Additional EPD content required and suggested by:
- ULE PCR Parts A and B for Sanitary Ceramics; and
- ULE/USGBC Enhanced EPD: Requirements for PCRs

Commercial Wall-Mount Lavatory LT307(A)

Life cycle information

Manufacturing The lavatory is manufactured in Monterrey, Mexico. The body of the lavatory is manufactured by pumping clay slurry called casting slip into a mold. After a portion of the water diffuses into the mold, the pieces are de-molded and sent to the dryer. The inspected products are glazed and sent to the kiln for firing. During firing, the glassy raw materials melt in a process called vitrification, which makes the body solid and impermeable. The fired products are finally inspected, packaged, and shipped.

Standards and codes The specified model meets or exceeds: ADA, ICC/ANSI A117.1, ASME A112.19.2/CSA B45.1, TAS

Health, safety and environmental aspects during production TOTO Group follows a Global Environmental Policy with the purpose to promote activities centered on protecting the earth. Activities include maintaining Environmental Management Systems within the TOTO Group and associated subsidiaries, many of which are ISO 14001 certified, while others are working towards certification. TOTO Group also employs the Health, Safety, and Security Management System for safety and worker health.

Packaging Finished products are packaged in corrugated board boxes, some of which contain a top and a bottom pad, along with some inserts and stickers. The boxes are stapled, palletized, and wrapped with stretch wrap, then shipped to the US market. The stretch wrap is less than 1% of the weight, and the stickers and paper are equal to or greater than 1% of the total weight, with cardboard making up the rest.

Installation into the building is assumed to be manual or negligible in terms of energy consumption. After installation, the cardboard packaging is disposed.

Conditions of use The service life if defined in such a way that no operational energy or water use is applied, since operational energy and water use are assigned to the faucet used in combination with the lavatory.

Recycle or reuse At the end of life, it is assumed that the lavatories are landfilled. The model assumes installation parts are disposed of as follows: 70.5% of brass and zinc is recycled, 62.5% of corrugated board and paper is recycled and 33.8% of steel is recycled. TOTO ceramic materials can be recycled as aggregate in several applications; however, this is not currently a common practice.

Disposal The disposal of all ceramic material and non-recycled installation parts in a landfill, including transportation to the landfill, was included in the model.

Data

Background Primary manufacturing data were collected and provided by TOTO Mexico for the calendar year 2013 and were verified to be less than five years old. Assumptions were made based on data from TOTO USA manufacturing facilities wherever data were missing. This study used literature data from the USLCI database and the US ecoinvent database when supplier data were not made available.

Quality TOTO Mexico's response to the request for data was comprehensive; however, the collection process gave little insight to the LCA practitioner as to how data was gathered and calculated. The LCA practitioner used back calculations and mass balance calculations to assure data was plausible, consistent and complete. No data on the recycled content of the components of the modeled products was provided. The LCA practitioner made no assumption in that regard and assumed worst-case scenario in that all materials were primary. The impact of this assumption is expected to be insignificant because the material inputs are not major drivers of the LCA results for the modeled products.

Literature data is comprised of the best available data from consistent sources, but varies from material to material in geography, time-related and technology coverage due to limited availability of specific data.

Dataset use A combination of primary and secondary data was used in the LCA; 100% primary data was used for the manufacturing module, and 100% secondary data was used for all other modules. 68.1% of the secondary data comes from ecoinvent 3, and 31.9% of the secondary data comes from ecoinvent 2. All generic datasets used are less than ten years old.

LCI DATASET NAME	AGE	VERSION
TOTO Mfg. Data	2013	N/A
ecoinvent 3	2013	3.0
ecoinvent 2	2010	2.0 and 2.2

Cut-off criteria for the inclusion of mass and energy flows are:
- 1% for renewable and non-renewable energy
- 1% of total input mass for unit processes, where the total neglected flows from each module shall be a maximum of 5% of the energy usage and mass

Allocation
Allocation of the manufacturing data is done by mass and includes the weight of the finished product and the yield of the specific product. All processes and transportation needed to recycle the materials are assigned to the recovery stage. This includes a credit for preventing the manufacturing of the primary material.

Scenarios and additional technical information

PARAMETER	VALUE	UNIT
Transport to the building site [A4]		
Liters of fuel	40	l/100km
Transport distance	1530	km
Capacity utilization (including empty runs)	-	%
Gross density of products transported	-	kg/m³
Capacity utilization volume factor	-	%
Installation into the building [A5]		
Auxiliary	-	kg
Water consumption	-	m³
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Output substances following waste treatment on site (cardboard packaging)	1.75	kg
Dust in the air	-	kg
VOC in the air	-	kg
Use phase reference [B1]		
Flushes/day/person	N/A	-
Reference service life (RSL)	20	years
Maintenance [B2]		
Information on maintenance	-	-
Maintenance cycle	7300	number/RSL
Water consumption	-	m³
Auxiliary	-	kg
Other resources	73	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Repair [B3]		
Information on the repair process	-	-
Information on the inspection process	-	-
Repair cycle	-	number/RSL
Water consumption	-	m³
Auxiliary	-	kg
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Replacement / refurbishment [B4-B5]		
Replacement cycle	-	number/RSL
Electricity consumption	-	kWh
Liters of fuel	-	l/100km
Replacement of worn parts	-	kg
Operational energy use [B6] and operational water use [B7]		
Water consumption	0	m³
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Equipment output	-	kW
End of life [C1-C4]		
Collected separately	2.10	kg
Collected as mixed construction waste	16.6	kg
Reuse	-	kg
Recycling	1.21	kg
Energy recovery	-	kg
Landfilling	17.5	kg

