

ICC-ES Evaluation Report

ESR-1613

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DIVISION: 22 00 00—PLUMBING
Section: 22 11 16—Domestic Water Piping
Section: 23 21 13—Hydronic Piping
REPORT HOLDER:
**AQUATHERM GmbH
BIGGEN I-5
ATTENDORN D-57439
GERMANY**
www.aquathermpipe.com
EVALUATION SUBJECT:
**AQUATHERM GREENPIPE®, FUSIOTHERM® AND
CLIMATHERM® POLYPROPYLENE (PP-R) PIPE AND
FITTINGS**
1.0 EVALUATION SCOPE
Compliance with the following codes:

- 2006 *International Plumbing Code*® (2006 IPC)
- 2006 *International Residential Code*® (2006 IRC)
- 2006 *International Mechanical Code*® (2006 IMC)
- 2003 *International Plumbing Code*® (2003 IPC)
- 2003 *International Residential Code*® (2003 IRC)
- 2003 *International Mechanical Code*® (2003 IMC)
- 2006 IAPMO *Uniform Plumbing Code* (2006 IAPMO UPC)
- 2006 IAPMO *Uniform Mechanical Code* (2006 IAPMO UMC)
- 2003 IAPMO *Uniform Plumbing Code* (2003 IAPMO UPC)
- 2003 IAPMO *Uniform Mechanical Code* (2003 IAPMO UMC)

Properties evaluated:

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

2.0 USES

Aquatherm greenpipe®, 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:

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.

Aquatherm greenpipe® and Fusiotherm® pipe and fittings are identical and are green in color with longitudinal dark green or blue stripes. Climatherm pipe is identical to the Aquatherm greenpipe® and Fusiotherm products except it is blue in color with longitudinal green stripes. The pipe and fittings are available in nominally 20-, 25-, 32-, 40-, 50-, 63-, 75-, 90-, 110-, 125-, 140- and 160-millimeter (0.787, 0.984, 1.26, 1.575, 1.96, 2.48, 2.95, 3.54, 4.33, 4.92, 5.51 and 6.3 inches) outside-diameter sizes in 4-meter (13.1 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 and 7.3, and for a minimum 160 psi (1100 kPa) at 73°F (23°C) for SDRs of 6, 7.3 and 11. SDR is the ratio of outside diameter to wall thickness and is constant for all Fusiotherm® pipe sizes. Fittings and pipe must be joined by heat welding with a proprietary device.

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 greenpipe®, Fusiotherm® and Climatherm® piping and fittings are socket 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 IAPMO UPC, PP piping must not be installed within the first 18 inches (457 mm) of piping connected to a water heater.

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 1906.3, 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 R314, 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 R2503.6 or IAPMO 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 IAPMO UMC, or Section M2103.3 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 greenpipe[®], 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 712 (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 605.21.1.

5.9 The piping is manufactured in Attendorn, Germany, under a quality control program with inspections by NSF International (AA-633).

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.

7.0 IDENTIFICATION

7.1 Piping:

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

- The name Aquatherm greenpipe[®], 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 or 11)
- Temperature and pressure ratings
- ASTM F 2389 designation
- Production code
- The name of the inspection agency (NSF International)
- The evaluation report number (ESR-1613)

7.2 Fittings:

Aquatherm greenpipe[®], 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 greenpipe[®], Fusiotherm[®] or Climatherm[®] fittings must be marked with the following:
- Name or logo of the inspection agency (NSF International)
 - ASTM F 2389 designation
 - The evaluation report number (ESR-1613)



FIGURE 1—AQUATHERM LOGO