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VERIFIED by SCS GLOBAL SERVICES
ENVIRONMENTAL PRODUCT DECLARATION
BASED ON LCA

Declaration Owner
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Product Group

Designer Washdown Urinal (SU-7409; SU-7419)

Functional Unit
Use of washdown urinal used for a period of 75 years.

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

EPD Number and Period of Validity
SCS-EPD-06391
EPD Valid October 13, 2020 through October 12, 2025

Product Category Rule
PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. Sept. 2018

PCR Guidance for Building-Related Products and Services Part B: Sanitary Ceramic EPD Requirements. Version 2.1. UL Environment. June 2018.

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SCSglobal SERVICES

Declaration Owner:	Sloan Valve Company
Address:	10500 Seymour Avenue, Franklin Park, IL 60131, United States
Declaration Number:	SCS-EPD-06391
Declaration Validity Period:	October 13, 2020 through October 12, 2025
Program Operator:	SCS Global Services
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
LCA Practitioner:	Gerard Mansell, Ph.D., SCS Global Services
LCA Software and LCI database:	OpenLCA 1.10 software and the Ecoinvent v3.6 database
Product RSL:	20 years
Markets of Applicability:	North America
EPD Type:	Product-Specific
EPD Scope:	Cradle-to-Grave
LCIA Method and Version:	CML-IA and TRACI 2.1
Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071	☐ internal ☒ external
LCA Reviewer:	Thomas Gloria, Ph.D., Industrial Ecology Consultants
Part A Product Category Rule:	PCR Guidance for Building-Related Products and Services Part A: Life Cycle Assessment Calculation Rules and Report Requirements. Version 3.2. UL Environment. Sept. 2018
Part A PCR Review conducted by:	Lindita Bushi, PhD (Chair); Hugues Imbeault-Tétreault, ing., M.Sc.A.; Jack Geibig
Part B Product Category Rule:	PCR Guidance for Building-Related Products and Services Part B: Sanitary Ceramic EPD Requirements. Version 2.1. UL Environment. June 2018.
Part B PCR Review conducted by:	Thomas Gloria (Chair), Industrial Ecology Consultants; Christopher Marozzi, Lixil Water Technologies Americas; Kim Lewis, Sustainable Minds
Independent verification of the declaration and data, according to ISO 14025 and the PCR	☐ internal ☒ external
EPD Verifier:	Thomas Gloria, Ph.D., Industrial Ecology Consultants

Declaration Contents:

Disclaimers: *This EPD conforms to ISO 14025, 14040, 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.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. Sloan Valve Company

Sloan is the world's leading manufacturer of commercial plumbing systems and has been in operation since 1906. Headquartered in Franklin Park, Illinois, USA, the company is at the forefront of the green building movement and provides smart, sustainable restroom solutions by manufacturing water-efficient products such as flushometers, electronic faucets, sink systems, soap dispensing systems, and vitreous china fixtures for commercial, industrial, and institutional markets worldwide.

2. Product

2.1 PRODUCT DESCRIPTION

The Sloan Designer Urinal is an aesthetically pleasing washdown urinal that provides the performance you depend on from Sloan. The Designer Urinal is built for optimal performance with any Sloan urinal flushometer—exposed or concealed, manual or sensor-activated. The optional SloanTec® Hydrophobic Glaze will also keep the urinal clean longer. The representative washdown urinal works with 0.125 to 1.0 gpf (gallons per flush)/0.5 to 3.8 Lpf (liters per flush), is made of vitreous china with a ¾" top spud, has a 2" national pipe thread (NPT) outlet flange, and includes a removable strainer, inlet spud, and hanger. Sloan washdown urinals are International Association of Plumbing and Mechanical Officials (IAPMO) certified to meet or exceed American Society of Mechanical Engineers (ASME) A112.19.2 standards, are WaterSense listed by the US Environmental Protection Agency, and meet Americans with Disabilities Act (ADA) guidelines and American National Standards Institute (ANSI) A117.1 requirements.

2.2 PRODUCT FLOW DIAGRAM

A flow diagram illustrating the production processes and life cycle phases included in the scope of the EPD is provided below.

