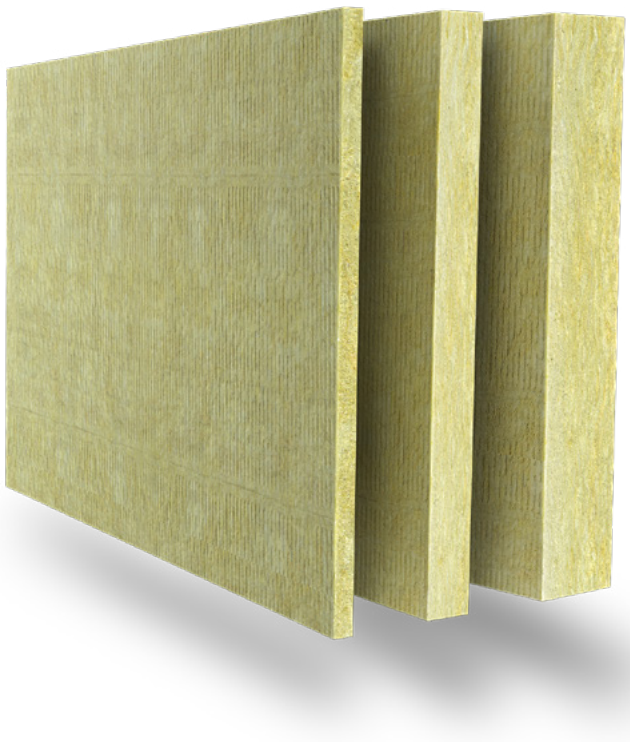
Akdağ MİNERAL TAŞ YÜNÜ

Environmental Product **Decleration**

In accordance with ISO 14025 and EN 15804:2012+A2:2019 for:

Stonewool Board from **AKDAĞ**



PROGRAMME

The International EPD® System, www.environdec.com
EPD Turkey, www.epdturkey.org

PROGRAMME OPERATOR

EPD International AB & EPD Turkey

EPD REGISTRATION NUMBER

S-P-04824

PUBLICATION DATE

2022-08-12

VALID UNTIL

2027-08-11

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

LCA Study & EPD Design Conducted by
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Information about verification and reference PCR:

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR) *PCR: PCR 2019:14 Construction products (EN 15804:A2) Version 1.1* *c-PCR005 Thermal insulation products (EN 16783: 2017)*
PCR review was conducted by *The Technical Committee of the International EPD® System. See www.environdec.com/TC 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.*
Independent verification of the declaration and data. according to ISO 14025:2006: ☐ EPD process verification ☑ EPD verification

Third party verifier Ing. Luca Giacomello. PMP® Via Leonardo Fea 35 10148 Torino - Italy	**Approved by** The International EPD® System Technical Committee. supported by the Secretariat

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

☐ YES ☑ NO

AKDAĞ has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. For further information about comparability, see EN 15804 and ISO 14025.

Company Information

Owner of the EPD

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Akdağ Group of Companies, taking a leading role with investments and projects for the needs of the region; was established in 1988 in Elazığ Organized Industrial Zone with its entrepreneurial, innovative and responsible visionary spirit. Akdağ continues its activities with a single business division under the Akdağ group. Akdağ Mineral Stonewool, one of the few facilities in Turkey, started production with its capacity and production facility with Industry 4.0 Technology.

Akdağ Integrated Stonewool facility, which produces on a closed area of 30,000 m² on an area of 90,000 m² in Elazığ Organized Industrial Zone, is the first and only facility in the region in aspects. Established with Industry 4.0 Smart Factory technology, Akdağ is environmentally friendly and produces flawlessly with zero waste.

Akdağ, which started production in 2021, has the largest stonewool production capacity in the region with an annual production capacity of 40,000 tons of Stonewool in the first place. Maintaining its investments with the goal of 40.000 m² closed area and annual 100.000 tons production capacity with the second and third stage additional investments to be made progressively, Akdağ Group aims to meet a significant part of the production volume in Turkey as a stonewool integrated production facility from this facility.

