate varies by manufacturer and machine type. It is best to confirm that there will be enough space for the machine to operate while planning the installation.

TOOLING

Fusion tools are a critical component of an Aquatherm installation, as reliable fusion connections are impossible without them. Aquatherm works with several tool manufacturers to provide installers with options, and optimized tooling for each type of connection. Installers should make sure they have the proper tools available for the job, as well as enough tools for the size and strategy of their crew. In many cases, having extra tools will speed an installation and reduce costs.

PREFABRICATION

Aquatherm piping systems are light, strong, and somewhat flexible, making them ideal for prefabrication. When installing Aquatherm pipe, identify the more complicated assemblies such as drop 90s, flange adapters, branch lines, and headers, and assemble them in-shop or at a prefabrication station on the job site. Many installers will assemble whole mechanical rooms in-shop and move the entire assembly to the job site. If a pipe will pass through an area that is difficult to access, Aquatherm recommends prefabricating all the connections in that area. This can be done off-site or on-site, depending on installer preference.



ON-SITE PREFABRICATION

Polypropylene is lighter than most other piping materials, and fusion joints adjust easily to reasonable levels of stress from being carried. To take advantage of this, many installers set up a prefab station on the job site, including a workbench, technical drawings, a welding jig or bench machine and the appropriate welding tools. This station is used to measure, cut, and prefabricate pipe and fittings for the installation. Use of this station ensures adequate space for tool operation.

PRE-ASSEMBLY

Connections done in a shop or at the prefab station on the job site are easier and faster to assemble than connections done on pipe that is already in place. It is possible to greatly speed up installation by attaching the appropriate fittings to one end of the pipe before hanging it. Identify the fittings (couplings, elbows, tees, valves, etc.) that will go with each length of pipe and fuse them together before hanging the pipe in its proper place. This will allow you to assemble as many as half your connections without any of the complications associated with in-line or overhead fusions.

TECHNICAL BULLETINS

Due to the wide variety of applications that Aquatherm pipe is used in, and the ongoing development of third-party tools, clamps, insulations, and other solutions, the recommendations for installing Aquatherm products are regularly improved and updated. Aquatherm regularly releases technical bulletins to fill in the gaps between editions of the catalog and installer manual.

Aquatherm recommends reading both past and new technical bulletins, in addition to this catalog regularly with the Aquatherm e-newsletter (visit www.aquatherm.com/newsroom to subscribe). Technical bulletins are sent to Aquatherm's installers and trainers at least quarterly.

INSTALLATION PRINCIPLES

SUPPORTING THE PIPE

There are two types of Aquatherm pipes: multi-layer faser (MF) pipes and single-layer pipes. MF pipes are designed for hot water installations and non-MF pipes are intended only for use in cold water installations. The faser layer reduces expansion in the pipe and provides linear support. As a result, the support spacing for MF pipe is wider than other plastics in most cases and is dependent on the temperature of the fluid it is carrying. The hanger spacing for cold water pipes is generally uniform.

The installer should base hanger spacing on the intended temperature of the pipes, taking into account the temperature of the pipes at the time of installation.



HANGERS AND CLAMPS

When installing Aquatherm pipes, use only rubber-lined or felt-lined clamps. You may use tape to pad the space between the PP-R and the metal on non-clamping hangers, such as clevis hangers.

Metal clamps (even plastic-safe clamps) can damage hot water pipes, and water vapor can condense on the bare metal clamp when used on cold water pipe. When installing chilled water lines in high-humidity areas, use a non-crushable pipe shield. Metal that is in direct contact with the Aquatherm pipe may sweat in certain chilled applications, even if the pipe itself shows no signs of condensation.

When securing the pipe in place, it is important to distinguish between anchors (fixed points) and guides (sliding points). Fixed points are clamped tightly against the pipe and prevent any expansion or movement through that point. Sliding points are clamped loosely or simply hung and do not restrict expansion or movement. The proper application of each is explained in the next two sections.

ANCHORS (FIXED POINTS)

Achors are used to divide the pipe into sections, restricting any uncontrolled movement of the pipe. Anchors must be measured and installed to accommodate the forces of expansion in the pipe as well as probable additional loads.

When using threaded rods or threaded screws, the drop from the ceiling should be as short as possible. Swinging clamps should not be used as fixed points. When the pipe section between anchor points is heated above the installation temperature, it may bow outward between anchors. This normally will not affect the pipe, but should be considered if the pipe is exposed or installed close to other utilities.

Vertical risers can be installed using only fixed points. MF risers do not require expansion loops, provided that fixed points are located immediately before or after a branch. Pipe clamp distances of vertically installed pipes are at each floor, or before and after each branch, whichever is more frequent. Mid-story guides can be used to avoid outward deflection of hot water piping.

GUIDES (SLIDING POINTS)

Guides must allow axial pipe movement without damaging the pipe. When positioning a guide, make sure that movement of the pipe is not blocked by walls, fittings, or mechanical equipment installed next to the clamp or hanger. Guides must allow expansion to pass through without twisting or binding on the pipe.

CLAMP AND HANGER SIZING

Use the following table to find the approximate imperial OD for supporting bare pipe. Larger clamps will be needed to go over insulation and/or pipe shields.

Pipe size	Clamp size
½" (20 mm)	¾"
¾" (25 mm)	1"
1" (32 mm)	1 ¼"
1 ¼" (40 mm)	1 ½"
1 ½" (50 mm)	2"
2" (63 mm)	2 ½"
2 ½" (75 mm)	3"
3" (90 mm)	3 ½"
3 ½" (110 mm)	4 ½"
4" (125 mm)	5"

Pipe size	Clamp size
6" (160 mm)	6 ½"
8" (200 mm)	8"
10" (250 mm)	10"
12" (315 mm)	12 ½"
14" (355 mm)	14"
16" (400 mm)	15 ¾"
18" (450 mm)	17 ¾"
20" (500 mm)	19 ¾"
22" (560 mm)	22"
24" (630 mm)	24 ¾"

SUPPORT INTERVALS

With PP-R, the hanger spacing varies with the expansion in the pipe. For cold water pipes, there is a negligible amount of expansion, or even some contraction, so only one spacing is given for non-MF installations. For heated or chilled applications, use MF pipe. The limited expansion helps increase hanger spacing. The temperature difference is based on an ambient temperature of 68 °F. For example, a 100 °F system in a 100 °F room should have support spacing based on (100 °F – 68 °F = 32 °F) temperature differential, not zero differential. In systems with a 0 or negative ΔT , use the maximum spacing.

Note: These support intervals are based on the pipes carrying water. If the pipes are carrying a material that is denser than water, additional support may be required. Alternative spacing should be confirmed with a chemical compatibility report.

aquatherm green pipe® MF pipe SDR 7.4 & aquatherm blue pipe® SDR 7.4 & 11 MF pipe

<div>ΔT</div> <div>Difference in temp.</div>	Pipe diameter																
	½"	¾"	1"	1 ¼"	1 ½"	2"	2 ½"	3"	3 ½" 110 mm	4"	6"	8"	10"	12"	14"	16"	18"
	20 mm	25 mm	32 mm	40 mm	50 mm	63 mm	75 mm	90 mm	125 mm	160 mm	200 mm	250 mm	315 mm	355 mm	400 mm	450 mm	
	Support intervals (ft)																
0 °F (0 °C)	4	4.6	5.2	5.9	6.7	7.5	8	8.5	9.5	10.5	11.2	11.3	11.5	12.5	13.5	15	16
36 °F (20 °C)	4	4	4	4.4	5.1	5.7	6.1	6.4	7.1	7.9	8.9	9	9.2	10.1	11	14	15
54 °F (30 °C)	4	4	4	4.4	5.1	5.7	6.1	6.4	6.9	7.4	8	8.2	8.4	9.2	10	12	13
72 °F (40 °C)	4	4	4	4.1	4.8	5.4	5.7	6.1	6.6	7.1	7.7	7.9	8	8.7	9.5	11	12
90 °F (50 °C)	4	4	4	4.1	4.8	5.4	5.7	6.1	6.2	6.4	6.7	6.9	7.1	7.8	8.5	10	11
108 °F (60 °C)	4	4	4	4	4.4	5.1	5.4	5.7	5.9	6.1	6.4	6.6	6.7	7.1	7.5	9	10
126 °F (70 °C)	4	4	4	4	4.3	4.8	5.1	5.4	5.6	5.7	6.1	6.2	6.4	6.7	7	8	8

aquatherm green pipe SDR 11 & aquatherm lilac pipe® SDR 11 support intervals

(Cold water applications, and ambient temperature below 85 °F)

Pipe diameter																
½" 20 mm	¾" 25 mm	1" 32 mm	1 ¼" 40 mm	1 ½" 50 mm	2" 63 mm	2 ½" 75 mm	3" 90 mm	3 ½" 110 mm	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm
Support intervals (ft)																
4	4	4	4	4	4.6	4.9	5.2	5.9	6.6	7.2	7.5	7.9	8.4	9.5	10.5	11.2

aquatherm blue pipe SDR 17.6 MF pipe support intervals

ΔT Difference in temp.	Pipe diameter										
	4" 125 mm	6" 160 mm	8" 200 mm	10" 250 mm	12" 315 mm	14" 355 mm	16" 400 mm	18" 450 mm	20" 500 mm	22" 560 mm	24" 630 mm
	Support intervals (ft)										
0 °F (0 °C)	8.4	8.5	8.7	9.0	9.2	9.4	9.7	10.0	10.3	10.7	10.8
36 °F (20 °C)	6.1	6.2	6.6	6.7	6.9	7.1	7.5	7.9	8.4	8.9	9.2
54 °F (30 °C)	5.7	5.9	6.2	6.4	6.6	6.7	7.2	7.5	8.0	8.5	9.0
72 °F (40 °C)	5.6	5.7	5.9	6.2	6.2	6.4	6.9	7.4	7.7	8.2	8.7
90 °F (50 °C)	5.2	5.4	5.7	5.9	6.1	6.1	6.6	7.1	7.5	7.9	8.4
108 °F (60 °C)	4.9	5.1	5.4	5.6	5.7	5.7	6.1	6.6	7.1	7.5	7.9
126 °F (70 °C)	4.6	4.8	5.1	5.2	5.6	5.7	5.7	6.2	6.7	7.2	7.5

LINEAR EXPANSION

The linear expansion of pipe depends on the difference between the installation temperature and the operating temperature:

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

Therefore, cold water pipes have practically no linear expansion. They can experience some contraction, but this is not a concern. The heat-fused connections cannot be pulled apart.

Hot water installations can expand visibly and may require expansion loops or sliding elbows to prevent bowing or curving. Aquatherm has significantly reduced the issues related to heat expansion with the introduction of patented MF pipes.

Expansion joints may also be used, but must be rated for use with plastic pipe and have sufficiently low application force requirements so that the joint will expand and contract when the pipe expands or contracts.

AQUATHERM FASER-COMPOSITE (MF) PIPES

The faser layer is a unique feature of Aquatherm piping systems. Made from a blend of the **fusiolen® PP-R** material and e-glass fibers, this layer is perfectly integrated into the center of the Aquatherm pipes. By extruding this special layer into the center of the pipe, the exterior and interior layers remain unaltered.

The e-glass fibers expand less than the PP-R material when heated, which prevents the material they are bonded to from expanding. Because the faser layer does not expand, the outside and inside layers can't either, reducing the overall expansion and contraction of the pipe by 75% when compared to non-MF plastic pipes.

The faser layer uses a low concentration of glass fibers, so the fusion properties of the pipe remain the same. There is also no issue with recycling the pipe, as the fibers can be removed during the process.

CONCEALED INSTALLATION

Unlike most piping materials, PP-R is able to absorb the stress caused by expansion within certain limits. The faser layer helps keep the pipe within these limits for most applications.

Concealed installations generally do not require additional consideration for the expansion of MF pipes. Most installations give enough expansion space for the pipe. In the case where the expansion is greater than the room to move in the available space, the material absorbs any stress arising from a residual expansion.

The same applies to pipes which do not have to be insulated according to current regulations. The expansion on pipes that don't need to be insulated is minimal because of the lower difference in temperature. The pipe itself can absorb the remaining stress.

Embedding the pipe in concrete or plaster will negate most of the linear expansion. The compressive strain and tensile stress arising from this are no longer critical, as the extra forces are absorbed by the pipe itself. This is also true of pipe that is buried in soil or sand.

OPEN INSTALLATION

In the case of exposed installations, it is important to maintain the visual trueness of the pipe as well as compensate for any expansive forces. Aquatherm's MF pipes make this an easy process.

It is important to calculate the expansion of the system and allow the piping to expand. Expansion can be compensated for using offset elbows and expansion loops. The flexible heat fusion joints will not crack or leak from the tension of expanding and contracting if the bending side is long enough.



CALCULATION OF LINEAR EXPANSION

The coefficient (α) of linear expansion of Aquatherm MF pipes is comparable to the linear expansion of metal pipes and is only:

$$\alpha \text{ MF} = 0.035 \text{ mm/mK} = 2.367 \cdot 10^{-4} \text{ in/ft}^\circ\text{F} = 1.973 \cdot 10^{-5} \text{ in/in}^\circ\text{F}$$

The coefficient of linear expansion of Aquatherm piping systems without the fiber-composite layer is comparable to other plastic pipes:

$$\alpha \text{ non-MF} = 0.150 \text{ mm/mK} = 1.008 \cdot 10^{-3} \text{ in/ft}^\circ\text{F} = 8.4 \cdot 10^{-5} \text{ in/in}^\circ\text{F}$$

While Aquatherm MF pipes can absorb most of their own expansion stresses, this can cause the pipe to bow or bend. Fixed points should be installed at least every 120 feet, with some form of expansion control between each fixed point. The expansion control must be able to absorb the stress of all the expansion between the two fixed points.

Non-MF pipes used for hot applications should have expansion controls at every 30 feet for straight runs.

Risers of MF pipes may be installed rigidly without expansion compensation. The risers will need to be anchored at each floor. It is recommended to anchor near any branch lines to minimize vertical movement.

The following formula, calculation examples, data tables and diagrams help to determine the linear expansion. The difference between working temperature and maximum or minimum installation temperature is essential for the calculation of linear expansion.

CALCULATION OF LINEAR EXPANSION

Calculation example: Linear expansion

Given and required values

Symbol	Meaning	Value	Measuring unit
ΔL	Linear expansion	?	$\frac{\text{in}}{\text{ft}}^\circ\text{F}$ $\frac{\text{mm}}{\text{m}}^\circ\text{K}$
α_1	Coefficient of linear expansion Aquatherm MF pipe	$2.367 \cdot 10^{-4}$ 0.035	$\frac{\text{in}}{\text{ft}}^\circ\text{F}$ $\frac{\text{mm}}{\text{m}}^\circ\text{K}$
α_2	Coefficient of linear expansion Aquatherm non-MF pipe	$1.008 \cdot 10^{-3}$ 0.15	$\frac{\text{in}}{\text{ft}}^\circ\text{F}$ $\frac{\text{mm}}{\text{m}}^\circ\text{K}$
L	Pipe length	100 30.5	ft m
T_w	Working temperature	160 71.0	$^\circ\text{F}$ $^\circ\text{C}$
T_M	Installation temperature	60 15.6	$^\circ\text{F}$ $^\circ\text{C}$
ΔT	Temperature difference between working and installation temperature ($\Delta T = T_w - T_M$)	100 38.0	$^\circ\text{F}$ $^\circ\text{K}$

$$\Delta T [^\circ\text{F}] \cdot \frac{5}{9} = \Delta T [^\circ\text{K}]$$

The linear expansion ΔL is calculated according to the following formula:

$$\Delta L = \alpha \cdot L \cdot \Delta T$$

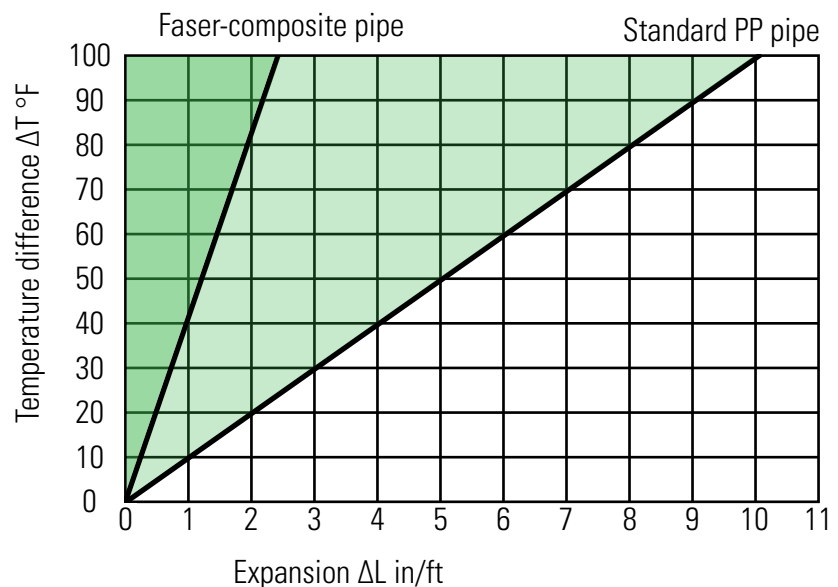
Material: Aquatherm MF pipe

$$(\alpha_1 = 2.367 \cdot 10^{-4} \text{ in/ft}^\circ\text{F})$$

$$\Delta L = 2.367 \cdot 10^{-4} \cdot 100 \text{ ft} \cdot 100^\circ\text{F}$$

$$\Delta L = 2.4 \text{ in}$$

**Linear expansion comparison:
Aquatherm MF (faser-composite)
versus standard PP pipe**

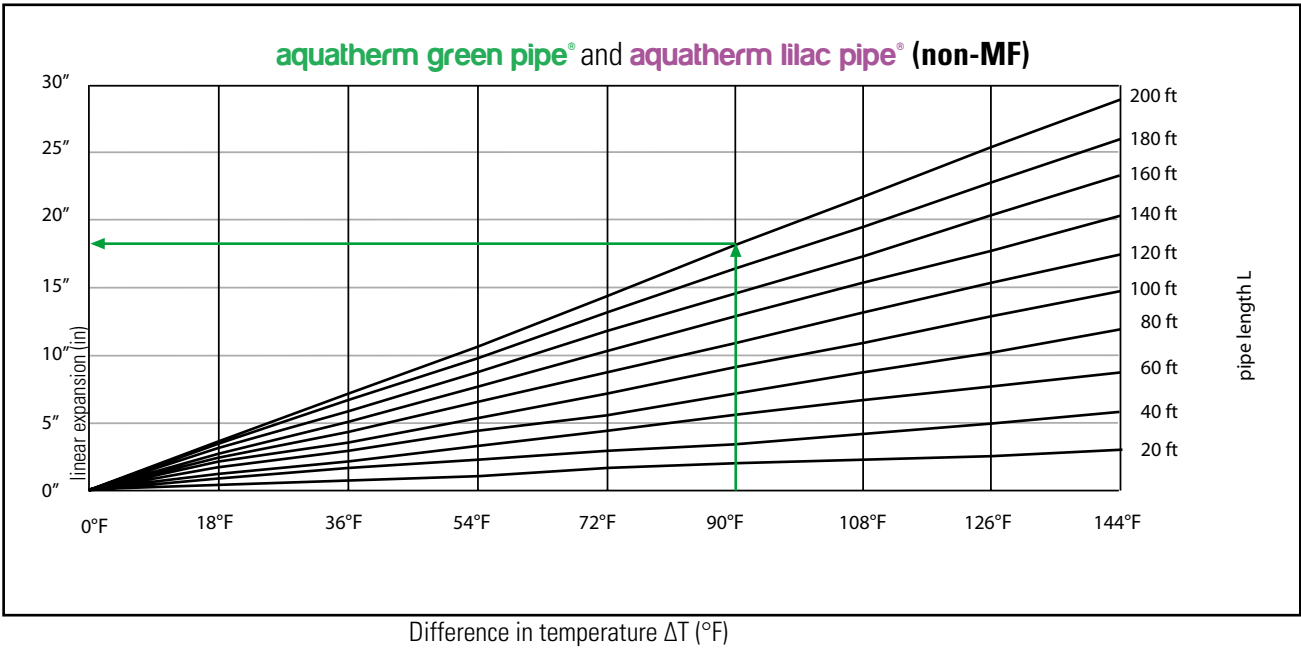


LINEAR EXPANSION FOR AQUATHERM NON-MF PP-R PIPES

The linear expansion described on the preceding pages can be taken from the following tables and graphs.

Linear expansion ΔL (in):
aquatherm non-MF pipe - α₂ = 0.150 mm/mK = 1.008 • 10⁻³ in/ft°F = 8.4 • 10⁻⁵ in/in°F

Pipe length	Difference in temperature ΔT = T _{operating temperature} - T _{installation temperature}							
	10 °F	20 °F	30 °F	40 °F	50 °F	60 °F	80 °F	100 °F
	Linear expansion ΔL (in)							
10 ft	0.1	0.2	0.3	0.4	0.5	0.6	0.8	1.0
20 ft	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.0
30 ft	0.3	0.6	0.9	1.2	1.5	1.8	2.4	3.0
40 ft	0.4	0.8	1.2	1.6	2.0	2.4	3.2	4.0
50 ft	0.5	1.0	1.5	2.0	2.5	3.0	4.0	5.0
60 ft	0.6	1.2	1.8	2.4	3.0	3.6	4.8	6.0
70 ft	0.7	1.4	2.1	2.8	3.5	4.2	5.6	7.0
80 ft	0.8	1.6	2.4	3.2	4.0	4.8	6.4	8.0
90 ft	0.9	1.8	2.7	3.6	4.5	5.4	7.2	9.0
100 ft	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0
150 ft	1.5	3.0	4.5	6.0	7.5	9.0	12.0	14.9
200 ft	2.0	4.0	6.0	8.0	10.0	12.0	15.9	19.9



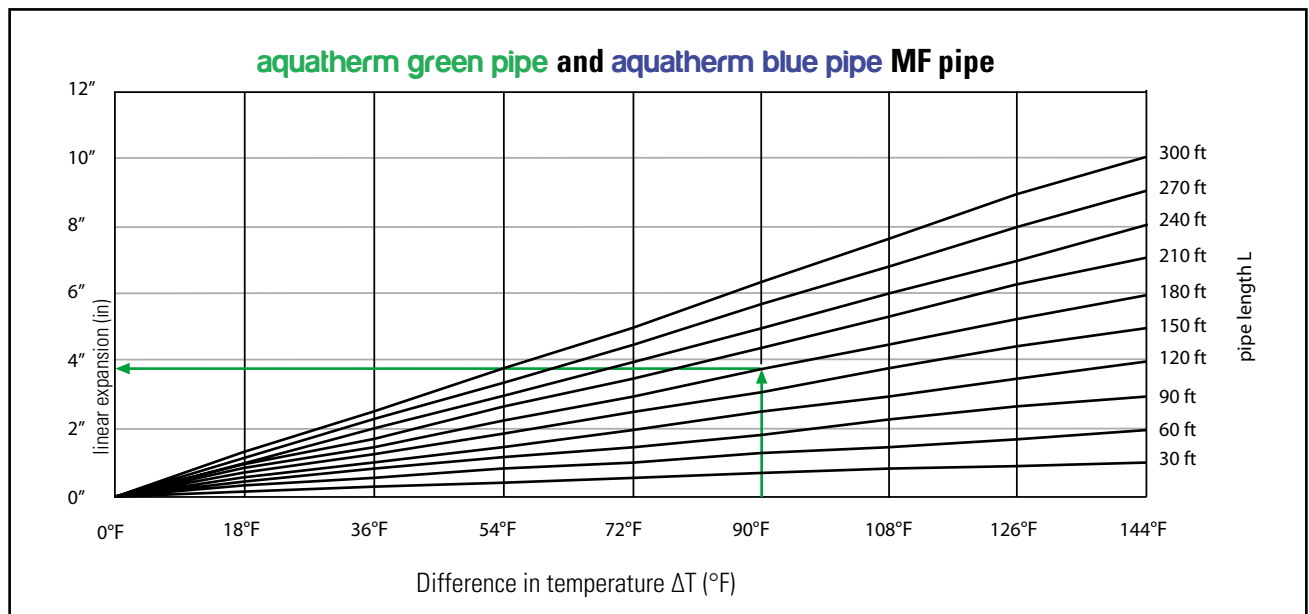
LINEAR EXPANSION FOR AQUATHERM MF PP-R PIPES

Due to the integration and positive bond of the different materials, the **aquatherm green pipe**® and **aquatherm blue pipe**® MF pipes offer much higher stability. The linear expansion is reduced to almost 1/5 the value of the standard PP-R pipes.

Linear expansion ΔL (in):

aquatherm MF pipe - $\alpha_1 = 0.035 \text{ mm/mK} = 2.367 \cdot 10^{-4} \text{ in/ft}^\circ\text{F} = 1.973 \cdot 10^{-5} \text{ in/in}^\circ\text{F}$

Pipe length	Difference in temperature $\Delta T = T_{\text{operating temperature}} - T_{\text{installation temperature}}$							
	10 °F	20 °F	30 °F	40 °F	50 °F	60 °F	80 °F	100 °F
	Linear expansion ΔL (in)							
10 ft	0.0	0.0	0.1	0.1	0.1	0.1	0.2	0.2
20 ft	0.0	0.1	0.1	0.2	0.2	0.3	0.4	0.5
30 ft	0.1	0.1	0.2	0.3	0.3	0.4	0.5	0.7
40 ft	0.1	0.2	0.3	0.4	0.5	0.5	0.7	0.9
50 ft	0.1	0.2	0.3	0.5	0.6	0.7	0.9	1.1
60 ft	0.1	0.3	0.4	0.5	0.7	0.8	1.1	1.4
70 ft	0.2	0.3	0.5	0.6	0.8	1.0	1.3	1.6
80 ft	0.2	0.4	0.5	0.7	0.9	1.1	1.5	1.8
90 ft	0.2	0.4	0.6	0.8	1.0	1.2	1.6	2.1
100 ft	0.2	0.5	0.7	0.9	1.1	1.4	1.8	2.3
150 ft	0.3	0.7	1.0	1.4	1.7	2.1	2.7	3.4
200 ft	0.5	0.9	1.4	1.8	2.3	2.7	3.6	4.6



EXPANSION CONTROLS

Linear expansion from the temperature difference between operating temperature and installation temperature can be addressed with the controls shown here.

Aquatherm also provides a simplified tool to calculate expansion controls online at www.aquatherm.com/expansion-controls.

BENDING SIDE

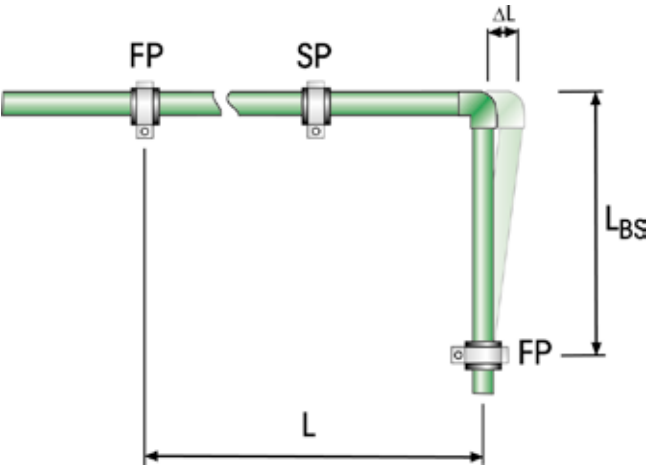
In most cases, directional changes can be used to compensate for linear expansion in pipes. The values of the bending side can be determined using the following tables and diagrams.

Symbol	Meaning		
L _{BS}	Length of the bending side	(in)	(mm)
K	Material-specific constant	2.98*	15
d	Outside diameter	(mm)	(mm)
ΔL	Linear expansion	(in)	(mm)
L	Pipe Length	(ft)	(m)
FP	Fixed point		
SP	Sliding point		

*Includes metric to imperial conversion factor

Calculation of the bending side length:

$$L_{BS} = K \cdot \sqrt{d \cdot \Delta L}$$



EXPANSION LOOP

If the linear expansion cannot be compensated for by a change in direction, it may be necessary to install an expansion loop.

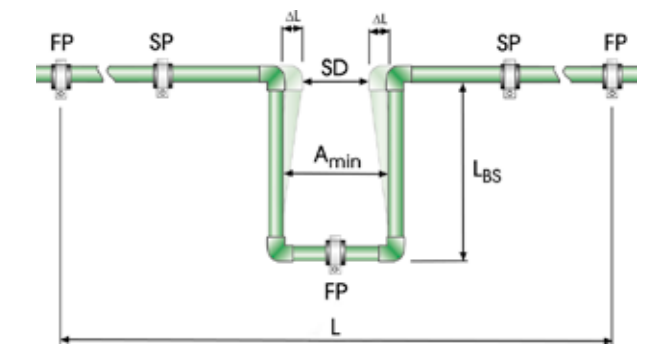
In addition to the length of the bending side L_{BS}, the width of the pipe bend A_{min} must be considered.

Symbol	Meaning	
A _{min}	Width of the expansion loop	(in)
SD	Safety distance	6 in

The pipe bend A_{min} is calculated according to the following formula:

$$A_{min} = 2 \cdot \Delta L + SD$$

For example, with
ΔL = 1.4 in
the width of the expansion loop should be at least
(2 • 1.4) + 6 = 8.8 in



PRE-EXPANSION

In applications where the system will be continuously running hot, the installer can fill the pipes and begin operation to expand the system before tightening down the clamps. This eliminates concerns about fixed and sliding points. If the system is turned off and the pipes contract, the fittings will not pull apart.

PRE-STRESS

Where space is limited, it is possible to shorten the total width A_{min} as well as the length of the bending side L_{BSV} by pre-stressing the pipe.

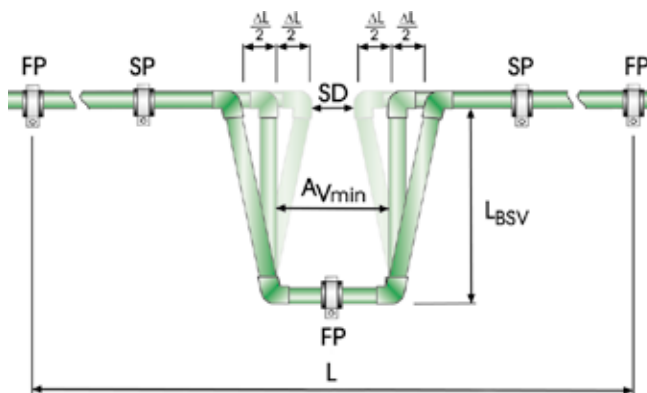
Pre-stressing the pipe during installation can help reduce the length of the bending side. It can also be used to make the operating system look visually square by using ΔL in the equation rather than $\Delta L/2$.

When shortening the length of the bending side, the new value is defined as:

Symbol	Meaning
L_{BSV}	Length of pre-stress (in)

The bending side length of expansion loops with pre-stress is calculated according to the following equation:

$$L_{BSV} = K \cdot \sqrt{d \cdot \Delta L/2}$$



As noted previously, the value of K is a material constant (2.98), d is the pipe outside diameter in mm, and ΔL is the previously calculated thermal expansion.

BELLOWS EXPANSION JOINT

All corrugated metal bellows expansion joints are unsuitable for use with Aquatherm piping systems. Joints made from elastomeric materials are acceptable. When using axial expansion joints, observe the manufacturer's instructions.

VERTICAL INSTALLATION

Due to the different linear expansion coefficients of the MF and non-MF pipes, the installation of pipe branches in risers has to be made according to the type of pipe.

WITH MULTI-LAYER FASER (MF) PIPE

The linear expansion of Aquatherm MF pipes in vertical risers can be ignored. The positioning of a fixed point directly before each branch is sufficient to keep the branch line from shifting under expansion.

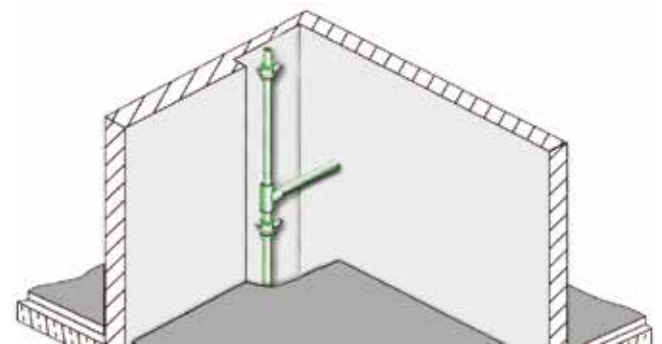
In general, it is possible to install risers rigidly without expansion joints. This exerts the expansion onto the space between the fixed points, where it becomes negligible.

It is important to maintain 10 feet of space between two fixed points, and mid-story guides may be necessary for sizes 2" and below.

