



Water Use Reduction Additional Guidance

December 1, 2009 (Updated July 6, 2012)
Version 7

This guidance applies to Water Efficiency (WE) Prerequisite 1 and WE Credit 3 in LEED 2009 for New Construction, LEED 2009 for Schools, LEED 2009 for Core & Shell, LEED 2009 for Retail-NC and LEED 2009 for Healthcare. This also applies to WE Prerequisite 1 and WE Credit 1 in LEED 2009 for Commercial Interiors and LEED 2009 for Retail-CI, and WE Prerequisite 1 and WE Credit 2 in LEED 2009 for Existing Buildings: Operations & Maintenance. The guidance is a supplement to the prerequisite and credit forms listed above. It is suggested to refer to the appropriate Reference Guide for implementation and calculation information and become familiar with the associated forms before using this guidance.

Please note the Appendix A: LEED 2009 CI WEp1/c1 Addenda FAQ is applicable to LEED 2009 CI projects only.

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Fixture Groups

Fixture usage groups are subsets of the project building (or project space for LEED-CI) occupancy based on different types of fixtures and fittings. Creating a single usage group is the simpler approach and is suitable for many buildings, including those that have the same usage patterns across all fixtures. If the project team desires, a different fixture group may be specified for each unique usage pattern in the project building. For example, if fixture usage patterns are different on the first floor of the project building compared to other floors, enter a separate fixture group for the first floor. The fixture groups are **not** for specific fixtures or fixture fittings, but are for specific spaces or areas within the project depending on the distribution of occupancy.

Total Daily Uses Calculation

The following tables include the default fixture use rates that are used in the Baseline and Performance case water use calculations.

Table 1. Non-residential Default Fixture Uses

Fixture Type	Duration (sec)	Uses / Day			
		FTE	Transient	Retail Customer	Students ³
Water Closet (Female)	n/a	3	0.5	0.2	3
Water Closet (Male) ¹	n/a	1	0.1	0.1	1
Urinal (Female)	n/a	0	0	0	0
Urinal (Male)	n/a	2	0.4	0.1	2



Lavatory Faucet	30 ²	3	0.5	0.2	3
Shower	300	0.1	0	0	0
Kitchen Sink	15	1	0	0	0

¹ If urinals are not installed for the fixture usage group, then the Water Closet (Male) usage rates are the same as the Water Closet (Female).

² Default duration for the metering type /autocontrol faucet is 15 seconds for the baseline and 12 seconds for the design case

³ The Students occupancy type is for use with LEED for Schools ONLY.

Table 2. Residential¹ Default Fixture Uses

Fixture Type	Duration (sec)	Uses / Day
Water Closet (Female)	n/a	5
Water Closet (Male)	n/a	5
Lavatory Faucet	60	5
Shower	480	1
Kitchen Sink	60	4

¹ Residents, hospital inpatients, hotel guests, and prisoners must use the default residential fixture usage assumptions

The Total Daily Uses is a necessary value for determining the annual water consumption in the Flush and Flow Fixture data tables. The total daily uses value is an aggregate of the daily uses for various occupancy types represented in the selected fixture usage group. The table below is a snapshot of an example Flush Fixture Data table from the WEp1 form, and highlights the location of the Total Daily Uses value.

Table WEp1-3. Flush Fixture Data

Enter flush fixture data for each fixture group defined in Table WEp1-2 above. Click "Calculate" in the summary section of the table to perform the water savings calculations. "Calculate" must be clicked after any or all the data is entered in the table to refresh the calculated values and obtain accurate information.

Fixture Groups					Flush Rate (GPF)		Annual Water Consumption (kGal)			
Select	Display	Fixture ID ¹	Fixture Family	Fixture Type	Default	Total Daily Uses ²	Baseline	Installed ³	IPC/UPC Baseline	Performance Case
Sample Gr	Sample Grp	WC123	Water Closet	HET, Pressure Assist	<input checked="" type="checkbox"/>	200	1.6	1	80	50
Total calculated flush fixture water use annual volume, baseline case (kGal)									80	
Total calculated flush fixture water use annual volume, performance case (kGal)									50	
Percent reduction of water use in flush fixtures (%)									37.5	

