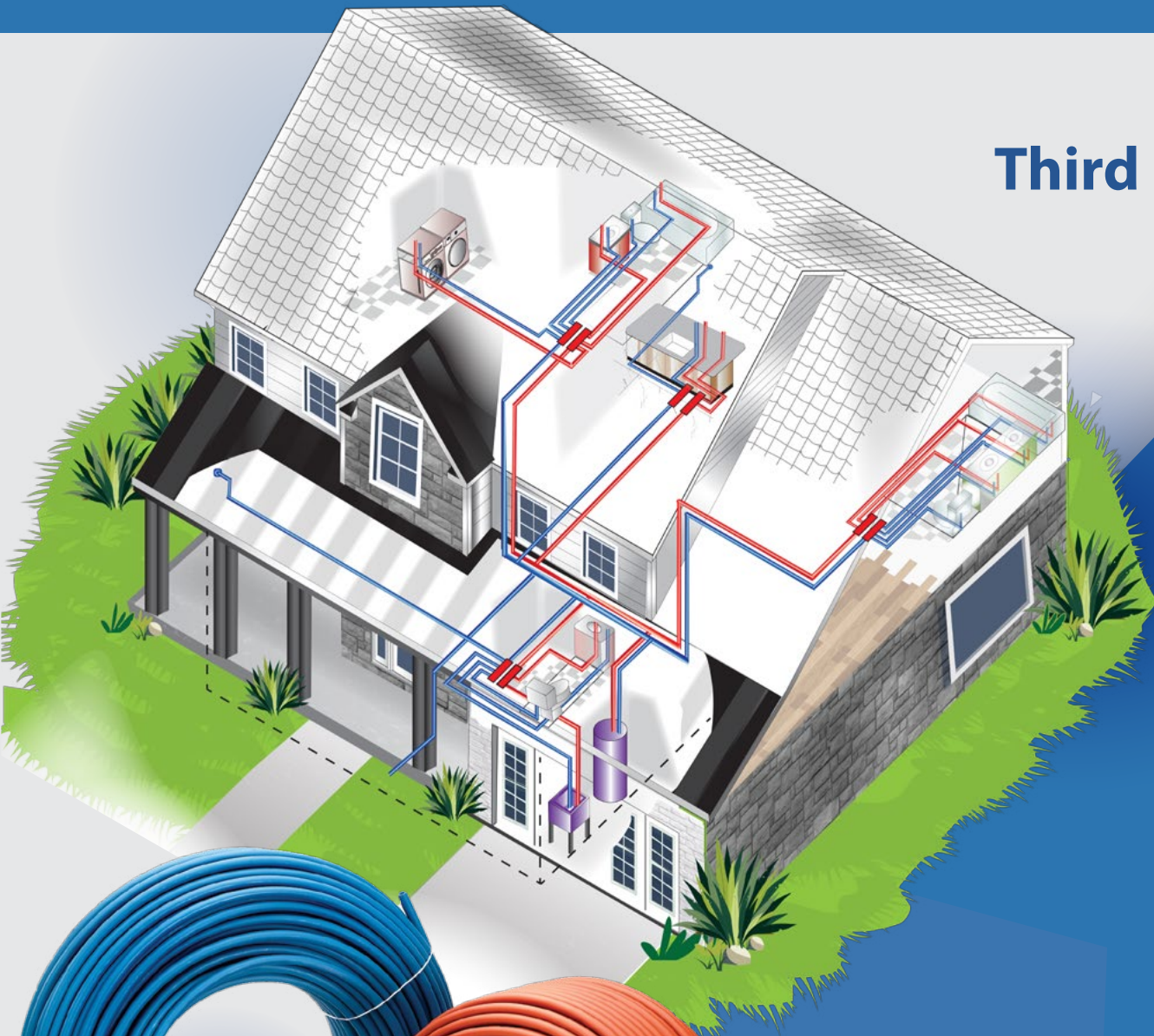


Third Edition



# PEX

## Plumbing Distribution Systems Design and Installation Guide

Advantages

Material Properties

Codes & Standards

Joining Methods

PEX Plumbing Layouts

Optimizing Design

Installation Guidelines

Water Service Line

Other Applications





# PEX

## Plumbing Distribution Systems Design and Installation Guide

### Third Edition

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This document was developed as the result of a consensus process involving the Plastics Pipe Institute, the Plastic Pipe and Fittings Association, and representatives from numerous piping and fitting manufacturers. It was prepared by Home Innovation Research Labs.

