Environmental Product Declaration

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

Fawori Carbon EPS Thermal Insulation Board

from

BETEK BOYA VE KİMYA SANAYİİ A.Ş.

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

Programme information

Programme:	The International EPD® System
Address:	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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Accountabilities for PCR, LCA and independent, third-party verification
Product Category Rules (PCR)
This EPD is in accordance with EN 15804+A2 and ISO 14025:2010 standards. The EN 15804 +A2:2019 serves as the core Product Category Rules (PCR). In addition, the Int'l EPD System PCR 2019:14 Construction products, v1.3.4 and c-PCR-005 Thermal Insulation Products, 2024-05-03 are used.
PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.
Life Cycle Assessment (LCA)
LCA accountability: Eren YAMAN, ERKE Sürdürülebilir Bina Tasarım Danışmanlık Ltd. Şti.
Third-party verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006: ☐ EPD process certification ☒ EPD verification
Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: ☒ EPD verification by individual verifier Third-party verifier: *Ipek Göktas Kalkan, Göktas Kalkan Ipek TMI* Approved by: The International EPD® System
Procedure for follow-up of data during EPD validity involves third party verifier: ☐ Yes ☒ No

Betek 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 Information

Owner of the EPD: Betek Boya Kimya ve Sanayi A.Ş.

Location of Production Site: 1. GOSB, Tembelova Alanı 3200 sk. No: 3206 Gebze/Kocaeli

About Betek

Founded in 1988, Betek Boya Kimya ve Sanayi A.Ş. developed high-quality concrete admixtures, ready-mixed mortars, and waterproofing materials. In the following years, it added construction paints to its product range. It was in 1993 when Betek first stepped into decorative coatings as a result of its technological collaboration with DAW, the largest manufacturer in Europe, and it became the first Turkish paint company to engage in manufacturing with a European partner. Betek became the market leader in the paint industry in 2001 and created the Filli Boya brand. With almost 1,900 employees and over 5,000 sales points, Betek is one of Turkey's leading industrial enterprises. Betek started its heat insulation activities in 2003, and took over the role as leader in the sector. Adhering to EU paint standards since 1993, Betek owns following management systems: ISO 9001, ISO 10002, ISO 14001, OHSAS 18001, ISO/IEC 27001, ISO 50001, IATF 16949. Betek, with a production facility in Egypt, has started manufacturing heat insulation systems at its facilities in Kayseri and Balıkesir. Betek Paint became a global player in 2019 when it was acquired by the Japan-based Nippon Paint. Founded in 1881 in Tokyo by Mr. Moteki Jujiro, Nippon Paint achieved a turnover of 628 billion yens with over 22.000 employees.

Product Information

About the Product

Product name: Fawori Carbon EPS Thermal Insulation Board

Geographical scope: The geographical scope of this EPD is global.

Product description: Fawori Carbon EPS Thermal Insulation Board is a carbonaceous polystyrene-based thermal insulation plate that is produced in line with the TS EN 13163 Insulation Materials Standard.

- Thermal conductivity coefficient (λ_D) is 0,032-0,034 W/mK.
- High water vapor permeability (μ=20-40). It prevents humidity, moisture, and mold formation in structures.
- Ability to stand all mechanical loads in structures. Prevents the formation of plaster, paint, and coating cracks resulting from expansion, shrinkage, and wall wearing.
- Reaches the perfect size balance by resting in accordance with the standards after production, there is no deviation from the square over time.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies.

UN CPC code is 369-Other plastic products.

Content of the product and packaging materials as shown in below. There is no biogenic carbon and secondary material content in both raw materials and packaging.

Product components	Weight, kg	% by weight
Lambdapor 750	0,700kg	100,00
Total	0,700kg	100,00
Packaging materials	Weight, kg	% by weight
EPS Shrink	0,008kg	100,00
Total	0,008 kg	100,00

The polymeric base product for EPS rigid foam is polystyrene (PS). It is produced by polymerizing monomeric styrene using various processes.