WITH NON-MF PIPE

The installation of risers using non-MF Aquatherm pipes requires that branch lines be installed in such a manner as to accommodate linear expansion of the vertical riser. Non-MF pipes in a heated application cannot absorb their own stresses. Adequate expansion controls will need to be added according to the guidelines given earlier in this chapter.

This can be done by installing a fixed point directly before or after each branch line, which prevents the line from moving. Using a large pipe sleeve that can accommodate the movement will also work. A swing joint may also be used to absorb vertical stresses.



Positioning of the fixed point clamp.

LENGTH OF BENDING SIDE FOR AQUATHERM PIPING SYSTEMS

The length of the bending side L_{BS} can be taken from the following tables and diagrams with consideration of the applied pipe dimensions and determined linear expansion.

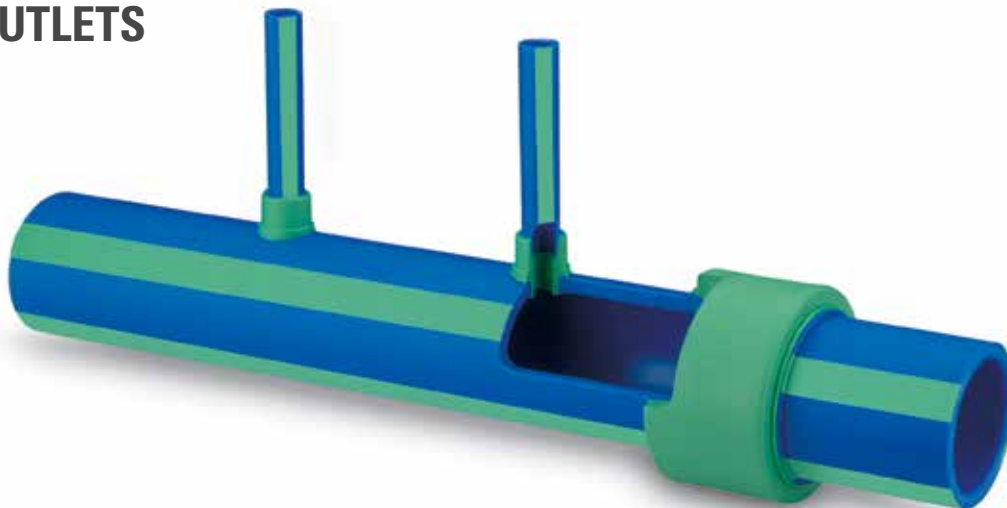
Pipe dimension in inches (mm)	Linear expansion											
	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
	Length of bending side (in)											
½" (20)	13	19	23	27	30	33	35	38	40	42	44	46
¾" (25)	15	21	26	30	34	37	40	42	45	47	50	52
1" (32)	17	24	29	34	38	42	45	48	51	54	56	59
1¼" (40)	19	27	33	38	42	46	50	54	57	60	63	66
1½" (50)	21	30	37	42	47	52	56	60	64	67	70	73
2" (63)	24	34	41	48	53	58	63	67	71	75	79	82
2½" (75)	26	37	45	52	58	64	69	73	78	82	86	90
3" (90)	28	40	49	57	64	70	75	80	85	90	94	99
3½" (110)	31	44	54	63	70	77	83	89	94	99	104	109
4" (125)	34	47	58	67	70	82	89	95	101	106	111	116
6" (160)	38	54	66	76	85	93	100	107	114	120	126	131
8" (200)	42	60	73	85	95	104	112	120	127	134	141	147
10" (250)	47	67	82	95	106	116	125	134	142	150	157	164
12" (315)	53	75	92	106	119	130	141	151	160	168	177	184
14" (355)	56	79	97	112	126	138	149	159	168	178	186	194
16" (400)	60	84	103	119	133	146	158	169	179	188	198	206
18" (450)	63	89	109	126	141	155	167	178	190	200	210	219
20" (500)	67	94	115	133	149	163	176	188	200	211	221	231
22" (560)	71	100	122	141	158	173	187	199	212	223	234	244
24" (630)	75	106	130	150	167	183	198	212	224	237	248	259

LENGTH OF BENDING SIDE WITH PRE-STRESS FOR AQUATHERM PIPING SYSTEMS

The length of the bending side with pre-stress L_{BSV} can be taken from the following tables and diagrams with consideration of the applied pipe dimensions and determined linear expansion.

Pipe dimension in inches (mm)	Linear expansion											
	1"	2"	3"	4"	5"	6"	7"	8"	9"	10"	11"	12"
	Length of bending side (in)											
½" (20)	9	13	16	19	21	23	25	27	28	30	31	33
¾" (25)	11	15	18	21	24	26	28	30	32	34	35	37
1" (32)	12	17	21	24	27	29	32	34	36	38	40	42
1¼" (40)	13	19	23	27	30	33	35	38	40	42	44	46
1½" (50)	15	21	26	30	34	37	40	42	45	47	50	52
2" (63)	17	24	29	34	38	41	45	48	51	53	56	58
2½" (75)	18	26	32	37	41	45	49	52	55	58	61	64
3" (90)	20	28	35	40	45	49	53	57	60	64	67	70
3½" (110)	22	31	39	44	50	54	59	63	67	70	74	77
4" (125)	24	34	41	47	53	58	63	67	71	75	79	82
6" (160)	27	38	46	54	60	66	71	76	80	85	89	93
8" (200)	30	42	52	60	67	73	79	85	90	95	99	104
10" (250)	34	47	58	67	75	82	89	95	101	106	111	116
12" (315)	38	53	65	75	84	92	100	106	113	119	125	130
14" (355)	40	56	69	79	89	97	105	112	119	126	132	138
16" (400)	42	60	73	84	94	103	112	119	126	133	140	146
18" (450)	45	63	77	89	100	109	118	126	134	141	148	155
20" (500)	47	67	82	94	105	115	125	133	141	149	156	163
22" (560)	50	71	86	100	112	122	132	141	150	158	165	173
24" (630)	53	75	92	106	118	130	140	150	159	167	175	183

FUSION OUTLETS



For installations with branch lines, fusion outlets offer many advantages over traditional reducing tees. Fusion outlets are installed directly onto the side of the pipe and can be added after the main lines are already in place. Fusion outlets also generate less friction than a reducing tee, lowering the pressure loss of the entire system.

Fusion outlets are installed by drilling out a properly sized hole and then fusing the fitting in place using socket fusion tools. The drilling bores offered by Aquatherm will produce properly sized holes, but the bits larger than 2" require a drill press to operate. Bores

produced by other companies must be at least 1 mm smaller than the intended branch, and should be no more than 3 mm smaller.

The table below can help determine if a fusion outlet is available for a particular branch size. The table to the left helps determine if a threaded outlet is available for a particular branch size.

When making a threaded connection using an Aquatherm threaded adapter fitting (FPT) and metal threaded pipe or other component, the threaded component or pipe should only be tightened 1-2 turns beyond hand-tight. The threads should NOT bottom out in the FPT fitting. It is recommended that only PTFE pipe tape be used on the threads as pipe dope may allow the threads to be engaged beyond recommended limits.

BRANCHING OPTIONS

Pipe size	Outlets available
1 ¼" (40 mm)	½" (20 mm) — ¾" (25 mm)
1 ½" (50 mm)	½" (20 mm) — ¾" (25 mm)
2" (63 mm)	½" (20 mm) — 1" (32 mm)
2 ½" (75 mm)	½" (20 mm) — 1 ¼" (40 mm)
3" (90 mm)	½" (20 mm) — 1 ¼" (40 mm)
3 ½" (110 mm)	½" (20 mm) — 1 ½" (50 mm)
4" (125 mm)	½" (20 mm) — 2" (63 mm)
6" (160 mm)	½" (20 mm) — 3" (90 mm)
8" (200 mm)	½" (20 mm) — 4" (125 mm)
10" (250 mm)	½" (20 mm) — 4" (125 mm)
12" (315 mm)	2" (63 mm) — 6" (160 mm)
14" (355 mm)	2" (63 mm) — 8" (200 mm)
16" (400 mm)	2" (63 mm) — 10" (250 mm)
18" (450 mm)	2 ½" (75 mm) — 12" (315 mm)
20" (500 mm)	2 ½" (75 mm) — 12" (315 mm)
22" (560 mm)	2 ½" (75 mm) — 12" (315 mm)
24" (630 mm)	2 ½" (75 mm) — 12" (315 mm)

FUSION OUTLETS WITH THREADED TRANSITIONS

Pipe size	Thread size		
	½"	¾"	1"
1 ¼" (40 mm)	M/F	M/F	
1 ½" (50 mm)	M/F	M/F	
2" (63 mm)	M/F	M/F	
2 ½" (75 mm)	M/F	M/F	F
3" (90 mm)	M/F	M/F	F
3 ½" (110 mm)	M/F	M/F	F
4" (125 mm)	M/F	M/F	F
6" (160 mm)	M/F	M/F	F
8" (200 mm)	F	F	F
10" (250 mm)	F	F	F

M = male thread available, F = female thread available

TRANSITION FITTINGS

COPPER STUB OUTS



To facilitate transitions to fixture units or copper components, Aquatherm offers a PP-R to copper stub out, intended for use with angle stops, flush valves, and other terminations. It is compatible with both compression and solder-type connections.

These fittings are combination of a custom Aquatherm PP-R socket with a gasket and copper stub added by Sioux Chief Manufacturing. The fused PP-R portion is covered under Aquatherm's warranty. The copper portion and gasket are covered under a warranty from Sioux Chief.

These fittings are available in 1/2", 3/4" and 1" sizes. Instructions are included with the fitting. Always follow these directions to avoid damaging the fitting.

BRASS TRANSITIONS

To make integration with non-fusible system components easier, Aquatherm offers a wide range of threaded transitions. These transitions consist of a PP-R base that has been mold-injected around a machined brass or stainless steel thread for maximum strength.

These fittings are available in male and female thread types. They can include a hex head for ease of installation. Installation instructions can be found in the Aquatherm Installer Manual.

The standard industrial brass fittings are manufactured with marine-grade DZR brass and are acceptable for a wide variety of uses.

The lead-free fittings are compliant with the new Reduction of Lead in Drinking Water Act and are recommended for areas specifically requiring 0.25% lead content or less.

Stainless steel fittings are made from Type 316 stainless steel, and are recommended for all chemically sensitive applications.

When making a threaded connection using an Aquatherm threaded adapter fitting (FPT) and metal threaded pipe or other component, the threaded component or pipe should only be tightened 1-2 turns beyond hand-tight. The threads should NOT bottom out in the FPT fitting. It is recommended that only PTFE pipe tape be used on the threads as pipe dope may allow the threads to be engaged beyond recommended limits.



Industrial brass

Stainless steel

Lead-free brass

PEX TRANSITIONS



Featuring a PP-R fitting on one end and a barbed brass end for PEX tubing, these transitions offer a simple solution for installing a system with both PP-R and PEX for 1/2", 3/4" and 1" sizes.

The socket x barb (above left) is made for transitioning to PEX using a crimped connection per ASTM F1807. The spigot x barb (above right) transitions to an expansion connection per ASTM F1960. The PEX transitions are lead-free (<0.25%) and rated for potable water use.

Aquatherm does not currently offer a PEX or PERT tubing line to use with these fittings in North America. As always, the Aquatherm warranty covers the PP-R and brass portions of this fitting. Any tubing that is attached to this fitting is considered to be covered under its own manufacturer's warranty, as is the crimp ring. The brass portion may not be acceptable for chemically aggressive applications.

FLANGES



For transitioning between larger sizes of pipe, attaching pre-fabricated sections, or connecting to pumps, valves, and other mechanical equipment, Aquatherm produces fusible flange adapters with steel flange rings. The rings are designed to match up metric pipes with ANSI bolt patterns.

Aquatherm recommends using a full face rubber (black EPDM or red SBR) gasket with its flanges. Viton® gaskets may also be used if needed for chemical resistance. Ring gaskets may be used for lower pressure systems and smaller diameters (4" and down), but there may be blow-outs during pressure testing. Ring gaskets are also more susceptible to leaking if the flanges and connected piping are not aligned properly during installation.

As of 2013, Aquatherm will only produce flange adapters that are compatible with ANSI butterfly valves. Some older flange adapters may not be compatible with all ANSI butterfly valves, but will work with other types of equipment. These older flange adapters may be exchanged for the new style through Aquatherm.

AQUATHERM DISTRIBUTION BLOCKS

Aquatherm distribution blocks are designed to help save time and space in parallel hot and cold water line installations. The distribution block allows for $\frac{3}{4}$ " hot and cold lines to run through the block with outlets for $\frac{1}{2}$ " branches. This eliminates the need to use a cross-over or bridge and keeps the installation simple, square, and clean.

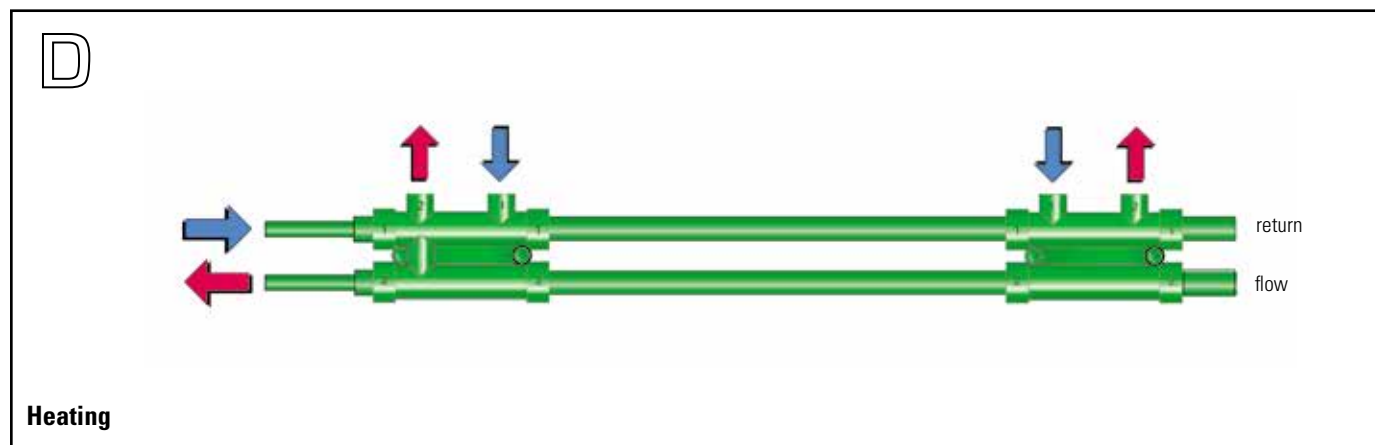
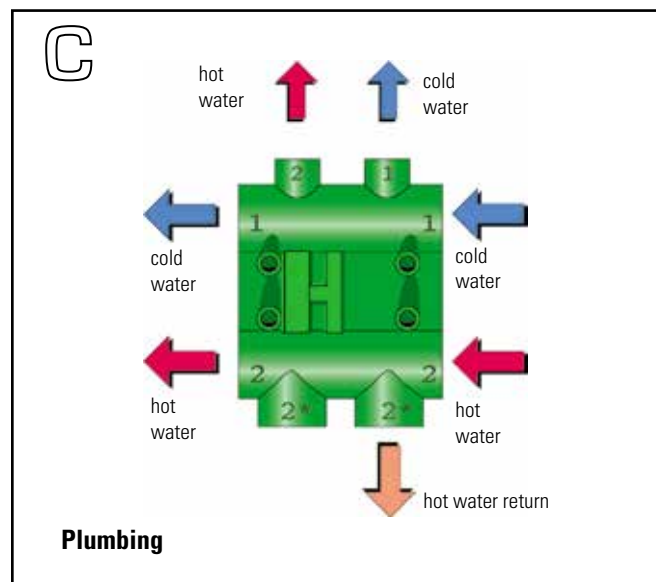
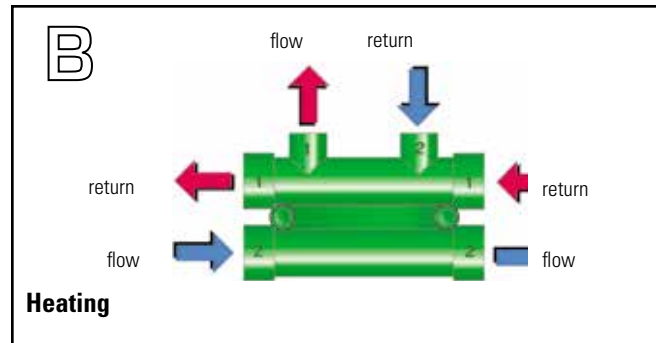
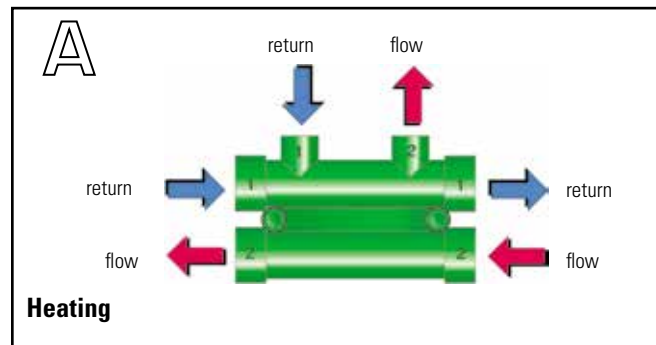
The stamped numbers 1 and 2 indicate the proper connection of the Aquatherm distribution block and provide assistance with the installation. Branches with the same number are connected by channels inside the distribution block. The natural insulation value of the PP-R block helps prevent heat exchange between the hot and cold lines.

For a heating or cooling connection, the return is connected to the channel marked 1 and the supply to the channel marked 2 (fig. A). The connections can also be used in reverse (fig. B).

For a potable water connection, channel 1 is intended for the cold water pipe and channel 2 for the hot water pipe connection. In factory condition, the lower outlets are closed. A return connection with channel 2 can be made by drilling out the opening with a $\frac{1}{2}$ " outlet drill bit, allowing an additional pipe to be connected (fig. C).

The block can be reversed to match up with existing or planned fixture units. The order of the hot and cold or supply and return lines does not matter as long as the number remains consistent (fig. D).

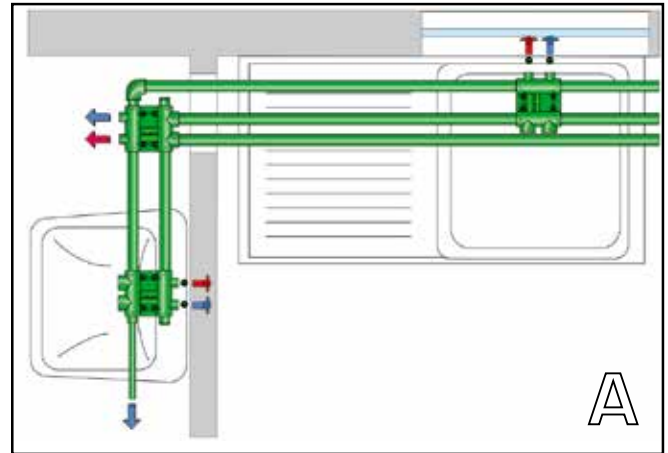
The distribution blocks are designed for use with $\frac{1}{2}$ " and $\frac{3}{4}$ " Aquatherm pipes and can be used with **aquatherm green pipe®**, **aquatherm blue pipe®**, and **aquatherm lilac pipe®**. If smaller sizes of piping are needed, bushings can be fused directly into the distribution block.



AQUATHERM DISTRIBUTION BLOCKS

With careful planning, the distribution blocks can be turned, drilled, and even capped off to accommodate a wide variety of fixtures and layouts in limited spaces (fig. A). Each block has two sets of $\frac{3}{4}$ " connections and two sets of $\frac{1}{2}$ " connections, allowing the blocks to have up to three branches from a single supply. Effective use of the distribution block can help improve overall design efficiency and simplify installation.

The distribution block comes from the factory with the inlets and outlets sealed. Leaving the outlets sealed can act as a cap for a particular line (fig. B). The $\frac{3}{4}$ " outlets can also be reduced and used to directly supply the last fixture unit in the line.



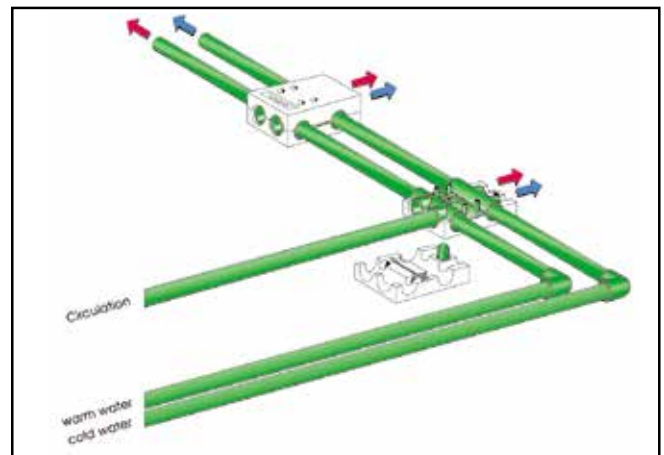
DISTRIBUTION BLOCK INSULATION

Because the unique shape of the distribution block makes it difficult to insulate with regular insulation, Aquatherm has developed a special insulation block that is designed to fit perfectly over the distribution block. The insulation for the distribution block is made from high-quality PPO/PS rigid expanded polyurethane.

Dimensions of insulation:

- Thermal conductivity: 0.28 BTU-in/hr • °F • ft²
- Length: 7.25 in
- Width: 4.69 in
- Height: 2.76 in

The accessories (1 plug, 2 fastening plugs) are integrated in the insulation of an Aquatherm distribution block with insulation tray.



FLUSHING THE PIPES

All piping systems, regardless of their intended medium, should be flushed thoroughly after installation. The following concerns should be addressed before the installation can be put into service:

- protection of the water quality
- avoidance of corrosion damage
- avoidance of malfunctions of pumps and equipment
- cleanliness of the inner surface of the pipe

These requirements can be met by:

- flushing the system with water
- flushing the system with a mixture of air and water

The flushing medium may be determined by local codes, engineering specifications, or the needs of the mechanical equipment used.

Where no requirements are established, potable water is sufficient for flushing Aquatherm piping materials.

UV PROTECTION

In applications where the installed pipe will be exposed to UV radiation (such as outdoor applications), it is recommended that Aquatherm UV pipe be used. This pipe is engineered with an outer coating of black polyethylene that protects the pipe from the aging and discoloration that can occur from prolonged exposure to UV radiation. This coating must be removed at the points of connection prior to heat fusion. Detailed instructions can be found in the Installer Manual.

Aquatherm pipes come from the factory packed in UV-resistant bags, which protect the pipes until they are removed. All Aquatherm pipes and fittings have UV stabilizers to bridge transport and installation times. Maximum recommended storage time exposed to UV radiation is six months.

Plastic-safe paint can be used to protect the pipe from UV damage, but most paints will not adhere well to PP-R. Painted pipe may need to be re-coated or maintained, and this is the responsibility of the installer or owner. Aquatherm recommends using an elastomeric paint, which will expand and contract with the pipes, but does not endorse any particular brand of paint. The pipe may also be painted for reasons unrelated to UV protection, if needed.

Painting the pipe is considered an aftermarket modification to the Aquatherm pipe, so Aquatherm does not assume any responsibility for the performance of the paint. Always use a paint that is safe with PP-R. Damage caused by painting is not covered under the Aquatherm warranty.

FREEZE PROTECTION

Aquatherm piping systems may be installed in applications where temperatures may get below freezing (32°F).

The Aquatherm piping is considered “freeze-tolerant”, meaning that freezing the piping with water in it will not cause the pipe to rupture. However, the piping is not intended to be installed where freeze/thaw will occur.

To avoid this, antifreeze (glycerin or glycol solutions at any concentration allowed by local codes) or heating cables (heat tracing) applied externally or inside the pipe may be used to ensure that the system does not freeze. Alternatively, providing a means for a minimum constant flow even during power outages can prevent freezing.

Regardless of the method chosen, all products must be used in accordance with the freeze protection system manufacturer's recommendations, the product listings, and in compliance with all applicable local codes.

When using any type of external heat source applied to the piping such as heat tape or heating cables, the product must be suitable for use with plastic piping. Additionally, the heat system must be self-regulating and ensure the surface temperature of the Aquatherm pipe and fittings will not exceed 160 °F (71 °C).

GROUNDING

Most building codes require that grounding be provided for all conductive components inside the structure. It is important to note that Aquatherm pipes do not carry electrical currents and cannot be used to provide grounding. Where metal pipes are replaced by PP-R pipes, the ground cannot be created by the piping system. An alternative ground system must be installed. **The grounding system should be inspected by a qualified electrician.**

TRANSPORT AND STORAGE

Aquatherm pipes may be stored outside at any temperature, but it is preferable to store the pipes inside.

Providing a solid, flat, and level base for the pipe is very important to avoid a deformation of the pipes during transport and storage. Improper storage of the pipe can cause bowing.

The pipe should always be handled with care, particularly in cold weather. Cold temperatures reduce the flexibility of the pipe, making it brittle and increasing the chances of it cracking or breaking.

Additional instructions regarding proper care and handling can be found on page 2.3 and in the Aquatherm Installer Manual.

PRESSURE TEST

In order to ensure that an installed system is prepared for service, a pressure test is highly encouraged. A properly administered test will pressurize the system via several cycles in order to identify any improper fusions that could disrupt system operation in the future.

While still accessible, all pipelines must be pressure tested using water, air, or a mix of the two.

The pressure test consists of a preliminary, principal, and final test. For more information, the pressure test procedure and test record are provided at www.aquatherm.com/pressure-test-form.

Note: The online instructions are kept up to date and take precedence over any information provided in this catalog concerning the pressure test.

TEST RECORD

A record of the pressure test must be prepared and signed by the client and contractor stating place, contractor installer number (found on the training certificate), and date. For an example, see the following page. A system can be tested in phases provided that every heat-fused connection is eventually tested and that the tests are properly documented upon completion.

This test is designed to identify damaged pipe, manufacturer's defects, and poor workmanship. It is required by the manufacturer for the validation of the Aquatherm warranty* from the date of install. This does not supersede or replace regulations placed by the local code authority having jurisdiction. To prevent back-dating, Aquatherm requires that this test be submitted before the system begins full operation.

Pressure test forms must be sent to Aquatherm:

- **E-mail: technical@aquatherm.com**
- **Fax: 801-847-6554**

* Aquatherm's warranty does not cover failures caused by improper installation, operation outside of the recommended parameters, or damage from mishandling after the pipe has left possession of the manufacturer. Completing the pressure test does not guarantee coverage in the event of a failure caused by improper installation.



INSTALLATION PRINCIPLES

DESCRIPTION OF THE INSTALLATION

Project Name: _____

Systems installed: _____

Units used on report:

☐ ft. or ☐ m
☐ psi or ☐ bar

Length of pipe used:

1/2" (20 mm) _____	6" (160 mm) _____
3/4" (25 mm) _____	8" (200 mm) _____
1" (32 mm) _____	10" (250 mm) _____
1 1/4" (40 mm) _____	12" (315 mm) _____
1 1/2" (50 mm) _____	14" (355 mm) _____
2" (63 mm) _____	16" (400 mm) _____
2 1/2" (75 mm) _____	18" (450 mm) _____
3" (90 mm) _____	20" (500 mm) _____
3 1/2" (110 mm) _____	22" (560 mm) _____
4" (125 mm) _____	24" (630 mm) _____

Highest point: _____
(over pressure gauge)

Start time: _____

End time: _____

Test duration: _____

Building address: _____

Contractor contact information: _____

Installer number (found on training certificate) _____

Building owner/manager: _____

Date: _____

Stamp / Signature _____

PRELIMINARY TEST

Test pressure: _____
(use min. 150 psi)

Pressure drop after 30 minutes: _____
(max. 8.7psi / 0.6 bar)

PRINCIPAL TEST

Principal test pressure: _____

Time elapsed: _____

Pressure after: _____

FINAL TEST*

1. Test Pressure: _____
at least 2 minutes, then
15 PSI : _____
at least 2 minutes

2. Test Pressure: _____
at least 2 minutes, then
15 PSI : _____
at least 2 minutes

3. Test Pressure: _____
at least 2 minutes, then
15 PSI : _____
at least 2 minutes

4. Test Pressure: _____
at least 5 minutes, then
15 PSI : _____
at least 5 minutes

*Depressurize the pipe between each cycle.

All fields are required on this test record.

Test should be faxed to **aquatherm** at:

- **801-847-6554**

Tests may also be e-mailed to:
technical@aquatherm.com.

use online version only

5 PRODUCT RANGE

aquatherm green pipe®

aquatherm blue pipe®

aquatherm lilac pipe®

Accessories

Fittings

Flanges

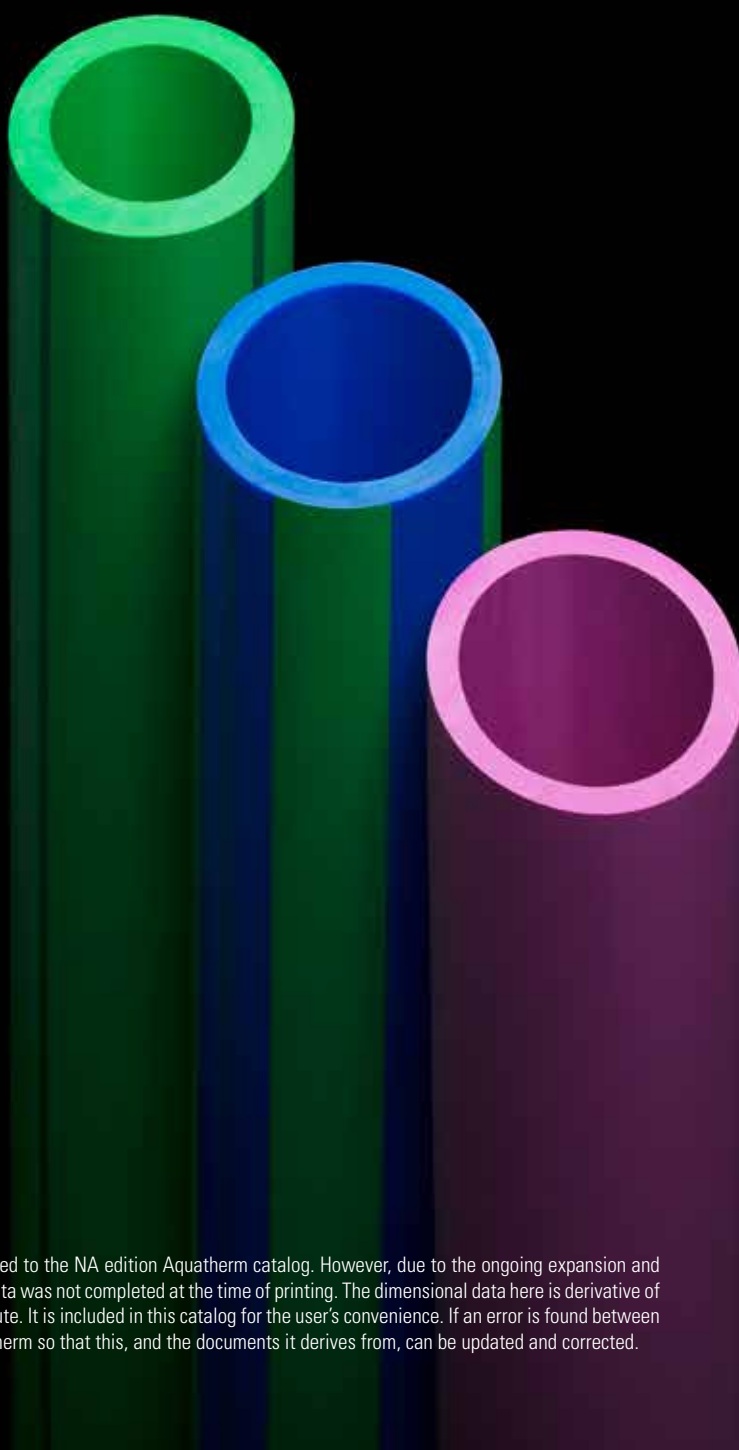
Couplings

PP-R to metal

Distributors

Valves

Tools



Note: Dimensional data for the fittings has been added to the NA edition Aquatherm catalog. However, due to the ongoing expansion and improvement of the Aquatherm line, the dimension data was not completed at the time of printing. The dimensional data here is derivative of other documents and should not be considered absolute. It is included in this catalog for the user's convenience. If an error is found between this chapter and an actual part, please inform Aquatherm so that this, and the documents it derives from, can be updated and corrected.

