

Environmental Product Declaration

Selectronic® 6065, 6066 & 606B Series Toilet Flush Valve

Flush Valve



Selectronic Toilet Flush Valves:

Battery-Powered: 6065.111, 121, 161, 721, 761

PWRX: 6066.111, 121, 161, 721, 761

Base Model: 6066.111, 121, 161, 721, 761

Making life healthier, safer and more beautiful at home, at work, and throughout the world.

*American
Standard*

The Exposed Selectronic® Toilet Flush Valve features a self-cleaning piston design that saves time and money by eliminating routine maintenance and preventing the valve from continuously running due to clogs.



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According to
ISO 14025,
21930:2007 &
EN 15804

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	LIXIL Water Technology
DECLARATION NUMBER	4788268911.103.1
DECLARED PRODUCT	Selectronic® 6065, 6066 & 606B Series Toilet Flush Valve
REFERENCE PCR	IBU Part B PCR for Bathroom Fittings with UL Addendum (2018)
REFERENCE PCR STANDARD	<input checked="" type="checkbox"/> EN 15804 (2012) <input checked="" type="checkbox"/> ISO 21930 (2007) <input type="checkbox"/> ISO 21930 (2017)
DATE OF ISSUE	March 13, 2018
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacturing Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	Institut Bauen und Umwelt e.V. The Independent Expert Committee (SRV) epd.ulenvironment.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	 Grant R. Martin, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by	 Thomas Gloria, Industrial Ecology Consultants

¹ **Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds , e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. **Accuracy of Results:** EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. **Comparability:** EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.



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Product Definition and Information

Production Description



The Exposed Selectronic® Toilet Flush Valve features a self-cleaning piston design that saves time and money by eliminating routine maintenance and preventing the valve from continuously running due to clogs.

Manufacturing Location: Monterrey, MX

Application

Flush Valve and Faucet products are used in a variety of bathroom and kitchen applications, including but not limited to hospitality, healthcare, education, government, military, office, and residential settings.

Environmental Activities and Certification

The LIXIL Group promotes conservation of water and raw materials and sustainable practices across the entire lifecycle of our products from inputs, procurement, through use and disposal. On September 17, 2017 LIXIL Group Corporation announced placement in the Dow Jones Sustainability Indices (DJSI) for sustainability performance. LIXIL Group was included in the DJSI Asia-Pacific Index as the highest scoring company in the Building Products Industry, and ranked third globally in this industry group.

Technical Data

For the declared product, the following technical data in the delivery status must be provided with reference to the test standard:

Technical Data

Category	Value
Width	2.875"
Height	16"

Market Placement / Application Rules

The standards that can be applied for the Selectronic Toilet Flush Valve are:

- ANSI A117.1 (ADA Compliant)
- ASSE 1037 / ASME 112.1037 / CS B125.37
- WaterSense Certified (for 1.28 gpm or less)

Properties of Declared Product as Delivered

The product arrives to the site of installation packaged in a cardboard box with similar dimensions to the product size stated above. Installation instructions are available online, and additional installation materials may be required.



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Material Composition

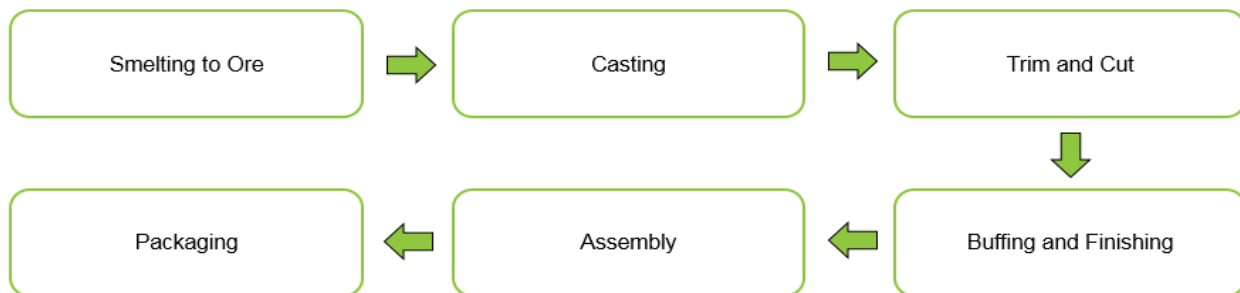
The composition of the Selectronic® 6065, 6066 & 606B Series Toilet Flush Valve is as follows:

Component	Percentage in mass (%)
Brass	43.10%
Red Brass	38.44%
Copper	0.01%
Zinc	10.87%
Stainless Steel	3.65%
Rubber	0.30%
Plastics	2.47%
Other	1.16%
Total	100.00%

Manufacturing

The primary manufacturing processes in the product of flush valve and faucet products are processes such as smelting, casting, trimming, and buffing of metal parts. These parts, along with other pre-fabricated components, are assembled into the final flush valve and faucet products.

Manufacturing Location: Monterrey, MX



Environmental and Health During Manufacturing

Lixil is committed to producing and distributing flush valve and faucet products with minimal environmental impact, where health and safety is the primary focus for all employees and associates.

- Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met and environment management program effectiveness is evaluated.
- Code of Conduct covers human rights, labor practices and decent work. Management of Lixil is aware of their environmental roles and responsibilities, providing appropriate training, supporting accountability, and recognizing outstanding performance.
- Any waste metals during machining are separated and recycled. Process water is treated internally before being discharged to municipal wastewater treatment.

Installation

The product is installed using an electric drill, in addition to caulk, which is used to create a waterproof seal along the edges of the installed product. No noise reduction measures are typically required or undertaken during the installation of these products. The installation phase also considers the disposal of packaging materials.



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Packaging

These products are primarily packaged with cardboard, paper, and plastic wrap. All of these materials are recyclable.

Use Conditions

The use phase of flush valve and faucet products includes the operational water use over the lifetime of the products. Additionally, faucet products consider the operational energy use required to provide hot tap water. Both operational energy and water use are calculated using the methodology detailed in the product category rules.

Environmental and Health During Use

There is no harmful emissive potential. No damage to health or impairment is expected under normal use corresponding to the intended use of the product.

Reference Service Life

The Reference Service Life is 10 years.

Extraordinary Effects

Fire

No danger to the environment is anticipated during exposure to fire.

Water

No substances are used which have a negative impact on ecological water quality on contact by the product with water.

Mechanical Destruction

No danger to the environment is anticipated during mechanical destruction.

Re-use Phase

These products are not typically reusable.

Disposal

While flush valves and faucet products are able to be recycled, this study adopts the conservative assumption of a 100% landfill scenario.

Further Information

LIXIL Water Technologies
One Centennial Avenue
Piscataway, NJ, 08854

Life Cycle Assessment

Functional Unit

The declaration refers to the functional unit of 1 unit (or piece) of Selectronic® 6065, 6066 & 606B Series Toilet Flush Valve.

Name	Value	Unit
Declared unit	1	Piece
Mass	3.54	kg
Conversion factor to 1 kg	0.28	-
Declared unit	3.9E-03	ton



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System Boundary

This is a cradle to gate with options Environmental Product Declaration. The following life cycle phases were considered:

Product Stage			Construction Process Stage		Use Stage							End of Life Stage*				Benefits and Loads Beyond the System Boundaries
Raw material supply	Transport	Manufacturing	Transport from gate to the site	Construction/ installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	MND

Description of the System Boundary Stages Corresponding to the PCR
(X = Included; MND = Module Not Declared)

*This includes provision of all materials, products and energy, packaging processing and its transport, as well as waste processing up to the end-of waste state or disposal of final residues.

Estimates and Assumptions

End of Life

In the end of life phase, a 100% landfill scenario was assumed.

Cut-off Criteria

In the assessment, all available data from the production process are considered, i.e. all raw materials used, auxiliary materials (e.g. lubricants), thermal energy consumption and electric power consumption - including material and energy flows contributing less than 1% of mass or energy (if available). In case a specific flow contributing less than 1% in mass or energy is not available, worst case assumption proxies are selected to represent the respective environmental impacts. Impacts relating to the production of machines and facilities required during production are out of the scope of this assessment.

No known flows are deliberately excluded from this EPD.

Background data

For life cycle modeling of the considered products, the SimaPro 8.2.0.0 software is used. Primary data was collected from the Lixil owned facilities. Secondary data was used for upstream raw material production and downstream inventory flows. This secondary data was sourced from either the Ecoinvent 3.1 or USLCI databases.

