Forefront™ K-5373IN-0

58 cm rectangular vessel bathroom sink

Product Group

Vitreous

Product Specifications

Packaged Product Weight (kg)	14.3
Product Recycled Content	0
Product Recyclable Content	14%
Product Life time (years)	20
Product Application	Commercial

Use Phase Specifications

Annual Cleaning Frequency (times)	260
Cleaner	10 mL of a 1% Sodium lauryl sulfate solution.

Greenhouse Gas Emission (kg CO2- eq.)

Material & Manufacturing	606
Use & Maintenance	1697

Water Intensity (m3)

Material & Manufacturing	36
Use & Maintenance	136

Manufacturing Locations

Jhagadia, India

Believing in Better

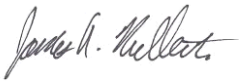
We believe in a better world. We are passionate about protecting the environment and enhancing the quality of life for current and future generations. And that means designing products that look beautiful and deliver exceptional performance, while being as sustainable as possible.

Program Operator Name, Address, and Website	UL Solutions | 333 Pfingsten Road Northbrook, IL 60062-2096 USA | www.ul.com
General Program Instructions and Version Number	Program Operator Rules V2.7 March 2022
Location of Explanatory Material	If you would like to learn more about the background LCA or any information provided in this EPD, please reach out to us at Transparency@Kohler.com..
Declaration Holder and Address	Kohler Co. 444 Highland Drive, Kohler, WI
Declaration Number	4791422286.148
Declared Product and Functional Unit	Single Lavatory sink in an average commercial environment over the estimated service life of the building
Product Definition	58 cm rectangular vessel bathroom sink
Reference PCR and Version Number	Sustainable Minds Transparency Report™/ EPD Framework: Part A: LCA calculation rules and report requirements, v2023. Part B: Commercial lavatories (v.1)
Markets of Applicability	North America
Date of Issue	19-Dec-25
Period of Validity	5 Years
EPD Type	Product Specific
EPD Scope	Cradle-to-grave
Year of Reported Manufacturer Primary Data	2021-24
LCA Software and Version Number	SimaPro v. 10.2.0.1
LCIA Database(s) and Version Numbers	Ecoinvent 3.11 DATASMART LCI Package (USEI 2.2)
LCIA Methodology and Version Number	TRACI 2.2 v1.00 CML-IA baseline v3.11 Cumulative Energy Demand (CED) v1.12
Applicable Green Building Certifications Schema	LEED v4.1/BD+C/Materials and Resources/Building Product Disclosure and Optimization- Environmental Product Declarations

The PCR review was conducted by:	Thomas P. Gloria, Ph. D., Chair (Industrial Ecology Consultants) Jack Geibig (Ecoform) Rifat Karim (Independent Consultant)

This declaration was independently verified in accordance with ISO 14025:2006. Sustainable Minds Transparency Report™/ EPD Framework: Part A: LCA calculation rules and report requirements, v2023. Part B: Commercial lavatories (v.1), based on ISO 21930:2017, serves as the core PCR.

☐ INTERNAL ☒ EXTERNAL

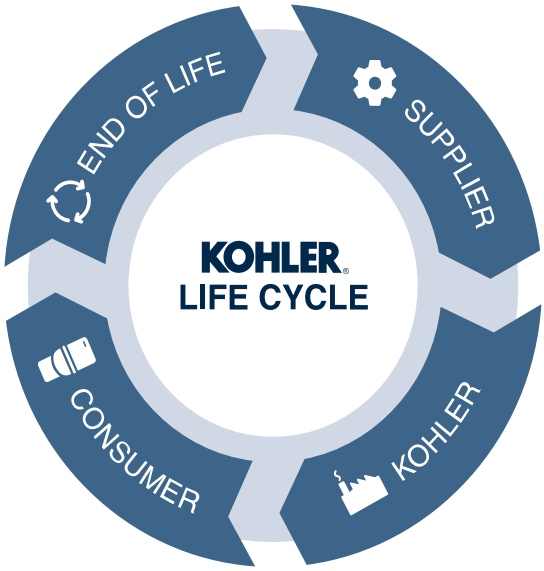
This life cycle assessment was conducted in accordance with ISO 14044, ISO 21930, and reference PCR by:	Ankit Bhardwaj, Punam Bagde, Shahana Bano, Maithili Bachhuwar (Product Transparency, Kohler Co.)
This life cycle assessment was independently verified in accordance with ISO 14044, ISO 21930, and the reference PCR by	 James Mellentine, Thrive ESG

LIMITATIONS: 1) Environmental declarations from different programs (ISO 14025) may not be comparable; 2) Comparison of the environmental performance using EPD information shall be based on the product's use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the building use phase as instructed under this PCR; 3) Full conformance with the PCR allows EPD comparability when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category PCR, and use equivalent scenarios with respect to constrution work. However, variations and deviations are possible. example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

This document is an environmental product declaration (EPD) in accordance with ISO 21930. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycles.

