

# ENVIRONMENTAL PRODUCT DECLARATION



ENVIRONMENTAL PRODUCT DECLARATIONS

In accordance with ISO 14025 and EN 15804 for:

**Wall Tile**

from

**VitrA Karo**

# VitrA

<b>Programme:</b>	EPD Turkey, a fully aligned regional programme <a href="http://www.epdturkey.org">www.epdturkey.org</a>	The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a>
<b>Programme operator:</b>	EPD Turkey SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY	EPD International AB
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<b>Geographical scope:</b>	Global	



# PROGRAMME INFORMATION

Programme	EPD Turkey, a fully aligned regional programme	The International EPD® System
	SÜRATAM – Turkish Centre for Sustainable Production Research & Design Nef 09 B Blok No:7/15 34415 Kağıthane/Istanbul, TURKEY  www.epdturkey.org info@epdturkey.org	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden  www.environdec.com info@environdec.com

Product Category Rules (PCR): The International EPD® System's PCR 2012:01 Construction Products and Construction Services, Version 2.3, 2018-11-15 and Sub-PCR-L Ceramic Tiles EN 17160

Independent third-party verification of the declaration and data, according to ISO 14025:2006:

EPD process certification     EPD verification

Third party verifier: PhD Vladimír Kočí - LCA Studio

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes     No

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 norm.

# ABOUT THE COMPANY



It all started  
with a small workshop  
in the Istanbul district of Kartal...

Propelled by a vision of smart and sustainable living for people of every age, ability, and cultural background, the Eczacıbaşı Building Products Division is gaining prominence in global design markets while maintaining its longstanding leadership in Turkey's ceramic sanitary ware and ceramic tile markets.

In pursuing this vision, the Division is supported by its multi-brand/multi-manufacturing site/multi-market growth strategy. Eight of the Division's 13 manufacturing sites are located in major international markets, including France, where it is the majority shareholder of V&B Fliesen GmbH, the former tile division of Villeroy & Boch AG, and Germany, where it owns Burgbad AG, the leader of the European luxury bathroom furniture market. In Russia, another major market, the Division has established two manufacturing plants for tiles and ceramic sanitary ware that are supporting its growing sales in the region.

Investments in capacity have been matched by an expansion of the Division's marketing network in international markets, high profile brand and product communication campaigns, and the development of innovative products and collections – an area where it is collaborating with prominent international designers.

VitrA also has a team of in-house designers who represent the backbone of its design philosophy and culture. These emerging stars are supported by multidisciplinary teams at the VitrA Innovation Center, Turkey's first R&D center for building products, which the Division established in 2011. Increasingly contributing to the performance of the Division, the VitrA Innovation Center has received the distinction of "Best R&D Center in the Ceramics and Refractory Industry" from the Turkish Ministry of Science, Industry and Technology for five consecutive years.

International sales, which account for about two-thirds of the Division's total sales, are supported by the Division's marketing and sales companies in Germany, the UK, and Russia. In collaboration with the marketing and sales offices of the Division's manufacturing subsidiaries in Europe, this network serves some 21,000 retail sales points (including sub-dealers) and 150 exclusive showrooms in major international markets.

VitrA Tile manufactures some 4000 varieties of ceramic, porcelain tiles for building interiors and exteriors, terracing and swimming pools. Most of these tiles are produced at its plant at the Building Product Division's production compound at Bozüyük, which has an annual tile capacity of 23 million square meters.

VitrA branded tiles manufactured at the plant in Bozüyük are the first in Turkey's ceramics industry to receive the European Union Eco-Label as well as the Turkish Standards Institute's Double Star Certification.

## Product Description

Wall tiles contain inorganic materials such as clay, kaolin and feldspar, but they may also include other raw materials. The production technology of tiles is dry pressing. The required composition is blended with water to form slurry. This slurry then fed into spray driers to form uniform granules ready for compaction. These granules are then shaped to form the green body. The formed green body may then be glazed if required. The green ceramic body is fired at high temperatures, resulting in a hard body. Vitra wall tiles come in several various dimensions depending on the intended use. Wall tiles have water absorption of more than 10%.