The most commonly used raw material production process is polymerization in a styrene/water suspension, with the blowing agent pentane being added towards the end of the polymerization. The PS granulate obtained in this way is further processed into foam in subsequent physical processing steps. During the EPS manufacturing process, there is an inherent release of pentane, this potential release is also taken into account in calculations.

Technical Data of the Product		
Name	**Value**	**Unit**
Thermal Conductivity (λ)	0,032-0,034	W/mK
Thermal Resistance (R)	0,60-4,65	m^2K/W
Water vapour diffusion resistance	20-40	μ
Gross density	0,700	kg/m^2
Compressive strength	≥0,04	N/mm^2
Size (Width x Length)	50 x 100	cm
Thickness	≥2-≤20 cm	cm
Usage Temperatures	(-50) / 75	°C

Application

Thermal insulation is applied in all buildings to reduce energy consumption and create more comfortable living spaces. There are many building types where thermal insulation solutions can be applied. The main application areas are residences, schools, public buildings, hospitals, hotels and industrial buildings.

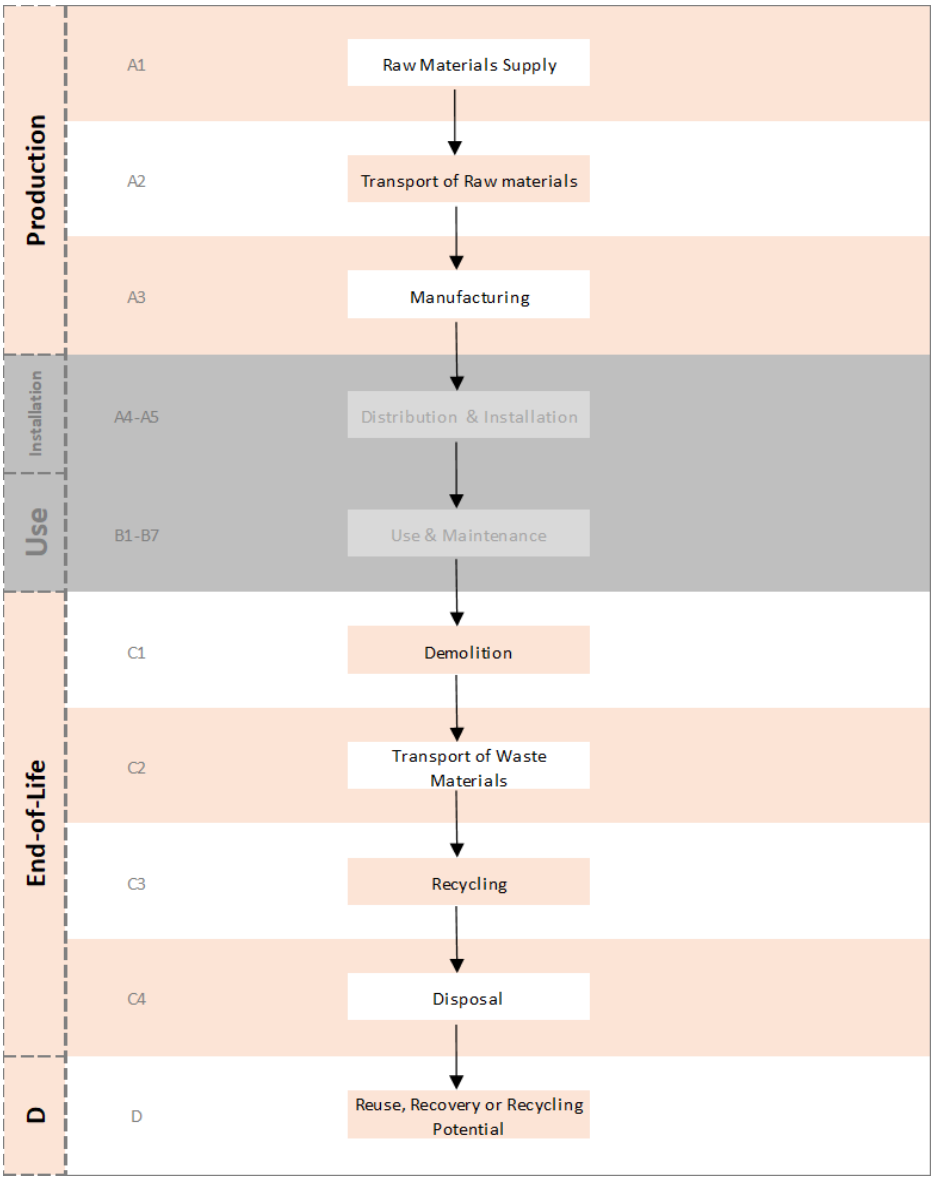
LCA information

Declared unit: 1 m^2

Time representativeness: Goal of the study is to determine the actual environmental loads for 12 consecutive months, so data for the time period is the year 2023.

Database(s) and LCA software used: Ecoinvent v3.10 and OpenLCA v2.2.0 based on EF 3.1

System Diagram:



Description of system boundaries: Cradle to gate with options, Modules C1-C4 and D

Excluded lifecycle stages: Modules A4-A5, Modules B1-B7

SYSTEM BOUNDARY	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage		
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
	Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction /demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling
Modules	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
Modules declared	X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X	X	X
Geography	Global			-	-	-	-	-	-	-	-	-	Global						
Share of specific data	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-

(MND: Module not declared)