Environmental product declarations enable purchasers and users to compare the potential environmental performance of products on a life cycle basis. They are designed to present information transparently to make the limitations of comparability more understandable. TRs/EPDs of products that conform to the same PCR and include the same life cycle stages, but are made by different manufacturers, may not sufficiently align to support direct comparisons. They therefore cannot be used as comparative assertions unless the conditions as defined in ISO 14025 Section 6.7.2. 'Requirements for Comparability' are satisfied.

At Kohler Co., we believe in protecting the environment and enhancing the quality of life for current and future generations. When developing new products, we consider the environmental impact at each stage of a product's existence - from the activities of our suppliers through the end of the product's useful life. Designing for a better world means every choice counts.



Product Description

Sleek and contemporary, the Forefront™ rectangular vessel bathroom sink features a symmetrical, deep basin and rounded edges in true minimalist fashion. Countertop installation ensures this sink will stand out in your bathroom as a striking focal point. The included overflow cover allows users to fill the basin for even more versatility.

Additional data can be found at:

https://www.kohler.co.in/p/washbasins/forefront-580-mm-rectangular-vessel-bathroom-sink-5373in

Product Features

- Deep rectangular basin with a contemporary design minimizes splash
- No faucet holes; requires wall- or deck-mount faucet
- Center drain
- With overflow and overflow cover

Product Standards, Approvals and Certifications

Specified model meets or exceeds the following:

- None Applicable

SUPPLIER OPERATIONS

Base Material Content of the Product

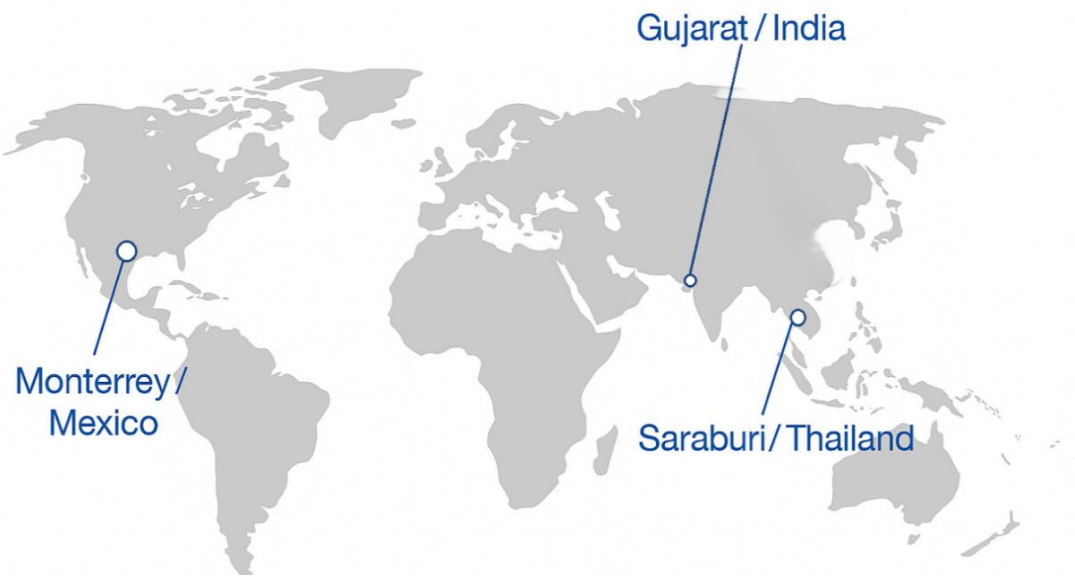
Material	Function	Quantity (% By Weight)
Clay	Slip and Glaze Ingredient	45-55
Feldspar	Slip and Glaze Ingredient	25-35
Silica	Slip and Glaze Ingredient	10-20
Corrugate	Packaging	5-10
Steel + Brass +Bronze	Miscellaneous Hardware	1-5

