Water Connects Us®

VERIFIED by SCS GLOBAL SERVICES ENVIRONMENTAL PRODUCT DECLARATION BASED ON LCA

Declaration Owner

Sloan Valve Company
10500 Seymour Avenue, Franklin Park, IL 60131
P: 847.671.4300 / 800.982.5839 · www.sloan.com

Product

Sloan Sensor Diaphragm Flushometers

Functional Unit

Sensor operated diaphragm flushometers are intended for use with toilet or urinal fixtures as the dispensing unit for the water supplied. These fixtures are primarily installed in the commercial environment including commercial buildings, airports, stadiums, healthcare, hospitality sectors, etc. The functional unit is defined as "10 years of use of a flush valve (or flushometer) for toilets and urinals in an average US commercial environment". The lifespan of 10 years is an industry accepted average lifetime that is based on the economic lifespan of a product. However, the flushometer lifespan may well greatly exceed 10 years with proper maintenance.

The scope of this EPD is Cradle-to-Grave.

EPD Number and Period of Validity

SCS-EPD-04676
EPD Valid October 2, 2017 through October 1, 2022

Product Category Rule

Part A: LCA Calculation Rules and Report Requirements v2017; Sustainable Minds (January 2017).

Part B: Product Group Definition | Commercial Flushometer Valves Product Group v3.0; Sustainable Minds (December 13, 2016).

Program Operator

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com

Table of Contents

Disclaimers: This Environmental Product Declaration (EPD) conforms to ISO 14025, 14040, ISO 14044, and ISO 21930.

Scope of Results Reported: The PCR requirements limit the scope of the LCA metrics such that the results exclude environmental and social performance benchmarks and thresholds, and exclude impacts from the depletion of natural resources, land use ecological impacts, ocean impacts related to greenhouse gas emissions, risks from hazardous wastes and impacts linked to hazardous chemical emissions.

Accuracy of Results: Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.

Comparability: The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.

PCR review, was conducted by	Part B PCR review conducted by the SM TAB, tab@sustainableminds.com	
Approved Date: October 2, 2017 – End Date: October 1, 2022		
Independent verification of the declaration and data, according to ISO 14025:2006 and ISO 21930:2007	☐ internal	☑ external
Third party verifier	Tom Gloria, PhD, Industrial Ecology Consultants	

PRODUCT

The following sensor flushometers are represented by this EPD:

SLOAN Sensor Flushometers			
Water Closets		Urinals	
Model #	Flush Volume	Model #	Flush Volume
ECOS 8111-1.6/1.1*	(1.28 gpf / 4.8 Lpf)	ECOS 8186-0.125	(0.125 gpf/ 0.5 Lpf)
ECOS 8111-1.1	(1.11 gpf / 4.2 Lpf)	ECOS 8186-0.125 L	(0.125 gpf/ 0.5 Lpf)
ECOS 8111-1.28	(1.28 gpf / 4.8 Lpf)	ECOS 8186-0.25	(0.25 gpf/ 1.0 Lpf)
G2 OPTIMA PLUS 8111-1.28	(1.28 gpf / 4.8 Lpf)	ECOS 8186-0.5	(0.5 gpf/ 1.9 Lpf)
G2 OPTIMA PLUS 8113-1.28	(1.28 gpf / 4.8 Lpf)	ECOS 8186-0.5 L	(0.5 gpf/ 1.9 Lpf)
G2 OPTIMA PLUS 8115-1.28	(1.28 gpf / 4.8 Lpf)	G2 OPTIMA PLUS 8186-0.5	(0.5 gpf/ 1.9 Lpf)
G2 OPTIMA PLUS 8116-1.28	(1.28 gpf / 4.8 Lpf)	G2 OPTIMA PLUS 8186-0.5 E	(0.5 gpf/ 1.9 Lpf)
SOLIS 8111-1.1	(1.11 gpf / 4.2 Lpf)	SLOAN 8186-0.125	(0.125 gpf/ 0.5 Lpf)
SLOAN 8111-1.28	(1.28 gpf / 4.8 Lpf)	SLOAN 8186-0.5	(0.5 gpf/ 1.9 Lpf)
SOLIS 8111-1.28 SINGLE FLUSH	(1.28 gpf / 4.8 Lpf)	SLOAN 8186-0.5 DFB	(0.5 gpf/ 1.9 Lpf)
SOLIS 8111-1.6/1.1 DUAL FLUSH*	(1.28 gpf / 4.8 Lpf)	SOLIS 8186-0.125 SINGLE FLUSH	(0.125 gpf/ 0.5 Lpf)
SOLIS 8113-1.6 /1.1 DUAL FLUSH*	(1.28 gpf / 4.8 Lpf)	SOLIS 8186-0.25 SINGLE FLUSH	(0.25 gpf/ 1.0 Lpf)
SOLIS 8115-1.6 /1.1 DUAL FLUSH*	(1.28 gpf / 4.8 Lpf)	SOLIS 8186-0.5 SINGLE FLUSH	(0.5 gpf/ 1.9 Lpf)

