

GEW160-14

702.8.1, 702.8.2, Table 802.8.2, Tables 802.8.2 (2) through 802.8.2 (10) (New), 702.8.2.1

Proponent: Michael Cudahy, representing Plastic Pipe and Fittings Association (mikec@cmservices.com)

Revise as follows:

702.8.1 Maximum allowable pipe length method. The maximum allowable pipe length from the source of hot or tempered water to the termination of the fixture supply pipe shall be in accordance with the maximum pipe length columns in Tables 702.8.2 (2) through 702.8.2 (10), as appropriate for type of the pipe to be installed. Where the type of pipe to be installed is unknown or the type of pipe is not covered by Tables 702.8.2 (2) through 702.8.2 (10), Table 702.8.2 (1) shall be used for design purposes. Where the length contains more than one size of pipe, the largest size shall be used for determining the maximum allowable length of the pipe in the tables 702.8.2.

702.8.2 Maximum allowable pipe volume method. The water volume in the piping shall be calculated in accordance with Section 702.8.2.1. The maximum volume of hot or tempered water in the piping to public lavatory faucets, metering or nonmetering, shall be 2 ounces (0.06 L). For fixtures other than public lavatory faucets, the maximum volume shall be 64 ounces (1.89 L) for hot or tempered water from a water heater or boiler; and 24 ounces (0.7 L) for hot or tempered water from a circulation loop pipe or an electrically heat-traced pipe. The water volume in the piping shall be calculated in accordance with Section 702.8.2.1.

TABLE 702.8.2 (1)

VOLUME AND MAXIMUM LENGTH OF PIPE OR TUBE OF A TYPE UNKNOWN OR NOT COVERED^b

For SI: 1 inch = 25.4 mm, 1 foot = 304.8mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 ml

- a. The flow rate for 1/4 -inch size pipe or tube is limited to 0.5 gallons per minute; for 5/16 – inch size, it is limited to 1 gpm; for 3/8 –inch size, it is limited to 1.5 gpm.
- b. Not covered means pipe or tube types not covered by Table 702.8.2(2) through 702.8.2(10).

(Portions of table not shown remain unchanged.)

TABLE 702.8.2(2)

VOLUME AND MAXIMUM LENGTH OF TYPE K COPPER TUBING

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
3/8 ^a	0.84	44.6	14.3	2.7
1/2	1.45	44.5	16.6	2.1
3/4	2.90	21.7	8.3	0.5
1	5.17	12.6	4.8	0.5
1 1/4	8.09	7.9	3.0	0.5
1 1/2	11.45	5.8	1.9	0.5
2 or larger	20.04	3.6	0.9	0.4

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

- a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(3)
VOLUME AND MAXIMUM LENGTH OF TYPE L COPPER TUBING

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>0.97</u>	<u>38.7</u>	<u>12.4</u>	<u>2.3</u>
<u>1/2</u>	<u>1.55</u>	<u>41.6</u>	<u>15.5</u>	<u>1.9</u>
<u>3/4</u>	<u>3.22</u>	<u>19.6</u>	<u>7.5</u>	<u>0.5</u>
<u>1</u>	<u>5.49</u>	<u>11.8</u>	<u>4.6</u>	<u>0.5</u>
<u>1 1/4</u>	<u>8.38</u>	<u>7.6</u>	<u>2.9</u>	<u>0.5</u>
<u>1 1/2</u>	<u>11.83</u>	<u>5.6</u>	<u>1.9</u>	<u>0.5</u>
<u>2 or larger</u>	<u>20.58</u>	<u>3.5</u>	<u>0.9</u>	<u>0.4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(4)
VOLUME AND MAXIMUM LENGTH OF TYPE M COPPER TUBING

