

ENVIRONMENTAL PRODUCT DECLARATION

ODE STARFLEX 035 Glass Wool
LUNAFLEX 035 Glass Wool
EVOMINERAL 035 Mineral Wool
ODE PIPELANE 035 Glass Wool

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

Products included in the EPD:

ODE STARFLEX 035 Glass Wool; LUNAFLEX 035 Glass Wool;
EVOMINERAL 035 Mineral Wool, PIPELANE 035 Glass Wool

An EPD may be updated or depublished if conditions change. To find the latest version
of the EPD and to confirm its validity, see www.environdec.com

EPD of a single product from a manufacturer/service provider

EPD Owner

ODE Yalıtım Sanayi ve
Ticaret A.Ş.

Programme

International EPD System
www.environdec.com

Programme operator

EPD International AB

Licensee

EPD Türkiye

Registration number

EPD-IES-0030981:001

Version date

2026-06-29

Validity date

2031-06-28



GENERAL INFORMATION

Programme information

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

Product category rules

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)	
Product Category Rules (PCR)	2019:14 Construction products (EN 15804+A2) (version 2.0.1) 2.0.1
PCR review was conducted by	The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/support .
Complementary Product Category Rules (c-PCR)	PCR 2019:14-c-PCR-005 Thermal insulation products (EN 16783) (c-PCR to PCR 2019:14) (1.0.0)
c-PCR review was conducted by	The Technical Committee of the International EPD System

Verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via	☒ EPD verification through an individual EPD verification ☐ EPD verification through EPD Process Certification* ☐ EPD verification through a fully pre-verified tool
Third-party verifier	Vijay Thakur (VIJAY THAKUR)
Approved by	International EPD System
Procedure for follow-up of data during EPD validity involves third party verifier	☐ Yes ☒ No
*EPD Process Certification involves an accredited certification body certifying and periodically auditing the EPD process and conducting external and independent verification of EPDs that are regularly published. More information can be found in the General Programme Instructions on www.environdec.com .	

Ownership and limitations on use of EPD

Limitations

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison.

Ownership

The EPD Owner has the sole ownership, liability, and responsibility for the EPD.

INFORMATION ABOUT EPD OWNER

EPD Owner	ODE Yalıtım Sanayi ve Ticaret A.Ş.
Contact person name	Emine DAHILOGLU OYSAL
Contact person e-mail	odekalite@ode.com.tr
Organisation address	Piyale Paşa Bulvarı Ortadoğu İş Merkezi K.12 Okmeydanı Şişli, İstanbul 34384 İstanbul Turkey
LCA Practitioner	Yıldırım Yılmaz, yildirim.yilmaz@metsims.com

Description of the organisation of the EPD Owner

ODE embarked on its business journey in 1985 with contracting operations. In 1998, ODE decided to move forward in the insulation industry, one that would serve Turkey's need. Having become an importer in 1990 and a manufacturer in 1996, ODE now manufactures products in 2 main categories, Building and HVAC insulation. ODE is now among the largest manufacturers of the insulation industry with 8 state-of-the-art manufacturing facilities, over 4 thousand product varieties, and expert workforce. We manufacture extruded polystyrene thermal insulating material under the brand of ODE Isipan; polymer modified bituminous waterproofing blankets under the brand of ODE Membrane, glass wool products used for heat and sound insulation and fire safety under the brand of ODE Starflex; and elastomeric rubber foam insulating material under the brand of ODE R-Flex.

ODE Insulation manufactures XPS thermal insulation boards, polymer-modified bituminous waterproofing membranes, glass wool-based thermal and acoustic insulation solutions, and elastomeric rubber foam-based plumbing insulation materials. The products are developed to meet requirements for low thermal conductivity, water resistance, acoustic performance and fire safety. ODE Isipan XPS products stand out for their high compressive strength and low water absorption, whilst the ODE Membrane and Epikon series of waterproofing solutions offer long-lasting performance. The Epikon series maintains its integrity at temperatures as low as -30°C thanks to its flexible structure. ODE Starflex glass wool products provide thermal and acoustic insulation as well as fire safety; ODE R-Flex products, meanwhile, offer condensation control and energy efficiency, particularly in HVAC and plumbing applications. As its Eskişehir Manufacturing Facility comes into play, ODE which currently exports to 8 continents aims to increase its export capacity even further, and become the leader in waterproofing in Turkey.