*Dual flush flushometer, with 1.6 gpf/ 6.1 Lpf (regular flush) and 1.1 gpf/ 4.2 Lpf (reduced flush) options.

PRODUCT DESCRIPTION

Sensor flushometers are precision metering valves designed to deliver a preset volume of water to a sanitary fixture (i.e., toilets and urinals). These are automatic flushometers with the following features:

ECOS

- Automatically activates by means of an infrared sensor with multi-focused lobular sensing fields
- Automatically initiates a 1.1 gpf or 1.6 gpf flush based on how long use remains in sensor range
- Buttons on top of the flush valve enable manual flushing with a standard or reduced flush at restroom visitor's discretion
- Fixed metering bypass and no external volume adjustment to ensure water conservation

G2

- Automatically operates by means of an infrared sensor with multiple-focused lobular sensing fields for high and low target detection
- User friendly, three-second flush delay and Courtesy Flush® override button
- Adjustable tailpiece
- Available in low consumption (1.6 gpf/6.0 Lpf), water saver (3.5 gpf/13.2 Lpf), and high efficiency (1.28 gpf/4.8 Lpf) models

SOLIS

- Automatically operates by means of an infrared sensor with multiple-focused lobular sensing fields for high and low target detection
- User friendly, three-second flush delay and Courtesy Flush® override button
- Adjustable tailpiece
- Available in low consumption (1.6 gpf/6.0 Lpf), water saver (3.5 gpf/13.2 Lpf), and high efficiency (1.28 gpf/4.8 Lpf) models

SLOAN

- Flush volumes start as low as 1.6 gpf/6.0 Lpf
- Water conservation is aided by the ADA-compliant, non-hold-open handle, which prevents toilet from exceeding intended flush volume
- Flush accuracy is controlled by CID™ technology, also enhancing water efficiency
- Integrity of the product is maintained with the vandal-resistant stop cap

MATERIAL RESOURCES

The material composition and availability of raw material resources of the sensor flushometers are shown in Table 1. Information on product packaging is shown in Table 2.

Table 1. *Material composition (in % of mass) of sensor flushometers.*

Material	% Mass	Availability			
		Renewable	Non-Renewable	Pre-Consumer Recycled Content	Post-Consumer Recycled Content
Brass	67%		Yes	53%	0%
Silicone	11%		Yes	0%	0%
Plastic combined with zinc and rubber	11%		Yes	0%	0%
Rubber	2.0%	Yes		0%	0%
Celcon	1.1%		Yes	0%	0%
EPDM	1.1%		Yes	0%	0%
Glass	1.0%		Yes	0%	0%
ABS	1.0%		Yes	0%	0%
Stainless Steel	0.84%		Yes	0%	0%
Zamak	0.74%		Yes	0%	0%
Battery AA	0.62%		Yes	0%	0%
Polycarbonate	0.50%		Yes	0%	0%
Polypropylene	0.50%		Yes	0%	0%
HDPE	0.45%		Yes	0%	0%
Copper	0.41%		Yes	0%	0%
Other	<1%		Yes	0%	0%
TOTAL	100%				

Table 2. *Material composition (in % of mass) of packaging for sensor flushometers.*

Material	% Mass	Availability			
		Renewable	Non-Renewable	Pre-Consumer Recycled Content	Post-Consumer Recycled Content
Cardboard	90%	Yes		0%	30%
Paper pulp	8.2%	Yes		0%	0%
HDPE	0.54%		Yes	0%	0%
Paper with printing ink	0.52%	Yes	Yes	0%	0%
Post-consumer paper with soy ink	0.26%	Yes		0%	0%
TOTAL	100%				

ADDITIONAL ENVIRONMENTAL INFORMATION

The sensor flushometer line continues the legacy of Sloan's Royal flushometers. Our SOLIS, ECOS and Sloan sensor flushometers all start in Boston at our West Newton facility. The sensor is assembled and tested by a skilled workforce and shipped to Chicago were it is mated with the valve portion of the product. All Sloan flushometers are built in the USA by our workforce with an average employment of over 19 years.