KOHLER OPERATIONS

Manufacturing Process Description

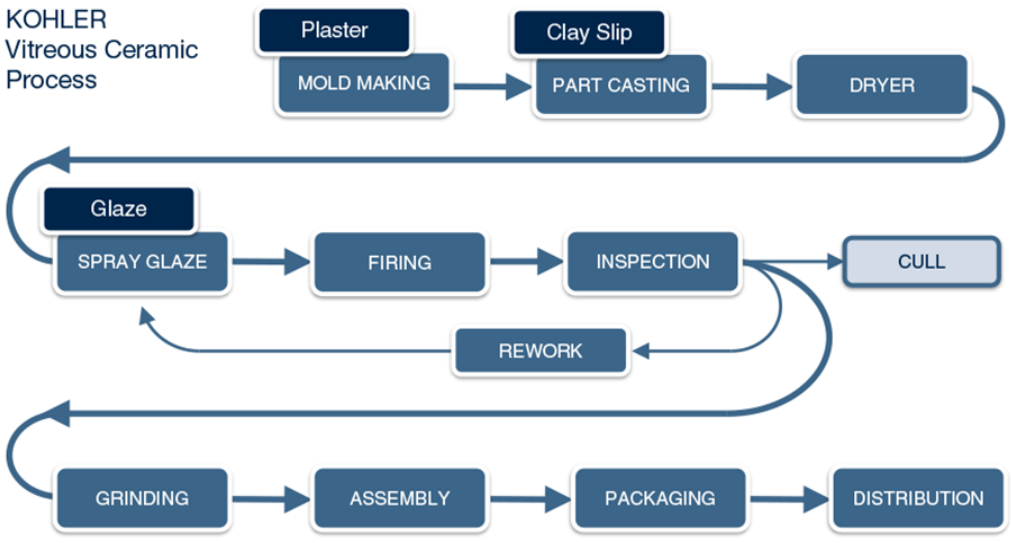
The body of vitreous ceramic sanitary ware is manufactured by casting slip - a mixture of water, clay, feldspar and silica - into a reusable mold. The cast body is partially dried, sprayed with an aqueous glaze mixture, and fired in a kiln to vitrify the product. An inspection process follows that ensures a singular high level of product quality. Finally, the ware is fitted with non-vitreous components, packaged and shipped.

Manufacturing Locations



Not all products are produced in all plants. EPDs for specific models only include data from plants in which they are produced.

Manufacturing Process



Health, Safety and Environmental Aspects during Production

Kohler Co. has established program management guidelines for safety, accident prevention and environmental performance. These systems enable Kohler Co. operations to achieve world-class performance: Kohler Safety Management System (KSMS) and Kohler Environmental Management System (KEMS). The management systems are based on best management practices, and the application of these programs consistently delivers significant results.

Packaging

Vitreous ware is packaged primarily with double-wall corrugated containerboard. When utilized, white exterior wrapping is manufactured with an Elemental Chlorine Free (ECF)/Totally Chlorine Free (TCF) bleaching process. Other packaging materials can include expanded polystyrene (EPS), low density polyethylene bags (LDPE) and honeycomb paperboard blocking.
Corrugated containerboard and honeycomb blocking are 100% recyclable, and collection is available in most municipalities. Other materials are typically recyclable; however, this is dependent on local availability of collection programs.

Installation A5

https://www.kohler.co.in/p/washbasins/forefront-580-mm-rectangular-vessel-bathroom-sink-5373in

Installation guidance is provided on the product page of the Kohler website, as highlighted above link. Packaging waste generated during installation is sent for recycling, and a transportation distance of 100 km is considered in accordance with cut-off criteria modeling.

CONSUMER USE

Conditions of Use

The use phase impacts of lavatories are primarily related to replacements and maintenance. If sold with a faucet, impacts from operational water use are also relevant.

Reference Service Life

Lavatory sink are assumed to remain in service for 20 years.

Cleaning and Maintenance

Lavatory sinks are assumed to require 260 cleanings per year with 10 ml of 1% sodium lauryl sulfate. These impacts are included within the product use stage of the LCA.

END OF LIFE

Recycle or Reuse

Collection and processing for vitreous product beneficial reuse and end-of-life are possible, but not widely available at present time

Disposal

Upon PCR default assumptions, The KOHLER® LCA model assumes 100% of the vitreous portion of the product, accessories, and packaging materials are landfilled.

LIFE CYCLE ASSESSMENT

Description of Declared or Functional Unit

The functional unit represented here refers to a single Lavatory Sink.

Name	Value	Unit
Functional Unit	Single Lavatory sink in an average commercial environment over the estimated service life of the building	
Mass	14.3	kg
Conversion factor to 1 kg	0.07	

Estimates and Assumptions

The LCI/ LCA assumptions are mentioned below:

- Product transport from Manufacturing Plant to final customer and from customer to disposal site are modeled based on PCR specifications
- Product and packaging disposal scenarios are adopted from the PCR specifications
- Building estimated service life (ESL) is assumed to be 75 years
- Biogenic carbon content is estimated for three types of packaging materials: plywood, corrugate box and kraft paper
- Carbon calcination emission factors are sourced from US-EPA technical support document
- Infrastructure and capital equipment's were considered only to the extent represented in Ecoinvent secondary datasets, as their impacts in certain cases were found to exceed the cut-off threshold.