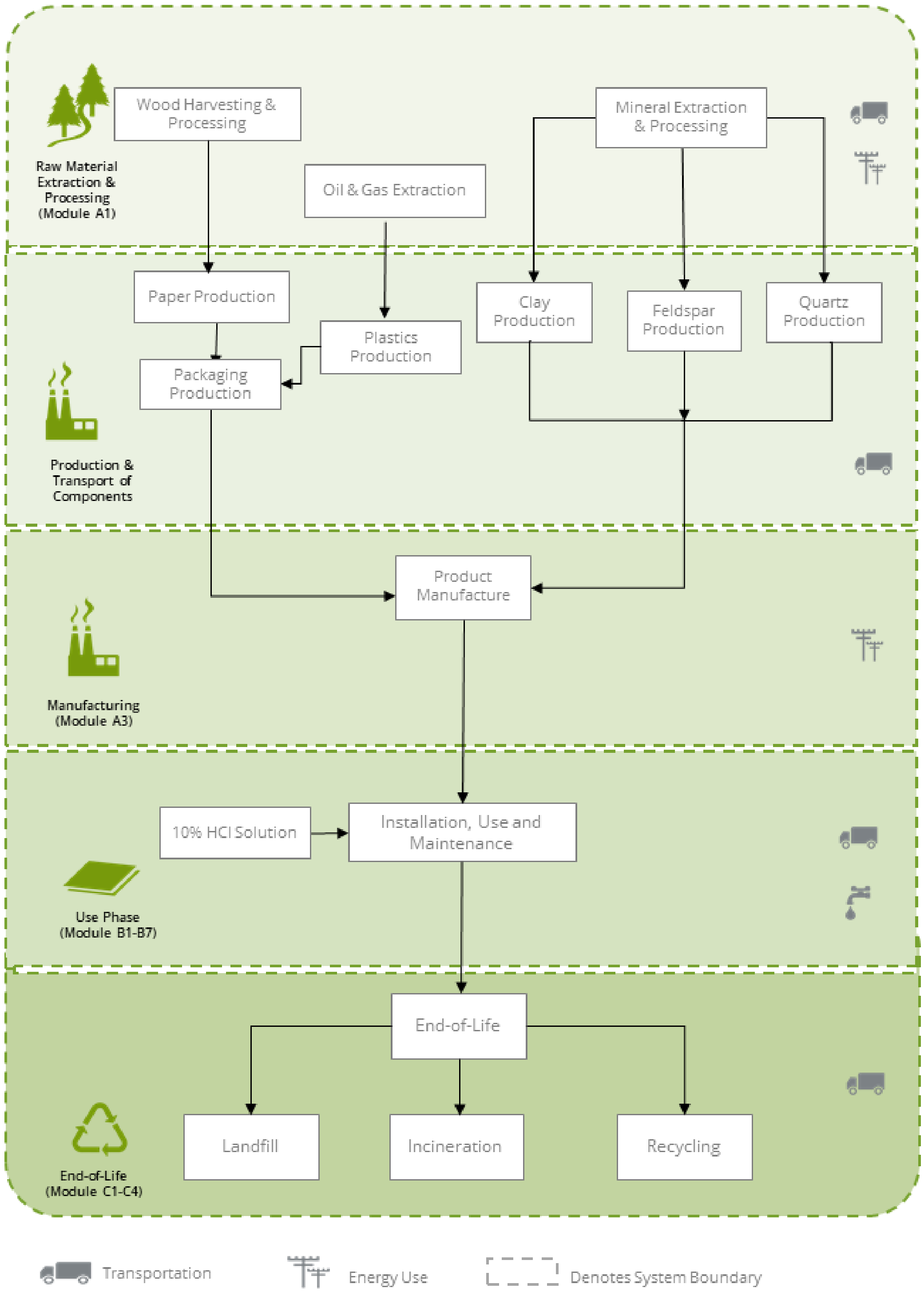

Figure 1. *Flow Diagram for the life cycle of the Designer Urinal product system.*

2.3 APPLICATION

Sloan Designer Urinals are installed in restrooms for commercial buildings, airports, stadiums, and the healthcare and hospitality sectors.

2.4 DECLARATION OF METHODOLOGICAL FRAMEWORK

The scope of the EPD is cradle-to-grave, including raw material extraction and processing, transportation, product manufacture, product delivery, installation and use, and product disposal. The life cycle phases included in the product system boundary are shown below.

Cut-off and allocation procedures are described below and conform to the PCR and ISO standards.

Table 1. *Life cycle phases included in the Designer Urinal product system boundary.*

Product			Construction Process		Use							End-of-life				Benefits and loads beyond the system boundary
A1	A2	A3	A4	A5	B1	B1	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and processing	Transport to 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	X	X	X	X	X	X	X	X	X	X	X	MND

X = Module Included | MND = Module Not Declared

2.5 TECHNICAL DATA

- Maximum flow rate: 8.5 GPM
- Maximum static pressure: 80 PSI
- Minimum flowing pressure: 25 PSI

2.6 MARKET PLACEMENT/APPLICATION RULES

Technical specifications and product performance results for the Designer Urinal products can be found on the manufacturer's www.sloan.com.

2.7 PROPERTIES OF DECLARED PRODUCT AS DELIVERED

Sloan urinals are delivered by truck to the customer. Total nominal weight of product with packaging delivered is 22.16 kg. The nominal dimensions of the representative product are: 14⅛" H x 12⅝" W x 23⅛" D (360 x 321 x 585mm)

2.8 MATERIAL COMPOSITION

The material composition of the Designer Urinal is shown in Table 2.

