



International Code Council (ICC) & CSA Group

ICC 805/CSA B805-201x RAINWATER HARVESTING SYSTEMS STANDARD Public Comment Draft #3

The CSA/ICC Joint Rainwater Collection Systems Design and Installation Committee (IS-RCSDI) has developed resolutions to comments received on the Second Public Comment Draft of the ICC 805/CSA B805 Rainwater Harvesting Systems Standard, dated November, 2016. Those resolutions resulted in the approved changes to the normative portions of the Second Public Comment Draft document, which are listed below.

Public comments are now requested on these approved changes, which in combination with the Second Public Comment Draft, constitute the Third Public Comment Draft. Public comments may only be submitted on the portions of the draft shown in legislative (strike through/underline) format. Public comments to other portions of the standard will not be considered. Please show the proposed NEW or REVISED or DELETED TEXT in legislative format: ~~Line through text to be deleted.~~ Underline text to be added.

The deadline for receipt of public comment is November 20, 2017

Inlet pre-filter - a device installed on the rainwater conveyance pipe prior to the primary storage vessel on a rainwater system.

Note: *An inlet pre-filter is intended to mitigate the introduction of, e.g., vermin, leaves, sticks, needles, tree fruit, bark, moss, or any other unwanted debris or roof contaminant that could enter the system.*

Potable water - water that meets human consumption quality standards, as established by the authority having jurisdiction.

Note: *Potable water is more commonly referred to as drinking water.*

Sewer: ~~A piping system that transports sewage and other liquid wastes to a point of disposal.~~

Secondary ~~directly-connected~~ water supply: An alternate secondary source of water that serves a ~~distribution system independently from the~~ rainwater harvesting system.

Note: *Secondary directly connected water supplies are typically intended to be used when the rainwater harvesting system is unable to provide sufficient water from the main supply. This water is not intended to be introduced directly to the storage tank, but to the distribution system piping.*

Stormwater runoff - rainwater that is not roof runoff.

Note: *This includes precipitation runoff from rain or snowmelt that flows over land and/or impervious surfaces (e.g. streets, parking lots, vegetative roofs, and roofs with public access).*

Vegetative roof: An assembly of interacting components designed to waterproof and normally insulate a building's top surface that includes, by design, vegetation and related landscaping elements.

Note: *Also known as a ~~blue roof~~, green roof or bio roof.*

5.1.9 Local site conditions

The system design, installation, and materials shall be suitable for local site conditions, including, but not limited to:

- (a) freezing;
- (b) excessive heat;
- (c) high wind;
- (d) seismic;
- (e) extreme rainfall;
- (f) contaminants;
- (g) elevation of water table;
- (h) flooding; and
- (i) sunlight exposure.

TABLE 5.1

End use tiers and the likelihood of exposure without mitigation measures

End use tier	Category	End Uses	Likelihood of exposure*			
			Ingestion	Inhalation	Skin contact	Overall
1	Non-potable	<ul style="list-style-type: none"> • Trap primers • Spray irrigation (restricted access or exposure)[†] • Surface and subsurface irrigation (drip, bubbler) • Fire suppression-<u>protection</u> • Ice rinks 	Rare	Unlikely	Unlikely	Unlikely
2	Non-potable	<ul style="list-style-type: none"> • Toilet and urinal flushing • Clothes washing • HVAC evaporative cooling (e.g., 	Rare	Possible	Possible	Possible

		cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) • Rooftop thermal cooling				
3	Non-potable	• Hose bibbs • Pressure washing • Decorative fountains • Vehicle washing • Spray irrigation (non-restricted access or exposure)‡	Possible	Likely	Likely	Likely
4	Potable	• Human consumption • Oral care • Food preparation • Dishwashing • Bathing, showering, and hand washing • Pools, hot tubs, spas, and splash pads • Misting stations • Swamp coolers	Certain	Certain	Certain	Certain

* Typical representative outcomes are gastrointestinal illness from ingestion, Legionellosis from inhalation, and bacterial wound infection from skin contact.

