



TECHNICAL BULLETIN

Micromist Systems

Number: MM2003-002

Date: 06/25/2003

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From: Product Support Services
Fire Suppression Group

Subject: Acceptable Pipe and Fittings for use on Micromist Systems

Effective: Immediately

Affects: New Micromist Installations

The purpose of this bulletin is to provide up-to-date information on the pipe and tube materials acceptable for use on a Fike Micromist[®] system. The information stated in this bulletin supercedes the information stated in Fike's Micromist[®] design manual, part number 06-153, dated February 1999. Wherever the word pipe is used in this bulletin, it shall be understood also to mean tube.

PIPE AND TUBE MATERIALS:

- A. Pipe shall be of noncombustible material having physical and chemical characteristics such that its deterioration under stress can be predicted with reliability.
- B. Acceptable piping materials include, but are not limited to the following:
- Stainless steel pipe conforming to ASTM A-312, Schedule 40
Grades: 304, 304L, 316 and 316L
Type: Seamless or Welded
 - Stainless steel tubing conforming to ASTM A-269
Grades: 304, 304L, 316 and 316L
Type: Seamless or Welded
 - Copper tubing conforming to ASTM B-88
Wall Thickness: Type K or L
Type: Drawn or Annealed
- C. ANSI B31.1, *Power Piping Code* shall be used to calculate the minimum acceptable wall thickness for the pipe selected with respect to maximum allowable working pressure. An internal pressure of 320 psi (22 bar) shall be used for this calculation. Refer to the FSSA *Piping Handbook* for additional guidance on determining acceptability of the material selected.
- D. Under no conditions shall non-metallic pipe, cast-iron pipe, black or galvanized pipe and fittings be used. The physical and chemical characteristics of these materials are such that when exposed to water, corrosion may occur. Resistance to corrosion is important since the small diameter orifices used in the Micromist[®] system are prone to clogging.
- E. Pipe or tube manufactured in accordance with an ASTM standard other than those identified may be used as long as they comply with the requirements outlined above.

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FITTING MATERIALS:

- A. Fittings shall have a corrosion resistance at least equivalent to wrought copper fittings conforming to ANSI B16.22, *Wrought Copper and Copper Alloy Solder Joint Pressure Fittings*.
- B. Acceptable fitting materials include, but are not limited to the following:
 - Stainless steel threaded fittings, Class 2000
 - Stainless steel compression type tube fittings (Swagelok® or equivalent)
 - Copper tubing with brazed fittings
- C. Fittings shall have a minimum rated working pressure equal to or greater than 320 psi (2206 kPa).
- D. Where compression type fittings are used to join tubing, the manufacturer's pressure and temperature ratings for the fitting shall not be exceeded.
- E. Fittings other than those listed above may be used as long as they comply with requirements stated above.

CALCULATIONS:

- A. Flow calculations shall be performed on the preliminary piping design to determine that the pressure loss in the system piping from the water storage tank to any nozzle does not exceed the maximum of 20 psi (1.38 bar). This ensures that the pressure at all nozzles is high enough to generate an "effective" spray. The calculation need only be performed on the nozzle located the furthest hydraulically from the container. If there is any doubt as to which nozzle is hydraulically farther from the container, calculations **MUST** be performed for each nozzle in question.
- B. To perform the required flow calculations, the designer must confirm the equivalent length values for the type of fittings used, and perform calculations to determine the pressure drop per foot/meter (psi/kPa) for the type of pipe used.

To simplify the design process, Fike has provided the equivalent length and pressure drop values (see following pages) for the pipe and fitting materials previously identified. As long as one of these materials is used, the pressure loss in the system piping can be calculated in accordance with the procedure outlined in Section 3.0 of the Micromist® Manual. These values have also been incorporated into Version 2.6 of the MicroCalc™ program, which can be used to perform the required calculations as well.

Where pipe or fittings other than those identified are used, the equivalent length and pressure drop values must be determined accordingly. Refer to NFPA 750 for further clarification.

