

Environmental Product Declaration

In accordance with EN15804
and ISO14025 for

Vitreous China Ceramic Sanitaryware

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Market Coverage: Worldwide

Declaration Number

S-P-00602



THE INTERNATIONAL EPD® SYSTEM

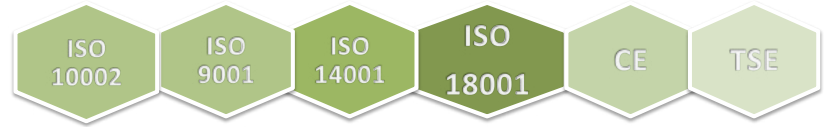
The **environmental impacts** of this product have been assessed **over its whole life cycle**. Environmental Product Declaration has been verified by an independent third party.



creavit®



The Company



The applicant of this EPD, Çanakcılar Seramik Sanayi ve Ticaret A.Ş., operates in the bathroom products sector in Turkey under the Creavit brand, manufacturing and selling sanitaryware and complementary products such as bathroom and kitchen mixers and accessories.

Çanakcılar Corporate Group started with production of mosaic toilet bowls in the 60's. The business was maintained with production and marketing of polyester coated 'ceramic-like' toilet bowls during 70's in Zonguldak, Turkey. Production of vitrified ceramic sanitaryware started in the 80's and Creavit has come a long way with increasing production year on year. Today, Creavit is exporting over 40% of its production to world markets thanks to its high quality and attractive design product range. All products are manufactured in a single plant in Gökçebey, a small district with a population of 8000 people.

Today, with their 60 000 m² factory spread over 100 000 m², they are one of Turkey's leading manufacturing companies. The most important value is the understanding of quality in the production. The emphasis Creavit places on the quality of work, human capital and environment proven with the award of national and international standards such as TSE EN ISO 9001:2008, TSE ISO 10002, TSE EN ISO 14001:2004 and TSE 18001:2008 (OHSAS).

In addition to the environmental and quality management policies, Creavit continues to engage in social activities such as building a primary school in 2007 and making botanical garden and zoo, located within the production facilities, open to the public at no cost. Besides, Creavit also open an Archaeology Museum in the city of Zonguldak to instil historical knowledge and embrace the past and the future.

And now, with the aim of getting these EPDs, Creavit will further strengthen their environmental awareness, while fulfilling the market requirements by declaring the environmental impacts of their products for Vitrous China (VC) sanitaryware products.

Statement

The LCA for this EPD is conducted in accordance with ISO 14040-44, the requirements given in the Product Category Rules (PCR) document for Construction Products and CPC 54 Construction Services (Version 1.2, 2012), EN 15804:2012 + A1:2013 Sustainability of Construction Works: Environmental Product Declarations and the general program guidelines by The International EPD System in accordance with ISO 14025 standards.

The inventory for the LCA is based on the 2013 - 2014 production figures for VC sanitaryware products from Creavit's single production plant in Zonguldak, Turkey. SimaPro LCA package with the Ecoinvent Ver. 3.0 database and CML Ver. 4.2 impact factors are used for the assessment.

EPD of construction products may not be comparable if they do not comply with EN 15804.

This EPD covers Cradle to Gate stage with disposal option for VC ceramic sanitaryware produced at a single production plant in Zonguldak, Turkey.

Product Specifications and Characterization

VC ceramic sanitaryware products are primarily made of naturally occurring raw materials such as clay, feldspar and kaolin. They may also contain other minor raw materials. Composition of VC product range is: 25-35% clay, 25-35% feldspar, 20-30% kaolin, 10-20% sand and small amount of other materials such as sodium silicate, barium, zircon, dolomite, zinc oxide and calcite.

Ceramic sanitaryware products are classified as:

- Main pieces such as WC, basin, lavatory;
- Larger bathroom pieces such as shower tray, bathtub;
- Other pieces such as bidet, pedestals and washbasins

Relevant standards for the VC ceramic sanitaryware products are shown on the table below.