Table 2. *Material composition of the Designer Urinal, in kg and percent of total mass.*

Component	Mass (kg)	Percent of total mass
Potash Feldspar	4.67	26%
Quartz	4.50	25%
Albite/Feldspar	1.80	10%
Zirconium silicate	1.80	10%
Calcium oxide	1.80	10%
Alumina	1.26	7.0%
Kaolin	0.900	5.0%
Zinc oxide	0.540	3.0%
Magnesium oxide	0.450	2.5%
Others	0.270	1.5%
Total	**18.0**	**100%**

No substances required to be reported as hazardous are associated with the production of this product

2.9 MANUFACTURING

The Designer Urinal is manufactured in Fujian Province, China. The manufacturer provided primary data for their annual production, resource use and electricity consumption and waste generation at the facility. Electricity consumption is modeled using Ecoinvent datasets for the regional electricity grid resource mix.

2.10 PACKAGING

The material composition of the product packaging is shown in Table 3.

Table 3. *Material composition of packaging for the washdown urinal, in kg and percent of total mass.*

Component	Mass (kg)	Percent of total mass
Fluted paper	3.40	81%
Stainless steel	0.480	11%
Copper	0.280	6.7%
Rubber	$3.90\text{x}10^{-2}$	0.9%
Total	**4.20**	**100.0%**

2.11 PRODUCT INSTALLATION

The installation of washdown urinals is completed using hand tools and manual labor and does not require any electricity or other resources.

2.12 USE CONDITIONS

It is important to note that water use impacts during product use are assigned to the device that controls water flow to avoid double counting (e.g., flushometer), which is outside the scope of this Environmental Product Declaration. Per PCR requirements, it is assumed washdown urinals require daily cleaning with 50 mL of 10% HCl solution.

2.13 PRODUCT REFERENCE SERVICE LIFE AND BUILDING ESTIMATED SERVICE LIFE

The Reference Service Life (RSL) of the product is 20 years. The building Estimated Service Life (ESL) is 75 years, consistent with the PCR.

2.14 RE-USE PHASE

Reuse at end-of-life via collection and processing of washdown urinals is possible but not widely available. It is assumed that no materials are recovered and processed for these purposes.

2.15 DISPOSAL

It is assumed that fixture products at end-of-life are disposed of in a landfill. Transportation of washdown urinals assumes a 62 miles (100 kilometer) distance to disposal, based on the Plumbing Manufacturers International (PMI) Product Category Rule (PCR) Guidance for Kitchen and Bath Vessel Fixtures. Recycling of packaging materials are based on 2015 statistics regarding municipal solid waste generation and disposal in the United States from the US Environmental Protection Agency. For packaging materials not recycled, it is assumed that 20% are incinerated and 80% go to landfill. Transportation of disposal packaging assumes a 20 mile (32 kilometer) distance based on the US Environmental Protection Agency WARM model.

2.16 FURTHER INFORMATION

Further information on the product can be found on the manufacturers' website at www.sloan.com.

3. LCA: Calculation Rules

3.1 FUNCTIONAL UNIT

The functional unit declared in this Environmental Product Declaration is one washdown urinal used for a period of 20 years. The functional unit used in the study is defined as one washdown urinal installed for use over a 75-year period. The corresponding reference flow for each product system is 20 years. A total of 2.75 product lifecycles are required during the 75-year period over which the product system is modeled.

3.2 SYSTEM BOUNDARY

The scope of this EPD is cradle-to-grave, including product stage (raw material extraction and processing, transport to the manufacturer, and manufacturing), construction (transport for use and installation), use (cleaning/maintenance, repair, replacement, and refurbishment), and end-of-life (de-construction/demolition, transport, waste processing, and disposal). The benefits and loads beyond the system boundary for reuse, recovery, and recycling potential (module D), are not included in this study. The life cycle phases included in the EPD scope are described in Table 4 and illustrated in Figure 1.

Table 4. *The modules and unit processes included in the scope for the product system.*

Module	Module Description	Unit Processes Included in Scope
A1	Extraction and processing of raw materials; any reuse of products or materials from previous product systems; processing of secondary materials; generation of electricity from primary energy resources; energy, or other, recovery processes from secondary fuels	Extraction and processing of raw materials for the product components.
A2	Transport (to the manufacturer)	Transport of component materials to the manufacturing facilities
A3	Manufacturing, including ancillary material production	Manufacturing of products and packaging (incl. upstream unit processes)
A4	Transport (to the building site)	Transport of product (including packaging) to the building site
A5	Construction-installation process	Impacts from the installation of product are assumed negligible. Only impacts from packaging disposal are included in this phase
B1	Product use	Use of the product in a commercial building setting. There are no associated emissions or impacts from the use of the product
B2	Product maintenance	Maintenance of products over the 75-year ESL, including periodic cleaning.
B3	Product repair	The product is not expected to require repair over its lifetime
B4	Product replacement	The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this phase
B5	Product refurbishment	The product is not expected to require refurbishment over its lifetime
B6	Operational energy use by technical building systems	There is no operational energy use associated with the use of the product
B7	Operational water uses by technical building systems	There is no operational water use associated with the use of the product
C1	Deconstruction, demolition	Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts
C2	Transport (to waste processing)	Transport of the product to waste treatment at end-of-life
C3	Waste processing for reuse, recovery and/or recycling	The products are disposed of by recycling, landfilling or incineration which require no waste processing
C4	Disposal	Disposal of the product
D	Reuse-recovery-recycling potential	Module Not Declared

3.3 PRODUCT SPECIFIC CALCULATION FOR USE PHASE

The recommended maintenance regime is prescribed by the PCR and includes daily cleaning with 50 mL of a 10% HCl solution.

