



**Part B: Product group definition | Commercial flushometer valves | Part B #23-001**

This Part B conforms to the ACLCA PCR Open Standard version 1.0 (May 2022) at the following level:

1 – Transparency  2 – Procurement  3 – Data source

<b>Initiated by</b>	TOTO USA - <a href="https://www.totousa.com/">https://www.totousa.com/</a>		
<b>Working group members</b>	Jim Mellentine, Thrive ESG (PCR committee chair) Fernando Fernandez, TOTO USA Kyle Thompson, Plumbing Manufacturers International (PMI) Andrea Burr, NSF Danny Gleiberman, Sloan Morgan Keck, Zurn John Watson, International Association of Plumbing and Mechanical Officials (IAPMO) Tanya Kuehl, Kohler Ben Perreault, Bradley Corporation Jim Kendzel, American Supply Association Olivia Tsamparlis, Watts Water Beth Cassese, SCS Global Services		
<b>Public notices of development/outreach</b>	<ul style="list-style-type: none"> <li>Public notice on the Sustainable Minds website announcing the renewal of existing Part Bs on February 23, 2023: <a href="http://www.sustainableminds.com/transparency-report-program/part-b">http://www.sustainableminds.com/transparency-report-program/part-b</a></li> <li>Email blast on March 24, 2023 to mailing lists of LCA professionals, building and construction industry and trade associations, and manufacturers with published transparency documentation listed in the Transparency Catalog under the plumbing CSI MasterFormat® Division (22 00 00), requesting participation on the PCR committee.</li> <li>Email blast on January 9, 2024 to the same mailing lists requesting public comment.</li> </ul>		
<b>Non-participating parties</b>	All interested parties identified participated in the working group.		
<b>New Part B?</b>	No	<b>Part B version number</b>	3.0
<b>Publication date</b>	March 8, 2024		
<b>Validity period</b>	03/08/2024 – 03/07/2029		
<b>Expected renewal schedule</b>	Sustainable Minds intends to notify the working group and post update/renewal information on its website approximately four months prior to expiration to determine update, extension, or expiration options for this Part B.		

**Product group**

<b>Name</b>	Commercial flushometer valves	<b>CSI MasterFormat® #</b>	22 42 43
<b>Description</b>	Flushometer valves intended for use with a toilet or urinal fixture as the dispensing unit for the water supplied.		
<b>Exclusions</b>	This product group does not include toilets/urinals that are sold with a flushometer valve.		
<b>Geographic representativeness</b>	North America		

**Program operator responsibilities**

<b>Existing PCRs, EPDs, TRs, or LCAs</b>	<ul style="list-style-type: none"> <li>This Part B shall be used in conjunction with Sustainable Minds Part A: LCA calculation rules and report requirements, version 2023.</li> <li>This Part B is an update to: <a href="http://www.sustainableminds.com/files/transparency/pgds/Part_B_Product_Group_Definition_Commercial_Flushometer_Valves_072018.pdf">http://www.sustainableminds.com/files/transparency/pgds/Part_B_Product_Group_Definition_Commercial_Flushometer_Valves_072018.pdf</a></li> <li>Existing guidance: Plumbing Manufacturers International, 2018. Product Category Rule (PCR) Guidance for Kitchen and Bath Fixture Fittings v1.0.</li> <li>Existing PCR: UL Environment: Product Category Rules (PCR) Guidance for Building-Related Products and Services Part B: Kitchen and Bath Fixture Fittings and Accessory Products (Version 1.0) (see justification for new Part B below)</li> </ul>
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	<ul style="list-style-type: none"> <li>Underlying LCA: TOTO Sanitary Fittings Products LCA Background Report (public version), July 2016, <a href="https://transparencycatalog.com/assets/uploads/files/TOTO_Sanitary_Fittings_Products_LCA_Background_Report_public_version_July_2016.pdf">https://transparencycatalog.com/assets/uploads/files/TOTO_Sanitary_Fittings_Products_LCA_Background_Report_public_version_July_2016.pdf</a></li> </ul>
<b>Justification for new Part B if relevant non-expired PCR exists</b>	The first PCR for commercial flushometer valves was created by Sustainable Minds in 2015 and was updated in 2018 to include assumptions informed by the PMI PCR Guidance. A UL Environment PCR which included flushometer valves in its scope was later created in 2020. This Sustainable Minds PCR was used to create LCAs for several years prior to the publication of the UL Environment PCR, and its update enables users to continue using the same program.
<b>Harmonization activities pursued</b>	Sustainable Minds announced the creation of this product group definition to other program operators, LCA analysts, and manufacturers via email, and posted an update on its website. One related PCR found was UL Environment's Part B for kitchen and bath fixture fittings and accessory products. Sustainable Minds reached out to the program operator to inquire whether the PCR could be modified to exclude commercial flushometer valves, since the Sustainable Minds PCR was published and being used to create LCAs for several years before the UL Environment PCR was published. This method of harmonization was requested so as not to overlap in scope. No response was received by the time of publication of this Part B.

