

# ENVIRONMENTAL PRODUCT DECLARATION



In accordance with ISO14025 and EN15804 for  
**Ceramic Floor Tiles**

from

**Kaleseramik Çanakkale Kalebodur Seramik Sanayi A.Ş.**

Programme :	The International EPD® System	EPD Turkey, fully aligned regional programme
Programme Operator :	EPD Turkey <a href="http://www.epdturkey.org">www.epdturkey.org</a>	EPD International AB <a href="http://www.environdec.com">www.environdec.com</a>
EPD Registration Number:	S-P-00872	
ECO Platform Reg. Number:	ECO-00000714	
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Geographical Scope:	Global	



The LCA for this EPD is conducted according to the guidelines of ISO 14040/44 and the requirements given in the Product Category Rules (PCR) document for Construction Products and Construction Services (2012:01, Version 2.2) and SUB-PCR-D bricks, blocks, tiles, flagstone of clay and siliceous earths (construction product) with reference to EN 15804 and the General Program Instruction of the International EPD System in accordance with ISO 14025 standards.

The inventory for the LCA study is based on the 2016 production figures for ceramic floor tiles manufactured by Kaleseramik Çanakkale Kalebodur Seramik Sanayi A.Ş. in their Çan production plant located in Çanakkale, Turkey.

The LCA was modelled with SimaPro 8.4 LCA software using the impact factors and the Ecoinvent database (V3.2) for secondary data and Turkish Life Cycle Inventory Database (TLCID) developed by Turkish Centre for Sustainable Production Research and Design (SÜRATAM) for local data.

<b>EPD Programme</b>	The International EPD® System <a href="http://www.environdec.com">www.environdec.com</a>
<b>EPD Programme Operator</b>	EPD Turkey, Istanbul - Turkey <a href="http://www.epdturkey.org">www.epdturkey.org</a>
<b>EPD Owner</b>	Kaleseramik Çanakkale Kalebodur Seramik Sanayi A.Ş. <a href="http://www.kale.com.tr">www.kale.com.tr</a>
<b>Declared Unit</b>	1 m² average ceramic floor tile
<b>CPC Code</b>	3731
<b>EPD Based on Product Category Rules (PCR)</b>	The CEN standard EN 15804 serves as the core PCR The International EPD® System's PCR 2012:01 Construction products and Construction services, Version 2.2, 2017-05-30 SUB-PCR-D bricks, blocks, tiles, flagstone of clay and siliceous earths
<b>PCR Review Conducted by</b>	The Technical Committee on the International EPD® System. Chair Massimo Marino. Contact via <a href="http://www.environdec.com">www.environdec.com</a> <a href="mailto:info@environdec.com">info@environdec.com</a>
<b>Independent Verification and data, according to ISO 14025:2006</b>	<input type="checkbox"/> Internal <input checked="" type="checkbox"/> External <input type="checkbox"/> EPD® Process Certification
<b>System Boundaries</b>	<input type="checkbox"/> Cradle to Gate <input type="checkbox"/> Cradle to Gate with Option <input checked="" type="checkbox"/> Cradle to Grave
<b>Approved and Verified by</b>	Vladimír Kočí, PhD
<b>LCA Report and EPD Prepared by</b>	Metsims Sustainability Consulting <a href="http://www.metsims.com">www.metsims.com</a>

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.

The EPD certificate, its background data and the results will be used for business-to-business communications and is expected to be a reliable document for green building designers, architectures, manufacturers of construction products and the other stakeholders in the construction sector to understand the potential environmental impacts caused by ceramic floor tiles.

For more information about this Environmental Product Declaration or its contents, please contact [kaleseramik@kale.com.tr](mailto:kaleseramik@kale.com.tr)

Laying its foundation with Çanakkale Ceramic Factories Corporation in 1957, Kale Group pioneered the formation of the ceramics industry in Turkey, and has become an industry giant with its investments. It has grown over the course of time with investments in construction products, machinery and equipment manufacturing, defence, chemistry, electrical appliances, energy, IT, transportation, tourism and food industries. Kale Group is currently comprised of 17 companies, and is regarded as one of the most important industrial enterprises of Turkey with over 5000 employees, spanning over a geography across Çanakkale to several locations in Turkey to Italy and Russia. Today, Kale Group is Europe's 3<sup>rd</sup> and the world's 12<sup>th</sup> largest ceramics manufacturer. Kale Group provides its products to consumers in over 100 countries via more than 400 sales points.