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# APPENDIX

## Performance Test Setup and Data

# A

### Diagrams of Piping Layouts for Different Test Runs

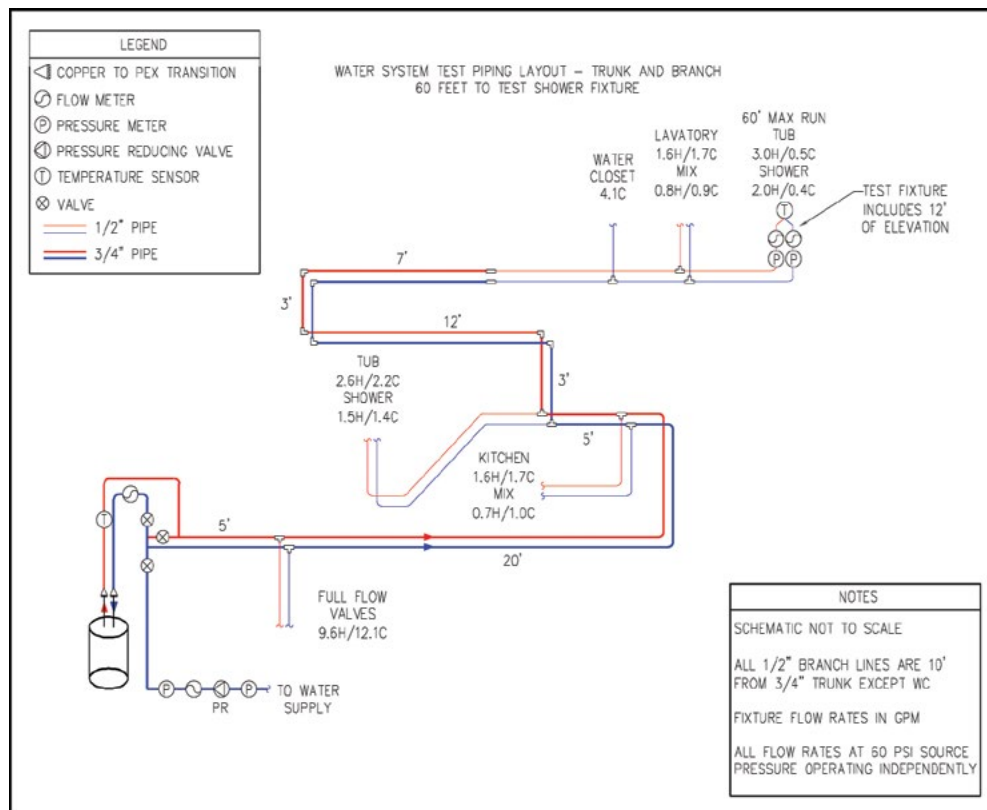


Figure A.1 Water System Test Piping Layout – Trunk and Branch, 60' to TF

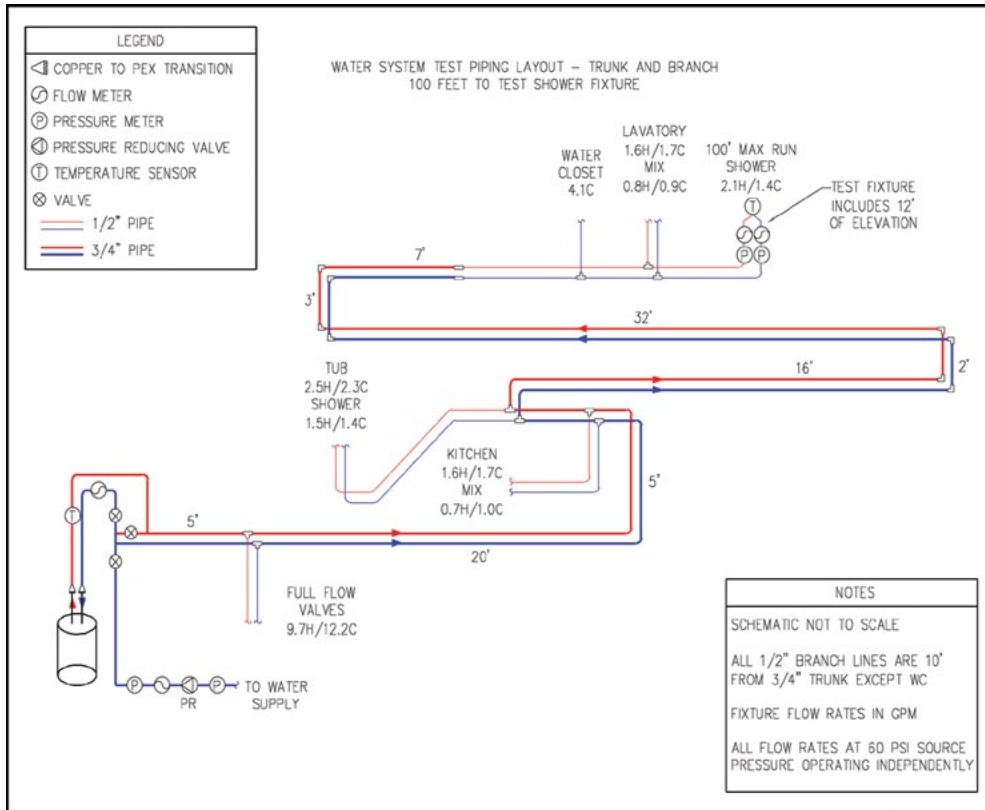


Figure A.2 Water System Test Piping Layout – Trunk and Branch, 100' to TF

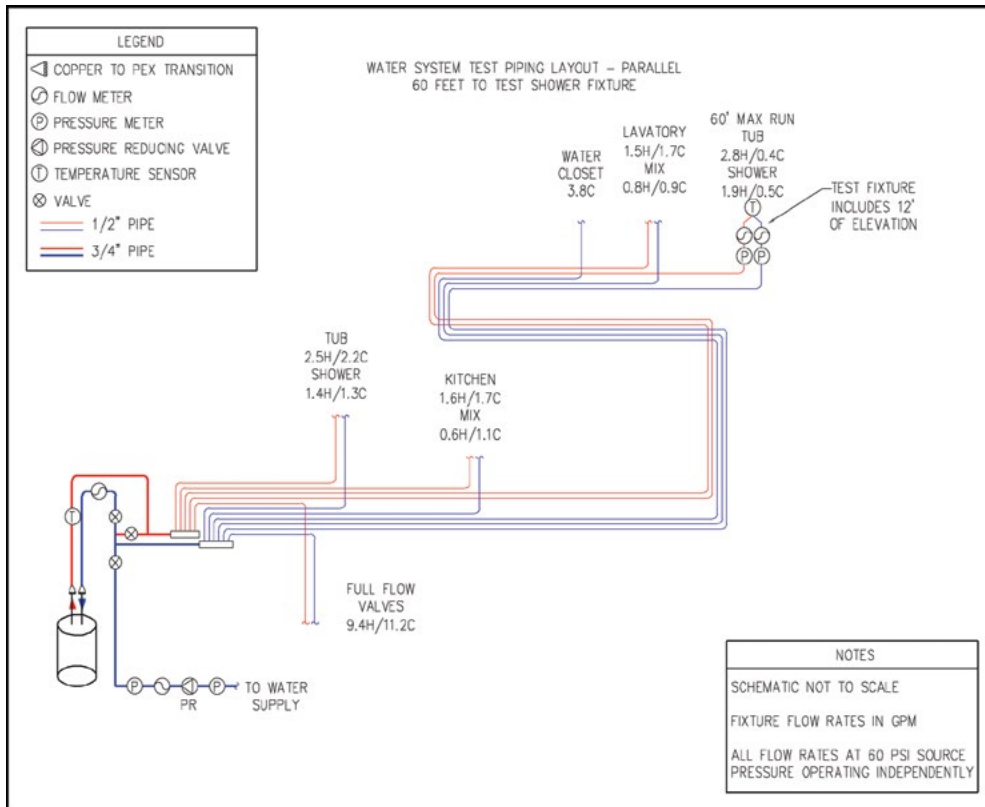


Figure A.3 Water System Test Piping Layout – Parallel, 60' to TF

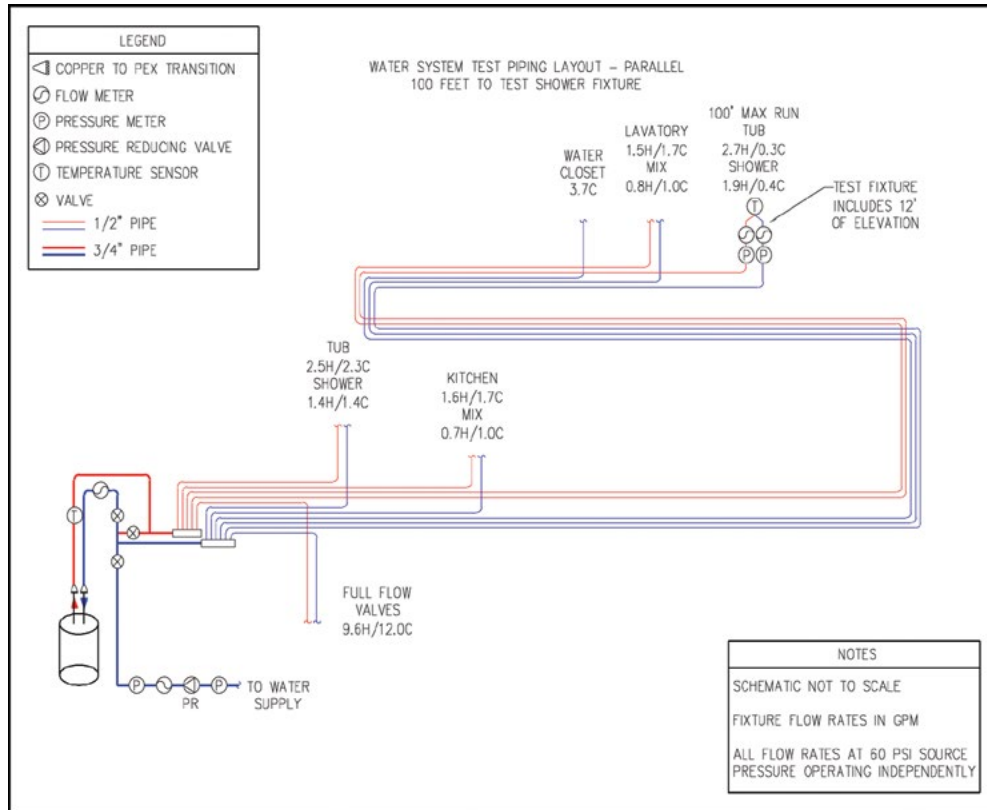


Figure A.4 Water System Test Piping Layout – Parallel, 100' to TF