ODE reflects its social responsibility awareness to all its operations, and is the first company in the insulation industry of Turkey to publish a "Corporate Social Responsibility Report". Furthermore, ODE has been the first among its peers to earn the internationally recognized Environmental Product Declaration (EPD) certificate which is compatible with European standards and which applies for all markets to all heat and water insulation products manufactured by ODE in its facilities in Çorlu. Having implemented pioneering efforts toward raising public awareness of insulation and energy awareness, and taking care to be involved in projects that will hand down permanent value to the future, ODE changed its company motto to "Insulates the Future" in 2014. ODE Insulation continues to contribute to the national economy. With a vision of becoming a global brand, ODE Insulation operates with a team of talented individuals who are preparing for the future, constantly developing their skills, open to innovation, and committed to environmental and social responsibility.



PRODUCT INFORMATION

Product name	ODE STARFLEX 035 Glass Wool; LUNAFLEX 035 Glass Wool; EVOMINERAL 035 Mineral Wool, PIPELANE 035 Glass Wool
Product identification	ODE Glass wool insulation products are mineral fibre-based thermal insulation materials manufactured by melting glass and transforming it into fibrous structures. The fibres are bonded with a binder to form lightweight insulation products supplied as boards, blankets, or pipes, either faced or unfaced according to application requirements. Starflex, Lunaflex & Evomineral are different brand names of the same product in different regions; thus, the product is a single product.
Product description	Glass wool thermal insulation products are designed to provide effective thermal insulation performance in building and technical applications. Due to their fibrous and porous structure, the products reduce heat transfer through conduction, convection, contributing to improved energy efficiency in buildings and technical installations. Glass wool thermal insulation products are manufactured in accordance with EN 13162, fulfilling the requirements related to thermal insulation performance, dimensional stability, and mechanical properties as defined by the relevant European standards. Products intended for building services and technical insulation applications are additionally assessed in accordance with EN 14303, covering requirements related to thermal performance, dimensional stability, and mechanical characteristics for the insulation of heating, cooling, and building service installations. Glass wool insulation products are used for thermal insulation, sound insulation and acoustic applications, while also contributing to fire safety in buildings. The reaction to fire performance of the products is determined according to EN 13501-1, and glass wool insulation products are classified as non-combustible. Owing to their lightweight and flexible structure, the products allow easy handling, cutting, and installation and can adapt to different building elements, including wooden and metal roof structures. The material maintains stable performance over time and is resistant to degradation and mould growth under normal conditions of use. The glass wool fibres are certified under the EUCEB scheme, confirming their bio-solubility and compliance with health and safety requirements. Depending on the application, the products are available in different forms, dimensions, and facing options to meet varying technical and functional requirements.
Product information from external sources	www.ode.com.tr/en/ode-starflex-build
Technical purpose of product	Glass wool insulation products are designed to provide effective thermal and acoustic insulation in residential, commercial, and industrial buildings. Made from fine fibers of recycled glass, they trap air within their structure, reducing heat transfer and helping maintain consistent indoor temperatures, which improves energy efficiency and lowers heating and cooling costs. Additionally, their fibrous composition absorbs sound, making them useful for noise reduction in walls, ceilings, and ducts. Glass wool is also non-combustible and resistant to moisture and mold, enhancing fire safety and durability across a wide range of applications.
Manufacturing or service provision description	The raw materials are weighed and fed into the furnace according to the specified glass wool recipes. The batch is melted at approximately 1,400–1,500°C to obtain a homogeneous molten glass. The molten glass is transferred through forehearth channels and fiberized using high-speed spinners, forming fine glass fibers. During fiberization, a chemical binder is sprayed onto the fibers together with water to provide structural integrity, moisture resistance, and product stability. The fiber mat is collected on a moving perforated metal conveyor, where fiber distribution, density, and surface weight are adjusted. The formed mat enters a