Products	Relevant Standard	Description	Testing	Reference	Result
Toilet bowl	TS EN 997	WC pans and WC suites with integral trap	Depth of water seal	The depth of the water seal shall be not less than 50 mm	Compliant
			Wash of bowl	The arithmetic average of any unflushed area below the rim and above the surface of the water in the trap shall not be more than 50 cm ² after five flushing operations	Compliant
			Flushing toilet paper	12 sheets of toilet paper shall be flushed out of WC pan a minimum of 4 times out of five tests	Compliant
			Flushing of 50 plastic balls	After five tests, each with 50 balls, a minimum of 85 % of the balls shall be flushed out of WC pan	Compliant
			Oversplashing	Flushing water shall not splash beyond the rim of the bowl and wet the floor. Only a few small drops are permissible	Compliant
			After-flush volume	Required volume (2,5 L or 2,8 L) should be satisfied	Compliant
			Water absorption	The arithmetic average for water absorption of glazed ceramic WC pans shall not exceed 0,5 % by mass	Compliant
			Static Load	Wall-hung WC pans and WC suites shall withstand a force of (4,00 ± 0,05) kN without showing any evidence of cracking or permanent deformation	Compliant
			Flush volume(s) for flushing cistern of suites	The flush volume(s) for one-piece and close coupled flushing cisterns supplied a WC pan shall conform to the value(s) specified by the manufacturer	Compliant
			Leak tightness between cistern and bowl	There shall be no leakage between the WC pan and the flushing cistern	Compliant
			Outlet valve leak tightness	The outlet shall not show any leakage greater than three drops within 15 min.	Compliant
			Outlet valve reliability	The outlet mechanism functions shall be ensured. The flushing device shall not show any failure or permanent distortion of any component including linkages that prevents normal operation of the mechanism	Compliant
			Overflow	The overflow shall meet the requirements specified below a) The distance between the maximum water level and the overflow level shall be ≤ 20 mm b) The distance between the critical water level shall be ≤ 10 mm c) The distance between the meniscus level and overflow level shall be ≤ 5 mm	Compliant
			Safety margin-dimension "c"	The dimension "c" corresponding the distance between the overflowing level and the maximum nominal water level indicated by the manufacturer shall be ≥ 20 mm	Compliant
			Safety margin-dimension "a"	The dimension "a" between the overflow level and the lowest point of the air inlet orifice of the inlet valve shall be 20 mm minimum to prevent backflow	Compliant
Urinals	TSEN 13407	Wall-hung urinals - Functional requirements and test methods	Depth of water seal	The depth of the water seal shall be not less than 75 mm	Compliant
			Cleanability	Wall – hung urinal shall be cleaned easily and properly.	Compliant
			Static Load	Resistance to cracking, permanent deformation or separation from the wall under 1,00±0,01 kN vertical force applied for 1 hour	Compliant
Bidets	TS EN 14528	Bidets - Functional requirements and test methods	Cleanability	Bidets should be have the functional surfaces which easy cleaned and non- absorbent.	Compliant
			Flow rate of overflow	All Bidets should be provided in protection against overflow.	Compliant
			Static Load	Resistance to 4,00±0,01 kN for wall hung bidets under loading for 1 hour	Compliant
Wash Basins	TS EN 14688	Sanitary appliances - Wash basins Functional requirements and test methods	Static Load	Under 1.50±0.01 kN load for 1 hour wall hung wash basins, should be resistance to cracking, breaking up, or permanent deformation	Compliant
			Draining of water	Water should drain totally during testing	Compliant
			Cleanability	Washbasins should be have the functional surfaces which easy cleaned and non- absorbent.	Compliant
			Flow rate of overflow	All Bidets should be provided in protection against overflow.	Compliant
Shower Trays	TS EN 14527	Shower Trays for domestic purposes	Appearance of surface	Shower Trays should be have the functional surfaces which easy cleaned and non- absorbent.	Compliant
			Drainage of water	Water should drain totally during testing	Compliant
			Stability of bottom	There shall be no permanent distortion or other defects e.g cracks.	Compliant
			Resistance to chemicals and staining	The surface of the shower tray shall be unaffected by the chemicals and staining agents.	Compliant
Kitchen Sinks	TS EN 13310	Kitchen Sinks - Functional Requirements and Test Methods	Resistance to chemicals and staining	The surface of the sink shall be unaffected by the chemicals and staining agents.	Compliant
			Draining of water	All surfaces of the kitchen sinks should be oblique against to outlet hole.	Compliant
			Static Load	Under 1.50±0.01 kN load for 1 hour wall hung sinks, should be resistance to cracking, breaking up, or permanent deformation	Compliant
WC Pans	TS 799	Squatting WC Pans	cleaning of the bowl of squatting pan by the water	The sawdust should be clean groom the bowl of the squatting pan.	Compliant
			Surface hardness	The glazed surfaces has to be resistance to scratch with fluorite.	Compliant
			Resistance to beat	The diameter of the stain or the length of the crack can not be bigger than 5 mm.	Compliant
			Resistance to the cleaner	The glazed surface should be stay glossy after the test.	Compliant
			Resistance to Dilute Acid	There shall be no any colour of glossy differences after the test.	Compliant
			Resistance to Dilute Alkali	There shall be no any colour of glossy differences after the test.	Compliant
			Water absorption	The arithmetic average for water absorption of Squatting WC Pans shall not exceed 1 % by mass	Compliant
			Resistance to glaze cracking.	There shall be no any cracking on the glaze.	Compliant

