

# What to Look for Series Heated Water Supply Piping

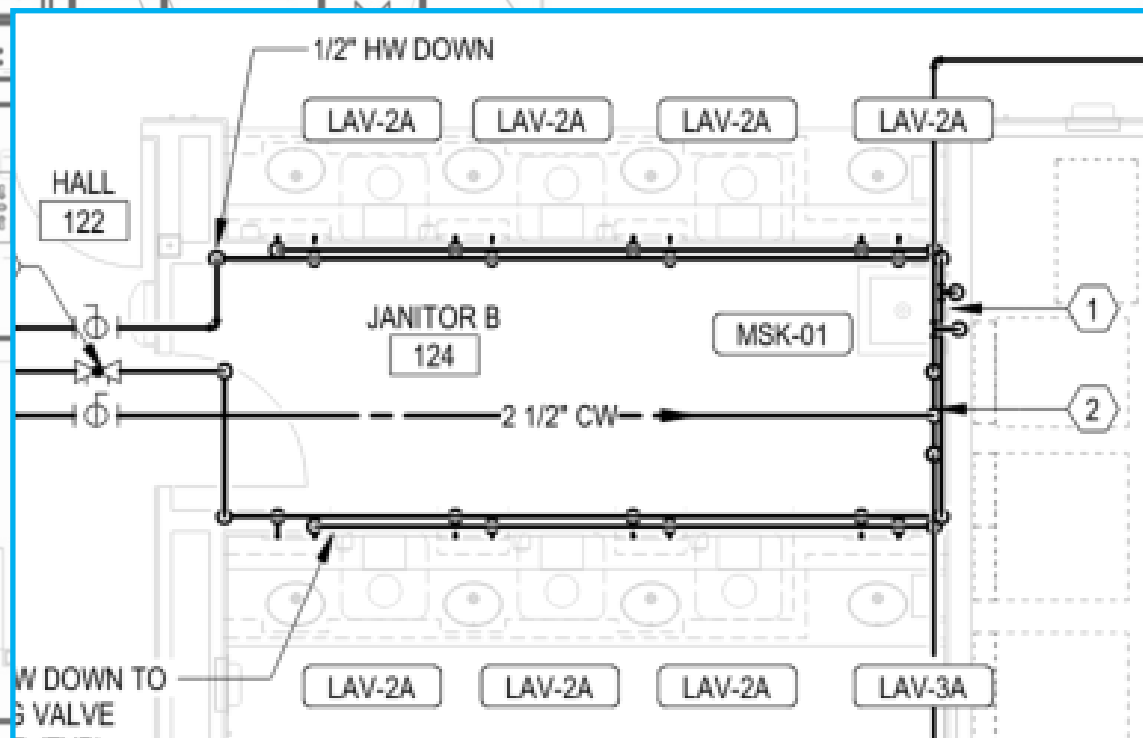
**Why heated water supply piping limited in length?**