3.4 UNITS

All data and results are presented using SI units.

3.5 ESTIMATES AND ASSUMPTIONS

- Electricity use at the manufacturing facility was allocated to the products based on the product mass as a fraction of the total production.
- The facility under review is located in China. An Ecoinvent inventory dataset for the Chinese energy grid mix was used to model resource use and emissions from electricity use at the manufacturing facility.
- The Reference Service Life (RSL) of the products was modeled as 20 year as prescribed by the PCR.
- Downstream transport was modeled based on information provided by the manufacturer representing transport for product distribution in North America.
- The maintenance phase of the product life cycle was modeled based on PCR specifications including daily cleaning with a 10% HCl solution.
- For the product end-of-life, disposal of product and product packaging is modeled based on the PCR guidance regarding recycling rates packaging materials. The product is assumed landfilled.
- Transportation of packaging waste material at end-of-life assumes a 20-mile (32 km) distance by truck to disposal, consistent with assumptions made in the US EPA WARM model. Transportation of the product at end-of-life assumes a 62 mile (100 kilometers) distance to disposal, based on the PMI PCR Guidance for Kitchen and Bath Vessel Fixtures. Datasets representing disposal in a landfill and waste incineration are from Ecoinvent.

The PCR requires the results for several inventory flows related to construction products to be reported including energy and resource use and waste and outflows. These are aggregated inventory flows, and do not characterize any potential impact; results should be interpreted considering this limitation.

3.6 CUT-OFF RULES

According to the PCR, processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory. No data gaps were allowed which were expected to significantly affect the outcome of the indicator results. No known flows are deliberately excluded from this EPD.

3.7 DATA SOURCES

Unit processes are developed with OpenLCA v1.10 software, drawing upon data from multiple sources. Primary data were provided by the manufacturer for their processes and upstream transport. The primary sources of secondary life cycle inventory data are from Ecoinvent, version 3.6.

Table 5. *Data sources for the Sloan® Designer washdown urinal product system.*

Component	Dataset	Data Source	Publication Date
Product			
Quartz	silica sand production | silica sand | Cutoff, S/RoW	EI v3.6	2019
Potash Feldspar	feldspar production | feldspar | Cutoff, S/RoW	EI v3.6	2019
Zirconium silicate	zirconium oxide production | zirconium oxide | Cutoff, S/RoW	EI v3.6	2019
Kaolin	kaolin production | kaolin | Cutoff, S/RoW	EI v3.6	2019
Calcium oxide	quicklime production, milled, loose | quicklime, milled, loose | Cutoff, S/RoW	EI v3.6	2019
Zinc oxide	zinc oxide production | zinc oxide | Cutoff, S/RoW	EI v3.6	2019
Alumina	aluminium oxide production | aluminium oxide, non-metallurgical | Cutoff, S/RNA	EI v3.6	2019
Albite/Feldspar	feldspar production | feldspar | Cutoff, S/RoW	EI v3.6	2019
Magnesium oxide	magnesium oxide production | magnesium oxide | Cutoff, S/RoW	EI v3.6	2019
Others	limestone production, crushed, washed | limestone, crushed, washed | Cutoff, S/RoW	EI v3.6	2019
Packaging			
Fluted paper	containerboard production, linerboard, testliner | containerboard, linerboard | Cutoff, S/RoW	EI v3.6	2019
Stainless steel	metal working, average for steel product manufacturing | metal working, average for steel product manufacturing | Cutoff, S/RoW	EI v3.6	2019
Copper	metal working, average for copper product manufacturing | metal working, average for copper product manufacturing | Cutoff, S/RoW	EI v3.6	2019
Rubber	injection moulding | injection moulding | Cutoff, S/RoW	EI v3.6	2019
Transport			
Road	market for transport, freight, lorry 16-32 metric ton, EURO4 | transport, freight, lorry 16-32 metric ton, EURO4 | Cutoff, S/RoW	EI v3.6	2019
Ship	transport, freight, sea, container ship | transport, freight, sea, container ship | Cutoff, S/GLO	EI v3.6	2019
Resources			
Grid electricity	market group for electricity, medium voltage | electricity, medium voltage | Cutoff, S/CN	EI v3.6	2019
Heat - natural gas	market group for heat, district or industrial, natural gas | heat, district or industrial, natural gas | Cutoff, S/GLO	EI v3.6	2019
Water	market group for tap water | tap water | Cutoff, S/GLO	EI v3.6	2019
Cleaning Materials			
10% HCl solution	market for hydrochloric acid, without water, in 30% solution state | hydrochloric acid, without water, in 30% solution state | Cutoff, S/RoW	EI v3.6	2019
	market group for tap water | tap water | Cutoff, S/GLO	EI v3.6	2019