This EPD covers the production of porcelain tiles in Bozüyük, Bilecik plant. UN CPC code for wall tiles is 3731. The assessment is based on the most produced tile type within the product range for 1 m<sup>2</sup> of wall tile.



## Product Application

Wall tiles are largely used as interior wall coverings. Interior applications are mainly in bathrooms and kitchens in residential applications.

No substances included in the Candidate List of Substances of Very High Concern for authorisation under the REACH Regulations are present in the ceramic tiles manufactured by Vitra, either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).





## Technical Specifications

Tests such as dimension and surface quality, physical and chemical properties are applied to wall tiles. All Vitra tiles ready for delivery pass these tests. Relevant standards for testing are listed in section "More Information".

Water absorption	E > 10 %
Breaking strength	min. 600 N for thickness ≥ 7.5 mm min. 200 N for thickness < 7.5 mm
Modulus of rupture	min. 15 N/mm <sup>2</sup>
Deep abrasion	Not applicable
Surface abrasion	Not intended to be used on the floor
Coefficient of friction	Not intended to be used on the floor
Staining Resistance	min. Class 3
Resistance to household chemicals, pool salts	min. Class B

## Base and Ancillary Materials

Main raw materials for wall tiles:

- Clay 60 - 65%
- Feldspar 5 - 10%
- Calcite 10 - 15%
- Kaolin 5 - 10%
- Other <1%

Auxiliary substances / additives:

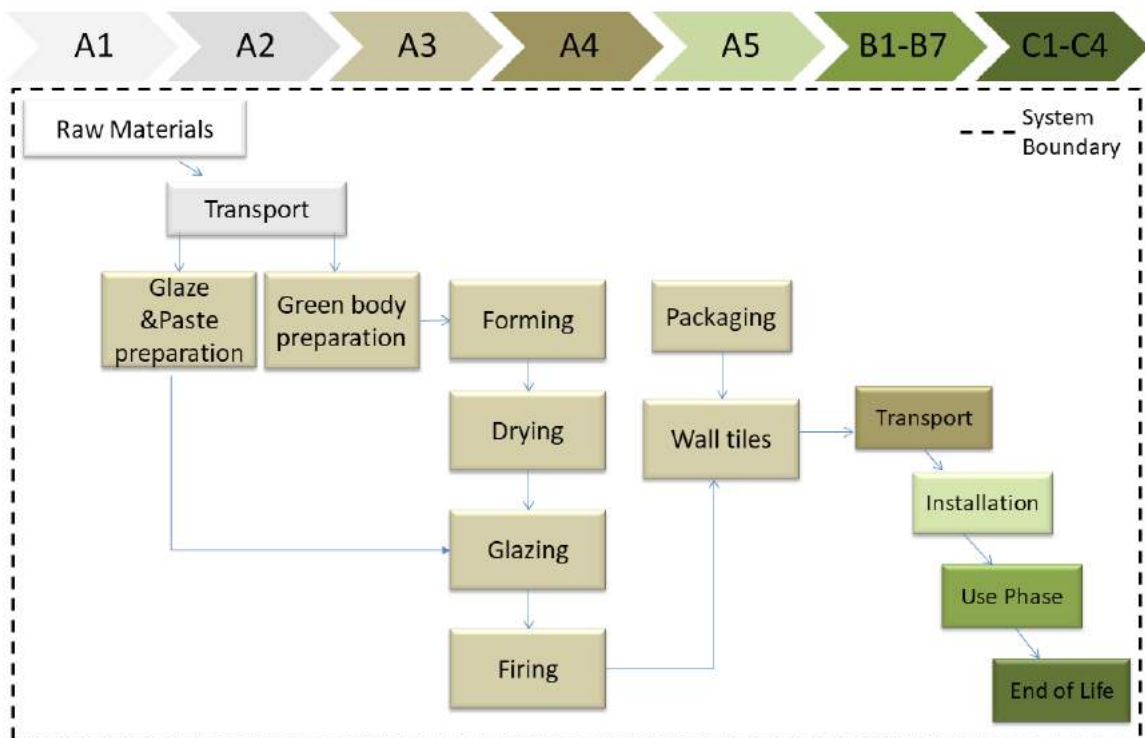
- Dispersant
- Pigment
- Binder
- Rheological additives