Built with Industry 4.0 architecture and built with the “Smart factory” system, the facility has been designed with a zero waste target. With a sustainable and clean transformation system, all wastes are transformed back into production and a production model that is friendly to nature, respectful to human and environment is created by reducing carbon footprint below international standards. Akdağ, which produces its own auxiliary raw materials, also has a laboratory that works like an R&D base.

Akdağ aim to minimize the environmental impact of the their production and operating processes. Under this goal, Akdağ attach great importance to minimizing the emissions stemming from their operations while they have been further concentrating on the production of environmentally friendly. Therefore, Akdağ has invested in solar energy. Akdağ will begin meeting their total electricity need at a rate, as high as through the solar power plant that they started on the roofs of their production facility.

Stonewool which were formed by melting basalt rocks from mineral rocks at high temperatures and turning them into fibers, started to be used in heating, cooling, sound and moisture insulation of all living spaces as building insulation. In addition to its natural structure, we aim to minimize the damage to the ecosystem by reducing our carbon footprint with Akdağ Mineral Stonewool’s environmentally friendly production process and zero waste policy. In addition different types like panel board, rabitz wire indusrial matterss of mineral Stonewool products, Akdağ is producing Stonewool and Agro used in soilless agriculture.

Product Information

Product Name:

Stonewool Board

Partiton board which were formed by melting basalt rocks from mineral rocks at high temperatures and turning them into fibers. Products countains also contain post-consumer and pre consumer recycled metarials and other additives.

Production

After the analysis of basalt, dolomite, limestone and slag samples taken from the quarries, the raw materials are shipped through appropriate quarries with adjusted sizes and then to the factory by vehicles. In the factory the appropriate raw materials are loaded on weighbridge and weighed. Later they are piled on to the stock area.

The recipes are made according to the chemical anaylsis results. Then these results are entered into the scada screen which automatically starts feeding the cupola furnace. Cupola furnace heats up to about 1500 ^{0}C and it melts the ingredients by using high calorie coke coal. The molten lava passes through the water-cooled lava channels and the discs in the spnner machine turn into fibers.

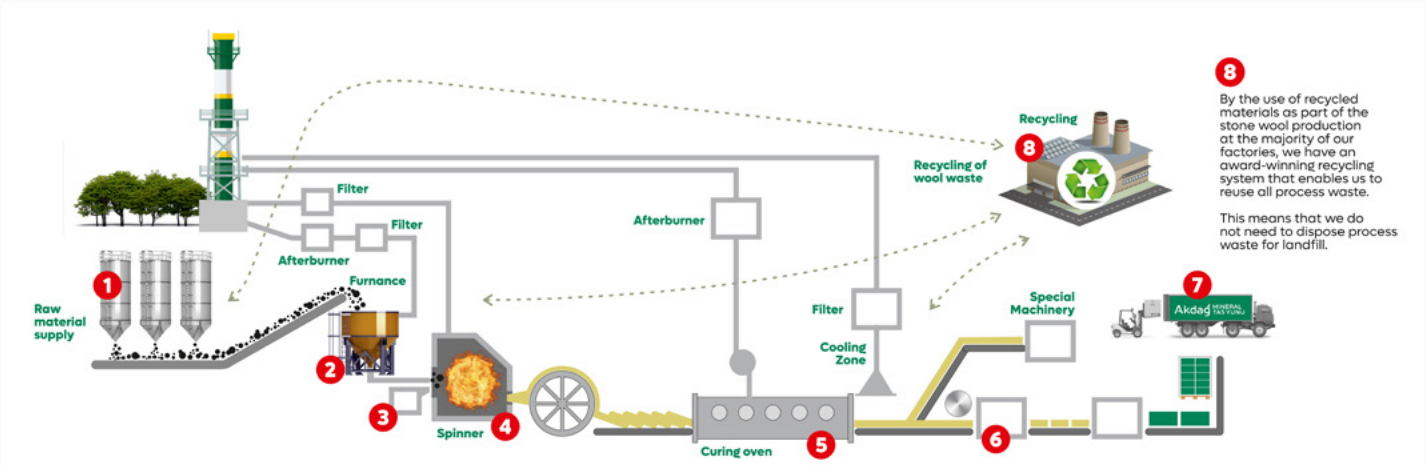
The fiber that has become a whole is collected on the forming chamber and then transferred to the cold line conveyor belts by passing through the transfer conveyors.