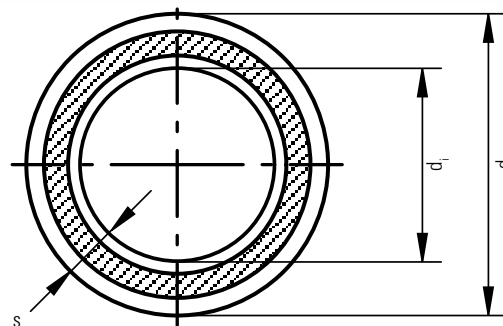
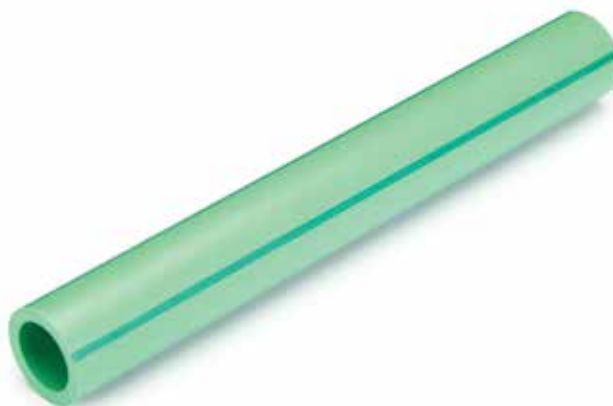
PRODUCT RANGE - PIPE

aquatherm green pipe® SDR 7.4 MF

Material: fusiolen® PP-R faser-composite

In accordance with:

- NSF 14, 51 & 61
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F2389
- CFIA #A508
- FM 1635
- NFPA 13D



Appearance: Light green with dark green stripe.

NSF system certification: Including fittings, connection pieces, and connection techniques.

Fields of application: For high temperature, moderate pressure systems, particularly domestic hot water systems.

Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	gal/ft	lb/ft	lb/ft
0670708	½" — 20 mm	20	2.70	14.6	0.013	0.11	0.22
0670710	¾" — 25 mm	25	3.38	18.2	0.021	0.17	0.34
0670712	1" — 32 mm	32	4.32	23.4	0.034	0.27	0.56
0670714	1 ¼" — 40 mm	40	5.41	29.2	0.054	0.41	0.84
0670716	1 ½" — 50 mm	50	6.76	36.5	0.084	0.64	1.31
0670718	2" — 63 mm	63	8.51	46.0	0.134	1.00	2.11
0670720	2 ½" — 75 mm	75	10.1	54.7	0.189	1.42	3.00
0670722	3" — 90 mm	90	12.2	65.7	0.273	2.04	4.31
0670724	3 ½" — 110 mm	110	14.9	80.3	0.407	3.04	7.33
0670726	4" — 125 mm	125	16.9	91.2	0.526	4.17	8.55
0670730	6" — 160 mm	160	21.6	117	0.862	6.55	13.8
0670730x2 ^d	6" — 160 mm (Double Length)	160	21.6	117	0.862	6.55	13.8
0670734	8" — 200 mm	200	27.0	146	1.347	10.1	21.3
0670734x2 ^e	8" — 200 mm (Double Length)	200	27.0	146	1.347	10.1	21.3
0670738	10" — 250 mm	250	33.8	182	2.105	15.8	33.2
0670738x2 ^e	10" — 250 mm (Double Length)	250	33.8	182	2.105	15.8	33.2
0070742	12" — 315 mm	315	42.6	230	3.341	24.4	52.2
0070744	14" — 355 mm	355	48.0	259	4.244	30.9	66.2

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

^d Pipe comes in 26 ft lengths.

^e Pipe comes in 38 ft lengths.

aqualtherm green pipe® SDR 7.4/11 S

Material: fusiole® PP-R

In accordance with:

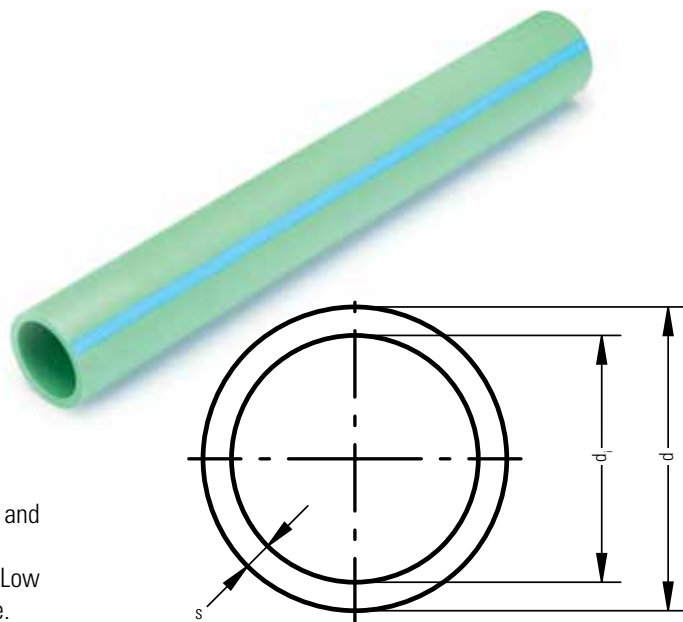
- NSF-14
- NSF-51
- NSF-61
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389
- CFIA #A508



Appearance: Light green with light blue stripe.

NSF system certification: Including fittings, connection pieces, and connection techniques.

Fields of application: Potable water, preferably domestic cold. Low pressure installations, such as well casings, food processing, and more.



Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	gal/ft	lb/ft	lb/ft
0610808	½" — 20 mm SDR 7.4 (non-MF)	20	2.70	14.6	0.013	0.10	0.21
0610810	¾" — 25 mm SDR 7.4 (non-MF)	25	3.38	18.2	0.021	0.16	0.33
0610212	1" — 32 mm SDR 11	32	2.91	26.2	0.043	0.18	0.54
0610214	1 ¼" — 40 mm SDR 11	40	3.64	32.7	0.068	0.28	0.84
0610216	1 ½" — 50 mm SDR 11	50	4.55	40.9	0.106	0.43	1.31
0610218	2" — 63 mm SDR 11	63	5.73	51.5	0.168	0.68	2.08
0610220	2 ½" — 75 mm SDR 11	75	6.82	61.4	0.238	0.95	2.93
0610222	3" — 90 mm SDR 11	90	8.18	73.6	0.343	1.37	4.22
0610224	3 ½" — 110 mm SDR 11	110	10.0	90.0	0.512	2.11	6.37
0610226	4" — 125 mm SDR 11	125	11.4	102	0.661	2.64	8.12
0610226x2 ^e	4" — 125 mm SDR 11 (Double Length)	125	11.4	102	0.661	2.64	8.12
0610226x3 ^f	4" — 125 mm SDR 11 (Triple Length)	125	11.4	102	0.661	2.64	8.12
0610230	6" — 160 mm SDR 11	160	14.5	131	1.084	4.31	13.3
0610230x2 ^g	6" — 160 mm SDR 11 (Double Length)	160	14.5	131	1.084	4.31	13.3
0610234	8" — 200 mm SDR 11	200	18.2	164	1.693	6.71	20.9
0610234x2 ^g	8" — 200 mm SDR 11 (Double Length)	200	18.2	164	1.693	6.70	20.9
0610238	10" — 250 mm SDR 11	250	22.7	205	2.646	10.4	32.5
0610238x2 ^g	10" — 250 mm SDR 11 (Double Length)	250	22.7	205	2.646	10.4	32.5
0010242	12" — 315 mm SDR 11	315	28.6	258	4.201	17.3	52.3
0010242x2 ^g	12" — 315 mm SDR 11 (Double Length)	315	28.6	258	4.201	17.3	52.3
0010244	14" — 355 mm SDR 11	355	32.3	290	5.335	21.0	65.3
0010246 ^d	16" — 400 mm SDR 11	400	36.4	327	6.773	27.8	84.1
0010248 ^d	18" — 450 mm SDR 11	450	40.9	368	8.573	35.2	107
The following items are supplied in coils:							
0610308	½" — 20 mm SDR 11 (100m or 328' length coils)	20	1.82	16.4	0.017	0.07	0.21
0610310	¾" — 25 mm SDR 11 (100m or 328' length coils)	25	2.27	20.5	0.026	0.11	0.33
0610312	1" — 32 mm SDR 11 (50 m or 164' length coils)	32	2.91	26.2	0.043	0.17	0.53

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

^d Mechanically stabilized with a fiber-composite layer in the center of the pipe.

^e Pipe comes in 26 ft lengths.

^f Pipe comes in 38 ft lengths..

^g Pipe comes in 39 ft lengths.

PRODUCT RANGE - PIPE

aquatherm green pipe® SDR 7.4 MF UV

Material: fusiolen® PP-R faser-composite

In accordance with:

- NSF-14
- NSF-51
- NSF-61
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389
- CFIA #A508

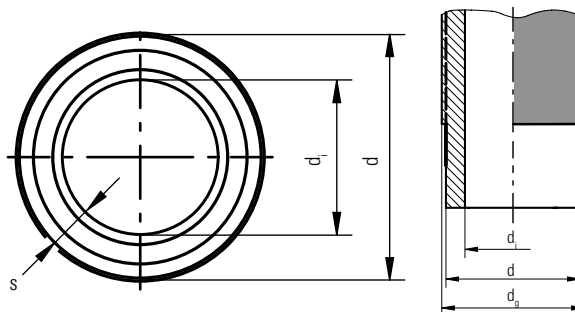


Appearance: Light green with black exterior.

NSF system certification: Including fittings, connection pieces and connection techniques.

Fields of application: All the same applications as the standard aquatherm green pipe® SDR 7.4 MF, but for installations where the pipe is exposed to UV radiation.

Note: Because these parts are not stocked in large numbers, please contact Aquatherm for details about your order.



Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	(d) total	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	d _g (mm)	gal/ft	lb/ft	lb/ft
0670758	½" — 20 mm	20	2.70	14.6	22	0.013	0.14	0.25
0670760	¾" — 25 mm	25	3.38	18.2	27	0.021	0.21	0.38
0670762	1" — 32 mm	32	4.32	23.4	34	0.034	0.33	0.60
0670764	1 ¼" — 40 mm	40	5.41	29.2	42	0.054	0.49	0.92
0670766	1 ½" — 50 mm	50	6.76	36.5	52	0.084	0.74	1.41
0670768	2" — 63 mm	63	8.51	46.0	65	0.134	1.14	2.20
0670770	2 ½" — 75 mm	75	10.1	54.7	77	0.189	1.59	3.09
0670772	3" — 90 mm	90	12.2	65.7	92	0.273	2.28	4.46
0670774	3 ½" — 110 mm	110	14.9	80.3	113	0.407	3.42	6.66
0670776	4" — 125 mm	125	16.9	91.2	127	0.526	4.33	8.53
0670780	6" — 160 mm	160	21.6	117	162	0.826	7.00	13.9
0670784	8" — 200 mm	200	27.0	146	202	1.347	10.8	21.7
0670788	10" — 250 mm	250	33.8	182	252	2.105	16.8	34.0

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

aquatherm blue pipe® SDR 7.4/11 MF

Material: fusiole® PP-R faser-composite

In accordance with:

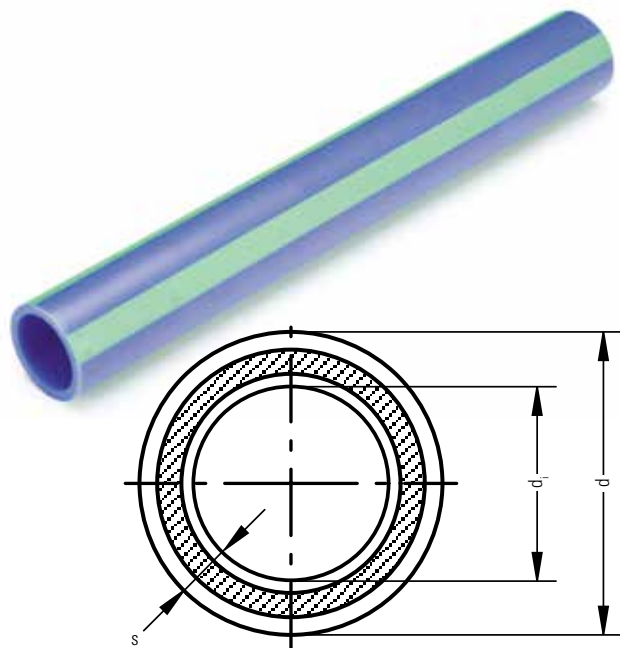
- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389



Appearance: Blue with light green stripe.

NSF system certification: Including fittings, connection pieces, and connection techniques.

Fields of application: Heating and cooling applications, industrial applications, compressed air.



Pipe ^a	Diameter ^b	Wall thickness	Internal diameter	Water capacity	Weight ^c	Weight w/ water	
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	gal/ft	lb/ft	lb/ft
2670708	½" — 20 mm SDR 7.4	20	2.70	14.6	0.013	0.13	0.24
2670710	¾" — 25 mm SDR 7.4	25	3.38	18.2	0.021	0.20	0.37
2670112	1" — 32 mm SDR 11	32	2.91	26.2	0.043	0.19	0.55
2670114	1 ¼" — 40 mm SDR 11	40	3.64	32.7	0.068	0.29	0.85
2670116	1 ½ " — 50 mm SDR 11	50	4.55	40.9	0.106	0.45	1.33
2670118	2" — 63 mm SDR 11	63	5.73	51.5	0.168	0.70	2.12
2670120	2 ½" — 75 mm SDR 11	75	6.82	61.4	0.238	1.00	2.98
2670122	3" — 90 mm SDR 11	90	8.18	73.6	0.343	1.44	4.29
2670124	3 ½" — 110 mm SDR 11	110	10.0	90.0	0.512	2.13	6.39
2670126	4" — 125 mm SDR 11	125	11.4	102	0.661	2.77	8.25
2670126x2 ^d	4" — 125 mm SDR 11 (Double Length)	125	11.4	102	0.661	2.77	8.25
2670126x3 ^e	4" — 125 mm SDR 11 (Triple Length)	125	11.4	102	0.661	2.77	8.25
2670130	6" — 160 mm SDR 11	160	14.5	131	1.084	4.52	13.6
2670130x2 ^f	6" — 160 mm SDR 11 (Double Length)	160	14.5	131	1.084	4.52	13.6
2670134	8" — 200 mm SDR 11	200	18.2	164	1.693	7.04	21.2
2670134x2 ^f	8" — 200 mm SDR 11 (Double Length)	200	18.2	164	1.693	7.04	21.2
2670138	10" — 250 mm SDR 11	250	22.7	205	2.646	11.0	33.1
2670138x2 ^f	10" — 250 mm SDR 11 (Double Length)	250	22.7	205	2.646	11.0	33.1
2070142	12" — 315 mm SDR 11	315	28.6	258	4.201	17.3	52.3
2070142x2 ^f	12" — 315 mm SDR 11 (Double Length)	315	28.6	258	4.201	17.3	52.3
2070144	14" — 355 mm SDR 11	355	32.3	290	5.335	22.2	66.5
2070144x2 ^f	14" — 355 mm SDR 11 (Double Length)	355	32.3	290	5.335	22.2	66.5
2070146	16" — 400 mm SDR 11	400	36.4	327	6.773	27.8	84.1
2070148	18" — 450 mm SDR 11	450	40.9	368	8.573	35.2	107
The following items are supplied in coils:							
2610308	½" — 20 mm SDR 11 (100 m or 328' length coils)	20	1.82	16.4	0.017	0.07	0.21
2610310	¾" — 25 mm SDR 11 (100 m or 328' length coils)	25	2.27	20.5	0.026	0.11	0.33
2610312	1" — 32 mm SDR 11 (50 m or 164' length coils)	32	2.91	26.2	0.043	0.17	0.53

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

^d Pipe comes in 26 ft lengths.

^e Pipe comes in 39 ft lengths.

^f Pipe comes in 38 ft lengths.

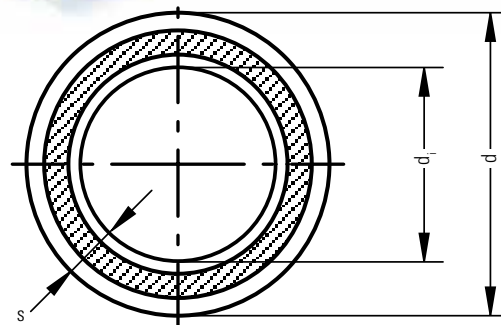
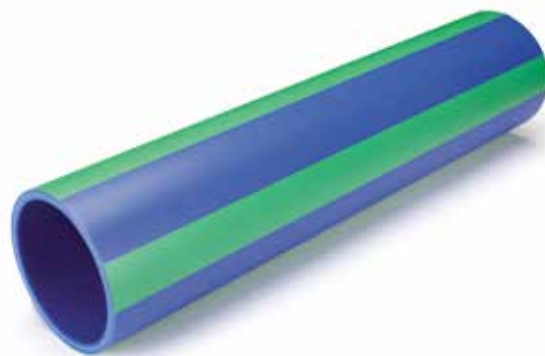
PRODUCT RANGE - PIPE

aquatherm blue pipe® SDR 17.6 MF

Material: fusioen® PP-R faser-composite

In accordance with:

- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389



Appearance: Blue with light green stripe.

NSF system certification: Including fittings, connection pieces, and connection techniques.

Fields of application: Cooling distribution, condenser water, industrial applications, compressed air, and limited heating applications.

Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	gal/ft	lb/ft	lb/ft
2570126	4" — 125 mm	125	7.10	111	0.776	1.92	8.41
2570126x2 ^d	4" — 125 mm (Double Length)	125	7.10	111	0.776	1.92	8.41
2570126x3 ^e	4" — 125 mm (Triple Length)	125	7.10	111	0.776	1.92	8.41
2570130	6" — 160 mm	160	9.09	142	1.272	2.93	13.5
2570130x2 ^f	6" — 160 mm (Double Length)	160	9.09	142	1.272	2.93	13.5
2570134	8" — 200 mm	200	11.4	177	1.987	4.57	22.0
2570134x2 ^f	8" — 200 mm (Double Length)	200	11.4	177	1.987	4.51	22.0
2570138	10" — 250 mm	250	14.2	222	3.105	7.10	33.0
2570138x2 ^f	10" — 250 mm (Double Length)	250	14.2	222	3.105	7.10	33.0
2570142	12" — 315 mm	315	17.9	279	4.930	11.3	52.3
2570142x2 ^f	12" — 315 mm (Double Length)	315	17.9	279	4.930	11.3	52.3
2570144	14" — 355 mm	355	20.2	315	6.261	14.3	66.5
2570144x2 ^f	14" — 355 mm (Double Length)	355	20.2	315	6.261	14.3	66.5
2570146	16" — 400 mm	400	22.8	355	7.949	18.1	84.4
2570146x2 ^f	16" — 400 mm (Double Length)	400	22.8	355	7.949	18.1	84.4
2570148	18" — 450 mm	450	25.6	399	10.061	22.9	107
2570148x2	18" — 450 mm (Double Length)	450	25.6	399	10.061	22.9	107
2570150	20" — 500 mm	500	28.4	443	12.421	28.3	132
2570150x2 ^f	20" — 500 mm (Double Length)	500	28.4	443	12.421	28.3	132
2570152	22" — 560 mm	560	31.8	496	15.581	35.3	165
2570154	24" — 630 mm	630	35.8	558	19.719	44.7	209
2570154x2 ^e	24" — 630 mm (Double Length)	630	35.8	558	19.719	44.7	209

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

^d Pipe comes in 26 ft lengths.

^e Pipe comes in 39 ft lengths.

^f Pipe comes in 38 ft lengths.

aquatherm blue pipe® SDR 7.4/11 MF UV

Material: fusiole® PP-R

In accordance with:

- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389

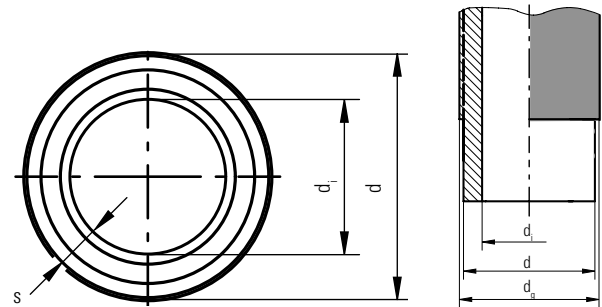


Appearance: Light blue with black exterior.

NSF system certification: Including fittings, connection pieces and connection techniques.

Fields of application: All the same applications as the standard aquatherm blue pipe® SDR 11 MF, but for installations where the pipe is exposed to UV radiation.

Note: Because these parts are not stocked in large numbers, please contact Aquatherm for details about your order.



Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	(d) total	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	d _g (mm)	gal/ft	lb/ft	lb/ft
2670758	½" — 20 mm SDR 7.4	20	2.70	14.6	22	0.013	0.14	0.25
2670760	¾" — 25 mm SDR 7.4	25	3.38	18.2	27	0.024	0.21	0.38
2670162	1" — 32 mm SDR 11	32	2.91	26.2	34	0.043	0.23	0.59
2670164	1 ¼" — 40 mm SDR 11	40	3.64	32.7	42	0.067	0.37	0.93
2670166	1 ½" — 50 mm SDR 11	50	4.65	40.9	52	0.105	0.55	1.43
2670168	2" — 63 mm SDR 11	63	5.73	51.5	65	0.167	0.84	2.24
2670170	2 ½" — 75 mm SDR 11	75	6.82	61.4	77	0.237	1.15	3.13
2670172	3" — 90 mm SDR 11	90	8.18	73.6	92	0.343	1.67	4.52
2670174	3 ½" — 110 mm SDR 11	110	10.0	90.0	112	0.512	2.48	6.74
2670176	4" — 125 mm SDR 11	125	11.4	102	127	0.661	3.14	8.62
2670180	6" — 160 mm SDR 11	160	14.5	131	162	1.082	5.05	14.1
2670184	8" — 200 mm SDR 11	200	18.2	164	202	1.692	7.67	21.8
2670188	10" — 250 mm SDR 11	250	22.7	205	252	2.646	11.9	34.0

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

PRODUCT RANGE - PIPE

aquatherm blue pipe® SDR 17.6 MF UV

Material: fusiole® PP-R

In accordance with:

- NSF-14
- CSA-B137.11
- ICC AC 122
- ICC ESR 1613
- ASTM F 2389

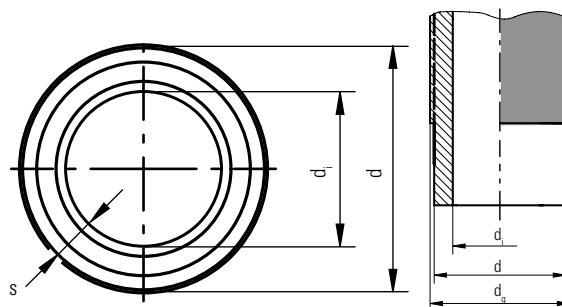


Appearance: Light blue with black exterior.

NSF system certification: Including fittings, connection pieces and connection techniques.

Fields of application: All the same applications as the standard aquatherm blue pipe® SDR 17.6 MF, but for installations where the pipe is exposed to UV radiation.

Note: Because these parts are not stocked in large numbers, please contact Aquatherm for details about your order.



Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	(d) total	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	d _g (mm)	gal/ft	lb/ft	lb/ft
2570180	6" — 160 mm	160	9.10	142	162	1.272	3.28	13.9
2570184	8" — 200 mm	200	11.4	177	202	1.987	5.09	21.6
2570188	10" — 250 mm	250	14.2	222	252	3.105	7.68	33.6
2570192	12" — 315 mm	315	17.9	279	317	4.930	12.0	53.0
2570194	14" — 355 mm	355	20.2	315	357	6.261	15.1	67.3
2570196	16" — 400 mm	400	22.7	355	402	7.949	19.1	85.4
2570198	18" — 450 mm	450	25.6	399	452	10.061	24.0	108
2570200	20" — 500 mm	500	28.4	443	502	12.421	29.6	133
2570202	22" — 560 mm	560	31.8	497	562	15.581	36.9	167
2570204	24" — 630 mm	630	35.8	559	632	19.719	46.5	211

^a Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

aqualtherm lilac pipe® SDR 7.4/11 S

Material: fusiole® PP-R

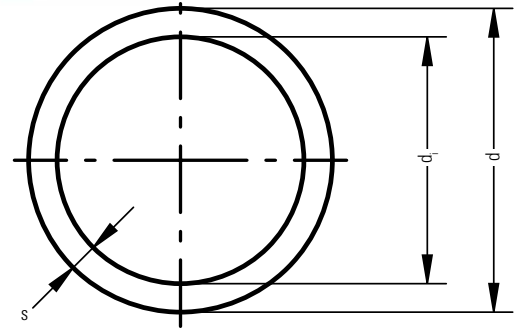
In accordance with:

- NSF-14
- CSA B 137.11



Appearance: Light purple.

Fields of application: For rainwater and reclaimed water systems, gray water supply.



Pipe ^a		Diameter ^b	Wall thickness	Internal diameter	Water capacity	Weight ^c	Weight w/ water
Part no.	Dimension (ND — OD)	d (mm)	s (mm)	d _i (mm)	gal/ft	lb/ft	lb/ft
9010808	½" — 20 mm SDR 7.4	20	2.70	14.6	0.013	0.10	0.21
9010810	¾" — 25 mm SDR 7.4	25	3.38	18.2	0.021	0.16	0.33
9010212	1" — 32 mm SDR 11	32	2.91	26.2	0.043	0.18	0.54
9010214	1 ¼" — 40 mm SDR 11	40	3.64	32.7	0.068	0.28	0.84
9010216	1 ½" — 50 mm SDR 11	50	4.55	40.9	0.106	0.43	1.31
9010218	2" — 63 mm SDR 11	63	5.73	51.5	0.168	0.68	2.08
9010220	2 ½" — 75 mm SDR 11	75	6.82	61.4	0.238	0.95	2.93
9010222	3" — 90 mm SDR 11	90	8.18	73.6	0.343	1.36	4.21
9010224	3 ½" — 110 mm SDR 11	110	10.0	90.0	0.512	2.02	6.28
9010226	4" — 125 mm SDR 11	125	11.4	102	0.661	2.63	8.11
9010226x2 ^d	4" — 125 mm SDR 11 (Double Length)	125	11.4	102	0.661	2.63	8.11
9010226x3 ^e	4" — 125 mm SDR 11 (Double Length)	125	11.4	102	0.661	2.63	8.11
9010230	6" — 160 mm SDR 11	160	14.5	131	1.084	4.31	13.3
9010230x2 ^f	6" — 160 mm SDR 11 (Double Length)	160	14.5	131	1.084	4.31	13.3
9010234	8" — 200 mm SDR 11	200	18.2	164	1.693	6.71	20.9
9010238	10" — 250 mm SDR 11	250	22.7	205	2.646	10.4	32.5

^a ½" - 4" pipes come in standard 13 ft lengths (4 m). Pipes 6" and larger come in standard 19 ft lengths (5.8 m).

^b To calculate exact dimensions of the pipe in imperial inches, divide the metric measurement by 25.4.

^c To calculate the weight of the pipe in kg/m, multiply the measurement by 1.5.

^d Pipe comes in 26 ft lengths.

^e Pipe comes in 39 ft lengths.

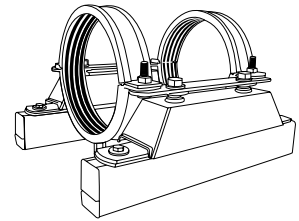
^f Pipe comes in 38 ft lengths.

PRODUCT RANGE - ACCESSORIES

PIPE CLAMPS FOR AQUATHERM PIPES

Suitable for anchoring pipe, either horizontal or vertical.

Part no.	Dimension (ND — OD)	[lb]
0060668	6" — 160 mm	8.81
0060670	8" — 200 mm	22.2
0060674	10" — 250 mm	23.3
0060678	12" — 315 mm	29.6



PIPE FASTENING STRAP SUITABLE FOR $\frac{3}{8}$ " - 1" (16 - 32 MM) PIPE

Part no.	Dimension	[lb]
0060604	Single — 1 $\frac{3}{8}$ " (45 mm)	0.01
0060606	Single — 2 $\frac{1}{2}$ " (75 mm)	0.02
0060608	Double — 1 $\frac{3}{8}$ " (45 mm)	0.02
0060610	Double — 2 $\frac{1}{2}$ " (75 mm)	0.02

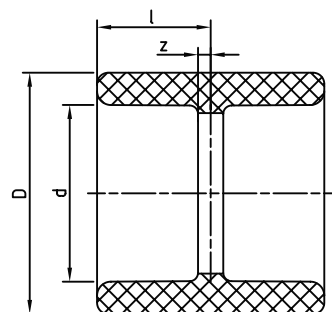


PLASTIC PIPE CLAMPS FOR AQUATHERM PIPE

Part no.	Dimension (ND — OD)	[lb]
0060620	$\frac{1}{2}$ " — 20 mm	0.02
0060625	$\frac{3}{4}$ " — 25 mm	0.04

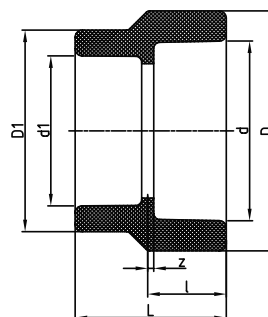


aquatherm green pipe® COUPLING



Part no.	Dimension (ND — OD)	d	l	z	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0111008	½" — 20 mm	0.79	0.63	0.06	1.16	0.02
0111010	¾" — 25 mm	0.98	0.69	0.06	1.34	0.03
0111012	1" — 32 mm	1.26	0.80	0.09	1.69	0.06
0111014	1¼" — 40 mm	1.57	0.94	0.13	2.05	0.10
0111016	1½" — 50 mm	1.97	1.04	0.12	2.68	0.19
0111018	2" — 63 mm	2.48	1.19	0.11	3.31	0.31
0111020	2½" — 75 mm	2.95	1.31	0.13	3.94	0.50
0111022	3" — 90 mm	3.54	1.43	0.13	4.72	0.76
0111024	3½" — 110 mm	4.33	1.61	0.16	5.79	1.28
0111026	4" — 125 mm	4.92	1.77	0.20	6.57	1.86

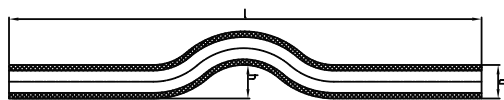
aquatherm green pipe® REDUCING COUPLING female/female



Part no.	Dimension (ND — OD)	d	d1	L	l	z	D	D1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0111222	1 ¼" to 1" — 40 to 32 mm	1.57	1.26	1.73	0.94	0.14	2.05	1.69	0.08
0111228	1 ½" to 1" — 50 to 32 mm	1.97	1.26	1.85	1.04	0.12	2.68	1.69	0.14
0111230	1 ½" to 1 ¼" — 50 to 40 mm	1.97	1.57	1.99	1.04	0.12	2.68	2.05	0.15
0111236	2" to 1 ¼" — 63 to 40 mm	2.48	1.57	2.13	1.20	0.12	3.31	2.05	0.25
0111238	2" to 1 ½" — 63 to 50 mm	2.48	1.97	2.20	1.18	0.10	3.31	2.68	0.27
0111240	2 ½" to 1 ½" — 75 to 50 mm	2.95	1.97	2.36	1.32	0.14	3.94	2.68	0.39
0111242	2 ½" to 2" — 75 to 63 mm	2.95	2.48	2.46	1.28	0.10	3.94	3.31	0.41
0111252	3" to 2" — 90 to 63 mm	3.54	2.48	2.62	1.44	0.14	4.72	3.31	0.61
0111253	3" to 2 ½" — 90 to 75 mm	3.54	2.95	2.72	1.42	0.12	4.72	3.94	0.65
0111257	3 ½" to 2 ½" — 110 to 75 mm	4.33	2.95	2.93	1.61	0.16	5.79	3.94	1.14
0111259	3 ½" to 3" — 110 to 90 mm	4.33	3.54	3.05	1.61	0.16	5.79	4.72	1.15
0111263	4" to 3" — 125 to 90 mm	4.92	3.54	3.27	1.81	0.24	6.57	4.72	1.65
0111265	4" to 3 ½" — 125 to 110 mm	4.92	4.33	3.43	1.81	0.24	6.57	5.79	1.60

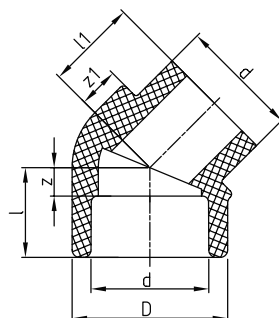
PRODUCT RANGE - FITTINGS

aquatherm green pipe® CROSS-OVER



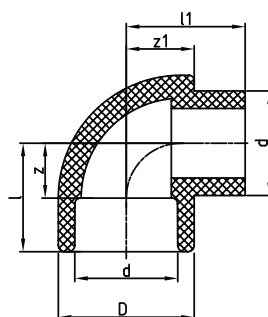
Part no.	Dimension (ND — OD)	d	h	l	Weight
		[in]	[in]	[in]	[lb]
0116108	½" — 20 mm	0.79	0.87	13.9	0.13
0116110	¾" — 25 mm	0.98	0.98	13.9	0.20
0116112	1" — 32 mm	1.26	1.26	13.9	0.34

aquatherm green pipe® STREET 45° female/male



Part no.	Dimension (ND — OD)	d	z	l	D	l1	z1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0112708	½" — 20 mm	0.79	0.20	0.77	1.16	0.77	0.35	0.03
0112710	¾" — 25 mm	0.98	0.24	0.87	1.34	0.87	0.33	0.04
0112712	1" — 32 mm	1.26	0.30	1.00	1.69	1.12	0.45	0.08
0112714	1 ¼" — 40 mm	1.57	0.37	1.18	2.05	1.20	0.53	0.13

aquatherm green pipe® STREET 90° female/male

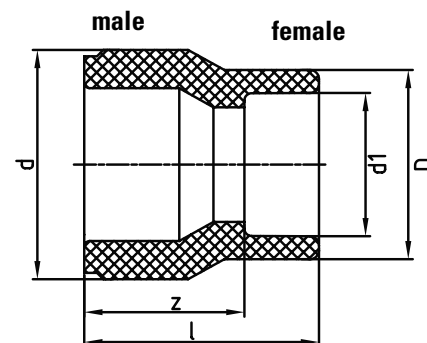


Part no.	Dimension (ND — OD)	d	z	l	D	l1	z1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0112308	½" — 20 mm	0.79	0.43	1.00	1.16	1.00	0.59	0.04
0112310	¾" — 25 mm	0.98	0.53	1.16	1.34	1.16	0.67	0.05
0112312	1" — 32 mm	1.26	0.67	1.38	1.69	1.54	0.85	0.10
0112314	1 ¼" — 40 mm	1.57	0.83	1.63	2.05	1.79	1.02	0.18

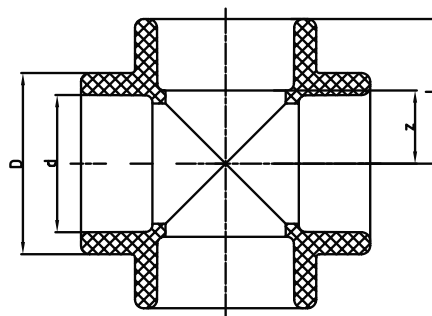
aquatherm green pipe® BUSHING

Female to male for use with standard fitting. Female side is identified by a socket-fitting structure, male side is identified with a beveled edge. Appearance of bushing will vary by dimension.

