An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www environdec.com.

THE INTERNATIONAL EPD® SYSTEM
TURKEY EPD®
ENVIRONMENTAL PRODUCT DECLARATIONS
ECO PLATFORM EPD VERIFIED

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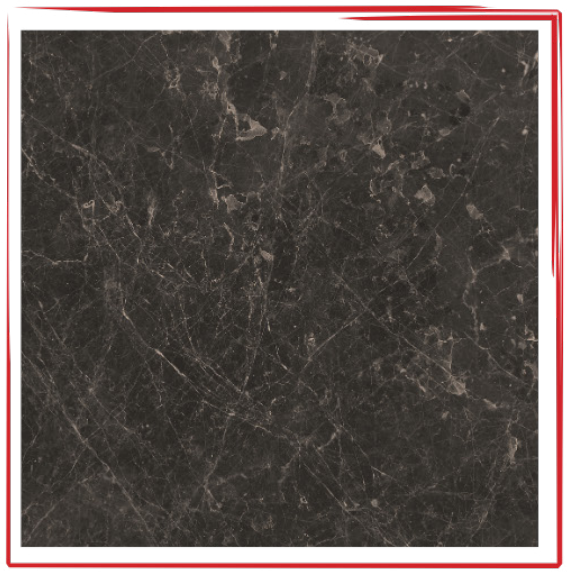
ENVIRONMENTAL PRODUCT DECLARATION

Ceramic Floor Tiles

Manufactured by by Kaleseramik Çanakkale Kalebodur Seramik Sanayi A.Ş.
in accordance with ISO 14025:2006 and EN 15804:2012 - A2:2021



Kale

Programme Information

ISO standard ISO 21930 and CEN standard EN 15804 serves as the core Product Category Rules (PCR).

Product Category Rules (PCR):
2019:14 Version 1.2.5, 2024-12-20, Construction Products and CPC 54 Construction Services, EN 15804:2012 - A2:2021 Sustainability of Construction Works

PCR review was conducted by: The Technical Committee of the International EPD® System. Review chair: Claudia A. Peña, University of Concepción, Chile

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

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Third-party verification

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

EPD verification by individual verifier

Third party verifier: Prof. Ing. Vladimír Koçí, Ph.D., MBA, LCA Studio Šárecká 5,16000 Prague 6 - Czech Republic

Approved by: The International EPD® System

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

Yes [x] No

Kaleseramik Çanakkale Kalebodur Seramik Sanayi A.Ş. has the sole ownership, liability, and responsibility for this EPD.

How To Read This EPD?

An Environmental Product Declaration (EPD) is an ISO Type III Environmental Declaration based on ISO 14025 standard. An EPD transparently reports the environmental performance of products or services from a lifecycle perspective. The preparation of an EPD includes different stages, from acquiring raw materials to the end of life of the final product/service. EPDs are based on international standards and consider the entire value chain. Additionally, **EPD is a third-party verified document**. This EPD includes the following sections described below.

1. General and Program Information

The first part of an EPD has information about the name of the manufacturer and product/service and other general information such as the validity and expiration dates of the document, the name of the program operator, geographical scope, etc. The second page states the standards followed and gives information about the program operator, third-party verifier, etc. The followed Product Category Rule (PCR) is indicated on the second page.

2. Company and Product/Service Information

Information about the company and the investigated product is given in this section. It summarizes the characteristics of the product provided by the manufacturer. It also includes information about the product such as product composition and packaging.

3. LCA Information

Life Cycle Analysis (LCA) information is one of the most important parts of the EPD as it describes the functional/declared unit, time representativeness of the study, database(s) and LCA software, along with system boundaries. The table presented in this part has columns for each stage in the life cycle. The considered stages are marked 'X' whereas the ones that are not considered are labeled as 'NR' (Not Relevant). Not all EPDs consider the full life cycle assessment for a product's entire life stages. The 'System Boundary' page is also the place where one can find detailed information about the stages and the assumptions made.

4. LCA Results

The results of the LCA analysis are presented in table format. The first column in each table indicates the name of the impact category and their measurement units are presented in the second column. These tables show an amount at each life cycle stage to see the impact of different indicators on different stages. Each impact can be understood as what is released through the production of the declared unit of the material. The benefits of reuse/recycling of the declared product are reflected in this section.

