CODE CHANGE PROPOSAL FORM

(See instructions on page 2)

Code: IRC –12/13

Code Sections/Tables/Figures Proposed for Revision (3.3.2); Note: *If the proposal is for a new section, indicate (new).*

P2708.3

Proponent: Edward R. Osann, Natural Resources Defense Council, representing self.

Revise as follows:

P2708.3 Shower control valves.

Individual shower and tub/shower combination valves shall be equipped with control valves of the pressure-balance, thermostatic-mixing or combination pressure-balance/thermostatic-mixing valve types with a high limit stop in accordance with ASSE 1016 or ASME A112.18.1/CSA B125.1. Shower control valves shall provide thermal shock protection for the rated flow rate of the installed showerhead or a flow rate of 1.5 gpm ± 0.1 gpm (5.75 L/m ± 0.35 L/m), whichever is less. The high limit stop shall be set to limit the water temperature to not greater than 120°F (49°C). Each valve shall be factory marked with the manufacturer's minimum rated flow, and such marking shall be in an accessible position so as to be readily visible after installation. In-line thermostatic valves shall not be used for compliance with this section.

Reason: The thermal protection afforded by shower valves can be compromised if the flow rate of the showerhead is less than the flow rate for which the protective components of the valve have been designed. As noted by Martin and Johnson (2008) (as cited in Codes and Standards Enhancement Initiative (CASE), "Multi-Head Showers and Lower-Flow Shower Heads," *2013 California Building Energy Efficiency Standards,* California Utilities Statewide Codes and Standards Team, September 2011), combinations of valves and shower heads were tested to determine whether pressure-compensating valves and thermostatic valves rated for 2.5gpm would perform adequately at lower flow rates. The tests included 22 shower valves from six manufacturers, and the valves were assessed on their ability to maintain water temperature within certain bounds for a given time after a change in pressure event, as described by the ASSE 1016-2005 standard for shower valves. The results indicated that a significant share of shower valves rated for 2.5 gpm failed to provide the thermal protection specified by ASSE 1016 when tested at lower flow rates. As summarized in the CASE report (p. 15): "These results indicate that shower valve temperature maintenance is strongly affected by flow rate, and that new showers with lower-flow shower heads would have to be installed with valves that are designed for 2.0 and lower flow rates."

Showerheads with maximum flow rates below 2.5 gpm are widely available on the market today, and simple replacement of a showerhead is typically not subject to code. Since shower valve components are located behind finished walls, replacement of showerheads is likely to be more frequent than replacement of shower valves. This proposed change seeks to reduce the likelihood that consumers replacing a showerhead will compromise the thermal protection offered by a building subject to this code by ensuring that shower valves can fully accommodate showerheads with lower flow rates than the current maximum federal standard of 2.5 gpm. The current EPA WaterSense specification for showerheads has a maximum flow rate of 2.0 gpm, and many showerheads are already available with flow rates between 2.0 and 1.5 gpm. As manufacturers continue to innovate with more water- and energy-efficient showerheads, the code change proposed here will help ensure that new buildings built to this code can safely accommodate showerheads with lower flow rates that may be selected by building occupants in future years.

Note that this language does not require that the showerhead itself have a flow rate of 1.5 gpm, but simply that the shower valve provide the thermal protection called for under the recognized standard when tested at a flow rate as low as 1.5 gpm. In the event that the showerhead selected for initial installation has a flow rate of less than 1.5 gpm, the minimum rated flow if the shower valve must match the flow rate of the showerhead.

The marking requirement is necessary to facilitate inspection. A permanent mark in a visible location will provide a point of reference for building occupants to consider when changing showerheads in future years.

Cost Impact: Conforming products are on the market today without a significant cost premium. The code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D	
	Assembly:	ASF	AMF	DF

RP_____ – 13
Table P2903.1

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself. (eosann@nrdc.org)

Revise as follows:

TABLE P2903.1
REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE

FIXTURE AT POINT OF OUTLET	FLOW RATE (gpm)	FLOW PRESSURE (psi)
Bathtub, pressure-balanced or thermostatic mixing valve	4	20
Bidet, thermostatic mixing	2	20
Dishwasher	2.75	8
Laundry tub	4	8
Lavatory	~~2~~ 0.8	8
Shower, pressure-balancing or thermostatic mixing valve	~~3~~ 2.5[a]	20
Sillcock, hose bibb	5	8
Sink	~~2.5~~ 1.75	8
Water closet, flushometer tank	1.6	20
Water closet, tank, close coupled	3	20
Water closet, tank, one-piece	6	20

For SI: 1 gallon per minute = 3.785 L/m, 1 pound per square inch = 6.895 kPa.

a. Where the minimum rated flow of the specific mixing valve to be used is lower than 2.5 gpm, then the minimum rated flow of the mixing valve shall be the required capacity for this table.

