TERMOKIR

EPD

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

Termokir Special Mortars (MO Series)

Sakret MO 041

Fine cementitious grout for ground anchors

Programme: The International EPD® System
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Programme operator: EPD International AB
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EPD® ENVIRONMENTAL PRODUCT DECLARATIONS

ECO PLATFORM EPD VERIFIED

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General information

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Life Cycle Assessment (LCA)
LCA accountability: Shira Shabtai, Sher Consulting and Training Ltd.
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Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:
EPD® verification by individual verifier
Third-party verifier: Itxaso Trabudua, IK Ingeniería S.L., i.trabudua@ik-ingenieria.com
Approved by: The International EPD® System
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Company information

About the Company

Established in 1983, Termokir Industries Ltd. (1980) is a kibbutz-owned company based in Kibbutz Horshim providing innovative construction and building solutions for the Israeli market. Termokir supplies more than 50 different mortar products, providing high-quality technological solutions based on sustainability principles and designed for building claddings, floorings, adhesion, sealing, insulation and acoustics applications, as well as for concrete repair and grout products. All of the company's products are manufactured on the grounds of the Kibbutz.

Company Strategy

Over the years, Termokir has become a mainstay in the Israeli construction market due to the company's clear value proposition based on three main strategic anchors: Technology - developing innovative and environmentally-minded products tailored to the local construction industry; Quality – putting our stakeholders first by developing high-quality solutions based on international standards and certification frameworks, while also providing related services and training, and thorough technical guidance in implementation of the company's systems and products; and Sustainability – the anchor at the core of the company's value proposition, beginning with the development of it's first "Thermal Plaster" product recognized for its contribution to building energy savings and efficiency in construction. The company continues to develop environmental products and to operate its factory and manufacturing processes in a sustainable way.

In addition, the company strives to achieve green office principles, by recycling, reusing and minimizing the use of paper, and other materials, and by encouraging the use of digital means. Finally, Termokir engages in social impact projects with the community to implement its recycling program, for example, by working with organizations that employ individuals with disabilities.

Through the implementation of these anchors, Termokir strives to continuously challenge, improve and be innovative in the Israeli construction market.

Product-related or management system-related certifications:

Termokir's manufacturing site has received the Israeli Standards Institute Diamond mark which reflects a recipient company's conformity to seven Israeli and international standard quality marks related to their management systems, processes, and products. These include: ISO 9001, ISO 14001, ISO 50001, ISO 45001 and ISO 27001, the Israeli Green Label, and the Standards Mark. All are certified under the scope "Manufacture of thermal insulation plasters, industrial plasters, coating & finishing layers, glues for tiles, sealing materials, etc.".

Name and location of production site(s)

All data utilized for the life cycle assessment is related to the Company's production plant located in in Kibbutz Horshim, Israel.

Product information

Product name: Sakret MO 041- fine cementitious grout for ground anchors

Product identification, description and use:

All Termokir products are manufactured in Israel in a dry mix process at the company's manufacturing site in Kibbutz Horshim. Raw materials are fed automatically from silos, additives are premixed and added automatically as a compound or added without premixing through automatic or manual addition based on the type of additive. The ready-mixed product is filled in paper bags, size depending on the intended use or application.

Termokir products contain no substances that appear in the REACH candidate list of SVHC ("Candidate list of substances of very high concern").

The Termokir MO series is intended as special mortars including different grouts and fine grout. The products are meant for external use. All products in this series comply with the Israeli Green Label.

The products are marketed in a paper bag as dry mix products; a mixture ready for use with water addition only. The bags are transported on wooden pallets, packaged under polyethylene film (60 x 25 kg bags per pallet for Sakret MO 041).

Product Contents:

Component	**MO Family**
Cement	85-90%
Fillers	10-15%
Aggregates	---------
Special additives	0-0.5%
Packaging Materials	**MO Family**
kraft paper	95%
LDPE	5%

0.005 kg (95% kraft paper, 5% LDPE)

UN CPC code: 375 – Articles of concrete, cement and plaster.