## Functional performance

Standard/certification (most recent edition, conformance not required for PCR conformance)	URL
Water consumption - <b>EPAct 1992</b>	<a href="https://afdc.energy.gov/files/pdfs/2527.pdf">https://afdc.energy.gov/files/pdfs/2527.pdf</a>
Water consumption – <b>WaterSense – urinal</b>	<a href="https://www.epa.gov/sites/default/files/2017-01/documents/ws-products-spec-urinals.pdf">https://www.epa.gov/sites/default/files/2017-01/documents/ws-products-spec-urinals.pdf</a>
Water consumption – <b>WaterSense – toilet</b>	<a href="https://www.epa.gov/sites/default/files/2017-01/documents/ws-products-spec-fv-toilets.pdf">https://www.epa.gov/sites/default/files/2017-01/documents/ws-products-spec-fv-toilets.pdf</a>
Functional performance - <b>ASSE 1037-2015/ASME A112.1037-2015/CSA B125.37-15</b>	<a href="https://webstore.ansi.org/standards/asse-sanitary/asse10372015asmea112csab12537">https://webstore.ansi.org/standards/asse-sanitary/asse10372015asmea112csab12537</a>

## System boundary

<b>System boundary</b>	<p>The type of EPD shall be specified as cradle to grave. The modules considered in the LCA shall be described in brief as per “System boundaries” outlined in SM Part A section 5.1. Module D may be optionally declared. It should be apparent as to what processes are considered in each module per the module descriptions in SM Part A section 6.</p> <p>While it is unclear whether capital goods and infrastructure are significant to the overall impacts of the products, it is known that different databases inconsistently account for these items in secondary data sets. To reduce possible artificial variation in EPD results across the product group, capital goods and system infrastructure flows shall be excluded from the system boundary by default, with justification required for alternative assumptions.</p>
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## Functional unit

<b>Unit</b>	<b>One flushometer valve for toilets (single flush and dual flush) and urinals used in an average commercial environment over the estimated service life of the building</b>
<b>Rationale</b>	<ul style="list-style-type: none"> <li>Products are available and used in the North American commercial market</li> <li>Flushometer valves are intended for use with a toilet or urinal fixture as the dispensing unit for the water supplied</li> </ul>

## Additional rules for comparability

<b>1. Additional rules to Part A</b>	<ul style="list-style-type: none"> <li>The construction of water and wastewater infrastructure are excluded.</li> <li>EPDs that use secondary data for any unit process that contributes 5% or more to any disclosed environmental impact category shall disclose the data source (database name and version, software type and version implemented, dataset name, dataset geography, and dataset allocation method). Materials considered confidential may be reported as “proprietary ingredient” along with the database name and version.</li> </ul>
<b>2. Default life cycle stage scenario(s)</b>	<p><b>Extraction and upstream production (A1)</b></p> <p>When materials used in the product are represented by secondary data, the manufacturing activities should reflect the source country or region to the extent possible. The electricity grid</p>

profile of the data set should be adapted to the source country or region, if known and possible with the selected data set. Average data sets with “Global” or “Rest of World” average electricity profiles may only be used if the material source location is unknown or adapting the electricity grid is not possible.

