

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	DEUTSCHE ROCKWOOL GmbH & Co. KG
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
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ROCKWOOL stone wool insulation (high bulk density range)
DEUTSCHE ROCKWOOL GmbH & Co. KG

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1. General Information

DEUTSCHE ROCKWOOL GmbH & Co. KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-DRW-20240316-IBC3-EN

This declaration is based on the product category rules:

Mineral insulating materials, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

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29/08/2029



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ROCKWOOL stone wool insulation (high bulk density range)

Owner of the declaration

DEUTSCHE ROCKWOOL GmbH & Co. KG
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45966 Gladbeck
Germany

Declared product / declared unit

This EPD describes the environmental impacts of 1 m³ unfaced or uncoated stone wool insulation material from DEUTSCHE ROCKWOOL GmbH & Co. KG in the high bulk density range of > 120 kg/m³, with a declared bulk density of 159 kg/m³. In addition, the environmental impacts of nine facings based on 1 m² are listed in appendix 1.

Scope:

This Environmental Product Declaration refers to a declared unit of 1 m³ unfaced or uncoated, resin-bonded stone wool from ROCKWOOL in the high bulk density range (> 120 kg/m³). It is produced at the sites in Gladbeck, Neuburg and Flechtingen (Germany) for which the production data for the year 2022 were collected and weighted according to the mass-based production quantity. The declared average considers the total amount of stone wool in the defined bulk density range produced at the three sites. The averaging results in an average bulk density of 159 kg/m³ for stone wool insulations in the high bulk density range. The environmental impacts of the facings can be found in appendix 1. The life cycle assessment therefore represents 100 % of the stone wool produced by ROCKWOOL. The products represented by this EPD are listed in appendix 2.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally



Angela Schindler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

Stone wool is a non-combustible insulating material consisting mainly of amorphous fibres obtained from a silicate melt.

The stone wool insulation materials described in this declaration are produced in the form of rolls, boards, mats, lamella mats, pipe sections and moulded parts in the high bulk density range ($> 120 \text{ kg/m}^3$). The ready-made products are supplied in thicknesses between 10 mm and 400 mm.

For certain applications, the insulation materials are provided with a functional facing or coating on one or both sides. The environmental effects of the facings and coatings are shown in appendix 1 on the basis of 1 m^2 .

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. The products require a declaration of performance taking into account *EN 13162* (Thermal insulation products for buildings) or *EN 14303* (Thermal insulation products for building equipment and industrial installations) and the CE marking. The respective national regulations apply to its use.

2.2 Application

Stone wool insulation materials are used in buildings and industrial plants for thermal insulation as well as noise and fire protection. The main application areas of the products declared in this EPD are:

- All areas of application according to *DIN 4108-10* for wall, ceiling and roof applications with the specified requirements regarding thermal and sound insulation and the mechanical properties
- Technical insulation and building services (e.g. insulation of pipes for ventilation, heating and hot water, district heating pipelines, boilers and equipment)
- Fire protection elements and industrial applications (e.g. air-conditioning ducts, fire protection doors, prefabricated components, chimney systems, cable penetration sealing)

2.3 Technical Data

Technical data

Name	Value	Unit
Bulk density	> 120	kg/m^3
Thermal conductivity according to EN 13162 or EN 14303	0.032 - 0.05	$\text{W}/(\text{mK})$
Calculation value for thermal conductivity according to DIN 4108-4	0.033 - 0.051	$\text{W}/(\text{mK})$
For technical insulation data according to EN 14303	please refer to product data sheets	
For faced or coated products, the respective data sheets must be observed.		
Water vapour diffusion equivalent air layer thickness	μ x component thickness in [m]	m
Sound absorption coefficients α_S depending on the frequency is to be found in the data sheets for the relevant products.		
Formaldehyde emissions according to EN 16516	≤ 120	$\mu\text{g}/\text{m}^3$
Compressive strength / compressive stress according to EN 13162 or EN 14303	5 - 90	kPA
Fire behaviour of unfaced or uncoated stone wool according to EN 13501-1	A1	
Fire behaviour of faced or coated stone wool	please refer to product data sheets	
Continuous glowing combustion	does not show propensity for continuous glowing combustion according to EN 16733	

The product-specific technical data can be found in the respective product data sheets.