LCA information

Functional units (and functional units for conversion):

- 1 kg of Sakret MO 041

Database(s) and LCA software used: For Termokir Products components and energy requirements the data was collected directly from Termokir ltd. The life cycle analysis (LCA) has been done according to the requirements/guidelines of ISO 14040, using specialized LCA software (SimaPro 9.5).

Time representativeness: The data used to model product manufacturing corresponds to 2022, the data from LCA generic databases is from 2011 – 2022.

Assessment period for each module considered in the LCA - one-year average.

Inputs used for software: Relevant datasets for raw materials and waste handling are not available for Israel. Therefore, all input and output streams were taken from the Ecoinvent 3.9.1 which is relevant mostly for Europe. As Israel is following EU environmental regulation very closely, we assume the results will not differ much when local data becomes available.

Description of system boundaries and key assumptions:

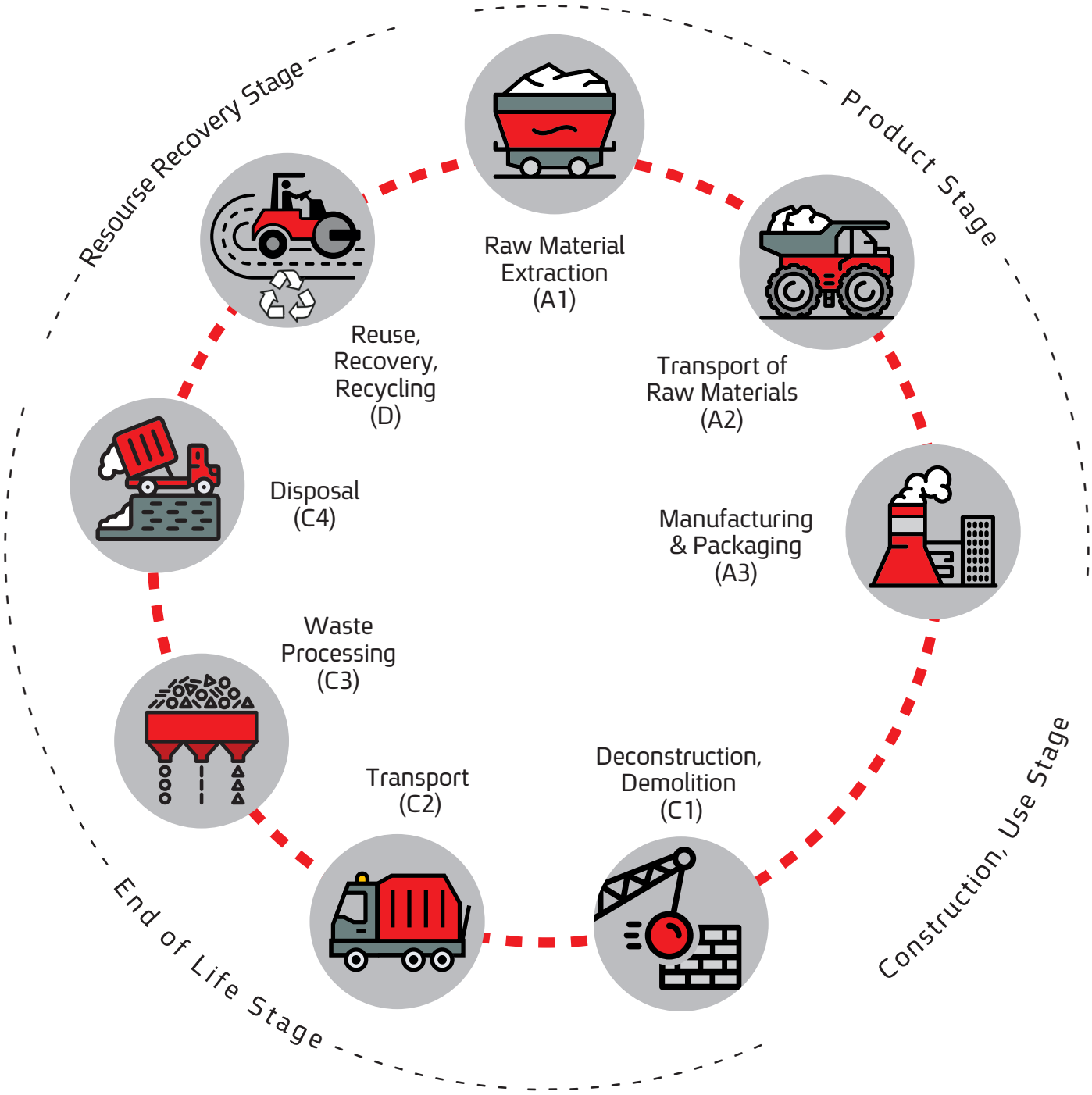
- The life cycle analysis presented is a cradle-to-gate with modules C1-C4 and module D analysis. The EPD includes the analysis of the product stage (A1-A3), End of life (C1-C4) and resource recovery stage (D). Process A1-A3 include raw material production, manufacturing of the product. Process C1-C4 represents the end-of-life treatments - transportation and landfill/ recycling treatment. D Module represents benefits from resource recovery occurring in researched scenario and beyond study boundaries. Reuse- Recovery- Recycling potential: Module D calculates the potential environmental benefits of the recycling or reuse of materials. The scenarios included are currently in use and are representative for one of the most probable.
- This study includes the transport of raw materials and packaging materials to the production site, by road or sea.
- Packaging-related flows in the production process are included in the