Cut-off Criteria

Cutoff criteria**:** exclusions are allowed if <1% of mass, energy, and impacts, with total exclusions ≤5% per module; hazardous materials are never excluded regardless of quantity.
This LCA is in compliance with the cutoff criteria specified above, as no known processes were excluded from this assessment outside of the specific items listed within the System Boundary.

Allocation

Impacts are allocated to individual products using a unit process approach. Product mass is typically used as the basis for allocating impacts. In some cases, differences in production quality is also considered. For materials that cross the system boundary, the cut-off rule was applied.

Data Sources

Primary manufacturing data was collected directly from process experts for the five Kohler vitreous plants within North America and India, for calendar year of 2021-2024. Secondary data primarily references the Ecoinvent 3.11 LCI and DATASMART databases. Both databases are widely distributed and are referenced within the LCA community. All ecoinvent datasets have been critically reviewed.

Data Quality

Wherever secondary data is used,the study adopts critically reviewed data for consistency,precision,and reproducibility to limit uncertainty. The data sources used are complete and representative of North America, and India in terms of the geographic and technological coverage and are a recent vintage(i.e.,less than ten years old). Any deviations from these initial data quality requirements for secondary data are documented in the critically reviewed LCA report. When a product is produced at more than one plant,impacts are weighted by unit production quantities at each plant.

LCA Modeling Scenarios

Transport from gate to the building site (A4)		
Name	**Value**	**Unit**
Road transport distance (Diesel freight lorry)	1,680	km
Amount of Diesel	38	l/100km
Transoceanic distance (Heavy fuel oil container ship)	15,289	km
Amount of Heavy Fuel	60,000	Kg/100km

Installation into the building (A5)		
Name	**Value**	**Unit**
Auxiliary material	-	kg
Water consumption	-	m^3
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Product loss per functional unit	-	kg
Waste material at the construction site before waste processing	4.26	kg
Output materials resulting from on-site waste processing	-	kg
Direct emissions to ambient air, soil and water	-	kg

Reference service life		
Name	**Value**	**Unit**
Reference service life (RSL)	20	years

Maintenance (B2)		
Name	**Value**	**Unit**
Maintenance process information	-	-
Maintenance cycle	5200	Number/RSL
Maintenance cycle	19500	Number/ESL
Water consumption	-	m^3
Auxiliary material (cleaning agent)	195	l/ESL
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Power output of equipment	-	kW
Material loss	-	kg
Direct emissions to ambient air, soil and water	-	kg

Repair (B3)		
Name	**Value**	**Unit**
Repair process information	-	-
Inspection process information	-	-
Repair cycle	-	Number/RSL
Repair cycle	-	Number/ ESL
Water consumption	-	m^3
Auxiliary	-	kg
Other resources	-	kg
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Material loss	-	kg
Direct emissions to air, soil and water	-	kg

Replacement (B4)/Refurbishment (B5)		
Name	**Value**	**Unit**
Reference service life	20	Number/RSL
Replacement cycle	2.75	Number/ESL
Electricity consumption	-	kWh
Liters of fuel	-	l/100 km
Water consumption	-	m^3
Auxiliary material	-	kg
Replacement of worn parts	-	kg
Direct emissions to air, soil and water	-	kg

Operational energy use (B6) and water use (B7)		
Name	**Value**	**Unit**
Water consumption	-	m3/p/RSL
Electricity consumption	-	kWh
Other energy carriers	-	MJ
Equipment output	-	kW
Direct emissions to air, soil and water	-	kg

End of life (C1-C4)		
Name	**Value**	**Unit**
Road transport distance (Diesel freight lorry)	100	km
Amount of Diesel	38	l/100km
Reuse	-	kg
Recycling	-	kg
Energy recovery	-	kg
Landfilling	14.25	kg

System Boundaries

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads Beyond the System Boundaries	
Cradle to grave	Raw material supply	Transport	Manufacturing	Transport from gate to the site	Assembly/ Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling potential	Reference Service Life
	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)