† The WSP shall establish whether a given application has restricted or unrestricted access or exposure.

‡ Exposure potential through inhalation for HVAC evaporative cooling is high.

6.3 Operational conditions ~~Pressure and temperature~~

Components used in rainwater harvesting systems shall be suitable for use at the components' anticipated maximum and minimum operating water temperatures, ~~and~~ pressures, ~~and~~ flow rates.

6.5 Buried collection and distribution piping

Except for irrigation piping located outside of a building and downstream of a backflow preventer, buried collection and distribution piping shall

- (a) maintain the separation distances from potable water piping specified by the authority having jurisdiction;
- (b) be protected from damage and potential sources of contamination in accordance with the plumbing code and
- (c) Identified as non-potable in accordance with the plumbing code, where applicable.

7.1.3.2

Colder climate regions subject to some degree of snowfall during the year and use of salt for de-icing shall not collect stormwater runoff for ~~use~~ reuse unless appropriate treatment is undertaken to address salt content.

TABLE 7.1
Collection surfaces per water end use tier for the prescriptive approach
(See Clause 7.1.3.1.)

Collection surface		End use tier
Roofing material	Asbestos cement	‡
	Asphalt	1, 2, 3, 4
	Asphalt felt and bituminous and tar membranes	1, 2, 3
	Ceramic	1, 2, 3, 4
	Clay	1, 2, 3, 4
	Concrete	1, 2, 3, 4
	Copper	1, 2, 3
	Fiberglass	1, 2, 3, 4
	Glass	1, 2, 3, 4
	Polyethylene membrane	1, 2, 3, 4
	Polymer and acrylic	1, 2, 3
	Rubber/Butyl /EPDM membrane	1, 2, 3
	Steel, coated	1, 2, 3, 4
	Steel, stainless	1, 2, 3, 4
	Tin	1, 2, 3, 4
	Wood, untreated	1, 2, 3
	Wood, treated	1, 2, 3
	<u>PVC</u>	<u>1, 2, 3, 4</u>
	<u>TPO</u>	<u>1, 2, 3, 4</u>
Public pedestrian accessible roofs	1, 2	
Vegetated roofs	1, 2§	
Pedestrian and parking surfaces (e.g., sidewalks, courtyard,	1, 2§	
Landscaped runoff	1, 2§	
Street, freeway, shoulder areas, paved parking	<u>‡ None</u>	

Subsurface collection†	1, 2
Surface waters and stormwater detention ponds	± None

** Roofing products used within rainwater harvesting systems collecting water for use as drinking water can be third-party certified to NSF P151-1995 Health Effects from Rainwater Catchment System Components unless the water collected is treated to address the constituent contaminants.*

† Subsurface water shall not be collected from sites which contain contaminated soils.

~~‡ Not in the scope of this Standard.~~

§ HVAC evaporative cooling applications not included.

7.1.4 Collection surfaces for potable water applications

Roofing materials used for collection of rainwater for potable applications shall be third-party certified to NSF/ANSI 61 or NSF P151, unless the water collected is treated to address the constituent contaminants. ~~Paints, liners, and~~ or coatings applied to surfaces used for collection of rainwater for potable applications shall be third-party certified to NSF/ANSI 61 or NSF P151 ~~or NSF/ANSI 61~~ and applied in accordance with the manufacturer’s installation instructions. Lead or chromium, ~~or zinc based paints and coatings~~ shall not be used on surfaces used for collection of rainwater for potable applications.

7.2.10.2 Pre-filtration

Inlets accepting water from collection surfaces shall be protected with a debris excluder, inlet pre-filter or equivalent device to prevent the entry of large contaminants and debris into the conveyance system (e.g., vermin, leaves, sticks, ~~pine tree~~ needles, tree fruit, bark, and moss).”