Period under consideration: The period under consideration is defined as one year. The monthly data is collected by the producer and is averaged to obtain the yearly data. The specific data for the year 2023 is utilized within this study.

Estimates and Assumptions: In the end-of-life stages, it is assumed that the final products are sent to the landfill. Disposal area is estimated as 50 km and common transportation type and fuel are used in the calculation. All the other estimations and assumptions regarding the cut off criteria and the allocation are declared in those parts. There are no other additional estimations and/or assumptions in the scope of this study.

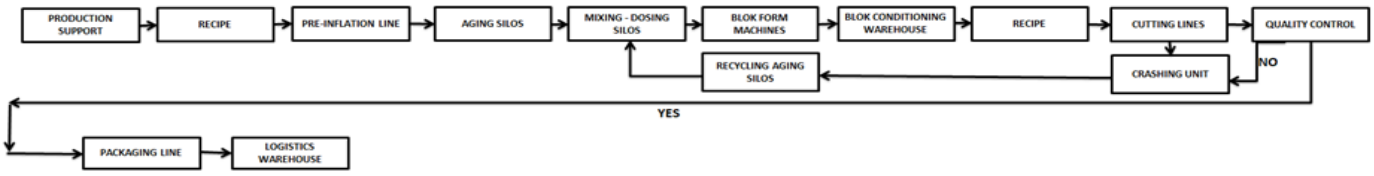
Cut of Rules: All inputs and outputs to a (unit) process are included in the calculation, for which data were available. The applied cut off criteria is 1% off renewable and nonrenewable primary energy usage and 1% of the total mass input of that unit process in case of in sufficient input data or data gaps for a unit process.

The total of neglected input flows is a maximum of 5% of energy usage and mass. The total neglected input and output flows are also not exceeded 1% of energy usage or mass as indicated in the PCR. Infrastructure/capital goods for upstream, core and downstream processes are cut off.

Allocation: The allocation was performed in which the product output fixed to 1 m2 and the corresponding amount of product was used in calculations.

Average breakdown was done by considering product total weight per year production. According to this, the total energy, water, and raw materials used to produce the product were divided by the total annual production. The raw material and energy/water inputs and waste outputs were allocated depending on the total mass annual production and calculated for 1 m2 product. Co-product allocation is not applicable, since there is no co-product generation in the production line.

Production Process



The energy source from openLCA

The inventory data for the generation of electricity used in A1-A3 has been modelled based on residual electricity mix on the market. GWP-GHG of the used electricity data is 0.57 kg CO2e / kWh.