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Copper Tubing conforming to ASTM B-88, Standard Specification for Seamless Copper Water Tube (Drawn or Annealed)

Equivalent Length Values					
Nominal Tube Size in. (mm)	90° Elbow ft. (m)	45° Bend ft. (m)	90° Bend ft. (m)	Thru Tee ft. (m)	Side Tee ft. (m)
1/2" (15)	1.0 (0.30)	0.5 (0.15)	0.5 (0.15)	-	2.0 (0.61)
5/8" (18)	1.5 (0.46)	0.5 (0.15)	1.0 (0.30)	-	2.0 (0.61)
3/4" (20)	2.0 (0.61)	0.5 (0.15)	1.0 (0.30)	-	3.0 (0.91)
1" (25)	2.5 (0.76)	0.5 (0.15)	1.0 (0.30)	-	4.5 (1.37)
1-1/4" (32)	3.0 (0.91)	1.0 (0.30)	2.0 (0.61)	0.5 (0.15)	5.5 (1.68)

Note: Equivalent length values are for standard radius, soldered fittings. Long radius fittings will have slightly less equivalent length – hence the pressure losses calculated using the equivalent length for standard radius fittings will be conservatively larger.

Pressure Drop Values psi/ft. (kPa/m) of Equivalent Length											
Nominal Tube Size in. (mm)	Tube Type	Nozzle Quantity									
		One	Two	Three	Four	Five	Six	Seven	Eight	Nine	
1/2" (15)	L	0.041 (0.927)	0.139 (3.144)	0.284 (6.424)	0.474 (10.722)	0.707 (15.993)					
	K	0.049 (1.108)	0.166 (3.755)	0.341 (7.714)	0.569 (12.871)	0.850 (19.228)					
5/8" (18)	L	0.016 (0.362)	0.053 (1.199)	0.107 (2.24)	0.179 (4.049)	0.266 (6.017)	0.368 (8.324)	0.485 (10.971)	0.617 (13.957)	0.763 (17.260)	
	K	0.018 (0.407)	0.059 (1.335)	0.120 (2.714)	0.200 (4.524)	0.298 (6.741)	0.413 (9.342)	0.545 (12.328)	0.693 (15.676)	0.858 (19.408)	
3/4" (20)	L	0.007 (0.158)	0.024 (0.543)	0.049 (1.108)	0.081 (1.832)	0.120 (2.714)	0.166 (3.755)	0.219 (4.954)	0.278 (6.289)	0.344 (7.781)	
	K	0.009 (0.204)	0.031 (0.701)	0.064 (1.448)	0.106 (2.398)	0.158 (3.574)	0.219 (4.954)	0.288 (6.515)	0.366 (8.279)	0.453 (10.247)	
1" (25)	L		0.007 (0.158)	0.014 (0.317)	0.022 (0.498)	0.033 (0.746)	0.046 (1.041)	0.060 (1.357)	0.076 (1.719)	0.094 (2.126)	
	K		0.008 (0.181)	0.016 (0.362)	0.026 (0.588)	0.039 (0.882)	0.054 (1.222)	0.070 (1.583)	0.089 (2.013)	0.110 (2.488)	
1-1/4" (32)	L			0.005 (0.113)	0.008 (0.181)	0.012 (0.271)	0.017 (0.385)	0.022 (0.498)	0.028 (0.633)	0.034 (0.769)	
	K			0.005 (0.133)	0.009 (0.204)	0.013 (0.294)	0.018 (0.407)	0.024 (0.543)	0.030 (0.679)	0.037 (0.837)	

Note: Pressure drop calculations are based on minimum internal diameter available for each tube type.

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Stainless Steel Tubing conforming to ASTM A-269, Standard Specification for Seamless & Welded Austenitic Stainless Steel Tubing for General Service

Equivalent Length Values					
Nominal Tube Size in. (mm)	90° Elbow ft. (m)	45° Bend ft. (m)	90° Bend ft. (m)	Thru Tee ft. (m)	Side Tee ft. (m)
1/2" (15)	2.0 (0.61)	0.5 (0.15)	0.5 (0.15)	-	2.0 (0.61)
5/8" (18)	2.5 (0.76)	0.5 (0.15)	1.0 (0.30)	-	2.5 (0.76)
3/4" (20)	3.0 (0.91)	0.5 (0.15)	1.0 (0.30)	-	3.0 (0.91)
1" (25)	4.5 (1.37)	0.5 (0.15)	1.0 (0.30)	-	4.5 (1.37)
1-1/4" (32)	5.0 (1.52)	1.0 (0.30)	2.0 (0.61)	0.5 (0.15)	5.0 (1.52)

Note: Above values are for Swagelok® fittings only.

