Environmental Product Declaration

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

Fire Plus$^{+2.0}$ from Knauf Orbond

Programme:	The International EPD® System, www.environdec.com
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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

General information

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
Website:	www.environdec.com
E-mail:	info@environdec.com

Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product Category Rules (PCR): 2019:14, Construction products, version 1.2.5, UN CPC 375
PCR review was conducted by: *The Technical Committee of the International EPD® System. A full list of members available on www.environdec.com.* *The review panel may be contacted via info@environdec.com* *Chair of the PCR review: Claudia A. Peña*
Life Cycle Assessment (LCA)
LCA accountability: *Shai Ben Aharon, KVS*
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: *Ruben Carnerero* 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 registered in different EPD programmes, or not compliant with EN 15804, 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. For further information about comparability, see EN 15804 and ISO 14025.

Company Info

"ORBOND Gypsum Industries and Products Ltd". provides a variety of solutions for the construction industry. Thanks to the quality of its products, its professional knowledge, and its commitment to its customers and to the quality of the environment, Orbond has become a leader in its field in the Israeli market from the day it was founded until today.
The Orbond factory was established in Israel in 1993, and since 1998 Orbond has enjoyed the professional support of the German parent company KNAUF, a world leader in the gypsum industry, and operates approximately 320 factories which are located in 90 countries on five continents.
All the products are "MADE IN ISRAEL" and have ISO 9001 quality system management certification, ISO 14001, Environmental management, ISO 18001 And in addition, there is a green note for all products as part of the platinum certificate.

Environmental Policy

Gypsum is considered a preferred construction material that wins sympathy among environmental authorities around the world and is defined as a green construction product.
Gypsum is a natural material that does not contain toxic and harmful substances, it can be recycled, and its construction produces almost no waste.
Orbond has a variety of products with a green note, among them: plasterboards, gypsum-based plasters and more.
The materials are environmentally friendly and do not emit hazardous substances.

Name and location of production site(s): Knauf Orbond manufacturing site is located in the industrial area of Alon Tavor, located in Afula, Israel.

Product information

Product name: Fire Plus+2.0,
Product identification: Plasterboard.
Product description:

- Fire Plus+2.0– This plasterboard has an improved resistance to fire with thickness of 22 mm instead of 12.5 mm. It is a special board that has fire retardants and fiberglass added to it in order to improve the duration of its fire resistance and the strength of the board. The fire-resistant board 2.0 is intended to be used for buildings that require improved resistance to fire, for cladding of walls, ceilings, pits, shafts and canals.

Specifications:

Name of Product	Fire rasistant
Base material for the product	Gypsum core wrapped in special vail
Length [mm]	2250
Width [mm]	1200
Thickness [mm]	22
Weight [kg/m^2]	17
Horizontal elastic module [N/mm^2]	2000
Vertical elastic module [N/mm^2]	1700

Product test standard:
The product complies the Israeli standard 1490 part 1 and complies with ASTM C 1396, Fire test according Israeli standard 931, Fire clasification according Israeli stand 755.

UN CPC code: 37530 – Articles of plaster or of compositions based on plaster.

Geographical scope: The study represents the manufacturing of Gypsum Plasterboards in Knauf Orbond's manufacturing factory in the industrial area of Alon Tavor, located in Afula, Israel. The end-of-life scenario of the products is demolishment and recycling in Israel, according to market research that was conducted.