Part no.	Dimension (ND — OD) (M to F)	d	d1	l	z	D	Weight
		[in]	[in]	[in]	[in]	[in]	[lb]
0111112	¾" to ½" — 25 to 20 mm	1.16	0.79	1.52	0.94	0.98	0.03
0111114	1" to ½" — 32 to 20 mm	1.26	0.79	1.48	0.91	1.16	0.03
0111116	1" to ¾" — 32 to 25 mm	1.34	0.98	1.50	0.87	1.26	0.03
0111118	1 ¼" to ½" — 40 to 20 mm	1.57	0.79	1.77	1.20	1.16	0.05
0111120	1 ¼" to ¾" — 40 to 25 mm	1.57	0.98	1.97	1.34	1.34	0.06
0111122	1 ¼" to 1" — 40 to 32 mm	1.69	1.26	1.97	1.26	1.57	0.07
0111124	1 ½" to ½" — 50 to 20 mm	1.97	0.79	2.17	1.59	1.16	0.10
0111126	1 ½" to ¾" — 50 to 25 mm	1.97	0.98	2.17	1.54	1.34	0.10
0111128	1 ½" to 1" — 50 to 32 mm	1.97	1.26	2.13	1.42	1.69	0.11
0111130	1 ½" to 1 ¼" — 50 to 40 mm	2.05	1.57	2.07	1.26	1.97	0.12
0111131	2" to ½" — 63 to 20 mm	2.48	0.79	2.56	1.99	1.16	0.16
0111132	2" to ¾" — 63 to 25 mm	2.48	0.98	2.56	1.93	1.34	0.16
0111134	2" to 1" — 63 to 32 mm	2.48	1.26	2.44	1.73	1.69	0.18
0111136	2" to 1 ¼" — 63 to 40 mm	2.48	1.57	2.56	1.75	2.05	0.23
0111138	2" to 1 ½" — 63 to 50 mm	2.68	1.97	2.50	1.57	2.48	0.25
0111143	2 ½" to ½" — 75 to 20 mm	2.95	0.79	2.58	2.01	1.36	0.24
0111144	2 ½" to ¾" — 75 to 25 mm	2.95	0.98	2.58	1.95	1.36	0.24
0111145	2 ½" to 1" — 75 to 32 mm	2.95	1.26	2.74	2.03	2.05	0.31
0111139	2 ½" to 1 ¼" — 75 to 40 mm	2.95	1.57	2.74	1.93	2.05	0.29
0111140	2 ½" to 1 ½" — 75 to 50 mm	2.95	1.97	2.48	1.56	2.68	0.31
0111142	2 ½" to 2" — 75 to 63 mm	3.31	2.48	2.80	1.71	2.95	0.38
0111151	3" to 1 ½" — 90 to 50 mm	3.54	1.97	2.95	2.03	2.68	0.43
0111152	3" to 2" — 90 to 63 mm	3.54	2.48	3.07	1.99	3.31	0.49
0111153	3" to 2 ½" — 90 to 75 mm	3.94	2.95	3.21	2.03	3.54	0.60
0111155	3 ½" to 2" — 110 to 63 mm	4.33	2.48	3.39	2.30	3.31	0.79
0111157	3 ½" to 2 ½" — 110 to 75 mm	4.33	2.95	3.50	2.32	3.94	0.84
0111159	3 ½" to 3" — 110 to 90 mm	4.72	3.54	3.90	2.60	4.33	1.10
0111161	4" to 2 ½" — 125 to 75 mm	4.92	2.95	3.98	2.80	3.94	1.14
0111163	4" to 3" — 125 to 90 mm	4.92	3.54	3.90	2.60	4.72	1.30
0111165	4" to 3 ½" — 125 to 110 mm	5.79	4.33	4.41	2.95	4.92	1.83



aquatherm green pipe® CROSS



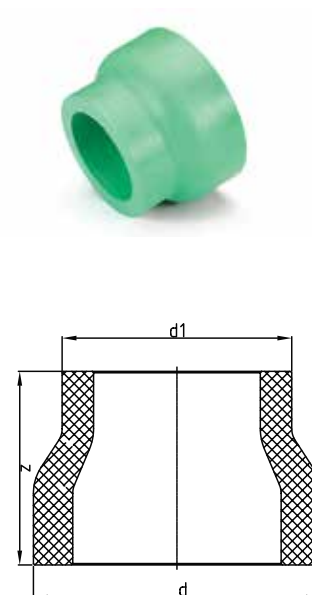
Part no.	Dimension (ND — OD)	d	z	l	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0113708	½" — 20 mm	0.79	0.45	1.02	1.16	0.06
0113710	¾" — 25 mm	0.98	0.53	1.16	1.34	0.08
0113712	1" — 32 mm	1.26	0.67	1.38	1.69	0.14
0113714	1 ¼" — 40 mm	1.57	0.83	1.63	2.05	0.22

PRODUCT RANGE - FITTINGS

aquatherm green pipe® BUTT WELD REDUCER

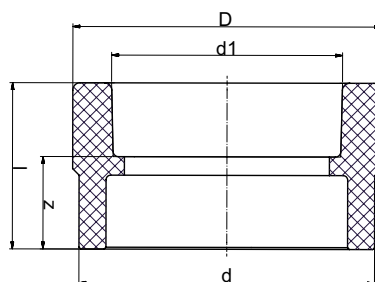
The butt weld reducer can be used with either the **aquatherm green pipe®** or **aquatherm blue pipe®** systems, but are all molded from the green **fusiole®** material. The SDR of the fittings must match the SDR of the pipe.

SDR	Part no.	Dimension (ND — OD)	d	d1	z	Weight
			[in]	[in]	[in]	[lb]
7.4	0111184	8" to 6" — 200 to 160 mm	7.87	6.30	5.31	3.46
	0111188	10" to 6" — 250 to 160 mm	9.84	6.30	6.79	6.35
	0111190	10" to 8" — 250 to 200 mm	9.84	7.87	6.79	7.17
	0111192	12" to 8" — 315 to 200 mm	12.4	7.87	8.86	9.91
	0111194	12" to 10" — 315 to 250 mm	12.4	9.84	8.86	8.96
	0111196	14" to 10" — 355 to 250 mm	14.0	9.84	6.69	11.6
	0111198	14" to 12" — 355 to 315 mm	14.0	12.4	6.30	10.9
11	0111185	8" to 6" — 200 to 160 mm	7.87	6.30	5.31	2.66
	0111189	10" to 6" — 250 to 160 mm	9.84	6.30	6.79	5.10
	0111191	10" to 8" — 250 to 200 mm	9.84	7.87	6.79	5.27
	0111193	12" to 8" — 315 to 200 mm	12.4	7.87	8.86	9.68
	0111195	12" to 10" — 315 to 250 mm	12.4	9.84	9.17	10.6
	0111197	14" to 10" — 355 to 250 mm	14.0	9.84	9.65	9.77
	0111199	14" to 12" — 355 to 315 mm	14.0	12.4	6.30	9.99
	0111201	16" to 10" — 400 to 250 mm	15.8	9.84	10.2	16.5
	0111203	16" to 12" — 400 to 315 mm	15.8	12.4	10.2	13.4
	0111204	16" to 14" — 400 to 355 mm	15.8	14.0	10.2	12.1
	0111206	18" to 12" — 450 to 315 mm	17.7	12.4	9.06	20.2
	0111207	18" to 14" — 450 to 355 mm	17.7	14.0	9.06	16.7
	0111208	18" to 16" — 450 to 400 mm	17.7	15.8	9.06	16.7
17.6	2511184	8" to 6" — 200 to 160 mm	7.87	6.30	5.31	2.23
	2511188	10" to 6" — 250 to 160 mm	9.84	6.30	6.79	3.31
	2511190	10" to 8" — 250 to 200 mm	9.84	7.87	6.79	2.95
	2511193	12" to 8" — 315 to 200 mm	12.4	7.87	6.79	9.13
	2511195	12" to 10" — 315 to 250 mm	12.4	9.84	8.86	7.54
	2511197	14" to 10" — 355 to 250 mm	14.0	9.84	9.65	6.83
	2511199	14" to 12" — 355 to 315 mm	14.0	12.4	6.30	6.85
	2511201	16" to 10" — 400 to 250 mm	15.8	9.84	10.2	9.88
	2511203	16" to 12" — 400 to 315 mm	15.8	12.4	10.2	7.42
	2511204	16" to 14" — 400 to 355 mm	15.8	14.0	10.2	6.72
	2511206	18" to 12" — 450 to 315 mm	17.7	12.4	9.06	10.8
	2511207	18" to 14" — 450 to 355 mm	17.7	14.0	9.06	10.3
	2511208	18" to 16" — 450 to 400 mm	17.7	15.8	9.06	9.45
	2511209	20" to 12" — 500 to 315 mm	19.7	12.4	9.06	17.9
	2511210	20" to 14" — 500 to 355 mm	19.7	14.0	9.06	14.3
	2511211	20" to 16" — 500 to 400 mm	19.7	15.8	9.06	14.8
	2511212	20" to 18" — 500 to 450 mm	19.7	17.7	9.06	12.1
	2511213	22" to 16" — 560 to 400 mm	22.1	15.8	9.06	19.8
	2511214	22" to 18" — 560 to 450 mm	22.1	17.7	7.87	19.0
	2511215	22" to 20" — 560 to 500 mm	22.1	19.7	7.87	16.8
	2511216	24" to 16" — 630 to 400 mm	24.8	15.8	9.06	33.3
	2511217	24" to 18" — 630 to 450 mm	24.8	17.7	7.87	30.2
	2511218	24" to 20" — 630 to 500 mm	24.8	19.7	7.87	24.3
	2511219	24" to 22" — 630 to 560 mm	24.8	22.0	7.87	19.8



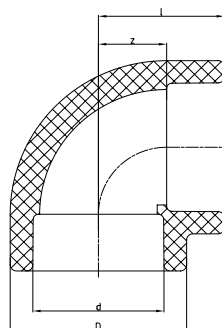
aquatherm green pipe® REDUCING COUPLING

Socket welded on one side, butt welded on the other. These fittings can be used with either the **aquatherm green pipe®** or **aquatherm blue pipe®** systems, but are all molded from the green **fusiofen**® material. The SDR of the fittings must match the SDR of the pipe.



SDR	Part no.	Dimension (ND — OD)	d	d1	l	z	D	Weight
			[in]	[in]	[in]	[in]	[in]	[lb]
7.4	0111174	6" to 3 1/2" — 160 to 110 mm	6.30	4.33	3.43	1.97	5.79	1.61
	0111176	6" to 4" — 160 to 125 mm	6.30	4.92	3.54	1.97	6.57	1.85
	0111182	8" to 4" — 200 to 125 mm	7.87	4.92	5.31	3.74	6.57	3.62
11	0111175	6" to 3 1/2" — 160 to 110 mm	6.30	4.33	3.54	2.09	5.79	1.44
	0111177	6" to 4" — 160 to 125 mm	6.30	4.92	3.54	1.97	6.57	1.40
	0111183	8" to 4" — 200 to 125 mm	7.87	4.92	5.31	3.74	6.57	2.96
17.6	2511174	6" to 3 1/2" — 160 to 110 mm	6.30	4.33	3.54	2.09	5.79	1.36
	2511176	6" to 4" — 160 to 125 mm	6.30	4.92	3.54	1.97	6.57	1.39
	2511182	8" to 4" — 200 to 125 mm	7.87	4.92	5.31	3.74	6.57	2.33

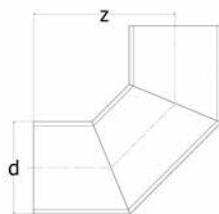
aquatherm green pipe® ELBOW 90° (SOCKET)



Part no.	Dimension (ND — OD)	d	z	l	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0112108	1/2" — 20 mm	0.79	0.43	1.00	1.16	0.04
0112110	3/4" — 25 mm	0.98	0.53	1.16	1.34	0.05
0112112	1" — 32 mm	1.26	0.67	1.38	1.69	0.09
0112114	1 1/4" — 40 mm	1.57	0.83	1.63	2.05	0.17
0112116	1 1/2" — 50 mm	1.97	1.02	1.95	2.68	0.36
0112118	2" — 63 mm	2.48	1.28	2.36	3.31	0.65
0112120	2 1/2" — 75 mm	2.95	1.52	2.70	3.94	0.98
0112122	3" — 90 mm	3.54	1.81	3.11	4.72	1.61
0112124	3 1/2" — 110 mm	4.33	2.20	3.66	5.79	2.85
0112126	4" — 125 mm	4.92	3.01	4.59	6.57	4.42

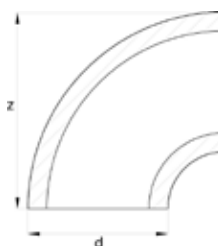
PRODUCT RANGE - FITTINGS

aquatherm green pipe® ELBOW 90° SD (BUTT-WELD)



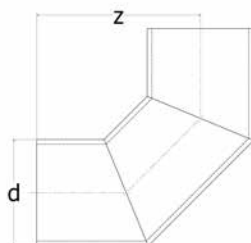
SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
7.4 Faser	7312130	6" — 160 mm	6.30	9.00	8.75
	7312134	8" — 200 mm	7.87	12.0	18.3
	7312138	10" — 250 mm	9.84	15.0	35.0
	7312142	12" — 315 mm	12.4	18.0	66.0
	7312144	14" — 355 mm	14.0	21.0	98.0

aquatherm green pipe® ELBOW 90° SD (BUTT-WELD) molded



SDR	Part No.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
7.4	0112130	6" — 160 mm	6.30	5.71	5.65

aquatherm green pipe® ELBOW 90° SD (BUTT-WELD)



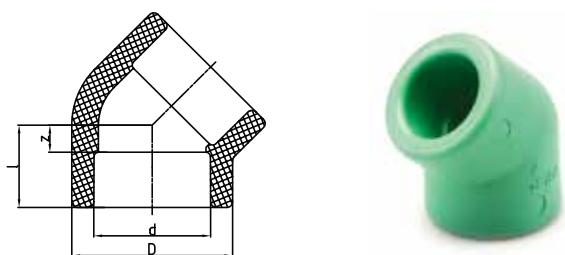
SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
11 Faser	7112130	6" — 160 mm	6.30	9.00	6.00
	7112134	8" — 200 mm	7.87	12.0	12.3
	7112138	10" — 250 mm	9.84	15.0	23.8
	7112142	12" — 315 mm	12.4	18.0	44.0
	7112144	14" — 355 mm	14.0	21.0	65.0
	7112146	16" — 400 mm	15.8	24.0	94.0
	7112148	18" — 450 mm	17.7	27.0	133

aquatherm green pipe® ELBOW 90° SD (BUTT-WELD) molded



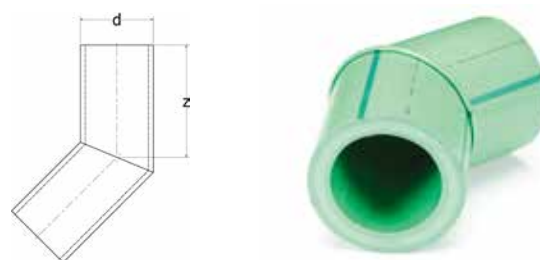
SDR	Part No.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
11	0112131	6" — 160 mm	6.30	5.71	5.65

aquatherm green pipe® ELBOW 45° (SOCKET)



Part no.	Dimension (ND — OD)	d	z	l	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0112508	½" — 20 mm	0.79	0.20	0.77	1.16	0.03
0112510	¾" — 25 mm	0.98	0.24	0.87	1.34	0.04
0112512	1" — 32 mm	1.26	0.30	1.00	1.69	0.08
0112514	1 ¼" — 40 mm	1.57	0.37	1.18	2.05	0.12
0112516	1 ½" — 50 mm	1.97	0.45	1.38	2.68	0.25
0112518	2" — 63 mm	2.48	0.55	1.63	3.31	0.50
0112520	2 ½" — 75 mm	2.95	0.65	1.83	3.94	0.77
0112522	3" — 90 mm	3.54	0.77	2.07	4.72	1.25
0112524	3 ½" — 110 mm	4.33	0.93	2.38	5.79	2.26
0112526	4" — 125 mm	4.92	1.06	2.64	6.57	2.93

aquatherm green pipe® ELBOW 45° SD (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
7.4 Faser	7312530 ^a	6" — 160 mm	6.30	7.44	8.50
	7312534 ^a	8" — 200 mm	7.87	9.94	9.00
	7312538	10" — 250 mm	9.84	6.25	17.0
	7312542	12" — 315 mm	12.4	7.50	32.0
	7312544	14" — 355 mm	14.0	8.75	48.0

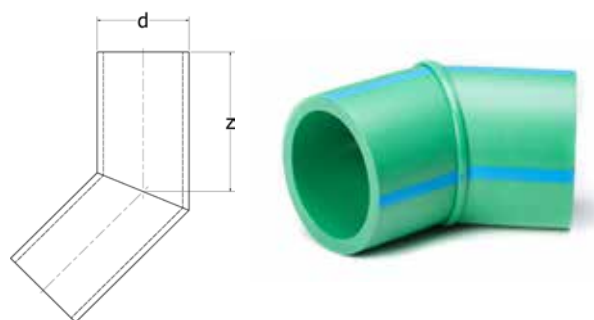
^aMade with the Z-value of the ANSI B16.9 3D fittings with a larger Z-value.

aquatherm green pipe® ELBOW 45° SD (BUTT-WELD) molded



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
7.4	0112530	6" — 160 mm	6.30	3.74	4.20

aquatherm green pipe® ELBOW 45° SD (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
11 Non- Faser	7112530 ^a	6" — 160 mm	6.30	7.44	5.75
	7112534 ^a	8" — 200 mm	7.87	9.94	6.00
	7112538	10" — 250 mm	9.84	6.25	11.3
	7112542	12" — 315 mm	12.4	7.50	21.0
	7112544	14" — 355 mm	14.0	8.75	32.0
	7112546	16" — 400 mm	15.8	10.0	46.0
	7112548	18" — 450 mm	17.7	11.3	65.0

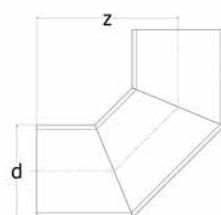
^aMade with the Z-value of the ANSI B16.9 3D fittings with a larger Z-value.

aquatherm green pipe® ELBOW 45° SD (BUTT-WELD) molded



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
11	0112531	6" — 160 mm	6.30	3.74	3.07

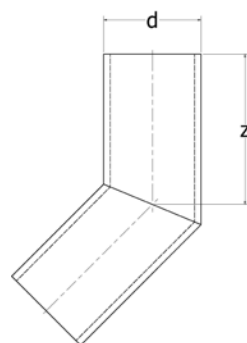
aquatherm blue pipe® ELBOW 90° SD (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
11	7512130	6" — 160 mm	6.30	9.00	6.25
	7512134	8" — 200 mm	7.87	12.0	12.5
	7512138	10" — 250 mm	9.84	15.0	24.3
	7512142	12" — 315 mm	12.4	18.0	46.0
	7512144	14" — 355 mm	14.0	21.0	67.0
	7512146	16" — 400 mm	15.8	24.0	97.0
	7512148	18" — 450 mm	17.7	27.0	138
17.6	7412130	6" — 160 mm	6.30	9.00	4.25
	7412134	8" — 200 mm	7.87	12.0	8.25
	7412138	10" — 250 mm	9.84	15.0	15.8
	7412142	12" — 315 mm	12.4	18.0	30.0
	7412144	14" — 355 mm	14.0	21.0	44.0
	7412146	16" — 400 mm	15.8	24.0	63.0
	7412148	18" — 450 mm	17.8	27.0	90.0
	7412150	20" — 500 mm	19.7	30.0	123
	7412152	22" — 560 mm	22.1	33.0	154
	7412154	24" — 630 mm	24.8	36.0	233

PRODUCT RANGE - FITTINGS

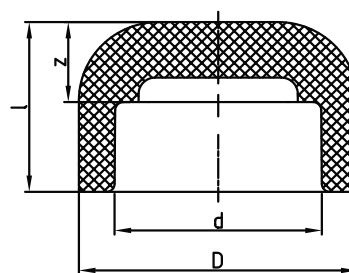
aquatherm blue pipe® ELBOW 45° SD (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
11	7512530 ^a	6" — 160 mm	6.30	7.44	6.00
	7512534 ^a	8" — 200 mm	7.87	9.94	6.25
	7512538	10" — 250 mm	9.84	6.25	12.0
	7512542	12" — 315 mm	12.4	7.50	22.0
	7512544	14" — 355 mm	14.0	8.75	33.0
	7512546	16" — 400 mm	15.8	10.0	48.0
	7512548	18" — 450 mm	17.7	11.3	67.0
17.6	7412530 ^a	6" — 160 mm	6.30	7.44	4.00
	7412534 ^a	8" — 200 mm	7.87	9.94	4.25
	7412538	10" — 250 mm	9.84	6.25	8.00
	7412542	12" — 315 mm	12.4	7.50	15.0
	7412544	14" — 355 mm	14.0	8.75	22.0
	7412546	16" — 400 mm	15.8	10.0	31.0
	7412548	18" — 450 mm	17.7	11.3	44.0
	7412550	20" — 500 mm	19.7	12.5	60.0
	7412552	22" — 560 mm	22.1	13.5	81.0
	7412554	24" — 630 mm	24.8	15.0	114

^aMade with the Z-value of the ANSI B16.9 3D fittings with a larger Z-value.

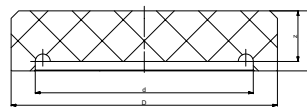
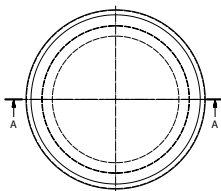
aquatherm green pipe® END CAP (SOCKET)



Part no.	Dimension (ND — OD)	d	z	L	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0114108	½" — 20 mm	0.79	0.37	0.94	1.16	0.02
0114110	¾" — 25 mm	0.98	0.31	0.94	1.34	0.02
0114112	1" — 32 mm	1.26	0.53	1.24	1.69	0.05
0114114	1 ¼" — 40 mm	1.57	0.69	1.50	2.05	0.09
0114116	1 ½" — 50 mm	1.97	0.83	1.75	2.68	0.18
0114118	2" — 63 mm	2.48	0.96	2.05	3.31	0.32
0114120	2 ½" — 75 mm	2.95	1.12	2.30	3.94	0.54
0114122	3" — 90 mm	3.54	1.36	2.26	4.72	0.80
0114124	3 ½" — 110 mm	4.33	1.10	2.56	5.79	1.40
0114126	4" — 125 mm	4.92	1.18	2.76	6.57	1.92

aqualtherm green pipe® END CAP (BUTT-WELD)

These fittings can be used with either the **aqualtherm green pipe®** or **aqualtherm blue pipe®** systems, but are all molded from the green **fusiole®** material. The SDR of the fittings must match the SDR of the pipe.

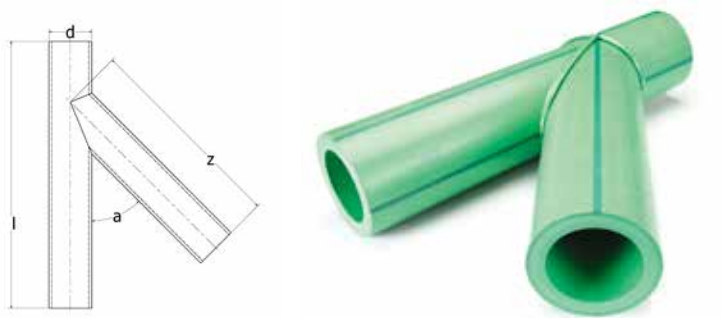


SDR	Part no.	Dimension (ND — OD)	D	d	l	z	Weight
			[in]	[in]	[in]	[in]	[lb]
7.4	0114130	6" — 160 mm	6.30	4.60	2.76	1.16	1.93
	0114134	8" — 200 mm	7.87	5.75	3.15	1.08	3.08
	0114138	10" — 250 mm	9.84	7.18	3.54	1.48	5.58
	0114142	12" — 315 mm	12.4	9.05	1.97	1.57	9.70
	0114144	14" — 355 mm	14.0	10.2	-	-	14.6
11	0114131	6" — 160 mm	6.30	5.15	2.76	0.55	1.67
	0114135	8" — 200 mm	7.87	6.44	3.15	0.72	2.36
	0114139	10" — 250 mm	9.84	8.06	3.54	0.89	4.38
	0114143	12" — 315 mm	12.4	10.1	10.6	1.13	13.7
	0114145	14" — 355 mm	14.0	11.4	3.15	2.66	20.9
	0114147	16" — 400 mm	15.8	12.9	3.15	2.76	18.8
	0114149	18" — 450 mm	17.7	14.5	3.15	2.76	26.9
17.6	2514130	6" — 160 mm	6.30	5.58	2.76	0.57	1.50
	2514134	8" — 200 mm	7.87	6.98	3.15	0.72	2.04
	2514138	10" — 250 mm	9.84	8.72	3.54	1.35	4.65
	2514142	12" — 315 mm	12.4	11.0	1.97	1.57	6.53
	2514144	14" — 355 mm	14.0	12.4	2.05	1.65	8.66
	2514146	16" — 400 mm	15.8	14.0	2.36	1.97	13.6
	2514148	18" — 450 mm	17.7	15.7	2.76	2.20	18.8
	2514150	20" — 500 mm	19.7	17.5	2.95	2.44	27.6
	2514152	22" — 560 mm	22.1	19.6	3.15	2.74	35.3
	2514154	24" — 630 mm	24.8	22.0	3.54	3.07	51.8

PRODUCT RANGE - FITTINGS

aquatherm green pipe® WYE (LATERAL 45)

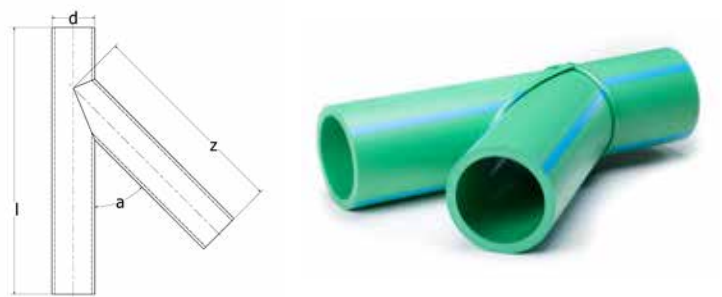
For low pressure piping and gravity fed systems. Additional sizes available upon request.



SDR	Part no.	Dimension (ND — OD)	d	l	z	a	Weight
			[in]	[in]	[in] ± 1/8"	[°]	[lb]
7.4 Faser	2303726	4" — 125 mm	4.92	26.2	18.7	45.0	15.6
	2303730	6" — 160 mm	6.30	30.8	21.7	45.0	28.7
	2303734	8" — 200 mm	7.87	36.4	25.6	45.0	52.2
	2303738	10" — 250 mm	9.84	43.5	30.7	45.0	97.7

aquatherm green pipe® WYE (LATERAL 45)

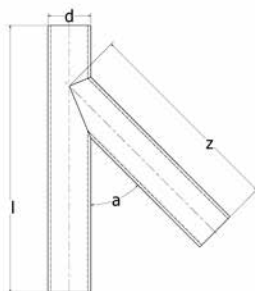
For low pressure piping and gravity fed systems. Additional sizes available upon request.



SDR	Part no.	Dimension (ND — OD)	d	l	z	a	Weight
			[in]	[in]	[in] ± 1/8"	[°]	[lb]
11 Non-Faser	2103126	4" — 125 mm	4.92	26.2	18.7	45.0	9.88
	2103130	6" — 160 mm	6.30	30.8	21.7	45.0	18.9
	2103134	8" — 200 mm	7.87	36.4	25.6	45.0	34.7
	2103138	10" — 250 mm	9.84	43.5	30.7	45.0	64.3

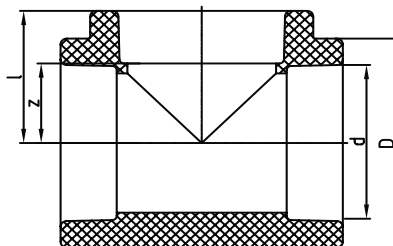
aquatherm blue pipe® WYE (LATERAL 45)

For low pressure piping and gravity fed systems. Additional sizes available upon request.



SDR	Part no.	Dimension (ND — OD)	d	l	z	a	Weight
			[in]	[in]	[in] ± 1/8"	[°]	[lb]
11	2503126	4" — 125 mm	4.92	26.2	18.7	45.0	10.4
	2503130	6" — 160 mm	6.30	30.8	21.7	45.0	19.8
	2503134	8" — 200 mm	7.87	36.4	25.6	45.0	36.4
	2503138	10" — 250 mm	9.84	43.5	30.7	45.0	68.0
17.6	2403126	4" — 125 mm	4.92	26.2	18.7	45.0	7.18
	2403130	6" — 160 mm	6.30	30.8	21.7	45.0	12.8
	2403134	8" — 200 mm	7.87	36.4	25.6	45.0	23.6
	2403138	10" — 250 mm	9.84	43.5	30.7	45.0	43.9

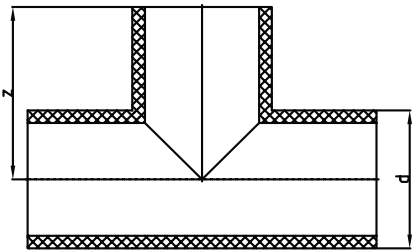
aquatherm green pipe® TEE (SOCKET)



Part no.	Dimension (ND — OD)	d	z	l	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0113108	½" — 20 mm	0.79	0.43	1.00	1.16	0.05
0113110	¾" — 25 mm	0.98	0.59	1.22	1.34	0.07
0113112	1" — 32 mm	1.26	0.67	1.38	1.69	0.12
0113114	1 ¼" — 40 mm	1.57	0.79	1.59	2.05	0.22
0113116	1 ½" — 50 mm	1.97	1.02	1.95	2.68	0.39
0113118	2" — 63 mm	2.48	1.28	2.36	3.31	0.81
0113120	2 ½" — 75 mm	2.95	1.52	2.70	3.94	1.19
0113122	3" — 90 mm	3.54	1.81	3.11	4.72	2.03
0113124	3 ½" — 110 mm	4.33	2.20	3.66	5.79	3.52
0113126	4" — 125 mm	4.92	3.01	4.59	6.57	5.89

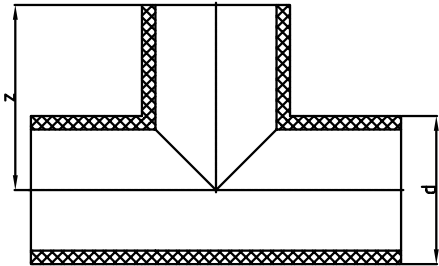
PRODUCT RANGE - FITTINGS

aquatherm green pipe® TEE (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
7.4 Faser	0113130MF	6" — 160 mm	6.30	9.06	13.1
	0113134	8" — 200 mm	7.87	11.8	22.5
	0113138	10" — 250 mm	9.84	14.8	55.5
	0113142	12" — 315 mm	12.4	18.1	107
	0113144	14" — 355 mm	14.0	18.9	140

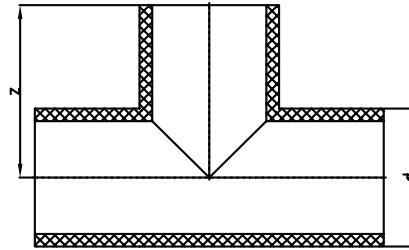
aquatherm green pipe® TEE (BUTT-WELD) molded



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
7.4	0113130	6" — 160 mm	6.30	5.71	7.94
	0113130LG ^a	6" — 160 mm	6.30	17.7	27.2

^a Comes with a 1-ft extension on each end.