Kaleseramik, a company of Kale Group, manufactures ceramic tiles with a production capacity of 66 million m² ceramic tile/year. Kaleseramik's tile products take place in market under Çanakkale Seramik, Kalebodur and Kale brand names.

Kaleseramik that aims for continuous development has received the following certifications within the scope of the system standards; TS EN ISO 9001:2015, ISO 10002:2006, TS EN ISO 14001:2015, ISO 50001:2011, ISO 27001 and OHSAS 18001:2014.



# PRODUCT INFORMATION

Ceramic tiles are primarily made of kaolin, clay and feldspar, but they also include other raw materials such as marble, frit, dolomite, bentonite and quartz. The production technology of tiles is dry pressing. The required composition is blended with water to form uniform slurry. This slurry then fed into spray driers to form uniform granules ready for compaction. These granules are then shaped to form the bisque or green body. This can be glazed or left unglazed depending on its intended use. The green ceramic body is fired at high temperatures, resulting in a hard body.

Technical Specification		Kaleseramik Floor Tiles	Related Standards
Water Absorption (%)		3.0%	ISO 10545 - 3
Breaking Strength(N)	Thickness ≥ 7.5 mm	1550 N	ISO 10545 - 4
	Thickness < 7.5 mm	1400 N	ISO 10545 - 4
Modules of Rupture (N/mm2)		Min. 30	ISO 10545 - 4
Resistance to Surface Abrasion for Glazed Tile		Class: 1 - 2 - 3 - 4 - 5	ISO 10545 - 7
Linear Thermal Expansion Coefficient (100°C)		Affirmative	ISO 10545-8
Impact Resistance		Affirmative	ISO 10545-5
Resistance To Thermal Shock		Affirmative	ISO 10545-9
Crazing Resistance For Glazed Tiles		Resistant	ISO 10545-11
Frost Resistance		Resistant	ISO 10545-12
Resistance To Low Concentrations Of Acids And Alkalis		GLA-GLB	ISO 10545-13
Resistance To High Concentrations Of Acids And Alkalis		Affirmative	ISO 10545-13
Resistance To Household Chemicals And Swimming Pool Salts (Glazed&Unglazed)		Min. GB	ISO 10545-13
Resistance To Stain		Min. class 3	ISO 10545-14
Ramp Slip Resistance (Oil/Wet)		R = 09-10-11-12-13 CLASS = A-B-C	DIN51130 DIN 51097

## Areas of Use

Ceramic floor tiles are largely used as interior and exterior floor coverings. Interior applications include bathrooms, kitchens, living rooms, halls, balconies etc. Exterior applications can be in public buildings, commercial and industrial areas, swimming pools and façades etc. For interior applications, floor tiles should be selected regarding the technical specifications such as PEI value, hardness, stain resistance, chemical resistance and easy cleaning, if they are to be used in the interiors of a residence. The tiles selected for exteriors should be frost resistant and have low water absorbency. The numbers beside ceramic floor tiles indicate the abrasion resistance of the ceramic surface according to Turkish and European Standard TS-EN ISO 10545-7:

Class-1: Suitable for walls and bedroom and bath-room floors.

Class-2: Suitable for light traffic areas, such as the floors of a house.

Class-3: Suitable for moderately heavy traffic floors such as in entrances and corridors.

Class-4: Suitable for heavy traffic area floors such as in restaurants, stores, etc.

Class-5: Suitable for floors subject to heavy foot traffic and abrasion, such as in shops, hotels, restaurants, offices, schools, exhibition halls, etc.

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 Kaleseramik, either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

# SYSTEM BOUNDARY

## 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** Ceramic tiles are primarily made of kaolin, clay and feldspar, but they also include other raw materials such as marble, frit, dolomite, bentonite and quartz. The required composition is blended with water to form uniform slurry. This slurry then fed into spray driers to form uniform granules ready for compaction. These granules are then shaped to form the bisque or green body. This can be glazed or left unglazed depending on its intended use. The green ceramic body is fired at high temperatures, resulting in a hard body. Floor tiles tend to have better mechanical strength compared to wall tiles, due to their lower porosity. Depending on the use, tiles might be glazed to control abrasion and slip resistance. This EPD declaration is applicable to average floor tiles. Electric energy and heat from natural gas are consumed during manufacturing. (A3). For packaging kraft paper, PE film and wooden pallets are used.