## Manufacturing

Wall tiles include several different products with different recipes. According to the recipe, raw materials are loaded into the mills for wet grinding and to form a slurry. The slurry then spray dried to form granules and after sieving process stored in the press-feeding silos ready for dry compaction. Hydraulic presses are used for dry compaction to form green tile. Green tiles are then dried in fast vertical-drying unit to remove the excess humidity before glazing applications or might remain unglazed. Within the glazing unit printing and other surface design applications are performed. Tiles are then fired at high temperatures to form hard body. After quality checks, tiles are packed for dispatch.

Manufacturing process of wall tiles can be seen in detail from the flow chart given below.



Flow chart of manufacturing wall tiles and LCA system boundary.



## Product Processing / Installation

Wall tiles are fixed to the walls using tile cement and subsequently the seams are filled with mortar. No emissions occur during the installation stage.

## Packaging

Products are packed in cardboard boxes, nylon and stacked on wooden pallets.

## Condition of Use

Wall tiles are solid and chemically stable materials and can be used many covering applications.

## Delivery Status

The dimensions of products in the delivery status vary between 1cmx1cm to 75cmx150cm according to customers demand. The thickness varies between 5mm and 14mm depending on the product properties.

## Reference Service Life

The Reference Service Life (RSL) of the wall tiles is thought to be same as with the whole building life.

## Reuse Phase

Wall tiles are not collected for the purposes of reuse or recycled materials.

## Disposal

According to the European Waste Catalogue and The Waste Code List of the Turkish Ministry of Environment and Urban Planning, porcelain tiles waste belongs to the group of construction and demolition wastes - tiles and ceramics" (code: 17 01 03). After domestic usage, ceramic tile products end up at construction and demolition waste landfills.





## Environment and Health at Vitra

### *Occupational health and safety*

Studies on health and safety of employees and safety of working conditions are conducted. Existing and potential risks are assessed and decreased to acceptable levels. All taken measures are included in a OHSAS 18001 Occupational Health and Safety Management System.

### *Environmental protection*

Vitra Tiles Co.'s environmental policy is based on the principle "Being aware of our responsibilities towards the environment and society, our aim is to bequeath a viable and clean environment to future generations". Adopting a green approach both to the production process and to products, protecting the environment and reducing the consumption of resources such as raw materials, energy and water are vital components of all processes.

Vitra Tiles Co. re-uses residual glaze and mud in production, recovers the waste heat of the kilns and uses it for spray drying. The company treats domestic and industrial wastewater and reuses over 90% of the treated industrial water in production, and has built a pallet repair station and begun repairing old pallets by re-using them in packaging.

Activities being conducted include: Reducing noise levels in the processes from 90 dbA to 80 dbA through sound insulation, making the dust collection system a closed-cycle combining the forklift battery charging points in a single location and establishing a "battery charging station", eliminating back injury risks in the Quality Separation areas by employing a conveyor system and establishing a ventilation system to reduce ambient temperature.

Protection of environment, decreasing and legal withdrawal of wastes, effective usage of natural resources, decreasing of environmental risks is of primary importance. Activities relating to recycling of wastes and effective usage of resources, casting of environmental effects before plant and process design are conducted according to certified ISO 14001 Environmental Management System.

Continuous improvement works for effective usage of energy, energy effectiveness projects, assessment of present-potential opportunities, development and application of energy policy and reduction of greenhouse gas emissions done according to ISO 50001 Energy Management System.

The technology investments of energy for conscious usage and recycling to nature, responsibility of preserving natural resources started from production phase for all processes and recycling systems were developed to decrease wastes to minimum.

## Relevant Standards

Wall tiles comply with many standards.