	curing oven with upper and lower perforated belts, ensuring uniform curing of the binder. After curing, the product passes through cooling, trimming, cutting, sizing, and compression stages. Finally, the finished insulation product undergoes quality control, is packaged, and prepared for shipment.
Material properties	Area density: 0.63 kg/m ² Thickness: 0.036 m
Manufacturing site	ODE Yalıtım Sanayi ve Ticaret A.Ş. Çorlu factory Velimeşe OSB Mah. 207. Sok. No:6/1 Ergene / Tekirdağ / Türkiye 59860 Tekirdağ Turkey
UN CPC code	37990. Non-metallic mineral products n.e.c. (including mineral wool, expanded mineral materials, worked mica, articles of mica, non-electrical articles of graphite or other carbon and articles of peat)
Geographical scope(s)	Republic of Türkiye
Geographical scope description	Production takes place in Türkiye, while the remaining life cycle stages are considered representative of European conditions.
Actual or technical lifespan	50 year(s)

PRODUCT IMAGES





CONTENT DECLARATION

Hazardous and toxic substances

The product does not contain any substances from the SVHC candidate list in concentrations exceeding 0.1% of its weight.

PRODUCT CONTENT

Content name	Mass, kg	Post-consumer recycled material, mass-% of product	Biogenic material, mass-% of product	Biogenic material ¹ , kg C/product
Recycled Glass Cullet	0.48	76	0	0
Mineral / Glass-forming Raw Materials	0.107	0	0	0
Binder Resin System	0.025	0	0	0
Process Chemicals / Neutralising Agents	0.013	0	0	0
Additives / Hydrophobic Agents	0.005	0	0	0
Total	0.63	76	0	0
Note 1	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂			

PACKAGING MATERIALS

Material name	Mass, kg	Mass-% (versus the product)	Biogenic material ¹ , kg C/product
Wooden Pallet	0.021	3.33	0.008
PE Stretch	0.014	2.22	0
Total	0.035	5.55	0.008
Note 1	1 kg biogenic carbon is equivalent to 44/12 kg of CO ₂		

LCA INFORMATION

EPD based on declared or functional unit	Functional unit
Functional unit description	1 m2 of ODE Starflex & Evomineral & Lunaflex & Pipelane 035 with a thickness of 36 mm and a density of 18 kg/m3 for R =m2.K/W.
Reference flow	Starflex & Evomineral & Lunaflex & Pipelane 035 Area: 1 m ²
Conversion factor to mass	1.59
Are infrastructure or capital goods included in any upstream, core or downstream processes?	☐ Yes ☒ No
Data sources used for this EPD	ecoinvent database (general) ecoinvent 3.11 database
LCA Software	SimaPro 10.2
Version of the EN 15804 reference package	EF Reference Package 3.1
Characterisation methods	EN 15804 EF 3.1
Technology description including background system	ODE Starflex, Evomineral and Lunaflex are different trade names used across various markets for the same glass mineral wool insulation product range developed by ODE. This product family is designed for building applications, providing thermal insulation, acoustic comfort, sound absorption, and fire safety. It is available in multiple forms such as blankets, boards, and rolls, with a variety of dimensions and facing options depending on the intended application. Classified as A1 non-combustible according to EN 13501-1, it also contributes to energy efficiency through its low thermal conductivity.
Scrap (recycled material) inputs contribution level	Less than 10% of the GWP-GHG results in modules A1-A3 come from scrap inputs

SCRAP (RECYCLED MATERIAL) INPUTS DATA	
Material scrap name	Material scrap value
Recycled Glass Cullet	10.1, kg CO ₂ eq./tonne
The share of the total scrap input that was assumed to come with an environmental burden	100 %

