Assertion

How does the pressure drop of HeatLink® ASTM F2159 press system fittings compare to HeatLink® ASTM F1960 expansion system fittings? Since the F1960 fitting system has a larger fitting internal diameter and a lower pressure drop, how much do the fittings contribute to the overall pressure drop?

HeatLink asserts that the pressure drop due to fittings in a complete system is relatively insignificant.

Methodology

To demonstrate the small differences in pressure drop between the F1960 fitting system and the F2159 (HPP) fitting system**, we installed an actual 2322 sq. ft., 2 ½ bath home plumbed in accordance with all applicable code requirements. The system was installed using HeatLink's F2159 (HPP) fittings and we then modeled the equivalent system with F1960 fittings, leaving all other parameters equal.

For each major fixture in the house, the equivalent feet of ½" and ¾" PEX was calculated and multiplied by the known pressure drop of PEX tubing for a given fixture flow requirement. All the fixtures used in the installation were considered low flow with a fixture unit of less than 1.5 GPM. Table 1 (below) shows the measured equivalent length of ½" and ¾" PEX, the actual number of fittings used, the total pressure drop, and the pressure drop that is contributed by the fittings.

As demonstrated in Table 1, although the F2159 (HPP) fittings have a slightly higher individual pressure drop than the F1960 fittings, the max. increase is only 0.72 psi. In fact, the majority of the pressure drop comes from the elevation change relative to the supply line.

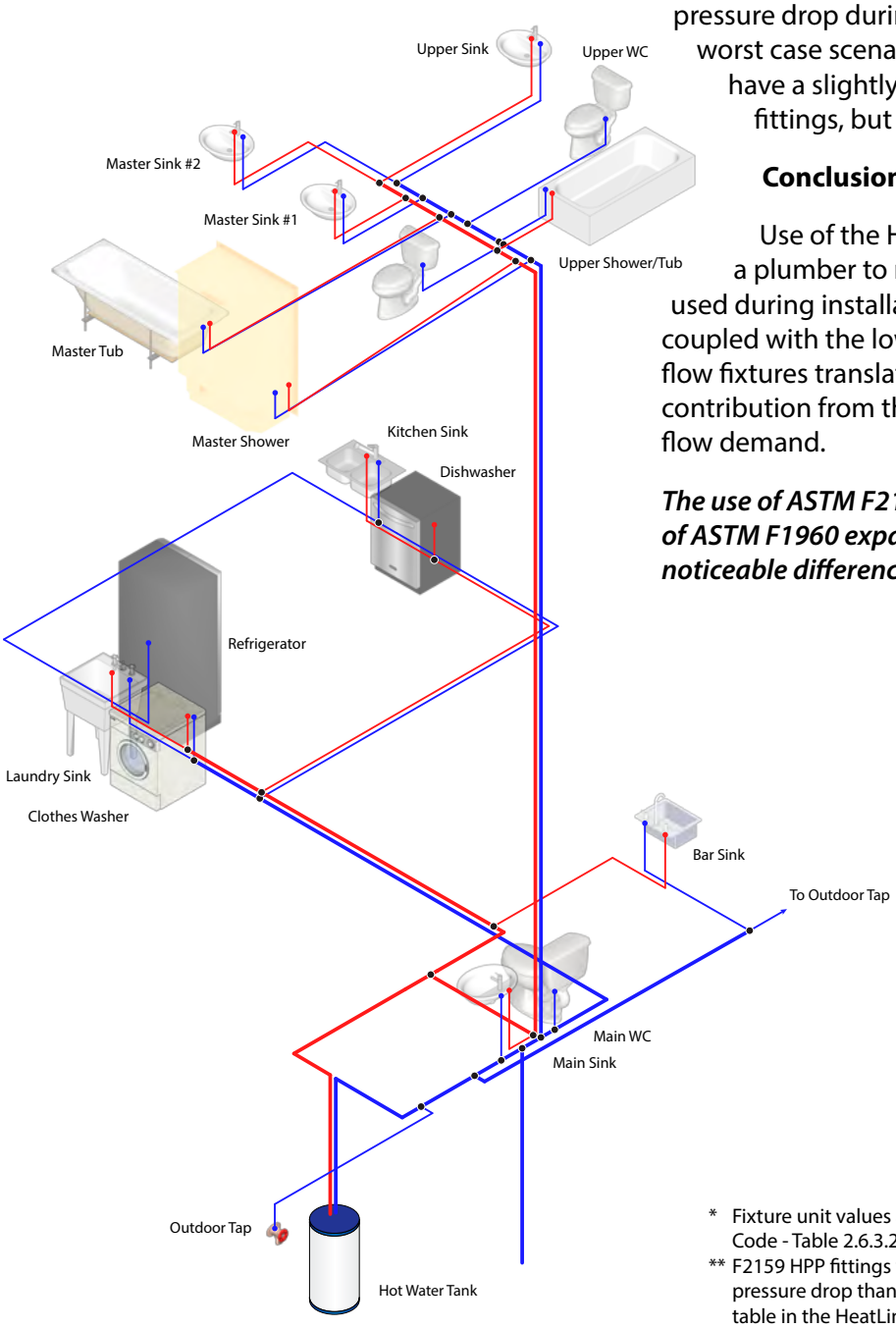
This example assumes that only one fixture is in use. We recognize that this is not the reality for most families. A typical "worst case scenario," could be a family using the master bathroom and the upper level bathroom in the morning while preparing for work/school (2 showers, 2 water closets, and 1 sink).