manufacturing module (wooden pallets, paper sack and LDPE film).

- A small amount of process waste is produced that is reprocessed as filling material. A conservative assumption has been made that all the environmental impact is allocated to the product and not the co-product (i.e. the filling material). The amount of filling materials differs between the Company's products.
- Packaging waste was not included in the LCA study as it is repurposed fully (100%) and used to make bags & notebooks by 'Orange Heart' (a rehabilitation project which employs people with mental illness). The notebooks are designed by designers from the 'terminal'- a social enterprise which promotes young Israeli designers while sponsoring social and educational enterprises in the arts.
- The impact assessment method used in this study is EN 158O4+A2. The impact indicators can be found below.
- Raw materials: Relevant datasets for raw materials are not available for Israel. Therefore, most datasets were taken from the Ecoinvent 3.9.1 which is relevant mostly for Europe. As Israel is following EU environmental regulation very closely, we assume the results will not differ much when local data becomes available.
- Transportation distances: Raw materials and packaging materials are imported from several countries; travel distances were calculated based on the location of manufacture, and assuming arrival via the Ashdod port, from which most of the raw materials arrive before being sent to the company's manufacturing facility.
- Transportation to waste facility treatment was modelled as 50 km, as Israel is a small country (C2).
- End of life: Beyond the transportation of waste mentioned in the paragraph earlier, the end-of-life treatment modeled is 58% recycle and 42% landfill. This is based on a report by the Israeli Knesset using the environmental protection agency data from 2021[1] (C3-C4).

1 *https://fs.knesset.gov.il/globaldocs/MMM/4a321fa6-5669-ec11-8142-00155d0401c3/2_4a321fa6-5669-ec11-8142-00155d0401c3_11_19422.pdf*

System diagram:



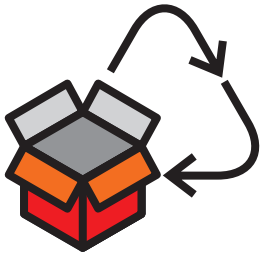
Standards

- The Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804:2012+A2:2019/AC:2021 and applicable construction products PCR 2019:14 - Version 1.2.5.
- ISO 14040/44 (International Organization for Standardization (ISO) 2006a, b).

Allocation: The study uses mass allocation method. Additionally, the allocation method used in this study for all data sets is the "cut off" method. Regarding end of life, this method does not include burdens of the recycling, but rather only transportation to recycling facilities, as it considers the burdens and credit of recycling to the "second" product produced from recycled material.

A small amount of process waste is produced that is reprocessed as filling material. A conservative assumption has been made that all the environmental impact is allocated to the product and not the co-product (i.e., the filling material). The amount of filling materials differs between the Company's products.