Data quality assessment

Description of data quality assessment and reference years	Life Cycle Assessment (LCA) for this Environmental Product Declaration (EPD) is based on both primary and secondary data. Primary data were collected directly from the manufacturer's production processes and site-specific operations for the reference year 2025. The quality and representativeness of all data used for the EPD have been evaluated in terms of time, geography, and technology according to the principles outlined in EN 15804:2012+A2:2019, Annex E, and the data quality requirements specified in EN 15941:2010 for life cycle data. All relevant datasets were reviewed for completeness, consistency, and reliability, and the assessment confirmed that no data were classified as "poor" or "very poor" in quality.
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DATA QUALITY ASSESSMENT					
Process name	Source type	Source	Reference year	Data category	Share of primary data, of GWP-GHG results for A1-A3
Thermal energy in manufacturing	Calculated Data	EPD Owner	2025	Primary	32.7%
Electricity used in manufacturing	Calculated Data	EPD Owner	2025	Primary	51.5%
Upstream Transport	Calculated Data	EPD Owner	2025	Primary	1.7%
Others	Database	Ecoinvent 3.11	2015-2025	Secondary	0%
Total share of primary data, of GWP-GHG results for A1-A3					85.9%
Note	The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.				

Comment on the data sources and other information in the table	The total share of primary data contributing to the declared GWP-GHG results of modules A1-A3 is provided in the table above. The share for modules A1-A3 is 85.9% of the total A1-A3; primary data, specific from the EPD owner, and secondary data (e.g. based on assumptions or other sources) contribution to the A1-A3 can be found above.
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ELECTRICITY USED IN THE MANUFACTURING PROCESS IN A3 (A5 FOR SERVICES)		
Type of electricity mix	Residual electricity mix on the market	
Energy sources	Hydro	0%
	Wind	0%
	Solar	0%
	Biomass	0%
	Geothermal	0%

	Waste	0%
	Nuclear	0%
	Natural gas	35%
	Coal	65%
	Oil	0%
	Peat	0%
	Other	0%
Climate impact (GWP-GHG):	0.89 kg CO ₂ eq./kWh	

Method used to calculate residual electricity mix	The market data for Türkiye is modified to exclude all the renewable sources as there is no 'secondary data' on the residual market mix for Türkiye.
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SYSTEM BOUNDARY

Description of the System boundary	b) Cradle to gate with options, modules C1-C4, module D and with optional modules (A1-A3 + C + D and additional modules).
Excluded modules	Yes, there is an excluded module, or there are excluded modules
Justification for omission of modules	The use stage modules (B1-B7) are excluded from the scope of this study because the assessed product does not require energy, water, maintenance, repair, replacement, refurbishment, or operational inputs during its service life. Furthermore, no significant environmental exchanges occur during the use phase that would materially influence the overall life cycle impacts. Therefore, the inclusion of use stage modules is not considered relevant for the intended application of the product.

	Product stage			Construction process stage	Use stage								End of life stage				Beyond product life cycle
	Raw material supply	Transport	Manufacturing	Transport to site	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	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	Global	Global	Republic of Türkiye	Global	Global	N/A	N/A	N/A	N/A	N/A	N/A	N/A	Global	Global	Global	Global	Global
Share of specific data	85.9%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Disclaimer	The share of specific/primary data and both variations (products and sites) refer to GWP-GHG results only.																

Process flow diagram(s) related images



DEFAULT SCENARIO

Name of the default scenario	None
Description of the default scenario	None

Module A4: Transport to the building site

Explanatory name of the default scenario in module A4	None
Description of the default scenario in module A4	Impacts at this stage are considered based on real shipment distances.

