

ICC-ES Report

ESR-1613

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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**

DIVISION:

22 00 00—PLUMBING

SECTION:

22 11 16—DOMESTIC WATER PIPING

DIVISION:

23 00 00—HEATING, VENTILATING AND AIR CONDITIONING (HVAC)

SECTION:

23 21 13—HYDRONIC PIPING

Report Holder:

AQUATHERM GMBH

BIGGEN I-5
ATTENDORN D-57439
GERMANY

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ICC-ES Evaluation Report

ESR-1613

Effective Date: April 2018

This report is subject to re-examination in one year.

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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 I-5

ATTENDORN D-57439

GERMANY

www.aquathermpipe.com

EVALUATION SUBJECT:

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

1.0 EVALUATION SCOPE

Compliance with the following codes:

- 2018, 2015, 2012, 2009, 2006 and 2003 *International Plumbing Code*® (IPC)
- 2018, 2015, 2012, 2009, 2006 and 2003 *International Residential Code*® (IRC)
- 2018, 2015, 2012, 2009, 2006 and 2003 *International Mechanical Code*® (IMC)
- 2018, 2015, 2012, 2009, 2006 and 2003 *Uniform Plumbing Code* (UPC)
- 2018, 2015, 2012, 2009, 2006 and 2003 *Uniform Mechanical Code* (UMC)
- 2015, 2010 and 2005 *National Plumbing Code of Canada*

Properties evaluated:

- Temperature and pressure ratings
- Physical properties
- Drinking water system component—health effects
- Surface Burning Characteristics

2.0 USES

Aquatherm green pipe, green pipe MF, blue pipe, blue pipe MF, lilac pipe, Fusiotherm® and Climatherm® polypropylene (PP-R) pipe and fittings are used in hydronic piping systems, hot- and cold-water distribution systems, and for water service.

3.0 DESCRIPTION

3.1 General:

Aquatherm green pipe, green pipe MF, blue pipe, blue pipe

MF, lilac pipe, Climatherm® and Fusiotherm® pipe and fittings are manufactured from random copolymer polypropylene pipe (PP-R) materials satisfying NSF 14 and 61 as well as ASTM F 2389 and CSA B137.11. Aquatherm green pipe, green pipe MF and Fusiotherm® pipe and fittings are identical and are green in color with longitudinal dark green or blue stripes. Climatherm®, blue pipe and blue pipe MF are identical to the Aquatherm green pipe, green pipe MF and Fusiotherm products except it is blue in color with longitudinal green stripes. Aquatherm lilac pipe is identical to the blue pipe except it is purple in color. The pipe and fittings are available in nominally 20-, 25-, 32-, 40-, 50, 63-, 75-, 90-, 110-, 125-, 140-, 160, 200- 250-, 315, 355, 400, 450, 500, 560, and 630-millimeter (0.787, 0.984, 1.26, 1.575, 1.96, 2.48, 2.95, 3.54, 4.33, 4.92, 5.51, 6.3, 7.87, 9.84, 12.4, 14.0, 15.7, 17.7, 19.7, 22.0, and 24.8 inches) outside-diameter sizes in 4-meter (13.1 feet) and 6 meter (19.7 feet) straight lengths. The 20- and 25-millimeter (0.787 and 0.973 inch) sizes are also available in coils of 100-meter (328 feet) lengths. The pipe and fitting products are pressure-rated for a minimum of 100 psi (690 kPa) at 180°F (82°C) for standard dimension ratios (SDRs) of 6 7.3 and 9, and for a minimum 160 psi (1100 kPa) at 73°F (23°C) for all SDRs. SDR is the ratio of outside diameter to wall thickness and is constant for all pipe sizes. Fittings and pipe must be joined by heat welding with a proprietary device.

Aquatherm Advanced system consisting of Aquatherm green pipe, green pipe MF, Fusiotherm® Climatherm®, Climatherm® Faser, blue pipe or blue pipe MF pipe, fittings and fiberglass or mineral wool insulation on the pipe, with bare fittings no more than every 6 ft. of pipe were evaluated to ASTM E84 and ULC S102.2 and were found to have a flame-spread index of less than 5 and smoke-development index of less than 25.

3.2 Heat Transfer Fluids:

Where used in radiant heating systems, the pipe and fittings are recognized for use with potable water, as well as aqueous solutions of ethylene glycol or propylene glycol for antifreeze, up to 100% concentrations of either glycol.

4.0 INSTALLATION

4.1 General:

Aquatherm green pipe, green pipe MF, blue pipe, blue pipe MF, lilac pipe, Fusiotherm® and Climatherm® piping and fittings are socket, butt, fusion outlet, or electrofusion heat welded and must be installed in accordance with the manufacturer's published installation instructions, the applicable codes and this report. Where differences exist, the instructions in this report must govern. The minimum cold bending radius is six times the nominal diameter.

4.2 Water Distribution:

Horizontally laid pipe must be secured in such a manner that temperature-induced expansion and contraction are accommodated. In areas using the Uniform Plumbing Code, PP piping must not be installed within the first 18 inches (457 mm) of piping connected to a water heater. The system may be installed in concrete in accordance with the manufacturer's instructions. The piping must be secured to the concrete reinforcement (ie "rebar") to hold it in place while pouring concrete. When embedment is in concrete, installation, including minimum concrete cover, must comply with IBC Section 1907, or IRC Section R506.1, as applicable.

4.3 Water Service:

Buried piping must be installed in such a manner that external loads do not decrease the vertical dimension of the cross section by more than 5 percent. Piping must be installed to provide an allowance for contraction of the line due to temperature change prior to backfilling. In areas with poor soil conditions (plastic clays), the trench bottom must be prepared using granular material to provide a stable base. Potable water service piping must not be located in, under or above cesspools, septic tanks, septic tank drainage fields or pits.