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>1.06</u>	<u>35.4</u>	<u>11.3</u>	<u>2.1</u>
<u>1/2</u>	<u>1.69</u>	<u>38.2</u>	<u>14.2</u>	<u>1.8</u>
<u>3/4</u>	<u>3.43</u>	<u>18.4</u>	<u>7.0</u>	<u>0.4</u>
<u>1</u>	<u>5.81</u>	<u>11.2</u>	<u>4.3</u>	<u>0.4</u>
<u>1 1/4</u>	<u>8.70</u>	<u>7.4</u>	<u>2.8</u>	<u>0.5</u>
<u>1 1/2</u>	<u>12.18</u>	<u>5.4</u>	<u>1.8</u>	<u>0.5</u>
<u>2 or larger</u>	<u>21.08</u>	<u>3.4</u>	<u>0.9</u>	<u>0.4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(5)
VOLUME AND MAXIMUM LENGTH OF CPVC TUBING, CTS^a

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>1/2</u>	<u>1.25</u>	<u>51.6</u>	<u>19.2</u>	<u>2.4</u>
<u>3/4</u>	<u>2.67</u>	<u>23.6</u>	<u>9.0</u>	<u>0.6</u>
<u>1</u>	<u>4.43</u>	<u>14.7</u>	<u>5.6</u>	<u>0.6</u>
<u>1 1/4</u>	<u>6.61</u>	<u>9.7</u>	<u>3.6</u>	<u>0.6</u>
<u>1 1/2</u>	<u>9.22</u>	<u>7.2</u>	<u>2.4</u>	<u>0.6</u>
<u>2 or larger</u>	<u>15.79</u>	<u>4.6</u>	<u>1.1</u>	<u>0.6</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 ounce = 29.6 mL

a. Copper tube size outside diameter dimension and SDR 11

TABLE 702.8.2(6)
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 40

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Pipe Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>1.17</u>	<u>32.1</u>	<u>10.3</u>	<u>1.9</u>
<u>1/2</u>	<u>1.89</u>	<u>34.1</u>	<u>12.7</u>	<u>1.6</u>
<u>3/4</u>	<u>3.58</u>	<u>17.6</u>	<u>6.7</u>	<u>0.4</u>
<u>1</u>	<u>5.53</u>	<u>11.8</u>	<u>4.5</u>	<u>0.5</u>
<u>1 1/4</u>	<u>9.66</u>	<u>6.6</u>	<u>2.5</u>	<u>0.4</u>
<u>1 1/2</u>	<u>13.20</u>	<u>5.0</u>	<u>1.7</u>	<u>0.4</u>
<u>2 or larger</u>	<u>21.88</u>	<u>3.3</u>	<u>0.8</u>	<u>0.4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(7)
VOLUME AND MAXIMUM LENGTH OF CPVC PIPE, SCHEDULE 80

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Pipe Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>0.86</u>	<u>43.6</u>	<u>14.0</u>	<u>2.6</u>
<u>1/2</u>	<u>1.46</u>	<u>44.2</u>	<u>16.4</u>	<u>2.1</u>
<u>3/4</u>	<u>2.74</u>	<u>23.0</u>	<u>8.8</u>	<u>0.5</u>
<u>1</u>	<u>4.56</u>	<u>14.3</u>	<u>5.5</u>	<u>0.5</u>
<u>1 1/4</u>	<u>8.24</u>	<u>7.8</u>	<u>2.9</u>	<u>0.5</u>
<u>1 1/2</u>	<u>11.38</u>	<u>5.8</u>	<u>1.9</u>	<u>0.5</u>
<u>2 or larger</u>	<u>19.11</u>	<u>3.8</u>	<u>0.9</u>	<u>0.5</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(8)
VOLUME AND MAXIMUM LENGTH OF PE-AL-PE TUBING

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>0.63</u>	<u>59.5</u>	<u>19.0</u>	<u>3.6</u>
<u>1/2</u>	<u>1.31</u>	<u>49.2</u>	<u>18.3</u>	<u>2.3</u>
<u>3/4</u>	<u>3.39</u>	<u>18.6</u>	<u>7.1</u>	<u>0.4</u>
<u>1</u>	<u>5.56</u>	<u>11.7</u>	<u>4.5</u>	<u>0.4</u>
<u>1 1/4</u>	<u>8.49</u>	<u>7.5</u>	<u>2.8</u>	<u>0.5</u>
<u>1 1/2</u>	<u>13.88</u>	<u>4.8</u>	<u>1.6</u>	<u>0.4</u>
<u>2 or larger</u>	<u>21.48</u>	<u>3.4</u>	<u>0.8</u>	<u>0.4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