Reason: TABLE P2903.1 "REQUIRED CAPACITIES AT POINT OF OUTLET DISCHARGE" requires plumbing distribution system design to achieve flow rates of *at least* 3 gpm for showers, 2.5 gpm for sinks, and 2 gpm for lavatories, all of which are excessive as minimum requirements. The *minimum* flow rate for a shower is above the allowable *maximum* flow rate for a showerhead as specified by Table P2903.2 of this code and by the nationwide standard that has been in effect for nearly 20 years. Similarly, the *minimum* flow rate for sinks other than laundry sinks is again set higher than the *maximum* flow rate allowable for a sink faucet under Table P2903.2. For building sites that are at the low end of the acceptable range of water pressure, these excessive minimum flow values tend to encourage the oversizing of pipes leading to fixture outlets, leaving a larger volume of cooled hot water to purge before use, and thus exacerbating the problem of the energy and water lost while waiting for actual hot water to arrive at the fixture. In some installations, these excessive minimum values may require water pressure booster systems that might otherwise be unnecessary.

Under this proposal, the minimum flow rates for lavatory, sink, and shower supply pipes would be adjusted downward. Minimum flow rates for pipes supplying showers would be set at 2.5 gpm, or such lower flow rate as would match the manufacturer's minimum rated flow for the mixing valve to provide the level of thermal protection prescribed by the industry standard. The minimum flow rate for pipe supplying a sink other than a laundry sink would be set at 1.75 gpm, which is 80 percent of the value of the maximum flow rate allowed for a sink faucet by this code under Table P2903.2. The minimum flow rate for pipe supplying a lavatory would be set at 0.8 gpm, which is the same as the minimum flow rate prescribed for private lavatory faucets by the US EPA's WaterSense specification (version 1.0, October 2007).

Note: Each change proposed here for Table P2903.1 has been accepted for Table 604.3 in the 2015 version of the International Plumbing Code.

Cost Impact: This proposal will have the effect of reducing the diameter of pipe that is allowed to serve lavatories and showers in some installations, and may also eliminate the need for water pressure booster systems in some applications. This code change proposal will not increase the cost of construction.

RP_-13

Public Hearing: Committee: AS AM D

Assembly: ASF AMF DF

Code: IRC –12/13

Code Sections/Tables/Figures Proposed for Revision (3.3.2);

P2903.2

Proponent: Edward R. Osann, Natural Resources Defense Council, on behalf of self.

Revise Table P2903.2 as follows:

TABLE P2903.2
MAXIMUM FLOW RATES AND CONSUMPTION
FOR PLUMBING FIXTURES AND FIXTURE FITTINGS[b]

PLUMBING FIXTURE OR FIXTURE FITTING	~~PLUMBING FIXTURE OR FIXTURE FITTING~~ MAXIMUM FLOW RATE OR QUANTITY
Lavatory faucet	~~2.2~~ 1.5 gpm at 60 psi
Shower head[a]	~~2.5~~ 2.0 gpm at 80 psi
Sink faucet	2.2 gpm at 60 psi
Water closet	~~1.6~~ 1.3 gallons per flushing cycle[c]

For SI: 1 gallon = 3.785 L, 1 gallon per minute = 3.785 L/m,1 pound per square inch = 6.895 kPa.
a. A hand-held shower spray is also a shower head.
b. Consumption tolerances shall be determined from referenced standards.
c. The effective flush volume for a dual-flush water closet is defined as the composite, average flush volume of two reduced flushes and one full flush.

Reason:

The maximum flow rates and water consumption levels in the current Table P2903.2 for water closets, shower heads, and lavatory faucets equate to nationwide standards enacted nearly 20 years ago. In December, 2010, the US Department of Energy determined that states were no longer preempted from adopting more stringent efficiency standards for these products. (*Federal Register*, Vol. 75, No. 245, December 22, 2010, p. 80289; this document is attached).

Today, fixtures and fittings that perform well at flush volumes and flow rates lower than the values in Table P2903.2 are widely available. Since 2006, the establishment of the WaterSense voluntary labeling program for water efficient products and services by the Environmental Protection Agency has provided a framework for the recognition of products that are substantially more efficient than minimum federal requirements while maintaining full functionality and customer satisfaction. WaterSense criteria were established for tank-type toilets (1.28 gpf) in 2007; lavatory faucets (1.5 gpm @ 60 psi) in 2007; and showerheads (2.0 gpm @ 80 psi) in 2010. Manufacturers have responded by bringing large numbers of models to market that meet or exceed WaterSense specifications. Based on the most recent reports by WaterSense partners, the following figures regarding the number of WaterSense labeled models available as of December 2012 indicate the widespread availability and commercial viability of plumbing products that are more efficient than the federal minimum standards shown in the current Table P2903.2:

- Tank-type water closets 1,475 models from 87 brands
- Lavatory faucets and accessories 5,207 models from 134 brands
- Showerheads 808 models from 45 brands

With the pace of introduction of new models that meet WaterSense specifications, it is reasonable to expect that these figures will be substantially larger by 2015.

Improving the water efficiency of water closets, shower heads, and lavatory faucets in new residential construction will save future building owners money and reduce the likelihood of municipal water and wastewater capacity constraints that can lead to moratoria on new connections.