All of our flushometers are made from highly recycled materials, and have become the benchmark for quality, performance and sustainability in the commercial plumbing industry. The brass casting alloy is created from 99% recycled sources such as an old car part, boat propeller or old plumbing materials. Sloan utilizes reclaimed brass as a way to preserve the environment by reducing or eliminating the need to mine virgin material from the earth. A large portion of the flushometer is also recyclable. This means that after the effective life of the product, often the life of the building itself, Sloan flushometers can be recycled and turned into new products.

All the sensor flushometers within this EPD are also Watersense labeled. Developed in 2006 the EPA WaterSense program was created to certify water using products that are more than 20% more efficient than the baseline without sacrificing performance.

Sloan is a proud member of the United States Green Building Council (USGBC) and through the use of the Leadership in Energy and Environmental Design (LEED) Green Building Rating System, Sloan recognizes and validates the importance of best-in-class building strategies and practices of high performing green buildings. Sloan's flushometers within this EPD can be used to help achieve water efficiency goals as well as gaining USGBC LEED v4 Materials and Resources points and/or complying with CAL Green and other building codes.

LIFE CYCLE ASSESSMENT OVERVIEW

The system boundary is cradle-to-grave and includes resource extraction and processing, product manufacture and assembly, distribution/transport, use and maintenance, and end-of-life. The diagram below illustrates the life cycle stages included in this EPD.

Product			Construction Process		Use							End-of-Life				Benefits & Loads Beyond the System Boundary
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw Material Extraction and Processing	Transport to the Manufacturer	Manufacturing	Transport	Construction – Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery, and/or recycling potential
X	X	X	X	X	NR	X	X	NR	NR	NR	X	X	X	X	X	MND

X = Included, MND = module not declared, NR = not relevant

The following provides a brief overview of the Modules included in the product system for Sloan® sensor flushometers.

Module A1 Raw material extraction and processing, processing of secondary material inputs for sensor flushometers

This module includes the potential environmental impacts associated with the extraction and processing of raw materials for various component parts in the sensor diaphragm flushometer. The brass components are one of the primary materials, comprising of at least 67% of the flushometer product composition. The impacts from the following processes were considered for brass component processing:

Brass Ingot Production from Scrap Metal

A large proportion of raw material for brass components are sourced in the form of brass ingots from a U.S. based secondary smelter and scrap metal refiner. Scrap metal is sorted into grades depending on the purity and the scrap is subsequently melted down into molten brass in gas-fired rotary furnace and poured into molds to produce brass ingots. The brass ingots are then transported to the U.S. based sand casting facility for further processing.

Sand Casting of Brass Components

The brass ingots are sand cast depending on the design specification of the component parts in the flushometers.

Module A2: Transportation

This module includes transportation of the sand cast brass components to the Chicago based Sloan manufacturing facility. This also includes the transportation of all other components (such as plastics, stainless steel, synthetic rubber, etc.) from the suppliers to the facility, as well as the components for the sensor module to the facility in West Newton, Massachusetts.

Module A3: Manufacture of Sensor flushometer

The brass component parts are polished and plated at the Chicago based manufacturing facility. The sensor module is manufactured at the West Newton based facility and subsequently transported to the Chicago facility. Sensor flushometer products are then assembled and packaged.

Module A4: Transportation & Delivery to the site

This module includes the impacts associated with transportation of finished sensor flushometers to the U.S. based distribution center and the subsequent delivery to the installation site.

Module A5: Construction & Installation

The installation of sensor flushometers is performed with hand tools and does not require any ancillary material input. This module considers the impacts associated with waste processing and disposal of product packaging waste generated during the installation process.

Module B1: Normal use of the product

This module includes environmental impacts arising through normal anticipated use of the product. This module is not applicable because the anticipated use of the flushometer is accounted for in Module B7: Operational water use.

Module B2: Maintenance

This module considers the impacts associated with cleaning and maintenance of the product over a 10-year period. Typical cleaning involves wiping the flushometer with a damp cloth. For a more thorough cleaning, the manufacturer recommends using a mild soap diluted in water. For the EPD, cleaning of the flushometer is assumed to occur each week for a period of 10 years. Additionally, waste processing and disposal related to these maintenance activities are included in this module.

