

ENVIRONMENTAL PRODUCT DECLARATIONS



Ceramic Floor Tiles

Programme:	EPD Turkey, a fully aligned regional programme www.epdturkey.org	The International EPD® System www.environdec.com
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EPD registration number:	S-P-00675	
ECO Platform number:	00000134	
Publication date:	07.01.2015	
Revision date:	20.01.2020	
Validity date:	19.01.2025	
Geographical scope:	Global	



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PROGRAM INFORMATION

seranit

Programme

EPD Turkey, a fully aligned regional programme

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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: Vladimír Kočí, PhD

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

COMPANY INFORMATION



seranit

Seranit was established in 1992 as the first “Technical Porcelain” manufacturer of Turkey and has been manufacturing ceramic and 100% porcelain tiles for both interior and exterior application. Seranit adds value to spaces with an innovative approach, rich color, effect and size range, and trend-setting designs. Today, Seranit continues production at their Bilecik Plant with a production capacity of 8.5 million sqm and Inönü/Eskişehir plant with a production capacity of 10 million sqm.

Never compromising on its principle to maintain its globally-recognized quality and to choose quality over price as a competition advantage with the goal of optimizing customer satisfaction since its foundation, Seranit has a respected place among porcelain manufacturers all over the world with its modern production technologies.

Seranit, the first technical porcelain manufacturer of Turkey, is the original producer of many generic brands such as Super White that were created after an in-house R&D and P&D process. Along with standard sizes, Seranit offers 60x60cm and 60x120cm technical porcelain sizes and became the first company to introduce 90x90cm and 90x135cm tiles to the industry in 2007.

Seranit R&D and Design Centers aim to design national and international projects, establish an expert infrastructure in the industry, create new cooperation opportunities and develop innovative products with high added value.

Attracting attention with trend-setting designs, Seranit is the preferred brand in projects with a rich product portfolio. Seranit is also capable of responding to product development needs rapidly thanks to the strong R&D and P&D departments.

The Seranit brand produces porcelain tiles and ceramic tiles.

Aiming to build a better and cleaner world for the next generations, Seranit produces environmentally-friendly products within the framework of an environmentally-friendly management mentality following national and international standards. As a holder of 14001 Environmental Management System Certificate, Seranit fulfills all environmental requirements by using the right raw materials and prioritizing energy efficiency in the production processes.

Moreover, Seranit makes investments and conducts research studies to reuse its wastewater and usable waste, and to reduce and improve gas emissions aiming for zero waste with in the scope of its environmental protection program.

Seranit proves that they care about the people and the environment with numerous certificates such as TSE ISO EN 14000, TS EN ISO 14001:2004, TS 18001:2008, TSE ISG OHSAS TS 18001 and ISO 9001:2008. The company had also certified its superior quality in ceramic and porcelain tile production with the TS EN 14411 Double Star Certificate in 2014.

PRODUCT INFORMATION



Ceramic floor tiles manufactured by Seranit in İnönü Plant, Turkey and covered under this Environmental Product Declaration are primarily made of naturally occurring major raw materials such as clay, pegmatite, and albite, but they may also include other minor raw materials such as feldspar, zinc, zircon and kaolin. The typical compositions of these products are shown below.

Composition	%
Clay	40-50
Albite	15-25
Feldspar	10-20
Pegmatite	10-20
Kaolin	0-1
Cooked Broken	0-1
Raw Broken	0-1
Sodium Silicate	0-1
Glaze Material	1-5
Zinc	0-1
Zircon	0-1

(Floor Tile Composition)

The required composition is mixed with water to form uniform slurry, which is generally referred as “masse”. This slurry is then fed into spray driers to form uniform granules ready for compaction. These granules are shaped to form the bisque or green body. This can be glazed or left unglazed depending on its intended use. The floor tiles, produced with a size of 20x60, 30x60, 30x90, 40x80, 33x100, may be utilized in the following areas:

- Commercial buildings (shopping centers, hotels, office buildings, banks, restaurants, WC/bathroom walls of stores etc.)
- Residences (interior spaces of luxury houses, villas etc.)
- Public buildings (WC/bathroom floors of municipalities, courthouses etc.)
- Educational facilities, culture centers (WC/bathroom floors of schools, theater halls etc.)

