



A Comparison of 'Green'

Summarizing key water efficiency provisions of the:

*IAPMO Green Plumbing & Mechanical Code Supplement (GPMCS)
ICC International Green Construction Code (IgCC)
ASHRAE SS189.1 for High Performance Buildings
ASHRAE S191P Water Efficiency
California Green Building Standards Code (CalGREEN)
USGBC LEED Program Guidelines*

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Disclaimer: The information contained herein was gathered from sources assumed to be current and deemed reliable. However, these tables are only a summary of the individual provisions within the referenced documents. As such, for a complete understanding of the specific requirements, the user should consult the foundational documents for each of the columns. The author makes no guarantee as to the accuracy of the information within the individual cells in these summary tables. Reviewers are requested to provide corrections to these tables as appropriate.

NATIONAL GREEN BUILDING STANDARDS, CODES, & GUIDELINES with water use efficiency provisions

	Applications	Guidelines, code or standard?	Code-adoptable language?	Minimum thresholds or points?	Status
California: CALGreen	Residential & non-residential	Code	Yes	Minimum thresholds	Became effective in 2011; continuing development & expansion
USGBC LEED-NC et.al.	All except Single Family Residential	Guidelines	No	Prerequisites + points	LEED 2009 and v.4 mandate 20% reduction from baseline; other significant changes
USGBC LEED-Homes	Single Family Residential (SFR)	Guidelines	No	Both	Active – being updated
Green Globes – Green Bldg Initiative 01-200XP	Residential & multi-use above 3 stories + all commercial	ANSI Standard	Yes	Points	Final standard ANSI-approved and published in April 2010; update process began 2014 – new public review document to be released 2015
ASHRAE SS189.1 – High Performance Buildings	Residential above 3 stories + all commercial	ANSI Standard	Yes	Minimum thresholds	Final standard ANSI-approved; published in January 2010; version 2 released 2011; now in sustaining process; addendum v for water efficiency approved in 2014
ASHRAE S191P – Water Efficiency	All except SFR	ANSI Standard	Yes	Minimum thresholds	First public comment period completed; revised draft to be released for second public comment period – date undetermined
ICC 700 - NAHB Green Bldg Standard for Homes	Residential	ANSI Standard	Yes	Points	Final standard ANSI-approved; published in Jan 2009 as ICC-700
IAPMO Green Plumbing & Mechanical Code Supplement	Residential & multi-use above 3 stories + all commercial	Code	Yes	Minimum thresholds	Overlay to existing codes; version 3 programmed for 2015 publication
ICC Green Construction Code	Residential & multi-use above 3 stories + all commercial	Code	Yes	Minimum thresholds	Overlay to existing codes; Final (first) version released March 2012; updated version to be published 2015
U.S. EPA WaterSense for New Homes	Residential	Guidelines	No	Minimum thresholds	Final specification issued in December 2009

NATIONAL GREEN BUILDING STANDARDS, GUIDELINES & CODES

Comparison of specific water use efficiency provisions – maximum water use

PLUMBING: TOILETS & URINALS	CalGREEN ¹ (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 ¹ (v.2-2011, updated with addendum v- 2014)	ASHRAE S191P (Public review draft v.1)	ICC 700- 2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Residential toilets OR “private” setting in commercial – FLUSHOMETER TYPE (gals per flush)	HET: 1.28g ²	<i>No individual maximums specified, except requires WaterSense products where available². Mandatory to reduce aggregate water consump- tion by at least 20% from “baseline”³</i>	HET: 1.28g ²	HET: 1.28g ²	HET: 1.28g	HET: 1.28g ⁴	HET: 1.28g ²
Residential toilets – TANK TYPE (gallons per flush)	HET: 1.28g ² + WaterSense		HET: 1.28g ⁵ + WaterSense	HET: 1.28g ² + WaterSense		HET: 1.28g ² + WaterSense	HET: 1.28g ² + WaterSense
Commercial toilets “public” setting and remote ⁶ (gals/flush)	HET: 1.28g ² Tank-type must comply with WaterSense		HET: 1.28g ⁷ Tank-type must comply with WaterSense	HET: 1.28g ² Tank-type must comply with WaterSense		1.6g ^{4,6}	1.6g ^{4,8}
Commercial toilets – “public” setting and non-remote (gallons/flush)						HET: 1.28g ^{2,4}	HET: 1.28g ^{2,4}
Flushing urinals (gallons per flush)	HEU: 0.5 gpf		HEU: 0.5g + WaterSense	HEU: 0.5g + WaterSense	HEU: 0.5 gpf	HEU: 0.5g + WaterSense	HEU: 0.5g + WaterSense
Non-water urinals	Permitted		Permitted	Permitted		Permitted; requires upstream discharges to drain from other fixtures or fittings	