~~7.2.9 Slope~~

~~Gutters and collection piping that use gravity to produce flow shall have a slope along their entire length and shall not permit the collection or pooling of water at any point. Siphonic roof drain systems shall be installed in accordance with Clause 7.2.12 and shall not be sloped.~~

7.2.13 Roof drain systems

The collection and conveyance of rainwater shall not adversely impact the function of roof drain systems. Roof drain systems shall be designed and installed in accordance with the requirements of the applicable codes and manufacturer’s requirements. ~~Siphonic roof drains and drainage systems shall be designed in accordance with ASME A112.6.9 and ASPE 45.~~

7.3.1.1 Compliance

Tanks used for fire ~~suppression~~ protection shall comply with the fire code.

7.3.1.3.1 Materials

~~Tanks intended for potable and non-potable water applications shall be manufactured with recycled or virgin polymers complying with the applicable requirements of NSF/ANSI 61 and ASTM D1998, respectively. Injection molded products shall use polymer material tested in accordance with ASTM D1621.~~

~~Tanks shall comply with NSF/ANSI 61 where used for potable water applications.~~

7.3.4.3.1 General

The design of buried or partially buried tanks shall consider the

- (a) external loads on the tank including the weight of the backfill together with hydrostatic, overburden, and live loads; ~~and~~
 - (b) soil type at the site and the tank loading when the tank is either full and empty; ~~and~~
 - (c) manufacturer's installation requirements.
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~~**7.4.4.2.5 Free chlorine residual**~~

~~When provided, free chlorine residual in the distribution system shall be maintained between 0.5 and 4.0 mg/L.~~

8.1.4 Control of growth of opportunistic pathogens

Rainwater harvesting systems whose water temperature is anticipated to be between 25 °C and 55 °C (77 °F and 131°F) shall have a means to control the growth of opportunistic pathogens (e.g., *Legionella*, *Pseudomonas aeruginosa*, *Mycobacterium avian* complex). ~~Water supplied for multi-residential and commercial applications shall maintain a chlorine residual of 0.5 mg/L in accordance with Tables 8.3 and 8.4.~~

Table 8.1

Roof runoff water treatment requirements for single-family residential applications

(See Clauses 8.1.1 and 8.2.1.)

Application				Minimum performance criteria				Minimum prescriptive requirements				
End user tier	Category	Potential for human contact	Examples of uses	Log reduction (% reduction)			pH	Options for post-storage treatment before end use				
				Viruses	Bacteria**	Protozoa		UV ⁺⁺		Chemical-based disinfectants ⁺⁺		Microfiltration or ultrafiltration
								Filtration	Disinfection	Filtration	Disinfection	
1	Non-potable	Low	<ul style="list-style-type: none"> Trap primers Spray irrigation (restricted access or exposure)^{§§} Surface and subsurface irrigation (drip, bubbler) Fire suppression <u>protection</u> Ice rinks 	0	0	0	-	None [§]				
2	Non-potable	Medium	<ul style="list-style-type: none"> Toilet and urinal flushing Clothes washing HVAC evaporative cooling (e.g., cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) Rooftop thermal cooling 	0*	2 (99%)	2 (99%)	-	5 µm	16 mJ/cm ²	NR ^{†***}	NR ^{†***}	0.5 µm [‡]

3	Non-potable	High	<ul style="list-style-type: none"> Hose bibbs Pressure washing Decorative fountains Vehicle washing Spray irrigation (non-restricted access or exposure)§§ 	0*	3 (99.9%)	3 (99.9%)	-	5 µm	30 mJ/cm ²	NR+**	NR+**	0.5 µm‡
4	Potable	High	<ul style="list-style-type: none"> Human consumption Oral care Food preparation Dishwashing Bathing, showering, and hand washing Pools, hot tubs, spas, /splash pads Misting stations Swamp coolers 	0*	6 (99.9999%)	4 (99.99%)	7- 10.5 ±0	5 µm	40 mJ/cm ² and third-party certified to Class A of NSF/ANSI 55	NR+**	NR+**	0.2 µm‡ third-party certified to NSF/ANSI 53

* It is unlikely that human infectious viruses are present in harvested rainwater sourced from elevated surfaces. If below-ground tanks are used where there is a potential for sewage contamination, a 4 log reduction shall be required in accordance with the WSP.