LCA information
Functional unit / declared unit: 1 m^2 of board

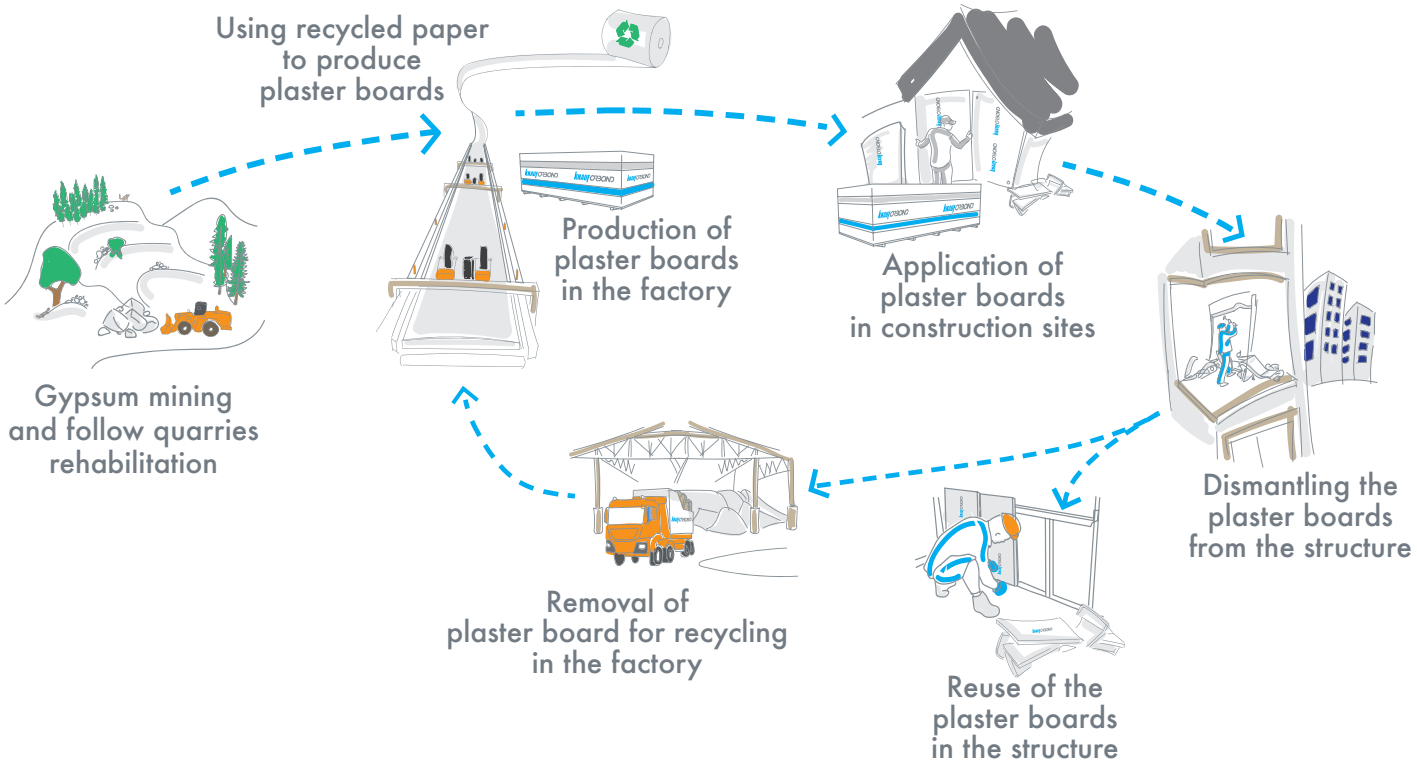
Reference service life: The Reference Service Lives result from the application areas in accordance with the /BBSR Service Life/ is as follows: a service life of at least 50 years can be considered for gypsum standard interior plasters. There are no influences on ageing when the recognized rules of technology are applied (code 345.211 for "stucco, lime-gypsum plaster" in the BBSR2017).

Time Representativeness: The time coverage of the LCA's data is from January 2022 to December 2022.

Database(s) and LCA software used: The software used is SimaPro, Analyst 9.4.0.2. The database used is the Ecoinvent database v3.8 (2021) using the cut-off by classification approach (SCLCI, 2017).

Description of system boundaries:
Cradle to gate with modules C1–C4 and module D (A1–A3 + C + D).

PLASTER BOARD LIFE CYCLE



Manufacturer's contact information:

Address: Alon Tavor Industrial Area, Afula 18000, Israel.

Phone Number: +972-072-3945095

Email: office@knauf.com

Website: https://www.orbond.co.il/

Name and contact information of the LCA practitioner: Shai Ben Aharon shai@kvs.co.il of KVS.

Assumptions: The plasterboard's relative amount per declared unit for the wooden legs was assumed to be approximately the same for all of the boards and equals to the relative amount per declared unit of the regular board.

The primary energy of raw materials was calculated for all renewable and non-renewable raw materials that had LHV value sources.

The End of life scenario was based on the recycling percentage of gypsum plasterboards in Israel (3%).