- EN 14411:2016, Ceramic tiles - Definitions, classification, characteristics and marking
- ANSI A137.1:2017, American National Standard Specifications for Ceramic Tile
- ISO 13006:2018, Ceramic tiles - Definitions, classification, characteristics and marking
- Test methods according to EN 14411:2016 and ISO 13006:2018:
- EN ISO 10545-1:2014, Ceramic tiles - Part 1: Sampling and basis for acceptance (ISO 10545-1)
- EN ISO 10545-2:2018, Ceramic tiles - Part 2: Determination of dimensions and surface quality (ISO 10545-2, including Technical Corrigendum 1)
- EN ISO 10545-3:2018, Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density (ISO 10545-3, including Technical Corrigendum 1)
- EN ISO 10545-4:2019, Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength (ISO 10545-4)
- EN ISO 10545-5:1996, Ceramic tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution (ISO 10545-5, including Technical Corrigendum 1)
- EN ISO 10545-6:2010, Ceramic tiles - Part 6: Determination of resistance to deep abrasion for unglazed tiles (ISO 10545-6)
- EN ISO 10545-7:1996, Ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles (ISO 10545-7).
- EN ISO 10545-8:2014, Ceramic tiles - Part 8: Determination of linear thermal expansion (ISO 10545-8)
- EN ISO 10545-9:2013, Ceramic tiles - Part 9: Determination of resistance to thermal shock (ISO 10545-9)
- EN ISO 10545-10:1995, Ceramic tiles - Part 10: Determination of moisture expansion (ISO 10545-10)
- EN ISO 10545-11:1994, Ceramic tiles - Part 11: Determination of crazing resistance for glazed tiles (ISO 10545-11)
- EN ISO 10545-12:1995, Ceramic tiles - Part 12: Determination of frost resistance (ISO 10545-12, including Technical Corrigendum 1)
- EN ISO 10545-13:2016, Ceramic tiles - Part 13: Determination of chemical resistance (ISO 10545-13)
- EN ISO 10545-14:2015, Ceramic tiles - Part 14: Determination of resistance to stains (ISO 10545-14, including Technical Corrigendum 1)
- EN ISO 10545-15:1995, Ceramic tiles - Part 15: Determination of lead and cadmium given off by glazed tiles (ISO 10545-15)
- EN ISO 10545-16:2010, Ceramic tiles - Part 16: Determination of small colour differences (ISO 10545-16).

For additional information about VitrA Tiles Co. and its design, production and management philosophy, please follow Bluelife®, <http://www.vitrabluelife.com>

## PRODUCT STAGE

**A1. Raw Material Supply** includes raw material extraction and pre-treatment processes before production. In this report, production for each product starts with raw material acquisition.

**A2. Transport** is relevant for delivery of raw materials to the plant and involves forklift usage within the factory.

**A3. Manufacturing** stages include production of granules by spray drying, forming, drying, glazing, firing and packaging. Transport is only relevant for delivery of raw materials to the plant and forklift usage within the factory. Packaging waste scenario is created separately depending on the geographic location of the installation process. Packaging waste is assumed to end up at packaging recycling streams due to the relevant national law in Turkey, which requires at least 54% of the packaging waste to be recovered in 2018.

## CONSTRUCTION PROCESS STAGE

**A4. Transport** includes transportation of wall tiles to the construction site. Vitra transport tiles by seaway (96%), airway (2%) and road haulage (2%) to the distribution centres for export. From distribution centers, freight of 6350 km with transoceanic ship for seaway, 2510 km with aircraft for airway and 3900 km with Euro 5 class truck with capacity of 27 tonnes for road haulage is assumed. Local deliveries is done by road haulage and transportation of 200 km with 27-tonnes Euro 5 class is assumed.

**A5. Installation of the Product** stage includes the adhesive mortar and water usage in the construction site. For 1 m<sup>2</sup> wall tile installation; 6 kg mortar and 1.5 L water usage was assumed. A wastage of 3% (in mass) is assumed during the installation.

## USE STAGE

**B1. Use** stage concerns emissions into environment. Wall tiles are inert materials, so during the use stage, they do not cause any emissions. Hence, use phase is not relevant for the assessment.

**B2. Maintenance** includes cleaning with water and detergent. Vitra recommends to use detergent containing stain remover or neutral low-sulphate and rinse with tap water after cleaning. 0.2 mL detergent and 0.1 L water use is assumed to wash 1 m<sup>2</sup> Vitra

wall tiles. Maintenance cycle of Vitra wall tiles is 4 times a year.