¹ Prescriptive option only

² Today, WS product maximums are: toilets-1.28 gpf; flushing urinals-0.5 gpf; residential lavatory faucets-1.5 gpm; residential showerheads-2.0 gpm; pre-rinse spray valves-1.28 gpm.

³ Baseline established as EPA 1992 (fixtures/fittings), EPA 2005 (pre-rinse spray valves), ANSI standard ASME A112.18.1/CSA B125.1 & model plumbing codes (public lavatory faucets)

⁴ For dual-flush fixture, ‘effective’ flush volume defined as average of 2 reduced flushes and 1 full flush.

⁵ Maximum full flush volume on dual flush fixtures is 1.28 gallons per flush; calculation of ‘effective flush volume’ is no longer required

⁶ ‘Remote’ definition: toilet is one located 30 feet or more upstream of other drainline connections or fixtures AND where that connection is served by less than 1.5 drainage fixture units.

⁷ For dual-flush fixture in this category, maximum full flush volume is 1.28 gallons per flush; calculation of ‘effective flush volume’ is not required

⁸ 1.6 g permitted only when toilet location meets code definition of ‘remote’.

NATIONAL GREEN BUILDING STANDARDS, GUIDELINES & CODES

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PLUMBING: FAUCETS & SHOWERS	CalGREEN ⁹ (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 ¹ (v.2-2011, updated with addendum v)	ASHRAE S191P (Public review draft v.1)	ICC 700- 2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Residential & commercial “private” lavatory faucets (gallons/minute)	1.2 gpm ¹⁰	<i>No individual maximums specified, except requires WaterSense products where available¹¹. Mandatory to reduce aggregate water consumption by at least 20% from “baseline”³</i>	1.5 gpm + WaterSense ¹²	1.5 gpm + WaterSense ⁹	1.5 gpm	1.5 gpm + WaterSense ⁹	1.5 gpm ⁷
Commercial & non-residential “public” lavatory faucets (gals/min.)	0.5 gpm ¹³		0.5 gpm	0.5 gpm		0.5 gpm	0.5 gpm
Commercial kitchen & bar sink faucets (gallons per minute)	1.8 gpm ¹⁴		Hands-free in food prep area & in dish room of comm'l kitchen				2.2 gpm ¹⁵
Commercial metering faucets (gallons per cycle ¹⁶)	0.25 gpc		0.25 gpc	0.25 gpc		0.25 gpc	0.25 gpc
Residential kitchen faucets (gallons per minute)	1.8 gpm; allows temporary override to 2.2 gpm		1.8 gpm; allows temporary override to 2.2 gpm	2.2 gpm		1.8 gpm; allows temporary override to 2.2 gpm	1.8 gpm; allows temporary override to 2.2 gpm for pot filling
Residential showerheads (gallons per minute)	2.0 gpm + WaterSense		2.0 gpm + WaterSense	2.0 gpm	2.5 gpm	2.0 gpm + WaterSense; shower valve must scald-protect at showerhead flow rate	2.0 gpm + WaterSense
Non-residential showerheads (gal/min)	2.0 gpm + WaterSense						

⁹ Prescriptive option only

¹⁰ Also a minimum flow rate of 0.8 gpm at 20 psi (WaterSense not specified); maximum flow rate as set by California Energy Commission & incorporated into CalGREEN

¹¹ Today, WS product maximums are: toilets-1.28 gpf; flushing urinals-0.5 gpf; residential lavatory faucets-1.5 gpm; residential showerheads-2.0 gpm; pre-rinse spray valves-1.28 gpm.