Allocations: In this study, as per EN 15804, allocation is conducted in the following order:

1. Allocation should be avoided if possible.
2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small.
3. Allocation should be based on economic values.

Overall and in general, allocations were avoided whenever possible. Nevertheless, allocations were made in the general energy usage.

Allocation used in Ecoinvent 3.8 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 standard.

Cut-off rules: The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR of the EPD International Institution. The study does not exclude any hazardous materials or substances. The study includes all major raw materials and energy consumption. All inputs and outputs of the unit processes with available data are included in the calculation. There is no neglected unit process of more than 1% of total mass or energy flows, and in fact components with a share of even less than 1% are included.

Background Database: The EPD is based on the primary production data of Knauf-Orbond. The background database is Ecoinvent database v3.8 (2021). Since there are several missing datasets for Israel, background data for larger areas in which Israel is included in was used for a small part of the life cycle inventory. The electricity mix of the high voltage electricity grid according to 2020 data is given by a formal report from the ministry of energy in Israel and the water grid is modeled according to the water sources in Israel.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X
Geography	IL EUR Global	IL EUR Global	IL										IL	IL	IL	IL	IL
Specific data used	>90%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%					-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%					-	-	-	-	-	-	-	-	-	-	-	-

Module A1 – Supply of raw materials: The Knauf-Orbond gypsum boards consist of a gypsum core which also contains additives for easier processing and/or a fine adjustment of the respective properties of the individual boards. The natural gypsum is mainly extracted from open-cast mining. FGD recycled gypsum is also added to the core of the boards. The Board liner which covers the gypsum core is produced from recycled paper. The raw materials of packaging i.e., wooden legs and polyethylene are also included in this module.

Module A2 – Transport of raw materials: Natural gypsum is extracted from mines abroad in a nearby country to the manufacturing sites. Accordingly, transport distances are short and done by ships and trucks. Further raw materials are supplied from manufacturers within Israel or other European countries.

Module A3 – Manufacturing: Stucco and additives are suspended in water and spread on a continuous sheet of board liner (visible face, lower layer). Beforehand, the board liner is cut at the sides for edge shaping. The slurry is covered with a second sheet of board liner (back surface) in the forming station and the edges of the visible face board liner are flipped upwards. On the subsequent board line, the gypsum sets continuously and the boards are dried in a multi-level drier to the permitted residual moisture level. Drying is followed by the cutting of the boards to the desired lengths. Finally, gypsum boards are piled up on reusable wooden legs. The waste which is generated from the manufacturing process of the plasterboards is included also in the module, small amounts of plastic polymers which are left from the wrapping of the packaging, municipal waste, plasterboards leftovers from cutting, etc. All waste types are treated according to the normal procedure of regular waste treatment in Israel, by incineration or sanitary landfilling. Toxic or other emissions to air in the manufacturing process were not reported.

End-of-Life stage (C1-C4):

Module C1 – De-construction: Demolition of plasterboards takes place with the whole demolition of the building/ construction. Thus it is assumed that energy used for the demolition of the plasterboards has minor significance and the environmental impact of this module is set to be zero.

At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as mixed construction waste.

Module C2 – Transportation: Transportation distance to the closest disposal area is estimated as 50 km by a 16-32 tonne lorry, which is the most common.

Module C3 – Waste processing: According to a research of Milken Innovation center (Research institute in Israel) from 2021, named "Promoting the circular economy in the construction sector" and according to interviews with industry executives that manage the construction waste in Israel (GREENMIX), approx. 3% of the plasterboards are recycled, and about 97% are landfilled. The fraction of waste is commonly recycled to become a gypsum raw marerial and thus the dataset was modeled to fit this assumption. For the waste processing, an energy consumption of 0.001 kWh of electricity/kg of waste input was calculated.

Module C4 – Disposal: 97% of the gypsum plasterboards will be landfilled.

Resource Recovery stage (D):

Module D – Reuse-Recovery-Recycling potential Module D calculates the potential environmental benefits of the recycling or reuse of materials. 3% of the product is assumed to be recycled to raw gypsum that will be used instead of virgin raw materials. The calculations of this module were according to Annex D in EN 15804:2012+A2:2019.