UN CPC code for ceramic floor tiles is 37310.

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

NORMS+A1:F10E6A1:D10A1:F1 6E6A1:D10A1:F20E6A1:D10	TECHNICAL CHARACTERISTICS		REQUIRED VALUES	SERANIT DECLARED VALUES
				Average values of production
ISO 10545-2	Dimensions and surface quality	Length and Width	N≥ 15 cm ± %0.6, ± 2 mm	± 0.5%, ± 0.5 mm
		Thickness	N≥ 15 , ± 5% ,± 0.5%	± 4%, ±0.3 mm
		Rectangularity	± 0.5%, ± 2 mm	± 0.4%, ± 1.2 mm
		Straightness of sides	± 0.5% , ± 1.5 mm	± 0.3%, ± 1.0 mm
		Surface flatness	± 0.5% , ± 2 mm	Centre curvature:0.3% ,± 1.5 mm Edge curvature:0.3 % ,± 1.5 mm Warpage: 0.3 %± 1.5 mm
		Surface Quality	A minumum of 95% of the tiles shall be free from visible defects that would impair the appearence of a major area of tiles	A minumum of 95% of the tiles shall be free from visible defects that would impair the appearence of a major area of tiles
ISO 10545-3	Water absorption		3%<E ≤ 6% Individual max. 6.5%	ave. E ≤4% Individual max. 5.5%
ISO 10545-4	Breaking Strength (Newton)	Thickness ≥ 7.5mm	S ≥ 1100 N	S ≥ 1800 N
	Modulus of rapture (N/mm ²)		ave.min. 22 N / mm ² Individual 20N / mm ²	R > 30 N / mm ²
ISO 10545-5	Impact resistance by measurement of coefficient of restitution		Declared Value	0.88
ISO 10545-7	Resistance to surface abrasion - intended for use on floors		Reported abrasion class and cycles	Class 3, cycle:750
ISO 10545-8	Determination of linear thermal expansion		Declared Value	6.00 x 10 ⁻⁶ / °C
ISO 10545-9	Resistance to thermal shock		Required	Resistant
ISO 10545-10	Moisture expansion, in mm/m'e		Declared Value	0.2 mm/m
ISO 10545-11	Crazing resistance		Required	Dayanıklıdır/Resistant
ISO 10545-12	Frost resistance		Required for exterior	Dayanıklıdır/Resistant
ISO 10545-13	Resistance to low concentrations of acids and alkalis		Manufacturer to state classification	LA
	Resistance to high concentrations of acids and alkalis		Manufacturer to state classification	HA
	Resistance to household chemicals and swimming pool salts		Min.B	A
ISO 10545-14	Resistance to stains		Min. Class 3	5
ISO 10545-15	Lead, cadmium, other dangerous substances given off by tiles		Declared Value	Pb <0.1 mg/dm ² , Cd<0.01 mg/dm ²
ISO 10545-16	Small color differences		Glazed: ΔE < 0.75	ΔE < 0.75
EN 101	Surface hardness Mohs		Test method available	min. 6
CEN/TS 16165 DIN 51130	Skid resistance		Test method available	--
DIN 51094	Color resistance to light		Not any noticable color change	Resistant
EN 12004:2007+A1:2012, 4.1 EN 12004:2007+A1:2012, 4.2 EN 12004:2007+A1:2012, 4.3 EN 1015:12'	Bond strength/adhesion A) Cementitious adhesives B) Dispersion adhesives C)Reaction resin adhesives D)Mortar		Declared value	A) ≥ 0.5 N/mm ² B) ≥ 1 N/mm ² C)≥ 2 N/mm ² D)Efficiency not ascertained
(Class A1 or A1 _{FL}) ^m	Reaction to fire		A1FL or A1	

Relevant standards applied to floor tiles and values by Seranit



SYSTEM BOUNDARY

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A1 : Raw Material

This stage includes raw material extraction and pre-treatment processes before production. For ceramic floor tiles, production starts with raw materials, mainly locally sourced but some transported from other parts of the world.