**How does this save energy?**

**This intent is to not wait (too long) for the hot water to arrive at the fixture.**

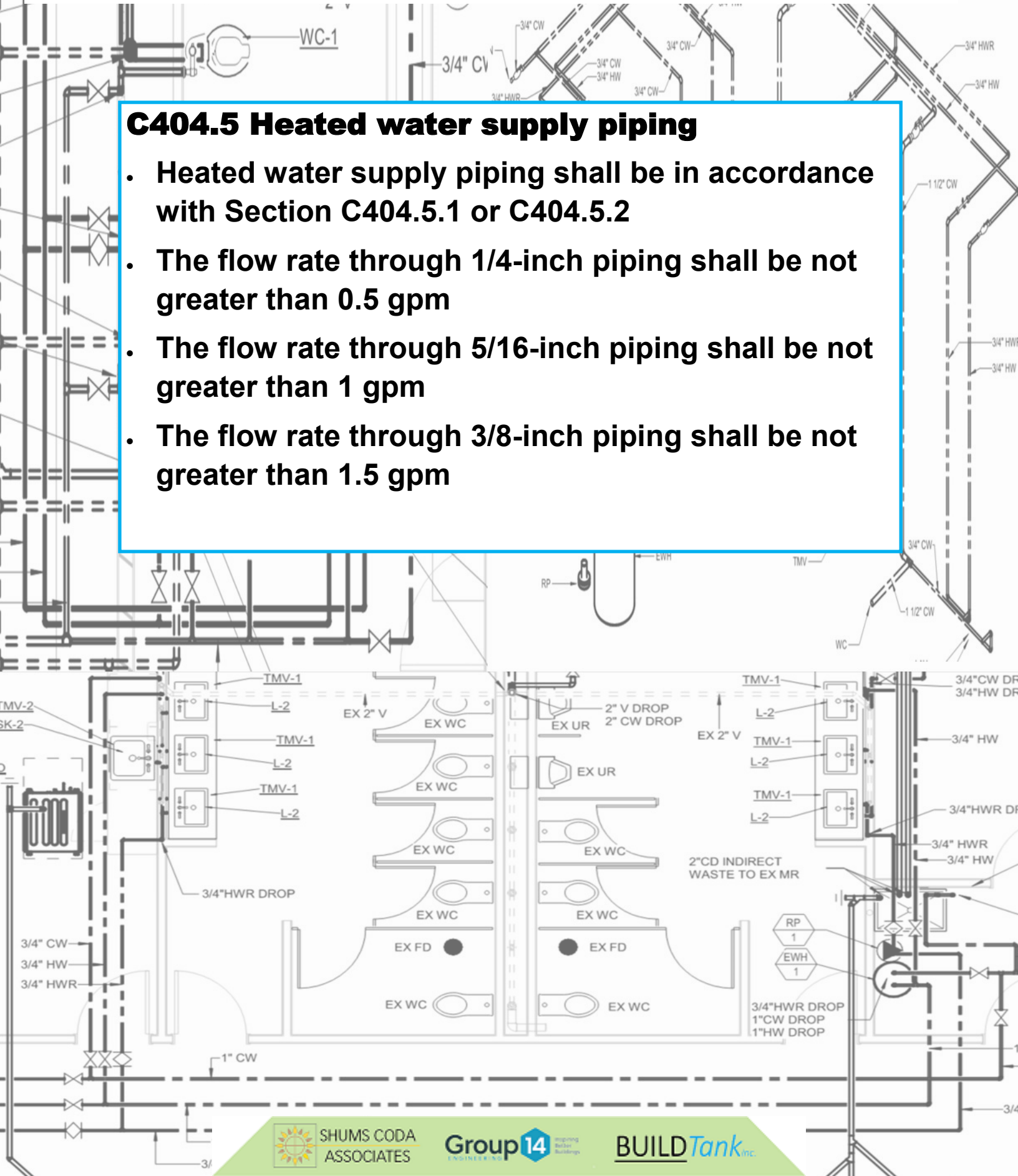
**Think about the amount of water that goes down the drain before hot enough for use.**

**Not only has that water been treated (takes energy) before it reaches the building, but is also treated (takes energy) after it leaves the building.**



## C404.5 Heated water supply piping

- Heated water supply piping shall be in accordance with Section C404.5.1 or C404.5.2
- The flow rate through 1/4-inch piping shall be not greater than 0.5 gpm
- The flow rate through 5/16-inch piping shall be not greater than 1 gpm
- The flow rate through 3/8-inch piping shall be not greater than 1.5 gpm



## C404.5.1 Maximum allowable pipe length method

- The maximum allowable piping length from the nearest source of heated water to the termination of the fixture supply pipe shall be in accordance with the following.
- Where the piping contains more than one size of pipe, the largest size of pipe within the piping shall be used for determining the maximum allowable length of the piping in Table C404.5.1
- For a public lavatory faucet, use the “Public lavatory faucets” column in Table C404.5.1.
- For all other plumbing fixtures and plumbing appliances, use the “Other fixtures and appliances” column in Table C404.5.1.

TABLE C404.5.1  
PIPING VOLUME AND MAXIMUM PIPING LENGTHS

NOMINAL PIPE SIZE (inches)	VOLUME (liquid ounces per foot length)	MAXIMUM PIPING LENGTH (feet)	
		Public lavatory faucets	Other fixtures and appliances
$\frac{1}{4}$	0.33	6	50
$\frac{5}{16}$	0.5	4	50
$\frac{3}{8}$	0.75	3	50
$\frac{1}{2}$	1.5	2	43
$\frac{5}{8}$	2	1	32
$\frac{3}{4}$	3	0.5	21
$\frac{7}{8}$	4	0.5	16
1	5	0.5	13
$1\frac{1}{4}$	8	0.5	8
$1\frac{1}{2}$	11	0.5	6
2 or larger	18	0.5	4