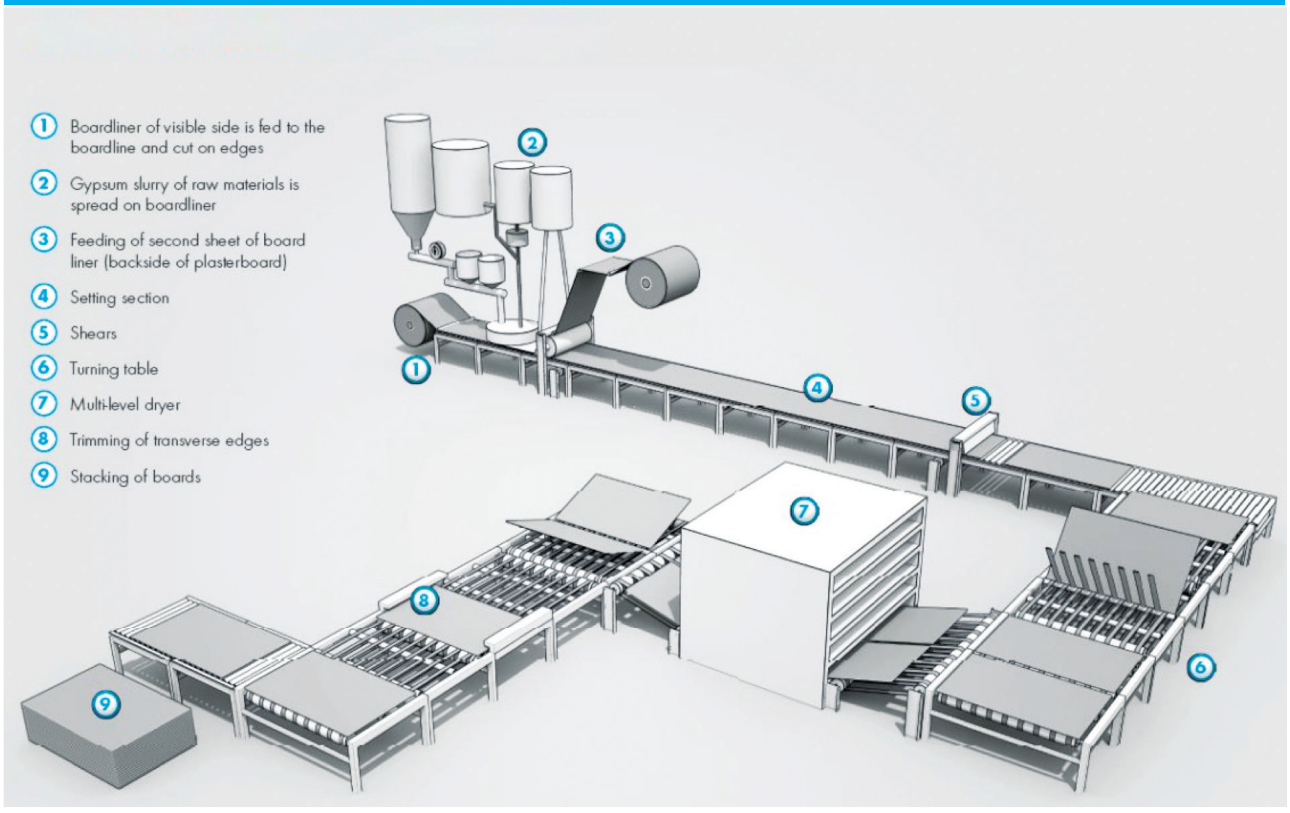
The scenarios included are currently in use and are representative for one of the most probable alternatives.

Content information

Product components	Weight-%	Post-consumer material, weight-%	Biogenic material, weight-%
Gypsum core	93-96	6.2	0
Wrapping paper	<5	<5	<1
Additivies	<1	0	0
TOTAL	100	0	0
Packaging materials	**Weight-%**	**Weight-% (versus the product)**	**Weight biogenic carbon-%**
Wooden legs	<1	<1	<1
PE cover	<1	<1	0
TOTAL	<1	<1	<1

Dangerous substances from the candidate list of SVHC for Authorisation	EC No.	CAS No.	Weight-% per functional or declared unit
ND	ND	ND	ND