Ceramic Sanitaryware Production Process



Based on the specific compositions, casting slips are prepared by ball milling. To remove the impurities the slip is passed through a mesh and a magnet before being stored in the storage tanks. From there, the slip is then sent to casting department for being cast into products.

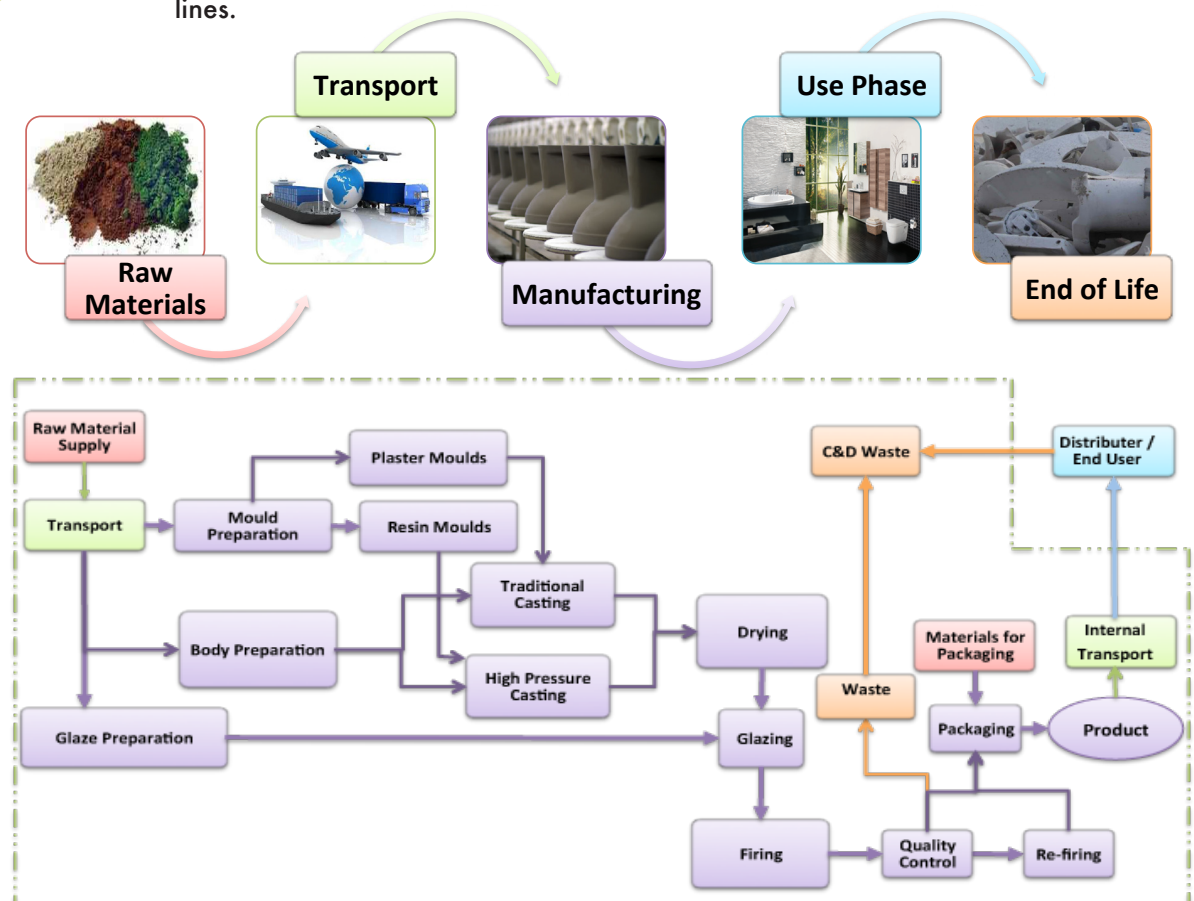
The green or unfired cast products are arranged on trolleys to undergo a natural drying process for about 1-2 days depending on the size of the products. after this stage, drying at shuttle driers about 10 -12 hours to achieve moisture content of less than 1% followed by surface treatment for a smooth finish. The dried pieces are then inspected before undergoing the glazing process.