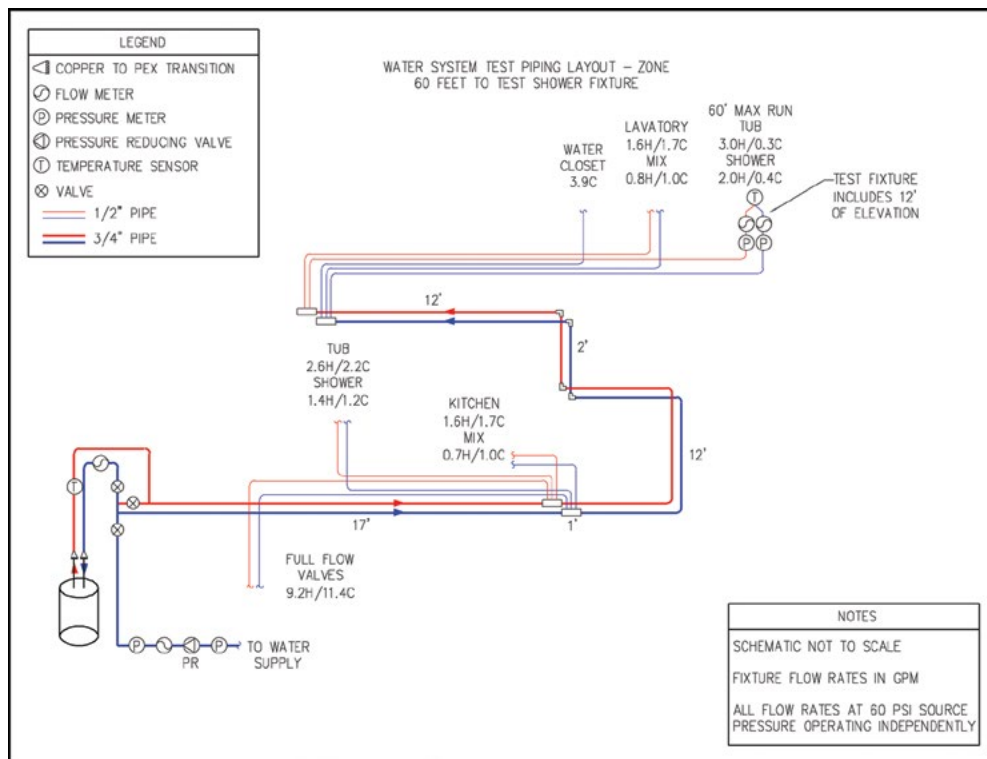


Figure A.5 Water System Test Piping Layout – Zone, 60' to TF

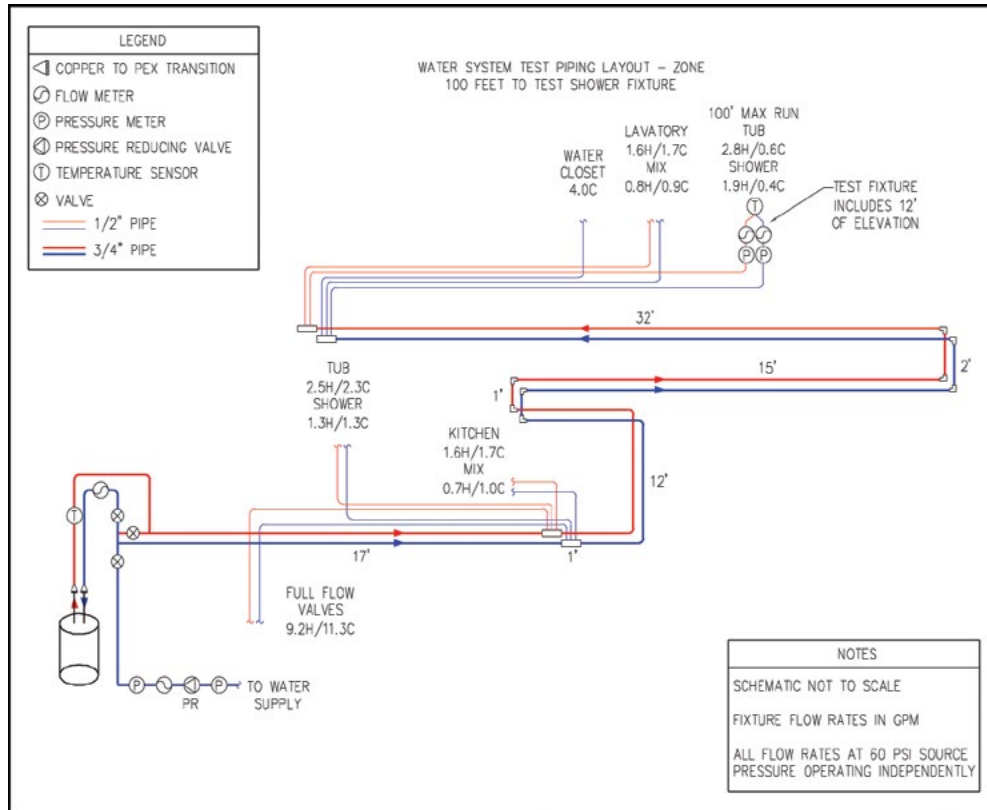


Figure A.6 Water System Test Piping Layout – Zone, 100' to TF

**Table A.1 Simultaneous Flow Performance Data –  
100' Maximum Length, 60 psi Source Pressure**

Fixture Flow	Total System Flow GPM	Cold Supply Flow GPM	Hot Supply Flow GPM	Main Pressure psi	Test Fixture (Shower)			
					Hot Flow GPM	Hot Pressure psi	Cold Flow GPM	Cold Pressure psi
<b>Trunk and Branch 100' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	54.3	0.0	55.4