Environmental parameters derived from LCA (as per EN 15804) per one lavatory

Use of resources

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D	Total
Use of renewable primary energy excluding the renewable primary energy resources used as raw materials	MJ, lower calorific value	1.48E+01	1.19E-01	4.03E-03	0	2.13E+01	0	0	2.43E-03	7.01E-03	1.02E-02	-1.30E+00	**3.49E+01**
Use of renewable primary energy resources used as raw materials	MJ, lower calorific value	5.72E+01	1.22E-02	1.60E-03	0	2.95E-01	0	0	2.48E-04	3.03E-03	4.90E-03	-4.91E+01	**8.46E+00**
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, lower calorific value	7.20E+01	1.31E-01	5.64E-03	0	2.15E+01	0	0	2.68E-03	1.00E-02	1.51E-02	-5.04E+01	**4.33E+01**
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ, lower calorific value	6.80E+02	1.00E+02	3.06E-01	0	1.90E+03	0	0	2.05E+00	3.41E-01	3.45E+00	-2.02E+01	**2.67E+03**
Use of non-renewable primary energy resources used as raw materials	MJ, lower calorific value	0	0	0	0	0	0	0	0	0	0	0	**0**
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	MJ, lower calorific value	6.80E+02	1.00E+02	3.06E-01	0	1.90E+03	0	0	2.05E+00	3.41E-01	3.45E+00	-2.02E+01	**2.67E+03**
Use of secondary material	kg	0	0	0	0	0	0	0	0	0	0	0	**0**
Use of renewable secondary fuels	MJ, lower calorific value	0	0	0	0	0	0	0	0	0	0	0	**0**
Use of nonrenewable secondary fuels	MJ, lower calorific value	0	0	0	0	0	0	0	0	0	0	0	**0**
Use of net fresh water	m³	1.04E+02	6.61E-01	2.98E-02	0	1.76E+02	0	0	1.35E-02	3.80E-03	7.60E-02	-1.42E+01	**2.67E+02**

Output material flows

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D	Total
Hazardous waste disposed	kg	2.43E+01	1.53E-04	7.52E-04	0	1.77E+01	0	0	4.60E-06	5.30E-03	2.54E-03	-2.42E-01	**4.18E+01**
Non-hazardous waste disposed	kg	5.75E+00	3.14E-02	1.63E-02	0	6.11E+01	0	0	6.41E-04	1.73E-02	3.87E-02	-1.57E+00	**6.54E+01**
Radioactive waste disposed	kg	6.29E-02	7.90E-05	6.31E-05	0	2.10E-01	0	0	1.61E-06	2.24E-04	1.27E-04	-4.83E-03	**2.69E-01**

Waste categories

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D	Total
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0	0	**0**
Materials for recycling	kg	1.30E-02	0	0	0	0	0	0	0	0	0	1.18E+00	**1.20E+00**
Materials for energy recovery	kg	0	0	0	0	0	0	0	0	0	0	0	**0**
Exported energy	MJ, lower heating value per energy carrier	0	0	0	0	0	0	0	0	0	0	0	**0**

TRACI v2.1 disaggregated results per one lavatory

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
Acidification	kg SO_2 eq	1.22E-01	4.80E-02	2.05E-04	0	1.42E+00	0	0	9.45E-04	2.90E-04	1.05E-03	-1.33E-02
Ecotoxicity	CTUe	3.66E+01	1.97E+01	2.04E-02	0	1.03E+02	0	0	4.02E-01	5.19E-02	5.78E-02	-4.17E+00
Eutrophication	kg N eq	1.45E-02	2.82E-03	1.13E-03	0	1.14E-01	0	0	5.54E-05	5.53E-05	1.03E-04	-2.61E-03
Global warming	kg CO_2 eq	3.89E+01	7.88E+00	7.34E-01	0	1.03E+02	0	0	1.61E-01	3.30E-02	1.38E-01	-1.42E+00
Ozone depletion	kg CFC-11 eq	5.19E-06	1.80E-09	2.72E-09	0	6.79E-06	0	0	3.66E-11	4.19E-09	5.14E-08	-1.15E-07
Carcinogenics	CTUh	1.35E-06	1.06E-07	3.57E-10	0	1.78E-06	0	0	2.17E-09	2.22E-09	1.42E-09	-3.27E-07
Non-carcinogenics	CTUh	3.75E-06	1.02E-06	3.69E-09	0	1.20E-05	0	0	2.08E-08	1.85E-08	7.76E-09	-5.73E-07
Respiratory effects	kg PM2.5 eq	1.28E-02	8.56E-04	1.59E-05	0	1.20E-01	0	0	1.68E-05	6.24E-05	1.07E-04	-2.40E-03
Smog	kg O_3 eq	2.21E+00	1.32E+00	2.11E-03	0	6.13E+00	0	0	2.57E-02	7.50E-03	2.81E-02	-1.60E-01
Fossil fuel depletion	MJ surplus	7.98E+01	1.39E+01	2.81E-02	0	2.04E+02	0	0	2.85E-01	3.95E-02	4.63E-01	-1.57E+00