Part B: Product group definition | Commercial flushometer valves

Initiators	**TOTO USA** Visit an SM Transparency Report for commercial flushometer valves: http://www.sustainableminds.com/showroom/toto/
Other company(s) and organization(s) involved	**TOTO USA, Sloan Valve Company, Zurn Industries**

Product group

Name	**Commercial Flushometer Valves**	**CSI MasterFormat® #(s)**	22 42 43
Description Define the types of products included under this Part B	Flushometer valves intended for use with a toilet or urinal fixture as the dispensing unit for the water supplied		
New Part B request? Yes / No	No	**Is this an update to an existing Part B?** Yes / No	Yes
Validity date	12/13/2016 – 12/12/2021		
Existing PCRs, EPDs, SM TRs or LCAs This information will be used to identify additional rules for comparability and to substantiate the rationale for creating a Part B.	This Part B is an update to: http://www.sustainableminds.com/files/transparency/pgds/Part_B_Commercial_Flush_Valves_10.27.2015.pdf **Institut Bauen und Umwelt e.V.: PCR Guidance-Texts for Building-Related Products and Service From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), Part B: Requirements on the EPD for Bathroom fittings and showers. October 2013** www.bau-umwelt.de This European guidance document applies to bathroom fittings and showers. It does not contain any relevant additional rules specific to this product group.		
Any relevant literature and/or published material	Updated according to new research on the number of toilet flushes per year (in the Default life cycle stage scenario(s) section, references 1-4)		

Functional performance

Standard/certification	URL
Water consumption – EPAct 1992	http://www.ferc.gov/legal/maj-ord-reg/epa.pdf
Water consumption - WaterSense – urinal	http://www.epa.gov/WaterSense/docs/urinal_finalspec508.pdf
Functional performance – ASSE 1037	http://stores.assewebstore.com/asse-standard-1037-1990/

Functional / declared unit

Unit	**10 years of use of a flushometer valve for toilets and urinals in an average US commercial environment**
Rationale	• Product available and used in US market • 10 years is an industry accepted average lifespan that is based on the economic lifespan of a product; this is more limited due to changes in consumer preferences and innovations in water usage than the technical lifespan of the product. The valve lifespan is much greater with proper maintenance. Electrical and other hardware components, especially related to rubbers for water tight connections and moving parts, will require replacement beyond this timeframe. • Flushometer valves are intended for use with a toilet or urinal fixture as the dispensing unit for the water supplied

Additional rules for comparability

1. Clarification More product group specificity as needed	None
2. Add rules to Part A	Water and wastewater infrastructure are excluded.
3. Default life cycle stage scenario(s)	**Default use phase scenario in flushometer valves – toilet combination:** The flushometer valve with a toilet is assumed to be used in an average US commercial environment over a 10-year time period with an average of 51 flushes per day, 260 days per year. This number was derived by finding the number of flushes per toilet per day in a commercial environment from four different sources and calculating the average [1-4]. The toilet is assumed to be used 260 days per year (5 days a week for 52 weeks), which aligns with the days per year used in the WaterSense specification for urinals [5]. Any electricity used in flushometer valve operation is included. The volume of water per flush varies and depends on the specific product to which this Part B applies. **Default use phase scenario in flushometer valves – urinal combination:** The flushomter valve with a urinal is assumed to be used in an average US commercial environment over a 10-year time period with an average of 18 flushes per day, 260 days per year [5]. Any electricity used in flushometer valve operation is included. The volume of water per flush varies and depends on the specific product to which this Part B applies. **Electricity consumption for water supply and treatment:** Water usage in a commercial facility would also include electricity usage for acquisition, treatment and distribution of water to facilities and collection, conveyance and wastewater treatment of domestic wastewater. The Electric Power Research Institute (EPRI) published this type of data in a study on water and sustainability. EPA's data were used to establish weighted average composite factors, to obtain an electricity usage per gallon of water consumed. Use this table to calculate the electricity used for water supply and treatment:

Table: Average National Electricity Usage Factors

Activity	EPRI factors: kWh / MMgal[Note 1]	Weighted avg composite factors: kWh / MMgal
Acquisition, treatment and distribution of surface water by a Public Water System (PWS)	1,406	1,540[Note 2]
Acquisition, treatment and distribution of ground water by a PWS	1,824	
Self-supply of drinking water (typically pumping from private wells)	700	700
Collection, conveyance and < secondary treatment of domestic wastewater	661	1,399[Note 3]
Collection, conveyance and secondary treatment of domestic wastewater	1,212	
Collection, conveyance and advanced treatment of domestic wastewater	1,726	
Collection, conveyance and zero discharge/other treatment of domestic wastewater	400	
Total electricity per million gallons →		3,639
Total kWh electricity per 1 gallon →		**0.0036**

Note 1: Source: EPRI, Water & Sustainability (Volume 4): U.S. Electricity Consumption for Water Supply & Treatment -- The Next Half Century, March 2002.

Note 2: Source: U.S. Environmental Protection Agency (EPA), Office of Water (4606) Drinking Water Treatment, June 2004 http://water.epa.gov/lawsregs/guidance/sdwa/upload/2009_08_28_sdwa_fs_30ann_treatment_web.pdf. This document cites 68% of population served by PWSs relies on surface water while 32% relies on ground water.

Note 3: Source: U.S. Environmental Protection Agency (EPA), Clean Watersheds Needs Survey 2008 Report to Congress http://water.epa.gov/scitech/datait/databases/cwns/upload/cwns2008rtc.pdf. This report cites1.7% of POTW-served population receives < secondary treatment, 40.9% receives secondary treatment, 49.9% receives advanced treatment, and 7.5% receives zero discharge or other treatment.

[1] Harrison, Masaye. Flush: Examining the Efficacy of Water Conservation in Dual Flush Toilets. University of Oregon Department of Architecture. 2010. http://www.map-testing.com/assets/files/2010-commercial_dual-flush_toilet_study-harrison.pdf
This study shows 370 total flushes for 6 toilets, which totals 61 flushes per toilet per day.

[2] Arocha, J. and L. McCann. 2013. Behavioral Economics and the Design of a Dual-Flush Toilet. Journal of the American Water Research Association, 105 (2). http://www.awwa.org/publications/journal-awwa/abstract/articleid/35092845.aspx
The amount of flushes was measured for seven weeks in two women's restrooms. This was done during a July 4 summer period in a municipal building, so there were likely vacation days within the study period. However, it is conservative to include this data and to average 11 flushes per toilet per day.

[3] Gauley, B. & Koeller, J., 2010. Sensor-Operated Plumbing Fixtures, Do They Save Water? http://www.energy.ca.gov/appliances/2013rulemaking/documents/responses/Water_Appliances_12-AAER-2C/Sensor-Operated_Fixtures_Final_Report_March_2010_2013-06-03_TN-71101.pdf
This study looked at sensor operated fixtures in an office building. For a total of eight 1.6gpf toilets, they measured average daily water use of 654 gallons. This equates to 51 flushes per toilet per day.

[4] Koeller, J. (2011). High-Efficiency Plumbing Fixture Direct Install Water Savings Analysis. Santa Rosa, California: Sonoma County Water Agency. http://www.map-testing.com/assets/files/sonoma-final-report-rev1-2011-11-23(1).pdf
This study combines water savings for residential and non-residential toilets. For our purposes, Table 12 is relevant. For 335 1.6gpf toilets that were replaced with 1.28gpf toilets, the measured water savings per toilet is 25.8 gallons per day. This means these 335 toilets were flushed an average of 81 times per day (25.8/[1.6-1.28]).

[5] U.S. Environmental Protection Agency (EPA) WaterSense® Specification for Flushing Urinals Supporting Statement (Washington, DC, October 8, 2009) http://www.epa.gov/WaterSense/docs/urinal_suppstat508.pdf.
This supporting statement document cites 18 flushes per day, 260 days per year. Vickers, A, 2001.

Additional LCA calculation rules

N/A	Optional	Required	*Indicate whether compliance is the manufacturer's choice or required for SM TRs/EPDs. Refer to Part A: Compatibility appendices for content requirements.*
	X		**ISO 21930**
	X		**EN 15804**