The performance data of the products correspond to the respective declaration of performance with regard to their essential characteristics in accordance with the applicable harmonised standard:

- *EN 13162*, Thermal insulation products for buildings – Factory-made mineral wool (MW) products
- *EN 14303*, Thermal insulation products for building equipment and industrial installations – Factory-made mineral wool (MW) products – Specification

2.4 Delivery status

The stone wool insulation materials described in this declaration are manufactured in the form of rolls, boards, mats, lamella mats, pipe sections and moulded parts in the high bulk density range (> 120 kg/m³). The products are supplied in thicknesses between 10 mm and 400 mm, for example as pressure-resistant boards, impact-resistant two-layer boards or highly compressible felts and rolls.

2.5 Base materials/Ancillary materials

Stone wool consists mainly of naturally occurring stones such as diabase, basalt, dolomite (max. 50 mass%) and moulded bricks (max. 100 mass%). The moulded bricks contain cement, production residues, recycled stone wool waste (construction site cuttings and dismantling waste) and other (secondary) raw materials.

The cross-linking of the fibres is achieved by using up to 5.5 % binder (urea-modified phenol-formaldehyde resin). Furthermore, small amounts (< 0.5 %) of adhesive agents and mineral oil are used as hydrophobising agents.

The base and auxiliary materials of the facings are listed below. The weights shown are averaged values.

facing/coating	g/m ² (one-sided)	components
glass fleecce	100	glass fibres, binder
glass silk	100	glass fibres, binder
mineral fleecce	346	glass fibres, mineral based primer, binder
mineral based primer	110	silicate emulsion
aluminium foil resp. aluminium sandwich foil	94.8	aluminium foil and – if necessary - glass scrims and PE film
facing for Masterrock (Toprock)	283	PP fibres, adhesive, siliconised PP film, acrylate
fiberglass reinforced cementitious coating	5,250	cement, gypsum, water, aggregates, PE, glass fibres
PE foil	20	PE foil
wired mat	302	galvanised steel or stainless steel

Co-products from other industries and secondary materials are used in production. The average proportion of reclaimed

materials is 20.52 % and is broken down into:

- "Pre-consumer" (secondary materials without internal waste): 6.17 %
- "Post-consumer" (e.g. construction waste and demolition waste): 0.01 %
- Co-products' (including processed slag): 14.34 %

The product/article/at least one partial article contains substances listed in the ECHA Candidate List (status: 16.01.2020) exceeding 0.1 percentage by mass: no.

This product/article/at least one partial article contains other CMR substances in categories 1A or 1B which are not on the ECHA Candidate List, exceeding 0.1 percentage by mass: no.

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the Biocidal Products Regulation): no.

2.6 Manufacture

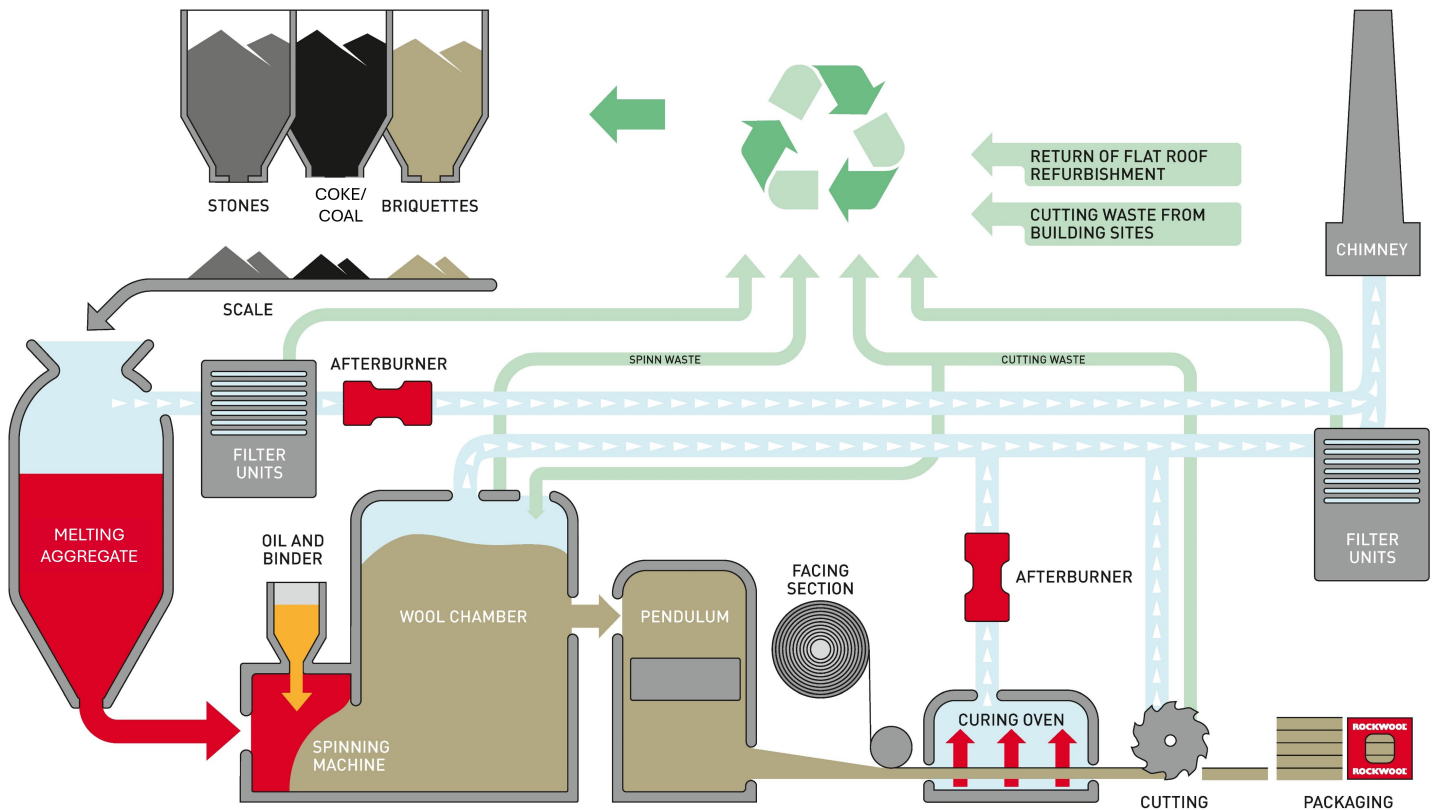
For production, the required quantities of the raw materials are weighed, mixed and fed into a melting unit. The raw materials are melted at temperatures of approx. 1,400-1,500 °C.