Results of the Assessment

TRACI 2.2 Impact Assessment					
Module	GWP	ODP	AP	EP	POCP
	(kg CO2 Eq.)	(kg CFC-11 Eq.)	(kg SO2- Eq.)	(kg N-Eq.)	(kg O3-Eq.)
Total	2.31E+03	2.30E-05	6.90E+00	1.03E+00	1.10E+02
A1- A3	6.06E+02	5.98E-06	1.75E+00	2.58E-01	2.78E+01
A4	6.68E+00	9.83E-08	7.16E-02	1.22E-02	1.44E+00
A5	1.54E+00	5.46E-10	1.46E-04	3.07E-05	3.61E-03
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	7.60E+00	1.87E-07	5.58E-02	1.45E-02	6.19E-01
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	1.69E+03	1.68E-05	5.02E+00	7.45E-01	8.05E+01
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	2.17E-01	3.16E-09	8.45E-04	1.77E-04	2.09E-02
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	7.44E-02	7.31E-09	5.17E-04	1.14E-04	1.35E-02

CML 3.11 Impact Assessment							
Module	GWP	ODP	AP Air	EP	POCP	ADP element	ADP fossil fuels
	(kg CO2-Eq.)	(kg CFC-11 Eq.)	(kg SO2-Eq.)	(kg (PO4)3- Eq.)	(kg C2H4 Eq.)	(kg Sb-Eq.)	(MJ, LHV)
Total	2.33E+03	1.78E-05	6.39E+00	4.69E+00	3.05E-01	1.82E-03	3.04E+04
A1- A3	6.10E+02	4.62E-06	1.62E+00	1.23E+00	7.30E-02	4.38E-04	7.98E+03
A4	6.74E+00	7.47E-08	6.53E-02	1.04E-02	2.08E-03	1.74E-05	8.97E+01
A5	1.54E+00	4.16E-10	1.21E-04	3.88E-05	5.82E-06	1.26E-07	5.24E-01
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	7.62E+00	1.67E-07	5.39E-02	3.20E-02	2.33E-02	1.07E-04	8.97E+01
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	1.70E+03	1.29E-05	4.65E+00	3.41E+00	2.07E-01	1.26E-03	2.22E+04
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	2.19E-01	2.41E-09	6.99E-04	2.25E-04	3.37E-05	7.28E-07	3.03E+00
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	7.53E-02	5.51E-09	4.29E-04	1.04E-04	1.95E-05	1.09E-07	1.92E+00

Rest of the World Impact Assessment (CML & TRACI)					
Module	GWP	ODP	AP	EP	POCP
	(kg CO2-Eq.)	(kg CFC-11 Eq.)	(kg SO2-Eq.)	(kg N-Eq.)	(kg O3- Eq.)
Total	2.33E+03	1.78E-05	6.39E+00	4.69E+00	1.10E+02
A1- A3	6.10E+02	4.62E-06	1.62E+00	1.23E+00	2.78E+01
A4	6.74E+00	7.47E-08	6.53E-02	1.04E-02	1.44E+00
A5	1.54E+00	4.16E-10	1.21E-04	3.88E-05	3.61E-03
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	7.62E+00	1.67E-07	5.39E-02	3.20E-02	6.19E-01
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	1.70E+03	1.29E-05	4.65E+00	3.41E+00	8.05E+01
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	2.19E-01	2.41E-09	6.99E-04	2.25E-04	2.09E-02
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	7.53E-02	5.51E-09	4.29E-04	0.00E+00	1.35E-02

Resource Use											
Module	RPRe	RPRm	RPRt	NRPRe	NRPRm	NRPRt	SM	RSF	NRSF	RE	FW
	(MJ)	(MJ)	(MJ)	(MJ)	(MJ)	(MJ)	(kg)	(MJ)	(MJ)	(MJ)	(M3)
Total	1.03E+03	2.11E+02	1.24E+03	3.34E+04	1.56E+01	3.35E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.73E+02
A1- A3	2.41E+02	5.63E+01	2.97E+02	8.79E+03	4.16E+00	8.79E+03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.59E+01
A4	1.09E+00	0.00E+00	1.09E+00	9.64E+01	0.00E+00	9.64E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.57E-01
A5	7.37E-03	0.00E+00	7.37E-03	5.64E-01	0.00E+00	5.64E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.45E-03
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	1.23E+02	0.00E+00	1.23E+02	1.07E+02	0.00E+00	1.07E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.49E+01
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	6.66E+02	1.55E+02	8.21E+02	2.44E+04	1.14E+01	2.45E+04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.02E+02
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	4.26E-02	0.00E+00	4.26E-02	3.26E+00	0.00E+00	3.26E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.42E-02
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	1.63E-02	0.00E+00	1.63E-02	2.07E+00	0.00E+00	2.07E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.49E-01