Module A4 information	Value	Unit
Capacity utilization (including empty returns)	50	%
Volume capacity utilization factor (factor: =1 or <1 or ≥1 for compressed or nested packaged products)	1	N/A
Type of vehicle	Truck, Euro 6 (16-32 t payload)	

Module A5: Installation in the building

Explanatory name of the default scenario in module A5	Packaging treatment
Description of the default scenario in module A5	Installation-related data carries a high level of uncertainty because the process depends heavily on project-specific conditions and differs between installers. Therefore, impacts associated with cutting, fitting, and the use of energy and other resources during installation are excluded from the assessment. However, the treatment of packaging waste is considered, assuming 100% disposal along with 2% waste generation according to the relevant PCR.

Module A5 information	Value	Unit
Amount of packaging waste, disposed	0.039	kg
Waste generation	2	%

Module C: End-of-life

Explanatory name of the default scenario in module C	100% landfill
Description of the default scenario in module C	At end-of-life, glass wool insulation is primarily disposed of via landfill due to current technical and economic limitations in recycling. Therefore, conservative distribution is assumed with 100% landfill of the product. The environmental impact values in the reference table are provided on a basis of 1,000 kg of product. Since the final product mass in this study is significantly lower, all impact calculations were proportionally adjusted according to the actual final mass of the product

Module C information	Value	Unit
C1, Demolition/deconstruction of steel, wood, and other materials	1.1	kWh
C2, Transport (for products/materials not to be incinerated)	80	km
C4, Compacting inert construction waste for landfills	1.6	kWh

Module D: Beyond product life cycle

Explanatory name of the default scenario in module D	None
Description of the default scenario in module D	As 100% of the product at EOL is conservatively considered disposed, no benefit nor load is associated in module D.

ENVIRONMENTAL PERFORMANCE

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.

Mandatory environmental performance indicators according to EN 15804

Impact category	Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change - total	GWP-total	kg CO ₂ eq.	1.03E+0	1.09E-1	6.98E-2	ND	ND	ND	ND	ND	ND	ND	2.36E-4	1.55E-2	0.00E+0	4.29E-3	0.00E+0
Climate change - fossil	GWP-fossil	kg CO ₂ eq.	1.06E+0	1.09E-1	3.82E-2	ND	ND	ND	ND	ND	ND	ND	2.36E-4	1.55E-2	0.00E+0	4.29E-3	0.00E+0
Climate change - biogenic	GWP-biogenic	kg CO ₂ eq.	-2.91E-2	3.97E-6	3.16E-2	ND	ND	ND	ND	ND	ND	ND	1.18E-8	5.36E-7	0.00E+0	1.37E-6	0.00E+0
Climate change - land use and land-use change	GWP-luluc	kg CO ₂ eq.	3.83E-3	1.93E-6	5.99E-5	ND	ND	ND	ND	ND	ND	ND	9.72E-9	2.44E-7	0.00E+0	2.27E-6	0.00E+0
Ozone depletion	ODP	kg CFC-11 eq.	1.50E-8	2.50E-9	2.76E-8	ND	ND	ND	ND	ND	ND	ND	3.59E-12	3.51E-10	0.00E+0	1.15E-10	0.00E+0
Acidification	AP	mol H ⁺ eq.	4.21E-3	3.46E-4	2.38E-4	ND	ND	ND	ND	ND	ND	ND	2.18E-6	3.99E-5	0.00E+0	3.08E-5	0.00E+0
Eutrophication aquatic freshwater	EP-freshwater	kg P eq.	6.08E-5	7.12E-8	1.47E-6	ND	ND	ND	ND	ND	ND	ND	1.97E-9	7.95E-8	0.00E+0	3.48E-7	0.00E+0
Eutrophication aquatic marine	EP-marine	kg N eq.	8.43E-4	7.81E-5	4.38E-5	ND	ND	ND	ND	ND	ND	ND	1.03E-6	1.52E-5	0.00E+0	1.21E-5	0.00E+0
Eutrophication terrestrial	EP-terrestrial	mol N eq.	8.49E-3	8.62E-4	7.17E-4	ND	ND	ND	ND	ND	ND	ND	1.13E-5	1.66E-4	0.00E+0	1.32E-4	0.00E+0
Photochemical ozone formation	POCP	kg NMVOC eq.	3.34E-3	4.04E-4	1.52E-4	ND	ND	ND	ND	ND	ND	ND	3.36E-6	6.61E-5	0.00E+0	4.67E-5	0.00E+0
Depletion of abiotic resources - minerals and metals	ADP-minerals&metals ¹	kg Sb eq.	4.25E-5	2.81E-9	5.67E-7	ND	ND	ND	ND	ND	ND	ND	8.28E-12	4.03E-10	0.00E+0	5.75E-9	0.00E+0
Depletion of abiotic resources - fossil fuels	ADP-fossil ¹	MJ, net calorific value	1.56E+1	1.49E+0	5.23E-1	ND	ND	ND	ND	ND	ND	ND	3.09E-3	2.05E-1	0.00E+0	1.01E-1	0.00E+0
Water use	WDP ¹	m ³ world eq. deprived	3.09E-1	1.18E-3	6.95E-3	ND	ND	ND	ND	ND	ND	ND	3.89E-6	1.63E-4	0.00E+0	4.29E-3	0.00E+0
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																
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).																
Disclaimer 1	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																