**B3. Repair:** Vitra wall tiles require no repairing during the use phase and therefore no impacts has occurred in this module.

**B4. Replacement:** Vitra wall tiles require no replacement during the use phase and therefore no impacts occurred in this module.

**B5. Refurbishment:** Vitra wall tiles require no refurbishment during the use phase and therefore no impacts has occurred in this module.

**B6. Operational Energy Use:** Operational energy use is not relevant for this product.

**B7. Operational Water Use:** Operational water use is not relevant for this product.

## END OF LIFE STAGE

**C1. De-construction, Demolition** at the end of RSL is usually conducted with a selective deconstruction/demolition. The environmental impacts generated during this phase are very low and therefore can be neglected.

**C2. Transport (Waste)** includes the transportation of the discarded tiles and adhesive mortar to final disposal. Average distance from demolition site to inert landfill site for final disposal is assumed to be 50 km.

**C3. Waste Processing** concerns processing of discarded wall tiles for recycle or reuse. The environmental impacts generated during this phase are very low and therefore can be neglected.

**C4. Disposal** is the final stage of product life. Wall tiles end up at construction and demolition waste landfills as their final fate and modelled as such in this LCA.



# ENVIRONMENTAL PERFORMANCE RELATED INFORMATION

Functional Unit	The functional unit is the production of 1 m <sup>2</sup> the most produced wall tile with a mass of 13.98 kg.
Goal and Scope	Evaluation of environmental impacts for 1 m <sup>2</sup> wall tile from the range of products that are produced the most from cradle to grave.
System Boundary	The system boundary covers A1 - A3 product stages referred as 'Raw material supply', 'Transport' and 'Manufacturing', A4 - A5 'Construction', B1 - B7 'Use' and C1 - C4 'End of life' stages.
Cut-off Rules	For this LCA study, 1% cut-off was applied.
Background Data	For local data specific for Turkey, Turkish Life Cycle Inventory Database (TLCID) developed by SÜRATAM was used. For any other background data the EcoInvent database (Ver.3.5) was used.
Data Quality	Raw materials, energy and water consumption, waste and material and product transport data is collected from Vitra.
Period Under Review	All primary data collected from Vitra refers to the period year of 2018.
Allocations	No allocation was performed for this LCA study.



PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw Materials Supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction	Transport	Waste processing	Disposal	Reuse-Recycling-Recovery Potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	NR	X	X	X	X	NR	NR	X	X	X	X	MND

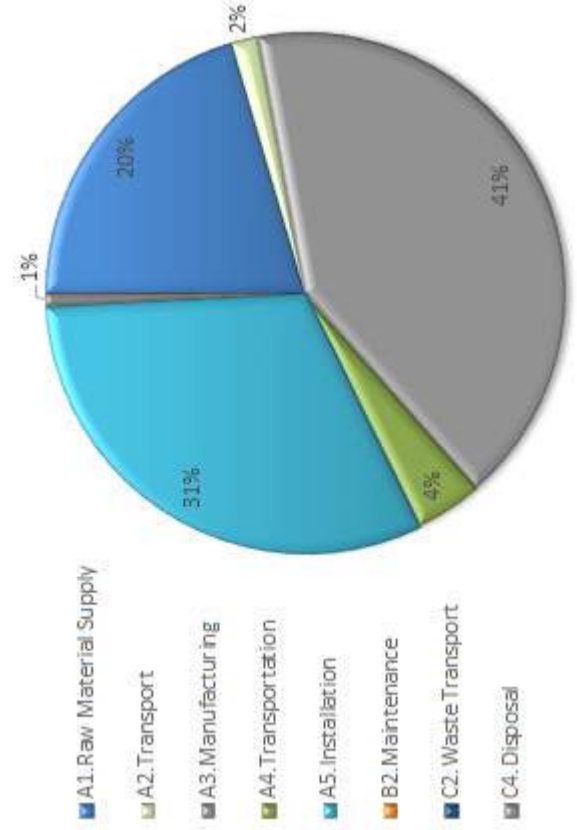
Description of the system boundary (X = Included in LCA, MND= Module Not Declared, NR=Not Relevant)

The system boundaries in tabular form for all modules are shown in the table above. The results of the LCA with the indicators as per EPD requirement are given in the following tables for product stage (A1 - A3), construction process (A4, A5), use stage (B1 - B7), and end of life (C1 - C4).