In cases when the EPD owner purchases manufactured components, the manufacturing process activity at the upstream supplier shall be counted in the extraction and upstream production stage, separate and in addition to the upstream raw material extraction. For example, if a manufacturer purchases a copper heating coil that fastens to a water heater, the coil cannot simply be represented by copper material alone. Additional manufacturing must be added to represent the manufacturing of raw copper into the coil part.

**Transport to factory (A2)**

In cases when the EPD owner maintains multiple suppliers for the same material or part, the life cycle inventory and impact assessment results shall reflect a weighted average transportation distance from the multiple suppliers for each mode of transport used. To simplify the calculation for those with many suppliers for the same material or part, suppliers which provide less than 5%, by mass or by volume, of a particular material or part may be excluded from the calculation of weighted average transport distance, subject to existing cut-off requirements in SM Part A.

If the location of a material/part supplier is unknown, a default distance of 1,243 miles (2,000 km) must be assumed unless otherwise justified.

**Transport to site (A4)**

Land transport: If primary data are unavailable, assume land transport distance in the destination country is 497 miles (800 km) by truck with an empty return trip of the same distance (994 miles (1,600 km) total). This includes transport to the final installation site if multiple transport legs are included.

Warehouse/distribution center and retail: Energy consumption in warehouses, distribution centers, and retail facilities during the course of transport to the final customer shall be omitted from the analysis.

**Installation (A5)**

The installation stage shall include, as applicable, any ancillary materials, electricity and/or water consumption (e.g., from tools or initial product testing by customer prior to first use), and disposal of product packaging waste and other waste materials.

**Building estimated service life and product reference service life**

This Part B uses a building estimated service life (ESL) of 75 years. All use stage activity and impacts shall be counted for the full ESL period.

The default reference service life (RSL) for a commercial flushometer valve shall be 10 years unless otherwise justified. If another RSL is used, justification shall include a guarantee by the signature of the most senior officer of the product manufacturer. The default 10-year RSL for the commercial flushometer valve is based on the useful life specified in PMI’s PCR Guidance. 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.

**Use or application of the installed product (B1)**

Any activity related to product use and not included in stages B2-B7 shall be included in this stage.

**Maintenance (B2)**

Commercial flushometer valves require periodic cleaning, and the following schedule of maintenance and corresponding quantities shall be used unless primary data or product usage guides are available to justify alternative assumptions.

**Table 1. Maintenance activities for commercial flushometer valve**

Activity (as applicable)	Frequency	Assumptions per event
Cleaning of flushometer valve	Daily, 260 days per year	0.338 fl oz (10 mL) of a 1% sodium lauryl sulfate solution.

### **Repair (B3)**

Repair data is not widely available for this product category and is not expected to be part of normal usage. Zero activity may be assumed for this stage unless otherwise justified by the manufacturer's product specifications.

### **Replacement (B4)**

Replacements for the duration of the ESL for the commercial flushometer valve must be counted proportionally to the nearest tenth of a product. For example, if the default RSL of 10 years is used, then 6.5 replacement products (65 remaining years in the ESL divided by 10-year RSL) must be included. Replacements must include the sum of impacts from stages A1-A5 and C1-C4 multiplied by the number of replacements.

### **Refurbishment (B5)**

Refurbishment is not expected to occur in the normal operation of the product. Zero activity may be assumed for this stage unless otherwise justified.

### **Operational energy use (B6)**

Electricity directly used by the flushometer valve operation shall be included in this stage. Electricity used for stand-by electricity (if any) and other product functions must be counted in the consumption of electricity. Unless otherwise justified, the following use stage assumptions shall be used when calculating the impacts from operational energy use.