Module B3: Repair

This module includes any anticipated repair events during the reference service of the flushometers. Some parts of the sensor flushometer require replacement up to two times over a 10 year period. This module considers the impacts associated with the production and transportation of components required for product maintenance.

Module B4-B5: Replacement and refurbishment

These modules include anticipated replacement or refurbishment events during the reference service life associated with replacing a whole product (Module B4) and restoration of parts to a condition in which the products can perform its required function (Module B5). These modules are not applicable to sensor flushometers as these products are not expected to be replaced as a whole product over a 10 year period. The replacement of certain worn out parts are considered as repair in Module B3.

Module B6: Operational Energy Use

This module is not applicable because the sensor flushometer is battery operated and/or equipped with a solar panel to capture and store power. There is no primary energy consumption associated with these products.

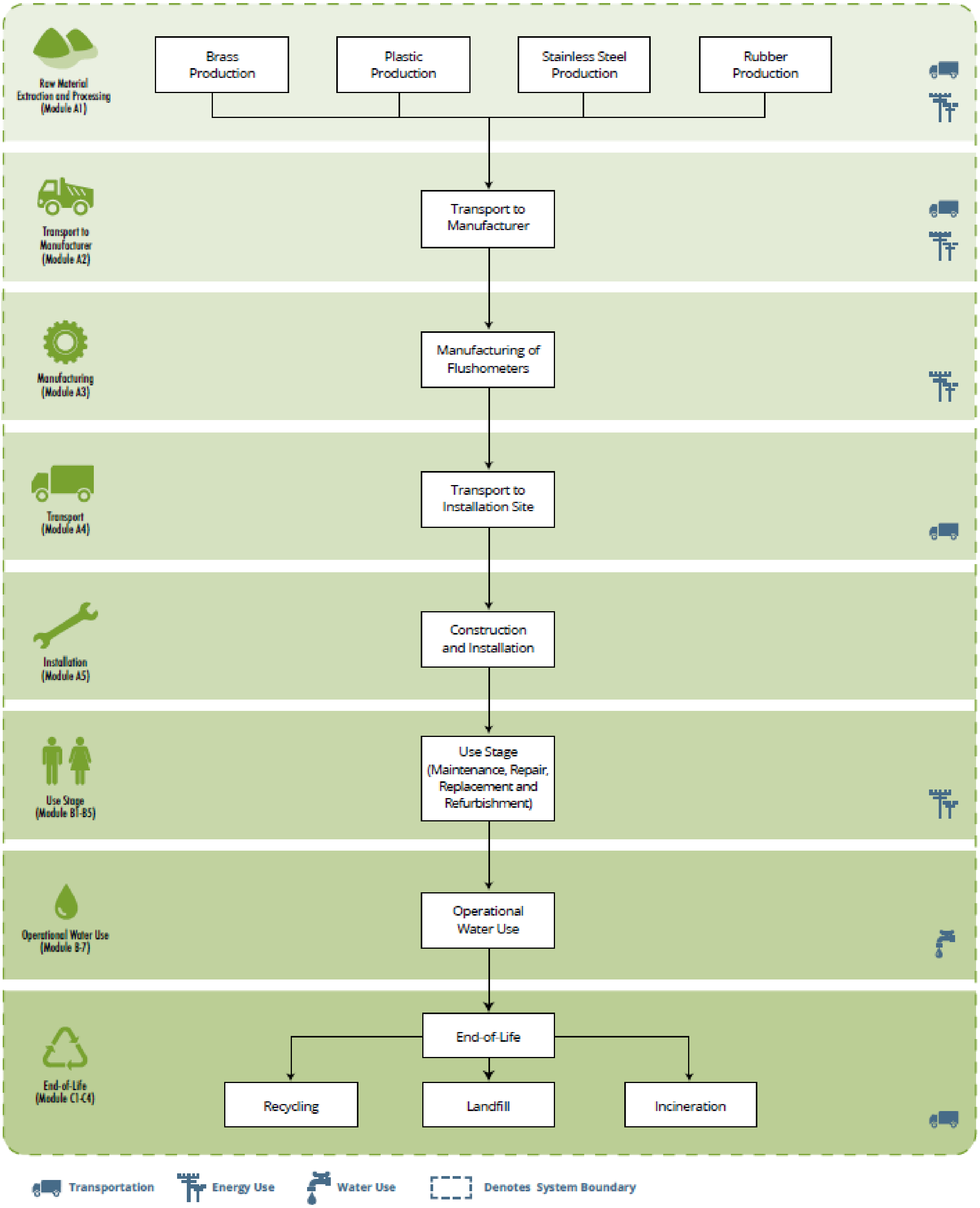
Module B7: Operational Water Use

This module includes water use during the operation of the product, together with its associated environmental aspects and impacts considering the life cycle of water which includes production, delivery, and wastewater treatment. Impacts were calculated depending on the water use (gallons per flush) specifications of sensor flushometers.

Module C1-C4: End-of-Life The end-of-life stage of the product starts when it is replaced, dismantled or deconstructed from the building. Impacts for deconstruction and dismantling processes were not modeled in the LCA as it is a manual process with hand tools, and does not require any energy input for removal of the product. The impacts associated with transportation of waste materials to processing facilities, waste processing of material components and waste disposal of the product are included in these modules.

PROCESS FLOW DIAGRAM

The diagram below is a representation of the most significant contributions to the production for sensor flushometers. The following life cycle stages are included: production (Modules A1-A3); construction & installation (Module A4-A5); product use (Modules B1-B7); and end-of-life (Modules C1-C4).