Life Cycle Inventory Analysis indicators describing the use of resources are determined respectively to the following impact categories, calculated using CML-IA Baseline (Ver. 3.5) method: Global Warming Potential (GWP) for time span of 100 years, Ozone Layer Depletion Potential (ODP) with time span of infinity, Formation Potential of Tropospheric Ozone Photochemical Oxidants (POCP) with time span of 5 days, Acidification Potential (AP) with time span of eternity, Eutrophication Potential (EP) with time span of eternity, Photochemical Oxidation (POCP) and Abiotic Depletion Potential for Fossil (ADPF) and Non-fossil (ADPE) resources. All energy calculations were done using Cumulative Energy Demand (LHV) (ver. 1.0) methodology. The freshwater use value for manufacturing life cycle was taken from the manufacturer as the net freshwater consumption occurs during the manufacturing stage only. Water Scarcity (WSI) was calculated using AWARE methodology.

## ENVIRONMENTAL IMPACTS, 1 m<sup>2</sup> WALL TILE

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	TOTAL	
Global warming Potential	Fossil	[kg CO <sub>2</sub> eq.]	5.09e+00	414e-03	10.3e+00	1.04e+00	7.81e+00	0.40e-03	0	0	0	NR	NR	0	6.00e-03	0	166e-03	24.9e+00	
	Biogenic	[kg CO <sub>2</sub> eq.]	22.0e-03	0.10e-03	8.00e-03	0.27e-03	45.0e-03	5.33e-06	0	0	0	NR	NR	0	1.55e-06	0	38.0e-03	113e-03	
	Land Use & Transformation	[kg CO <sub>2</sub> eq.]	4.00e-03	0.32e-03	19.0e-03	0.27e-03	6.00e-03	0.62e-03	0	0	0	NR	NR	0	2.10e-06	0	69.1e-06	31.0e-03	
Total	[kg CO <sub>2</sub> eq.]	5.11e+00	415e-03	10.4e+00	1.04e+00	7.86e+00	1.00e-03	1.00e-03	0	0	0	NR	NR	0	6.00e-03	0	204e-03	25.0e+00	
Ozone Layer Depletion Potential	[kg CFC11 eq.]	0.34e-06	71.5e-09	0.63e-06	0.19e-06	0.69e-06	52.5e-12	0	0	0	NR	NR	NR	0	1.06e-09	0	44.5e-09	1.96e-06	
Acidification Potential	[kg SO <sub>2</sub> eq.]	19.0e-03	1.00e-03	20.0e-03	8.00e-03	43.0e-03	2.99e-06	0	0	0	NR	NR	NR	0	0.19e-06	0	1.00e-03	92.0e-03	
Eutrophication Potential	[kg PO <sub>4</sub> <sup>3-</sup> eq.]	7.0e-03	0.40e-03	8.00e-03	1.00e-03	15.0e-3	3.00e-06	0	0	0	NR	NR	NR	0	4.54e-06	0	0.50e-03	32.0e-03	
Photochemical Oxidation Potential	[kg C <sub>2</sub> H <sub>4</sub> eq.]	1.00e-03	69.1e-06	1.00e-03	0.30e-03	4.00e-03	0.57e-06	0	0	0	NR	NR	NR	0	0.99e-06	0	60.8e-06	7.00e-03	
Abiotic Depletion Potential	[kg Sb eq.]	27.6e-06	1.14e-06	2.18e-06	1.40e-06	41.5e-06	2.01e-09	0	0	0	NR	NR	NR	0	23.6e-09	0	0.22e-06	74.0e-06	
Abiotic Depletion Potential (Fossil Resources)	[MJ]	49.6e+00	6.16e+00	137e+00	15.2e+00	105e+00	4.00e-03	NR	0	0	0	NR	NR	0	88.0e-03	0	4.08e+00	318e+00	
Legend		NR: Not Relevant																	