## Heated Water Source

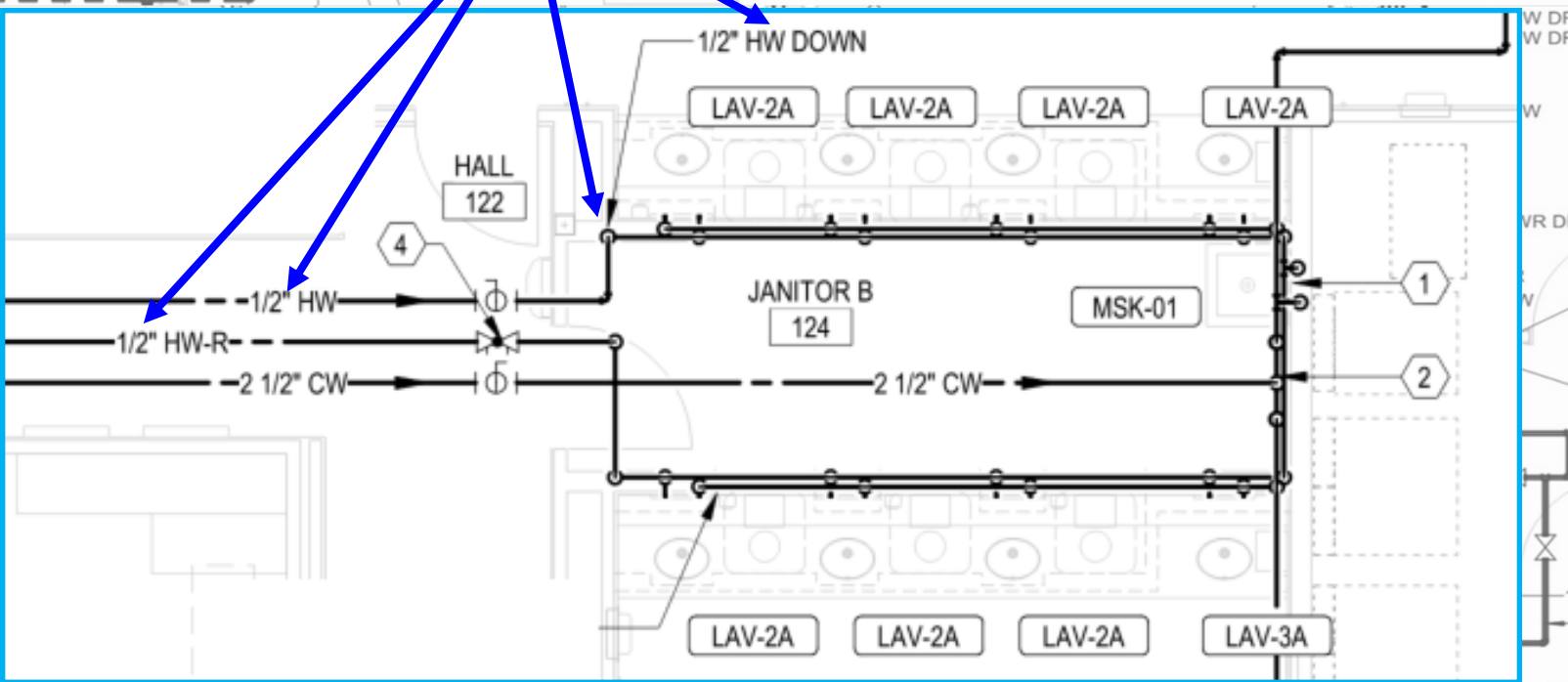
Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered to be sources of heated water.

What we typically see is a hot water circulating system for public lavatories. As these pipe lengths are the shortest.

The pipe begins at the hot water source and ends at the shut off valve for the fixture. In the example below that would be the valve under the lavatory.

The length of pipe in the example below is about 6"- 10" (max allowed is 2'). Note that the 1/2" hot water (HW) supply pipe has a note "Down". This would indicate that the supply pipe goes down the wall and directly behind all the lavatories.

Then back up to the 1/2" HW-R (hot water return) line of the circulation system.



## **C404.5.2 Maximum allowable pipe volume method**

- The water volume in the piping shall be calculated in accordance with Section C404.5.2.1.
- Water heaters, circulating water systems and heat trace temperature maintenance systems shall be considered to be sources of heated water.
- The volume from the nearest source of heated water to the termination of the fixture supply pipe shall be as follows:
  - For a public lavatory faucet: not more than 2 ounces
  - For other plumbing fixtures or plumbing appliances; not more than 0.5 gallon