TF	2.5	0.5	2.1	60.0	2.2	50.0	0.3	55.2
TF+Lav	4.3	1.8	2.5	60.0	2.2	49.1	0.3	53.5
TF+WC	6.8	4.6	2.2	60.0	2.2	50.1	0.2	46.5
TF+Kit	4.3	1.5	2.8	60.0	2.2	49.2	0.3	54.9
TF+Sh2	5.2	1.6	3.6	60.0	2.1	47.9	0.3	54.8
TF+Sh2+Kit	6.9	2.7	4.2	60.0	2.1	47.4	0.3	54.5
TF+Sh2+Kit+Lav	8.6	4.2	4.4	60.0	2.1	47.1	0.3	52.1
TF+Sh2+Kit+Lav+WC	12.5	7.2	5.3	60.0	2.1	44.4	0.2	44.5
<b>Zone 100' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	54.2	0.0	55.2
TF	2.5	0.5	2.1	60.0	2.2	49.7	0.3	54.9
TF+Lav	4.13	1.7	2.6	60.0	2.2	49.0	0.3	54.1
TF+WC	6.8	4.7	2.1	60.0	2.2	50.1	0.2	49.6
TF+Kit	4.3	1.6	2.7	60.0	2.2	49.1	0.3	54.8
TF+Sh2	5.2	1.7	3.5	60.0	2.2	48.4	0.3	54.7
TF+Sh2+Kit	6.9	2.8	4.0	60.0	2.1	47.9	0.3	54.3
TF+Sh2+Kit+Lav	8.6	4.2	4.4	60.0	2.1	47.2	0.3	53.1
TF+Sh2+Kit+Lav+WC	12.5	7.4	5.1	60.0	2.1	46.3	0.2	47.8
<b>Parallel 100' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	54.1	0.0	55.1
TF	2.5	0.5	2.1	60.0	2.1	46.4	0.3	54.8
TF+Lav	4.3	1.5	2.8	60.0	2.1	46.3	0.3	54.7
TF+WC	6.8	4.6	2.1	60.0	2.1	47.1	0.3	54.6
TF+Kit	4.3	1.4	2.9	60.0	2.1	46.2	0.3	54.7
TF+Sh2	5.2	1.7	3.5	60.0	2.1	45.7	0.3	54.7
TF+Sh2+Kit	6.9	2.7	4.1	60.0	2.1	45.3	0.3	54.6
TF+Sh2+Kit+Lav	8.6	3.9	4.7	60.0	2.1	45.0	0.3	54.4
TF+Sh2+Kit+Lav+WC	12.5	7.7	4.8	60.0	2.1	45.6	0.3	53.9