Cut-off: The upstream processes include extraction and processing of raw materials, primary fuels used and transportation to the facility. The core process includes all product manufacturing processes at the manufacturing facility itself. The study applies a cut-off criterion of 1%. More than 99 mass % of the materials have been included in the LCA. As some raw materials were not found in the available databases, these were cut-off after finding that the contribution from those materials was less than 1% of the product mass. Excluded processes and materials: machine oil, machine cleaners, factory cleaning.



Declared Modules

The life cycle stages included in the analysis are illustrated in the table below, according to EN 15804. The EPD includes the analysis of the product stage (A1-A3), End of life (C1-C4) and resource recovery stage (D). If a module is included, it is indicated with “X” and if it is excluded with a “ND” (Not Declared).

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	IL, EU Global	IL, EU Global	IL	ND	ND	ND	ND	ND	ND	ND	ND	ND	IL	IL	IL	IL	IL
Specific Data Used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - Sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

A1 Includes the raw material production, from a number of different countries (Germany, The Netherlands, Turkey, Israel, Spain, China).

A2 Describes the shipping and transportation of these materials to Termokir facility in the state of Israel.

A3 Includes the production of the 49 items, in Termokir facility. All Termokir products are manufactured in Israel in a dry mix process at the company's manufacturing site in Kibbutz Horshim. Raw materials are fed automatically from silos, additives are premixed and added automatically as a compound or added without premixing through automatic or manual addition based on the type of additive. The ready-mixed product is filled in paper bags, size depending on the intended use or application. The biogenic carbon content in the packaging is presented in table 4. The electricity power mix selected is Israel grid for the year 2021 based on published data from the Israeli ministry of environmental protection[1] - 69% natural gas, 23% coal, 8% renewable energy.

A small amount of process waste is produced that is reprocessed as filling material. A conservative assumption has been made that all the environmental impact is allocated to the product and not the co-product (i.e., the filling material). The amount of filling materials differs between the Company's products.

Packaging waste was not included in the LCA study as it is repurposed fully (100%) and used to make bags & notebooks.

Process C1-C4 represents the end-of-life treatments - transportation and landfill/ recycling treatment.

C1 - Takes place with the whole demolition of the building. It is assumed that no significant energy is associated with Termokir items as part of the building demolition.

There for the environmental impact of this module is set to be zero.

C2 – Transportation distances to the closest landfill and recycle plant are estimated as 50 km by 16-32 tone lorry (eur04).

C3 - The end-of-life treatment modeled is 58% recycle and 42% landfill. This is based on a report by the Israeli Knesset using the environmental protection agency data from 2021[2].

C4 – 42% of the waste is send to landfill in the state of Israel.

D Module represents benefits occurring in researched scenario and beyond study boundaries - resources recovery (Reuse- Recovery-

1 *Israel Ministry of environmental protection – A review of the electricity sector in Israel*

2 *Israel Knesset - Construction waste process in Israel*

Recycling potential). Module D calculates the potential environmental benefits of the recycling or reuse of materials. The module D assumptions have not been changed (year of reference, electricity and power production, amount, quality of material and material losses). The scenarios included are currently in use and are representative for one of the most probable.

Processes	Unit
Collection	1 kg collected with mixed construction waste
Recovery	Recycling – 0.58 kg
Disposal	0.42 kg
Transportation Assumptions	Transportation distances to the closest landfill and recycle plant are estimated as 50 km by 16-32 tone lorry (eur04).

Table 2 – EOL

Environmental Information

LCA results are detailed in the following tables.