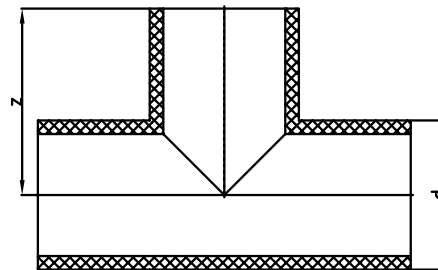
aquatherm green pipe® TEE (BUTT-WELD)



SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in] ± 1/8"	[lb]
11 Non- Faser	0113131MF	6" — 160 mm	6.30	9.06	8.63
	0113135	8" — 200 mm	7.87	11.8	15.0
	0113139	10" — 250 mm	9.84	14.8	36.5
	0113143	12" — 315 mm	12.4	18.1	71.0
	0113145	14" — 355 mm	14.0	18.9	93.0
	0113147 ^c	16" — 400 mm	15.8	19.7	122
	0113149 ^c	18" — 450 mm	17.7	20.7	159

^b Mechanically stabilized with a faser-composite layer in the center of the pipe.

aquatherm green pipe® TEE (BUTT-WELD) molded

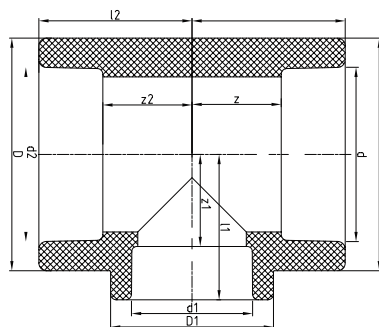


SDR	Part no.	Dimension (ND — OD)	d	z	Weight
			[in]	[in]	[lb]
11	0113131	6" — 160 mm	6.30	5.71	6.62
	0113131LG ^a	6" — 160 mm	6.30	17.7	19.6

^a Comes with a 1-ft extension on each end.

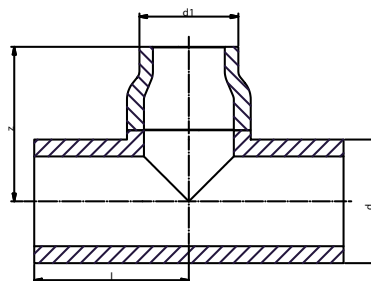
PRODUCT RANGE - FITTINGS

aquatherm green pipe® REDUCING TEE (SOCKET) molded (inlet, outlet, branch)



Part no.	Dimension (ND — OD)	d	d1	d2	l	l1	l2	z	z1	z2	D	D1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0113511	½" x ½" x ¾" — 20 x 20 x 25 mm	0.79	0.98	0.79	1.22	1.20	1.22	0.65	0.57	0.65	1.34	1.34	0.09
0113520	¾" x ½" x ½" — 25 x 20 x 20 mm	0.98	0.79	0.79	1.22	1.20	1.22	0.65	0.63	0.65	1.34	1.34	0.08
0113522	¾" x ¾" x ½" — 25 x 25 x 20 mm	0.98	0.79	0.98	1.22	1.20	1.22	0.65	0.63	0.65	1.34	1.34	0.08
0113532	1" x ½" x ½" — 32 x 20 x 20 mm	1.26	0.79	0.79	1.44	1.46	1.44	0.74	0.89	0.74	1.69	1.69	0.17
0113534	1" x 1" x ½" — 32 x 32 x 20 mm	1.26	0.79	1.26	1.38	1.22	1.38	0.67	0.65	0.67	1.69	1.16	0.12
0113538	1" x ¾" x ¾" — 32 x 25 x 25 mm	1.26	0.98	0.98	1.38	1.36	1.38	0.67	0.73	0.67	1.69	1.69	0.15
0113540	1" x 1" x ¾" — 32 x 32 x 25 mm	1.26	0.98	1.26	1.38	1.36	1.38	0.67	0.73	0.67	1.69	1.69	0.11
0113542	1 ¼" x 1 ¼" x ½" — 40 x 40 x 20 mm	1.57	0.79	1.57	1.63	1.42	1.63	0.83	0.85	0.83	2.05	1.34	0.20
0113544	1 ¼" x 1 ¼" x ¾" — 40 x 40 x 25 mm	1.57	0.98	1.57	1.63	1.42	1.63	0.83	0.79	0.83	2.05	1.34	0.20
0113546	1 ¼" x 1 ¼" x 1" — 40 x 40 x 32 mm	1.57	1.26	1.57	1.65	1.59	1.65	0.85	0.89	0.85	2.05	2.05	0.20
0113547	1 ½" x 1 ½" x ½" — 50 x 50 x 20 mm	1.97	0.79	1.97	1.95	1.59	1.95	1.02	1.02	1.02	2.68	1.16	0.36
0113548	1 ½" x 1 ½" x ¾" — 50 x 50 x 25 mm	1.97	0.98	1.97	1.95	1.75	1.95	1.02	1.12	1.02	2.68	1.69	0.35
0113550	1 ½" x 1 ½" x 1" — 50 x 50 x 32 mm	1.97	1.26	1.97	1.95	1.75	1.95	1.02	1.04	1.02	2.68	1.69	0.35
0113551	1 ½" x 1 ½" x 1 ¼" — 50 x 50 x 40 mm	1.97	1.57	1.97	1.95	1.95	1.95	1.02	1.14	1.02	2.68	2.68	0.36
0113552	2" x 2" x ½" — 63 x 63 x 20 mm	2.48	0.79	2.48	2.36	1.91	2.36	1.28	1.34	1.28	3.31	1.34	0.74
0113554	2" x 2" x ¾" — 63 x 63 x 25 mm	2.48	0.98	2.48	2.36	1.91	2.36	1.28	1.28	1.28	3.31	1.34	0.73
0113556	2" x 2" x 1" — 63 x 63 x 32 mm	2.48	1.26	2.48	2.36	2.11	2.36	1.28	1.40	1.28	3.31	2.05	0.75
0113558	2" x 2" x 1 ¼" — 63 x 63 x 40 mm	2.48	1.57	2.48	2.36	2.11	2.36	1.28	1.30	1.28	3.31	2.05	0.73
0113560	2" x 2" x 1 ½" — 63 x 63 x 50 mm	2.48	1.97	2.48	2.36	2.36	2.36	1.28	1.44	1.28	3.31	3.31	0.88
0113561	2 ½" x 2 ½" x ½" — 75 x 75 x 20 mm	2.95	0.79	2.95	2.70	2.15	2.70	1.52	1.57	1.52	3.94	1.34	1.10
0113562	2 ½" x 2 ½" x ¾" — 75 x 75 x 25 mm	2.95	0.98	2.95	2.70	2.15	2.70	1.52	1.52	1.52	3.94	1.34	1.10
0113564	2 ½" x 2 ½" x 1" — 75 x 75 x 32 mm	2.95	1.26	2.95	2.70	2.32	2.70	1.52	1.61	1.52	3.94	2.05	1.11
0113566	2 ½" x 2 ½" x 1 ¼" — 75 x 75 x 40 mm	2.95	1.57	2.95	2.70	2.32	2.70	1.52	1.52	1.52	3.94	2.05	1.10
0113568	2 ½" x 2 ½" x 1 ½" — 75 x 75 x 50 mm	2.95	1.97	2.95	2.70	2.60	2.70	1.52	1.67	1.52	3.94	3.31	1.21
0113570	2 ½" x 2 ½" x 2" — 75 x 75 x 63 mm	2.95	2.48	2.95	2.70	2.60	2.70	1.52	1.52	1.52	3.94	3.31	1.13
0113576	3" x 3" x 1" — 90 x 90 x 32 mm	3.54	1.26	3.54	3.11	2.56	3.11	1.81	1.85	1.81	4.72	2.05	1.94
0113578	3" x 3" x 1 ¼" — 90 x 90 x 40 mm	3.54	1.57	3.54	3.11	2.56	3.11	1.81	1.75	1.81	4.72	2.05	1.90
0113580	3" x 3" x 1 ½" — 90 x 90 x 50 mm	3.54	1.97	3.54	3.11	2.95	3.11	1.81	2.03	1.81	4.72	3.31	2.00
0113582	3" x 3" x 2" — 90 x 90 x 63 mm	3.54	2.48	3.54	3.11	2.95	3.11	1.81	1.87	1.81	4.72	3.31	1.93
0113584	3" x 3" x 2 ½" — 90 x 90 x 75 mm	3.54	2.95	3.54	3.11	3.19	3.11	1.81	2.01	1.81	4.72	4.72	2.18
0113586	3 ½" x 3 ½" x 2" — 110 x 110 x 63 mm	4.33	2.48	4.33	3.66	3.44	3.66	2.20	2.36	2.20	5.79	3.94	3.44
0113588	3 ½" x 3 ½" x 2 ½" — 110 x 110 x 75 mm	4.33	2.95	4.33	3.66	3.44	3.66	2.20	2.26	2.20	5.79	3.94	3.33
0113590	3 ½" x 3 ½" x 3" — 110 x 110 x 90 mm	4.33	3.54	4.33	3.66	3.50	3.66	2.20	2.20	2.20	5.79	4.72	3.41
0113592	4" x 4" x 2 ½" — 125 x 125 x 75 mm	4.92	2.95	4.92	4.59	4.19	4.59	3.01	3.01	3.01	6.57	3.94	5.35
0113594	4" x 4" x 3" — 125 x 125 x 90 mm	4.92	3.54	4.92	4.59	4.31	4.59	3.01	3.01	3.01	6.57	4.72	5.53
0113596	4" x 4" x 3 ½" — 125 x 125 x 110 mm	4.92	4.33	4.92	4.59	4.47	4.59	3.01	3.01	3.01	6.57	5.79	5.65

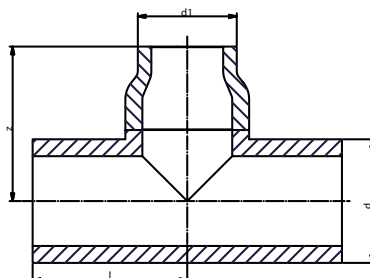
aquatherm green pipe® REDUCING TEE (BUTT-WELD) (inlet, outlet, branch)



SDR	Part no.	Dimension (ND — OD)	d	d1	l	z	Weight
			[in]	[in]	[in]	[in] ± 1/8"	[lb]
7.4 Faser	0113604 ^a	6" x 6" x 4" — 160 x 160 x 125 mm	6.30	4.92	9.06	9.06	13.0
	0113618	8" x 8" x 6" — 200 x 200 x 160 mm	7.87	6.30	11.8	11.8	25.5
	0113634	10" x 10" x 6" — 250 x 250 x 160 mm	9.84	6.30	14.8	14.8	49.4
	0113640	10" x 10" x 8" — 250 x 250 x 200 mm	9.84	7.87	14.8	14.8	50.4
	0113908	12" x 12" x 8" — 315 x 315 x 200 mm	12.4	7.87	18.1	18.1	89.7
	0113910	12" x 12" x 10" — 315 x 315 x 250 mm	12.4	9.84	18.1	18.1	88.7
	0113922	14" x 14" x 10" — 355 x 355 x 250 mm	14.0	9.84	18.9	18.9	122
	0113924	14" x 14" x 12" — 355 x 355 x 315 mm	14.0	12.4	18.9	18.9	123

^a If needed, branch can come with 1 ft extension to be used for butt-welding.

aquatherm green pipe® REDUCING TEE (BUTT-WELD) (inlet, outlet, branch)



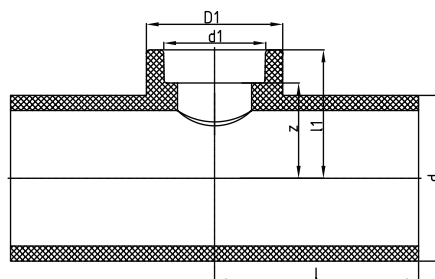
SDR	Part no.	Dimension (ND — OD)	d	d1	l	z	Weight
			[in]	[in]	[in]	[in] ± 1/8"	[lb]
11 Non-Faser	0113605 ^a	6" x 6" x 4" — 160 x 160 x 125 mm	6.30	4.92	9.06	9.06	8.76
	0113619	8" x 8" x 6" — 200 x 200 x 160 mm	7.87	6.30	11.8	11.8	17.3
	0113635	10" x 10" x 6" — 250 x 250 x 160 mm	9.84	6.30	14.8	14.8	33.4
	0113641	10" x 10" x 8" — 250 x 250 x 200 mm	9.84	7.87	14.8	14.8	33.6
	0113655	12" x 12" x 8" — 315 x 315 x 200 mm	12.4	7.87	18.1	18.1	66.3
	0113657	12" x 12" x 10" — 315 x 315 x 250 mm	12.4	9.84	18.1	18.1	66.7
	0113669	14" x 14" x 10" — 355 x 355 x 250 mm	14.0	9.84	18.9	18.9	79.9
	0113671	14" x 14" x 12" — 355 x 355 x 315 mm	14.0	12.4	18.9	18.9	85.9
	0113684 ^b	16" x 16" x 12" — 400 x 400 x 315 mm	15.8	12.4	19.7	19.7	108
	0113685 ^b	16" x 16" x 14" — 400 x 400 x 355 mm	15.8	14.0	19.7	19.7	107
	0113699 ^b	18" x 18" x 14" — 450 x 450 x 355 mm	17.7	14.0	20.7	20.7	146
	0113700 ^b	18" x 18" x 16" — 450 x 450 x 400 mm	17.7	15.8	20.7	20.7	146

^a If needed, branch can come with 1 ft extension to be used for butt-welding.

^b Mechanically stabilized with a faser-composite layer in the center of the pipe.

PRODUCT RANGE - FITTINGS

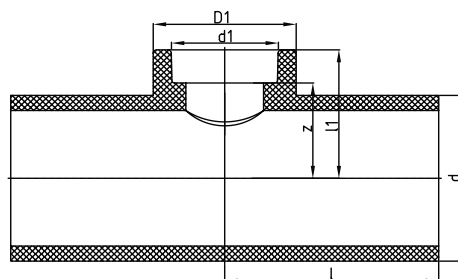
aquatherm green pipe® REDUCING TEE (SOCKET) (inlet, outlet, branch)



SDR	Part no.	Dimension (ND — OD)	d	d1	l	l1	z	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[lb]
7.4 Faser	0113600	6" x 6" x 2 1/2" — 160 x 160 x 75 mm	6.30	2.95	9.06	4.80	3.62	3.94	9.73
	0113602	6" x 6" x 3" — 160 x 160 x 90 mm	6.30	3.54	9.06	4.92	3.62	4.27	9.95
	0113608	8" x 8" x 2 1/2" — 200 x 200 x 75 mm	7.87	2.95	11.8	5.59	4.41	3.94	15.7
	0113610	8" x 8" x 3" — 200 x 200 x 90 mm	7.87	3.54	11.8	5.71	4.41	4.27	16.6
	0113612	8" x 8" x 3 1/2" — 200 x 200 x 110 mm	7.87	4.33	11.8	5.87	4.41	5.79	16.2
	0113614	8" x 8" x 4" — 200 x 200 x 125 mm	7.87	4.92	11.8	6.10	4.53	6.57	16.9
	0113624	10" x 10" x 2 1/2" — 250 x 250 x 75 mm	9.84	2.95	14.8	6.57	5.39	3.94	36.6
	0113626	10" x 10" x 3" — 250 x 250 x 90 mm	9.84	3.54	14.8	6.69	5.39	4.27	37.0
	0113628	10" x 10" x 3 1/2" — 250 x 250 x 110 mm	9.84	4.33	14.8	6.85	5.39	5.79	37.0
	0113630	10" x 10" x 4" — 250 x 250 x 125 mm	9.84	4.92	14.8	7.09	5.51	6.57	37.5
	0113904	12" x 12" x 4" — 315 x 315 x 125 mm	12.4	4.92	18.1	8.39	6.81	6.57	75.5
	0113906 ^a	12" x 12" x 6" — 315 x 315 x 160 mm	12.4	-	18.1	9.37	-	6.30	75.5
	0113916	14" x 14" x 4" — 355 x 355 x 125 mm	14.0	4.92	18.9	9.17	7.60	6.57	99.1
	0113918 ^a	14" x 14" x 6" — 355 x 355 x 160 mm	14.0	-	18.9	10.2	-	6.30	99.2
	0113920 ^a	14" x 14" x 8" — 355 x 355 x 200 mm	14.0	-	18.9	10.6	-	7.87	133

^a Branch outlet has a butt-weld connection.

aqualtherm green pipe® REDUCING TEE (SOCKET) (inlet, outlet, branch)



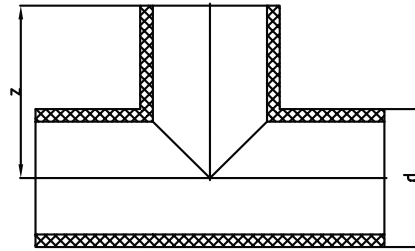
SDR	Part no.	Dimension (ND — OD)	d	d1	l	l1	z	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[lb]
11 Non- Faser	0113601	6" x 6" x 2 1/2" — 160 x 160 x 75 mm	6.30	2.95	9.06	4.80	3.62	3.94	6.92
	0113603	6" x 6" x 3" — 160 x 160 x 90 mm	6.30	3.54	9.06	4.92	3.62	4.27	7.00
	0113609	8" x 8" x 2 1/2" — 200 x 200 x 75 mm	7.87	2.95	11.8	5.59	4.41	3.94	11.7
	0113611	8" x 8" x 3" — 200 x 200 x 90 mm	7.87	3.54	11.8	5.71	4.41	4.27	11.4
	0113613	8" x 8" x 3 1/2" — 200 x 200 x 110 mm	7.87	4.33	11.8	5.87	4.41	5.79	12.5
	0113615	8" x 8" x 4" — 200 x 200 x 125 mm	7.87	4.92	11.8	6.10	4.53	6.57	12.8
	0113625	10" x 10" x 2 1/2" — 250 x 250 x 75 mm	9.84	2.95	14.8	6.57	5.39	3.94	26.5
	0113627	10" x 10" x 3" — 250 x 250 x 90 mm	9.84	3.54	14.8	6.69	5.39	4.27	26.5
	0113629	10" x 10" x 3 1/2" — 250 x 250 x 110 mm	9.84	4.33	14.8	6.85	5.39	5.79	28.7
	0113631	10" x 10" x 4" — 250 x 250 x 125 mm	9.84	4.92	14.8	7.09	5.51	6.57	26.5
	0113651	12" x 12" x 4" — 315 x 315 x 125 mm	12.4	4.92	18.1	8.39	6.81	6.57	55.5
	0113653 ^a	12" x 12" x 6" — 315 x 315 x 160 mm	12.4	-	18.1	9.37	-	6.30	54.8
	0113663	14" x 14" x 4" — 355 x 355 x 125 mm	14.0	4.92	18.9	9.17	7.60	6.57	68.0
	0113665 ^{ab}	14" x 14" x 6" — 355 x 355 x 160 mm	14.0	-	18.9	10.2	-	6.30	68.1
	0113667 ^a	14" x 14" x 8" — 355 x 355 x 200 mm	14.0	-	18.9	10.5	-	7.87	69.8
	0113676 ^b	16" x 16" x 4" — 400 x 400 x 125 mm	15.8	4.92	19.7	10.0	8.46	6.57	93.0
	0113678 ^{ab}	16" x 16" x 6" — 400 x 400 x 160 mm	15.8	-	19.7	11.0	-	6.30	97.3
	0113680 ^{ab}	16" x 16" x 8" — 400 x 400 x 200 mm	15.8	-	19.7	11.0	-	7.87	97.3
	0113682 ^{ab}	16" x 16" x 10" — 400 x 400 x 250 mm	15.8	-	19.7	11.0	-	9.84	97.3
	0113690	18" x 18" x 4" — 450 x 450 x 125 mm	17.7	4.92	20.7	11.0	9.45	6.57	123
	0113692 ^{ab}	18" x 18" x 6" — 450 x 450 x 160 mm	17.7	-	20.7	12.0	-	6.30	128
	0113694 ^{ab}	18" x 18" x 8" — 450 x 450 x 200 mm	17.7	-	20.7	12.0	-	7.87	128
	0113696 ^{ab}	18" x 18" x 10" — 450 x 450 x 250 mm	17.7	-	20.7	12.0	-	9.84	128
	0113698 ^{ab}	18" x 18" x 12" — 450 x 450 x 315 mm	17.7	-	20.7	12.4	-	12.4	130

^aBranch outlet has a butt-weld connection.

^bMechanically stabilized with a faser-composite layer in the center of the pipe.

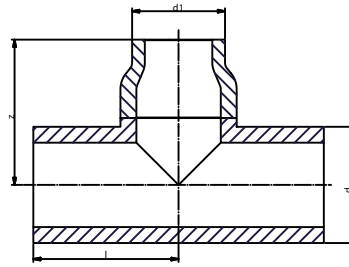
PRODUCT RANGE - FITTINGS

aquatherm blue pipe® TEE (BUTT-WELD)



SDR	Part No.	Dimension (ND — OD)	d	z	Weight lb/pc
			[in]	[in] ± 1/8"	
11	2613131	6" — 160 mm	6.30	9.06	9.05
	2613135	8" — 200 mm	7.87	11.8	15.8
	2613139	10" — 250 mm	9.84	14.8	38.5
	2013143	12" — 315 mm	12.4	18.1	74.0
	2013145	14" — 355 mm	14.0	18.9	97.0
	2013147	16" — 400 mm	15.8	19.7	127
	2013149	18" — 450 mm	17.7	20.7	166
17.6	2513130	6" — 160 mm	6.30	9.06	6.25
	2513134	8" — 200 mm	7.87	11.8	10.3
	2513138	10" — 250 mm	9.84	14.8	25.0
	2513142	12" — 315 mm	12.4	18.1	48.0
	2513144	14" — 355 mm	14.0	18.9	63.0
	2513146	16" — 400 mm	15.8	19.7	82.0
	2513148	18" — 450 mm	17.7	20.7	108
	2513150	20" — 500 mm	19.7	23.6	152
	2513152	22" — 560 mm	22.1	24.8	197
	2513154	24" — 630 mm	24.1	26.2	265

aquatherm blue pipe® REDUCING TEE (BUTT-WELD) (inlet, outlet, branch)

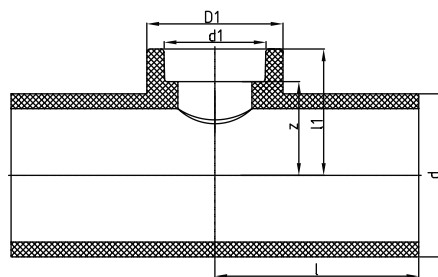


SDR	Part no.	Dimension (ND — OD)	d	d1	l	z	Weight
			[in]	[in]	[in]	[in] ± 1/8"	[lb]
11	2613605 ^a	6" x 6" x 4" — 160 x 160 x 125 mm	6.30	4.92	9.06	9.06	9.12
	2613619	8" x 8" x 6" — 200 x 200 x 160 mm	7.87	6.30	11.8	11.8	18.0
	2613635	10" x 10" x 6" — 250 x 250 x 160 mm	9.84	6.30	14.8	14.8	35.1
	2613641	10" x 10" x 8" — 250 x 250 x 200 mm	9.84	7.87	14.8	14.8	35.2
	2013655	12" x 12" x 8" — 315 x 315 x 200 mm	12.4	7.87	18.1	18.1	66.3
	2013657	12" x 12" x 10" — 315 x 315 x 250 mm	12.4	9.84	18.1	18.1	66.7
	2013669	14" x 14" x 10" — 355 x 355 x 250 mm	14.0	9.84	18.9	18.9	83.9
	2013671	14" x 14" x 12" — 355 x 355 x 315 mm	14.0	12.4	18.9	18.9	90.3
	2013684	16" x 16" x 12" — 400 x 400 x 315 mm	15.8	12.4	19.7	19.7	108
	2013685	16" x 16" x 14" — 400 x 400 x 355 mm	15.8	14.0	19.7	19.7	107
	2013699	18" x 18" x 14" — 450 x 450 x 355 mm	17.7	14.0	20.7	20.7	146
	2013700	18" x 18" x 16" — 450 x 450 x 400 mm	17.7	15.8	20.7	20.7	146
17.6	2513604 ^a	6" x 6" x 4" — 160 x 160 x 125 mm	6.30	4.92	9.06	9.06	6.39
	2513618	8" x 8" x 6" — 200 x 200 x 160 mm	7.87	6.30	11.8	11.8	12.2
	2513634	10" x 10" x 6" — 250 x 250 x 160 mm	9.84	6.30	14.8	14.8	22.7
	2513640	10" x 10" x 8" — 250 x 250 x 200 mm	9.84	7.87	14.8	14.8	22.3
	2513655	12" x 12" x 8" — 315 x 315 x 200 mm	12.4	7.87	18.1	18.1	48.0
	2513657	12" x 12" x 10" — 315 x 315 x 250 mm	12.4	9.84	18.1	18.1	44.5
	2513669	14" x 14" x 10" — 355 x 355 x 250 mm	14.0	9.84	18.9	18.9	54.6
	2513671	14" x 14" x 12" — 355 x 355 x 315 mm	14.0	12.4	18.9	18.9	58.6
	2513684	16" x 16" x 12" — 400 x 400 x 315 mm	15.8	12.4	19.7	19.7	69.3
	2513685	16" x 16" x 14" — 400 x 400 x 355 mm	15.8	14.0	19.7	19.7	68.6
	2513699	18" x 18" x 14" — 450 x 450 x 355 mm	17.7	14.0	20.7	20.7	94.6
	2513700	18" x 18" x 16" — 450 x 450 x 400 mm	17.7	15.8	20.7	20.7	93.8
	2513813	20" x 20" x 14" — 500 x 500 x 355 mm	19.7	14.0	23.6	23.6	137
	2513814	20" x 20" x 16" — 500 x 500 x 400 mm	19.7	15.8	23.6	23.6	137
	2513815	20" x 20" x 18" — 500 x 500 x 450 mm	19.7	17.7	23.6	23.6	135
	2513831	22" x 22" x 16" — 560 x 560 x 400 mm	22.1	15.8	24.8	24.8	180
	2513832	22" x 22" x 18" — 560 x 560 x 450 mm	22.1	17.7	24.8	24.8	182
	2513833	22" x 22" x 20" — 560 x 560 x 500 mm	22.1	19.7	24.8	24.8	180
	2513849	24" x 24" x 16" — 630 x 630 x 400 mm	24.8	15.8	26.2	26.2	246
	2513850	24" x 24" x 18" — 630 x 630 x 450 mm	24.8	17.7	26.2	26.2	247
	2513851	24" x 24" x 20" — 630 x 630 x 500 mm	24.8	19.7	26.2	26.2	242
	2513852	24" x 24" x 22" — 630 x 630 x 560 mm	24.8	22.1	26.2	26.2	237

^a If needed, branch can come with a 1ft extension to be used for butt-welding.