**TF** = Test Shower Fixture, 15' elevation; **Lav** = Lavatory, both valves open, 15' elevation;

**WC** = Water Closet, tank type, 15' elevation; **Kit** = Kitchen, mid-position, 4' elevation;

**Sh2** = 2nd Shower, full open valve, 6' elevation

**Table A.2 Simultaneous Flow Performance Data –  
100' Maximum Length, 80 psi Source Pressure**

Fixture Flow	Total System Flow GPM	Cold Supply Flow GPM	Hot Supply Flow GPM	Main Pressure psi	Test Fixture (Shower)			
					Hot Flow GPM	Hot Pressure psi	Cold Flow GPM	Cold Pressure psi
<b>Trunk and Branch 100' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.5	0.0	75.4
TF	2.9	0.4	2.5	80.0	2.6	68.7	0.3	75.1
TF+Lav	5.0	2.0	3.0	80.0	2.6	67.9	0.3	73.0
TF+WC	7.8	5.5	2.3	80.0	2.6	69.4	0.3	62.4
TF+Kit	5.0	1.7	3.3	80.0	2.6	68.5	0.3	75.0
TF+Sh2	6.0	1.8	4.1	80.0	2.6	67.9	0.3	74.8
TF+Sh2+Kit	7.9	2.9	5.0	80.0	2.5	66.3	0.3	74.3
TF+Sh2+Kit+Lav	9.9	4.8	5.2	80.0	2.5	65.2	0.3	71.3
TF+Sh2+Kit+Lav+WC	14.4	8.3	6.1	80.0	2.4	61.6	0.3	60.9
<b>Zone 100' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.6	0.0	75.4
TF	2.9	0.5	2.4	80.0	2.6	68.7	0.3	75.1
TF+Lav	5.0	1.9	3.1	80.0	2.5	67.3	0.3	74.0
TF+WC	7.8	5.5	2.3	80.0	2.6	68.9	0.3	67.6
TF+Kit	5.0	1.7	3.2	80.0	2.6	68.2	0.3	74.8
TF+Sh2	6.0	1.8	4.1	80.0	2.5	67.2	0.3	74.8
TF+Sh2+Kit	7.9	34.1	4.8	80.0	2.5	65.9	0.3	74.5
TF+Sh2+Kit+Lav	9.9	4.8	5.1	80.0	2.5	65.0	0.3	72.7
TF+Sh2+Kit+Lav+WC	14.4	8.6	5.8	80.0	2.5	63.0	0.3	65.0
<b>Parallel 100' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.5	0.0	75.3
TF	2.9	0.4	2.5	80.0	2.5	63.6	0.3	75.0
TF+Lav	5.0	1.7	3.3	80.0	2.5	63.3	0.3	74.8
TF+WC	7.8	5.3	2.6	80.0	2.5	64.4	0.3	74.6
TF+Kit	5.0	1.7	3.3	80.0	2.5	63.4	0.3	74.8
TF+Sh2	6.0	1.7	4.2	80.0	2.5	62.6	0.3	74.8
TF+Sh2+Kit	7.9	3.0	4.9	80.0	2.4	62.0	0.3	74.7
TF+Sh2+Kit+Lav	9.9	4.5	5.4	80.0	2.4	61.5	0.3	74.5
TF+Sh2+Kit+Lav+WC	14.4	8.9	5.5	80.0	2.4	62.0	0.3	73.8

**TF** = Test Shower Fixture, 15' elevation; **Lav** = Lavatory, both valves open, 15' elevation;

**WC** = Water Closet, tank type, 15' elevation; **Kit** = Kitchen, mid-position, 4' elevation;

**Sh2** = 2nd Shower, full open valve, 6' elevation

**Table A.3 Simultaneous Flow Performance Data –  
60' Maximum Length, 60 psi Source Pressure**

Fixture Flow	Total System Flow GPM	Cold Supply Flow GPM	Hot Supply Flow GPM	Main Pressure psi	Test Fixture (Shower)			
					Hot Flow GPM	Hot Pressure psi	Cold Flow GPM	Cold Pressure psi
<b>Trunk and Branch 60' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	54.2	0.0	55.1
TF	2.5	0.5	2.1	60.0	2.2	50.8	0.3	54.9
TF+Lav	4.3	1.8	2.5	60.0	2.2	49.9	0.3	53.7
TF+WC	6.8	4.7	2.1	60.0	2.2	50.8	0.2	46.5
TF+Kit	4.3	1.4	3.0	60.0	2.2	49.9	0.3	48.6
TF+Sh2	5.2	1.6	3.5	60.0	2.2	48.7	0.3	54.7
TF+Sh2+Kit	6.9	2.7	4.2	60.0	2.1	48.0	0.3	54.5
TF+Sh2+Kit+Lav	8.6	4.2	4.4	60.0	2.1	47.7	0.3	52.4
TF+Sh2+Kit+Lav+WC	12.5	7.3	5.2	60.0	2.1	46.0	0.2	46.5
<b>Zone 60' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	54.0	0.0	55.2
TF	2.5	0.5	2.0	60.0	2.2	50.6	0.3	55.0
TF+Lav	4.3	1.7	2.6	60.0	2.2	50.1	0.3	54.5
TF+WC	6.8	4.7	2.1	60.0	2.2	50.9	0.3	51.7
TF+Kit	4.3	1.7	2.7	60.0	2.2	50.2	0.3	54.8
TF+Sh2	5.2	1.6	3.6	60.0	2.2	49.2	0.3	54.7
TF+Sh2+Kit	6.9	2.7	4.2	60.0	2.2	48.5	0.3	54.4
TF+Sh2+Kit+Lav	8.6	4.1	4.5	60.0	2.1	48.0	0.3	53.5
TF+Sh2+Kit+Lav+WC	12.5	7.5	5.0	60.0	2.1	47.4	0.2	49.7
<b>Parallel 60' 60 psi Static</b>	0.0	0.0	0.0	60.0	0.0	27.6	0.0	28.5
TF	2.5	0.5	2.0	60.0	2.2	48.8	0.3	54.9
TF+Lav	4.3	1.5	2.8	60.0	2.2	48.6	0.3	54.8
TF+WC	6.8	4.8	2.0	60.0	2.2	49.3	0.3	54.6
TF+Kit	4.3	1.7	2.7	60.0	2.2	48.5	0.3	54.8
TF+Sh2	5.2	1.7	3.5	60.0	2.1	47.8	0.3	54.8
TF+Sh2+Kit	6.9	2.7	4.2	60.0	2.1	47.3	0.3	54.6
TF+Sh2+Kit+Lav	8.6	4.0	4.6	60.0	2.1	46.9	0.3	54.5
TF+Sh2+Kit+Lav+WC	12.5	7.8	4.6	60.0	2.1	47.5	0.3	54.0