Data Quality

The data sources used are complete and representative of North America in terms of the geographic and technological coverage and are a recent vintage (i.e. less than ten years old). The data used for primary data are based on direct information sources of the manufacturer. Secondary data sets were used for raw materials extraction and processing, end of life, transportation, and energy production flows. Wherever secondary data is used, the study adopts critically reviewed data for consistency, precision, and reproducibility to limit uncertainty.

Period Under Review

The period under review is 2017 Fiscal Year.



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Allocation

Impacts associated with recycled materials were assigned to the previous product system using the cut-off method for end of life allocation. To determine the manufacturing impacts per product, total facility inputs were allocated on a unit basis. No credits from recycling or energy recovery are included.

Comparability

A comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to EN 15804 and the building context, respectively the product-specific characteristics of performance, are taken into account. Environmental declarations from different programs may not be comparable. Full conformance with the selected PCR allows EPD comparability only when all stages of a product's life cycle have been considered. However, variations and deviations are possible.

LCA: Modeling Scenarios and Additional Technical Information

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared. Any information omitted from the following scenario tables was done so intentionally as it was unrelated and had no presentable values.

Transport to Building Site (A4)		
Name	Value	Unit
Liters of fuel	38	l/100km
Transport distance	1651	km
Capacity utilization (including empty runs)	90	%
Gross density of products transported	-	kg/m ³
Capacity utilization volume factor	0.11	-

Installation into the Building (A5)		
Name	Value	Unit
Auxiliary materials		kg
Water consumption	-	m ³
Other resources	0.05	kg
Electricity consumption	3.9E-04	kWh
Other energy carriers	-	MJ
Waster materials at construction site	2.50	kg
Output substance (landfill)	2.00	kg
Output substance (incineration)	0.50	kg
Direct Emissions to ambient air, soil, and water	0.21*	kg CO ₂

* CO₂ emissions to air from disposal of packaging

Maintenance (B2)		
Name	Value	Unit
Information on maintenance	-	-
Maintenance cycle	-	Number / RSL
Water consumption (from tap, to sewer)	-	m ³
Auxiliary materials (cleaing agent)	-	kg
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg

Replacement (B4) / Refurbishment (B5)		
Name	Value	Unit
Replacement cycle	-	Number / RSL
Replacement cycle	6.5	Number / ESL

Operational Energy Use (B6) and Water Use (B7)		
Name	Value	Unit
Water consumption (from tap, to sewer)	643.3	m ³
Electricity consumption	6.1E+02	kWh
Other energy carriers	-	MJ
Equipment output	-	kW
Direct Emissions to ambient air, soil, and water	-	kg
Further assumptions	*	-

* 10 years of use, 260 days per year, 51 flushes per day, 1.28 gallons per flush

End of Life (C1 - C4)		
Name	Value	Unit
Collected separately	-	kg
Collected as mixed construction waste	3.54	kg
Reuse	-	kg
Recycling	-	kg
Energy recovery	-	kg
Landfilling	3.54	kg



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LCA Results

Results shown below were calculated using TRACI 2.1 Methodology.

TRACI 2.1 Impact Assessment									
Parameter	Parameter	Unit	A1-A3	A4	A5	B6	B7	C2	C4
GWP	Global warming potential	kg CO ₂ -Eq.	2.5E+01	5.4E-01	1.4E+00	4.0E+02	4.2E+02	2.1E-02	3.7E-02
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	2.2E-06	2.1E-11	1.1E-07	6.5E-09	1.1E-04	9.1E-13	1.3E-08
AP Air	Acidification potential for air emissions	kg SO ₂ -Eq.	8.0E-01	3.2E-03	1.4E-03	3.5E+00	2.2E+00	1.5E-04	2.9E-04
EP	Eutrophication potential	kg N-Eq.	1.4E+00	1.8E-04	1.4E-02	4.7E-02	1.6E+00	8.7E-06	1.2E-04
SP	Smog formation potential	kg O ₃ -Eq.	3.5E+00	8.9E-02	1.8E-02	2.3E+01	2.4E+01	4.2E-03	6.8E-03
FFD	Fossil Fuel Depletion	MJ-surplus	2.7E+01	9.8E-01	3.6E-01	3.2E+02	2.9E+02	4.3E-02	1.2E-01

**All use and end of life stages have been considered, and only those stages with non-zero values have been reported above. All stages not shown above have values of zero.*

Results shown below were calculated using CML 2001 - April 2013 Methodology.