Results of the environmental performance indicators

Mandatory impact category indicators according to EN 15804

Results per functional or declared unit										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-fossil	kg CO_2 eq.	2,52E+00	6,71E-01	1,82E-01	3,38E+00	0,00E+00	6,85E-03	0,00E+00	8,62E-02	0,00E+00
GWP-biogenic	kg CO_2 eq.	1,34E-02	1,96E-05	5,27E-05	1,34E-02	0,00E+00	1,53E-07	0,00E+00	6,44E-05	0,00E+00
GWP-luluc	kg CO_2 eq.	1,76E-04	2,73E-04	1,21E-04	5,69E-04	0,00E+00	2,72E-06	0,00E+00	4,56E-06	0,00E+00
GWP-total	kg CO_2 eq.	2,54E+00	6,71E-01	1,82E-01	3,39E+00	0,00E+00	6,85E-03	0,00E+00	8,63E-02	0,00E+00
ODP	kg CFC 11 eq.	2.81E-08	9.93E-09	4.62E-09	4.26E-08	0.00E+00	9.56E-11	0.00E+00	2.03E-10	0.00E+00
AP	mol H^+ eq.	9.40E-03	1.54E-03	3.33E-04	1.13E-02	0.00E+00	2.28E-05	0.00E+00	5.67E-05	0.00E+00
EP-freshwater[1]	kg P eq.	7.60E-05	5.31E-05	1.96E-05	1.49E-04	0.00E+00	5.37E-07	0.00E+00	8.54E-07	0.00E+00
EP-marine	kg N eq.	1.51E-03	3.58E-04	8.86E-05	1.96E-03	0.00E+00	7.40E-06	0.00E+00	4.82E-04	0.00E+00
EP-terrestrial	mol N eq.	1.62E-02	3.87E-03	9.25E-04	2.10E-02	0.00E+00	8.05E-05	0.00E+00	2.30E-04	0.00E+00
POCP	kg NMVOC eq.	8.35E-03	2.16E-03	5.29E-04	1.10E-02	0.00E+00	3.18E-05	0.00E+00	9.97E-05	0.00E+00
ADP-minerals&metals[2]	kg Sb eq.	5.06E-07	2.25E-06	3.24E-07	3.08E-06	0.00E+00	2.25E-08	0.00E+00	1.78E-08	0.00E+00
ADP-fossil[2]	MJ	6.00E+01	9.43E+00	3.13E+00	7.25E+01	0.00E+00	9.60E-02	0.00E+00	1.75E-01	0.00E+00
WDP[2]	m^3	1.97E+00	4.29E-02	2.94E-02	2.04E+00	0.00E+00	4.32E-04	0.00E+00	8.44E-04	0.00E+00
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									

[1] Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e.
[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.

Additional mandatory and voluntary impact category indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-GHG[1]	kg CO_2 eq.	2,54E+00	6,71E-01	1,82E-01	3,39E+00	0,00E+00	6,85E-03	0,00E+00	8,63E-02	0,00E+00
PM	Disease inc.	1.08E-07	5.00E-08	2.42E-09	1.60E-07	0.00E+00	5.43E-10	0.00E+00	1.27E-09	0.00E+00
IRP[2]	kBq U-235 eq	1.41E-03	7.83E-03	3.05E-03	1.23E-02	0.00E+00	7.89E-05	0.00E+00	1.81E-04	0.00E+00
ETP-fw	CTUe	1.36E+00	2.53E+00	4.04E-01	4.30E+00	0.00E+00	2.56E-02	0.00E+00	2.71E-01	0.00E+00
HTP-c	CTUh	6.05E-10	3.53E-09	4.16E-10	4.55E-09	0.00E+00	3.55E-11	0.00E+00	4.63E-11	0.00E+00
HTP-nc	CTUh	3.08E-09	6.09E-09	6.62E-10	9.83E-09	0.00E+00	6.15E-11	0.00E+00	7.07E-10	0.00E+00
SQP	dimensionless	6.76E-01	5.71E+00	2.15E-01	6.60E+00	0.00E+00	5.73E-02	0.00E+00	4.06E-01	0.00E+00
Acronyms	GWP-GHG = Global Warming Potential greenhouse gases, PM = Particulate Matter emissions, IR = Ionizing radiation, human health, SQP = Land use related impacts/Soil quality, HTTP-C = Human toxicity, cancer effects, HTTP-NC = Human toxicity, non-cancer effects									

[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 CO2 is set to zero.
[2] 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.
[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.