3.8 DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 6. *Data quality assessment for the product system.*

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old (typically 2016). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annual production for 2019.
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 provide the best possible representation available with current data. Electricity use for product manufacture is modeled using representative data for China. Surrogate data used in the assessment are representative of global or European operations. Data representative of European operations are considered sufficiently similar to actual processes. Data representing product disposal are based on regional statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
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 the products. In some instances, surrogate data used to represent upstream and downstream operations may be missing some data which is propagated in the model. 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	Data used in the assessment represent typical or average processes as currently reported from multiple data sources and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
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 v3.6 data where available. Different portions of the product life cycle are equally considered.
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 Sloan's manufacturing facility represents an annual average and are considered of high quality due to the length of time over which these data are collected, as compared to a snapshot that may not accurately reflect fluctuations in production. For secondary LCI data, Ecoinvent v3.6 LCI data are used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the products and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<10 years) but lacked geographical representativeness. Uncertainty related to the impact assessment methods used in the study are high. The impact assessment method required by the PCR includes impact potentials, which lack characterization of providing and receiving environments or tipping points.

3.9 PERIOD UNDER REVIEW

The period of review is the calendar year 2019.

3.10 ALLOCATION

Manufacturing resource use was allocated to the products based on mass. The representative washdown urinal includes some recycled content, which are allocated using the recycled content allocation method, also known as the 100-0 cut off method. Impacts from transportation were allocated based on the mass of material and distance transported.

3.11 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.

4. LCA: Scenarios and Additional Technical Information

Delivery and Installation stage (A4 - A5)

Distribution of the urinal products to the point of installation is included in the assessment. Transportation parameters for modeling product distribution are summarized in Table 7. Average distances by transport mode were used to represent product distribution in North America.

Table 7. *Product distribution parameters (A4).*

Transport Mode	Value
Diesel truck – Fuel utilization (L/100 km)	42
Diesel truck – Capacity utilization (%)	76%
Diesel truck – Distance (km)	2,678
Ocean freighter – Fuel utilization (g/tkm)	2.5
Ocean freighter – Capacity utilization (%)	65%
Ocean freighter – Distance (km)	6,376
Gross mass of products transported[1] (kg)	22.16

[1] Including packaging

The impacts associated with the product installation are assumed negligible. The impacts associated with packaging disposal are included with the installation phase as per PCR requirements.

Table 8. *Installation parameters for the washdown urinal products (A5).*

Parameter		Value
Ancillary materials (kg)		negligible
Net freshwater consumption (m^3)		-
Electricity consumption (kWh)		-
Product loss per functional unit (kg)		negligible
Waste materials generated by product installation (kg)		negligible
Output materials resulting from on-site waste processing (kg)		n/a
Mass of packaging waste (kg)	Paper/Corrugated	3.40
	Rubber	0.04
	Metals	0.76
Biogenic carbon contained in packaging (kg CO_2)		5.86
Direct emissions (kg)		-

Use stage (B1)

No impacts are associated with the use of the product over the Reference Service Lifetime.

Maintenance stage (B2)

The maintenance stage includes cleaning. The cleaning type, amount, and frequency assumptions are prescribed by the PCR and includes daily cleaning with 50 mL of 10% HCl solution.

Table 9. Maintenance parameters for the Sloan urinal products.

Parameter	Unit	Value
Maintenance cycle	Cycles / RSL	7,300
Maintenance cycle	Cycles / ESL	27,375
Maintenance process	-	Cleaning
Net freshwater consumption	kg/RSL	328.5
Cleaning agent (10% HCl solution)	kg /RSL	43.8
Further assumptions	-	Daily cleaning

Repair/Refurbishment stage (B3; B5)

Product repair and refurbishment are not relevant during the lifetime of the product.

Replacement stage (B4)

The materials and energy required for replacement of the product over the 75-year ESL of the assessment are included in this stage.

Building operation stage (B6 – B7)

There is no operational energy associated with the use of the product. Water use impacts are assigned to the device that controls water flow rate (e.g., flushometer) to avoid double counting, which is outside the scope of this Environmental Product Declaration.

Disposal stage (C1 - C4)

Deconstruction and dismantling of the installed product is performed manually with hand tools and does not require any resource use. Waste processing of washdown urinals for reuse, recycling, and energy recovery is possible but not widely available. As such, it is assumed that no materials are collected separately, recovered, and processed for these purposes. It is assumed that the product at end-of-life is disposed of in a landfill.

Transportation of waste materials at end-of-life (C2) assumes a 20 mile (~32 km) average distance to disposal, consistent with assumptions used in the US EPA WARM model. The recycling rates used for the product packaging are based on the PCR and are summarized in Table 10. For material not recycled, 80% are assumed landfilled and 20% incinerated. The end-of-life disposal scenario parameters for the product system are summarized in Table 11.