**TF** = Test Shower Fixture, 15' elevation; **Lav** = Lavatory, both valves open, 15' elevation;

**WC** = Water Closet, tank type, 15' elevation; **Kit** = Kitchen, mid-position, 4' elevation;

**Sh2** = 2nd Shower, full open valve, 6' elevation

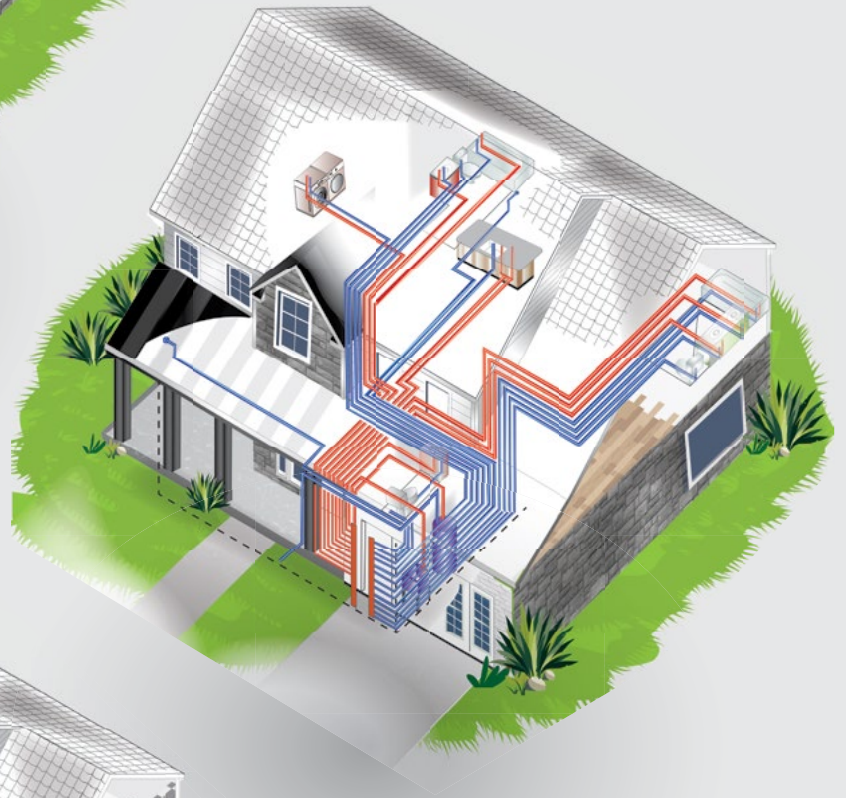
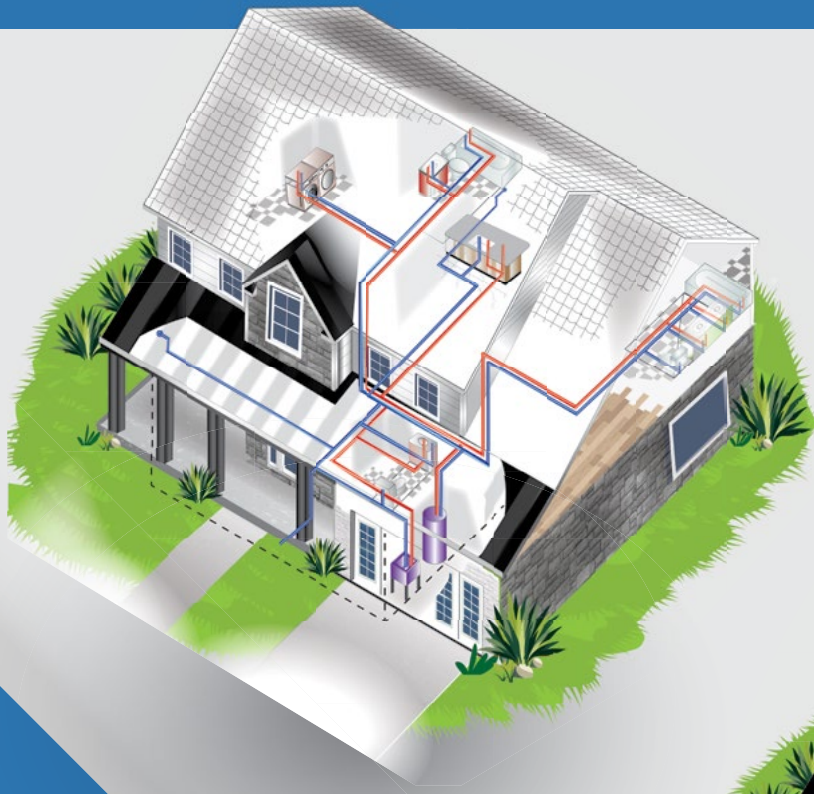
**Table A.4 Simultaneous Flow Performance Data –  
60' Maximum Length, 80 psi Source Pressure**