¹² WaterSense also provides for minimum flow rate of 0.8 gpm at 20 psi

¹³ Table 5.303.2.2 (Baseline - Nonresidential Mandatory Measures); CalGREEN also specifies a maximum flow rate of 0.5 gpm in Section 4.303.1.4.2 (Residential Mandatory Measures)

¹⁴ CalGREEN (Table 5.303.2.3) generically defines “kitchen faucets” for “Nonresidential Mandatory Measures” without specifying if the requirements specifically apply to commercial kitchens; CalGREEN includes no requirements for bar sink faucets.

¹⁵ Handwashing faucets in food service must be self-closing

¹⁶ NOTE: Metering faucets have **no flow rate maximum**

NATIONAL GREEN BUILDING STANDARDS, GUIDELINES & CODES
Comparison of specific water use efficiency provisions – maximum water use

PLUMBING: MISCEL- LANEOUS	CalGREEN (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 (v.2-2011, updated with addendum v)	ASHRAE S191P (Public review draft v.1)	ICC 700- 2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Residential shower valve (automatic compensating valve)						Meet ASSE 1016 OR ASME A112.18.1/CSA B125.1 for temp control when tested at 2.0 gpm	
Tub spout diverter leakage (gallons per minute)	0.01 gpm when new; 0.05 gpm after 15,000 cycles ¹					Zero leakage	0.1 gpm
Drinking fountain – manual (gallons per minute)						Auto shut-off	0.7 gpm with auto shut-off
Drinking fountain – metered (gallons per cycle)							0.25 gpc
Trap primer						Maximum usage of 30 gal per year	Maximum usage of 30 gal per year

¹ Defers to Calif Code of Regulations, Title 20 by the California Energy Commission

NATIONAL GREEN BUILDING STANDARDS, GUIDELINES & CODES

Comparison of specific water use efficiency provisions – maximum water use

Appliances, Equipment, Irrigation & Alternate Water	CalGREEN (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 (v.2-2011, updated with addendum v)	ASHRAE S191P (Public review draft v.1)	ICC 700-2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Residential dishwashers (total water per full cycle)	<i>(defers to Calif Energy Commiss'n)</i>	Energy Star (or equivalent)	Energy Star & 3.8 gal – 14.3L	Energy Star & 5.8 gal – 22L	Energy Star	Energy Star	Energy Star
Residential clothes washers (water factor maximum)			Energy Star & WF of 5.4 gal – 20L	Energy Star & WF of 6.0 gal – 23L	Energy Star	Energy Star	Energy Star & WF of 5.4 gal – 20L
On-site reclaimed water (incl. graywater) treatment systems	<i>(future)</i>	Metered	Encouraged through the treatment and use of alternate (non-potable) sources of water		Points available for use of alternate sources	Specific provisions for equipment installation & water treatment	NSF 350 listed
Rainwater capture	<i>(future)</i>						Included
Landscape irrigation	Weather-based or soil moisture sensor-based irrigation controller req'd for landscape >1,000 sf	30% - 50% reduction from baseline calculated via WaterSense water budget tool	ET-based; smart technology; restrictions on turf		Non-mandatory provisions; some turf restrictions	75% of irrig needs satisfied with water from alternate sources; if controller used, smart controller reqd; other specific landscape provisions	If automatic irrig controller used, smart controller reqd; alternate non-potable water sources encouraged; other specific landscape provisions
Water features (fountains, etc.)		Metered	Use alternate water sources (non-potable) where available; recirculation required			Use alternate water sources (non-potable) where available	Use alternate (non-potable) water source; potable water use OK for small features.
Commercial clothes washers in <u>public access</u> : common area laundry rooms, hotels, laundromats (water factor max.)		CEE Tier 3A	Energy Star & WF of 4.0 gal (.53 kL/m ³)	Energy Star & WF of 7.5 gal (1 kL/m ³)		Energy Star where applicable	
Commercial clothes washers – all others without public access (water use maximum)		1.8 gal per pound (on-premise)	WF of 8.0 gal				