In the cold line, the products are layed and squeezed on the strip before Incubator.
The product is polymerized by burners in the polymerizer oven. The polymerized products are cooled while they pass through the cooling zone after they exit the polymerizer oven. During the edge cut section, the products are cut according to their sizes.

The wastages of the edges are passed through crusher with fans. They are sent to forming chamber and mixed back into the product. In saw and sizing section the products are cut to adjusted sizes and passed along to quality control. The unsuitable products are seperated into the crushing unit, and then they are broken down and sent to the stock silo. After that, they are put added into the products in the adjusted amounts. The products which are approved by the quality control are stacked according to their type and mass to be delivered to the customer.

Intended Use of Product

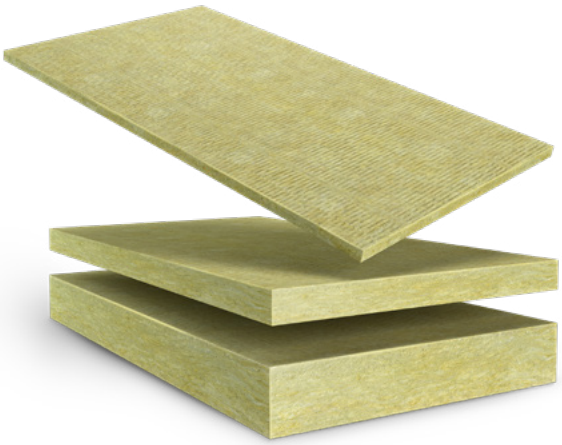
Stonewool is produced through melting volcanic rocks, which are rich in minerals, at temperature of more than 1500 ^{0}C and turning them into fibers. Stonewool Board TS EN 13162+A1 can be used in the partitions of aluminum, PVC granite, marble and glass facade cladding systems, light partition walls, internal isulation of external walls, stairs and elevator shafts, drywall and adjacent wall applications.

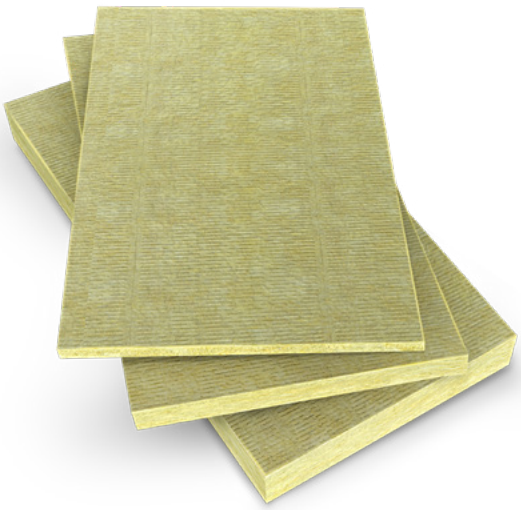


Technical Specifications

Standarts	Parameter	Value
EN 1602	Density	70 kg/m³ (+/-10%)
EN 12086	Water Vapor Diffusion Resistance	1
EN 12667	Thermal Conductivity	max. 0,035W/(mK) at 10 °C
EN 13501	Reaction to Fire Class	A1
EN 13162	Thermal Resistance	1 m²KW
EN 1609	Water Absorption	Max 1 kg/m²

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).





LCA Information

Functional Unit
1 m^2 of Stonewool Board with a thermal resistance of 1 K. $m^2.W^{-1}$ manufactured in AKDAĞ Manufacturing plant in Elazığ (TR).