Pressure Drop Values psi/ft. (kPa/m) of Equivalent Length									
Nominal Tube Size in. (mm)	Nozzle Quantity								
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine
1/2" (15)	0.329 (7.781)	1.120 (26.53)	2.316 (54.88)	3.895 (92.29)	5.842 (138.46)				
5/8" (18)	0.071 (1.968)	0.239 (6.673)	0.490 (13.71)	0.820 (22.94)	1.224 (34.27)	1.701 (47.66)	2.249 (63.02)	2.866 (80.37)	3.553 (99.67)
3/4" (20)	0.032 (0.475)	0.109 (1.629)	0.223 (3.303)	0.371 (5.519)	0.553 (8.211)	0.768 (11.38)	1.013 (15.02)	1.290 (19.11)	1.597 (23.64)
1" (25)		0.022 (0.565)	0.045 (1.131)	0.075 (1.900)	0.111 (2.805)	0.154 (3.981)	0.202 (5.135)	0.257 (6.515)	0.317 (8.05)
1-1/4" (32)			0.012 (0.475)	0.020 (0.792)	0.030 (1.176)	0.041 (1.629)	0.054 (2.149)	0.068 (2.714)	0.084 (3.35)

Note: Pressure drop calculations are based on minimum internal diameter shown in the table below. Minimum internal diameter is calculated using an outside diameter equal to tube size less 0.1 inches (0.08 mm) and a maximum permitted wall thickness which is 10% greater than the nominal wall thickness.

Tubing Properties			
Nominal Tube Size in. (mm)	OD in. (mm)	Wall Thickness in. (mm)	ID in. (mm)
1/2" (15)	0.50 (12)	0.065 (1.5)	0.37 (9.0)
5/8" (18)	0.625 (16)	0.065 (2.0)	0.495 (12.0)
3/4" (20)	0.75 (20)	0.083 (2.0)	0.584 (16.0)
1" (25)	1.00 (25)	0.095 (2.5)	0.81 (20.0)
1-1/4" (32)	1.25 (30)	0.095 (3.0)	1.06 (24.0)

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Schedule 40 - Stainless Steel Pipe conforming to ASTM A-312, Standard Specification for seamless and straight-seam welded austenitic steel pipe intended for high-temperature and general corrosive service

Stainless Steel Pipe Fittings (Threaded)					
Equivalent Lengths					
Nominal Size in.	Union ft. (m)	45° Elbow ft. (m)	90° Elbow ft. (m)	Thru Tee ft. (m)	Side Tee ft. (m)
1/2"	0.4 (0.12)	0.8 (0.24)	1.7 (0.52)	1.0 (0.30)	3.4 (1.04)
3/4"	0.5 (0.15)	1.0 (0.30)	2.2 (0.67)	1.4 (0.43)	4.5 (1.37)
1"	0.6 (0.18)	1.3 (0.40)	2.8 (0.85)	1.8 (0.55)	5.7 (1.74)
1-1/4"	0.8 (0.24)	1.7 (0.52)	3.7 (1.13)	2.3 (0.70)	7.5 (2.29)

Pressure Drop psi/ft. of Equivalent Length									
Pipe Size in. (mm)	Nozzle Quantity								
	One	Two	Three	Four	Five	Six	Seven	Eight	Nine
1/2"	0.023	0.081	0.174	0.300	0.460	0.653	0.879	1.139	1.432
3/4"		0.020	0.042	0.072	0.110	0.155	0.208	0.269	0.337
1"				0.022	0.033	0.046	0.061	0.079	0.099
1-1/4"						0.012	0.016	0.020	0.025

Note: The thickness of the pipe wall shall be calculated in accordance with ASME B31.1, Power Piping Code using an internal pressure of 320 psi (2,206 kPa).