CML 4.1 Impact Assessment									
Parameter	Parameter	Unit	A1-A3	A4	A5	B6	B7	C2	C4
GWP	Global warming potential	kg CO ₂ -Eq.	2.5E+01	5.4E-01	1.4E+00	4.0E+02	4.2E+02	2.1E-02	3.7E-02
ODP	Depletion potential of the stratospheric ozone layer	kg CFC-11 Eq.	1.7E-06	2.0E-11	1.0E-07	3.0E-09	1.1E-04	9.0E-13	9.6E-09
AP Air	Acidification potential for air emissions	kg SO ₂ -Eq.	8.9E-01	2.7E-03	1.3E-03	3.8E+00	2.2E+00	1.2E-04	2.6E-04
EP	Eutrophication potential	kg(PO ₄) ³ -Eq.	5.9E-01	4.7E-04	5.5E-03	1.2E-01	7.9E-01	2.3E-05	7.7E-05
POCP	Formation potential of tropospheric ozone photochemical oxidants	kg ethane-Eq.	3.7E-02	1.2E-04	3.3E-04	1.5E-01	1.2E-01	5.8E-06	1.2E-05
ADPE	Abiotic depletion potential for non-fossil resources	kg Sb-Eq.	1.1E-02	0.0E+00	4.2E-07	0.0E+00	1.0E-03	0.0E+00	5.0E-08
ADPF	Abiotic depletion potential for fossil resources	MJ	3.1E+02	7.4E+00	3.5E+00	5.8E+03	4.8E+03	3.3E-01	9.4E-01

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Results below contain the resource use throughout the life cycle of the product.

Resource Use									
Parameter	Parameter	Unit	A1-A3	A4	A5	B6	B7	C2	C4
PERE	Renewable primary energy as energy carrier	MJ, lower calorific value	2.8E+01	0.0E+00	1.4E-01	0.0E+00	3.6E+02	0.0E+00	1.1E-02
PERM	Renewable primary energy resources as material utilization	MJ, lower calorific value	4.9E+01	0.0E+00	1.2E-01	0.0E+00	1.1E+02	0.0E+00	1.6E-02
PERT	Total use of renewable primary energy resources	MJ, lower calorific value	7.8E+01	0.0E+00	2.7E-01	0.0E+00	4.8E+02	0.0E+00	2.6E-02
PENRE	Nonrenewable primary energy as energy carrier	MJ, lower calorific value	3.4E+02	7.4E+00	3.7E+00	5.8E+03	5.6E+03	3.3E-01	9.7E-01
PENRM	Nonrenewable primary energy as material utilization	MJ, lower calorific value	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PENRT	Total use of nonrenewable primary energy resources	MJ, lower calorific value	3.4E+02	7.4E+00	3.7E+00	5.8E+03	5.6E+03	3.3E-01	9.7E-01
SM	Use of secondary material	MJ, lower calorific value	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	Use of renewable secondary fuels	MJ, lower calorific value	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	Use of nonrenewable secondary fuels	MJ, lower calorific value	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	Use of net fresh water	m ³	1.6E-01	0.0E+00	4.6E-03	0.0E+00	6.3E+02	0.0E+00	7.2E-04

**All use and end of life stages have been considered, and only those stages with non-zero values have been reported above. All stages not shown above have values of zero.*

Results below contain the output flows and wastes throughout the life cycle of the product.