Reference service life
Stonewool board is the lifetime of the building equipment is at least 50 years.

Time Representativeness
The inventory for the LCA study is based on the period of 1st January 2022 and 15th may 2022.

Database(s) and LCA software used
SimaPro v9.2 and Ecoinvent v3.7.1

Description of system boundaries
This EPD covers the cradle to grave and module D stages.

Data quality and data collection
According to EN 15804:2012+A2:2019 specific data was used for module A3 (Processes the manufacturer has influence over) and was gathered from the AKDAĞ manufacturing plant. Specific data includes actual product weights, amounts of raw materials used, product content, energy consumption, transport figures, water consumption and amounts of wastes. Data represents the period from 1st January 2022 to 15th May 2022. For secondary data Ecoinvent v3.7.1 data sets was used. LCA was modelled in SimaPro v9.2.

Allocation
Allocation of impacts among co-products was not applied.

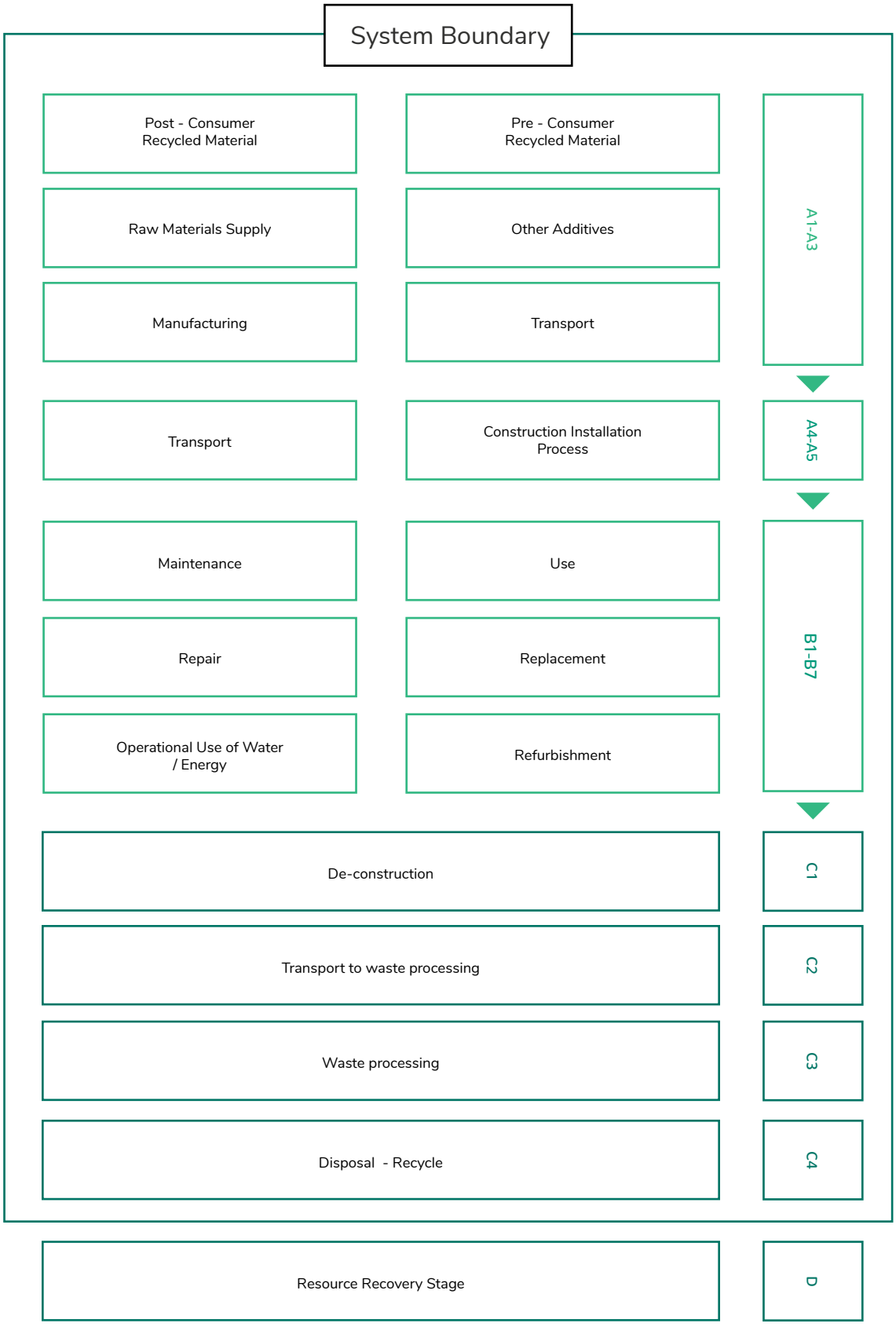
Cut-off rules
Life Cycle Inventory data for a minimum of 99 % of total inflows to the three life cycle stages have been included and a cut-off rule of 1% regarding energy, mass, and environmental relevance was applied.