After glazing, the products are fired at high temperature of around 1200°C for achieving VC ceramic sanitaryware, with less than 0.5% water absorption of the dry weight.

The final products go through various quality control stages. After quality control, the end products are packaged for delivery.

LCA Calculation Rules

The system boundary of the LCA assessment for the VC ceramic sanitaryware products cover all stages excluding the use pahse as shown below by the dotted lines.



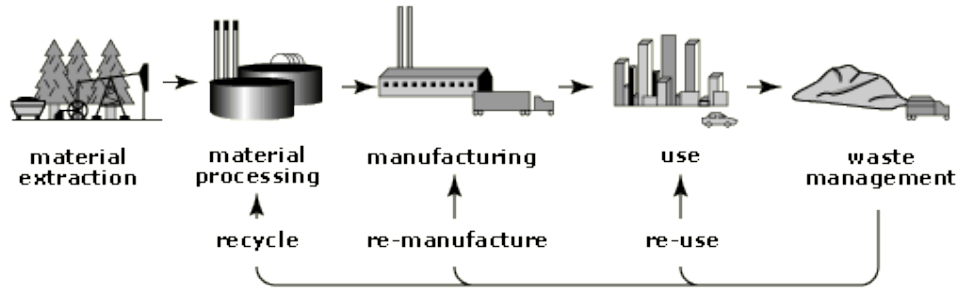
System boundary of the LCA study conducted on VC ceramic sanitaryware