PRODUCT RANGE - FITTINGS

aquatherm blue pipe® REDUCING TEE (SOCKET) (inlet, outlet, branch)



SDR	Part no.	Dimension (ND — OD)	d	d1	l	l1	z	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[lb]
11	2613601	6" x 6" x 2 1/2" — 160 x 160 x 75 mm	6.30	2.95	9.06	4.80	3.62	3.94	7.33
	2613603	6" x 6" x 3" — 160 x 160 x 90 mm	6.30	3.54	9.06	4.92	3.62	4.72	11.4
	2613609	8" x 8" x 2 1/2" — 200 x 200 x 75 mm	7.87	2.95	11.8	5.59	4.41	3.94	12.0
	2613611	8" x 8" x 3" — 200 x 200 x 90 mm	7.87	3.54	11.8	5.71	4.41	4.72	12.3
	2613613	8" x 8" x 3 1/2" — 200 x 200 x 110 mm	7.87	4.33	11.8	5.87	4.41	5.79	12.8
	2613615	8" x 8" x 4" — 200 x 200 x 125 mm	7.87	4.92	11.8	6.10	4.53	6.57	13.5
	2613625	10" x 10" x 2 1/2" — 250 x 250 x 75 mm	9.84	2.95	14.8	6.57	5.39	3.94	27.4
	2613627	10" x 10" x 3" — 250 x 250 x 90 mm	9.84	3.54	14.8	6.69	5.39	4.72	27.4
	2613629	10" x 10" x 3 1/2" — 250 x 250 x 110 mm	9.84	4.33	14.8	6.85	5.39	5.79	28.1
	2613631	10" x 10" x 4" — 250 x 250 x 125 mm	9.84	4.92	14.8	7.09	5.51	6.57	28.7
	2013651	12" x 12" x 4" — 315 x 315 x 125 mm	12.4	4.92	18.1	8.39	6.81	6.57	55.1
	2013653 ^a	12" x 12" x 6" — 315 x 315 x 160 mm	12.4	-	18.1	9.37	-	6.30	55.2
	2013663	14" x 14" x 4" — 355 x 355 x 125 mm	14.0	4.92	18.9	9.17	7.60	6.57	71.7
	2013665 ^a	14" x 14" x 6" — 355 x 355 x 160 mm	14.0	-	18.9	10.2	-	6.30	71.7
	2013667 ^a	14" x 14" x 8" — 355 x 355 x 200 mm	14.0	-	18.9	10.5	-	7.87	66.6
	2013676	16" x 16" x 4" — 400 x 400 x 125 mm	15.8	4.92	19.7	10.0	8.46	6.57	92.8
	2013678 ^a	16" x 16" x 6" — 400 x 400 x 160 mm	15.8	-	19.7	10.1	-	6.30	97.2
	2013680 ^a	16" x 16" x 8" — 400 x 400 x 200 mm	15.8	-	19.7	11.0	-	7.87	97.2
	2013682 ^a	16" x 16" x 10" — 400 x 400 x 250 mm	15.8	-	19.7	11.0	-	9.84	101
	2013690	18" x 18" x 4" — 450 x 450 x 125 mm	17.7	4.92	20.7	11.0	9.45	6.57	123
	2013692 ^a	18" x 18" x 6" — 450 x 450 x 160 mm	17.7	-	20.7	12.0	-	6.30	128
	2013694 ^a	18" x 18" x 8" — 450 x 450 x 200 mm	17.7	-	20.7	12.0	-	7.87	128
	2013696 ^a	18" x 18" x 10" — 450 x 450 x 250 mm	17.7	-	20.7	12.0	-	9.84	128
	2013698 ^a	18" x 18" x 12" — 450 x 450 x 315 mm	17.7	-	20.7	12.4	-	12.4	129

^aBranch outlet has a butt-weld connection.

aquatherm blue pipe® REDUCING TEE (SOCKET) (continued)

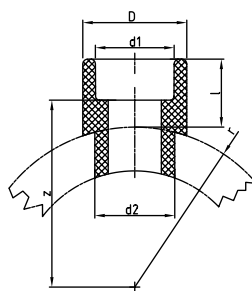
SDR	Part no.	Dimension (ND — OD)	d	d1	l	l1	z	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[lb]
17.6	2513600	6" x 6" x 2 ½" — 160 x 160 x 75 mm	6.30	2.95	9.06	4.80	3.62	3.94	4.91
	2513602	6" x 6" x 3" — 160 x 160 x 90 mm	6.30	3.54	9.06	4.92	3.62	4.27	5.21
	2513608	8" x 8" x 2 ½" — 200 x 200 x 75 mm	7.87	2.95	11.8	5.59	4.41	3.94	7.98
	2513610	8" x 8" x 3" — 200 x 200 x 90 mm	7.87	3.54	11.8	5.71	4.41	4.27	8.25
	2513612	8" x 8" x 3 ½" — 200 x 200 x 110 mm	7.87	4.33	11.8	5.87	4.41	5.79	8.77
	2513614	8" x 8" x 4" — 200 x 200 x 125 mm	7.87	4.92	11.8	6.10	4.53	6.57	9.41
	2513624	10" x 10" x 2 ½" — 250 x 250 x 75 mm	9.84	2.95	14.8	6.57	5.39	3.94	18.0
	2513626	10" x 10" x 3" — 250 x 250 x 90 mm	9.84	3.54	14.8	6.69	5.39	4.27	18.3
	2513628	10" x 10" x 3 ½" — 250 x 250 x 110 mm	9.84	4.33	14.8	6.85	5.39	5.79	18.8
	2513630	10" x 10" x 4" — 250 x 250 x 125 mm	9.84	4.92	14.8	7.09	5.51	6.57	19.8
	2513651	12" x 12" x 4" — 315 x 315 x 125 mm	12.4	4.92	18.1	8.39	6.81	6.57	38.7
	2513653 ^a	12" x 12" x 6" — 315 x 315 x 160 mm	12.4	-	18.1	9.37	-	6.30	36.8
	2513663	14" x 14" x 4" — 355 x 355 x 125 mm	14.0	4.92	18.9	9.17	7.60	6.57	47.4
	2513665 ^a	14" x 14" x 6" — 355 x 355 x 160 mm	14.0	-	18.9	10.2	-	6.30	47.4
	2513667 ^a	14" x 14" x 8" — 355 x 355 x 200 mm	14.0	-	18.9	10.5	-	7.87	48.3
	2513676	16" x 16" x 4" — 400 x 400 x 125 mm	15.8	4.92	19.7	10.0	8.46	6.57	61.1
	2513678 ^a	16" x 16" x 6" — 400 x 400 x 160 mm	15.8	-	19.7	11.0	-	6.30	65.5
	2513680 ^a	16" x 16" x 8" — 400 x 400 x 200 mm	15.8	-	19.7	11.0	-	7.87	65.5
	2513682 ^a	16" x 16" x 10" — 400 x 400 x 250 mm	15.8	-	19.7	11.0	-	9.84	63.9
	2513690	18" x 18" x 4" — 450 x 450 x 125 mm	17.7	4.92	20.7	11.0	9.45	6.57	80.4
	2513692 ^a	18" x 18" x 6" — 450 x 450 x 160 mm	17.7	-	20.7	12.0	-	6.30	81.6
	2513694 ^a	18" x 18" x 8" — 450 x 450 x 200 mm	17.7	-	20.7	12.0	-	7.87	81.6
	2513696 ^a	18" x 18" x 10" — 450 x 450 x 250 mm	17.7	-	20.7	12.0	-	9.84	81.6
	2513698 ^a	18" x 18" x 12" — 450 x 450 x 315 mm	17.7	-	20.7	12.4	-	12.4	81.6
	2513804	20" x 20" x 4" — 500 x 500 x 125 mm	19.7	4.92	23.6	12.0	10.4	6.57	113
	2513806 ^a	20" x 20" x 6" — 500 x 500 x 160 mm	19.7	-	23.6	13.0	-	6.30	118
	2513808 ^a	20" x 20" x 8" — 500 x 500 x 200 mm	19.7	-	23.6	13.0	-	7.87	118
	2513810 ^a	20" x 20" x 10" — 500 x 500 x 250 mm	19.7	-	23.6	13.0	-	9.84	118
	2513812 ^a	20" x 20" x 12" — 500 x 500 x 315 mm	19.7	-	23.6	13.3	-	12.4	119
	2513821	22" x 22" x 4" — 560 x 560 x 125 mm	22.1	4.92	24.8	13.2	11.6	6.57	119
	2513839	24" x 24" x 4" — 630 x 630 x 125 mm	24.8	4.92	26.2	14.6	13.0	6.57	197
	2513841 ^a	24" x 24" x 6" — 630 x 630 x 160 mm	24.8	-	26.2	15.7	-	6.30	202
	2513843 ^a	24" x 24" x 8" — 630 x 630 x 200 mm	24.8	-	26.2	15.7	-	7.87	202
	2513845 ^a	24" x 24" x 10" — 630 x 630 x 250 mm	24.8	-	26.2	15.7	-	9.84	202
	2513847 ^a	24" x 24" x 12" — 630 x 630 x 315 mm	24.8	-	26.2	16.1	-	12.4	204

^aBranch outlet has a butt-weld connection.

PRODUCT RANGE - FITTINGS

aquatherm green pipe® FUSION OUTLET (SOCKET)

The necessary welding heads are listed on page 5.51 (part no. 0050614 - 0050640). Fusion outlet fittings are rated at SDR 7.4. Allowances should be made for connection to other SDRs. System piping should be de-rated to SDR 11 capacities.



Part no.	Dimension pipe x outlet (ND — OD)	r	d1	d2	l	z	D	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0115156	1 ¼" x ½" — 40 x 20 mm	0.79	0.79	0.98	1.06	1.28	1.16	0.03
0115158	1 ¼" x ¾" — 40 x 25 mm	0.79	0.98	0.98	1.12	1.28	1.34	0.04
0115160	1 ½" x ½" — 50 x 20 mm	0.99	0.79	0.98	1.08	1.50	1.16	0.04
0115162	1 ½" x ¾" — 50 x 25 mm	0.99	0.98	0.98	1.12	1.48	1.34	0.04
0115164	2 x ½" — 63 x 20 mm	1.24	0.79	0.98	1.08	1.75	1.16	0.04
0115166	2" x ¾" — 63 x 25 mm	1.24	0.98	0.98	1.12	1.73	1.34	0.04
0115168	2" x 1" — 63 x 32 mm	1.24	1.26	1.26	1.18	1.71	1.69	0.06
0115170	2 ½" x ½" — 75 x 20 mm	1.48	0.79	0.98	1.08	1.99	1.16	0.04
0115172	2 ½" x ¾" — 75 x 25 mm	1.48	0.98	0.98	1.12	1.97	1.34	0.04
0115174	2 ½" x 1" — 75 x 32 mm	1.48	1.26	1.26	1.18	1.95	1.69	0.06
0115175	2 ½" x 1 ¼" — 75 x 40 mm	1.48	1.57	1.57	1.34	2.01	2.05	0.11
0115176	3" x ½" — 90 x 20 mm	1.77	0.79	0.98	1.08	2.28	1.16	0.04
0115178	3" x ¾" — 90 x 25 mm	1.77	0.98	0.98	1.12	2.26	1.34	0.04
0115180	3" x 1" — 90 x 32 mm	1.77	1.26	1.26	1.18	2.24	1.69	0.06
0115181	3" x 1 ¼" — 90 x 40 mm	1.77	1.57	1.57	1.34	2.30	2.05	0.11
0115182	3 ½" x ½" — 110 x 20 mm	2.17	0.79	0.98	1.08	2.68	1.16	0.04
0115184	3 ½" x ¾" — 110 x 25 mm	2.17	0.98	0.98	1.12	2.70	1.34	0.04
0115186	3 ½" x 1" — 110 x 32 mm	2.17	1.26	1.26	1.18	2.64	1.69	0.07
0115188	3 ½" x 1 ¼" — 110 x 40 mm	2.17	1.57	1.57	1.34	2.70	2.05	0.11
0115189	3 ½" x 1 ½" — 110 x 50 mm	2.17	1.97	1.97	1.34	2.58	2.68	0.20
0115190	4" x ½" — 125 x 20 mm	2.46	0.79	0.98	1.08	2.93	1.16	0.04
0115192	4" x ¾" — 125 x 25 mm	2.46	0.98	0.98	1.12	2.95	1.34	0.04
0115194	4" x 1" — 125 x 32 mm	2.46	1.26	1.26	1.18	2.93	1.69	0.06
0115196	4" x 1 ¼" — 125 x 40 mm	2.46	1.57	1.57	1.34	2.99	2.05	0.11
0115197	4" x 1 ½" — 125 x 50 mm	2.46	1.97	1.97	1.34	2.87	2.68	0.20
0115198	4" x 2" — 125 x 63 mm	2.46	2.48	2.48	1.50	2.87	3.31	0.33
0115206	6" x ½" — 160 x 20 mm	3.15	0.79	0.98	2.44	3.66	1.16	0.05
0115208	6" x ¾" — 160 x 25 mm	3.15	0.98	0.98	1.12	3.64	1.34	0.05
0115210	6" x 1" — 160 x 32 mm	3.15	1.26	1.26	1.18	3.62	1.69	0.07
0115212	6" x 1 ¼" — 160 x 40 mm	3.15	1.57	1.57	1.34	3.68	2.05	0.12
0115214	6" x 1 ½" — 160 x 50 mm	3.15	1.97	1.97	1.34	3.56	2.70	0.21
0115216	6" x 2" — 160 x 63 mm	3.15	2.48	2.48	1.50	3.56	3.31	0.34
0115218	6" x 2 ½" — 160 x 75 mm	3.15	2.95	2.95	1.65	3.62	3.94	0.52
0115220	6" x 3" — 160 x 90 mm	3.15	3.54	3.54	1.77	3.62	4.72	0.79
0115228	8" to 10" x ½" — 200 to 250 x 20 mm	3.94/4.92	0.79	0.98	1.08	4.45	1.16	0.04
0115229	8" to 10" x ¾" — 200 to 250 x 25 mm	3.94/4.92	0.98	0.98	1.12	4.43	1.34	0.05
0115230	8" to 10" x 1" — 200 to 250 x 32 mm	3.94/4.92	1.26	1.26	1.18	4.41	1.69	0.07
0115231	8" x 1 ¼" — 200 x 40 mm	3.94	1.57	1.57	1.34	4.47	2.05	0.11
0115232	8" x 1 ½" — 200 x 50 mm	3.94	1.97	1.97	1.34	4.35	2.68	0.19
0115233	8" x 2" — 200 x 63 mm	3.94	2.48	2.48	1.48	4.33	3.31	0.32

aquatherm green pipe® FUSION OUTLET (SOCKET) (continued)

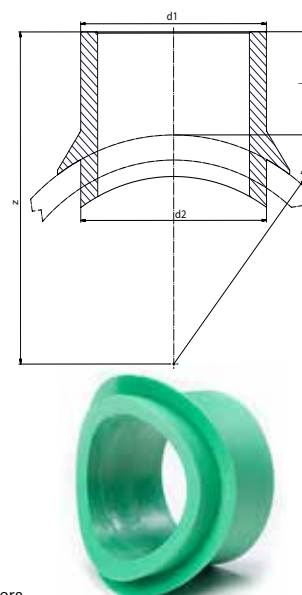
Part no.	Dimension pipe x outlet (ND — OD)	r	d1	d2	l	z	D	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0115234	8" x 2 1/2" — 200 x 75 mm	3.94	2.95	2.95	1.65	4.41	3.94	0.50
0115235	8" x 3" — 200 x 90 mm	3.94	3.54	3.54	1.77	4.41	4.72	0.78
0115236	8" x 3 1/2" — 200 x 110 mm	3.94	4.33	4.33	1.93	4.41	5.79	1.41
0115237	8" x 4" — 200 x 125 mm	3.94	4.92	4.92	2.17	4.53	6.57	1.90
0115251	10" x 1 1/4" — 250 x 40 mm	4.92	1.57	1.57	1.34	5.45	2.05	0.12
0115252	10" x 1 1/2" — 250 x 50 mm	4.92	1.97	1.97	1.34	5.33	2.68	0.20
0115253	10" x 2" — 250 x 63 mm	4.92	2.48	2.48	1.48	5.31	3.31	0.33
0115254	10" x 2 1/2" — 250 x 75 mm	4.92	2.95	2.95	1.65	5.39	3.94	0.49
0115255	10" x 3" — 250 x 90 mm	4.92	3.54	3.54	1.77	5.39	4.72	0.77
0115256	10" x 3 1/2" — 250 x 110 mm	4.92	4.33	4.33	1.93	5.39	5.79	1.33
0115257	10" x 4" — 250 x 125 mm	4.92	4.92	4.92	2.17	5.51	6.57	1.81
0115260	12" to 14" x 2" — 315 to 355 x 63 mm	6.20/7.00	2.48	2.48	1.48	6.59	3.31	0.34
0115261	12" to 14" x 2 1/2" — 315 to 355 x 75 mm	6.20/7.00	2.95	2.95	1.65	6.67	3.94	0.51
0115262	12" x 3" — 315 x 90 mm	6.20	3.54	3.54	1.77	6.67	4.27	0.80
0115263	12" x 3 1/2" — 315 x 110 mm	6.20	4.33	4.33	1.93	6.67	5.79	1.31
0115264	12" x 4" — 315 x 125 mm	6.20	4.92	4.92	2.17	6.79	6.57	1.83
0115268	14" x 3" — 355 x 90 mm	7.00	3.54	3.54	1.77	7.46	4.27	0.78
0115269	14" x 3 1/2" — 355 x 110 mm	7.00	4.33	4.33	1.93	7.46	5.79	1.29
0115270	14" x 4" — 355 x 125 mm	7.00	4.92	4.92	2.17	7.58	6.57	1.79
0115275	16" to 20" x 2 1/2" — 400 to 500 x 75 mm	7.90/9.85	2.95	2.95	1.65	8.35	3.94	0.48
0115277	16" to 18" x 3 1/2" — 400 to 450 x 110 mm	7.90/8.85	4.33	4.33	1.93	8.35	5.79	1.18
0115278	16" x 4" — 400 x 125 mm	7.90	4.92	4.92	2.17	8.46	6.57	1.53
0115288	16" to 20" x 3" — 400 to 500 x 90 mm	7.90/9.85	3.54	3.54	1.77	9.33	4.27	0.73
0115290	18" to 20" x 4" — 450 to 500 x 125 mm	8.85/9.85	4.92	4.92	2.17	9.45	6.57	1.48
0115300	16" to 24" x 2" — 400 to 630 x 63 mm	7.90/12.4	2.48	2.48	1.48	10.2	3.31	1.10
0115303	20" to 22" x 3 1/2" — 500 to 560 x 110 mm	9.85/11.0	4.33	4.33	1.93	10.3	5.79	1.17
0115315	22" to 24" x 2 1/2" — 560 to 630 x 75 mm	11.0/12.4	2.95	2.95	1.65	11.5	3.94	0.57
0115316	22" to 24" x 3" — 560 to 630 x 90 mm	11.0/12.4	3.54	3.54	1.77	11.5	4.27	0.77
0115318	22" to 24" x 4" — 560 - 630 x 125 mm	11.0/12.4	4.92	4.92	2.17	11.5	6.57	1.52
0115331	24" x 3 1/2" — 630 x 110 mm	12.4	4.33	4.33	1.93	12.9	5.79	1.25

aquatherm green pipe® FUSION OUTLET (BUTT WELD)

The necessary welding heads are listed on page 5.51 (part no. 0050614 - 0050640). Fusion outlet fittings are rated at SDR 11. Allowances should be made for connection to other SDRs. System piping should be de-rated to SDR 11 capacities.

Part no.	Dimension pipe x outlet (ND — OD)	r	d1	d2	l	z	Weight
		[in]	[in]	[in]	[in]	[in]	[lb]
0115265	12" x 6" — 315 x 160 mm	6.30	6.30	6.30	3.15	6.30	1.91
0115271	14" x 6" — 355 x 160 mm	7.00	6.30	6.30	3.15	6.30	1.91
0115272	14" x 8" — 355 x 200 mm	7.00	7.86	7.86	3.54	10.5	-
0115280 ^a	16" x 6" to 10" — 400 x 160 to 250 mm	7.90	9.83	9.83	3.14	11.0	-
0115292 ^a	18" x 6" to 10" — 450 x 160 to 250 mm	8.85	9.83	9.83	3.14	12.0	-
0115298	18" x 12" — 450 x 315 mm	8.85	12.4	12.4	3.54	12.4	-
0115306 ^a	20" x 6" to 10" — 500 x 160 to 250 mm	9.85	9.83	9.83	3.14	13.0	-
0115312	20" x 12" — 500 x 315 mm	9.85	12.4	12.4	3.43	13.3	-
0115334 ^a	24" x 6" to 10" — 630 x 160 to 250 mm	12.4	9.83	9.83	3.34	15.7	-
0115340	24" x 12" — 630 x 315 mm	12.4	12.4	12.4	3.73	16.1	-

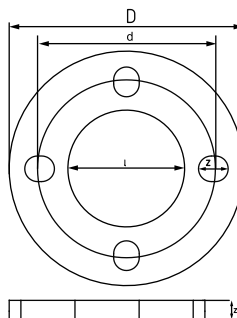
^a Molded fitting designed to accommodate a range of branch sizes. If needed, the fitting can be cut and butt welded to the smaller diameters in the given range.



PRODUCT RANGE - FLANGES

AQUATHERM FLANGE RING

Carbon steel with green epoxy powder coating, American bolt pattern. For flange bolt size and torque, refer to Appendix A. ASME B16.5, Class 150 bolt pattern.

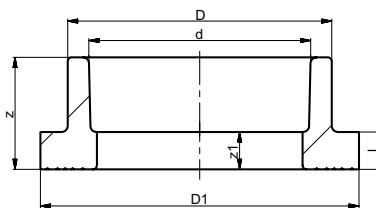


Part no.	Dimension (ND — OD)	No. of bolt holes	D	d	l	z	z1	Weight
			[in]	[in]	[in]	[in]	[in]	[lb]
3315712	1" — 32 mm	4	4.28	3.21	1.73	0.70	0.51	1.50
3315714	1 ¼" — 40 mm	4	5.57	4.25	2.11	0.84	0.51	2.73
3315716	1 ½" — 50 mm	4	5.96	4.56	2.52	0.86	0.51	3.05
3315718	2" — 63 mm	4	6.00	4.84	3.15	0.75	0.63	3.45
3315720	2 ½" — 75 mm	4	7.00	5.56	3.71	0.75	0.63	4.75
3315722 ^a	3" — 90 mm	8	8.00	6.15	4.39	0.85	0.63	5.50
3315724 ^a	3 ½" — 110 mm	8	8.75	7.13	5.33	0.75	0.63	6.00
3315726	4" — 125 mm	8	9.00	7.33	5.38	0.92	0.63	6.80
3315730	6" — 160 mm	8	11.0	9.54	7.13	0.84	0.71	10.4
3315734	8" — 200 mm	8	13.5	11.9	9.50	0.81	0.71	13.9
3315738	10" — 250 mm	12	16.0	14.2	11.4	1.13	0.81	20.4
3315742	12" — 315 mm	12	19.0	16.9	13.5	0.97	0.91	33.6
3315744	14" — 355 mm	12	21.0	18.7	14.8	1.37	1.46	61.8
3315746	16" — 400 mm	16	23.5	21.2	16.9	1.38	1.45	78.6
3315748	18" — 450 mm	16	25.0	22.8	18.9	1.25	0.94	50.4
3315750	20" — 500 mm	20	27.0	25.0	20.8	1.25	1.00	112
3315752	22" — 560 mm	20	29.5	27.3	27.8	1.38	1.13	137
3315754	24" — 630 mm	20	31.8	29.4	25.0	1.34	2.00	145

^a Flange ring will have 8 holes, but only 4 holes will be used when mating up to steel flanges in the same size.

aquatherm green pipe® FLANGE ADAPTER (SOCKET)

Socket welded. Gasket not included. All sizes are compatible with butterfly valves.

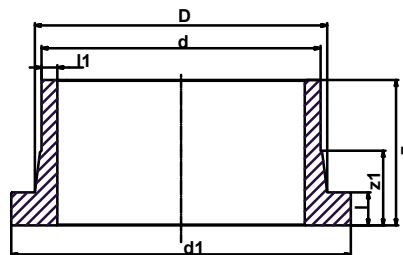


Part no.	Dimension (ND — OD)	d	z	z1	D	D1	l	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0115512	1" — 32 mm	1.26	1.38	0.67	1.61	2.68	0.43	0.12
0115514	1 ¼" — 40 mm	1.57	1.44	0.63	1.97	3.07	0.47	0.16
0115516	1 ½" — 50 mm	1.97	1.59	0.67	2.40	3.46	0.51	0.16
0115518	2" — 63 mm	2.48	1.75	0.67	2.99	4.02	0.59	0.25
0115520	2 ½" — 75 mm	2.95	1.85	0.67	3.54	4.80	0.67	0.37
0115522	3" — 90 mm	3.54	1.97	0.67	4.25	5.43	0.67	0.58
0115524	3 ½" — 110 mm	4.33	2.19	0.73	5.16	6.22	0.73	0.73
0115526 ^a	4" — 125 mm	4.92	2.19	0.73	5.16	6.22	0.53	2.78

^aPart no. 0115526 may be butt welded or paired with a coupling (part no. 0111026, sold separately).

aquatherm green pipe® FLANGE ADAPTER (BUTT-WELD)

Butt welded. Gasket not included. All sizes are compatible with butterfly valves.



SDR	Part no. for butterfly valve	Dimension (ND — OD)	d	l	z	D	d1	l1	z1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
7.4	0115530BV	6" — 160 mm	6.30	1.00	3.63	6.89	8.38	0.86	2.13	2.56
	0115530LBV ^a	6" — 160 mm	6.30	1.00	15.6	6.89	8.38	0.86	2.13	8.97
	0115534BV	8" — 200 mm	7.87	1.26	5.12	9.13	10.6	1.08	2.83	5.05
	0115538BV	10" — 250 mm	9.84	1.38	5.12	11.2	12.6	1.35	2.95	7.27
	0115542BV	12" — 315 mm	12.4	1.38	6.69	13.1	14.6	1.13	3.19	17.4
	0115544BV	14" — 355 mm	14.0	1.65	7.28	14.6	17.0	1.27	3.74	23.8
11	0115531BV	6" — 160 mm	6.30	0.98	3.66	6.89	8.35	0.57	2.09	2.10
	0115531LBBV ^b	6" — 160 mm	6.30	0.98	15.6	6.89	8.35	0.57	2.09	2.20
	0115531LGBV ^a	6" — 160 mm	6.30	0.98	15.6	6.89	8.35	0.57	2.09	2.20
	0115535BV	8" — 200 mm	7.87	1.26	5.12	9.13	10.6	0.72	2.83	4.31
	0115539BV	10" — 250 mm	9.84	1.38	5.12	11.2	12.6	0.89	2.95	5.99
	0115543BV	12" — 315 mm	12.4	1.38	6.69	13.1	14.6	1.13	3.19	12.5
	0115545BV	14" — 355 mm	14.0	1.65	7.28	14.6	17.0	1.27	3.74	19.8
	0115547BV	16" — 400 mm	15.8	1.30	7.83	16.7	19.1	0.89	3.86	26.5
	0115549BV	18" — 450 mm	17.7	1.80	5.50	20.8	23.1	1.00	3.00	36.4
17.6	2915530BV	6" — 160 mm	6.30	0.98	3.66	6.89	8.35	0.36	2.09	1.81
	2915534BV	8" — 200 mm	7.87	1.26	5.12	9.13	10.6	0.45	2.83	4.08
	2915538BV	10" — 250 mm	9.84	1.38	5.12	11.2	12.6	0.56	2.95	6.03
	2915542BV	12" — 315 mm	12.4	1.38	6.69	13.1	14.6	0.70	3.19	9.92
	2915544BV	14" — 355 mm	14.0	1.65	7.28	14.6	17.0	0.79	3.74	14.3
	2915546BV	16" — 400 mm	15.8	1.30	7.83	16.7	19.1	0.89	3.50	18.7
	2915548BV	18" — 450 mm	17.7	1.80	5.50	20.8	23.1	1.00	3.00	26.5
	2915550BV	20" — 500 mm	19.7	1.85	5.55	20.7	23.0	1.12	2.91	21.6
	2915552 ^c	22" — 560 mm	22.0	1.97	5.55	22.4	25.6	1.25	3.19	30.4
	2915554BV	24" — 630 mm	24.8	1.97	5.59	25.2	27.1	1.41	3.23	27.8

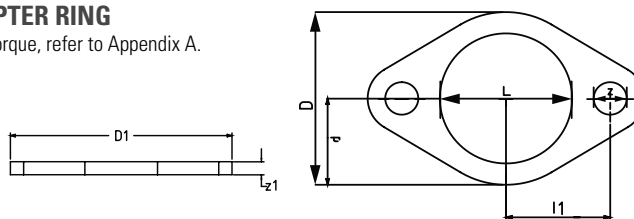
^a Includes 1-ft extension of **aquatherm green pipe**®.

^b Includes 1-ft extension of **aquatherm blue pipe**®.

^c Not butterfly valve compatible.

AQUATHERM PUMP FLANGE ADAPTER RING

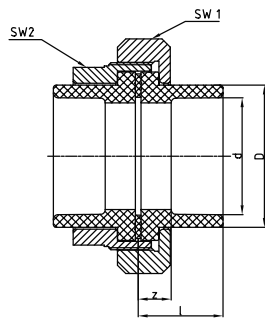
American bolt pattern. For flange bolt size and torque, refer to Appendix A.



Part no.	Dimension (ND — OD)	d	L	z	D	l1	D1	z1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
5515712	1" — 32 mm pump flange ring - blue (used with part no. 0115512)	1.33	1.75	0.50	2.66	1.58	4.18	0.25	0.36
5515713	1 ¼" — 40 mm pump flange ring (used with part no. 0115514)	1.33	2.00	0.50	2.66	1.58	4.18	0.25	0.30
5515714	1 ¼" — 40 mm pump flange ring (used with part no. 0115514, fitted Grundfos model UP4375)	1.50	2.00	0.50	3.00	1.75	4.80	0.25	0.43

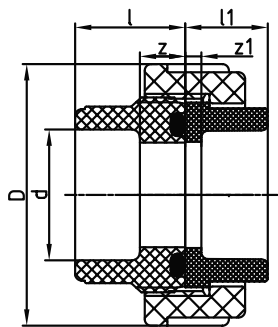
PRODUCT RANGE - COUPLINGS

aquatherm green pipe® UNION WITH BRASS NUT



Part no.	Dimension (ND — OD)	d	l	z	D	SW1	SW2	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0115812	1" — 32 mm	1.26	1.44	0.73	1.61	2.52	1.97	1.06
0115814	1 ¼" — 40 mm	1.57	1.50	0.69	1.97	3.15	2.36	1.85
0115816	1 ½" — 50 mm	1.97	1.61	0.69	2.40	3.39	2.76	1.81
0115818	2" — 63 mm	2.48	1.77	0.69	2.99	4.25	3.54	3.30
0115820	2 ½" — 75 mm	2.95	1.87	0.69	3.54	5.04	4.09	4.40

aquatherm green pipe® UNION WITH PP-R NUT



Part no.	Dimension (ND — OD)	d	l	z	l1	z1	D	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0115838	½" — 20 mm	0.79	1.02	0.47	0.79	0.22	1.81	0.08
0115840	¾" — 25 mm	0.98	1.10	0.47	0.83	0.20	2.20	0.13
0115842	1" — 32 mm	1.26	1.26	0.47	0.91	0.20	2.60	0.20
0115844	1 ¼" — 40 mm	1.57	1.50	0.55	1.00	0.20	3.11	0.30
0115846	1 ½" — 50 mm	1.97	1.77	0.63	1.12	0.20	3.43	0.37
0115848	2" — 63 mm	2.48	2.19	0.79	1.28	0.20	4.21	0.53
0115850	2 ½" — 75 mm	2.95	1.97	0.79	1.42	0.24	5.04	1.20

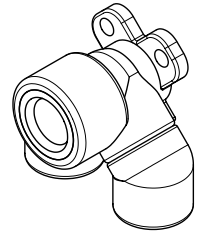
aquatherm green pipe® FLOW THROUGH BACK PLATE ELBOW 90°

Part No.	Dimension
20197	20 mm x 1/2" IG x 20 mm

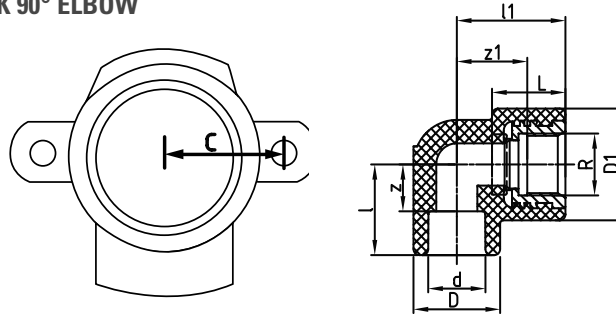


aquatherm green pipe® FLOW THROUGH BACK PLATE ELBOW PARALLEL

Part No.	Dimension
20198	20 mm x 1/2" IG x 20 mm

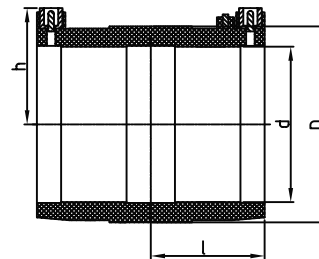


aquatherm green pipe® WING BACK 90° ELBOW



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension	d	R	l	z	D	l1	z1	D1	L	c	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0120158	0920158	0620158	20 mm x 1/2" F	0.79	0.50	1.18	0.61	1.16	1.46	0.94	1.46	0.98	2.32	0.17

aquatherm green pipe® ELECTROFUSION COUPLING

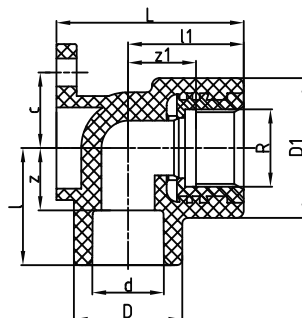


Part no.	Dimension (ND — OD)	d	l	h	D	Weight
		[in]	[in]	[in]	[in]	[lb]
0117208	1/2" — 20 mm	0.79	1.38	1.42	1.24	0.11
0117210	3/4" — 25 mm	0.98	1.54	1.52	1.44	0.13
0117212	1" — 32 mm	1.26	1.57	1.67	1.77	0.17
0117214	1 1/4" — 40 mm	1.57	1.81	1.85	2.13	0.23
0117216	1 1/2" — 50 mm	1.97	2.03	2.05	2.56	0.31
0117218	2" — 63 mm	2.48	2.32	2.28	3.21	0.53
0117220	2 1/2" — 75 mm	2.95	2.56	2.54	3.78	0.77
0117222	3" — 90 mm	3.54	2.85	2.83	4.47	1.10
0117224	3 1/2" — 110 mm	4.33	3.15	3.25	5.47	1.81
0117226	4" — 125 mm	4.92	3.39	3.54	6.14	2.42
0117230 ^a	6" — 160 mm	6.30	3.66	4.31	7.76	3.87
0117234 ^a	8" — 200 mm	7.87	4.13	5.28	9.57	7.99
0117238 ^a	10" — 250 mm	9.84	4.92	6.69	12.4	15.8

^a Cannot be used in conjunction with UV pipe.

PRODUCT RANGE - PP-R TO METAL

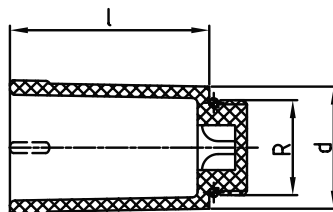
aquatherm green pipe® BACK PLATE ELBOW threaded



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	l1	z1	D1	L	c	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0120108	0920108	0620108	(½" — 20 mm) x ½" F	0.79	0.50	1.22	0.65	1.16	1.24	0.61	1.46	2.01	0.79	0.17
0120110	0920110	0620110	(½" — 20 mm) x ¾" F	0.79	0.75	1.46	0.89	1.34	1.46	0.94	1.73	2.13	0.98	0.23
0120112	0920112	0620112	(¾" — 25 mm) x ¾" F	0.98	0.75	1.46	0.83	1.34	1.46	0.94	1.73	2.13	0.98	0.23
0120113	0920113	0620113	(¾" — 25 mm) x ½" F	0.98	0.50	1.32	0.69	1.34	1.22	0.59	1.46	2.09	0.79	0.18

aquatherm green pipe® ISO PLUG FOR PRESSURE TESTS

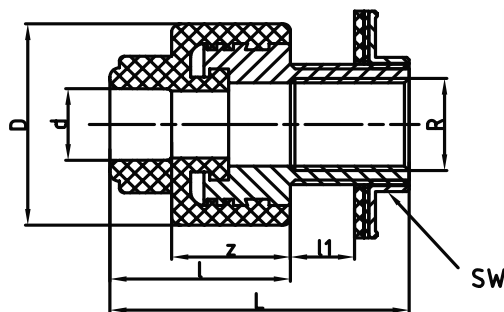
Includes gasket.