Resource use indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	MJ	3,16E-01	1,26E-01	8,25E-02	5,24E-01	0,00E+00	1,26E-03	0,00E+00	2,68E-03	0,00E+00
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,16E-01	1,26E-01	8,25E-02	5,24E-01	0,00E+00	1,26E-03	0,00E+00	2,68E-03	0,00E+00
PENRE	MJ	5,99E+01	8,56E+00	2,93E+00	7,14E+01	0,00E+00	8,72E-02	0,00E+00	1,59E-01	0,00E+00
PENRM	MJ	8,66E-02	0,00E+00	0,00E+00	8,66E-02	0,00E+00	0,00E+00	0,00E+00	-8,66E-02	0,00E+00
PENRT	MJ	6,00E+01	8,56E+00	2,93E+00	7,15E+01	0,00E+00	8,72E-02	0,00E+00	7,23E-02	0,00E+00
SM	kg	1,46E-03	7,10E-03	2,69E-03	1,12E-02	0,00E+00	7,13E-05	0,00E+00	1,39E-04	0,00E+00

RSF	MJ	2,46E-04	9,03E-04	1,09E-03	2,24E-03	0,00E+00	9,07E-06	0,00E+00	2,49E-05	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	4,55E-02	1,26E-03	4,34E-03	5,11E-02	0,00E+00	1,24E-05	0,00E+00	-2,59E-03	0,00E+00
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									

Waste indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste disposed	kg	2.50E-02	1.14E-02	2.75E-03	3.92E-02	0.00E+00	1.15E-04	0.00E+00	2.18E-04	0.00E+00
Non-hazardous waste disposed	kg	3.82E-02	9.00E-02	2.30E-01	3.58E-01	0.00E+00	9.05E-04	0.00E+00	3.47E+00	0.00E+00
Radioactive waste disposed	kg	3.53E-07	1.92E-06	7.51E-07	3.02E-06	0.00E+00	1.93E-08	0.00E+00	4.44E-08	0.00E+00

Output flow indicators

Results per functional or declared unit										
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	4.36E-21	-3.82E-20	-5.39E-22	-3.44E-20	0.00E+00	-3.95E-22	0.00E+00	-8.09E-22	0.00E+00
Material for recycling	kg	1.02E-03	6.25E-03	2.33E-03	9.60E-03	0.00E+00	6.28E-05	0.00E+00	9.67E-05	0.00E+00
Materials for energy recovery	kg	1.11E-07	4.05E-07	4.90E-07	1.01E-06	0.00E+00	4.07E-09	0.00E+00	1.12E-08	0.00E+00
Exported energy, electricity	MJ	1.43E-04	6.80E-04	3.19E-04	1.14E-03	0.00E+00	6.84E-06	0.00E+00	1.70E-05	0.00E+00
Exported energy, thermal	MJ	3.29E-04	1.37E-03	3.01E-04	2.00E-03	0.00E+00	1.38E-05	0.00E+00	1.99E-05	0.00E+00

Mass balance approaches (MBAs), to claim, for example, biobased, renewable, and/or recycled product content, are not applied.

The use of the results of modules A1-A3 (A1-A5 for services) without considering the results of module C is not encouraged.

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

References

• PCR 2019:14 Construction products v1.3.4
• c-PCR-005 Thermal Insulation Products, 2024-05-03
• EN 15804:2012+A2:2019: Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction product
• ISO 14040: 2006 Environmental management - Life cycle assessment - Principles and framework
• ISO 14044: 2006 Environmental management - Life cycle assessment - Requirements and Guidelines
• ISO 14020: 2002 Environmental labels and declarations- General principles
• ISO 14025: 2006 Environmental labels and declarations - Type III environmental declarations -
Principles and procedures
• The International EPD® System; www.environdec.com
• The International EPD® System / The General Programme Instructions; http://www.environdec.
com/tr/The-International-EPD-System/General-Programme-Instructions
• openLCA Software, ecoinvent 3.10 database; https://www.openlca.org/openlca

Contact Information

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