Additional mandatory environmental performance indicators

Impact category	Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change - GWP-GHG	GWP-GHG ¹	kg CO ₂ eq.	1.06E+0	1.09E-1	3.95E-2	ND	ND	ND	ND	ND	ND	ND	2.36E-4	1.55E-2	0.00E+0	4.29E-3	0.00E+0
Acronyms	GWP-GHG = Global warming potential greenhouse gas.																
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).																
Disclaimer 1	The GWP-GHG indicator is termed GWP-IOBC/GHG in the ILCD+EPD+ data format. The 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.																

Additional voluntary environmental performance indicators according to EN 15804

Impact category	Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter emissions	PM	Disease incidence	2.76E-8	8.15E-9	2.22E-9	ND	ND	ND	ND	ND	ND	ND	6.28E-11	1.03E-9	0.00E+0	7.26E-10	0.00E+0
Ionizing radiation - human health	IRP ¹	kBq U235 eq.	4.48E-3	1.41E-4	1.19E-3	ND	ND	ND	ND	ND	ND	ND	5.99E-7	5.17E-5	0.00E+0	5.86E-5	0.00E+0
Eco-toxicity - freshwater	ETP-fw ²	CTUe	2.60E+0	5.95E-2	3.04E-1	ND	ND	ND	ND	ND	ND	ND	8.85E-5	7.35E-3	0.00E+0	7.11E-3	0.00E+0
Human toxicity - cancer effects	HTP-c ²	CTUh	1.41E-10	7.95E-12	8.79E-11	ND	ND	ND	ND	ND	ND	ND	1.26E-14	1.05E-12	0.00E+0	7.33E-13	0.00E+0
Human toxicity - non-cancer effects	HTP-nc ²	CTUh	4.21E-9	8.93E-10	3.43E-10	ND	ND	ND	ND	ND	ND	ND	2.33E-13	1.03E-10	0.00E+0	1.64E-11	0.00E+0
Land-use related impacts/soil quality	SQP ²	Dimensionless	3.53E+0	1.90E-3	1.32E-1	ND	ND	ND	ND	ND	ND	ND	5.24E-6	2.61E-4	0.00E+0	1.90E-1	0.00E+0
Acronyms	PM = Potential incidence of disease due to particulate matter emissions; IRP = Potential human exposure efficiency relative to U235; ETP-fw = Potential comparative toxic unit for ecosystems; HTP-c = Potential comparative toxic unit for humans; HTP-nc = Potential comparative toxic unit for humans; SQP = Potential soil quality index.																
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).																
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 of these results are high or as there is limited experience with the indicator.																

