

Public Review Draft

Proposed Addendum m to Standard 189.1-2017

Standard for the Design of High-Performance Green Buildings Except Low-Rise Residential Buildings

Second Public Review Draft (August 2019)
(Draft Shows Proposed Changes to Current Standard)

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Foreword

This addendum adds new provisions to enable right-sized tubing for efficient delivery of water through hot water distribution systems. The new requirement balances health, energy and plumbing code intents with energy and water efficiency strategies. The addendum is based in part on research by the California Energy Commission on the energy implications of hot water supply. The volume of water in a pipe is the primary determinant of how long a user must wait for hot water to be delivered at a fixture. This has significant implications for both energy use to heat the water and the volume of water wasted before delivery. Similar provisions are currently included in the 2018 IECC (Section C404.5) and the 2015 IgCC (Section 702.8.)

[Note to Reviewers: This addendum makes proposed changes to the current standard. These changes are indicated in the text by underlining (for additions) and ~~strikethrough~~ (for deletions) except where the reviewer instructions specifically describe some other means of showing the changes. Only these changes to the current standard are open for review and comment at this time. Additional material is provided for context only and is not open for comment except as it relates to the proposed changes.]

Addendum m to 189.1-2017

Insert new section 6.3.3 and renumber following sections as appropriate

6.3.3 Hot water distribution.

Hot water distribution pipes shall be designed in accordance with Section 6.3.3.1 and Section 6.3.3.2.

6.3.3.1 Maximum allowable pipe volume. The maximum volume of water in the pipes between the source of hot or tempered water and the fixtures shall be 64 ounces (1.9 L) where the source of hot or tempered water is a water heater; and 24 ounces (0.71 L) where the source of hot or tempered water is from a circulation loop pipe or an electrically heat-traced pipe. For the purpose of section 6.3.3, the source of hot or tempered water shall be the point of connection to a water heater, heat-traced pipe or a circulation loop.

The water volume in the pipe shall be calculated as follows:

The volume shall be the sum of the internal volumes of pipe, fittings, valves, meters and manifolds between the source of hot or tempered water and the termination of the fixture supply pipe. The volume shall be determined using Table 6.3.3.1 1. 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 the source of hot or tempered water is 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

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fixture. Where the type of pipe is unknown or not specifically included in the table, the generic pipe column shall be used to determine the volume.

Exception to 6.3.3.1: This section shall not apply to public lavatory fixtures.

**TABLE 6.3.3.1.1
INTERNAL VOLUME OF PIPE OR TUBE**

Ounces of Water per Foot of Pipe				
Nominal Size (Inch)	Generic Pipe	Copper Type L	CPVC CTS SDR 11	PEX CTS SDR 9
<u>1/4"</u>	<u>0.33</u>	<u>0.52</u>	<u>0.37</u>	<u>0.33</u>
<u>5/16"</u>	<u>0.5</u>	<u>NA</u>	<u>NA</u>	<u>0.48</u>
<u>3/8"</u>	<u>0.75</u>	<u>0.97</u>	<u>0.75</u>	<u>0.68</u>
<u>1/2"</u>	<u>1.5</u>	<u>1.55</u>	<u>1.25</u>	<u>1.18</u>
<u>5/8"</u>	<u>2</u>	<u>2.23</u>	<u>NA</u>	<u>1.78</u>
<u>3/4"</u>	<u>3</u>	<u>3.22</u>	<u>2.67</u>	<u>2.35</u>
<u>1"</u>	<u>5</u>	<u>5.47</u>	<u>4.43</u>	<u>3.91</u>
<u>1 1/4"</u>	<u>8</u>	<u>8.36</u>	<u>6.61</u>	<u>5.81</u>
<u>1 1/2"</u>	<u>11</u>	<u>11.83</u>	<u>9.22</u>	<u>8.09</u>
<u>2"</u>	<u>18</u>	<u>20.58</u>	<u>15.79</u>	<u>13.86</u>

Liters of Water per Meter of Pipe				
Dimension Nominal DN (mm)	Generic Pipe	Copper Type L	CPVC CTS SDR 11	PEX CTS SDR 9
<u>8</u>	<u>0.03</u>	<u>0.05</u>	<u>0.04</u>	<u>0.03</u>
<u>9</u>	<u>0.05</u>	<u>NA</u>	<u>NA</u>	<u>0.05</u>
<u>10</u>	<u>0.07</u>	<u>0.09</u>	<u>0.07</u>	<u>0.07</u>
<u>15</u>	<u>0.15</u>	<u>0.15</u>	<u>0.12</u>	<u>0.11</u>
<u>18</u>	<u>0.19</u>	<u>0.22</u>	<u>NA</u>	<u>0.17</u>
<u>20</u>	<u>0.29</u>	<u>0.31</u>	<u>0.26</u>	<u>0.23</u>
<u>25</u>	<u>0.49</u>	<u>0.53</u>	<u>0.43</u>	<u>0.38</u>
<u>32</u>	<u>0.78</u>	<u>0.81</u>	<u>0.64</u>	<u>0.56</u>
<u>40</u>	<u>1.07</u>	<u>1.15</u>	<u>0.89</u>	<u>0.78</u>
<u>50</u>	<u>1.75</u>	<u>2.00</u>	<u>1.53</u>	<u>1.34</u>

NA = No value provided based on lack of availability of pipe in this size.

6.3.3.2 Maximum Length. The maximum pipe length from the source of hot or tempered water to the termination of the fixture supply pipe serving any plumbing fixture or appliance shall not exceed 50 feet (15 m) of developed length.