Table 1: Single Fixture Pressure Drop Analysis

				HeatLink F2159 (HPP) Fittings				HeatLink F1960 Fittings				Difference in Fitting Pressure Drop (psi)
				Equivalent Length (ft.) (PEX + Fittings)		Total Pressure Drop	Pressure Drop of Fittings	Equivalent Length (ft.) (PEX + Fittings)		Total Pressure Drop	Pressure Drop of Fittings	
Fixture	Level	Fixture Unit (GPM)*	# of Fittings Used	½"	¾"	(psi)	(psi)	½"	¾"	(psi)	(psi)	
Dishwasher (Hot)	Main	1.5	4	43.5	55.7	**6.1**	0.86	24.5	43.6	**5.4**	0.14	**0.72**
Kitchen Sink (Hot)	Main	1.0	4	49.3	55.7	**5.9**	0.41	30.3	43.6	**5.6**	0.07	0.34
Clothes Washer (3.5kg) (Hot)	Main	1.0	4	14.5	62	**6.0**	0.24	5.3	43.8	**5.8**	0.04	0.20
Master Shower (<9.5 LPM) (Cold)	Upper	1.0	3	24.5	51.9	**10.5**	0.25	15	32.6	**10.3**	0.035	0.22
Master Water Closet (<6 LPF) (Cold)	Upper	0.5	4	15.5	60.5	**7.9**	0.073	6.3	36.9	**7.9**	0.012	0.06

Table 2: Worst Case Pressure Drop Analysis

Fixture	Level	Fixture Unit (GPM)*	# of Fittings Used	HeatLink F2159 (HPP) Fittings				HeatLink F1960 Fittings				Difference in Fitting Pressure Drop (psi)
				Equivalent Length (ft.) (PEX + Fittings)		Total Pressure Drop (psi)	Pressure Drop of Fittings (psi)	Equivalent Length (ft.) (PEX + Fittings)		Total Pressure Drop (psi)	Pressure Drop of Fittings (psi)	
				½"	¾"			½"	¾"			
Master Shower (<9.5 LMP) (Cold)	Upper	1.0	3	24.5	51.9	**12.5**	1.0	15.0	32.6	**11.5**	0.075	0.9
Master Water Closet (<6 LPF) (Cold)	Upper	0.5	4	15.5	60.5	**10.2**	1.0	6.3	36.9	**9.3**	0.10	0.9
Upper Shower (<9.5 LMP) (Cold)	Upper	1.0	5	14.8	74.8	**12.8**	1.5	5.3	36.2	**11.5**	0.10	**1.4**
Upper Water Closet (<6 LPF) (Cold)	Upper	0.5	6	18.3	74.5	**10.4**	1.2	8.8	36.9	**9.3**	0.060	1.3
Master Sink #1 (Cold)	Upper	1.0	8	15.3	88.3	**11.1**	1.4	5.8	38.5	**9.8**	0.086	1.3



As demonstrated in Table 2 (above), there is an increased pressure drop during times of high demand flow. In the worst case scenario described, the F2159 (HPP) fittings have a slightly higher pressure drop than the F1960 fittings, but the max. increase is only 1.4 psi.

Conclusion

Use of the HeatLink Potable Water System allows a plumber to minimize the number of fittings used during installation. The minimal number of fittings coupled with the low flow requirements of modern low flow fixtures translates into a very small pressure drop contribution from the fittings, even during times of high flow demand.

The use of ASTM F2159 (HPP) insert style fittings in lieu of ASTM F1960 expansion style fittings results in no noticeable difference for the homeowner.

* Fixture unit values adapted from the 2010 Canadian National Plumbing Code - Table 2.6.3.2.A

** F2159 HPP fittings were used for this comparison as they have a higher pressure drop than F1807 brass fittings; see Fitting Equivalent Length table in the HeatLink Potable Installation Guide (L3235)