The first impact in the table is global warming potential (GWP), which shows how much CO_2 is released at each stage. Other impacts include eutrophication potential, acidification potential, ozone layer depletion, land use related impacts, etc. The second table provides results for resource use and the third table is about the waste produced during production. The fourth and final table shows the results for the GWP-GHG indicator, which is almost equivalent to the GWP-Total indicator mentioned previously. The only difference is that this indicator excludes the biogenic carbon content by following a certain methodology.

About Kale

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 3rd and the world's 12th 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 m^2 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, TS ISO 10002:2018, TS EN ISO 14001: 2015, TS EN ISO 50001: 2018, ISO 27001: 2013, TS ISO 45001: 2018.

About Product

Product Description

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.

Raw Material	Composition (%)
Clay	40-50
Ceramic Waste	20-30
Feldspar	10-20
Kaolin	10-20
Glaze	0-5
Dolomite	0-5
Others	0-5

Areas of Use

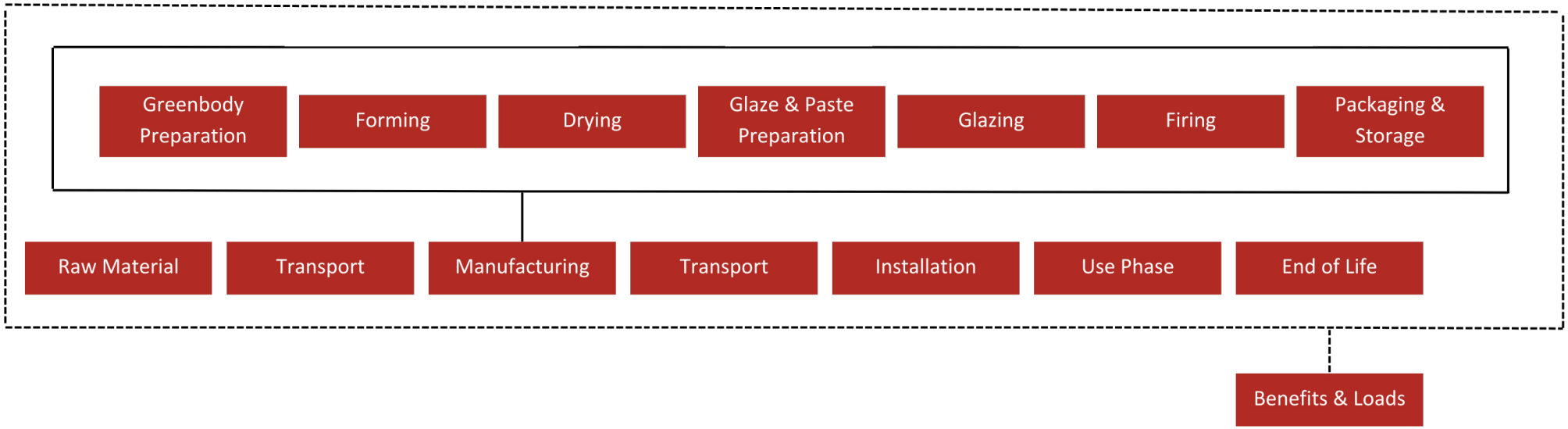
Ceramic floor tiles are largely used as interior and exterior floor coverings. Interior applications include bathrooms, kitchens, living rooms, halls, balconies etc. Exterior applications can be in public buildings, commercial and industrial areas, swimming pools and façades etc. For interior applications, 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 absorbencymThe 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).

Technical Specifications

Technical Specification		Kaleseramik Wall 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	
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



Product Stage

A1-A3: Represents raw material supply which includes raw material extraction and pre-treatment processes before production. A2 relevant to raw material transportation to the plant and A3 refers to the impact occurs from manufacturing process.

Construction Process Stage

A4: This stage is relevant to the transportation of the final product from the factory gate to the customers.
A5. This stage includes the adhesive mortar and water usage in the construction site. For 1 m^2 tile installation; 3.3 kg mortar and 0.8 L water usage was assumed.

