



## Design Standard

### Hydronic Piping in Buildings

This standard was revised on May 5, 2021, and the latest changes are underlined. Please refer to Part 4 of this standard for full revision history.

Detailed specifications follow.

#### PART 1 - GENERAL

1.01 Above ground hydronic piping 4 inches and less in diameter shall be as follows:<sup>5</sup>

A. Copper

1. Pipe: ASTM B88, hard drawn copper, Type L.<sup>1</sup>
2. Fittings: ASTM B16.22 Wrought copper and copper alloy.
3. Viega propress fittings or approved equal required<sup>10</sup>

B. Polypropylene

1. Pipe: ASTM F2389 polypropylene pipe and fittings.
2. Pipe shall have certification from NSF to meet NSF 14 and 61 and be listed with ICC.
3. Joints: Socket fusion, electrofusion, or butt fusion as applicable.
4. All installers and equipment used for fusing shall be certified by piping manufacturer. All fusion joints shall be prepared using a data logging system. Each joint shall be uniquely identified with a permanent marker<sup>12</sup>
5. Manufacturer: Aquatherm, Niron or approved equal.<sup>7,13</sup>

1.02 Above ground hydronic piping greater than 4 inches in diameter shall be as follows:<sup>6</sup>

A. Carbon Steel<sup>9</sup>

1. Pipe: ASTM A53, Grade B Type E or S, standard weight black steel pipe.
2. Fittings: ASTM A234 WPB, ANSI B16.11 standard weight seamless carbon steel.
3. Victaulic grooved fittings required for 3/4" and larger<sup>11</sup>

B. Polypropylene

1. Pipe: ASTM F2389 polypropylene pipe and fittings.
2. Pipe shall have certification from NSF to meet NSF 14 and 61 and be listed with ICC.
3. Joints: Socket fusion, electrofusion, or butt fusion as applicable.
4. All installers and equipment used for fusing shall be certified by piping manufacturer. All fusion joints shall be prepared using a data logging system. Each joint shall be uniquely identified with a permanent marker<sup>12</sup>



5. Manufacturer: Aquatherm, Niron or approved equal. <sup>7,13</sup>
- 1.03** For condensate drain piping, provide one of the following:
- A. Copper piping as specified above.
  - B. Schedule 40 conforming to ASTM Standard Specifications for black and hot-dipped zinc coated galvanized welded and seamless steel pipe, ASTM designation A135.
- 1.04** For polypropylene applications, piping shall be terminated at the control valve at the AHU. Piping from the control valve to the coil shall be copper.
- 1.05** Isolation Valves
- A. Provide the piping systems with line size shutoff valves located at risers, at main branch connections at each floor, at branch takeoffs serving equipment and at each heating and cooling coil. Valves shall be provided on both supply and return lines.
  - B. At air handling units where multicoil (stacked) arrangement is used, provide each supply and return line to and from each stacked coil section with a union, pressure gauge, thermometer and a balancing valve with memory stop and valves for isolation of each coil.
- 1.06** Provide insulation with minimum thickness and conductivity values in compliance with the version of IECC specified in the Building Energy Efficiency Design Standard. <sup>14</sup>
- 1.07** All hydronic piping systems (CHW and HHW) shall have automatic air venting at the highest point in the system.
- 1.08** Stainless steel fine wire mesh strainers shall be installed at all pumps and air handling units to mitigate problems with particulate matter.
- 1.09** The methodology for initial flushing and treatment of hydronic systems contained in Appendix A, or equivalent approved in advance by UES, is required for any new hydronic system (chilled water or heating hot water) prior to start up.
- 1.10** The methodology contained in Appendix B, or equivalent approved in advance by UES, is required for any hydronic system (chilled water or heating hot water) shutdown or layup of more than 30 days duration.
- 1.11** Di-electric insulating flanges shall be provided at all connections between copper and steel piping and maintained for the life of the piping system.



## **PART 2 - POLYPROPYLENE PIPE REQUIREMENTS**

- 2.01** Standard Grade hydrostatic pressure ratings from Plastic Pipe Institute in accordance with TR-3 as listed in TR-4. The following three standard-grade hydrostatic ratings are required as a minimum:
- A. 200 Degrees F at 80 psi
  - B. 180 Degrees F at 100 psi
  - C. 73.4 Degrees F at 160 psi.
  - D. The project design engineer shall ensure that pipe specified meets the temperature and pressure requirements of the project.<sup>8</sup>
- 2.02** Certification of flame spread/smoke development rating of 25/50 in accordance with ASTM E84 when wrapped with standard pipe insulation, field installed.
- 2.03** Where installed in systems with pumps in excess of 7.5 HP, piping shall be protected from excessive heat generated by operating the pump at shut-off conditions. Where the possibility exists that the pump will operate with no flow, the protection method shall be a temperature relief valve or comparable level of protection, set to a maximum temperature of 185° F.

## **PART 3 - FLUSHING AND TREATMENT**

- 3.01** All new metallic, hydronic piping systems shall be flushed and treated before the building piping system is connected to the central hydronic piping system.
- 3.02** Flushing and treatment shall be initiated by the university's project manager for the piping project (FP&C or SSC) upon completion of the installation.
- 3.03** Flushing and treatment shall be done in accordance with the specification in Appendix A.
- 3.04** Flushing and treatment shall be witnessed by representatives of the mechanical contractor, SSC and UES.
- 3.05** The chemical treatment firm shall complete the report in Appendix A. It shall be signed by the chemical treatment firm and all witnesses. The signed report shall be submitted to the UES Technical Services manager before the building system is connected to the central system.
- 3.06** Installation contractor shall cover the flushing and treatment costs for the building hydronic piping systems.
- 3.07** ChemTreat CT38 or approved equal is the chemical to be used for flushing. University Project Manager shall notify UES ([darryl.petersen@tamu.edu](mailto:darryl.petersen@tamu.edu)) one week prior to flushing and treatment.<sup>2, 15</sup>



3.08 After witnessing and verifying satisfactory completion of flushing and treatment, UES will open valve connecting the building to the campus hydronic systems. <sup>3</sup>

**PART 4 - REVISIONS TO DESIGN STANDARD**

Revision #	Date	Location	Brief Description
1	6/1/2017	Part 1.01 A1	"Type K" pipe changed to "Type L".
2	1/18/2019	Part 3.07	FQ7101 is approved chemical to be used for flushing
3	1/18/19	Part 3.08	Witness and verification of flushing and treatment is needed before reconnection
4	1/18/19	Appendix A, Section 1.2	Recommended doses for pipe cleaning procedure
	10/6/2020	ALL	PEX-A removed from standard
5	10/6/2020	Part 1.01	Above ground hydronic piping changed from 2" to 4"
6	10/6/2020	Part 1.02	Above ground piping designation changed to 4" or greater
7	10/6/2020	Part 1.01 B4 and Part 1.02 A4	Niron removed from standard
8	5/5/2021	2.01D	Project design engineer shall ensure pipe specifications
9	5/5/2021	1.02A	Carbon Steel pipe added to standard
10	5/5/2021	Part 1.01 A	Viega propress fittings added to standard
11	5/5/2021	1.02 A	Victaulic grooved fittings added to standard
12	5/5/2021	1.01 B and 1.02 B	Fusing shall be certified by piping manufacturer
13	5/5/2021	1.01 B and 1.02 B	Niron added to standard
	5/5/2021	1.03	Polypropylene removed from standard
14	5/5/2021	1.06	Insulation thickness and conductivity values will comply with version of IECC
15	5/5/2021	3.07	ChemTreat CT38SUEZ replaces FerroQuest (FQ) 7101