Output Flows and Waste Categories								
Module	HWD	NHWD	HLRW	ILLRW	CRU	MFR	MER	EE
	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(kg)	(MJ)
Total	1.09E+00	1.42E+03	0.00E+00	1.14E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A1- A3	2.80E-01	3.60E+02	0.00E+00	3.00E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A4	2.47E-03	4.10E+00	0.00E+00	1.54E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A5	1.73E-05	3.22E-02	0.00E+00	1.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	2.91E-02	6.61E+00	0.00E+00	8.57E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	7.78E-01	1.04E+03	0.00E+00	8.30E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	1.00E-04	1.86E-01	0.00E+00	6.04E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	2.23E-04	1.27E+01	0.00E+00	3.92E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Greenhouse Gas Emissions and Removals								
Module	BCRP	BCEP	BCRK	BCEK	BCEW	CCE	CCR	CWNR
	(kg CO2e)	(kg CO2e)	(kg CO2e)	(kgCO2e)	(kg CO2e)	(kg CO2e)	(kg CO2e)	(kg CO2e)
Total	0.00E+00	0.00E+00	5.63E+00	5.63E+00	0.00E+00	9.60E-02	0.00E+00	0.00E+00
A1- A3	0.00E+00	0.00E+00	1.50E+00	0.00E+00	0.00E+00	2.56E-02	0.00E+00	0.00E+00
A4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
A5	0.00E+00	0.00E+00	0.00E+00	1.50E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B4	0.00E+00	0.00E+00	4.13E+00	4.13E+00	0.00E+00	7.04E-02	0.00E+00	0.00E+00
B5	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B6	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
B7	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Interpretation

The environmental impact of lavatory sinks is primarily influenced by their replacement during the estimated service life of a commercial building. This recurring replacement affects the overall life cycle impact.
Additionally, raw material extraction and the manufacturing processes contribute to various environmental impact categories. The manufacturing process mainly affects the environmental impacts due to energy consumption, particularly from natural gas and electricity. Therefore, improving energy efficiency, material substitution, supply chain localisation, and material reduction continues to be a key focus for ongoing projects.

Since most of our unit processes contribute more than 5% to the overall environmental impacts, we are providing the complete inventory table of secondary materials used in the LCA as an annexture to this file to ensure full transparency.

REFERENCES

- PCR Part A — SM transparency report™/EPD framework part A–LCA calculation rules and report requirements, 2023
- PCR Part B — Sustainable Minds Transparency Report [EPD]™ Program. Part B: Commercial lavatories (v.1)
- ISO 14025 — ISO 14025:2006, Environmental labels and declarations — Type III environmental declarations — Principles and procedures.
- ISO 14040 — ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework
- ISO 14044 — ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines
- ISO 21930 — ISO 21930:2017, Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
- WaterSense® — US EPA, Office of Wastewater Management http://www.epa.gov/watersense
- ULE 2022 — UL Environment, General Program Instructions, v2.7, 2022.
- OHSAS 18001 — Occupational Health and Safety Management Systems - Requirements
- ISO 14001 — Environmental Management Systems - Requirements with guidance for use
- ASME A112.19.2/CSA B45.1 — Ceramic Plumbing Fixtures
- ADA — Americans with Disabilities Act - Standards for Accessible Design
- ICC/ANSI A117.1 — International Code Council - Accessible and Usable Buildings and Facilities
- CSA B651 — Accessible Design for Built Environment
- OBC — Ontario Building Code Section 3.8 - Barrier-Free Design
- ICES-003 — Industry Canada, Interference Causing Equipment Standard 003 - Information Technology Equipment (ITE) - Limits and methods of measurement
- FCC part 15 — Federal Communications Commission, Title 47, Part 15 - Radio Frequency Devices
- DOE-Energy Policy Act 1992 — Department of Energy - Energy Policy Act 1992
- ASME A112.19.14 — Six Liter Closets Equipped with a Dual Flushing Device
- ADA-Children's Environment — ADA Standards for Accessible Design - Clause 604.9
- ASME A112.19.19-06 — Vitreous China Nonwater Urinals