Use Stage

B1: Tiles do not cause any emissions in the use stage because of the inert feature.
B2: Usage of detergent containing stain remover or neutral lowsulphate and rinsing with tap water after cleaning was assumed. 0.2 mL detergent and 0.1 L water use was assumed to wash 1 m^2 ceramic tiles.
B3-B5: Tiles do not require any repairment during the use phase and therefore no impacts should be declared.
B6-B7: Tiles do not require any water and energy in the use phase and therefore no impacts ocurred in this module.

End of Life Stage

C1: Deconstruction of tiles at the end of their life is done manually. So no impact occurs in this module.
C2: Waste transport includes discarded tiles and mortar to disposal area. Distance from demolition site to inert landfill site for final disposal is assumed as 50 km.
C3: Environmental impacts generated during the crushing of discarded tiles before recycle or reuse.
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.
D: Inert filler benefits and recycling of packaging materials specified in the disposal stage.

LCA Information

Functional / Declared Unit
The declared unit is 17.3 kg of 1 m^2 average ceramic floor tiles.

REACH Regulation
No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt)

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 and Module D 'Benefits & Loads'.

Cut-off Rules
For this LCA study, no cut-off criteria was applied.

Background Data
For all LCA modelling and calculation, Ecoinvent database (v3.9) and SimaPro (v9.5) LCA software were used.

LCA Modelling, Calculation and Data Quality
The results of the LCA with the indicators as per EPD requirements are given in the LCA result tables. All energy calculations were obtained using Cumulative Energy Demand (LHV) methodology, while freshwater use is calculated with selected inventory flows in SimaPro according to the PCR. There are no co-product allocations within the LCA study underlying this EPD. The regional energy datasets were used for all energy calculations.

Period Under Review
The data used for LCA study concerns the year 2022.

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 l ocations 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 Kaleseramik. Kaleseramik 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

Information on biogenic carbon content according to EN 15804+A2

Biogenic Carbon Content	Unit	Quantity
Biogenic carbon content in product	kg C	0.008
Biogenic carbon content in packaging	kg C	-0.003

LCA Information

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads
	Raw Material Supply	Transport	Manufacturing	Transport	Construction Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport	Waste Processing	Disposal	Future reuse, recycling or energy recovery potentials
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules Declared	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography	GLO	GLO	TR	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
Specific Data Used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

(X = Module included, - = Module not included)

LCA Results

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
GWP - Fossil	kg CO_2 eq	10.8	0.679	4.74	0	0.386	0	0	0.254	0	0.408	-0.769
GWP - Biogenic	kg CO_2 eq	0.078	0.001	0.089	0	-0.512	0	0	4.85E-04	0	0.079	-0.002
GWP - Luluc	kg CO_2 eq	0.026	3.82E-04	0.005	0	0.644	0	0	1.25E-04	0	0.000	-0.001
GWP - Total	kg CO_2 eq	10.9	0.681	4.84	0	0.518	0	0	0.254	0	0.488	-0.772
ODP	kg CFC-11 eq	7.78E-07	1.33E-08	1.80E-07	0	2.01E-08	0	0	3.59E-09	0	9.26E-09	-1.21E-08
AP	mol H+ eq	0.037	0.006	0.030	0	0.004	0	0	0.001	0	0.003	-0.006
*EP - Freshwater	kg P eq	0.003	4.13E-05	0.002	0	0.007	0	0	1.99E-05	0	1.03E-04	-8.19E-05
EP - Marine	kg N eq	0.010	1.26E-04	0.005	0	0.021	0	0	6.10E-05	0	3.14E-04	-2.51E-04
EP - Terrestrial	mol N eq	0.007	0.002	0.005	0	0.005	0	0	0.000	0	0.001	-0.002
POCP	kg NMVOC	0.073	0.017	0.051	0	0.016	0	0	0.003	0	0.011	-0.022
ADPE	kg Sb eq	0.027	0.006	0.019	0	0.003	0	0	0.001	0	0.004	-0.007
ADPF	MJ	7.39E-05	1.76E-06	5.26E-05	0	3.70E-06	0	0	7.78E-07	0	7.97E-07	-2.91E-06
WDP	m^3 depriv.	146	9.08	67.8	0	3.88	0	0	3.43	0	8.49	-10.3
PM	disease inc.	3.74	0.033	2.32	0	1.01	0	0	0.014	0	0.359	-0.858
IR	kBq U-235 eq	2.43E-07	3.39E-08	2.67E-07	0	6.71E-08	0	0	1.42E-08	0	5.82E-08	-6.60E-08
ETP - FW	CTUe	31.2	4.79	64.2	0	61.3	0	0	2.09	0	3.99	-6.41
HTTP - C	CTUh	3.21E-09	3.00E-10	2.84E-09	0	8.26E-10	0	0	1.03E-10	0	2.20E-10	-5.58E-10
HTTP - NC	CTUh	1.15E-07	7.41E-09	1.64E-07	0	2.48E-08	0	0	3.20E-09	0	4.84E-09	-1.11E-08
SQP	Pt	27.3	4.35	24.0	0	37.2	0	0	1.76	0	19.4	-19.8