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Residential water softeners						Permitted where water hardness \geq 8 grains/gallon; demand-initiated regeneration req'd; max water use 5 gal (19L) per 1K grains of hardness removed; salt efficiency exceeding 3400 grains of total hardness removed per pound of salt; NSF 44 listed	Demand-initiated regeneration req'd; max water use 4.0 gal (15L) per 1K grains of hardness removed; salt efficiency no less than 4000 grains of total hardness removed per pound of salt; NSF 44 listed; brine may not discharge to a reclaimed water collection system
Reverse osmosis water treatment system		75% recovery req'd				NSF 58 listed; auto shut-off	
Water-powered pumps						Water-powered sump pumps prohibited, except for emergency; emergency pumps shall be at least 58% efficient	Water-powered sump pumps prohibited, except for emergency; emergency pumps shall be at least 67% efficient
Automated vehicle wash facilities						Make-up water restrictions: In-bay-40gal/vehicle; Conveyor & express type-35gal/vehicle; spray wands & foamy brushes-3.0 gpm	50% water reuse; other water restricted as follows: In-bay-40gal/vehicle; Conveyor & express type-35gal/vehicle
Self-service vehicle wash facilities							Spray wands: 3.0 gpm

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Comparison of specific water use efficiency provisions – maximum water use

Metering and Sub-metering	CalGREEN ¹ (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 (v.2-2011, updated with addendum v)	ASHRAE S191P (Public review draft v.1)	ICC 700- 2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Metering tenant water use (usage in gallons per day)	Where non-residential tenant usage >100g + all bldgs where >1000g	Metering of single family dwellings and individual multi-family units req'd as prerequisite	Tenants or buildings where >1,000 g	Tenants or buildings where >1,000 g		Where non-resid. tenant use = >1,000 g/day OR high-use occupancy: all resid tenant space; all common area uses	Where usage >1,000 g/day
Meter reclaimed & potable water needed to supplement onsite water collection systems		Reclaimed				Potable and reclaimed water	
Sub-metering process water use – industrial/commercial (usage in gals per day)		Sub-meter at least 80% of process water, including pools	Where usage >1,000 g	Where usage >1,000 g		All where usage >1,000 g	Industrial usage >1,000 g
Sub-metering ornamental water features, swimming pools, in-ground spas			Make-up water supply to all ornamental water features	Make-up water supply lines		Make-up water supply to ornamental water features w/auto refill; make-up water to pools/spas	Make-up water supply lines
Sub-metering cooling towers			Towers of >500 gpm flow (through-put): make-up & blow-down water supply lines	Towers of >500 gpm flow (through-put)		Make-up water supply	Towers of 100 tons or greater: make-up and blow-down water supply lines
Sub-metering evaporative coolers			Where use in excess of 0.6 gpm: meter make-up water supply	Where use in excess of 0.6 gpm: meter make-up water supply		Make-up water supply where cooler has air flow in excess of 30K cfm	Where use in excess of 0.6 gpm: meter make-up water supply

¹ Prescriptive option only

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Sub-metering hydronic cooling systems						Make-up water supply when >50 tons of cooling	
Sub-metering fluid coolers & chillers						Make-up water supply where no closed-loop recirc	
Sub-metering roof spray systems						Where vegetated roof or thermal conditioning of >300 sq.ft.	