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

	PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				RECYCLING POTENTIAL
	RAW METARIAL SUPPLY	TRANSPORT	MANUFACTURING	TRANSPORT	CONSTRUCTION INSTALLATION	USE	MAINTENANCE	REPAIR	REPLACEMENT	REFURBISHMENT	OPERATIONAL ENERGY USE	OPERATIONAL WATER USE	DE-CONSTRUCTION DEMOLITION	TRANSPORT	WASTE PROCESSING	DISPOSAL	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	X	X	X	X	X	X	X	X	X	X	X	X
GEOGRAPHY	GLO	GLO	TR	TR	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO	GLO
SPECIFIC DATA USED	>99%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATION – PRODUCTS	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-
VARIATION – SITES	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

X: Declared; ND: Not Declared

System Diagram



Description of declared modules

A1 - Raw Materials Supply
This module takes into account raw material extraction, processing and energy used in the production process.

A2 - Transport to the Manufacturer
This module includes transportation of the raw materials from supplier to factory gate. Transportation types are considered as seaway and roadway.

A3 - Manufacturing
This module includes energy and water consumption during the manufacturing process. Additionally, packaging materials are covered in this module. Followed production processes are as;

*Mixing
*Melting
*Spinning
*Crimping
*Cutting
*Packaging

A4- Transport to the Construction Site
Transport to the construction site is calculated on the basis of a scenario with the parameters described in the attached table.

Parameters A4 Module	
Averafe Transport distance (km)	500 km
Type of fuel and vehicle consumption or type of vehicle used for transport.	Transport, freight, lorry >32 metric ton, EURO6

A5- Installation into the Building.
Installation into the Building is calculated on the basis of a scenario with the parameters described in the attached table. The treatment of the packaging waste after the installation of the product has been considered.

Parameters A5 Module	
Loss of materials in construction site	2%
Packaging Wooden pallet	100% incinerated
Packaging Plastic sheet	40% recycled, 60% landfill

B1-B7 The Use Stage

B1: Use
B2: Maintenance
B3: Repair
B4: Replacement
B5: Refurbishment
B6: Operational Energy Use
B7: Operational Water Use

After Stonewool Board installation is complete, no actions or technical operations are required during the use stages until the end of life. Therefore, the stonewool has no impact on this stage.

C1 - De-construction
The common manual dismantling impact of stonewool board is considered as very small and can be neglected in C1. Given the scenario that is assumed, environmental impact of de-construction process is not considered in this study.

C2 - Transport to Waste Processing
An average distance of 100 km has been assumed for the transport to sorting facility. Transport is calculated on the basis of a scenario with the parameters described in the attached table.

Parameters C2 Module	
Transport by road*	Lorry. 16-32 metric ton
Distance (km)	100
Database	Ecoinvent v3.7.1

C3 - Waste Processing for Reuse, Recovery and/or Recycling
The material and energy expenses required for Module C3 are negligible. It is assumed that there is no sorting or processing required for Stonewool board.