Calculate

For water closets and urinals, the total daily use calculation takes into account the number of occupants in the fixture usage group, the default fixture uses (see tables 1 and 2 above), and the male/female ratio of the fixture usage group. For example, the water closet total daily uses for a fixture group with 100 total FTE occupants and a 50/50 male/female ratio would be calculated accordingly:

Example Total Daily Uses =

$$\left(\text{FTE} * \text{Male Ratio} * \text{Water Closet (male) uses/day} \right) + \left(\text{FTE} * \text{Female Ratio} * \text{Water Closet (female) uses/day} \right)$$

$$(100 * .5 * 1 \text{ use/day}) + (100 * .5 * 3 \text{ uses/day}) = \mathbf{200}$$



The default calculation assumes that both water closets and urinals are installed for each fixture usage group. If urinals are not included, the Total Daily Uses must be modified such that the water closet default uses per day are the same for both males and females. See the following example for a fixture usage group where urinals are not included.

Example Total Daily Uses (no urinals) =

$$\left(\text{FTE} * \text{Male Ratio} * \text{Water Closet uses/day} \right) + \left(\text{FTE} * \text{Female Ratio} * \text{Water Closet uses/day} \right)$$

$$(100 * .5 * 3 \text{ uses/day}) + (100 * .5 * 3 \text{ uses/day}) = \mathbf{300}$$

For lavatory faucets, showers, and kitchen sinks, the daily use calculation takes into account the number of occupants in the fixture usage group and the default fixture uses (see tables 1 and 2 above). For example the lavatory faucet total daily uses for a fixture group with 100 FTE and 30 retail customers would be calculated accordingly:

Example Total Daily Uses =

$$\left(\text{FTE} * \text{Lavatory faucet uses/day} \right) + \left(\text{Retail Customer} * \text{Lavatory faucet uses/day} \right)$$

$$(100 * 3 \text{ uses/day}) + (30 * .2 \text{ uses/day}) = \mathbf{306}$$

The total daily uses may be modified for special circumstances. To override the default value, uncheck the “Default” box and fill in the calculated value instead. Provide a narrative and upload daily use calculations to justify the modifications.

Dual Flush Toilet Flush Rate

The actual dual flush toilet flush rate should be entered in to the Flush Fixture Data table as a weighted average. This average must take into account the full-flush rate and low-flush rate of the dual flush water closet and the number of times the full flush and low flush would be used, and whether or not urinals are installed. For the female water closet usage, there is a 1:2 ratio in terms of number of full-flush to low-flush uses per day. For the male water closet usage, there is 1 full-flush usage per day; unless urinals are not installed in which case the full-flush/low-flush ratio is the same as for females.

In the example below, a dual flush toilet was installed with a 1.6 gpf full flush rate and 1.1 gpf low flush rate and male restrooms include urinals.

Example Average flow rate =

$$\frac{\left[\left(\text{Male full-flush uses/day} * \text{Full-flush rate} \right) + \left(\text{Female full-flush uses/day} * \text{Full-flush rate} \right) + \left(\text{Female low-flush uses/day} * \text{Low-flush rate} \right) \right]}{\left(\text{Male \& Female total uses/day} \right)}$$

$$[(1 \text{ use/day} * 1.6 \text{ gpf}) + (1 \text{ use/day} * 1.6 \text{ gpf}) + (2 \text{ uses/day} * 1.1 \text{ gpf})] / 4 \text{ uses/day} = \mathbf{1.35 \text{ gpf}}$$

This average flush rate would be entered in the Flush Fixture Data table in the “Flush Rate (GPF)” section of the form under the dual flush fixture type.

Residential projects must use a 1:2 ratio in terms of number of full-flush to low-flush uses per day.



In cases where the manufacturer’s specifications provide a different weighted average, it is acceptable to use the recommendation. Please upload the specifications or provide a narrative and calculations to explain how the weighted average flush rate was derived.

Blow-out Fixtures

Certain circumstances, such as institutional use or where there are existing piping limitations, may require the use of toilets that consume greater than 1.6 gallons per flush. In such circumstances, the “Blow-out fixture” option may be selected from the “Fixture Family” category of the Flush Fixture Data table. When selecting this option, be mindful that the 3.5 gpf baseline should also be used for the installed case; no water saving credit may be taken for reducing consumption from a blow-out fixture baseline. Additionally, projects may be asked to provide justification for using fixtures that consume greater than 1.6 gpf.