TABLE 702.8.2(9)**VOLUME AND MAXIMUM LENGTH OF PEX AND PE-RT TUBING, CTS^b**

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>0.6</u>	<u>58.6</u>	<u>18.8</u>	<u>3.5</u>
<u>1/2</u>	<u>1.18</u>	<u>54.7</u>	<u>20.3</u>	<u>2.5</u>
<u>3/4</u>	<u>2.35</u>	<u>26.8</u>	<u>10.2</u>	<u>0.6</u>
<u>1</u>	<u>3.91</u>	<u>16.6</u>	<u>6.4</u>	<u>0.6</u>
<u>1 1/4</u>	<u>5.81</u>	<u>11.0</u>	<u>4.1</u>	<u>0.7</u>
<u>1 1/2</u>	<u>8.09</u>	<u>8.2</u>	<u>2.7</u>	<u>0.7</u>
<u>2</u>	<u>13.86</u>	<u>5.2</u>	<u>1.3</u>	<u>0.6</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm

b. Copper tube size outside diameter dimension and SDR 9, for both PEX and PE-RT types of tubing

TABLE 702.8.2(10)**VOLUME AND MAXIMUM LENGTH OF PEX-AL-PEX TUBING**

<u>Nominal Tube Size (inch)</u>	<u>Liquid Ounces per Foot of Length</u>	<u>Maximum Tube Length</u>		
		<u>System without a Circulation Loop or Heat Traced Line (feet)</u>	<u>System with a Circulation Loop or Heat Traced Line (feet)</u>	<u>Lavatory Faucets - Public (metering and non-metering) (feet)</u>
<u>3/8^a</u>	<u>0.63</u>	<u>59.5</u>	<u>19.0</u>	<u>3.6</u>
<u>1/2</u>	<u>1.31</u>	<u>49.2</u>	<u>18.3</u>	<u>2.3</u>
<u>3/4</u>	<u>3.39</u>	<u>18.6</u>	<u>7.1</u>	<u>0.4</u>
<u>1</u>	<u>5.56</u>	<u>11.7</u>	<u>4.5</u>	<u>0.4</u>
<u>1 1/4</u>	<u>8.49</u>	<u>7.5</u>	<u>2.8</u>	<u>0.5</u>
<u>1 1/2</u>	<u>13.88</u>	<u>4.8</u>	<u>1.6</u>	<u>0.4</u>
<u>2 or larger</u>	<u>21.48</u>	<u>3.4</u>	<u>0.8</u>	<u>0.4</u>

For SI: 1 inch = 25.4 mm, 1 foot = 304.8 mm, 1 gallon per minute = 3.785 L/m, 1 ounce = 29.6 mL

a. The flow rate for 3/8 inch size is limited to 1.5 gpm.

702.8.2.1 Water volume determination. The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot water and the termination of the fixture supply pipe. The volume shall be determined from the liquid ounces per foot column of Tables 702.8.2 (2) through 702.8.2 (10) as appropriate for the type of pipe. Where the type of pipe is unknown or the type of pipe is not covered by Tables 702.8.2 (2) through 702.8.2 (10), Table 702.8.2 (1) shall be used to determine the volume. The volume contained within fixture shutoff valves, flexible water supply connectors to a fixture fitting, or within a fixture fitting shall not be included in the water volume determination. Where hot or tempered water is supplied by a circulation loop pipe or an electrically heat-traced pipe, the volume shall include the portion of the fitting on the source pipe that supplies water to the fixture.

Reason: This proposal improves upon the method of calculating hot water volume in plumbing systems by adding additional tables to the language, as an option, if the piping material of the system is known.

There is a significant difference between tubing materials in regards to volume per unit length as volume of tubing materials for the same application can vary sometimes by as much as 30-40%. This proposal modification is the most accurate as it generates lengths that contain the same volume and will not result in significant differences in buildings when constructed to it.

Also, selecting the proper tables will be necessary if the building is being designed using BIM programs that calculate actual volumes of piping systems, or multiple green building ratings are sought after. One could imagine the challenges that could later occur if a building was designed in a way that did not deliver the hot water as calculated.

Cost Impact: Will not increase the cost of construction.

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