Annexure - Inventory table for Kohler's Jhagadia Vitreous Production			
List of Materials			
Materials	**Database**	**Library**	**Remarks**
Calcined talc	Sodium silicate, solid {RoW}| sodium silicate production, furnace process, solid product | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Silica sand {RoW}| silica sand production | Cut-off, U	Ecoinvent v3.11	
Soda feldspar	Feldspar {RoW}| feldspar production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Wollastonite	Magnesium oxide {RoW}| magnesium oxide production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Silica sand {RoW}| silica sand production | Cut-off, U	Ecoinvent v3.11	
ZIRCOSIL	Zirconium oxide {RoW}| zirconium oxide production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Silica sand {RoW}| silica sand production | Cut-off, U	Ecoinvent v3.11	
CARBOCEL	Carboxymethyl cellulose, powder {RoW}| carboxymethyl cellulose production, powder | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Sodium hydroxide, without water, in 50% solution state {RoW}| market for sodium hydroxide, without water, in 50% solution state | Cut-off, U	Ecoinvent v3.11	
Potash Feldspar	Feldspar {RoW}| feldspar production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Tixolam CD31	Carboxymethyl cellulose, powder {RoW}| carboxymethyl cellulose production, powder | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Sodium silicate, solid {RoW}| market for sodium silicate, solid | Cut-off, U	Ecoinvent v3.11	
JUMBO C/C	Clay {RoW}| clay pit operation | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
China clay (KOBI CAST BALL C	Clay {RoW}| clay pit operation | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
BALL CLAY	Silica sand {RoW}| silica sand production | Cut-off, U	Ecoinvent v3.11	
SANBLEND 90	Kaolin {RoW}| kaolin production | Cut-off, U	Ecoinvent v3.11	
SODA ASH(SOD CARBONATE	Soda ash, light {RoW}| market for soda ash, light | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
QUARTZ 200 MESH1	Silica sand {RoW}| silica sand production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Aluminium oxide, non-metallurgical {RoW}| treatment of aluminium scrap, new, at refiner | Cut-off, U	Ecoinvent v3.11	
	Magnesium oxide {GLO}| market for magnesium oxide | Cut-off, U	Ecoinvent v3.11	
China clay	Clay {RoW}| market for clay | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
BENTONITE POWER	Activated bentonite {RoW}| activated bentonite production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
TITANIUM DIOXIDE RUTILE RE	Titanium dioxide {RoW}| market for titanium dioxide | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
CALCINED ALUMINA HGRM-3	Aluminium oxide, metallurgical {RoW}| market for aluminium oxide, metallurgical | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Gypsum	Gypsum, mineral {RoW}| gypsum quarry operation | Cut-off, U	Ecoinvent v3.11	
Calcium carbonate	Calcium carbonate, precipitated {RoW}| market for calcium carbonate, precipitated | Cut-off, U	Ecoinvent v3.11	
Corrugated carton	Corrugated board box {RoW}| corrugated board box production | Cut-off, U	Ecoinvent v3.11	
Pallet- to distribution center	EUR-flat pallet {RoW}| market for EUR-flat pallet | Cut-off, U	Ecoinvent v3.11	
Honeycomb block	Corrugated board box {RoW}| corrugated board box production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Stretch wrap- to distribution c	Polyethylene, linear low density, granulate {RoW}| polyethylene production, linear low density, granulate | Cut-off, U	Ecoinvent v3.11	
Slip sheet- to distribution cen	Polyethylene, high density, granulate {RoW}| polyethylene production, high density, granulate | Cut-off, U	Ecoinvent v3.11	
Cusion Foam	Polyurethane, flexible foam {RoW}| market for polyurethane, flexible foam | Cut-off, U	Ecoinvent v3.11	
Plastic Tape	Polypropylene, granulate {RoW}| polypropylene production, granulate | Cut-off, U	Ecoinvent v3.11	
Plastic bag	Polyethylene, high density, granulate {RoW}| polyethylene production, high density, granulate | Cut-off, U	Ecoinvent v3.11	
PVC Film	Polyvinyl chloride, suspension polymerised {RoW}| market for polyvinyl chloride, suspension polymerised | Cut-off, U	Ecoinvent v3.11	
Literature	Kraft paper {RoW}| kraft paper production | Cut-off, U	Ecoinvent v3.11	
Labels	Kraft paper {RoW}| kraft paper production | Cut-off, U	Ecoinvent v3.11	
Ref- refractory- estiva	Refractory, high aluminium oxide, packed {RoW}| refractory production, high aluminium oxide, packed | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Ref- refractory- icra	Refractory, fireclay, packed {RoW}| refractory production, fireclay, packed | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Ref- refractory- ips	Refractory, basic, packed {RoW}| refractory production, basic, packed | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Ref- refractory- a&s	Refractory, high aluminium oxide, packed {RoW}| refractory production, high aluminium oxide, packed | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Ref-refractory -resco	Refractory, high aluminium oxide, packed {RoW}| refractory production, high aluminium oxide, packed | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1
Sponge	Cellulose fibre {RoW}| cellulose fibre production | Cut-off, U	Ecoinvent v3.11	
Dobi pad	Cellulose fibre {RoW}| cellulose fibre production | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 2
	Polypropylene, granulate {RoW}| polypropylene production, granulate | Cut-off, U	Ecoinvent v3.11	
Plywood for ware boards	Plywood, for indoor use {RoW}| plywood production, for indoor use | Cut-off, U	Ecoinvent v3.11	
Metal, Steel	Steel, chromium steel 18/8 {GLO}| market for steel, chromium steel 18/8 | Cut-off, U	Ecoinvent v3.11	
Bulk bags	Polypropylene, granulate {RoW}| polypropylene production, granulate | Cut-off, U	Ecoinvent v3.11	
Plastic shrink wrap	Polyethylene, low density, granulate {RoW}| polyethylene production, low density, granulate | Cut-off, U	Ecoinvent v3.11	
Aluminium	Aluminium, wrought alloy {GLO}| aluminium ingot, primary, to aluminium, wrought alloy market | Cut-off, U	Ecoinvent v3.11	
Brass	Brass {RoW}| brass production | Cut-off, U	Ecoinvent v3.11	
EPS	Polystyrene, expandable {RoW}| polystyrene production, expandable | Cut-off, U	Ecoinvent v3.11	
Steel hardware	Steel, chromium steel 18/8 {GLO}| market for steel, chromium steel 18/8 | Cut-off, U	Ecoinvent v3.11	
Synthetic rubber	Synthetic rubber {RoW}| synthetic rubber production | Cut-off, U	Ecoinvent v3.11	
Bronze	Bronze {RoW}| bronze production | Cut-off, U	Ecoinvent v3.11	
Polyethylene	Polyethylene, high density, granulate {RoW}| polyethylene production, high density, granulate | Cut-off, U	Ecoinvent v3.11	
Polypropylene	Polypropylene, granulate {RoW}| polypropylene production, granulate | Cut-off, U	Ecoinvent v3.11	
Water	Water, deionised {RoW}| market for water, deionised | Cut-off, U	Ecoinvent v3.11	
Sodium lauryl sulfate	Alkyl sulfate (C12-14) {GLO}| market for alkyl sulfate (C12-14) | Cut-off, U	Ecoinvent v3.11	Kindly refer Note 1