Resource use indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ, net calorific value	2.49E+0	3.67E-3	3.11E-1	ND	ND	ND	ND	ND	ND	ND	6.73E-6	5.12E-4	0.00E+0	9.12E-4	0.00E+0
PERM	MJ, net calorific value	2.65E-1	0.00E+0	-2.65E-1	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ, net calorific value	2.76E+0	3.67E-3	4.64E-2	ND	ND	ND	ND	ND	ND	ND	6.73E-6	5.12E-4	0.00E+0	9.12E-4	0.00E+0
PENRE	MJ, net calorific value	1.50E+1	1.49E+0	1.14E+0	ND	ND	ND	ND	ND	ND	ND	3.09E-3	2.05E-1	0.00E+0	1.01E-1	0.00E+0
PENRM	MJ, net calorific value	6.12E-1	0.00E+0	-6.12E-1	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	MJ, net calorific value	1.56E+1	1.49E+0	5.23E-1	ND	ND	ND	ND	ND	ND	ND	3.09E-3	2.05E-1	0.00E+0	1.01E-1	0.00E+0
SM	kg	5.82E-1	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
RSF	MJ, net calorific value	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ, net calorific value	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	m ³	7.86E-3	2.88E-5	1.83E-4	ND	ND	ND	ND	ND	ND	ND	9.36E-8	3.98E-6	0.00E+0	1.00E-4	0.00E+0
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 resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water.															
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).															

Waste indicators according to EN 15804

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	1.09E-4	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NHWD	kg	4.63E-2	0.00E+0	3.50E-2	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	6.30E-1	0.00E+0
RWD	kg	0.00E+0	0.00E+0	0.00E+0	ND	ND	ND	ND	ND	ND	ND	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Acronyms	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed.															
General disclaimer	The results of the end-of-life stage (modules C1-C4) should be considered when using the results of the product stage (modules A1-A3/A1-A5 for services).															

ADDITIONAL ENVIRONMENTAL INFORMATION

Scaling factors and variability of results

For this EPD, the declared unit is defined as 1 m² of glass wool insulation corresponding to a thermal resistance of 1 m²K/W (R = 1). As the product is manufactured at a constant density (18 kg/m³), its thermal conductivity (λ-value) remains unchanged, and the thermal resistance varies linearly with thickness. The environmental impacts are therefore calculated based on the thickness required to achieve R = 1. For other performance levels, the results can be scaled linearly (e.g. multiplied by 5 for R = 5).

ABBREVIATIONS

General Abbreviations

CEN: European Committee for Standardization

Ecoinvent: LCA database referenced (Ecoinvent v3.11)

EN: European Norm (Standard)

EPD: Environmental Product Declaration

GPI: General Programme Instructions

ISO: International Organization for Standardization

LCA: Life Cycle Assessment

PCR: Product Category Rules

Environmental Impact Indicators (EN 15804)

ADP-fossil: Abiotic depletion for fossil resources potential

ADP-minerals&metals: Abiotic depletion potential for non-fossil resources

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

ETP-c: Human toxicity, cancer effects

ETP-fw: Ecotoxicity (freshwater)

FW: Use of net fresh water

GWP-biogenic: Global Warming Potential biogenic

GWP-fossil: Global Warming Potential fossil fuels

GWP-GHG: Global Warming Potential – Greenhouse gas

GWP-luluc: Global Warming Potential land use and land use change

HTP-c: Human toxicity, cancer effects

HTP-nc: Human toxicity, non-cancer effects

IRP: Ionising radiation, human health

ODP: Depletion potential of the stratospheric ozone layer

PM: Particulate matter emissions

POCP: Formation potential of tropospheric ozone

SQP: Land use related impacts / soil quality

WDP: Water (user) deprivation potential, deprivation-weighted water consumption

Resource Use Indicators

NRSF: Use of non-renewable secondary fuels

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

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

RSF: Use of renewable secondary fuels

SM: Use of secondary material

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Ecoinvent database (v3.11) - www.ecoinvent.org

ODE <https://ode.com.tr/en/>

Metsims www.metsims.com

VERSION HISTORY

Version 001, 2026-06-29

Original version of the EPD