Global Warming Potential



WASTE GENERATIONS, 1 m<sup>2</sup> WALL TILE

Parameter	Unit	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	TOTAL
HWD	[kg]	0	0	4.00e-03	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	4.00e-03
NHWD	[kg]	0	0	2.27e+00	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	2.27e+00
RWD	[kg]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-

Legend HWD: Hazardous Waste Disposed, NHWD: Non-Hazardous Waste Disposed, RWD: Radioactive Waste Disposed, NR: Not Relevant, - : Not Calculated

RESOURCE USE, 1 m<sup>2</sup> WALL TILE

PERE	[MJ]	3.36e+00	116e-03	5.10e+00	165e-03	6.82e+00	NR	6.00e-03	0	0	0	NR	NR	0	1.00e-03	0	65.0e-03	15.7e+00
PERM	[MJ]	0	0	20.8e+00	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	20.8e+00
PERT	[MJ]	3.36e+00	116e-03	25.9e+00	165e-03	6.82e+00	NR	6.00e-03	0	0	0	NR	NR	0	1.00e-03	0	65.0e-03	36.5e+00
PENRE	[MJ]	53.1e+00	6.24e+00	130e+00	15.5e+00	113e+00	NR	5.00e-03	0	0	0	NR	NR	0	89.0e-03	0	4.19e+00	323e+00
PENRM	[MJ]	0.000	0	7.59e+00	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	7.59e+00
PENRT	[MJ]	53.1e+00	6.24e+00	138e+00	15.5e+00	113e+00	NR	5.00e-03	0	0	0	NR	NR	0	89.0e-03	0	4.19e+00	331e+00
SM	[kg]	0	0	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0
RSF	[MJ]	0	0	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0
NRSF	[MJ]	0	0	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0
FW	[m <sup>3</sup> ]	69.0e-03	1.0e-03	25.0e-03	2.00e-03	85.0e-03	NR	0.21e-03	0	0	0	NR	NR	0	15.0e-06	0	4.00e-03	186e-03
WSI	[m <sup>3</sup> ]	6.52e+00	179e-03	14.8e+00	89.0e-03	4.69e+00	NR	5.00e-03	0	0	0	NR	NR	0	0.63e-03	0	181e-03	26.5e+00

Legend PERE: Use of renewable primary energy excluding resources used as raw materials, PERM: Use of renewable primary energy resources used as raw materials, PERT: Total use of renewable primary energy resources, PENRE: Use of non-renewable primary energy excluding resources used as raw materials, PENRM: Use of non-renewable primary energy resources used as raw materials, PENRT: Total use of non-renewable primary energy resources, SM: Use of secondary material, RSF: Use of renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water, WSI: Water Scarcity Index, NR: Not Relevant

OUTPUT FLOWS, 1 m<sup>2</sup> WALL TILE

CR	[kg]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-
MR	[kg]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-
MER	[kg]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-
EEE	[MJ]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-
EET	[MJ]	-	-	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-

Legend CR: Components for Reuse, MR: Materials for Recycling, MER: Materials for Energy Recover, EEE: Exported Energy (Electricity), EET: Exported Energy (Thermal), - : Not Calculated, NR: Not Relevant

- ISO 9001:20015/ Quality management systems- Requirements
- 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 (ISO14040:2006) 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 2.3, Date 2018-11-15
- Sub PCR for Ceramic Tiles/ 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, Sub PCR to PCR 2012:01 Version 2.3, Date: 2019-04-29
- 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](http://www.environdec.com)
- Ecoinvent / Ecoinvent Centre, [www.Eco-invent.org](http://www.Eco-invent.org)
- SimaPro/ SimaPro LCA Software, Pré Consultants, the Netherlands, [www.pre-sustainability.com](http://www.pre-sustainability.com)
- TLCID/ Turkish Life Cycle Inventory Database, Turkish Center for Sustainable Production Research and Design (SURATAM), [www.suratam.org](http://www.suratam.org)

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