4.4 Hydronic Piping Systems:

The installation must comply with Chapter 12 of the applicable mechanical code(s) and the manufacturer's published installation instructions. Details of the design and installation of the hydronic piping system must be submitted to the code official for approval. All circuits must be formed from continuous lengths of piping, from manifold supply to return. No splices are allowed. The system may be installed in either concrete or wood floors. When the system is embedded in concrete floors, a moisture barrier must be laid over a concrete base slab a minimum of 3¹/₂ inches (38 mm) thick. Underfloor insulation and reinforcing mesh must then be placed on the slab. The piping must be uncoiled and attached to the mesh using soft steel wire. A concrete topping is then laid over the piping. When embedment is in concrete, installation, including minimum concrete cover, must comply with IBC Section 1907, or IRC Section R506.1, as applicable. When the piping is installed over polystyrene boards, the boards must comply with IBC Section 2603, or IRC Section R316, as applicable.

Antifreeze protection may be achieved by the addition of chemicals detailed in Section 3.2. The quantity of these allowed chemicals required to achieve a specific freeze protection level is beyond the scope of this report. Addition of antifreeze to the radiant heating loop must be in accordance with the manufacturer's installation instructions and the material safety data sheet (MSDS).

Mounting brackets and installation hardware are provided by the manufacturer. Horizontally laid pipe must be secured in such a way that temperature-induced expansion and contraction are accommodated.

4.5 Inspection:

4.5.1 Water Distribution and Water Service Piping: Installed piping must be pressure-tested and inspected as required by IPC Section 606.6, IRC Section P2503.7 or UPC Section 103.5.

4.5.2 Hydronic Piping: The piping must be pressure-tested for leaks before installation of covering, as noted in Section 1208 of the IMC, Section 1207 of the UMC, or Section M2103.4 of the IRC, as applicable. The leak test must be witnessed by the code official or the code official's designated representative.

5.0 CONDITIONS OF USE

The Aquatherm green pipe, green pipe MF, blue pipe, blue pipe MF, lilac pipe, Fusiotherm[®] and Climatherm[®] pipe and fitting system described in this report complies with, or is a suitable alternative to what is specified in, those codes listed in Section 1.0 of this report, subject to the following conditions:

- 5.1 Pipe and fitting systems must be manufactured, identified and installed in accordance with this report, the applicable code and the manufacturer's published installation instructions. Pipe and fittings must be installed by Aquatherm[®] trained installers. Manufacturer's published installation instructions must be furnished to the code official. The instructions within this report must govern if there are any conflicts between the manufacturer's instructions and this report.
- 5.2 When installation is in fire-resistance-rated assemblies, evidence of compliance with IBC Section 714 (penetrations) must be provided to the code official for approval.
- 5.3 During placement of cover over the piping, the pipe must be maintained at the greater of 1¹/₂ times the working pressure or 100 psi (689.4 kPa).
- 5.4 Each installation must be pressure-tested for leaks in the presence of the code official or the code official's designated representative.
- 5.5 Clearances from heat-producing equipment must be in accordance with the applicable.
- 5.6 The use of the piping in hydronic systems is limited to fluids as noted in Section 3.2.
- 5.7 Hydronic piping systems that utilize a nonpotable heat transfer fluid must not be connected to the potable water system except through the use of approved devices such as backflow preventers or double-walled heat exchangers.
- 5.8 For jurisdictions enforcing the IPC, for water supply and distribution, heat-fusion joints must be installed in accordance with IPC Section 605.20.1.
- 5.9 The piping is manufactured in Attendorn, Germany, under a quality control program with inspections by ICC-ES.

6.0 EVIDENCE SUBMITTED

Data in accordance with the ICC-ES Acceptance Criteria for PP, PEX, and PEX-AL-PEX Pipe and Fittings Used in Radiant Heating and Water Distribution Systems (AC122), dated October 2007, ASTM F2389-2017a for Pressure-rated Polypropylene (PP) Piping Systems, and CSA B137.11-2017 for Polypropylene (PP-R) Pipe and Fittings for Pressure Applications

7.0 IDENTIFICATION

7.1 Piping:

The piping must be marked every 5 feet (1524 mm) with the following:

- The name Aquatherm green pipe, green pipe MF, blue pipe, blue pipe MF, lilac pipe, Fusiotherm[®] or Climatherm[®] and the name Aquatherm
- Nominal pipe diameter
- Material designation (PP-R)
- Potable water designation (PW)
- Standard dimensional ratio (SDR 6, 7.3, 9, 11 or 17.6)
- Temperature and pressure ratings
- Standard designation
- Production code
- Pipe intended for the transport of potable water or other water that could include residual free chlorine as a

disinfectant shall also include the chlorine resistant destination for which it complies, CL-TD or CL-R;

- The evaluation report number (ESR-1613)

7.2 Fittings:

Aquatherm green pipe, green pipe MF, blue pipe, blue pipe MF, lilac pipe, Fusiotherm[®] and Climatherm[®] fittings must be marked with the following:

- Nominal diameter
- Aquatherm logo (see Figure 1)
- Type of material (PP-R)

Packages containing Aquatherm green pipe, green pipe, blue pipe, blue pipe MF, lilac pipe, Fusiotherm[®] or Climatherm[®] fittings must be marked with the following:

- Standard designation
- Nominal Size
- The evaluation report number (ESR-1613)



FIGURE 1—AQUATHERM LOGO