LIFE CYCLE IMPACT ASSESSMENT

Life cycle impact assessment is the process of converting the life cycle inventory results into a representation of potential environmental and human health impacts. For example, emissions of carbon dioxide, methane, and nitrous oxide (inventory data) together contribute to climate change (impact assessment). The impact assessment for the EPD is conducted in accordance with the requirements of the Product Category Rule (PCR). Impact category indicators were estimated using TRACI v2.1 characterization method, including Global Warming Potential (100 year time horizon), Acidification Potential, Eutrophication Potential, Smog formation, Ozone Depletion Potential, and Fossil Fuel Depletion Potential.

Table 3. *Results for 10 years of use of a sensor flushometer.*

Impact Category	Production			Construction & Installation		Use			End-of-Life			
	Raw Material Extraction/ Processing	Transport to the Manufacturer	Manufacturing	Transportation	Installation	Maintenance	Repair	Operational Water Use	Demolition	Transportation	Waste Processing	Disposal
	A1	A2	A3	A4	A5	B2	B3	B7	C1	C2	C3	C4
Ecological Indicators												
Acidification (kg SO_2 eq)	0.84	5.7×10^{-3}	3.6×10^{-2}	1.5×10^{-2}	5.5×10^{-4}	2.3×10^{-3}	9.3×10^{-2}	See Table 4	0.0	8.8×10^{-4}	2.0×10^{-3}	5.4×10^{-4}
Eutrophication (kg N eq)	1.4	9.0×10^{-4}	2.3×10^{-2}	3.7×10^{-3}	2.5×10^{-3}	4.5×10^{-3}	5.4×10^{-2}		0.0	1.2×10^{-4}	1.6×10^{-3}	2.0×10^{-2}
Global Warming (kg CO_2 eq)	36	0.72	7.5	3.3	0.47	0.82	17		0.0	0.15	0.51	1.6
Ozone Depletion (kg CFC-11 eq)	3.0×10^{-6}	1.3×10^{-7}	3.6×10^{-7}	6.1×10^{-7}	1.5×10^{-8}	2.6×10^{-8}	1.4×10^{-6}		0.0	2.8×10^{-8}	2.4×10^{-8}	9.2×10^{-9}
Human Health Indicators												
Smog (kg O_3 eq)	3.8	0.11	0.33	0.36	1.3×10^{-2}	2.6×10^{-2}	0.94	See Table 4	0.0	2.4×10^{-2}	2.3×10^{-2}	8.8×10^{-3}
Resource Depletion												
Fossil Fuel Depletion (MJ surplus)	56	1.5	6.7	7.2	0.17	0.22	35	See Table 4	0.0	0.33	0.35	0.11

The operational use phase (Module B7) considers the volume of water required per flush, the embedded energy required for water supply and flushometer operation, distribution and wastewater treatment, and the number of flushes over a 10-year period. The volume required per flush (expressed in terms of gallons per flush) varies depending on the design specification of the sensor flushometers for toilet and urinal fixtures.