Table 10. *Recycling rates for packaging materials at end-of-life.*

Material	Recycling Rate
Paper & Pulp	75%
Metals	57%

Table 11. *End-of-life disposal scenario parameters for the washdown urinal products.*

Parameter		Value
Assumptions for scenario development		100% landfill
Collection process		
	Collected with mixed construction waste (kg)	18.0
	Recovery	n/a
Disposal	Landfill (kg)	18.0
Removals of biogenic carbon (excluding packaging) (kg CO_2 eq)		n/a

5. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The following environmental impact category indicators are reported using characterization factors based on the U.S. EPA's TRACI 2.1 and CML-IA.

CMLI-A Impact Category	Unit	TRACI 2.1 Impact Category	Unit
Global Warming Potential (GWP)	kg CO_2 eq	Global Warming Potential (GWP)	kg CO_2 eq
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq	Ozone Depletion Potential (ODP)	kg CFC 11 eq
Acidification Potential of soil and water (AP)	kg SO_2 eq	Acidification Potential (AP)	kg SO_2 eq
Eutrophication Potential (EP)	kg PO_4^{3-} eq	Eutrophication Potential (EP)	kg N eq
Photochemical Oxidant Creation Potential (POCP)	kg C_2H_4 eq	Smog Formation Potential (SFP)	kg O_3 eq
Abiotic depletion potential (ADP-elements) for non-fossil resources	kg Sb eq	Fossil Fuel Depletion Potential (ADP_{fossil})	MJ Surplus, LHV
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	MJ, LHV	-	-

These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.

The following inventory parameters, specified by the PCR, are also reported.

Resources	Unit	Waste and Outflows	Unit
RPR_E: Renewable primary resources used as energy carrier (fuel)	MJ, LHV	**HWD:** Hazardous waste disposed	kg
RPR_M: Renewable primary resources with energy content used as material	MJ, LHV	**NHWD:** Non-hazardous waste disposed	kg
$NRPR_E$: Non-renewable primary resources used as an energy carrier (fuel)	MJ, LHV	**HLRW:** High-level radioactive waste, conditioned, to final repository	kg
$NRPR_M$: Non-renewable primary resources with energy content used as material	MJ, LHV	**ILLRW:** Intermediate- and low-level radioactive waste, conditioned, to final repository	kg
SM: Secondary materials	MJ, LHV	**CRU:** Components for re-use	kg
RSF: Renewable secondary fuels	MJ, LHV	**MR:** Materials for recycling	kg
NRSF: Non-renewable secondary fuels	MJ, LHV	**MER:** Materials for energy recovery	kg
RE: Recovered energy	MJ, LHV	**EE:** Recovered energy exported from the product system	MJ, LHV
FW: Use of net freshwater resources	m^3	-	-

Modules B1, B3, B5, B6 and B7 are not associated with any impact and are therefore declared as zero. In addition, module C1 is likewise not associated with any impact as the product is manually deconstructed. Additionally, as washdown urinal products do not typically contain bio-based materials, biogenic carbon emissions and removals are not declared. Module D is not declared. In the interest of space and table readability, these modules are not included in the results presented below.