Output Flows and Waste Categories									
Parameter	Parameter	Unit	A1-A3	A4	A5	B6	B7	C2	C4
HWD	Hazardous waste disposed	kg	2.0E-03	0.0E+00	4.4E-06	0.0E+00	1.2E-02	0.0E+00	7.1E-07
NHWD	Non-hazardous waste disposed	kg	5.5E+00	0.0E+00	2.2E+00	0.0E+00	3.9E+01	0.0E+00	3.5E+00
RWD	Radioactive waste disposed	kg	9.8E-04	0.0E+00	8.1E-06	0.0E+00	1.8E-02	0.0E+00	5.5E-06
CRU	Components for re-use	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
MFR	Materials for recycling	kg	7.8E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	5.3E-01
MER	Materials for energy recovery	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported electrical energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
EEE	Exported thermal energy	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

**All use and end of life stages have been considered, and only those stages with non-zero values have been reported above. All stages not shown above have values of zero.*



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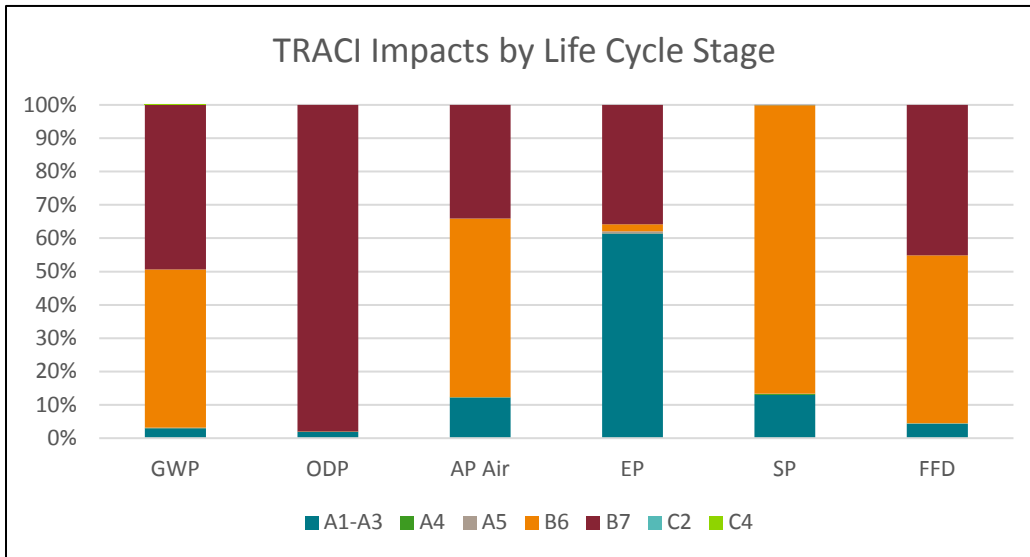
Results below contain direct greenhouse gas emissions and removals throughout the life cycle of the product.

Greenhouse Gas Emissions and Removals									
Parameter	Parameter	Unit	A1-A3	A4	A5	B6	B7	C2	C4
BCRP	Biogenic Carbon Removal from Product	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BCEP	Biogenic Carbon Emissions from Product	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BCRK	Biogenic Carbon Removal from Packaging	kg CO ₂	7.5E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BCEK	Biogenic Carbon Emissions from Packaging	kg CO ₂	0.0E+00	0.0E+00	7.5E-01	0.0E+00	0.0E+00	0.0E+00	0.0E+00
BCEW	Biogenic Carbon Emissions from Combustion of Waste from Renewable Sources Used in Production Process	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CCE	Calcination Carbon Emissions	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CCR	Carbonation Carbon Removal	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
CWNR	Carbon Emissions from Combustion of Waste from Non-renewable Sources Used in Production Process	kg CO ₂	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

**All use and end of life stages have been considered, and only those stages with non-zero values have been reported above. All stages not shown above have values of zero.*

Interpretation

Generally, the operational energy use (B6) or operational water use (B7) phase drives the environmental impacts across the full life cycle of the product. The one exception to this trend is in the eutrophication category, where production (A1-A3) is the dominant life cycle stage.



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References

- | PCR Part A UL Environment and Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. July 2014, version 1.3
- | PCR Part B UL Environment and Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Sanitary Ceramics. Version January 2018.
- | ISO 14025 ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- | ISO 14040 ISO 14040:2009-11, Environmental management — Life cycle assessment — Principles and framework.
- | ISO 14044 ISO 14044:2006-10, Environmental management — Life cycle assessment — Requirements and guidelines.
- | EN 15804 EN 15804:2012-04: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product.
- | ULE 2017 UL Environment, General Program Instructions, 2017.
- | TRACI 2.1 US EPA, Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI).
- | CML 2001 Center of Environmental Science of Leiden University impact categories and characterisation methods for impact assessment (CML).