Table 4. *Results for Module B7: Operational Water Use scenarios for toilet fixtures (51 flushes per day over 10 year period) and urinal fixtures (18 flushes per day over 10 year period).*

Impact Category	USE SCENARIO FOR B7: Operational Water Use				
	TOILET FIXTURES (51 flushes per day over 10 years)		URINAL FIXTURES (18 flushes per day over 10 years)		
	1.1 gpf	1.28 gpf	0.125 gpf	0.25 gpf	0.5 gpf
Ecological Indicators					
Acidification ($kg\ SO_2$ eq)	1.3	1.5	5.1×10^{-2}	0.10	0.23
Eutrophication (kg N eq)	2.8	3.2	0.11	0.22	0.50
Global Warming ($kg\ CO_2$ eq)	340	400	14	28	62
Ozone Depletion (kg CFC-11 eq)	2.9×10^{-5}	3.3×10^{-5}	1.1×10^{-6}	2.3×10^{-6}	5.1×10^{-6}
Human Health Indicators					
Smog ($kg\ O_3$ eq)	8.8	10	0.35	0.70	1.6
Resource Depletion					
Fossil Fuel Depletion (MJ surplus)	260	300	10	21	47

ADDITIONAL ENVIRONMENTAL PARAMETERS

ISO 21930 requires that several parameters be reported in the EPD, including resource use, waste categories and output flows, and other environmental information. The results for these parameters are shown in Table 5 and Table 6.

Table 5. *Results for 10 years of use of a sensor flushometer by module. Results representing energy flows are calculated using lower heating (i.e., net calorific) values.*

Impact Category	Production			Construction & Installation		Use			End-of-Life			
	Raw Material Extraction/ Processing	Transport to the Manufacturer	Manufacturing	Transportation	Installation	Maintenance	Repair	Operational Water Use	Demolition	Transportation	Waste Processing	Disposal
	A1	A2	A3	A4	A5	B2	B3	B7	C1	C2	C3	C4
Non-hazardous waste disposed (kg)	12	0.41	0.75	2.4	0.33	6.4×10^{-2}	5.8	See Table 6	0.0	9.4×10^{-3}	0.12	2.7
Hazardous waste disposed (kg)	3.4×10^{-3}	6.4×10^{-6}	1.3×10^{-4}	3.0×10^{-5}	5.4×10^{-7}	4.3×10^{-6}	3.1×10^{-4}		0.0	7.5×10^{-7}	1.1×10^{-2}	2.7×10^{-6}
Radioactive waste disposed (kg)	2.8×10^{-4}	1.2×10^{-5}	4.6×10^{-5}	5.7×10^{-5}	1.4×10^{-6}	1.3×10^{-6}	1.4×10^{-4}		0.0	2.6×10^{-6}	1.9×10^{-6}	8.5×10^{-7}
Primary Energy Demand, Non-Renewable (MJ)	570	12	100	53	1.3	3.8	320		0.0	2.3	3.7	1.0
Primary Energy Demand, Renewable (MJ)	40	0.16	21	0.64	1.3×10^{-2}	6.2	7.6		0.0	9.9×10^{-3}	0.37	5.2×10^{-2}
Water Use (m^3)	1.6	9.2×10^{-3}	0.23	3.7×10^{-2}	1.0×10^{-3}	7.8×10^{-2}	0.48		0.0	7.9×10^{-4}	1.3×10^{-2}	3.2×10^{-3}

Table 6. *Results for scenarios for Module B7: Operational Water Use scenarios for toilet fixtures (51 flushes per day over 10 year period) and urinal fixtures (18 flushes per day over 10 year period). Results representing energy flows are calculated using lower heating (i.e., net calorific) values.*

Impact Category	USE SCENARIO FOR B7: Operational Water Use				
	TOILET FIXTURES (51 flushes per day over 10 years)		URINAL FIXTURES (18 flushes per day over 10 years)		
	1.1 gpf	1.28 gpf	0.125 gpf	0.25 gpf	0.5 gpf
Non-hazardous waste disposed (kg)	11	13	0.45	0.91	2.0
Hazardous waste disposed (kg)	9.7x10-3	1.1x10-2	3.9x10-4	7.8x10-4	1.7x10-3
Radioactive waste disposed (kg)	3.4x10-3	4.0x10-3	1.4x10-4	2.8x10-4	6.2x10-4
Primary Energy Demand, Non-Renewable (MJ)	5,600	6,600	230	450	1,000
Primary Energy Demand, Renewable (MJ)	300	350	12	24	54
Water Use (m^3)	25	29	1.0	2.0	4.4