† Due to complexity of operation and design, chemical-based disinfection should not be used for single-family dwellings.

‡ Pre-filters of 5 to 100 µm should be used to extend the life of the filter.

§ For operational purposes only, filters smaller than 500 µm, or, for drip irrigation only, filters smaller than 100 µm should be used.

** Due to potential for growth of opportunistic pathogens in plumbing systems (e.g., Legionella, Pseudomonas aeruginosa, and Mycobacterium avian complex), water stored at temperatures higher than 25 °C (77 °F) for extended periods shall not be used for tiers 2, 3, and 4 unless a chlorine residual of at least 0.5 mg/L is maintained. If chlorine is used, consideration should be given to the potential formation of disinfection by-products.

†† Filtration and disinfection are both required. Filtration of at least 5 µm is required upstream of the UV disinfection device.

‡‡ Filtration and disinfection are both required.

§§ The WSP shall establish whether a given application has restricted or unrestricted access or exposure.

Table 8.2

Stormwater runoff treatment requirements for single-family residential applications

(See Clauses 8.1.1, 8.1.3, and 8.2.1.)

Application	Minimum performance criteria	Minimum prescriptive requirements
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End use tier	Category	Potential for human contact	Examples of uses	Log reduction (% reduction)			pH	Options for post-storage treatment before end use				
				Viruses	Bacteria**	Protozoa		UV++		Chemical-based disinfectants††		Microfiltration or ultrafiltration
								Filtration	Disinfection	Filtration	Disinfection	
1	Non-potable	Low	<ul style="list-style-type: none"> • Trap primers • Spray irrigation (restricted access or exposure)§§ • Surface and subsurface irrigation (drip, bubbler) • Fire suppression <u>protection</u> • Ice rinks 	0	0	0	-	None§				
2	Non-potable	Medium	<ul style="list-style-type: none"> • Toilet and urinal flushing • Clothes washing • HVAC evaporative cooling (e.g., cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) • Rooftop thermal cooling 	4*	2 (99%)	2 (99%)	-	5 µm	16 mJ/cm ²	NR+***	NR+***	0.5 µm‡
3	Non-potable	High	<ul style="list-style-type: none"> • Hose bibbs • Pressure washing • Decorative fountains • Vehicle washing • Spray irrigation (non-restricted access or exposure)§§ 	4*	3 (99.9%)	3 (99.9%)	-	5 µm	30 mJ/cm ²	NR+***	NR+***	0.5 µm‡
4	Potable	High	<ul style="list-style-type: none"> • Human consumption • Oral care • Food preparation • Dishwashing • Bathing, showering, and hand washing 	Not in the scope of this Standard								

			<ul style="list-style-type: none"> • Pools, hot tubs, spas, and splash pads • Misting stations • Swamp coolers 	
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** It is unlikely that human infectious viruses are present in harvested rainwater. For below-ground tanks where there is a potential for sewage contamination, a 4 log reduction shall be required in accordance with the WSP.*

† Due to complexity of operation and design, chlorine-based disinfection should not be used for single-family dwellings.

‡ Pre-filters of 5 to 100 µm should be used to extend the life of the filter.

§ For operational purposes only, filters smaller than 500 µm, or, for drip irrigation only, filters smaller than 100 µm should be used.

*** Due to potential for growth of opportunistic pathogens in plumbing systems (e.g., Legionella, Pseudomonas aeruginosa, and Mycobacterium avian complex), water stored at temperatures higher than 25 °C (77 °F) for extended periods shall not be used for tiers 2, 3, and 4 unless a chlorine residual of at least 0.5 mg/L is maintained. If chlorine is used, consideration should be given to the potential formation of disinfection by-products.*

†† Filtration and disinfection are both required. Filtration of at least 5 µm is required upstream of the UV disinfection device.

‡‡ Filtration and disinfection are both required.

§§ The WSP shall establish whether a given application has restricted or unrestricted access or exposure.