LCA | Calculation Rules

Functional Unit/ Declared Unit	The functional unit (FU) is the production of 1 tonne of VC ceramic sanitaryware products average weight at 15.5 kg.
Goal & Scope	This EPD evaluates the environmental impacts of 1 tonne VC ceramic sanitaryware products from cradle to gate with disposal.
System Boundaries	System boundary covers the production of raw materials, all relevant transport to the factory gate and manufacturing processes by Creavit (cradle to gate) involve: • Raw materials acquisition and transport, • Further processing of raw materials for body slip formulation, glaze and plaster mould productions, • Production operations include casting, drying, glazing and firing, • Energy and water consumption, waste management; and • Packaging of the product final for delivery.
Estimates and Assumptions	Packaging waste for the VC products are modelled based on the 44% collection rate by law. This rate is enforced regardless of packaging materials type, i.e. 44% packaging waste collected might not refer to packaging materials used for VC sanitaryware products. In the waste scenario, however, this was assumed to be the case.
Cut - Off Rules	All raw materials are taken into account in the LCA. As a result, no cut-off rule was applied.
Background Data	Primary data used were collected from 2013 - 2014 production figures. Use of raw materials, electricity and natural gas consumptions, water use and waste data were collected. Emissions to air were not measured but taken from Ecoinvent database for relevant energy consuming processes. Ecoinvent database were used as secondary data source. Where relevant, these datasets, were modified to Turkish conditions.
Data Quality	As a measure of data quality, all primary data collected from Creavit's plant. Primary datasets were produced in SimaPro using these data.
Period Under Review	This data is representative of the manufacturing process of the year of 2013 -2014.
Allocations	There are no co-products in the production of VC ceramic sanitaryware. No product allocation is required. Transport is allocated based on the raw materials tonnages. Allocation for energy was made for VC based on 2013 - 2014 production figures.
Comparability	A comparison or an evaluation of EPD data is only possible where EN 15804 has been followed, and the same building context and product-specific characteristics of performance are taken into account and the same stages have been included in the system boundary. According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. All the waste resulting from the main production and related processes of Idevit is managed in accordance with valid legal requirements.

LCA Results

Representation of Life Cycle Assessment Stages



Upstream Processes (A1: Raw Material Supply)

For VC products, production starts with mainly locally sourced raw materials. 'Raw material supply' stage includes pre-treatment processes.

Core Processes (A2: Transportation and A3: Manufacturing)

Transport stage is relevant for delivery of raw materials to the plant and forklift usage within the factory.

Manufacturing stage includes casting slip preparation, casting, drying, glazing, firing and packaging.

Downstream Processes (C4: Disposal)

All ceramic sanitaryware products end up at landfill as their final fate and modelled accordingly in the LCA. There is no open loop recycling within the manufacturing. Part of the packaging waste is assumed to end up at packaging recycling streams due to a national law, which requires manufacturers to have at least 44% of their packaging waste to be recovered. Gypsum plaster moulds at the end of their useful life are also discarded to landfill (C4).

Benefits and loads beyond the product system boundary in information Module D

No possible benefits of recycling and re-use were taken into account in the LCA. Inert waste was stored on site then disposed of in landfills according to current legislation. However, every effort is made by Creavit to find an outlet to get this material recycled back for other potential uses.

Description of the system boundary (X = Included in LCA, MND = Module Not Declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE								END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement ¹⁾	Refurbishment ¹⁾	Operational energy use	Operational water use	De-construction/ Demolition	Transport	Waste processing	Disposal	Reuse-Recycling-Recovery Potential	
					A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6		B7
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	MND

Indicators for the Life Cycle Analysis as per EN15804

		Manufacturing	End of Life
Parameter	Unit	A1 - A3	C4
Use of renewable primary energy excluding resources used as raw materials	[MJ]	0.56	0.00
Use of renewable primary energy resources used as raw materials	[MJ]	444	0.00
Total use of renewable primary energy resources	[MJ]	444	0.00
Use of non-renewable primary energy excluding resources used as raw materials	[MJ]	13471	267
Use of non-renewable primary energy resources used as raw materials	[MJ]	0.00	0.00
Total use of non-renewable primary energy resources	[MJ]	13471	267
Use of secondary material	[kg]	0.00	0.00
Use of renewable secondary fuels	[MJ]	0.00	0.00
Use of non-renewable secondary fuels	[MJ]	0.00	0.00
Use of net fresh water	[m³]	5.19	-0.068

Results of the LCA - Resource use for 1 tonne of VC ceramic sanitaryware

The results of the LCA with the indicators as per EPD requirement are given in the following tables for product manufacture (A1, A2, A3) and disposal (C4). The system boundaries in tabular form for all modules is shown in the table above. Life Cycle Inventory Analysis indicators describing the use of resources are shown above.