Interpretation of Results

For sensor diaphragm flushometers used with toilet fixtures, the most significant contributor across all life cycle stages is operational water use (Module B7), followed by raw material extraction and processing (Module A1). For sensor diaphragm flushometers used with urinal fixtures with 0.125 gpf and 0.25 gpf, the most significant contributor across all life cycle stages is raw material extraction and processing (Module A1), followed by operational water use (Module B7). For sensor diaphragm flushometers used with urinal fixtures with 0.5 gpf, the contribution from raw material extraction and processing (Module A1) is largest for acidification, eutrophication, and smog, while the contribution from operational water use (Module B7) is the largest for global warming and ozone depletion. This difference is mainly observed due to the flush volume and the number of flushes per day over the 10 year reference service life. Overall, the flushometer manufacturing operations occurring at the Sloan manufacturing facilities (Module A3) contribute less than 9% of impacts across all impact categories.

SUPPORTING TECHNICAL INFORMATION

Data Sources. *Data sources used for the LCA. Materials less than 1% of product mass are not listed.*

Material	Dataset	Publication Date
Product		
Brass components	Brass Ingot production: Gate-to-Gate LCI data from U.S. based supplier Sand Casting process: Gate-to-Gate LCI data from Sloan's U.S. based foundry Brass {GLO}| market for | Alloc Rec, U[1] (represents brass from other suppliers)	2015
Silicone	Silicone product {RoW}| production | Alloc Rec, U[1] Extrusion, plastic pipes {GLO}| market for | Alloc Rec, U[1]	2016
Plastic combined with zinc and rubber	Zinc {GLO}| primary production from concentrate | Alloc Rec, U[1] Synthetic rubber {RoW}| production | Alloc Rec, U[1] Injection moulding {GLO}| market for | Alloc Rec, U[1]	2016
Rubber	Literature[2]	2016
Celcon	Polypropylene, granulate {GLO}| market for | Alloc Rec, U[1] Injection moulding {GLO}| market for | Alloc Rec, U[1]	2016
EPDM	Synthetic rubber {GLO}| market for | Alloc Rec, U[1]	2016
Glass	Flat glass, uncoated {RoW}| production | Alloc Rec, U[1]	2016
ABS	Acrylonitrile-butadiene-styrene copolymer {GLO}| market for | Alloc Rec, U[1] Injection moulding {GLO}| market for | Alloc Rec, U[1]	2016
Stainless Steel	Steel, chromium steel 18/8, hot rolled {GLO}| market for | Alloc Rec, U[1]	2016
Zamak	Zamak3 {GLO} | market for | Alloc Rec[1,3]	2016
Battery	Battery cell, Li-ion {RoW}| production | Alloc Rec, U[1]	2016
Polycarbonate	Polycarbonate {RoW}| production | Alloc Rec, U[1]	2016
Polypropylene	Polypropylene, granulate {RoW}| production | Alloc Rec, U1; Glass fibre {RoW}| production | Alloc Rec, U[1]	2016
HDPE	Polyethylene, high density, granulate {RoW}| production | Alloc Rec, U[1] Injection moulding {GLO}| market for | Alloc Rec, U[1]	2016
Copper	Copper {GLO}| average, no market transport | Alloc Rec, U[1] Metal working, average for copper product manufacturing {RoW}| processing | Alloc Rec, U[1]	2016
Packaging		
Cardboard	Corrugated board box {RoW}| production | Alloc Rec, U[1]	2016
Paper pulp	Kraft paper, bleached {RER}| production | Alloc Rec, U[1]	2016
HDPE	Polyethylene, high density, granulate {RoW}| production | Alloc Rec, U[1]	2016
Energy Use		
Electricity	The dataset represents the supply mix of electricity for eGRID power subregions representing the locations of manufacturing facilities operated by SLOAN.[3]	2016
Operational water use	Electricity, medium voltage {US}| market group for | Alloc Rec, U[1]	2016
Natural Gas	Heat, district or industrial, natural gas {GLO}| market group for | Alloc Rec, U[1]	2016
Transportation		
Truck	Transport, freight, lorry 16-32 metric ton, EURO4 {GLO}| market for | Alloc Rec[1]	2016
Ship	Transport, freight, sea, transoceanic ship {GLO}| market for | Alloc Rec, U[1]	2016