Table 12. Life Cycle Impact Assessment (LCIA) results for Sloan Designer Urinal product over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Impact Category	A1	A2	A3	A4	A5	B2	B4	C2	C4
CML-IA									
GWP (kg CO_2 eq)	11.8	2.24	87.0	11.5	1.71	352	2.28	11.3	11.8
	1.9%	0.36%	14%	1.8%	0.27%	56%	0.36%	1.8%	1.9%
ODP (kg CFC-11 eq)	2.98×10^{-6}	3.93×10^{-7}	4.04×10^{-6}	1.99×10^{-6}	3.48×10^{-8}	2.72×10^{-5}	3.97×10^{-7}	5.33×10^{-8}	2.98×10^{-6}
	3.1%	0.41%	4.2%	2.1%	0.036%	28%	0.41%	0.056%	3.1%
AP (kg SO_2 eq)	4.88×10^{-2}	8.80×10^{-3}	0.305	7.45×10^{-2}	1.11×10^{-3}	1.24	1.07×10^{-2}	2.57×10^{-3}	4.88×10^{-2}
	1.8%	0.33%	11%	2.8%	0.042%	47%	0.4%	0.097%	1.8%
EP (kg $(PO_4)^{3-}$ eq)	1.84×10^{-2}	2.09×10^{-3}	8.01×10^{-2}	1.33×10^{-2}	3.72×10^{-3}	0.457	2.30×10^{-3}	4.61×10^{-2}	1.84×10^{-2}
	2%	0.23%	8.7%	1.4%	0.4%	49%	0.25%	5%	2%
POCP (kg C_2H_4 eq)	2.33×10^{-3}	3.06×10^{-4}	1.36×10^{-2}	2.29×10^{-3}	3.41×10^{-4}	5.95×10^{-2}	3.53×10^{-4}	2.43×10^{-3}	2.33×10^{-3}
	1.9%	0.25%	11%	1.9%	0.28%	49%	0.29%	2%	1.9%
ADPE (kg Sb eq)	3.45×10^{-8}	2.30×10^{-9}	5.44×10^{-8}	1.09×10^{-8}	1.49×10^{-10}	2.86×10^{-7}	6.24×10^{-10}	1.11×10^{-9}	3.45×10^{-8}
	2.8%	0.18%	4.3%	0.87%	0.012%	23%	0.05%	0.088%	2.8%
ADPF (MJ eq)	114	33.1	981	167	2.86	3,670	31.2	5.73	114
	1.7%	0.49%	15%	2.5%	0.042%	54%	0.46%	0.085%	1.7%
TRACI 2.1									
GWP (kg CO_2 eq)	11.7	2.23	85.1	11.4	1.55	342	2.28	10.1	11.7
	1.9%	0.36%	14%	1.9%	0.25%	56%	0.37%	1.6%	1.9%
ODP (kg CFC-11 eq)	3.22×10^{-6}	5.23×10^{-7}	5.22×10^{-6}	2.65×10^{-6}	4.61×10^{-8}	3.37×10^{-5}	5.29×10^{-7}	7.05×10^{-8}	3.22×10^{-6}
	3%	0.49%	4.9%	2.5%	0.043%	32%	0.5%	0.066%	3%
AP (kg SO_2 eq)	5.08×10^{-2}	1.03×10^{-2}	0.326	8.34×10^{-2}	1.62×10^{-3}	1.35	1.32×10^{-2}	5.74×10^{-3}	5.08×10^{-2}
	1.8%	0.37%	12%	3%	0.058%	48%	0.47%	0.2%	1.8%
EP (kg N eq)	3.64×10^{-2}	2.62×10^{-3}	0.140	1.39×10^{-2}	9.51×10^{-3}	0.899	1.73×10^{-3}	0.122	3.64×10^{-2}
	2%	0.14%	7.7%	0.76%	0.52%	49%	0.094%	6.7%	2%
SFP (kg O_3 eq)	0.703	0.245	4.62	1.79	3.50×10^{-2}	21.5	0.373	5.42×10^{-2}	0.703
	1.7%	0.59%	11%	4.3%	0.083%	51%	0.89%	0.13%	1.7%
FFD (MJ eq)	10.2	4.45	88.7	22.5	0.392	361	4.42	0.666	10.2
	1.6%	0.71%	14%	3.6%	0.062%	58%	0.7%	0.11%	1.6%

Table 13. Resource use and waste flows for the Sloan Designer Urinal product over a 75-yr time horizon. Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Parameter	A1	A2	A3	A4	A5	B2	B4	C2	C4
Resources									
RPR_E (MJ)	10.2	0.367	52.5	1.77	3.38×10^{-2}	179	0.115	0.262	10.2
	2.4%	0.085%	12%	0.41%	0.0078%	42%	0.027%	0.061%	2.4%
RPR_M (MJ)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
$NRPR_E$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA	INA
$NRPR_M$ (MJ)	INA	INA	INA	INA	INA	INA	INA	INA	INA
SM (kg)	1.98	0.00	0.00	0.00	0.00	5.45	0.00	0.00	1.98
	27%	0%	0%	0%	0%	73%	0%	0%	27%
RSF/NRSF (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
RE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
FW (m^3)	0.721	2.40×10^{-2}	4.35	0.115	2.77×10^{-3}	14.4	1.03×10^{-2}	1.46×10^{-2}	0.721
	2%	0.066%	12%	0.31%	0.0076%	39%	0.028%	0.04%	2%
Wastes									
HWD (kg)	1.62×10^{-4}	8.85×10^{-5}	8.44×10^{-4}	4.16×10^{-4}	7.63×10^{-6}	4.46×10^{-3}	8.49×10^{-5}	2.03×10^{-5}	1.62×10^{-4}
	1.7%	0.91%	8.7%	4.3%	0.078%	46%	0.87%	0.21%	1.7%
NHWD (kg)	3.15	1.58	6.53	7.21	1.35	105	0.148	18.1	3.15
	1.9%	0.95%	3.9%	4.3%	0.81%	63%	0.089%	11%	1.9%
HLRW (kg)	5.04×10^{-5}	1.80×10^{-6}	5.81×10^{-5}	8.60×10^{-6}	1.79×10^{-7}	3.33×10^{-4}	5.26×10^{-7}	1.51×10^{-6}	5.04×10^{-5}
	3.6%	0.13%	4.2%	0.62%	0.013%	24%	0.038%	0.11%	3.6%
ILLRW (kg)	3.29×10^{-4}	2.19×10^{-4}	4.81×10^{-4}	1.11×10^{-3}	1.92×10^{-5}	6.62×10^{-3}	2.22×10^{-4}	3.02×10^{-5}	3.29×10^{-4}
	2.6%	1.7%	3.7%	8.6%	0.15%	51%	1.7%	0.23%	2.6%
CRU (kg)	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MR (kg)	0.00	0.00	0.00	0.00	2.55	7.01	0.00	0.00	0.00
	0%	0%	0%	0%	27%	73%	0%	0%	0%
MER (kg)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.
EE (MJ)	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.	Neg.