## CONSTRUCTION PROCESS STAGE

**A4. Transport** includes transportation of ceramic tiles to the construction site. Kaleseramik transport tiles by road haulage (89%), railway (8%) and seaway (3%) to the distribution centres. From there, local road transport of 50 km with Euro 5 class truck with capacity of 27 tonnes is assumed.

**A5. Installation of the Product** stage includes the adhesive mortar usage in the construction site in addition to packaging waste transportation and disposal processing. For 1 m<sup>2</sup> ceramic tile installation; 3.3 kg mortar and 0.8 L water usage assumed. A 3% (in mass) wastage is assumed during the installation.

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 2016. For Europe case; according to the Directive 94/62/EC of 20 December 1994 on packaging and packaging waste, 60% of the packaging waste is assumed to go to reuse, recovery, and recycling. Average distance from waste container to destination is assumed as 30 km.

## USE STAGE

**B1. Use** stage concerns emissions into environment. Use phase is not relevant for this product.

**B2. Maintenance** includes cleaning facilities with water and detergent. Kaleseramik advises 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> ceramic tiles. Maintenance cycle of floor tiles is once a week. Kaleseramik ceramic tiles reference service life has been considered as 50 years.

**B3. Repair:** Kaleseramik ceramic tiles require no repairing during the use phase and therefore no impacts should be declared in module B3.

**B4. Replacement:** Kaleseramik ceramic tiles require no replacement during the use phase and therefore no impacts should be declared in module B4.

**B5. Refurbishment:** Kaleseramik ceramic tiles require no refurbishment during the use phase and therefore no impacts should be declared in module B5.

**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

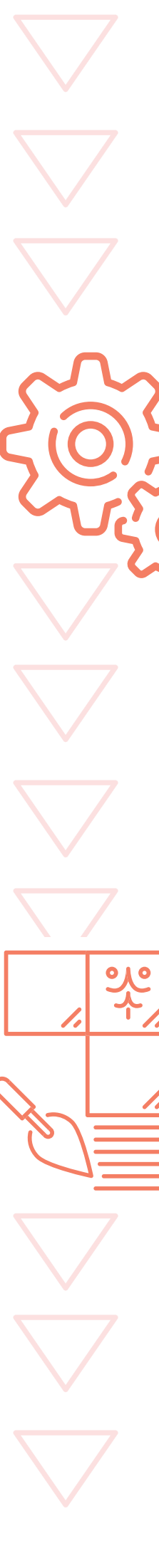
**C1. De-construction, demolition** at the end of RSL is usually conducted with a selective deconstruction/demolition. The environmental impacts generated during the C1 phase are very low and therefore can be neglected.

**C2. Transport (Waste)** includes the transportation of the discarded tiles and adhesive mortar to final disposal. Average distance from waste container to final destination is assumed as 50 km.

**C3. Waste Processing** concerns crushing of discarded ceramic tiles before recycle or reuse. The environmental impacts generated during the C3 phase are very low and therefore can be neglected.

**C4. Disposal** construction and demolition waste scenario is created separately depending on the geographic location of the use phase. After domestic usage, ceramic tile products end up at construction and demolition waste landfills as their final fate and modelled as such in the LCA. For Europe's construction and demolition waste scenario, 50% of the waste is assumed to go to recycling according to EU Construction and Demolition Waste Protocol published on 09/11/2016.





**PRODUCT STAGE**

- A1. Raw Material Supply
- A2. Raw Material Transport
- A3. Manufacturing
  - Greenbody preparation
    - Forming
    - Drying
  - Glaze&Paste Preparation
    - Glazing
    - Firing
- Packaging & Storage

**CONSTRUCTION PROCESS STAGE**

- A4. Transport to construction site
- A5. Installation of the Product

**USE STAGE**

- B1. Use
- B2. Maintenance
- B3. Repair
- B4. Replacement
- B5. Refurbishment
- B6. Operational Energy Use
- B7. Operational Water Use

**END OF LIFE STAGE**

- C1. Deconstruction and Demolition
- C2. Transport
- C3. Reuse, Recovery and Recycling
- C4. Disposal