A2 : Transport

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

A3 : Manufacturing

This stage starts with slurry preparation, spray drying, pressing for green body followed by removal of excess humidity. The green body tiles are then glazed, if required, and fired at around 1170°C. After quality control, the end products are then packaged and dispatched. Electricity and natural gas are the energy sources consumed during the manufacturing.

A4 : Transport to Construction Site

This stage involves transportation of floor tiles to the construction site.

A5 : Assembly

This stage includes the assembly of tiles using adhesive mortar and water in the construction site. For 1 m² floor tile installation; 6 kg mortar and 1.5 L water usage was assumed.

B1 : Use Stage

Use Stage is related to any impacts done during use of the product. Ceramic floor 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

This stage is related to any activities to maintain the function of the product in its life time. It includes cleaning with water and detergent. Seranit 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 clean the surfaces 1 m² floor tiles.

B3 : Repair

No repair is necessary for floor tiles during their use.

B4 : Replacement

No replacement is necessary for floor tiles during their use.

B5 : Refurbishment

No refurbishment is necessary for floor tiles during their use.

B6 : Operational Energy Use

No energy is used in operation for ceramic floor tiles.

B7 : Operational Water Use

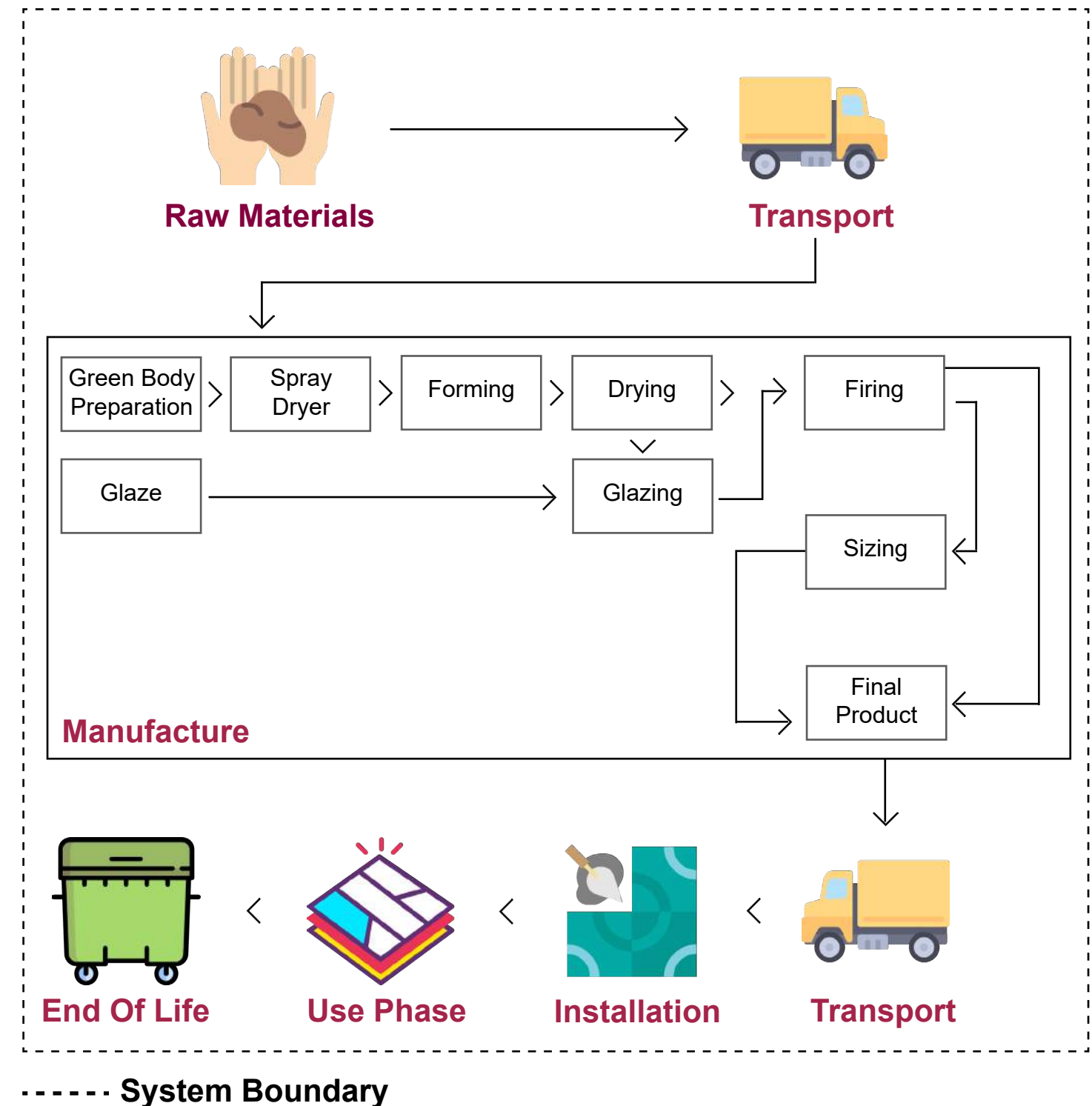
No water is used in operation for ceramic floor tiles except cleaning as stated in B2.