Sakret MO 041

Potential environmental impact– mandatory indicators according to EN 15804

Indicator	Unit	A1 - A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.8E-01	0.0E+00	9.5E-03	7.0E-03	2.6E-03	-1.39E-01
GWP-biogenic	kg CO_2 eq.	-1.8E-02	0.0E+00	3.6E-06	1.8E-02	1.5E-06	-1.73E-01
GWP-luluc	kg CO_2 eq.	3.4E-05	0.0E+00	5.0E-06	4.0E-07	1.5E-06	-5.19E-07
GWP-total	kg CO_2 eq.	3.6E-01	0.0E+00	9.5E-03	2.5E-02	2.6E-03	-3.12E-01
ODP	kg CFC 11 eq.	5.4E-08	0.0E+00	1.5E-10	1.2E-10	7.4E-11	-2.15E-08
AP	mol H^+ eq.	2.9E-03	0.0E+00	4.2E-05	3.4E-05	1.9E-05	-1.09E-03
EP-freshwater	kg PO_4^{3-} eq.	1.9E-05	0.0E+00	2.8E-07	4.7E-07	7.7E-08	-4.88E-01
EP-freshwater	kg P eq.	6.4E-06	0.0E+00	9.0E-08	1.5E-07	2.5E-08	-1.50E+00
EP-marine	kg N eq.	9.7E-04	0.0E+00	1.5E-05	4.9E-06	7.4E-06	-3.61E-04
EP-terrestrial	mol N eq.	1.1E-02	0.0E+00	1.6E-04	5.4E-05	7.9E-05	-4.06E-03
POCP	kg NMVOC eq.	2.8E-03	0.0E+00	5.6E-05	2.1E-05	2.8E-05	-1.02E-03
ADP-minerals & metals*	kg Sb eq.	1.9E-07	0.0E+00	3.1E-08	6.6E-09	3.6E-09	-4.21E-08
ADP-fossil*	MJ	5.9E+00	0.0E+00	1.3E-01	9.4E-02	6.4E-02	-2.12E+00
WDP	m^3	4.2E+01	0.0E+00	6.0E-04	3.4E-04	2.8E-03	-1.63E+01
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption						

** Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.*

Potential environmental impact – additional mandatory indicator

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG [1]	kg CO2 eq.	3.9E-01	0.0E+00	9.7E-03	7.2E-03	2.7E-03	-2.93E-01

Use of resources

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	2.8E-01	0.0E+00	1.7E-03	2.0E-03	5.4E-04	-2.26E-02
PERM	MJ	6.7E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PERT	MJ	3.5E-01	0.0E+00	1.7E-03	2.0E-03	5.4E-04	-2.26E-02
PENRE	MJ	5.9E+00	0.0E+00	1.3E-01	9.4E-02	6.4E-02	-1.07E+00
PENRM	MJ	1.1E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
PENRT	MJ	5.9E+00	0.0E+00	1.3E-01	9.4E-02	6.4E-02	-1.07E+00
SM	kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
RSF	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
NRSF	MJ	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00
FW	m^3	9.8E-01	0.0E+00	1.9E-05	1.2E-05	6.8E-05	-2.91E-04
Acronyms	PERE = Use of renewable primary energy excluding renewable primary energy 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 non-renewable primary energy 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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water						

Information on biogenic carbon content

The packaging total weight – 0.005 kg (95% kraft paper, 5% LDPE)

Results per functional or declared unit		
Biogenic Carbon Content	**Unit**	**Quantity**
Biogenic carbon content in product	kg C	0
Biogenic carbon content in packaging	kg C	0.002

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO_2.

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1 *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 almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.*

Indicators describing waste

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg.	8.10E-06	0.00E+00	8.73E-07	3.18E-07	3.38E-07	-2.71E-06
Non-hazardous waste disposed	kg.	1.65E-02	0.00E+00	6.56E-03	2.85E-04	4.21E-01	-3.54E-03
Radioactive waste disposed	kg.	2.97E-06	0.00E+00	2.73E-08	2.04E-09	9.42E-09	0.00E+00

Indicators describing output flows

Parameter	Unit	A1-A3	C1	C2	C3	C4
Components for reuse	kg	0	0	0	0	0
Material for recycling	kg	0	0	0	0.58	0
Material for energy recovery	kg	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0

References

- General programme instructions of the International EPD® System. Version 4.0
- PCR 2019:14 Construction products (EN 15804:A2) (1.2.5)
- EN 15804:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14025: Environmental labels and declarations – type III Environmental declarations principles and procedure (2009)
- ISO 14040:2006 Environmental management - Life cycle assessment - Principles and framework
- ISO 14044:2006 Environmental management - Life cycle assessment - Requirements and guidelines
- Termokir product declaration catalog for construction products
- SimaPro 9.5 Software and database

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