C4 - Final disposal
Although Stonewool Board products are partly recycled at their end-of-life, an established collection system does not yet exist. Therefore, the assumption chosen in this study, 100% landfill after the use phase, is the most conservative approach.

D - Reuse. Recovery or Recycling Potential

Benefits considered in this modüle originate from stonewool boards packaging recycling or incineration.

Information on which life cycle stages are not considered

This EPD covers the cradle to grave and module D stages. After Stonewool Board installation is complete, no actions or technical operations are required during the use stages until the end of life. Therefore, the mineral wool has no impact on B1-B7 modules.

Content Declaration

Content Declaration of Stonewool Board

Product	Basalt, weight-%	Dolomite, weight-%	Pre-consumer recycled materials, weight-%	Post-consumer recycled materials, weight-%	Additives, weight-%	Renewable material, weight-%	Biogenic carbon, weight-%
Stonewool Board	60-65	15-20	20-25	4-5	5-10	0	0

Content Declaration of Packaging Materials

Stonewool Board	Weight, %	Biogenic carbon, kg C
Shrink	<1	-
Strech	<1	-
Pallet	<1	0,008089068

Environmental Performance

Potential Environmental Impact Mandatory Indicators According to EN 15804

Results for 1 m2 of stonewool board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-7	C1	C2	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
GWP-fossil	kg CO2 eq	3,07	2,88	0,11	4,4E-02	0	0	2,2E-02	0	1,3E-02	-1,4E-03
GWP-biogenic	kg CO2 eq	4,27	-2,0E-02	2,0E-04	4,29	0	0	3,9E-05	0	4,0E-05	-3,5E-06
GWP- luluc	kg CO2 eq	4,2E-03	4,2E-03	3,4E-05	7,8E-06	0	0	6,7E-06	0	3,5E-06	-4,9E-07
GWP-total	kg CO2 eq	7,35	2,87	0,11	4,33	0	0	2,2E-02	0	1,3E-02	-1,4E-03
ODP	kg CFC11 eq	2,1E-07	1,7E-07	2,6E-08	3,0E-09	0	0	5,2E-09	0	5,3E-09	-3,6E-11
AP	mol H+ eq	0,02	2,3E-02	3,6E-04	4,8E-04	0	0	7,1E-05	0	1,2E-04	-5,6E-06
EP-freshwater	kg PO43-	1,8E-03	1,6E-03	3,9E-05	1,2E-04	0	0	7,8E-06	0	1,6E-05	-4,7E-07
EP-aquatic freshwater	kg P eq	1,3E-04	1,3E-04	9,7E-07	6,1E-07	0	0	1,9E-07	0	1,4E-07	-2,8E-08
EP- marine	kg N eq	2,4E-03	2,1E-03	7,9E-05	2,3E-04	0	0	1,6E-05	0	4,2E-05	-1,1E-06
EP-terrestrial	mol N eq	0,04	4,1E-02	8,8E-04	2,4E-03	0	0	1,8E-04	0	4,6E-04	-1,2E-05
POCP	kg NMVOC eq	0,01	1,2E-02	3,4E-04	5,9E-04	0	0	6,8E-05	0	1,3E-04	-4,9E-06
ADP-minerals&metals*	kg Sb eq	5,8E-06	5,4E-06	2,6E-07	9,2E-08	0	0	5,3E-08	0	2,9E-08	-8,8E-09
ADP-fossil*	MJ, net calorific value	34,1	32,3	1,75	0,38	0	0	0,35	0	0,36	-4,3E-02
WDP	m3 world eq. deprived	1,36	1,37	6,5E-03	-3,3E-02	0	0	1,3E-03	0	1,6E-02	-6,4E-04

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*

Results according to PCR2019:14 for 1 m2 of stonewool partiton board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-B7	C1	C2	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
GWP - GHG[1]	kg CO2 eq	2,98	2,79	0,11	4,3E-02	0	0	2,2E-02	0	1,3E-02	-1,4E-03