- The electricity grid mix used to model the use stage energy shall be a weighted average country-level mix based on the share of sales to one or more countries. The grid mix shall be based on low-voltage consumption and include transmission and distribution losses. The mix shall be based on the latest data available from applicable national government disclosures or the latest version of the Energy Institute's Statistical Review of World Energy<sup>1</sup>.
- Though many countries have goals to further decarbonize their electricity grid mix over time, actual implementation rates are uncertain and therefore the use-stage electricity shall not account for anticipated future grid mix changes.
- The flow rate of water will be defined by each product. For commercial flushometer valves intended for use with a single flush toilet or urinal, the flush volume is product defined. For all uses, 100% cold water use shall be assumed.
- The number of uses per day shall be the following:
  - Single flush toilet combination: 90 flushes per day, 260 days per year. This equates to 23,400 flushes per year and 1,755,000 flushes over 75 years.
  - Dual flush toilet combination: 90 flushes per day, 260 days per year. This equates to 23,400 flushes per year and 1,755,000 flushes over 75 years. Of these flushes, 60 flushes per day are reduced flushes (liquid waste) and 30 flushes per day are full flushes (solid waste).
  - Urinal combination: 60 flushes per day, 260 days per year. This equates to 15,600 flushes per year and 1,170,000 flushes over 75 years.

### **Operational water use (B7)**

Water used to flush the toilet/urinal shall be included in this stage. Unless otherwise justified, the following use stage assumptions shall be used when calculating the impacts from operational water use.

- Incoming water is unfiltered municipal tap water. If the commercial flushometer valve requires incoming water to be pre-filtered, the relevant filtration activity shall be included.
- The flow rate of water will be defined by each product. For commercial flushometer valves the flush volume is product defined. For all uses, 100% cold water use shall be assumed.
- The number of uses per day shall be the following:
  - Single flush toilet combination: 90 flushes per day, 260 days per year. This equates to 23,400 flushes per year and 1,755,000 flushes over 75 years.
  - Dual flush toilet combination: 90 flushes per day, 260 days per year. This equates to 23,400 flushes per year and 1,755,000 flushes over 75 years. Of these flushes, 60 flushes per day are reduced flushes (liquid waste) and 30 flushes per day are full flushes (solid waste).
  - Urinal combination: 60 flushes per day, 260 days per year. This equates to 15,600 flushes per year and 1,170,000 flushes over 75 years.

- Municipal water and sewer systems vary in energy consumption. To improve consistent reporting and reduce artificial variation in use stage results, the following values for water distribution and wastewater collection and treatment shall be used. The Electric Power Research Institute (EPRI) published this data in a study on water and sustainability. Data from the U.S. Environmental Protection Agency (EPA) were used to establish weighted average composite factors, to obtain an electricity usage per gallon of water consumed. Use the value generated in this table to calculate the electricity used for water supply and treatment. The same electricity grid mix(es) used in B6 shall also be used in B7.

**Table 2. Average national electricity usage factors**

Activity	EPRI factors: kWh / MMgal <sup>Note 1</sup>	Weighted avg. composite factors: kWh / MMgal
Acquisition, treatment, and distribution of surface water by a Public Water System (PWS)	1,406	1,540 <sup>Note 2</sup>
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 <sup>Note 3</sup>
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
<b>Total kWh electricity per 1 gallon →</b>		<b>0.00364</b>
<b>Total kWh electricity per 1 liter →</b>		<b>0.000961</b>

**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  
[https://transparencycatalog.com/assets/uploads/files/2009\\_08\\_28\\_sdwa\\_fs\\_30ann\\_treatment\\_web.pdf](https://transparencycatalog.com/assets/uploads/files/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 2012 Report to Congress. [https://www.epa.gov/sites/default/files/2015-12/documents/cwns\\_2012\\_report\\_to\\_congress-508-opt.pdf](https://www.epa.gov/sites/default/files/2015-12/documents/cwns_2012_report_to_congress-508-opt.pdf). This report cites 1.7% of POTW-served population receives < secondary treatment, 38.0% receives secondary treatment, 53.6% receives advanced treatment, and 6.7% receives zero discharge or other treatment.

[1] Plumbing Manufacturers International (PMI), Product Category Rule (PCR) Guidance for Kitchen and Bath Fixture Fittings <https://www.safeplumbing.org/files/safeplumbing.org/documents/resources/PMI-Kitchen-and-Bath-Fixture-Fitting-PCR-Guidance-Document.pdf>.