Table 8.3

Roof runoff water treatment requirements for multi-residential and non-residential applications

(See Clauses 8.1.1, 8.1.3, and 8.2.1.)

Application				Minimum performance criteria			Minimum prescriptive requirements						
End use tier	Category	Potential for human contact	Examples of uses	Log reduction (% reduction)			pH	Options for post-storage treatment before end use					
				Viruses	Bacteria**	Protozoa		UV‡‡		Chemical-based disinfectants§§		Microfiltration or ultrafiltration	
								Filtration	Disinfection	Filtration	Disinfection		

1	Non-potable	Low	<ul style="list-style-type: none"> • Trap primers • Spray irrigation (restricted access or exposure)*** • Surface and subsurface irrigation (drip, bubbler) • Fire suppression <u>protection</u> • Ice rinks 	0	0	0	-	None§				
2	Non-potable	Medium	<ul style="list-style-type: none"> • Toilet and urinal flushing • Clothes washing • Rooftop thermal cooling 	0*	2 (99%)	2 (99%)	-	5 µm	16 mJ/cm ²	1 µm absolute**	CT for 2 Log reduction for bacteria and at least 0.5 mg/L chlorine residual**	0.5 µm‡ with at least 0.5 mg/L chlorine residual
			<ul style="list-style-type: none"> • HVAC evaporative cooling (e.g., cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) 	Treatment shall consider equipment manufacturer water quality requirements and be designed in accordance to ANSI/ASHRAE 188								
3	Non-potable	High	<ul style="list-style-type: none"> • Hose bibbs • Pressure washing • Decorative fountains • Vehicle washing • Spray irrigation (non-restricted access or exposure)*** 	0*	3 (99.9%)	3 (99.9%)	-	5 µm	30 mJ/cm ² with at least 0.5 mg/L chlorine residual	1 µm absolute**	CT for 3 Log reduction for bacteria and at least 0.5 mg/L chlorine residual**	0.5 µm‡ with at least 0.5 mg/L chlorine residual

4††	Potable	High	<ul style="list-style-type: none"> • Human consumption • Oral care • Food preparation • Dishwashing • Bathing, showering, and hand washing • Pool/hot tubs/spas/splash pads • Misting stations • Swamp coolers 	0*	6 (99.9999%)	4 (99.99%)	7- <u>10.5</u> 10	5 µm	40 mJ/cm ² and third-party certified to Class A of NSF/ANSI 55 or validated to U.S. EPA UVDGM or DVGW W294 with at least 0.5 mg/L chlorine residual	1 µm absolute**	CT for 6 Log reduction for bacteria† and at least 0.5 mg/L chlorine residual**	0.2 µm‡ third-party certified to NSF/ANSI 53 with at least 0.5 mg/L chlorine residual
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* It is unlikely that human infectious viruses are present in harvested rainwater. For below-ground tanks where there is a potential for sewage contamination, a 4 log reduction shall be required in accordance with the WSP.

† Depending on source water quality, consideration should be given to the potential formation of disinfection by-products.

‡ Pre-filters of 5 to 100 µm should be used to extend the life of the filter.

§ For operational purposes only, filters smaller than 500 µm, or, for drip irrigation only, filters smaller than 100 µm should be used.

** Due to potential for growth of opportunistic pathogens in plumbing systems (e.g., Legionella, Pseudomonas aeruginosa, and Mycobacterium avian complex), a chlorine residual of at least 0.5 mg/L shall be maintained.

†† The authority having jurisdiction might specify additional requirements for public drinking water supplies.

‡‡ Filtration and disinfection are both required. Filtration of at least 5 µm is required upstream of the UV disinfection device.

§§ Filtration and disinfection are both required.

*** The WSP shall establish whether a given application has restricted or unrestricted access or exposure.

Notes:

(1) CT = disinfectant concentration times the contact time.

(2) Figure A.1 shows the particle size spectrum for filtration.