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 involves processing of discarded floor tiles for recycling and/or reuse. There is no such processing of ceramic floor tiles after demolition so this stage can be excluded.

C4 : Disposal is the final stage of product life. Floor tiles end up at construction and demolition waste landfills as their final fate and modelled as such or this EPD. The system boundary of the LCA study conducted for Seranit Ceramic Floor Tiles is shown next page.



(Flow chart of manufacturing floor tiles and LCA system boundary)



LCA RESULTS AND RELATED INFORMATION



Functional Unit	1 m ² ceramic floor tiles with a weight of 22 kg.
Goal and Scope	Evaluation of environmental impacts of 1 m ² ceramic floor tiles from cradle to grave.
System Boundary	The system boundary covers A1 - A3 product stages, A4 - A5 construction, B1 - B7 use and C1 – C4 end of life stages.
Cut-off Rules	1% cut-off is applied.
Background Data	Ecoinvent database (Ver.3.5) (www.ecoinvent.org) TLCID (Turkish Life Cycle Inventory Database, Ver. 1.0) (www.tlcid.org)
Data Quality	Raw materials, energy and water consumption, waste, material and product transport data is primary data collected from Seranit.
Period Under Review	All primary data collected from Seranit refers to the period year of 2019.
Allocations	No allocation was performed for this EPD. There are no co-products in the production of floor tiles. Hence, there is no need for co-product allocation. Transport is allocated according to tonnages for raw materials bought by Seranit. Similarly, water consumption and energy consumption are also allocated according to the 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.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	MND	
X	X	X	X	X	NR	X	X	X	X	NR	NR	X	X	X	X			
Raw Materials Supply			Transport		Manufacturing		Transport from the gate to the site		Assembly		Use		Maintenance		Repair		Replacement	

WASTE GENERATIONS, 1 m² CERAMIC FLOOR TILE																
Parameter	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	TOTAL
HWD	[kg]	0.001	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0.001
NHWD	[kg]	2.79	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	2.79
RWD	[kg]	-	-	-	NR	-	-	-	-	NR	NR	-	-	-	-	-
HWD: Hazardous Waste Disposed, NHWD: Non-Hazardous Waste Disposed, RWD: Radioactive Waste Disposed, NR: Not Relevant, - : Not Calculated																
RESOURCE USE, 1 m² CERAMIC FLOOR TILE																
PERE	[MJ]	26.2	0.138	6.82	NR	0.006	0	0	0	NR	NR	0	0.013	0	0.001	33.1
PERM	[MJ]	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0
PERT	[MJ]	26.2	0.138	6.82	NR	0.006	0	0	0	NR	NR	0	0.013	0	0.001	33.1
PENRE	[MJ]	136	13.4	113	NR	0.005	0	0	0	NR	NR	0	1.30	0	0.162	264
PENRM	[MJ]	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0
PENRT	[MJ]	136	13.4	113	NR	0.005	0	0	0	NR	NR	0	1.30	0	0.162	264
SM	[kg]	0.480	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0.480
RSF	[MJ]	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0.000
NRSF	[MJ]	0	0	0	NR	0	0	0	0	NR	NR	0	0	0	0	0.000
FW	[m³]	0.104	0.002	0.085	NR	205E-6	0	0	0	NR	NR	0	279E-6	0	0.007	0.199
WSI	[m³]	4.74	0.093	4.71	NR	0.007	0	0	0	NR	NR	0	0.010	0	0.007	9.57
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 non-renewable secondary fuels, NRSF: Use of non-renewable secondary fuels, FW: Use of net fresh water, WSI: Water Scarcy Index, NR: Not Relevant															
OUTPUT FLOWS, 1 m² CERAMIC FLOOR 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															

