1. DESIGN STANDARD:

1.1 Piping systems must be designed for approximately 50 years life in the main distribution to buildings and in main branches to buildings. Pipe sizing, materials, valving and support must be specified with longevity and future additions in mind.

1.1.1 Size piping for maximum pressure loss per 100 feet of 3-5 feet based on 30 year old pipe using Cameron or equivalent sizing charts. Maximum velocity in pipe mains should be 8 feet per second.

1.1.2 Include isolation valves at each connection to buildings from the campus system and at zoned segments of the building system. Isolation valves should be re-buildable in the field since the ability to isolate buildings and systems without central campus shutdown is necessary.

1.1.3 Butt-welded joints for piping systems are preferred. Do not use resiliently coupled piping systems without approval of the Rice University's Project Manager.

1.1.4 Black steel piping should be covered with insulated pipe covering or should be painted where insulation is not required or exposed to exterior. Exception: Sprinkler pipe does not require painting.

1.1.5 Refrigerant piping must be Type "L" copper ACR tubing.

1.2 Support systems for piping should be designed for stability and long life.

1.2.1 Pipe hangers should be steel clevis (unless piping is copper) for individually hung pipes and structural steel trapeze type for multiple pipes. Except when a multi-trade support system is part of the project planning, supports should be exclusive to each specific trade. (Do not support equipment, control wiring, light fixtures and the like from pipe, duct and conduit systems.

1.2.2 Support risers and floor mounted equipment with structural steel bases. Use pipe rollers for horizontal runs when expansion or contraction of the pipe run is expected.

1.2.3 Design of piping systems should include allowance for expansion. Expansion compensation that depends on manufactured devices and require periodic maintenance should be avoided (especially in main pipe runs). Pipe loops and anchors are preferred for expansion compensation.

1.2.4 Pipe supports and anchors should be specified with coatings to protect them against the effects of moisture and corrosion. Moisture is to be expected, especially in tunnels and basement locations.

1.2.5 Fire stops should be made using U.L. listed assemblies for the time rating of the wall or floor.

1.2.6 Penetrations through exterior walls should be sleeved with galvanized steel pipe and fitted with water resistant sealing assemblies.

1.2.7 Risers through floors above grade should be curbed in mechanical rooms to prevent water migration.

1.3 Piping downstream of building pumps may be designed using somewhat less conservative criteria.

1.3.1 Piping should be sized based on 30 year old pipe using Cameron Design Manual or equivalent.

1.3.2 Balancing at pumps and at each coil should be considered. Design should use balancing valves with memory stops and employ pressure/temperature test plugs at each coil and in major zone branches.

1.3.3 Piping systems should be identified with pipe markers identifying the system type and flow direction.

2. PRODUCT STANDARD:

2.1 Piping system for chilled and heating water should be ANSI/ASTM A 53 schedule 40 through 10" size; 0.375 minimum wall thickness for 12" and larger size.

	Pressure Rating	Temperature Range
CHWS	150	45
CHWR	150	57
HWS	150	180
HWR	150	140

2.2 Piping systems for steam should be ANSI/ASTM A53 Grade B, Schedule 40 for all sizes. Condensate use Schedule 80.

	Pressure Rating	Temperature Range
Steam	150	300
Condensate Return	300	

2.3 Refrigerant pipe fittings must be wrought copper streamlined sweat fitting. Solder must be Sil-Fos, except on valves use solder recommended by valve manufacturer.

3. PERFORMANCE STANDARD:

3.1 All condensate piping must be gravity fed to condensate pump. No up hill piping allowed.