Table 8.4

Stormwater runoff treatment requirements for multi-residential and non-residential applications

(See Clauses 8.1.1, 8.1.3, and 8.2.1.)

Application				Minimum performance criteria				Minimum prescriptive requirements				
End use tier	Category	Potential for human contact	Examples of uses	Log reduction (% reduction)			pH	Options for post-storage treatment before end use				
				Viruses	Bacteria†	Protozoa		UV**		Chemical-based disinfectants††		Microfiltration or ultrafiltration
								Filtration	Disinfection	Filtration	Disinfection	
1	Non-potable	Low	<ul style="list-style-type: none"> • Trap primers • Spray irrigation (restricted access or exposure)* • Surface and subsurface irrigation (drip, bubbler) • Fire suppression <u>protection</u> • Ice rinks 	0	0	0	-	None§				

2	Non-potable	Medium	<ul style="list-style-type: none"> • Toilet and urinal flushing • Clothes washing • Rooftop thermal cooling 	4 (99.99%)	4 (99.99%)	3 (99.9%)	-	5 µm	40 mJ/cm ² and third-party certified to Class A of NSF/ANSI 55 or validated to U.S. EPA UVDGM or DVGW W294 with at least 0.5 mg/L chlorine residual	1 µm absolute†	CT for 4 Log reduction for bacteria and at least 0.5 mg/L chlorine residual†	0.5 µm‡ with at least 0.5 mg/L chlorine residual	
			<ul style="list-style-type: none"> • HVAC evaporative cooling (e.g., cooling tower, evaporative condenser, spray cooler, direct and indirect evaporative cooling) 	Treatment shall consider equipment manufacturer water quality requirements and designed in accordance with ANSI/ASHRAE 188									
3	Non-potable	High	<ul style="list-style-type: none"> • Hose bibbs • Pressure washing • Decorative fountains • Vehicle washing • Spray irrigation (non-restricted access/exposure) 	4 (99.99%)	4 (99.99%)	3 (99.9%)	-	5 µm	40 mJ/cm ² and third-party certified to Class A of NSF/ANSI 55 or validated to U.S. EPA UVDGM or DVGW W294 with at least 0.5 mg/L chlorine residual	1 µm absolute†	CT for 4 Log reduction for bacteria and at least 0.5 mg/L chlorine residual†	0.5 µm‡ with at least 0.5 mg/L chlorine residual	
4	Potable	High	<ul style="list-style-type: none"> • Human consumption • Oral care • Food preparation • Dishwashing • Bathing, showering, and hand washing • Pools, hot tubs, spas, splash pads • Misting stations • Swamp coolers 	Not in the scope of this Standard									

** The WSP shall establish whether a given application has restricted or unrestricted access or exposure.*

† Due to potential for growth of opportunistic pathogens in plumbing systems (e.g., Legionella, Pseudomonas aeruginosa, and Mycobacterium avian complex), a chlorine residual of at least 0.5 mg/L shall be maintained.

‡ A pre-filter of 5 to 100 µm should be used to extend the life of the filter.

§ For operational purposes only, filters smaller than 500 µm, or, for drip irrigation only, filters smaller than 100 µm should be used.

** Filtration and disinfection are both required. Filtration of at least 5 µm is required upstream of the UV disinfection device.

†† Filtration and disinfection are both required.

Notes:

(1) CT = disinfectant concentration times the contact time.

(2) Figure A.1 shows the particle size spectrum for filtration.

9.6 Inspection and testing of backflow prevention assemblies

The testing of backflow preventers shall be conducted in accordance with the plumbing code and municipal water suppliers. ~~In the absence of code requirements, backflow preventers shall be tested in accordance with CSA B64.10.1.~~

C.2.1 Materials

~~Tanks intended for potable and non-potable water applications shall be manufactured with recycled or virgin polymers complying with the applicable requirements of NSF/ANSI 61 and ASTM D1998, respectively. Injection molded products shall use polymer material tested in accordance with ASTM D1621.~~

Tanks shall comply with NSF/ANSI 61 where used for potable water applications.