Acronyms	GWP-total: Climate change, GWP-fossil: Climate change- fossil, GWP-biogenic: Climate change - biogenic, GWP-luluc: Climate change - land use and transformation, ODP: Ozone layer depletion, AP: Acidification terrestrial and freshwater, EP-freshwater: Eutrophication freshwater, EP-marine: Eutrophication marine, EP-terrestrial: Eutrophication terrestrial, POCP: Photochemical oxidation, ADPE: Abiotic depletion - elements, ADPF: Abiotic depletion - fossil resources, WDP: Water scarcity, PM: Respiratory inorganics - particulate matter, IR: Ionising radiation, ETP-FW: Ecotoxicity freshwater, HTP-c: Cancer human health effects, HTP-nc: Non-cancer human health effects, SQP: Land use related impacts, soil quality.
Legend	A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Construction Installation, B1-B7: Use Stage, C1: Deconstruction / Demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Future reuse, recycling or energy recovery potentials
Disclaimer 1	This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.
Disclaimer 2	The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

LCA Results

Resource Use

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
PERE	MJ	11.6	0.128	4.44	0	18.2	0	0	0.046	0	0.147	-0.212
PERM	MJ	0	0	0	0	0	0	0	0	0	0	1.000
PERT	MJ	11.6	0.128	4.44	0	18.2	0	0	0.046	0	0.147	0.788
PENRE	MJ	146	9.08	67.8	0	4.57	0	0	3.43	0	8.49	-10.3
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	1.00
PENRT	MJ	146	9.08	67.8	0	4.57	0	0	3.43	0	8.49	-9.26
SM	kg	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	0.131	0.001	0.059	0	0.123	0	0	0.001	0	0.009	-0.065

Acronyms: 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, 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, SM: Secondary material, RSF: Renewable secondary fuels, NRSF: Non-renewable secondary fuels, FW: Net use of fresh water.

Waste & Output Flows

Impact Category	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
HWD	kg	2.16E-07	0	0	0	0	0	0	0	0	0	0
NHWD	kg	3.10E-07	0	0	0	0	0	0	0	0	0	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EE (Electrical)	MJ	0	0	0	0	0	0	0	0	0	0	0
EE (Thermal)	MJ	0	0	0	0	0	0	0	0	0	0	0

Acronyms: HWD: Hazardous waste disposed, NHWD: Non-hazardous waste disposed, RWD: Radioactive waste disposed, CRU: Components for reuse, MFR: Material for recycling, MER: Materials for energy recovery, EE (Electrical): Exported energy electrical, EE (Thermal): Exported energy, Thermal.

Climate Impact

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3-B7	C1	C2	C3	C4	D
*GHG-GWP	kg CO_2 eq	10.6	0.665	4.62	0	1.05	0	0	0.249	0	0.441	-0.753

GWP-GHG = Global Warming Potential total excl. biogenic carbon following IPCC AR5 methodology
* The indicator includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013

Legend: A1: Raw Material Supply, A2: Transport, A3: Manufacturing, A4: Transport, A5: Construction Installation, B1-B7: Use Stage, C1: Deconstruction / Demolition, C2: Transport, C3: Waste Processing, C4: Disposal, D: Future reuse, recycling or energy recovery potentials

References

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/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 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, 2019:14 Version 1.11 DATE 2019-12-20

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