Fixture Flow	Total System Flow GPM	Cold Supply Flow GPM	Hot Supply Flow GPM	Main Pressure psi	Test Fixture (Shower)			
					Hot Flow GPM	Hot Pressure psi	Cold Flow GPM	Cold Pressure psi
<b>Trunk and Branch 60' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.6	0.0	75.4
TF	2.9	0.4	2.5	80.0	2.6	69.9	0.3	75.2
TF+Lav	5.0	2.0	3.0	80.0	2.6	68.9	0.3	73.8
TF+WC	7.8	5.5	2.3	80.0	2.6	70.2	0.3	66.4
TF+Kit	5.0	1.7	3.3	80.0	2.6	69.4	0.3	75.0
TF+Sh2	6.0	1.8	4.2	80.0	2.6	68.2	0.3	75.1
TF+Sh2+Kit	7.9	2.9	5.0	80.0	2.5	66.9	0.3	74.7
TF+Sh2+Kit+Lav	9.9	4.7	5.2	80.0	2.5	66.1	0.3	72.1
TF+Sh2+Kit+Lav+WC	14.4	8.4	6.0	80.0	2.5	63.4	0.3	63.6
<b>Zone 60' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.5	0.0	75.3
TF	2.9	0.5	2.4	80.0	2.6	70.2	0.3	75.1
TF+Lav	5.0	1.8	3.1	80.0	2.6	69.0	0.3	74.4
TF+WC	7.8	5.6	2.2	80.0	2.6	70.2	0.3	69.9
TF+Kit	5.0	1.8	3.2	80.0	2.6	69.4	0.3	74.9
TF+Sh2	6.0	1.9	4.1	80.0	2.6	68.4	0.3	74.8
TF+Sh2+Kit	7.9	2.9	5.0	80.0	2.5	66.7	0.3	74.5
TF+Sh2+Kit+Lav	9.9	4.6	5.3	80.0	2.5	66.0	0.3	73.4
TF+Sh2+Kit+Lav+WC	14.4	8.7	5.7	80.0	2.5	64.5	0.3	67.7
<b>Parallel 60' 80 psi Static</b>	0.0	0.0	0.0	80.0	0.0	74.5	0.0	75.3
TF	2.9	0.5	2.4	80.0	2.5	66.9	0.3	75.1
TF+Lav	5.0	1.6	3.4	80.0	2.5	66.3	0.3	75.0
TF+WC	7.8	5.4	2.5	80.0	2.5	67.3	0.3	74.7
TF+Kit	5.0	1.6	3.4	80.0	2.5	66.4	0.3	74.9
TF+Sh2	6.0	1.8	4.2	80.0	2.5	65.8	0.3	75.0
TF+Sh2+Kit	7.9	2.9	5.0	80.0	2.5	64.8	0.3	74.8
TF+Sh2+Kit+Lav	9.9	4.5	5.5	80.0	2.5	63.8	0.3	74.6
TF+Sh2+Kit+Lav+WC	14.4	9.0	5.4	80.0	2.5	64.2	0.3	73.9

**TF** = Test Shower Fixture, 15' elevation; **Lav** = Lavatory, both valves open, 15' elevation;

**WC** = Water Closet, tank type, 15' elevation; **Kit** = Kitchen, mid-position, 4' elevation;

**Sh2** = 2nd Shower, full open valve, 6' elevation



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