Public Metering/Autocontrol Lavatory Faucet – Gallons per Cycle Conversion

When using an autocontrol faucet with metering control or automatic fixture sensor, please select the Metering Lavatory fixture in the Fixture Type pull-down menu of the Flow Fixture Data table.

The Baseline case flow rate for a metering/autocontrol faucet is 0.25 gallons per cycle (gpc). Since the flow rate is measured in gallons per cycle, the duration is not necessary and is shown as “N/A”. The “Installed” flow rate must also be entered in gallons per cycle.

The gallons per cycle value must be determined through a separate conversion calculation and then entered into the table. The flow rate is determined using the flow rate in gallons per minute (gpm) and the duration setting (in seconds) for the metering faucet. When using metering or sensor faucet a default 12 second **duration of flow** representing the total of all run times during the hand washing process should be used, regardless of the faucet’s cycle time, which might be repeated during the process.

$$\text{Installed flow rate} = \frac{\text{Flow rate (gpm)} * \text{Duration (sec per cycle)}}{60 \text{ sec}}$$

Example Installed flow rate = 1.0 gpm * (12 sec / 60) = .2 gpc

Non-potable Water Use Calculations

Overall, the focus of Water Use reduction prerequisite and credit is water efficiency of the installed fixtures and fixture fittings regardless of the water source, but projects are still allowed to use on-site alternative sources of water to achieve water use reduction through an alternative compliance path. Retail and Healthcare projects may apply on-site non-potable water sources for fixtures and process water use reduction.

Examples of on-site non-potable water sources that apply to the Water Use Reduction prerequisite and credit include: graywater, captured rainwater, air conditioner condensate, cooling tower blow-down/bleed-off water as indicated in LI 5453 and LI 2163, reverse osmosis reject water as indicated in LI 10118, and foundation drain water (only if being pumped to keep the building dry) as indicated in LI 1923 and LI 1836.

All of these non-potable water sources must be on-site in order to qualify.

Sources of non-potable water that do not apply to the Water Use Reduction prerequisite and credit include: municipally treated wastewater (purple pipe water) as indicated in LI



1551, municipally supplied seawater as indicated in LI 1551 and LI 10212, water discharged from an open loop geothermal system as indicated in LI 2545, untreated water sourced from naturally occurring surface water bodies, such as streams, rivers, and lakes, and well water as indicated in LI 10013 and LI 456.

To document the use of on-site non-potable water to reduce water use for flush and flow fixtures, use the Alternative Compliance Path (ACP) section of the applicable LEED Online forms, WEp1 and/or WEc3 (WEc1 for CI and WEc2 for EBOM).

Complete the flush and flow fixture tables with the actual flush and flow rates to determine the total baseline and performance case water usage. In the ACP section, provide the annual amount of non-potable water being used for each flush and flow fixtures. The annual amounts of non-potable water should be subtracted from the annual flush and flow fixture performance case water usage. Then use the results to recalculate the percent reduction of water use for all fixtures.

Also provide additional documentation/calculations to support the savings claimed from on-site sources of non-potable water use (this may include but is not limited to plumbing drawings, calculations and system capacity to support quantities provided, and any analysis to confirm the availability of the non-potable water source).

Example Calculations

1. Subtract the non-potable water that will be used for flush and flow fixtures.

Total calculated flush fixture water use annual volume, performance case (kGal) – calculated in WEp1 form	150
Annual quantity of non-potable water use for flush fixtures (kGal)	60
Adjusted flush fixture water use annual volume, performance case (kGal) 150 kGal – 60 kGal	90

Total calculated flow fixture water use annual volume, performance case (kGal) – calculated in WEp1 form	150
Annual quantity of non-potable water use for flow fixtures (kGal)	0
Adjusted flow fixture water use annual volume, performance case (kGal) 150 kGal – 0 kGal	150

2. Determine the total adjusted performance case water use and then use this value to recalculate the percent reduction of water use in all fixtures

Total calculated fixture water use annual volume, baseline case (kGal) – calculated in WEp1 form	400
Adjusted total fixture water use annual volume, performance case (kGal) 90 kGal + 150 kGal	240
Percent reduction of water use in all fixtures (%) [(400 kGal – 240 kGal) / 400 kGal] * 100	40%