**ENVIRONMENTAL PERFORMANCE  
RELATED INFORMATION**

Functional Unit/ Declared Unit	The declared unit is the production of 1 m <sup>2</sup> average ceramic floor tiles ( 17.3 kg)
Goal and Scope	Evaluation of environmental impacts for 1 m <sup>2</sup> average ceramic floor tiles 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, no cut-off criteria was applied.
Background Data	For local data specific for Turkey, TLCID (V1.01) developed by SÜRATAM was used. For any other background data the Ecoinvent database (V3.2) was used.
Data Quality	Data for raw material usage, energy consumption, water consumption and transport data for products, materials and waste are collected from Kaleseramik.
Period Under Review	All primary data collected from Kaleseramik is for the period year of 2016.
Allocations	There are no co-products in the production of ceramic tile manufactured by Kaleseramik. Hence, there was no need for co-product allocation.Kaleseramik sources raw materials from different locations across Turkey and other parts of the world and by different means of transport (truck and ship). For this reason, transport was allocated according to tonnages for almost all raw materials bought by Kale. Kale manufactures various ceramic tiles in the Company's Çanakkale plant in Turkey. Electricity and combined heat power (CHP) powered by natural gas are used. Raw materials, transport, packaging, waste, and energy consumption data were allocated for each product using related production tonnages from Kaleseramik's Çanakkale plant for the average product.

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

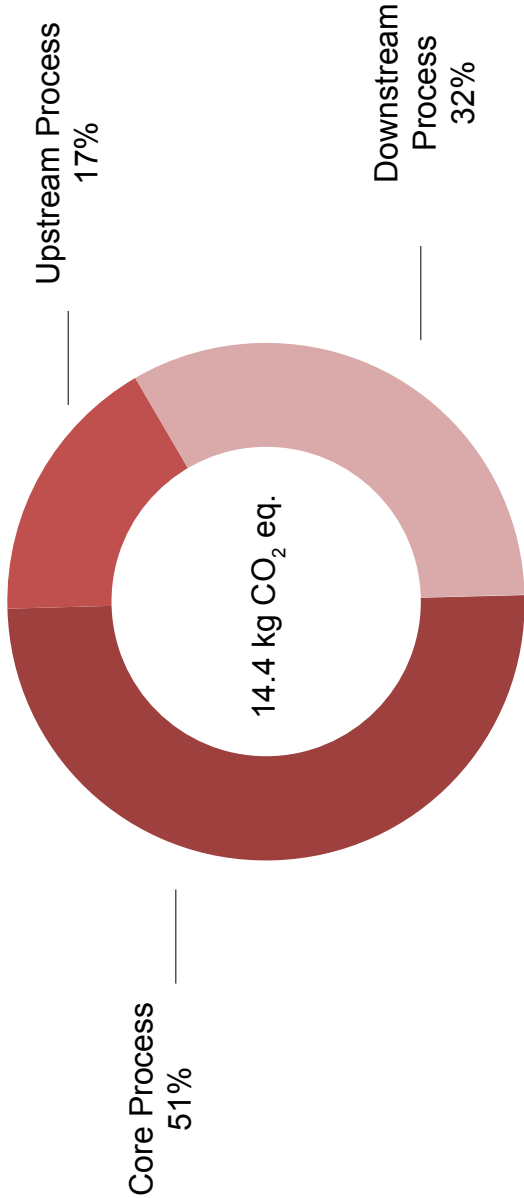
The results of the LCA with the indicators as per EPD requirement are given in the following tables for product product stage (A1 - A3), construction process (A4, A5), use stage (B1 - B7), and end of life (C1 - C4). The system boundaries in tabular form for all modules are shown in the table above.

All energy calculations were obtained using Cumulative Energy Demand V1.09 methodology, while environmental impacts are calculated with the CML-IA baseline V4.2 within SimaPro LCA Software. The net fresh water use reflect the water consumption during manufacturing processes.