A jet of the molten liquid then hits rapidly rotating metal rollers and is spun into fibres.

To ensure dimensional stability, dust reduction and hydrophobisation, the fibres are sprayed with an aqueous solution of binder, mineral oil and bonding agent and then placed on conveyor belts under negative pressure. Optionally, laminations or coatings can then be applied. (The corresponding environmental impacts are listed in Appendix 1).

The binder is cured above 200 °C in a continuous curing oven. The structure and density of the product can thereby be adapted to the exact application requirements.

The stone wool is cut to the desired size and shape. The finished products are packaged and prepared for despatch. Any stone wool left over from the production process is fed back into the production process.



Quality assurance:

- All products according to *RAL-GZ 388*
- Factory production control and third-party monitoring in accordance with European regulations
- KEYMARK according to *Insulation KEYMARK Scheme Rules 2.1*; for technical insulation according to *VDI 2055* according to *Insulation KEYMARK Scheme Rules 2.1* and *AGI-Q 132*
- EUCEB
- Quality management system according to *ISO 9001*
- Voluntary Certification programme for ETICS insulation materials made of mineral wool from FIW Munich in accordance with *ISO/IEC 17067*

2.7 Environment and health during manufacturing

Since 01.06.2000, a ban on the production, placing on the market and use of mineral wool insulation materials which do not fulfil the exemption criteria of Annexe II to § 16 Paragraph 2 of the Ordinance on Hazardous Substances (*GefStoffV*) and Appendix 1 to § 3 of the Chemicals Prohibition Ordinance (*ChemVerbotsV*) has been in force in Germany.

At the same time, the exemption criteria of Note Q of the *CLP Regulation* (EC) No 1272/2008 must be fulfilled. Regarding the production, the regulations of the Technical Instructions on Air Quality Control (*TA Luft*) apply.

During the entire manufacturing process, no health protection measures exceeding the legally defined health and safety measures for commercial enterprises are required.

ROCKWOOL has an environmental management system certified according to *ISO 14001* and attaches high importance to the environmental friendliness of its production facilities:

- The exhaust air produced during manufacture is cleaned by various filter systems and partially treated in an afterburner system. Heat exchangers are used to recover the energy for the production process. Separated dust is reused as raw material.
- Production-related waste water is treated internally and returned to the production process

- Noise protection measurements have shown that all values determined inside and outside the production facilities are below the requirements which apply in Germany. Noise-intensive parts of the facility, such as the fiberizing process, are encapsulated accordingly with constructional measures.

2.8 Product processing/Installation

The recommendations on product usage depend on the product and system and are described in the brochures, technical data sheets and the Safe Use Instruction Sheet (SUIS) and are available at www.rockwool.de.