INA = Indicator not assessed | Neg. = Negligible

6. LCA: Interpretation

The contributions to total impact indicator results are dominated by the product replacement phase (B4). Of the remaining life cycle phases, the product maintenance phase (B2) is generally the largest contributor followed by the product manufacturing phase (A3), raw material extraction and processing (A1), product distribution (A4) and disposal (C4). Other life cycle phase contributions are minimal.

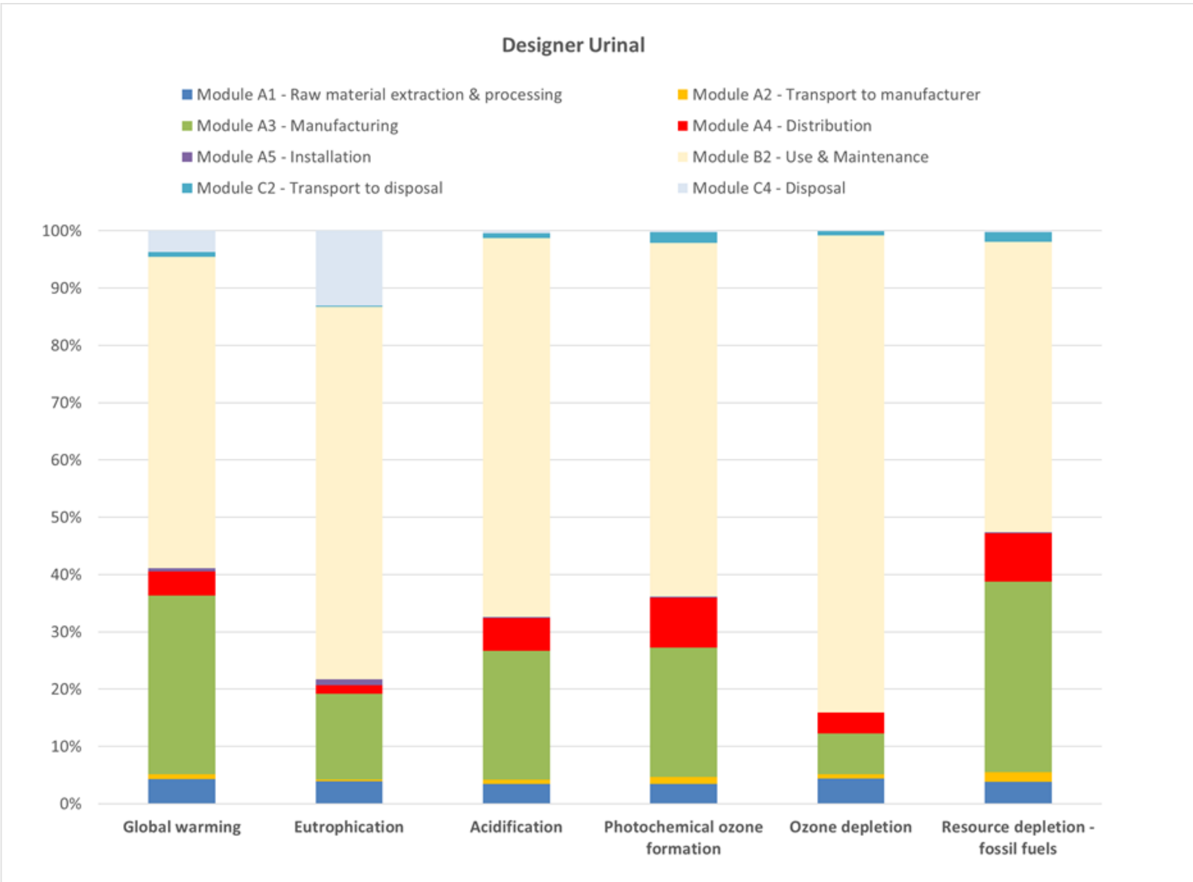

Figure 2. *Contribution analysis for the Sloan Designer Washdown Urinal product – TRACI v2.1. (excluding product replacements)*

7. Additional Environmental Information

The fixtures within this EPD have a Watersense label. The EPA WaterSense program was developed in 2006 and is a partnership program by the EPA. Similar to the Energy Star program for appliances and other energy consuming devises, WaterSense promotes the importance of water efficiency. Products and services that have the WaterSense label have been certified to be at least 20% more efficient than the baseline.

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 points and/or complying with CAL Green and other building codes.

For more information on Sloan's certifications and environmental initiatives please view the website at www.sloan.com.

8. References

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