		PRODUCT STAGE		
A1	A2	A3	A4	A5
X	X	X	X	X
CONSTRUCTION PROCESS STAGE				
NR				
USE STAGE				
X				
X				
X				
X				
NR				
NR				
END OF LIFE STAGE				
X	X	X	X	
X	X	X	X	
X				
MND		D	Reuse-Recycling-Recovery Potential	
			BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES	

# LCA RESULTS

ENVIRONMENTAL IMPACTS FOR 1 m² CERAMIC FLOOR TILES																
	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	TOTAL
GWP	Fossil	[kg CO <sub>2</sub> eq.]	9.77	1.32	0.968	NR	0.263	0.000	0.000	NR	NR	0.000	1.06	0.000	0.065	13.5
	Biogenic	[kg CO <sub>2</sub> eq.]	0.008	0.000	0.218	NR	0.000	0.000	0.000	NR	NR	0.000	65.1x10 <sup>-6</sup>	0.000	10.4x10 <sup>-6</sup>	0.227
	Land Use & Transformation	[kg CO <sub>2</sub> eq.]	0.007	0.000	0.001	NR	0.755	0.000	0.000	NR	NR	0.000	47.4x10 <sup>-6</sup>	0.000	12.6x10 <sup>-6</sup>	0.763
	Total		9.79	1.32	1.19	NR	1.019	0.000	0.000	NR	NR	0.000	1.06	0.000	0.065	14.4
ODP		[kg CFC11 eq.]	939x10 <sup>-9</sup>	227x10 <sup>-9</sup>	39.2x10 <sup>-9</sup>	NR	70.2x10 <sup>-9</sup>	0.000	0.000	NR	NR	0.000	198x10 <sup>-9</sup>	0.000	14.3x10 <sup>-9</sup>	1.49x10 <sup>-6</sup>
POCP		[kg C <sub>2</sub> H <sub>4</sub> eq.]	1.92x10 <sup>-3</sup>	307x10 <sup>-6</sup>	185x10 <sup>-6</sup>	NR	597x10 <sup>-6</sup>	0.000	0.000	NR	NR	0.000	194x10 <sup>-6</sup>	0.000	21.8x10 <sup>-6</sup>	3.22x10 <sup>-3</sup>
AP		[kg SO <sub>2</sub> eq.]	30.2x10 <sup>-3</sup>	9.06x10 <sup>-3</sup>	3.02x10 <sup>-3</sup>	NR	2.89x10 <sup>-3</sup>	0.000	0.000	NR	NR	0.000	5.04x10 <sup>-3</sup>	0.000	493x10 <sup>-6</sup>	50.7x10 <sup>-3</sup>
EP		[kg PO <sub>4</sub> <sup>3-</sup> eq.]	46.4x10 <sup>-3</sup>	4.29x10 <sup>-3</sup>	2.02x10 <sup>-3</sup>	NR	2.16x10 <sup>-3</sup>	0.000	0.000	NR	NR	0.000	1.04x10 <sup>-3</sup>	0.000	109x10 <sup>-6</sup>	56.1x10 <sup>-3</sup>
ADPE		[kg Sb eq.]	5.03x10 <sup>-6</sup>	23.2x10 <sup>-9</sup>	59.9x10 <sup>-9</sup>	NR	164x10 <sup>-9</sup>	0.000	0.000	NR	NR	0.000	3.10x10 <sup>-9</sup>	0.000	19.6x10 <sup>-9</sup>	5.31x10 <sup>-6</sup>
ADPF		[MJ]	161	19.5	5.45	NR	4.76	0.000	0.000	NR	NR	0.000	16.3	0.000	1.24	208
Legend	GWP: Global Warming Potential, ODP: Ozone Depletion Potential, POCP: Formation Potential of Tropospheric Ozone Photochemical Oxidants, AP: Acidification Potential, EP: Eutrophication Potential, ADPE: Abiotic Depletion Potential for Non-fossil Resources, ADPF: Abiotic Depletion Potential for Fossil Resources, NR: Not Relevant															