		Manufacturing	End of Life
Parameter	Unit	A1-A3	C4
HWD	[kg]	0.246	-
NHWD	[kg]	210	1000
RWD	[kg]	-	-
CRU	[kg]	8.23E-02	2.87E-02
MFR	[kg]	0.033	0.0495
MER	[kg]	-	-
EE [Typ]	[MJ]	-	-

Output flows and waste categories for 1 tonne of VC ceramic sanitaryware

Table above shows the impacts respectively for VC according to the following categories: Hazardous waste disposed (HWD), Non-hazardous waste disposed (NHWD), Radioactive waste disposed (RWD), Components for re-use (CRU), Materials for recycling (MFR), Materials for energy recovery (MER), Exported energy per energy carrier (EE).

		Manufacturing	End of Life
Parameter	Unit	A1-A3	C4
Global Warming Potential	[kg CO ₂ eq.]	854	20.8
Ozone Depletion Potential	[kg CFC11 eq.]	6.52E-05	1.09E-06
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene eq.]	1.48E-01	6.25E-03
Acidification Potential	[kg SO ₂ eq.]	2.78E+00	6.62E-02
Eutrophication Potential	[kg PO ₄ ³⁻ eq.]	7.54E-01	5.08E-02
Abiotic depletion potential for non-fossil resources	[kg Sb eq.]	5.85E-04	1.13E-05
Abiotic depletion potential for fossil resources	[MJ eq.]	13110	253

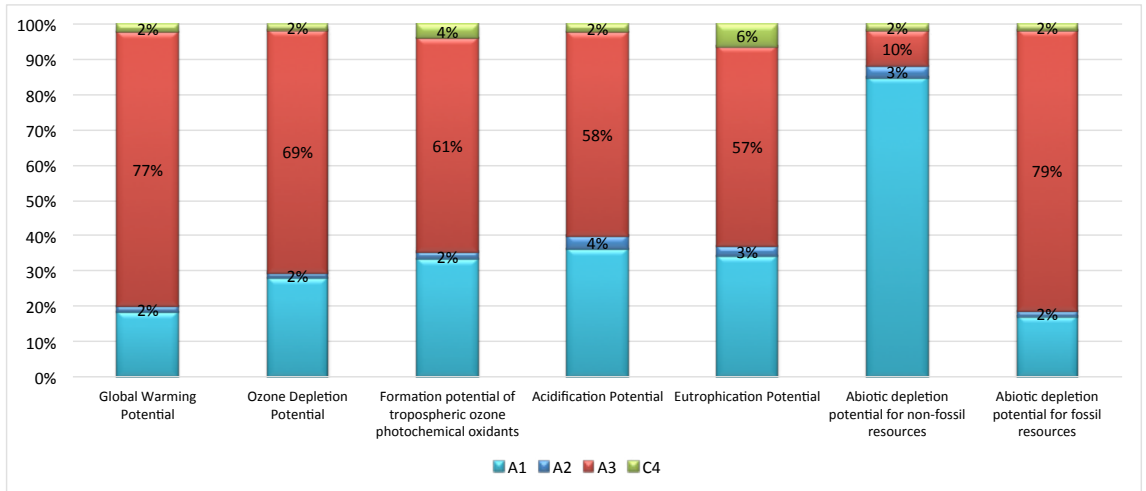
LCA- Environmental impacts for 1 tonne of VC ceramic sanitaryware

Table above depicts the contributions in the production of 1 tonne VC, to the following impact categories, calculated using CML-IA baseline (v4.2) method: ozone depletion potential (ODP), formation potential of tropospheric ozone photochemical oxidants, acidification potential, eutrophication potential and abiotic depletion potential for fossil resources.