Note: 1. Proxy: We have used the closest material if the required material is not available in SimaPro database, e.g., Clay, Feldspar
2. Modelled based on secondary data: As Material is not available in Simapro database so we have modeled it based on generic material composition.
3. Regional We have used the most suitable region data if dataset is not available in SimaPro e.g. GLO

Material	Processes	Library
Plastic	Blow moulding {RoW}| blow moulding | Cut-off, U	Ecoinvent v3.11
Plastic	Extrusion, plastic film {RoW}| extrusion, plastic film | Cut-off, U	Ecoinvent v3.11
Bronze	Casting, bronze {RoW}| casting, bronze | Cut-off, U	Ecoinvent v3.11
Brass	Casting, brass {GLO}| market for casting, brass | Cut-off, U	Ecoinvent v3.11
Steel/SS	Impact extrusion of steel, warm, deformation stroke {RoW}| impact extrusion of steel, warm, deformation stroke | Cut	Ecoinvent v3.11

Transportation Mode	Dataset	Library
Road	Transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 {RoW}| transport, freight, lorry, 16-32 metric ton, diesel, EURO 4 | Cut-off, U	Ecoinvent v3.11
Train	Transport, freight, train, fleet average {RoW}| transport, freight, train | Cut-off, U	Ecoinvent v3.11
Transoceanic	Transport, freight, sea, container ship, heavy fuel oil {GLO}| market for transport, freight, sea, container ship, heavy fuel oil | Cut-off, U	Ecoinvent v3.11

Electricity, Fuel and Water

Electricity and Fuel	Dataset	Library
Electricity Mix	Electricity, medium voltage {IN-Western grid}| market for electricity, medium voltage | Cut-off, U	Ecoinvent v3.11
Photovoltaic	Electricity, low voltage {IN-GJ}| electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted | Cut-off, U	Ecoinvent v3.11
Natural Gas	Heat, district or industrial, natural gas {RoW}| heat production, natural gas, at industrial furnace >100kW | Cut-off, U	Ecoinvent v3.11
Water	Tap water {RoW}| market for tap water | Cut-off, U	Ecoinvent v3.11

Wastewater Treatment and Disposal

Disposal	Dataset	Library
WWTP	Wastewater from ceramic production {RoW}| market for wastewater from ceramic production | Cut-off, U	Ecoinvent v3.11
Disposal	Inert waste, for final disposal {RoW}| treatment of inert waste, inert material landfill | Cut-off, U	Ecoinvent v3.11