MANUFATURING OF PLASTER BOARDS



Environmental Information

The EPD is for a specific product - **Environmental impacts of 17 kg/m2 of the FirePlus +2.0**

Potential environmental impact – mandatory indicators according to EN 15804

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq.	3.02E+00	0	1.44E-01	3.31E-03	1.43E-01	-1.27E-03
GWP-biogenic	kg CO_2 eq.	-3.38E-01	1.56E+00	7.82E-05	-5.01E-06	1.03E-04	7.91E-07
GWP - luluc	kg CO_2 eq.	1.06E-02	0	6.06E-05	1.72E-07	8.37E-05	-3.11E-07
GWP - total	kg CO_2 eq.	2.70E+00	1.56E+00	1.45E-01	3.31E-03	1.43E-01	-1.27E-03
ODP	kg CFC 11 eq.	2.95E-07	0	3.12E-08	1.22E-10	4.68E-08	-2.40E-10
AP	mol H^+ eq.	1.49E-02	0	4.26E-04	1.66E-05	1.42E-03	-2.53E-05
EP - freshwater	kg PO_4 eq.	3.52E-04	0	3.75E-06	2.78E-07	2.94E-06	-2.30E-08
EP - freshwater	kg P eq.	1.15E-04	0	1.23E-06	9.10E-08	9.60E-07	-7.50E-09
EP - marine	kg N eq.	4.84E-03	0	8.47E-05	2.41E-06	5.57E-04	-8.08E-06
EP - terrestrial	mol N eq.	4.24E-02	0	9.44E-04	2.67E-05	6.12E-03	-1.13E-04
POCP	kg NMVOC eq.	1.00E-02	0	3.54E-04	7.41E-06	1.72E-03	-2.42E-05
ADP-minerals&metals*	kg Sb eq.	4.59E+01	0	2.14E+00	4.62E-02	3.15E+00	-1.60E-02
ADP-fossil*	MJ	1.05E-05	0	5.02E-07	7.14E-09	2.19E-07	-4.46E-09
WDP*	m^3	1.42E+00	0	7.47E-03	2.23E-04	1.05E-01	-9.93E-05
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 and voluntary indicators

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
GWP-GHG[1]	kg CO_2 eq.	3.03E+00	0	1.45E-01	3.31E-03	1.43E-01	-1.27E-03

Disclaimers shall be added, if required by EN 15804.

Use of resources

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
PERE	MJ	1.29E+00	0	2.11E+00	4.61E-02	3.13E+00	-1.59E-02
PERM	MJ	7.63E+00	0	2.60E-02	9.88E-05	2.83E-02	-1.31E-04
PERT	MJ	8.92E+00	0	9.61E-05	2.17E-07	4.15E-04	-4.53E-07
PENRE	MJ	4.52E+01	0	7.27E-03	1.44E-04	6.18E-03	-9.41E-05
PENRM	MJ	6.58E-01	0	3.62E-03	1.15E-03	3.53E-03	-8.93E-05
PENRT	MJ	4.59E+01	0	1.40E-02	8.38E-05	1.33E-02	-1.05E-04
SM	kg	9.95E-01	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0
FW	m^3	4.21E-02	0	2.47E-04	6.76E-06	2.52E-03	-2.69E-06
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						

[1] This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO_2 is set to zero.

Waste production and output flows

Waste production

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	6.30E-05	0	5.64E-06	5.37E-08	5.85E-06	-3.65E-08
Non-hazardous waste disposed	kg	6.25E-01	0	1.11E-01	2.31E-04	1.57E+01	-9.83E-05
Radioactive waste disposed	kg	9.32E-05	0	1.39E-05	1.05E-08	2.10E-05	-1.04E-07

Output flows

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	6.2E-02	0	0	0	0	0
Material for recycling	kg	0	0	0	0	0	2.4E-01
Materials for energy recovery	kg	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0

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Contact information

Programme operator: EPD®

EPD owner: KNAUF ORBOND

Knauf Orbond
https://www.orbond.co.il/
orbond@orbond.co.il
T: +972-4-6521141

LCA author: KVS Leading Climate Action

KVS
http://www.kvs.co.il/
info@kvs.co.il
03-917 2202

3rd party verifie

Ruben Carnerero
r.carnerero@ik-ingenieria.com