Part no.	Dimension	d	R	l	Weight
		[in]	[in]	[in]	[lb]
0050708	½" M	1.10	0.50	2.19	0.05
0050710	¾" M	1.34	0.75	2.19	0.06

aquatherm green pipe® ISO TRANSITION PIECE

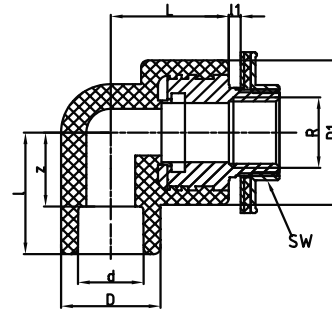
Includes counter nut, gasket and tension washer. The brass in this fitting is not for use with potable water.



Industrial brass part no. (ISO)	Dimension	d	R	l	z	D	l1	L	SW	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0120204	20 mm x ½" F x ¾" M	0.79	0.50	1.57	1.00	1.71	0.53	2.56	1.14	0.45

aquatherm green pipe® ISO TRANSITION ELBOW

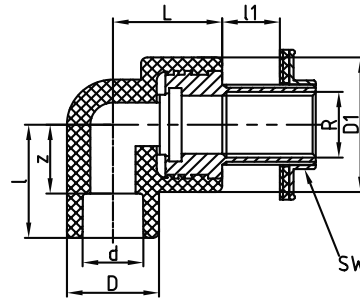
Includes counter nut, gasket and tension washer. The brass in this fitting is not for use with potable water.



Industrial brass part no. (ISO)	Dimension	d	R	l	z	D	l1	L	D1	SW	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0120208	20 mm x ½" F x ¾" M	0.79	0.50	1.46	0.89	1.16	0.14	1.38	1.73	1.14	0.34
0120209	25 mm x ½" F x ¾" M	0.98	0.50	1.46	0.83	1.34	0.14	1.46	1.73	1.14	0.45

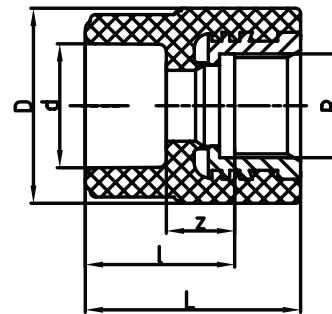
aquatherm green pipe® ISO TRANSITION ELBOW

For use in dry construction. The brass in this fitting is not for use with potable water.



Industrial brass part no. (ISO)	Dimension (ND — OD)	d	R	l	z	D	l1	L	D1	SW	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0120210	20 mm x ½" F x ¾" M	0.79	0.50	1.46	0.89	1.16	0.73	1.38	1.73	1.14	0.49

aquatherm green pipe® TRANSITION PIECE round (female)

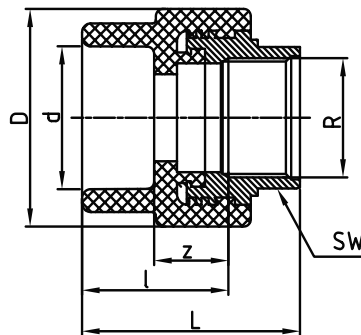


Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	L	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0121008	0921008	0621008	(½" — 20 mm) x ½" F	0.79	0.50	1.08	0.51	1.48	1.59	0.14
0121010	0921010	0621010	(½" — 20 mm) x ¾" F	0.79	0.75	1.08	0.51	1.71	1.59	0.20
0121011	0921011	0621011	(¾" — 25 mm) x ½" F	0.98	0.50	1.59	0.51	1.48	1.65	0.14
0121012	0921012	0621012	(¾" — 25 mm) x ¾" F	0.98	0.75	1.08	0.45	1.71	1.59	0.19
0121013	0921013	0621013	(1" — 32 mm) x ¾" F	1.26	0.75	1.20	0.49	1.71	1.71	0.20

PRODUCT RANGE - PP-R TO METAL

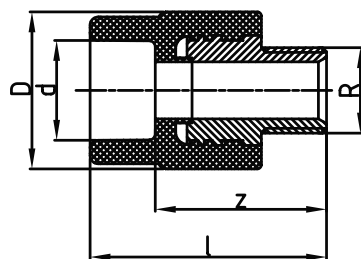
aquatherm green pipe® NPT TRANSITION PIECE (female)

With hex-shaped threaded transition



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	L	SW	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0121108	-	0621108	(½" — 20 mm) x ½" F	0.79	0.50	1.36	0.79	1.48	1.99	0.94	0.17
0121110	-	0621110	(½" — 20 mm) x ¾" F	0.79	0.75	1.14	0.57	1.71	1.97	1.22	0.25
0121111	-	0621111	(¾" — 25 mm) x ½" F	0.98	0.50	1.42	0.79	1.48	2.05	0.94	0.20
0121112	-	0621112	(¾" — 25 mm) x ¾" F	0.98	0.75	1.14	0.51	1.71	1.97	1.22	0.24
0121113	-	0621113	(1" — 32 mm) x ¾" F	1.26	0.75	1.26	0.55	1.71	2.09	1.22	0.25
	(NPT)										
0121114	1121114	0621114	(1" — 32 mm) x 1" F	1.26	1.00	1.48	0.77	2.36	2.34	1.54	0.53
0121115	1121115	0621115	(1 ¼" — 40 mm) x 1" F	1.57	1.00	1.57	0.77	2.36	2.44	1.54	0.50
0121116	1121116	0621116	(1 ¼" — 40 mm) x 1 ¼" F	1.57	1.25	1.57	0.77	2.91	2.48	1.97	0.85
0121117	1121117	0621117	(1 ½" — 50 mm) x 1 ¼" F	1.97	1.25	1.69	0.77	2.91	2.60	1.97	0.89
0121118	1121118	0621118	(1 ½" — 50 mm) x 1 ½" F	1.97	1.50	1.77	0.85	3.37	2.64	2.17	0.92
0121119	1121119	0621119	(2" — 63 mm) x 1 ½" F	2.48	1.50	2.03	0.94	3.31	2.89	2.17	0.97
0121120	-	0621120	(2" — 63 mm) x 2" F	2.48	2.00	2.01	0.93	3.98	3.03	2.64	1.32
0121122	-	0621122	(2 ½" — 75 mm) x 2" F	2.95	2.00	2.01	0.83	3.94	3.03	2.64	1.34

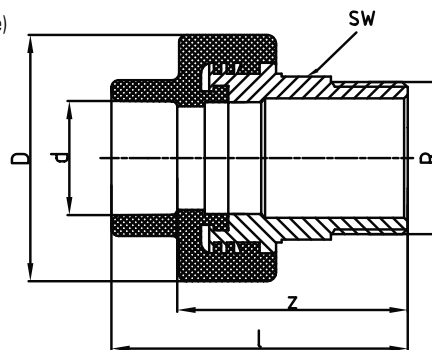
aquatherm green pipe® TRANSITION PIECE round (male)



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	Weight
				[in]	[in]	[in]	[in]	[in]	[lb]
0121208	0921208	0621208	(½" — 20 mm) x ½" M	0.79	0.50	2.22	1.65	1.52	0.19
0121210	0921210	0621210	(½" — 20 mm) x ¾" M	0.79	0.75	2.26	1.69	1.52	0.24
0121211	0921211	0621211	(¾" — 25 mm) x ½" M	0.98	0.50	2.28	1.65	1.52	0.22
0121212	0921212	0621212	(¾" — 25 mm) x ¾" M	0.98	0.75	2.26	1.63	1.52	0.20
0121213	0921213	0621213	(1" — 32 mm) x ¾" M	1.26	0.75	2.34	1.63	1.69	0.25

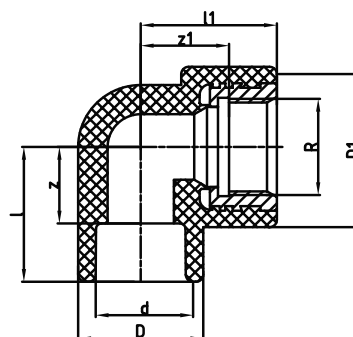
aqualtherm green pipe® NPT TRANSITION PIECE (male)

With hex-shaped threaded transition



Industrial brass part no. (NPT)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	SW	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0121308	0621308	(½" — 20 mm) x ½" M	0.79	0.50	2.62	2.05	1.52	0.87	0.23
0121310	0621310	(½" — 20 mm) x ¾" M	0.79	0.75	2.66	2.09	1.52	0.94	0.28
0121312	0621312	(¾" — 25 mm) x ¾" M	0.98	0.75	2.66	2.03	1.52	0.94	0.23
0121314	0621314	(1" — 32 mm) x 1" M	1.26	1.00	3.09	2.38	2.09	1.18	0.48
0121316	0621316	(1" — 32 mm) x 1 ¼" M	1.26	1.25	3.19	2.48	2.68	1.61	0.70
0121317	0621317	(1 ¼" — 40 mm) x 1" M	1.57	1.00	3.19	2.38	2.05	1.18	0.49
0121318	0621318	(1 ¼" — 40 mm) x 1 ¼" M	1.57	1.25	3.33	2.52	2.68	1.61	0.71
0121319	0621319	(1 ½" — 50 mm) x 1 ¼" M	1.97	1.25	3.37	2.44	2.68	1.61	0.77
0121320	0621320	(1 ½" — 50 mm) x 1 ½" M	1.97	1.50	3.48	2.56	2.91	1.81	0.94
0121321	0621321	(2" — 63 mm) x 1 ½" M	2.48	1.50	3.72	2.64	2.85	1.81	1.03
0121322	0621322	(2" — 63 mm) x 2" M	2.48	2.00	4.04	2.95	3.31	1.97	1.51
0121323	0621323	(2 ½" — 75 mm) x 2" M	2.95	2.00	4.02	2.83	3.31	1.97	1.61
0121324	0621324	(2 ½" — 75 mm) x 2 ½" M	2.95	2.50	4.13	2.95	3.94	2.56	2.14
0121325	0621325	(3" — 90 mm) x 3" M	3.54	3.00	4.76	3.46	4.72	3.35	2.92
0121327	0621327	(3 ½" — 110 mm) x 4" M	4.33	4.00	5.83	4.37	5.79	4.13	6.02

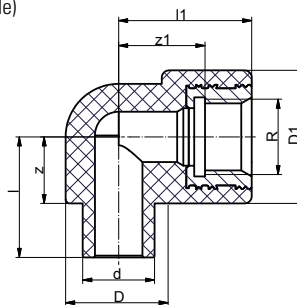
aqualtherm green pipe® TRANSITION ELBOW (female)



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	l1	z1	D1	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0123008	0923008	0623008	(½" — 20 mm) x ¾" F	0.79	0.75	1.46	0.89	1.34	1.46	0.94	1.73	0.22
0123010	0923010	0623010	(½" — 20 mm) x ½" F	0.79	0.50	1.24	0.67	1.16	1.24	0.73	1.46	0.17
0123012	0923012	0623012	(¾" — 25 mm) x ¾" F	0.98	0.75	1.46	0.83	1.34	1.46	0.94	1.73	0.22
0123014	0923014	0623014	(¾" — 25 mm) x ½" F	0.98	0.50	1.34	0.71	1.34	1.46	0.94	1.46	0.17
0123016	0923016	0623016	(1" — 32 mm) x ¾" F	1.26	0.75	1.08	0.37	1.69	2.01	1.50	1.73	0.23
	(NPT)											
0123018	1123018	0623018	(1" — 32 mm) x 1" F	1.26	1.00	1.34	0.63	1.69	2.62	1.75	2.37	0.55

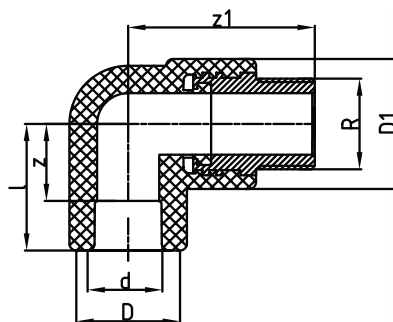
PRODUCT RANGE - PP-R TO METAL

aquatherm green pipe® NPT TRANSITION STREET ELBOW (male/female)



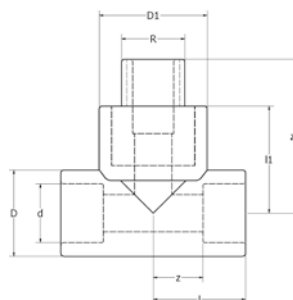
Industrial brass part no. (NPT)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	l1	z1	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0123208	0623208	(½" — 20 mm) x ½" F	0.79	0.50	1.32	0.73	1.16	1.46	0.94	1.46	0.17

aquatherm green pipe® TRANSITION ELBOW (male)



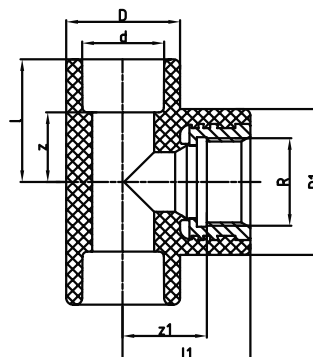
Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	z1	D1	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0123506	0923506	0623506	(½" — 20 mm) x ½" M	0.79	0.50	1.24	0.67	1.16	2.09	1.46	0.24
0123508	0923508	0623508	(½" — 20 mm) x ¾" M	0.79	0.75	1.46	0.89	1.34	2.13	1.50	0.28
0123510	0923510	0623510	(¾" — 25 mm) x ¾" M	0.98	0.75	1.46	0.83	1.34	2.13	1.50	0.23
0123512	0923512	0623512	(1" — 32 mm) x ¾" M	1.26	0.75	1.08	0.37	1.69	2.68	1.50	0.25
0123514	-	0623514	(1" — 32 mm) x 1" M	1.26	1.00	1.22	0.51	1.69	3.37	2.05	0.51

aquatherm green pipe® NPT TRANSITION TEE (male)



Industrial brass part no. (NPT)	Lead-free (potable) brass part no. (NPT)	Dimension (ND — OD)	d	R	l	z	D	z1	D1	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0125506	0625506	(½" — 20 mm) x ½" M x (½" — 20 mm)	0.79	0.50	1.24	0.67	1.16	2.09	1.46	0.23

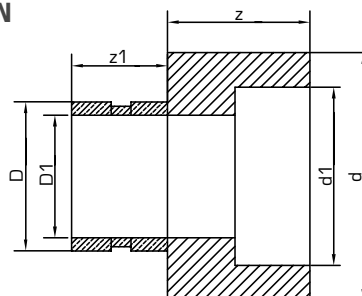
aqualtherm green pipe® TRANSITION TEE (female)



Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension PP-R (ND — OD) x thread	d	R	l	z	D	l1	z1	D1	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0125006	0925006	0625006	(½" — 20 mm) x (½" — 20 mm) x ½" F	0.79	0.50	1.24	0.67	1.16	1.46	0.94	1.46	0.19
0125008	0925008	0625008	(½" — 20 mm) x (½" — 20 mm) x ¾" F	0.79	0.75	1.46	0.89	1.34	1.50	0.98	1.73	0.27
0125010	0925010	0625010	(¾" — 25 mm) x (¾" — 25 mm) x ½" F	0.98	0.50	1.34	0.71	1.34	1.50	0.98	1.46	0.20
0125012	0925012	0625012	(¾" — 25 mm) x (¾" — 25 mm) x ¾" F	0.98	0.75	1.46	0.83	1.34	1.50	0.98	1.73	0.24
0125014	0925014	0625014	(1" — 32 mm) x (1" — 32 mm) x ¾" F	1.26	0.75	1.08	0.37	1.69	2.01	1.50	1.73	0.24
	(NPT)											
0125016	1125016	0625016	(1" — 32 mm) x (1" — 32 mm) x 1" F	1.26	1.00	1.22	0.53	1.69	2.64	1.93	2.36	0.56
0125022	-	0625022	(1 ½" — 50 mm) x (1 ½" — 50 mm) x 1" F	1.97	1.00	1.95	1.02	2.68	2.50	1.71	2.68	0.85

aqualtherm green pipe® PP-R TO GROOVED PIPE TRANSITION

The brass in this fitting is not for use with potable water.

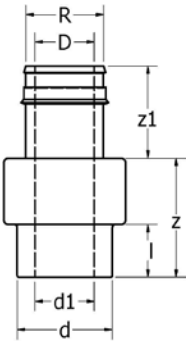


Industrial brass part no. (ISO)	Dimension (ND — OD)	d	d1	D	D1	z	z1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0627060	2 ½" (75 mm) PP-R to 2" grooved	4.00	2.80	2.40	2.00	2.30	1.50	1.70

PRODUCT RANGE - PP-R TO METAL

aquatherm green pipe® PEX ADAPTER (EXPANSION)

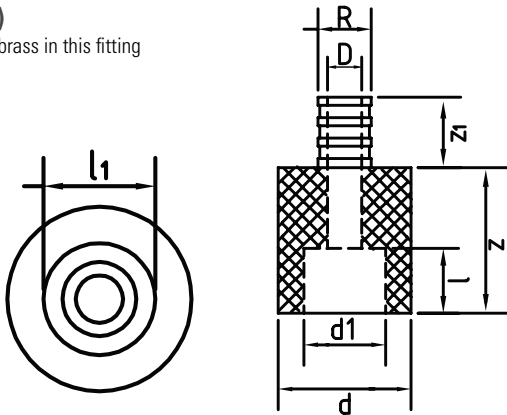
Built to ASTM F1960 standard with PP-R street connection. The brass in this fitting meets the lead-free (<0.25%) potable water requirement.



Lead-free (potable) brass part no. (NPT)	Dimension (ND — OD)	d	R	l	z	D	z1	d1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0098840	½" (20 mm) PP-R to ½" PEX	0.79	0.57	0.42	1.15	0.39	0.73	0.52	0.09
0098841	¾" (25 mm) PP-R to ¾" PEX	0.98	0.79	0.49	1.20	0.59	0.96	0.65	0.13
0098842	1" (32 mm) PP-R to 1" PEX	1.26	1.03	0.69	1.56	0.79	1.20	0.83	0.21

aquatherm green pipe® PEX ADAPTER (CRIMP)

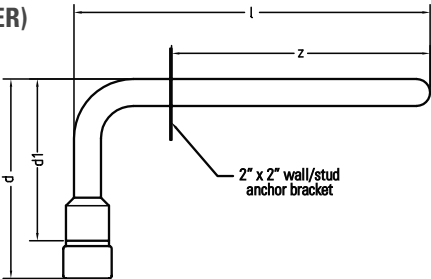
Built to ASTM F1807 standard with PP-R socket connection. The brass in this fitting meets the lead-free (<0.25%) potable water requirement.



Lead-free (potable) brass part no. (NPT)	Dimension (ND — OD)	d	R	l	z	D	l1	z1	d1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0098840	½" (20 mm) PP-R to ½" PEX	1.13	0.50	0.63	1.25	0.25	0.75	0.63	0.75	0.09
0098841	¾" (25 mm) PP-R to ¾" PEX	1.38	0.63	0.63	1.38	0.50	1.00	0.63	0.88	0.13
0098842	1" (32 mm) PP-R to 1" PEX	1.75	0.88	0.88	1.63	0.63	1.25	0.75	1.25	0.21

aquatherm green pipe® STUB OUT (PP-R TO COPPER)

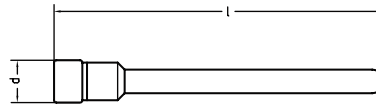
These fittings are combination of a custom Aquatherm PP-R socket with a gasket and copper stub added by Sioux Chief Manufacturing. The fused PP-R portion is covered under Aquatherm's warranty. The copper portion and gasket are covered under a warranty from Sioux Chief.



Part no.	Dimension (ND — OD)	d	d1	l	z	Weight
		[in]	[in]	[in]	[in]	[lb]
AQ630P248E	½" — 20 mm	4.63	3.75	8.25	6.00	0.30
AQ630P368E	¾" — 25 mm	7.50	6.63	8.50	6.00	0.55
AQ630P41110	1" — 32 mm	12.3	11.3	10.5	7.50	1.10

aquatherm green pipe® STRAIGHT STUB OUT (PP-R TO COPPER)

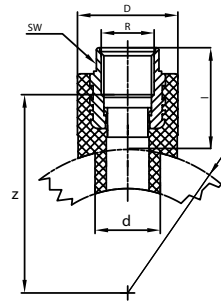
These fittings are a combination of a custom Aquatherm PP-R socket with a gasket and copper stub added by Sioux Chief Manufacturing. The fused PP-R portion is covered under Aquatherm's warranty. The copper portion and gasket are covered under a warranty from Sioux Chief.



Part no.	Dimension (ND — OD)	d	l	Weight
		[in]	[in]	[lb]
AQ638P211	½" — 20 mm	0.79	11.0	0.41
AQ638P311	¾" — 25 mm	0.98	11.0	0.68
AQ638P418	1" — 32 mm	1.26	18.0	0.94

aquatherm green pipe® NPT FUSION OUTLET (female)

Includes hex-shaped female thread, weld-in surface and weld-in socket for fusion with the inner wall of the pipe. The necessary welding heads are listed on page 5.57 (part no. 0050614 - 0050640).

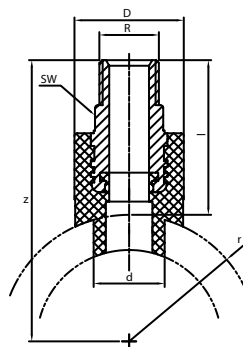


Industrial brass part no. (NPT)	Stainless steel part no. (ISO)	Lead-free (potable) brass part no. (NPT)	Dimension pipe x outlet (ND — OD) x thread	r	d	R	l	z	D	SW	Weight
				[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0128214	0928214	0628214	1 ¼" x ¾" — 40 x 25 mm x ½" F	0.79	0.98	0.50	1.54	1.69	1.52	0.94	0.19
0128216	0928216	0628216	1 ½" x ¾" — 50 x 25 mm x ½" F	0.99	0.98	0.50	1.54	1.89	1.52	0.94	0.20
0128218	0928218	0628218	2" x ¾" — 63 x 25 mm x ½" F	1.24	0.98	0.50	1.54	2.15	1.52	0.94	0.20
0128220	0928220	0628220	2 ½" x ¾" — 75 x 25 mm x ½" F	1.48	0.98	0.50	1.54	2.11	1.52	0.94	0.18
0128222	0928222	0628222	3" x ¾" — 90 x 25 mm x ½" F	1.77	0.98	0.50	1.54	2.68	1.52	0.94	0.20
0128224	0928224	0628224	3 ½" x ¾" — 110 x 25 mm x ½" F	2.17	0.98	0.50	1.54	3.07	1.52	0.94	0.20
0128226	0928226	0628226	4" x ¾" — 125 x 25 mm x ½" F	2.46	0.98	0.50	1.54	3.37	1.52	0.94	0.20
0128230	0928230	0628230	6" x ¾" — 160 x 25 mm x ½" F	3.15	0.98	0.50	1.54	4.06	1.52	0.94	0.20
0128232	0928232	0628232	8 to 10" x ¾" — 200 to 250 x 25 mm x ½" F	3.94	0.98	0.50	1.54	1.50	1.52	0.94	0.20
0128234	0928234	0628234	1 ¼" x ¾" — 40 x 25 mm x ¾" F	0.79	0.98	0.75	1.54	1.69	1.71	1.22	0.24
0128236	0928236	0628236	1 ½" x ¾" — 50 x 25 mm x ¾" F	0.99	0.98	0.75	1.54	1.95	1.71	1.22	0.24
0128238	0928238	0628238	2" x ¾" — 63 x 25 mm x ¾" F	1.24	0.98	0.75	1.54	2.19	1.71	1.22	0.24
0128240	0928240	0628240	2 ½" x ¾" — 75 x 25 mm x ¾" F	1.48	0.98	0.75	1.54	2.48	1.71	1.22	0.24
0128242	0928242	0628242	3" x ¾" — 90 x 25 mm x ¾" F	1.77	0.98	0.75	1.54	2.87	1.71	1.22	0.24
0128244	0928244	0628244	3 ½" x ¾" — 110 x 25 mm x ¾" F	2.17	0.98	0.75	1.54	3.17	1.71	1.22	0.24
0128246	0928246	0628246	4" x ¾" — 125 x 25 mm x ¾" F	2.46	0.98	0.75	1.54	3.78	1.71	1.22	0.25
0128250	0928250	0628250	6" x ¾" — 160 x 25 mm x ¾" F	3.15	0.98	0.75	1.54	2.30	1.71	1.22	0.25
0128254	0928254	0628254	8 to 10" x ¾" — 200 to 250 x 25 mm x ¾" F	3.94	0.98	0.75	1.54	2.60	1.71	1.22	0.25
	(NPT)										
0128260	1128260	0628260	2 ½" x 1" — 75 x 32 mm x 1" F	1.48	1.26	1.00	1.69	2.99	2.36	1.54	0.49
0128262	1128262	0628262	3" x 1" — 90 x 32 mm x 1" F	1.77	1.26	1.00	1.69	3.29	2.36	1.54	0.49
0128264	1128264	0628264	3 ½" x 1" — 110 x 32 mm x 1" F	2.17	1.26	1.00	1.69	3.98	2.36	1.54	0.49
0128266	1128266	0628266	4" x 1" — 125 x 32 mm x 1" F	2.46	1.26	1.00	1.69	4.84	2.36	1.54	0.49
0128270	1128270	0628270	6" x 1" — 160 x 32 mm x 1" F	3.15	1.26	1.00	1.69	4.65	2.36	1.54	0.50
0128274	1128274	0628274	8 to 10" x 1" — 200 to 250 x 32 mm x 1" F	3.94	1.26	1.00	1.69	4.76	2.36	1.54	0.54

PRODUCT RANGE - PP-R TO METAL

aquatherm green pipe® NPT FUSION OUTLET (male)

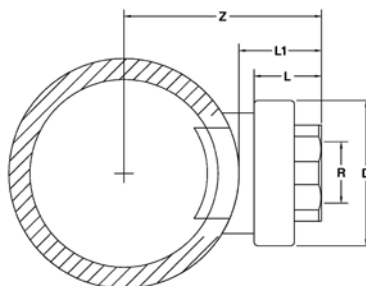
Includes hex-shaped male thread, weld-in surface and weld-in socket for fusion with the inner wall of the pipe. The necessary welding heads are listed on page 5.57 (part no. 0050614 - 0050640).



Industrial brass part no. (NPT)	Lead-free (potable) brass part no. (NPT)	Dimension pipe x outlet (ND — OD) x thread	r	d	l	z	D	R	SW	Weight
			[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0128314	0628314	1 ¼" x ¾" — 40 x 25 mm x ½" M	0.79	0.98	2.17	2.95	1.52	0.50	0.83	0.19
0128316	0628316	1 ½" x ¾" — 50 x 25 mm x ½" M	0.99	0.98	2.17	3.15	1.52	0.50	0.83	0.20
0128318	0628318	2" x ¾" — 63 x 25 mm x ½" M	1.24	0.98	2.17	3.41	1.52	0.50	0.83	0.20
0128320	0628320	2 ½" x ¾" — 75 x 25 mm x ½" M	1.48	0.98	2.17	3.64	1.52	0.50	0.83	0.21
0128322	0628322	3" x ¾" — 90 x 25 mm x ½" M	1.77	0.98	2.17	3.94	1.52	0.50	0.83	0.20
0128324	0628324	3 ½" x ¾" — 110 x 25 mm x ½" M	2.17	0.98	2.17	4.33	1.52	0.50	0.83	0.20
0128326	0628326	4" x ¾" — 125 x 25 mm x ½" M	2.46	0.98	2.17	4.63	1.52	0.50	0.83	0.20
0128330	0628330	6" x ¾" — 160 x 25 mm x ½" M	3.15	0.98	2.17	5.31	1.52	0.50	0.83	0.20
0128334	0628334	1 ¼" x ¾" — 40 x 25 mm x ¾" M	0.79	0.98	2.20	2.99	1.71	0.75	0.94	0.24
0128336	0628336	1 ½" x ¾" — 50 x 25 mm x ¾" M	0.99	0.98	2.20	3.19	1.71	0.75	0.94	0.24
0128338	0628338	2" x ¾" — 63 x 25 mm x ¾" M	1.24	0.98	2.20	3.44	1.71	0.75	0.94	0.24
0128340	0628340	2 ½" x ¾" — 75 x 25 mm x ¾" M	1.48	0.98	2.20	3.68	1.71	0.75	0.94	0.24
0128342	0628342	3" x ¾" — 90 x 25 mm x ¾" M	1.77	0.98	2.20	3.98	1.71	0.75	0.94	0.24
0128344	0628344	3 ½" x ¾" — 110 x 25 mm x ¾" M	2.17	0.98	2.20	4.37	1.71	0.75	0.94	0.24
0128346	0628346	4" x ¾" — 125 x 25 mm x ¾" M	2.46	0.98	2.20	4.67	1.71	0.75	0.94	0.25
0128350	0628350	6" x ¾" — 160 x 25 mm x ¾" M	3.15	0.98	2.20	5.35	1.71	0.75	0.94	0.25

aquatherm green pipe® FLOW METER WELL

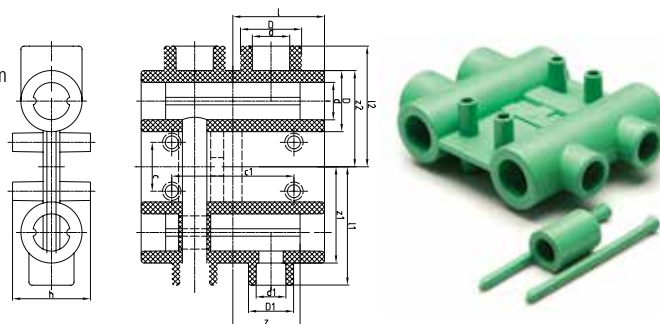
May also be used for thermometer well. Other sizes are readily available upon request. The brass in this fitting may or may not meet potable water standards depending on the brass fitting chosen to make up the fitting. Additional sizes and combinations are available. Contact Aquatherm for availability and cost.



Part no.	Dimension pipe x outlet x thread	L	L1	R	D	Z	Weight
		[in]	[in]	[in]	[in]	[in]	[lb]
0628480	2" to 2 ½" x 1 ¼" x 1 ¼" F	1.75	2.25	1.25	2.88	3.49/3.75	0.81
0628500	4" x 1 ½" x 1 ½" F	1.75	2.13	1.50	3.38	4.63	0.89
0628520	4" to 6" x 2" x 2" F	1.88	3.13	2.00	3.88	4.75/5.38	1.21

aqualtherm green pipe® DISTRIBUTION BLOCK PLUMBING

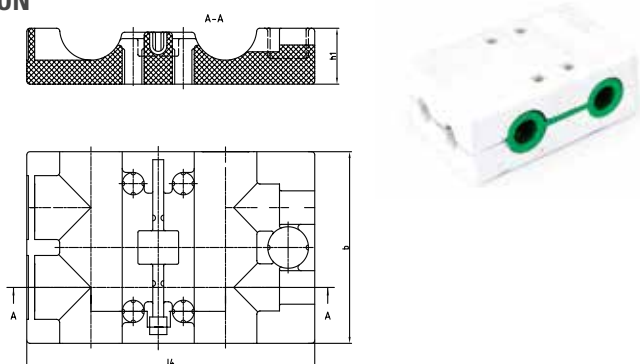
Made from **fusiolen**® PP-R. Passages are 25 mm socket connections with two 20 mm socket branches. Includes 1 plug and 2 fasteners.



Part no.	Dimension (ND — OD)	d	l	z	D	d1	l1	z1	D1	l2	z2	c	c1	h	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0130115	¾" x ½" — 25 x 20 mm	0.98	2.36	1.73	1.57	0.79	3.05	2.48	1.16	3.11	2.48	1.26	3.15	2.01	0.60

aqualtherm green pipe® DISTRIBUTION BLOCK WITH INSULATION

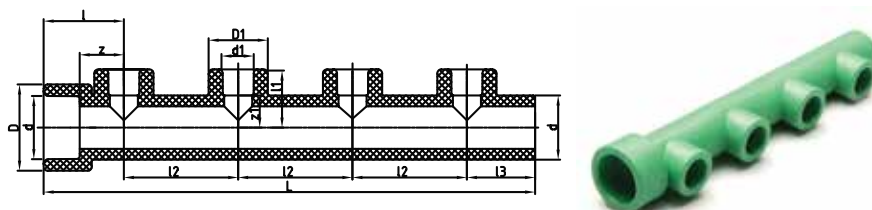
Identical to part no. 0130115, with added insulation block (3" x 3" — 70 x 70 mm).