Results according to EN 15804+A2 for 1 m2 of stonewool board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-7	C1	C2	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
PM/RI	disease inc.	2,7E-07	2,6E-07	9,4E-09	4,9E-09	0	0	1,9E-09	0	2,4E-09	-4,8E-11
IRP	kBq U-235 eq	0,04	3,3E-02	7,4E-03	5,5E-04	0	0	1,5E-03	0	1,5E-03	-2,1E-05
ET-freshwater	CTUe	47,6	45,0	1,46	0,66	0	0	0,29	0	0,23	-1,5E-02
HT-cancer	CTUh	1,4E-08	1,4E-08	4,1E-11	1,4E-10	0	0	8,3E-12	0	6,7E-12	1,5E-11
HT-non-cancer	CTUh	2,8E-08	1,9E-08	1,4E-09	6,1E-09	0	0	2,8E-10	0	1,4E-10	4,1E-10
SQP	Pt	15,4	12,1	1,99	0,13	0	0	0,40	0	0,76	-2,1E-03

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

Use of Resources

Results for 1 m2 of stonewool partiton board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-B7	C1	C2	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
PERE	MJ	1,90	1,86	1,9E-02	8,93E-03	0	0	3,8E-03	0	2,9E-03	-5,9E-04
PERM	MJ	0	0	0,0E+00	0,00E+00	0	0	0	0	0	0
PERT	MJ	1,90	1,86	1,9E-02	8,93E-03	0	0	3,8E-03	0	2,9E-03	-5,9E-04
PENRE	MJ	24,6	21,6	1,86	0,41	0	0	0,37	0	0,38	-4,7E-02
PENRM	MJ	11,9	11,9	0	0	0	0	0	0	0	0
PENRT	MJ	36,5	33,5	1,86	0,41	0	0	0,37	0	0,38	-4,7E-02
SM	kg	0,61	0,61	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m^3	0,10	9,5E-02	1,5E-03	1,90E-03	0	0	3,0E-04	0	5,7E-04	0

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 Production

Results for 1 m2 of stonewool partiton board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-7	C1	C3	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
Hazardous waste disposed	kg	1,07E-04	1,07E-04	0	0	0	0	0	0	0	0
Non-hazardous waste disposed	kg	1,00	0	0	8,82E-04	0	0	0	0	1,00	0
Radioactive waste disposed	kg	0	0	0	0	0	0	0	0	0	0

Output Flows

Results for 1 m2 of stonewool partiton board											
Indicator	Unit	Total	A1-3 Total	A4	A5	B1-7	C1	C3	C3	C4	D
							De-construction demolition	Transport	Waste processing	Disposal	Recycling-potential
Components for re-use	kg	0	0	0	0	0	0	0	0	0	0
Material for recycling	kg	0	0	0	5,88E-04	0	0	0	0	0	-5,88E-04
Materials for energy recovery	kg	2,93	0	0	2,93	0	0	0	0	0	0
Exported energy, electricity	MJ	0	0	0	0	0	0	0	0	0	0
Exported energy, thermal	MJ	0	0	0	0	0	0	0	0	0	0

References

- **ISO 14040** 2021 Environmental management - Life cycle assessment - Principles and framework
- **ISO 14044** 2021 Environmental management - Life cycle assessment - Requirements and guidelines
- **ISO 14025** 2006 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
- **ISO 14020** 2000 Environmental labels and declarations - General principles
- **c-PCR005** Thermal insulation products
- **EN 16783: 2017** Thermal insulation products - Product category rules (PCR) for factory made and in-situ formed products for preparing environmental product declarations
- **EN 15804:2012+A2:2019** Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products
- **The International EPD® System** www.environdec.com
- **The International EPD® System** The General Programme Instructions v4.0
- **The International EPD® System** PCR 2029:14 Construction products v1.1 (EN 15804:A2)
- **Ecoinvent 3.7.1** www.ecoinvent.org
- **SimaPro LCA Software** www.simapro.com
- **Akdag:** www.akdagtasyunu.com

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