NRDC estimates that nationwide adoption of the values in this proposal in all newly constructed single-family homes, effective 2016, can be expected to yield substantial additional savings of resources and dollars, as follows:

- 110 million gallons of water per day in 2030;
- 1,644 Gigawatt-hours of electricity per year in 2030;
- 118 million therms of natural gas per year in 2030; and
- Cumulative savings for consumers of $632 million through 2030.

Cost Impact:

While the costs of plumbing fixtures and fittings vary greatly due to style, trim, colors, and materials, the incremental cost of greater efficiency alone for products meeting the flush volumes and flow rates contained in this proposal is negligible. This code change proposal will not increase the cost of construction.

Public Hearing: Committee:	AS	AM	D	
	Assembly:	ASF	AMF	DF

RP_____ – 13
P2904 (New), P2904.1 (New), Table P2904.1 (New)

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself. (eosann@nrdc.org)

Add new text as follows:

SECTION P2904
HOT WATER DISTRIBUTION SYSTEMS

P2904.1 Hot water pipe volume. The volume in the piping between the end of a *hot water fixture supply* and the piping connection to a *hot water* source shall not exceed 0.5 gallon (1.9 liters). The hot water source shall be a recirculating system pipe, a heat-traced pipe or a water heater. The volume in the piping shall be calculated using the values in Table P2904.1.

TABLE P2904.1
INTERNAL VOLUME OF VARIOUS WATER DISTRIBUTION PIPING

Underlining in table is omitted for clarity

	LIQUID OUNCES OF WATER PER FOOT LENGTH OF HOT WATER TUBING							
Nominal Size (Inches)	**Copper Type M**	**Copper Type L**	**Copper Type K**	**CPVC CTS SDR 11**	**CPVC SCH 40**	**PEX-AL-PEX ASTM F 1281**	**PE-AL-PE**	**PEX CTS SDR 9**
⅜	1.06	0.97	0.84	N/A	1.17	0.63	0.63	0.64
½	1.69	1.55	1.45	1.25	1.89	1.31	1.31	1.18
⅝	2.49	2.31	2.22	N/A	N/A	2.12	2.12	1.72
¾	3.43	3.22	2.90	2.67	3.38	3.39	3.39	2.35
1	5.81	5.49	5.17	4.43	5.53	5.56	5.56	3.91
1¼	8.70	8.36	8.09	6.61	9.66	8.49	8.49	5.81
1½	12.18	11.83	11.45	9.22	13.20	13.88	13.88	8.09
2	21.08	20.58	20.04	15.79	21.88	21.48	21.48	13.86

For SI: 1 inch = 25.4 mm, 1 liquid ounce = 0.0296 liters, 1.0 ounce = 0.00781 gallons, 0.5 gallon (1.9 liters) = 64.0 liquid ounces

Reason: Cold or tepid water in the initial draw from a hot water outlet is often unusable for its intended purpose, and is frequently purged, resulting in a waste of water, energy, and time for building occupants. Pipe insulation significantly reduces heat loss and helps to ensure that hot water gets to the user sooner. However, a complementary strategy is to reduce the volume of water contained in the hot water distribution system in the first place.

This proposal, which is comparable to the criteria adopted by the US EPA WaterSense for New Homes specification in 2009, establishes a maximum volume of 0.5 gallons for water in a hot water supply line, based on internal volumes specific to the piping material. By allowing the volume limitation to be computed from runs from recirculation loops, this provision allows designers additional flexibility in larger homes while effectively limiting the amount of cooled down water to be purged to ½ gallon per draw.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

RP_-13
Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF

RP_____ – 13
P2904 (New), P2904.1 (New)

Proponent: Edward R. Osann, Natural Resources Defense Council, representing himself.
(eosann@nrdc.org)

Add new text as follows:

P2904
HOT WATER DISTRIBUTION SYSTEMS

2904.1 Hot or tempered water supply to fixtures. The developed length of hot water piping and tempered water piping from the end of a hot or tempered water *fixture supply* to the piping connection to a hot or tempered water source shall not exceed 50 feet (15 240 mm). The hot or tempered water source shall be a recirculating system pipe, a heat-traced pipe or a water heater.

Reason: This proposal sets a maximum length of 50 feet for hot (or tempered) water supply piping running from a heat source to any fixture. The language the first sentence is identical to Section 607.2 of the International Plumbing Code, which typically applies to much larger buildings than one- and two-family homes. Excessively long hot water piping results in excessive amounts of cooled water that must be purged before use, especially for showers and wash basins. For example, 70 feet of ¾ inch pipe contains nearly 2 gallons of water. At an average shower flow rate of 2.2 gallons per minute, a shower served by such a long pipe run would be running for over 50 seconds just to purge cold water from the hot water supply line, plus the additional time needed to warm the pipe between the heat source and the shower – all water, energy, and time wasted. A 50 foot limit will encourage money-saving choices about the placement of water heaters and hot water outlets in the design of large homes. This provision makes sense in the IPC and will make sense in the IRC as well.

The last line of the section simply ensures that when either recirculating systems or heat-traced piping are present, they are to be considered sources of hot or tempered water.

Cost Impact: This code change proposal is a design requirement that will not increase the cost of construction.

RP_-13
Public Hearing: Committee: AS AM D
Assembly: ASF AMF DF