Part no.	Dimension (ND — OD)	l4	b	h1	Weight
		[in]	[in]	[in]	[lb]
0130130	¾" x ½" — 25 x 20 mm	7.24	4.72	2.01	0.70

aqualtherm green pipe® DISTRIBUTION PIPE

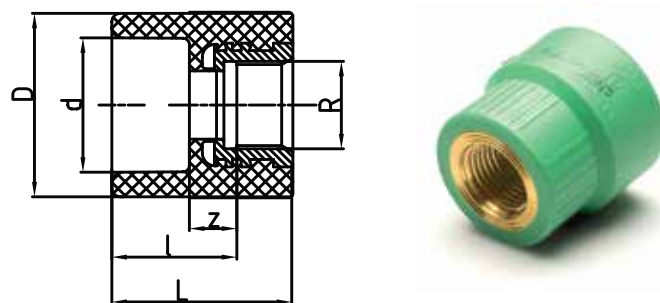
246 mm long, with four branch connections. This distribution pipe can be cut short or supplemented by fusion with additional distribution pipes as needed. The brass in this fitting meets potable water requirements.



Part no.	Dimension (ND — OD)	d	d1	l	z	D	l1	z1	D1	l2	l3	L	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0130604	1" x ½" — 32 x 20 mm	1.26	0.79	1.57	0.87	1.69	1.14	0.57	1.16	2.24	1.42	9.65	0.30

aqualtherm green pipe® DISTRIBUTOR END PIECE

PP-R socket with female thread NPT for emptying or aerating a distribution pipe. The brass in this fitting meets potable water requirements.

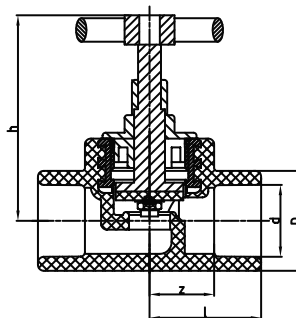


Lead-free (potable) brass part no. (NPT)	Dimension (ND — OD) x thread	d	l	z	D	L	R	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0630804	(1" — 32 mm) x ½" F	1.26	1.18	0.47	1.69	1.69	0.50	0.10

PRODUCT RANGE - VALVES

aquatherm green pipe® SCREW-DOWN STOP GLOBE VALVE

For surface installation.

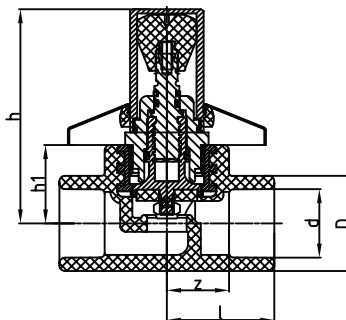


Part no.	Dimension (ND — OD)	d	l	z	D	h	Weight
		[in]	[in]	[in]	[in]	[in]	[lb]
0140808	½" — 20 mm	0.79	1.38	0.81	1.16	2.76	0.36
0140810	¾" — 25 mm	0.98	1.50	0.87	1.34	2.76	0.38
0140812	1" — 32 mm	1.26	1.93	1.22	1.69	3.41	0.69
0140814	1 ¼" — 40 mm	1.57	2.36	1.56	2.05	3.96	1.29

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

aquatherm green pipe® CONCEALED VALVE (short)

Chromium-plated and tamper-proof.



Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	h1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0140868	½" — 20 mm	0.79	1.38	0.81	1.16	2.81	1.10	0.57
0140870	¾" — 25 mm	0.98	1.50	0.87	1.34	2.81	1.10	0.63
0140872	1" — 32 mm	1.26	1.93	1.22	1.69	3.25	1.34	0.83

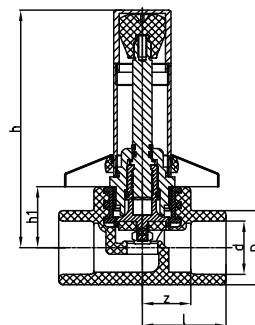
Part no. 0140868 - 0140870 suitable for construction depths up to 1".

Part no. 0140872 suitable for construction depths up to 1 ⅛".

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

aquatherm green pipe® CONCEALED VALVE (standard length)

Chromium-plated and tamper proof. Suitable for construction depths up to 1-1/8".

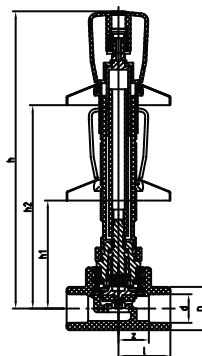


Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	h1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	
0140888	1/2" — 20 mm	0.79	1.38	0.81	1.16	4.29	1.10	0.75
0140890	3/4" — 25 mm	0.98	1.50	0.87	1.34	4.29	1.10	0.77
0140892	1" — 32 mm	1.26	1.93	1.22	1.69	4.53	1.34	0.95

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

aquatherm green pipe® CONCEALED VALVE (extended)

Chromium-plated. Includes hot/cold water indicator. Suitable for construction depths from 2 1/8" - 4".

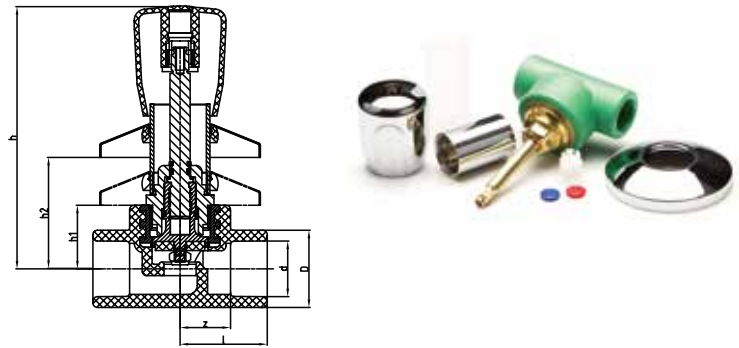


Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	h1	h2	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	
0140878	1/2" — 20 mm	0.79	1.38	0.81	1.16	8.39	5.79	2.32	0.79
0140880	3/4" — 25 mm	0.98	1.50	0.87	1.34	8.39	5.79	2.32	0.81
0140882	1" — 32 mm	1.26	1.93	1.22	1.69	8.62	6.02	2.56	1.00

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

PRODUCT RANGE - VALVES

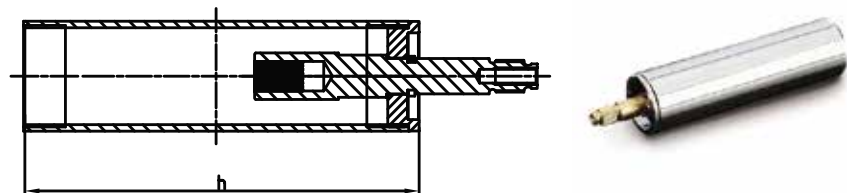
aqualtherm green pipe® CONCEALED VALVE (standard)
Chromium-plated. Includes hot/cold water indicator.



Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	h1	h2	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0140858	½" — 20 mm	0.79	1.38	0.81	1.16	4.57	1.10	2.32	0.70
0140860	¾" — 25 mm	0.98	1.50	0.87	1.34	4.57	1.10	2.32	0.73
0140862	1" — 32 mm	1.26	1.93	1.22	1.69	4.76	1.34	2.32	0.92

*Brass componets in these valves do not comply with the 2015 lead-free requirements for potable water systems.

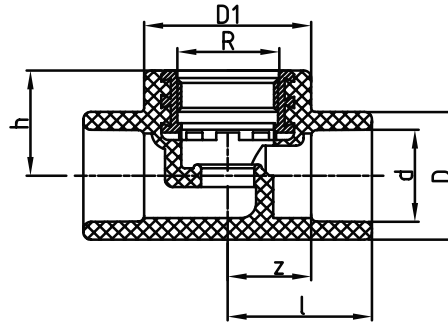
Extension for aqualtherm green pipe® CONCEALED VALVE
Chromium-plated. Use with part no. 0040858 - 0040862.



Industrial brass part no.	Dimension	h	Weight
		[in]	[lb]
0040900	3.2" extension (92 mm)	3.62	0.33
0040902	4.25" extension (132 mm)	5.20	0.46

*Brass componets in these valves do not comply with the 2015 lead-free requirements for potable water systems.

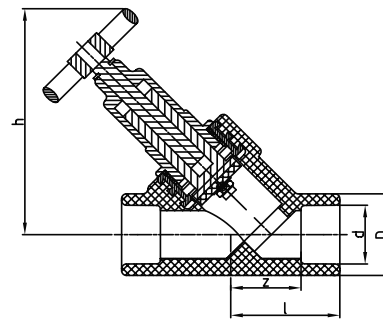
aqualtherm green pipe® STOP VALVE BODY ISO



Industrial brass part no. (ISO)	Dimension PP-R (ND — OD) x thread	d	l	z	D	h	D1	R	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0040908	(½" — 20 mm) x ¾" F	0.79	1.38	0.79	1.16	1.10	1.73	0.75	0.21
0040910	(¾" — 25 mm) x ¾" F	0.98	1.50	0.87	1.34	1.10	1.73	0.75	0.22
0040912	(1" — 32 mm) x 1" F	1.26	1.93	1.22	1.69	1.34	2.05	1.00	0.32
0040914	(1 ¼" — 40 mm) x 1 ¼" F	1.57	2.36	1.56	2.05	1.61	-	1.25	0.69

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

aqualtherm green pipe® INCLINED VALVE without drain



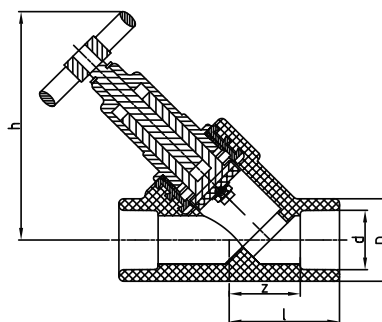
Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	Weight
		[in]	[in]	[in]	[in]	[in]	[lb]
0141108	½" — 20 mm	0.79	1.77	1.20	1.34	3.76	0.65
0141110	¾" — 25 mm	0.98	1.77	1.14	1.34	3.76	0.62
0141112	1" — 32 mm	1.26	2.20	1.50	1.69	4.39	0.93
0141114	1 ¼" — 40 mm	1.57	2.56	1.75	2.05	5.31	1.84

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

PRODUCT RANGE - VALVES

aqualtherm green pipe® INCLINED CHECK VALVE without drain

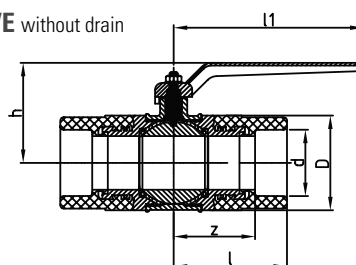
Adjustable pressure check valve.



Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	Weight
		[in]	[in]	[in]	[in]	[in]	
0141208	½" — 20 mm	0.79	1.77	1.20	1.34	3.76	0.65
0141210	¾" — 25 mm	0.98	1.77	1.14	1.34	3.76	0.64
0141212	1" — 32 mm	1.26	2.20	1.50	1.69	4.39	0.95
0141214	1 ¼" — 40 mm	1.57	2.56	1.75	2.05	5.31	1.85

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

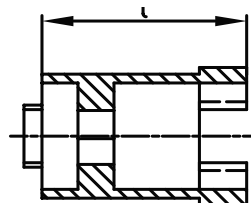
aqualtherm green pipe® POLYPROPYLENE/BRASS BALL VALVE without drain



Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	h	l1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	
0041308	½" — 20 mm	0.79	2.17	1.59	1.26	2.60	3.35	0.62
0041310	¾" — 25 mm	0.98	2.17	1.54	1.61	2.87	3.35	0.83
0041312	1" — 32 mm	1.26	2.50	1.79	1.85	3.23	4.25	1.31
0041314	1 ¼" — 40 mm	1.57	2.85	2.05	2.28	3.66	4.25	2.24
0041316	1 ½" — 50 mm	1.97	3.29	2.36	2.78	4.49	5.51	3.72
0041318	2" — 63 mm	2.48	4.04	2.95	3.43	5.20	5.51	6.34

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

aqualtherm green pipe® BALL VALVE HANDLE EXTENSION



Part no.	Dimension (ND — OD) x length	l	Weight
		[in]	
0041378	½" to ¾" — 20 to 25 mm x 35 mm	1.38	0.26
0041382	1" to 1 ¼" — 32 to 40 mm x 35 mm	1.38	0.26
0041386	1 ½" to 2" — 50 - 63 mm x 46 mm	1.81	0.60

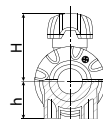
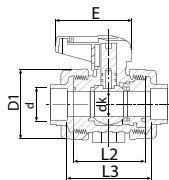
Part no. 0041378 suitable for part no. 0041308 / 0041310.

Part no. 0041382 suitable for part no. 0041312 / 0041314.

Part no. 0041386 suitable for part no. 0041316 / 0041318.

aqualtherm green pipe® POLYPROPYLENE BALL VALVE

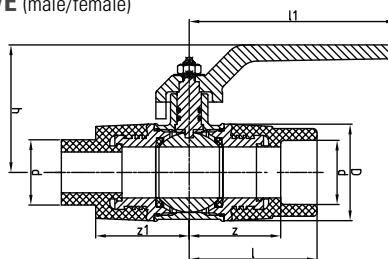
Replacement parts can be ordered for O-rings, handles, end connectors, and socket inserts for pipe connection.



Part no.	Dimension (ND — OD)	E	D1	d	dk	L2	L3	H	h	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0041488	½" — 20 mm	2.60	1.98	0.79	0.53	2.22	2.68	2.01	1.06	0.26
0041588 ^a	½" — 20 mm	2.60	1.98	0.79	0.53	2.22	2.68	2.01	1.06	0.26
0041490	¾" — 25 mm	3.19	2.32	0.98	0.73	2.58	3.09	2.40	1.18	0.40
0041590 ^a	¾" — 25 mm	3.19	2.32	0.98	0.73	2.58	3.09	2.40	1.18	0.40
0041492	1" — 32 mm	3.21	2.77	1.26	0.94	2.83	3.33	2.40	1.57	0.60
0041592 ^a	1" — 32 mm	3.21	2.77	1.26	0.94	2.83	3.33	2.40	1.57	0.60
0041494	1 ¼" — 40 mm	3.60	3.38	1.57	1.22	3.35	3.94	3.19	1.81	1.07
0041594 ^a	1 ¼" — 40 mm	3.60	3.38	1.57	1.22	3.35	3.94	3.19	1.81	1.07
0041496	1 ½" — 50 mm	3.60	3.92	1.97	1.52	3.50	4.21	3.54	2.17	1.43
0041596 ^a	1 ½" — 50 mm	3.60	3.92	1.97	1.52	3.50	4.21	3.54	2.17	1.43
0041498	2" — 63 mm	5.57	4.94	2.48	1.97	3.98	4.65	4.50	2.76	2.66
0041598 ^a	2" — 63 mm	5.57	4.94	2.48	1.97	3.98	4.65	4.50	2.76	2.66
0041400	2 ½" — 75 mm	7.31	5.06	3.62	2.53	8.13	9.00	5.50	2.90	5.35

^aPart comes with FKM/FPM O-ring and in the color gray.

aqualtherm green pipe® POLYPROPYLENE/BRASS BALL VALVE (male/female)



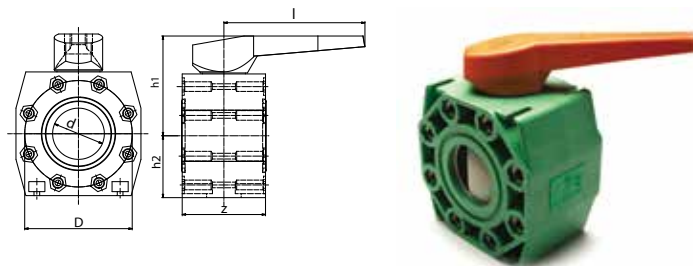
Industrial brass part no.	Dimension (ND — OD)	d	l	z	D	z1	h	l1	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0078000	(1" — 32 mm) M/F	1.26	2.48	1.77	1.87	1.83	3.07	4.25	1.27

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

PRODUCT RANGE - VALVES

aquatherm green pipe® BALL VALVE

Polypropylene construction with ISO bolt pattern.



Part no.	Dimension (ND — OD)	d	l	z	D	h1	h2	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0041602	3" — 90 mm	3.03	8.27	4.88	6.30	5.91	3.66	9.25
0041702 ^a	3" — 90 mm	3.03	8.27	4.88	6.30	5.91	3.66	9.25
0041604 ^b	3 ½" to 4" — 110 to 125 mm	3.70	10.2	5.71	7.09	6.50	4.06	12.4
0041704 ^{ab}	3 ½" to 4" — 110 to 125 mm	3.70	10.2	5.71	7.09	6.50	4.06	12.4
0041607	6" — 160 mm	5.31	12.2	8.07	9.45	8.27	5.37	29.6
0041707 ^a	6" — 160 mm	5.31	12.2	8.07	9.45	8.27	5.37	29.6

^aPart comes with FKM/FPM O-ring and in the color gray.

^bFor a 4" connection, use part no. 0115526 and part no. 3315724. For a 3 ½" connection, use part no. 0115524 and part no. 3315724.

Note: Bolts, washers and gaskets are included in delivery. A full-faced flange gasket should be used with these valves. Do not use an O-ring with or without the flange gasket or leakage may occur. Discard any O-ring that may come with the valve.

AQUATHERM REPLACEMENT BOLT/GASKET KIT FOR BALL VALVES

Kit includes the following replacement parts for the polypropylene Aquatherm ball valves: 2 gaskets, 16 bolts, and 16 washers. Individual parts are available upon request.

Part no.	Dimension (ND — OD)
4160218(S) ^a	3" — 90 mm
4160418(S) ^b	3 ½" to 4" — 110 to 125 mm
4160718(S) ^c	6" — 160 mm

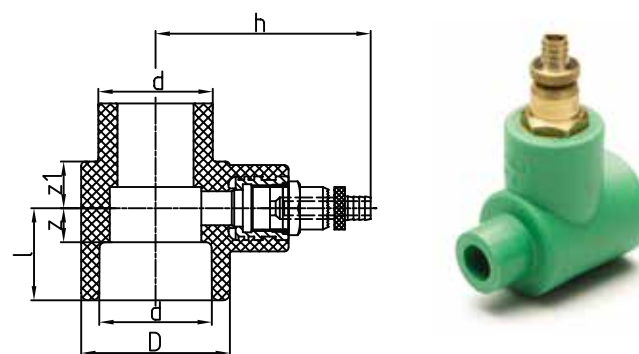
^aReplacement kit for part no. 0041602 and 0041702.

^bReplacement kit for part no. 0041604 and 0041704.

^cReplacement kit for part no. 0041607 and 0041707.

aquatherm green pipe® DRAINING BRANCH

Welded in-line for use with **aquatherm green pipe** valves or other cases where draining is needed.



Industrial brass part no. (NPT)	Dimension (ND — OD)	d	l	z	D	z1	h	Weight
		[in]	[in]	[in]	[in]	[in]	[in]	[lb]
0041408	½" — 20 mm	0.79	0.45	1.02	1.34	0.65	2.64	0.22
0041410	¾" — 25 mm	0.98	0.39	1.02	1.34	0.65	2.64	0.21
0041412	1" — 32 mm	1.26	0.55	1.26	1.69	0.67	2.78	0.26
0041414	1 ¼" — 40 mm	1.57	0.47	1.28	2.05	0.65	3.01	0.31
0041416	1 ½" — 50 mm	1.97	0.61	1.54	2.68	0.67	3.30	0.45
0041418	2" — 63 mm	2.48	0.65	1.73	3.31	0.65	3.66	0.64

*Brass components in these valves do not comply with the 2015 lead-free requirements for potable water systems.

AQUATHERM PIPE CUTTER

For use with Aquatherm PP-R only.

Part no.	Dimension	Weight [lb]
0050104	(3/8" - 1 1/4") — (16 - 40 mm)	1.30



AQUATHERM TEMPERATURE PROTECTIVE GLOVES

For use during fusion and changing welding heads.

Part no.	Dimension
0050195	20 mm x 1/2"IG x 20 mm



AQUATHERM REPAIR SET

For closing pipe holes up to 0.4 in. Use with repair plug (part no. 0060600).

Part no.	Dimension	Weight [lb]
0050307	1/4" — 7 mm	0.32
0050311	7/16" — 11 mm	0.39



aquatherm green pipe® REPAIR PLUG

PP-R plug for closing pipe holes up to 0.4 in. Use with Aquatherm repair set (part no. 0050307 & 0050311).

Part no.	Dimension OD for each end	Weight [lb]
0060600	7/16" x 1/4" — 11 x 7 mm	0.02



AQUATHERM DRILL BIT

For mounting weld-in fusion outlets.

Part no.	Dimension	Weight [lb]
0050940	1/2" & 3/4" — 20 & 25 mm (for pipes 1 1/4" - 6" — 40 - 160 mm)	0.30
0050941	1/2" & 3/4" — 20 & 25 mm (for pipes 6" - 10" — 160 - 250 mm)	0.35
0050942	1" — 32 mm	0.46
0050944	1 1/4" — 40 mm	0.63
0050946	1 1/2" — 50 mm	0.70
0050948	2" — 63 mm	1.00
0050950 ^a	2 1/2" — 75 mm	3.21
0050952 ^a	3" — 90 mm	3.78
0050954 ^a	3 1/2" — 110 mm	4.32
0050956 ^a	4" — 125 mm	5.02
0050958 ^a	6" — 160 mm	8.87
0050960 ^a	8" — 200 mm	12.2



^a Must be used in fixed drilling machine. Morse taper shank.

PRODUCT RANGE - TOOLS

AQUATHERM WELDING HEADS

Part no.	Dimension	Weight
		[lb]
0050206	$\frac{3}{8}$ " — 16 mm	0.24
0050208	$\frac{1}{2}$ " — 20 mm	0.25
0050210	$\frac{3}{4}$ " — 25 mm	0.31
0050212	1" — 32 mm	0.46
0050214	1 $\frac{1}{4}$ " — 40 mm	0.68
0050216	1 $\frac{1}{2}$ " — 50 mm	1.00
0050218	2" — 63 mm	1.50
0050220	2 $\frac{1}{2}$ " — 75 mm	2.02
0050222	3" — 90 mm	3.12
0050224	3 $\frac{1}{2}$ " — 110 mm	5.41
0050226	4" — 125 mm	7.33



AQUATHERM FUSION OUTLET WELDING HEADS

Part no.	Dimension	Weight
		[lb]
0050614	1 $\frac{1}{4}$ " x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 40 x 20 & 25 mm	0.41
0050616	1 $\frac{1}{2}$ " x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 50 x 20 & 25 mm	0.49
0050619	2" x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 63 x 20 & 25 mm	0.53
0050620	2" x 1" — 63 x 32 mm	0.54
0050623	2 $\frac{1}{2}$ " x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 75 x 20 & 25 mm	0.56
0050624	2 $\frac{1}{2}$ " x 1" — 75 x 32 mm	0.57
0050625	2 $\frac{1}{2}$ " x 1 $\frac{1}{4}$ " — 75 x 40 mm	0.99
0050627	3" x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 90 x 20 & 25 mm	0.59
0050628	3" x 1" — 90 x 32 mm	0.61
0050629	3" x 1 $\frac{1}{4}$ " — 90 x 40 mm	1.02
0050631	3 $\frac{1}{2}$ " x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 110 x 20 & 25 mm	0.61
0050632	3 $\frac{1}{2}$ " x 1" — 110 x 32 mm	0.63
0050634	3 $\frac{1}{2}$ " x 1 $\frac{1}{4}$ " — 110 x 40 mm	1.06
0050635	3 $\frac{1}{2}$ " x 1 $\frac{1}{2}$ " — 110 x 50 mm	1.71
0050636	4" x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 125 x 20 & 25 mm	0.64
0050638	4" x 1" — 125 x 32 mm	0.66
0050640	4" x 1 $\frac{1}{4}$ " — 125 x 40 mm	1.12
0050642	4" x 1 $\frac{1}{2}$ " — 125 x 50 mm	1.74
0050644	4" x 2" — 125 x 63 mm	2.71
0050648	6" x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 160 x 20 & 25 mm	0.71
0050650	6" x 1" — 160 x 32 mm	0.74
0050652	6" x 1 $\frac{1}{4}$ " — 160 x 40 mm	1.20
0050654	6" x 1 $\frac{1}{2}$ " — 160 x 50 mm	1.85
0050656	6" x 2" — 160 x 63 mm	2.84
0050657	6" x 2 $\frac{1}{2}$ " — 160 x 75 mm	3.90
0050658	6" x 3" — 160 x 90 mm	6.71
0050660	8" x $\frac{1}{2}$ " & $\frac{3}{4}$ " — 200 x 20 & 25 mm	0.44
0050662	8" x 1" — 200 x 32 mm	0.51
0050664	8" x 1 $\frac{1}{4}$ " — 200 x 40 mm	0.89
0050666	8" x 1 $\frac{1}{2}$ " — 200 x 50 mm	1.42



AQUATHERM FUSION OUTLET WELDING HEADS (continued)

Part no.	Dimension	Weight
		[lb]
0050667	8" x 2 ½" — 200 x 75 mm	3.94
0050668	8" x 2" — 200 x 63 mm	2.30
0050669	8" x 3" — 200 x 90 mm	6.77
0050670	8" x 3 ½" — 200 x 110 mm	10.5
0050671	8" x 4" — 200 x 125 mm	13.6
0050672	10" x ½" & ¾" — 250 x 20 & 25 mm	0.44
0050674	10" x 1" — 250 x 32 mm	0.51
0050676	10" x 1 ¼" — 250 x 40 mm	0.89
0050678	10" x 1 ½" — 250 x 50 mm	1.46
0050680	10" x 2" — 250 x 63 mm	2.35
0050682	10" x 2 ½" — 250 x 75 mm	3.95
0050684	10" x 3" — 250 x 90 mm	6.77
0050686	10" x 3 ½" — 250 x 110 mm	10.6
0050688	10" x 4" — 250 x 125 mm	13.2
0050690	12" x 2" — 315 x 63 mm	2.41
0050692	12" x 2 ½" — 315 x 75 mm	4.22
0050694	12" x 3" — 315 x 90 mm	7.11
0050696	12" x 3 ½" — 315 x 110 mm	10.6
0050698	12" x 4" — 315 x 125 mm	13.2
0050699	12" x 6" — 315 x 160 mm	20.6
0050712	14" x 2" — 355 x 63 mm	2.43
0050714	14" x 2 ½" — 355 x 75 mm	4.40
0050716	14" x 3" — 355 x 90 mm	7.22
0050718	14" x 3 ½" — 355 x 110 mm	10.7
0050720	14" x 4" — 355 x 125 mm	13.3
0050722	14" x 6" — 355 x 160 mm	19.5
0050724	14" x 8" — 355 x 200 mm	31.5
0050726	16" - 24" x 2" — 400-630 x 63 mm	2.34
0050728	16" - 20" x 2 ½" — 400-500 x 75 mm	3.41
0050730	22" - 24" x 2 ½" — 560-630 x 75 mm	3.66
0050732	16" - 20" x 3" — 400-500 x 90 mm	5.21
0050734	22" - 24" x 3" — 560-630 x 90 mm	5.43
0050736	16" - 18" x 3 ½" — 400-450 x 110 mm	6.46
0050738	20" - 22" x 3 ½" — 500-560 x 110 mm	8.81
0050740	24" x 3 ½" — 630 x 110 mm	9.11
0050742	16" x 4" — 400 x 125 mm	11.8
0050744	18" - 20" x 4" — 450-500 x 125 mm	11.9
0050746	22" - 24" x 4" — 560-630 x 125 mm	12.1



GLOSSARY

AQUATHERM GREEN PIPE

A polypropylene pressure piping system designed for potable and food-grade applications. It is identified by its green color and joined using heat fusion. Hot water pipes have a multi-layer faser (MF) composition as well as dark green stripes, while cold water pipes have light blue stripes and no MF layer.

BUTT WELDING

A heat fusion connection where the face of one pipe is fused directly to the face of another pipe. Fittings are sized to be even with the pipe walls and are joined the same way. This process is only used on sizes above 6 inches.

AQUATHERM BLUE PIPE®

Formerly known as Climatherm, **aquatherm blue pipe®** is a polypropylene pressure piping system designed for non-potable applications such as heating and cooling, chemical transport, compressed air, etc. **aquatherm blue pipe®** is blue, has a multi-layer faser (MF) composition and thick green stripes, and is also joined using heat fusion.

EXTRUSION

The process by which Aquatherm's pipes are manufactured. The **fusiole®** material is shaped and pushed from the extrusion machine in three layers and cooled in long tanks, forming the uniquely designed Aquatherm pipes.

MULTI-LAYER FASER (MF)

A patented mixture of **fusiole® PP-R** and fiberglass, specially engineered to increase structural strength and reduce linear expansion.

FUSIOLE PP-R

The basic material used in all of Aquatherm's polypropylene piping systems. This resin is produced exclusively by Aquatherm using only the purest raw polypropylene.

FUSION OUTLET

A special fitting designed to fuse directly onto the side of a pipe. These fittings were once called saddles but have been renamed to distinguish them from less reliable mechanical fittings.

HEAT FUSION (OR HEAT WELDING)

The process of simultaneously heating two similar plastics and allowing them to cool together under pressure. This process forms a seamless bond between the materials.

AQUATHERM LILAC PIPE

A special formulation of the Aquatherm piping systems engineered for use in rainwater and reclaimed water. This system is distinguished by the purple color of the pipe.

LINEAR (THERMAL) EXPANSION

The growth in a pipe that occurs when hot water is run through the system. Contraction can also occur under cold temperatures.

MOLD INJECTION

The process through which Aquatherm's fittings are manufactured. Heated **fusiole®** is pressed into molds and cooled under high pressure, creating strong fittings with no mechanical weaknesses.

POLYPROPYLENE RANDOM (PP-R)

A unique formulation of the thermoplastic polymer used to create all the Aquatherm pipe and fittings. Random lengths of polypropylene molecules ensure chemical uniformity throughout the connection.

SOCKET FUSION

A heat fusion connection using welding heads and special fittings. The inside of the fitting is fused to the outside of the pipe, forming a quick and simple leak-proof connection. This process is only used on sizes from 4 inches and smaller.

TRANSITION, FLANGE

A flange connection using a polypropylene flange, a steel flange ring, and a gasket that can be attached to a same-size flange of any other piping material.

TRANSITION, THREADED

A special fitting with a brass or stainless steel insert mold injected into the polypropylene. The insert is threaded for use with any other type of threaded connection.

WELDING HEADS

Teflon-coated molds designed to match specific sizes of pipe and fittings. The welding heads are engineered for direct contact with the pipe and fittings and generally contain one male side and one female side in order to heat both sides of a connection at the same time.

WELDING IRON

An electronic heating device with a large, flat heating surface. This surface is designed to heat the welding heads to the proper welding temperature and should never be in direct contact with the material being welded.

WELDING JIG

A portable clamping system that assists with moving the pipe and fitting during the fusion process.

APPENDIX A

AQUATHERM FLANGE BOLT TORQUE AND SIZE

Nominal pipe size	Torque		Bolts		
	N-m	ft-lb	Number	Diameter	Washers
½" (20mm)	9	7	4	½	Yes
¾" (25mm)	14	10	4	½	Yes
1" (32mm)	20	15	4	½	Yes
1 ¼" (40mm)	20	15	4	½	Yes
1 ½" (50 mm)	34	25	4	½	Yes
2" (63mm)	41	30	4	5⁄8	Yes
2 ½" (75mm)	54	40	4	5⁄8	Yes
3" (90mm)	54	40	8	5⁄8	Yes
3 ½" (110mm)	54	40	8	5⁄8	Yes
4" (125mm)	54	40	8	5⁄8	Yes
6" (160mm)	75	55	8	¾	Yes
8" (200mm)	102	75	8	¾	Yes
10" (250mm)	122	90	12	7⁄8	Yes
12" (315 mm)	142	105	12	7⁄8	Yes
14" (355 mm)	203	150	12	1	Yes
16" (400 mm)	203	150	16	1	Yes
18" (450 mm)	237	175	16	1 ⅛	Yes
20" (500 mm)	237	175	20	1 ⅛	Yes
24" (630 mm)	305	225	20	1 ⅛	Yes

Note: These are typical values for rubber gaskets with lubricated (lightly greased) or plated bolts. Values may be increased for harder gaskets or plain/un-plated bolts.

AQUATHERM BALL VALVE FLANGE BOLT TORQUE AND SIZE (for connection to Aquatherm ball valves)

Nominal Pipe Size	Torque		Bolts		
	N-m	ft-lb	Number	Diameter	Washers
3" (90mm)	40	29	8	M16 x 60mm	Yes, M16
3 ½" (110mm)	50	37	8	M16 x 60mm	Yes, M16
4" (125mm)	50	37	8	M16 x 60mm	Yes, M16
6" (160mm)	60	44	8	M20 x 80mm	Yes, M20

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