² Prescriptive option only

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Sub-metering boilers		Make-up water supply to boilers: drawing more than 100K gallons annually or rated at 500K Btu/hr or more	Steam & hot water boilers rated at 500K Btu/hr or more	Steam & hot water boilers rated at 500K Btu/hr or more		Make-up water supply to boilers collectively exceeding 1 mil Btu/hr	Make-up water supply to boilers: drawing more than 100K gallons annually or rated at 500K Btu/hr or more
Sub-meter indoor plumbing fixtures & fittings		Required. Alternate path of calculated use is provided.					
Sub-meter domestic hot water		Meter at least 80% of domestic hot water					
Sub-meter health care processes		Meter process water systems, e.g. purified water, dietary dept., laundry, labs, physiotherapy/hydrotherapy, surgical & hydronics					
Sub-metering landscape irrigation	Where non-residential landscape >1,000 sq.ft.**	Meter at least 80% of irrigated landscape, excluding Xeriscaping and native vegetation	Where total irrigated landscape >25,000 sq.ft.	Where total irrigated landscape >5,000 sq.ft.		Where >2,500 sq.ft. irrigated landscape	Yes, all irrig systems that are automatic
Building Meter Data Management System			Require remote data communication to central system, recording hourly consumption data			Requires remote data collection & transfer capability where more than 10 non-utility-owned meters are installed	Meters must be <u>capable of connecting & communicating</u> water use data; direct connection to central bldg system not req'd

NATIONAL GREEN BUILDING STANDARDS, GUIDELINES & CODES

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Commercial Food Service	CalGREEN (provisions effective Jan 1, 2014)	LEED V.4 July 2014	ASHRAE SS189.1 (v.2-2011, updated with addendum v)	ASHRAE S191P (Public review draft v.1)	ICC 700- 2008 (with NAHB)	IAPMO Green Plumbing & Mech Code Supplement (2015 version)	IgCC Green Code (2015 version)
Commercial food service – cubed ice makers	<i>(defers to Calif Energy Commission on food service appliances)</i>	Energy Star (or equiv.)	Energy Star (air cooled)	Energy Star (air cooled)		Energy Star (air cooled) + 20 g per 100 lbs. of ice	Energy Star (air cooled)
Commercial food service – nugget & flaked ice makers						Energy Star (air cooled) + 14 g per 100 lbs. of ice	
Commercial food service – all other ice makers not covered by Energy Star							25 gal per 100 lbs. of ice produced; air cooled
Commercial food service – connectionless steam cooker (gal per hour)		2.0 to 6.0 g per pan (cook-to-order = 5 to 10g per pan max)	2.0 g	2.0 g per pan		2.0 g per compartment	2.0 g per pan
Commercial food service – connected steam cooker (max gals per hour)						1.5 g per pan; tempering water not required for discharges (per UPC)	5.0 g per pan
Commercial food service – dishwashers (max gallons)		Energy Star + 0.9 to 1.6 gal per rack depending on type; Rackless flight-type DWs = 180 gal/hr max	Energy Star, version 2 requirements	Energy Star where applicable; Rackless flight-type DWs = 160 gal/hr maximum		Energy Star	Energy Star OR 2.2 gal/rack OR 2.2 gpm for rackless
Commercial food service – combination ovens (max gallons/hr)		1.5 to 3.5 g per pan	10g	3.5 g per pan		1.5 g per pan in steamer mode; no water use allowed in convection mode; tempering water not required for discharges (per UPC)	3.5 g per pan

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Commercial food service – dipper wells (gallons per minute)				Max flow per minute equal to the capacity of the DW, not to exceed 1.0 gpm		Max flow per minute equal to the capacity of the DW, not to exceed 0.2 gpm	1.0 gpm
Commercial food waste disposers (max gals per minute)		No load: 1.0g Full load: 3.0g to 8.0g				No load: 1.0g Full load: 8.0g	No load: 1.0g Full load: 8.0g
Commercial food scrap collector or pulper (max gallons/minute)		2.0g				2.0g with auto shut-off	
Commercial pre-rinse spray valve (max gallons per minute)		1.3g + WaterSense ³	1.3g	1.3g + WaterSense ³		1.3g with auto shut-off + WaterSense ³	1.3g with auto shut-off + WaterSense ³
Commercial kitchen faucets (gpm - gallons per minute)	1.8 gpm; allows temporary override to 2.2 gpm		Hands-free in food prep area & in dish room of comm'l kitchen	Hands-free in food prep area & in dish room of comm'l kitchen			2.2 gpm

³ WaterSense requirement is 1.28 gpm maximum