OUTPUT FLOWS AND WASTE CATEGORIES FOR 1 m² CERAMIC FLOOR TILES																
Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	TOTAL
HWD	[kg]	0.307	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	-	0.307
NHWD	[kg]	0.592	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	20.3	20.9
RWD	[kg]	-	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	-	-	0.000
Legend	HWD: Hazardous Waste Disposed, NHWD: Non-Hazardous Waste Disposed, RWD: Radioactive Waste Disposed, NR: Not Relevant															
RESOURCE USE FOR 1 m² CERAMIC FLOOR TILES																
PERE	[MJ]	62.0	0.747	0.771	NR	3.06	0.000	0.000	0.000	NR	NR	0.000	0.029	0.000	0.016	66.7
PERM	[MJ]	0.000	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	0.000	0.000
PERT	[MJ]	62.0	0.747	0.771	NR	3.06	0.000	0.000	0.000	NR	NR	0.000	0.029	0.000	0.016	66.7
PENRE	[MJ]	161	19.5	5.46	NR	4.76	0.000	0.000	0.000	NR	NR	0.000	16.3	0.000	19.5	227
PENRM	[MJ]	0.000	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	0.000	0.000
PENRT	[MJ]	161	19.5	5.46	NR	4.76	0.000	0.000	0.000	NR	NR	0.000	16.3	0.000	19.5	227
SM	[kg]	0.000	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	0.000	0.000
RSF	[MJ]	0.000	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	0.000	0.000
NRSF	[MJ]	0.000	0.000	0.000	NR	0.000	0.000	0.000	0.000	NR	NR	0.000	0.000	0.000	0.000	0.000
FW	[m³]	30.9x10 <sup>-3</sup>	-	8.00x10 <sup>-3</sup>	NR	270x10 <sup>-3</sup>	0.000	0.000	0.000	NR	NR	0.000	-	-	-	309x10 <sup>-3</sup>
WSI	[m³]	10.5	0.149	0.293	0.000	1.61	0.000	0.000	0.000	0.000	0.000	0.000	0.064	0.000	0.026	12.7
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															

REFERENCES

/ISO 9001:2015/ Quality Management System

/ISO 10002:2006/ Customer Satisfaction Management System

/ISO 14001:2015/ Environmental Management System

/ISO 50001/ Energy Management System

/ISO 27001/ Information Security Management System

/OHSAS 18001:2014/ Occupational Health and Safety Management System

/ISO 14020:2000/ Environmental labels and declarations - General principles

/EN 14411/ Ceramic tiles. Definitions, classification, characteristics, evaluation of conformity and marking

/ISO 10545-2/ Ceramic tiles - Part 3: Determination of dimensions and surface quality

/ISO 10545-3/ Ceramic tiles - Part 3: Determination of water absorption, apparent porosity, apparent relative density and bulk density

/ISO 10545-4/ Ceramic tiles - Part 4: Determination of modulus of rupture and breaking strength

/ISO 10545-5/ Ceramic tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution

/ISO 10545-6/ Ceramic tiles -- Part 6: Determination of resistance to deep abrasion for unglazed tiles

/ISO 10545-7/ Ceramic tiles - Part 7: Determination of resistance to surface abrasion for glazed tiles

/ISO 10545-8/ Ceramic tiles - Part 8: Determination of linear thermal expansion

/ISO 10545-9/ Ceramic tiles - Part 9: Determination of resistance to thermal shock

/ISO 10545-10/ Ceramic tiles - Part 10: Determination of moisture expansion

/ISO 10545-11/ Ceramic tiles - Part 11: Determination of crazing resistance for glazed tiles

/ISO 10545-12/ Ceramic tiles - Part 12: Determination of frost resistance

/ISO 10545-13/ Ceramic tiles - Part 13: Determination of chemical resistance

/ISO 10545-14/ Ceramic tiles - Part 14: Determination of resistance to stains

/DIN 51130/ Testing of floor coverings; determination of slip resistance; work rooms and work areas subject to pronounced risk of slipping

/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 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 2.2, Date 2017-05-30.

/SUB-PCR Bricks, blocks, tiles, flagstone of clay and siliceous earths/ (construction product) (v2.2.) The International EPD® System, 2012:01 Version 2.2, Date 2018-03-09.

/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.envrondec.com

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






/TLCID/ Turkish Life Cycle Inventory Database, Turkish Centre for Sustainable Production Research and Design - SÜRATAM , www.suratam.org

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

/Kaleseramik/ User's Guide for Ceramic Tiles







# VERIFICATION & REGISTRATION

<b>Programme</b>	<p><b>The International EPD System</b>  <a href="http://www.environdec.com">www.environdec.com</a></p> <p>EPD registered through the fully aligned regional programme:  EPD Turkey  <a href="http://www.epdturkey.org">www.epdturkey.org</a></p>	
<b>Programme Operator</b>	<p>EPD International AB  Box 210 60  SE- 100 31 Stockholm, Sweden</p> <p>EPD Turkey:  SÜRATAM-Turkish Centre for Sustainable Production Research &amp; Design  Nef 09 B Blok No:7/15, 34415 Kağıthane / İstanbul, Turkey  <a href="http://www.suratam.org">www.suratam.org</a></p>	
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