### **Deconstruction/demolition (C1)**

In the absence of primary data, the EPD owner may assume that the commercial flushometer valve reaches its end of life separately from the building and is manually removed using

<sup>1</sup> Energy Institute. Statistical Review of World Energy. Electricity generation by fuel, country-level. <https://www.energyinst.org/exploring-energy/statistical-review>

	<p>common hand tools. As such, energy or material inputs may be assumed zero for this stage unless otherwise justified.</p> <p><b><u>Transport to waste processing or disposal (C2)</u></b></p> <p>In the absence of primary data, EPD owners shall assume the product is transported 100 km via diesel-powered truck/trailer from the building site to the waste processing/disposal site.</p> <p><b><u>Waste processing (C3)</u></b></p> <p>In the absence of primary data, the default assumption is that 100% of products are disposed in a sanitary landfill at end of life. In that case no waste processing activity is applicable in this stage. Justifications for other end-of-life pathways, such as recycling, refurbishment, or other pathway in a product take-back program require evidence such as documentation of the program and documented number or share of units sold that participate in the program.</p> <p><b><u>Waste disposal (C4)</u></b></p> <p>The EPD owner shall assume 100% disposal in a sanitary landfill unless otherwise justified as described in C3 above. Landfill processes shall be modeled based on the mass of distinct materials in the commercial flushometer valve and availability of secondary data to model those materials.</p> <p><b><u>Benefits and loads beyond the system boundary (D), Optional</u></b></p> <p>Since the default end-of-life assumption is 100% landfill, there are no anticipated burdens or benefits beyond the system boundary. However, if alternative end-of-life pathways are justified, such benefits and burdens may be reasonably quantified or qualitatively described in this stage.</p>
<b>3. Additional data quality requirements</b>	No additional data collection specifications or data quality requirements were identified.

### Additional LCA calculation rules

N/A	Optional	Required	Indicate whether conformance is the manufacturer's choice or required for TRs/EPDs.
		X	ISO 21930: conformance is required by construction product manufacturers

### Industry-average EPD requirements

<b>Requirements</b>	Industry-average EPDs shall not be developed using this PCR.
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### Part B development information

<b>Part B review panel</b>	<p>This Part B was reviewed for conformance to ISO 14025, ISO 21930:2017, and ACLCA PCR Open Standard v1.0 by the following parties:</p> <table border="0"> <tr> <td>Hugues Imbeault-Tétreault, ing., M.Sc.A. Chair Groupe AGÉCO hugues.i-tetreault@groupeageco.ca</td> <td>Rebe Feraldi, LCACP, CLAR TranSustainable Enterprises, LLC lcacp@transustainable.com</td> <td>Rifat Karim Sphera RKarim@sphera.com</td> </tr> </table>	Hugues Imbeault-Tétreault, ing., M.Sc.A. Chair Groupe AGÉCO hugues.i-tetreault@groupeageco.ca	Rebe Feraldi, LCACP, CLAR TranSustainable Enterprises, LLC lcacp@transustainable.com	Rifat Karim Sphera RKarim@sphera.com
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<b>Open consultation</b>	Sustainable Minds solicited public comments on this Part B from January 9, 2024 – February 8, 2024. This consultation period and list of parties to submit comments were made available to the review panel.			
<b>Update justification</b>	This Part B was updated upon consideration of manufacturers looking to create new TRs/EPDs beyond the validity period of the previous version of the PCR.			
<b>Conflict statement</b>	Funding sources used to develop this Part B were disclosed to the working group during the development process. The policies identified in Sustainable Minds' Program Governance were followed to identify and resolve any potential conflicts of interest.			
<b>Sustainable Minds information</b>	<p>This Part B was developed by Sustainable Minds and participating interested parties according to the Sustainable Minds Program Governance available at <a href="http://www.sustainableminds.com/transparency-report-program/how-it-works">http://www.sustainableminds.com/transparency-report-program/how-it-works</a>.</p> <p>For questions about this or another Part B, to submit comments on this Part B, or to obtain a template for developing a transparency report, contact us using the information on the following page: <a href="http://www.sustainableminds.com/contact-us">http://www.sustainableminds.com/contact-us</a>.</p>			