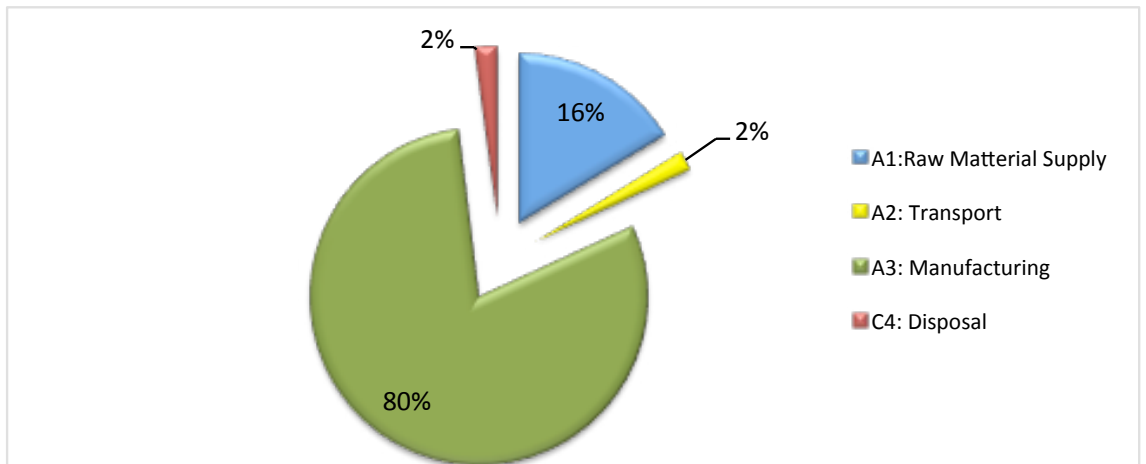
Environmental Interpretations

The relative impacts of all life cycle stages for VC are shown in figure below, in terms of EPD impact categories.

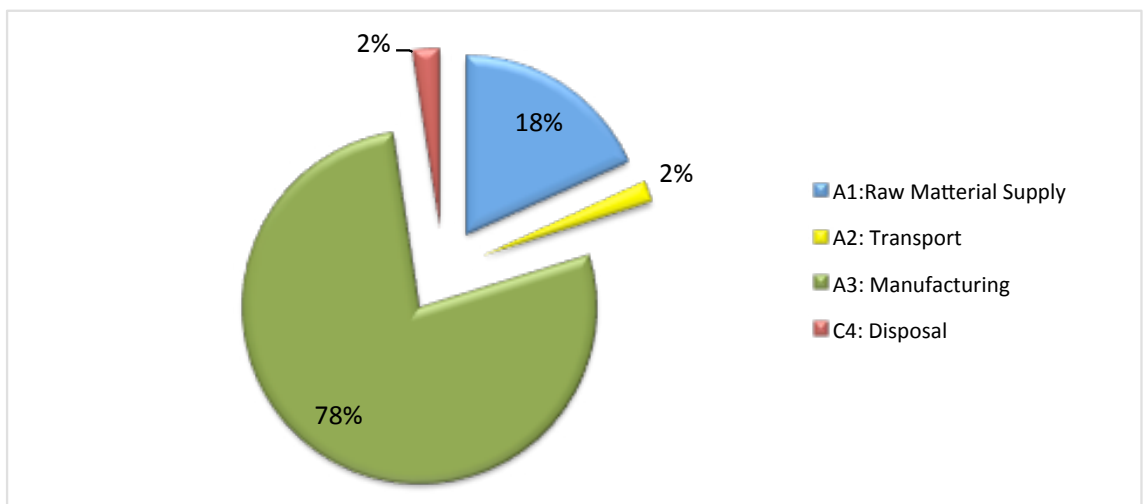
All impact categories except abiotic depletion potential for non-renewable resources, manufacturing (A3) represents the life cycle stage with the biggest impact. The GWP of manufacturing is 79%, while raw materials supply has about 19% of the total carbon emissions followed by transport of 2%. The carbon impact of 1 tonne VC manufactured by Creavit is 821 kg CO₂ eq. As expected from sanitary manufacturing, natural gas has the most impacts on GWP followed by electricity consumption.