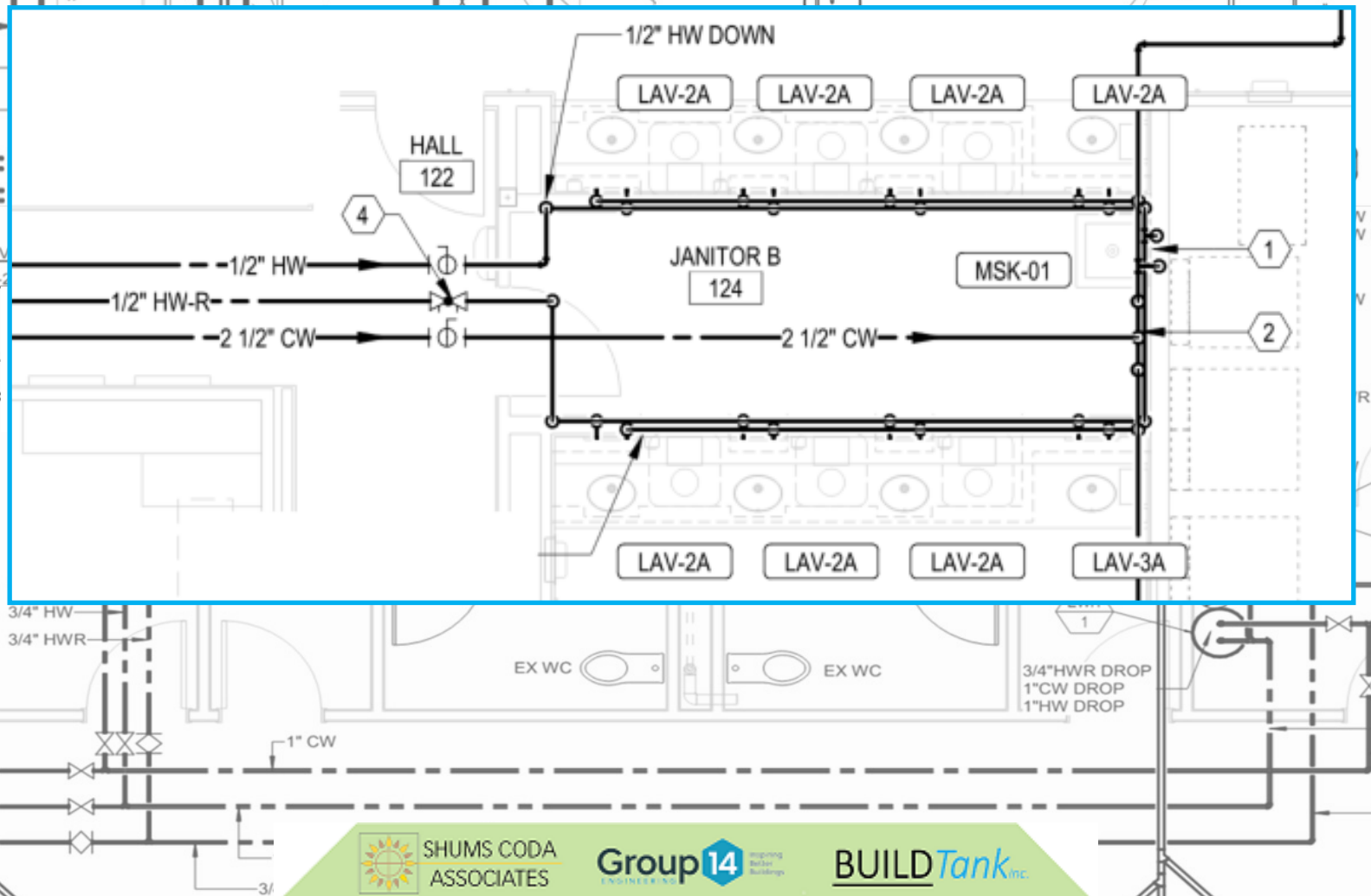
### **C404.5.2.1 Water volume determination**

- The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the nearest source of heated water and the termination of the fixture supply pipe.
- The volume in the piping shall be determined from the “Volume” column in Table C404.5.1 or from Table C404.5.2.1.
- The volume contained within fixture shutoff valves, within flexible water supply connectors to a fixture fitting and within a fixture fitting shall not be included in the water volume determination.
- Where heated water is supplied by a recirculating system or heat-traced piping, the volume shall include the portion of the fitting on the branch pipe that supplies water to the fixture.

**TABLE C404.5.2.1**  
**INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION TUBING**  
**OUNCES OF WATER PER FOOT OF TUBE**

Nominal Size (inches)	Copper Type M	Copper Type L	Copper Type K	CPVC CTS SDR 11	CPVC SCH 40	CPVC SCH 80	PE-RT SDR 9	Composite ASTM F1281	PEX CTS SDR 9
3/8	1.06	0.97	0.84	N/A	1.17	—	0.64	0.63	0.64
1/2	1.69	1.55	1.45	1.25	1.89	1.46	1.18	1.31	1.18
3/4	3.43	3.22	2.90	2.67	3.38	2.74	2.35	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	4.57	3.91	5.56	3.91
1 1/4	8.70	8.36	8.09	6.61	9.66	8.24	5.81	8.49	5.81
1 1/2	12.18	11.83	11.45	9.22	13.20	11.38	8.09	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	19.11	13.86	21.48	13.86

From our example we will use a 12" pipe length using type L copper pipe. Per table C404.5.2.1 would have 1.55 ounces of water per foot. Allowed is 2 ounces from section C404.5.2



For inspection in our example we need to verify:

**Was a circulation system installed?**

**Was the hot water supply pipe installed above and then travel down the wall?**

**Then directly behind all the public lavatories?**

**The actual supply pipe from the circulation system pipe to the lavatory valve was not more then 12" long?**