Gender Ratio Modifications

The default gender ratio for FTE in the water calculations is 50:50, male to female. Special circumstances may exist where an alternative ratio is justified. For such situations, provide a narrative and supporting documentation to account for the change. Modifications to the 50:50 ratio must be shown to apply *for the life of the building*. Acceptable special circumstances include:

1. **Projects specifically designed for an alternative gender ratio.** Examples of this could be a single gender educational facility or any project that can show that flush and flow fixtures have been distributed to account for the modified ratio. Project teams must provide documentation of the code-required plumbing fixture counts per gender, so the review team can verify that the flush-fixture ratio installed in the project supports the alternative gender ratio claimed.
2. **Projects expected to have alternative gender usage rates for the life of the building.** An example of this could be a military project. For such projects current staffing level or human resource data, alone, is not sufficient to justify a departure from the 50:50 ratio. Supporting documentation must include trend data forecasting forward that shows the unequal gender ratio will likely exist for the life of the building.



APPENDIX A: LEED 2009 CI WEp1/c1 Addenda FAQ

[LEED 2009 CI Rating System Addenda](#) was published in July 2010 for WE Prerequisite 1 and WE Credit 1. Below are frequently asked questions which will assist project teams with regard to application of the addenda and submittal requirements. This guidance applies to LEED 2009 CI projects ONLY.

1. Is my LEED 2009 CI project required to follow the LEED 2009 CI WE addenda published July 2010?

A project that is registered **after** July 19, 2010 will be required to follow the addenda and should upgrade to Version 4 of the form. If you have registered the project after Version 4 of the form is released, the project will automatically receive the updated WEp1 and WEc1 forms in LEED Online v3.

A project that was registered **before** July 19, 2010, is not required to follow the addenda, and therefore is required to include fixtures and fixture fittings that are installed or modified as part of the LEED-CI project's scope of work for both the Prerequisite and Credit. However, if the project team decides to voluntarily apply the addenda, there are instructions below in question 2 on how to complete the beta version or version 3.0 of the WEp1 and WEc1 forms.

For more information on form improvements and upgrading, [click here](#).

2. How do I do complete the beta version or version 3.0 of the WE Prerequisite 1 / WE Credit 1 forms when applying the LEED 2009 CI WE addenda (published July 2010) to my project?

First determine the project circumstances according to the following cases:

Case 1 - Fixtures and fixture fittings are located **only within the tenant space** to meet the needs of the tenant occupancy and there are none located outside the tenant space.

Case 2 - Fixtures and fixture fittings are located **only outside the tenant space** to meet the needs of the tenant occupancy and there are none located inside the tenant space.

Case 3 – Fixtures and fixture fittings are located **both within and outside the tenant space** to meet the needs of the tenant occupancy and water savings will be claimed for **all** fixtures and fixture fittings.

Case 4 – Fixtures and fittings are located **both within and outside the tenant space** to meet the needs of the tenant occupancy, however water savings is claimed **ONLY** for the fixtures and fixture fittings located **inside** the tenant space.

Once the project circumstances are identified, complete the form according to the following instructions:

Case 1 and Case 3 - Use the Special Circumstances section to describe the project circumstances. Complete the WE Prerequisite 1 form tables with the



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appropriate fixtures and fixture fittings as indicated by the project circumstances, which will also be reflected in the WE Credit 1 form.

Case 2 – The project is exempt from earning WE Prerequisite 1, so use the Alternative Compliance path section to describe the project circumstances. Include whether WE Credit 1 will be pursued for the fixtures and fixture fittings located outside of the tenant space. If WE Credit 1 is pursued complete the tables in WE Prerequisite 1 form for the fixtures/fittings located outside of the tenant space so that the water use reduction savings is reflected in the linked WE Credit 1 form. If WE Credit 1 is not being pursued, the tables in WE Prerequisite 1 form can be left blank.

Case 4 - Use the Special Circumstances section to describe the project circumstances. Complete the WE Prerequisite 1 form tables with the appropriate fixtures and fixture fittings as indicated by the project circumstances. In this case, the project is not eligible to achieve WE Credit 1 because they are not achieving water use reduction for all of the fixtures and fittings necessary to meet the needs of the occupants. Therefore the water use reduction reflected in the WE Credit 1 form is not valid, and there will be no points earned.