Relative impacts of LCA stages by each EPD indicator of Vitrous China Clay ceramic



Total energy contribution to each life cycle stage for Vitrous China Clay ceramic, MJ



Global Warming Potential at each life cycle stage for Vitrous China Clay ceramic, kg CO₂ eq.



References

/ISO 9001/ DIN EN ISO 9001:2008, Quality Management System-Requirements

/TS EN 997/ Standard for WC pans and WC suites with integral trap

/TS EN 13407/ Standard for Wall-hung urinals – Functional requirements and test methods

/TS EN 14528/ Standard for Bidets – Functional requirements and test methods.

/TS EN 14688/ Standard for Sanitary appliances – Wash basins – Functional requirements and test methods.

/EN 15804/ EN 15804:2012+A1:2013, Sustainability of construction works – Environmental Product Declarations – Core rules for the product category of construction products

/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations – Type III environmental declarations – Principles and procedures

/ISO 14040-44/ DIN EN ISO 14040:2006-10, Environmental management – Life cycle assessment – Principles and framework (ISO 14040:2006) and Requirements and guidelines (ISO 14044:2006)

/PCR for Construction Products and CPC 54 Construction Services/ Prepared by IVL Swedish Environmental Research Institute, Swedish Environmental Protection Agency, SP Trä, Swedish Wood Preservation Institute, Swedisol, SCDA, Svenskt Limträ AB, SSAB, The International EPD System, 2012:01 Version 1.2, DATE 2013-03-15

/The International EPD® System/ The International EPD® System is a programme for type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025.www.environdec.com

/Ecoinvent / Ecoinvent Centre, www.Eco-invent.org

/SimaPro/ SimaPro LCA Package, Pré Consultants, the Netherlands, www.pre-sustainability.com

Verification & Registration Contacts

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Programme Related Information

Generic PCR Review
Conducted by

Technical Committee of the International EPD® System

Calculation Procedure

SimaPro 8.0.3 Software
(Metsims Sustainability Consulting)

System Boundaries

☐ Cradle to Gate ☒ Cradle to Gate with option ☐ Cradle to Grave

Disclaimer

All values provided in this Environmental Product Declaration are a direct result from the use of characterisation factors and calculation rules as defined in the SimaPro software. The environmental indicators used for these calculations are based on CML Baseline V4.2 April 2013.

For more information about this Environmental Product Declaration or its contents, contact process owner, Mr Dursun Kayaci on d.kayaci@creavit.com.tr.

Demonstration of Verification

PCR Review was conducted by: Technical Committee of EPD International AB. Valhallavägen 81, 114 27 Stockholm, Sweden www.environdec.com info@environdec.com	
Independent Verification and data, according to ISO 14025:2006 Internal ☐ External ☒	
Third Party Verifier: Mr Marcus Wendin Sodra Larmgatan 6, 411 16 Goteborg Sweden	

CEN Standard EN 15804:2012 + A1:2013 Sustainability of Construction Works serves as core PCR and Construction Products and CPC 54 Construction Services (2012:01 Version 1.2, 2013-03-15) serves as specific PCR.	
Independent Verification and data, according to EN ISO 14025:2010 Internal ☐ External ☒	
Third Party Verifier: Mr Marcus Wendin Sodra Larmgatan 6, 411 16 Goteborg Sweden	