References

General Programme Instructions of the International EPD® System. Version 3.0.

/OHSAS 18001/ Occupational health and safety management systems - Specification
/EN 14411/ Ceramic tiles - Definitions, classification, characteristics and marking
/ISO 9001:2008/ Quality Management Systems-Requirements
/TSE EN 14411/ Double Star Criteria - Ceramic tiles - Definitions, classification, characteristics and marking
/EN 15804/ EN 15804:2012+A1:2013, Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products
/EN ISO 10545-2/ Technical Standard for Ceramic Tiles - Part 2: Determination of dimensions and surface quality
/EN ISO 10545-3/ Technical Standard for Ceramic Tiles - Part 3. Determination of water absorption apparent porosity, apparent relative density and bulk density
/EN ISO 10545-4/ Technical Standard for Ceramic Tiles - Part 4: Determination of modulus of rup-ture and breaking strength
/EN ISO 10545-5/ Technical Standard for Ceramic Tiles - Part 5: Determination of impact resistance by measurement of coefficient of restitution
/EN ISO 10545-7/ Technical Standard for Ceramic Tiles - Part 7: Determination of resistance to sur-face abrasion for glazed tiles
/EN ISO 10545-8/ Technical Standard for Ceramic Tiles - Part 8: Determination of linear thermal expansion
/EN ISO 10545-9/ Technical Standard for Ceramic Tiles - Part 9: Determination of resistance to thermal shock
/EN ISO 10545-10/ Technical Standard for Ceramic Tiles - Part 10: Determination of moisture expan-sion
/EN ISO 10545-11/ Technical Standard for Ceramic Tiles - Part 11: Determination of crazing re-sistance for glazed tiles
/EN ISO 10545-12/ Technical Standard for Ceramic Tiles - Part 12: Determination of frost resistance
/EN ISO 10545-13/ Technical Standard for Ceramic Tiles - Part 13: Determination of chemical re-sistance
/EN ISO 10545-14/ Technical Standard for Ceramic Tiles - Part 14: Determination of resistance to stains
/EN ISO 10545-15/ Technical Standard for Ceramic Tiles - Part 15: Determination of lead and cadmi-um given off by glazed tiles
/EN 101/ Ceramic Tiles - Determination of Scratch Hardness of Surface According to Mohs
/DIN 51130/ Testing of floor coverings - Determination of the anti-slip property - Workrooms and fields of activities with slip danger - Walking method - Ramp test
/DIN 51094/ Ceramic tiles - Testing of the light fastness and colour fastness of ceramic tiles for walls and floors
/ISO 14025/ DIN EN ISO 14025:2009-11: Environmental labels and declarations - Type III environ-mental 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)
EN 15804/ EN 15804:2012+A1:2013, Sustainability of construction works - Environmental Product Declarations — Core rules for the product category of construction products
/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
/Ecoinvent / Ecoinvent Centre, www.Eco-invent.org
/SimaPro/ SimaPro LCA Package, Pré Consultants, the Netherlands, www.pre-sustainability.com

Verification & Registration

Programme EPD registered through fully aligned regional programme:
EPD Turkey
www.epdturkey.org

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