[1]Ecoinvent 3.3 Life Cycle Database; [2]Jawjit, W., et al., (2009); [3]SCS Global Services

Data Quality

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	Manufacturer provided primary data on product manufacturing for U.S. based Sloan facilities based on annual production for 2015 and 2016, respectively. Primary data for intermediate processing of secondary brass components, including brass ingot production, and sand casting operations, were provided by a supplier and the Sloan foundry respectively, based on annual production for 2015. Representative datasets (secondary data) used for upstream and background processes are generally less than 10 years old from original publication, but almost all have been updated in the last two years.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis is considered to be of high quality and provide the best possible representation available with current data. Primary data for upstream operations of secondary brass component production were provided by the supplier. Datasets used in the assessment are representative of the US, Global, and "Rest-of-World" (average for all countries in the world with uncertainty adjusted). Datasets chosen are considered sufficiently similar to actual processes and are of good data quality.
Technology Coverage: Specific technology or technology mix	Data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Data was collected for all key processes including flushometer production and assembly, polishing and plating, packaging and secondary brass ingot production.
Precision: Measure of the variability of the data values for each data expressed	Precision of results are not quantified due to a lack of data. Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow that is measured or estimated	The LCA model included all known mass and energy flows for production of sensor diaphragm flushometers. No known processes or activities contributing to more than 1% of the total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Overall, data used in the assessment represent actual processes for production of sensor diaphragm flushometers. Primary data is used to model upstream manufacture of secondary brass components, which is one of the primary materials in the flushometer. Data is considered to be representative of the actual technologies used for flushometer production.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Data sources of similar quality and age are used, with a bias towards Ecoinvent data.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the manufacturer's facilities represent an annual average. Primary data were available for all key processes across the supply chain including flushometer production and assembly, packaging, transportation and secondary brass component production for sensor diaphragm flushometers. LCI datasets from Ecoinvent were used to model all unit processes.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to the product materials and packaging is low. Data for upstream operations relied upon use of actual processes and technologies used for production of primary raw material components (brass components). These datasets are considered to be representative as primary data was collected from the Sloan production facilities. Uncertainty related to the impact assessment methods used in the study is relatively high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

REFERENCES

1. Ecoinvent Centre (2016) Ecoinvent data from v3.3. Swiss Center for Life Cycle Inventories, Dubendorf, 2016, http://www.ecoinvent.org
2. SM Transparency Report Framework: Part A: LCA Calculation Rules and Background Report Requirements version 2017. Part B: Product Group Definition – Commercial Flush Valves. December 2016.
3. ISO 14025: 2006 Environmental labels and declarations – Type III environmental declarations – Principles and Procedures.
4. ISO 14040: 2006 Environmental Management – Life cycle assessment – Principles and framework.
5. ISO 14044: 2006 Environmental Management – Life cycle assessment – Requirements and Guidelines.
6. ISO 21930: 2007 Sustainability in building construction – Environmental declaration of building products.
7. Jawjit,W., et al., Greenhouse gas emissions from rubber industry in Thailand, J Clean Prod (2010), doi:10.1016/j.jclepro.2009.12.003
8. LEEDv4 Reference Guide. Indoor Water Use Reduction credit calculation. U.S. Green Building Council. 2013.
9. Life Cycle Assessment of Sensor Diaphragm Flushometer. Prepared for Sloan Valve Company. SCS Global Services. September 2017.
10. SCS Type III Environmental Declaration Program: Program Operator Manual v8.0. April 2017. SCS Global Services.
11. SimaPro software (version 8.3): https://www.pre-sustainability.com/simapro
12. Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI). Version 2.1. US Environmental Production Agency.
13. US EPA. Advancing Sustainable Materials Management: 2013 Fact Sheet. Assessing Trends in Material Generation, Recycling and Disposal in the United States. June 2015.
14. US EPA. WARM Model Transportation Research - Draft. Memorandum from ICF Consulting to United States Environmental Protection Agency. September 7, 2004. http://epa.gov/epawaste/conserve/tools/warm/SWMGHGreport.html#background.

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For more information contact:
Sloan Valve Company
10500 Seymour Avenue, Franklin Park, IL 60131
P: 847.671.4300 | 800.982.5839 | www.sloan.com

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Main +1.50.452.8000 | fax +1.510.452.8001