The occupational health and safety measures according to section 3 of the instructions 'Activities with mineral wool insulation materials (glass wool, stone wool)' (*DGUV Information 213-031*) must be observed:

- Prefer prefabricated mineral wool insulation materials. These can either be supplied by the manufacturer or cut to size centrally at the construction site.
- Unpack insulation materials only in the workplace.
- Do not throw the material.
- Do not use fast-running motor-driven saws without dust extraction.
- Cut on a solid surface with a knife or scissors, do not tear.
- Ensure good ventilation at the workplace. Avoid raising dust.
- Do not sweep dry or blow off dust and dust deposits with compressed air but pick them up with an industry-standard vacuum cleaner (category M) or wet-clean them.
- Keep the workplace clean and clean regularly. Collect offcuts and waste immediately in suitable containers, e.g. bins or plastic bags.
- Wear loose-fitting, closed work clothing and protective gloves made of leather, nitrile-coated cotton or similar.
- Rinse off building dust with water on finishing work.
- When working outdoors where dust is generated, ensure that the working method is low-dust, e.g. by using covered disposal containers with extraction (e.g. air purifiers) at the emission source.

2.9 Packaging

PE films (waste code 15 01 02 according to 2014/955/EU, cardboard (waste code 15 01 01), as well as disposable and reusable wooden pallets (waste code 15 01 03), are used as packaging materials.

With the exception of the reusable wooden pallets, all packaging materials are utilised by Interzero Circular Solutions Germany GmbH. The reusable wooden pallets are recycled.

2.10 Condition of use

If used as intended, no changes in the composition are to be expected during the use phase. Possible effects caused by extraordinary impacts are described in 2.13.

2.11 Environment and health during use

According to the current state of knowledge, hazards to water, air and soil are not to be expected if the products described are used as intended.

According to *UBA-Text 30/94* 'Investigations regarding indoor contamination through fibrous fine dust from installed stone wool', the concentration of fibrous dust indoors during the use phase is:

- Generally not increased if the thermal insulation is properly installed; this requires the insulation to be clearly separated from the interior (e.g. insulation on exterior walls or insulation behind an impervious moisture barrier and cladding consisting of gypsum board, wooden panels or similar);
- Generally only moderately increased if the mineral wool products are installed in such a manner that there is a direct air exchange with the interior; this is mainly the case in rooms with suspended (acoustic) ceilings without a functional trickle protection;
- Significantly increased (up to several thousand fibres per m³ room air) in isolated cases, e.g. in the case of structural defects or constructions that do not correspond to the state of the art, or temporarily during construction measures being performed on components that contain mineral wool products.

Tests have shown that mineral wool products are a negligible source of formaldehyde in buildings and therefore pose no health risk to residents or installers.

2.12 Reference service life

No reference service life (RSL) according to ISO 15686 was determined.

Information on the average service life according to BBSR 2017 can be found in chapter 4, section "Use phase (B1-B7)".

The service life of stone wool is not limited when used properly and is only determined by the service life of the building components or the complete building. The insulation performance remains fully intact over the service life. The performance of the insulation can be impaired by extraordinary effects and damage to the construction (see 2.13).

3. LCA: Calculation rules

3.1 Declared Unit

This EPD refers to a declared unit of 1 m³ unfaced stone wool insulation material with a declared bulk density of 159 kg/m³ (high bulk density range > 120 kg/m³).

2.13 Extraordinary effects

Fire

The stone wool insulation materials declared in this EPD are non-combustible and do not show any risk potential regarding smoke production, flaming droplets or toxicity of combustion gases.

Unfaced or uncoated stone wool insulation materials are assigned to building material class A1. For faced or coated products, the information on the building material class can be found in the respective technical data sheets.

Fire safety

Name	Value
Building material class according to EN 13501-1	A1 A2
Classification for smoke production	- s1
Classification for formation of flaming droplets/particles	- d0

Water

Exposure to moisture impairs the insulation properties. ROCKWOOL stone wool is vapour permeable and dries out on its own when exposed to low levels of moisture.

After longer lasting exposure to water (e.g. in the event of flooding or as a result of a water pipe burst), the insulation material must be replaced.

There are no known environmental impairments or harmful effects on water quality caused by stone wool.

Mechanical destruction

Not relevant.

2.14 Re-use phase

Stone wool insulation materials can be reused. Furthermore, they can be returned to the manufacturing process if they are separated by material type. Ground-up stone wool can also be used as an additive in the manufacture of bricks, fibre cement boards and roof tiles.

ROCKWOOL offers the Rockcycle® system for taking back the stone wool insulation materials.

2.15 Disposal

Construction site waste and demolition waste from stone wool insulation materials are collected under waste code 17 06 04 according to 2014/955/EU.

ROCKWOOL offers the Rockcycle® system for taking back the stone wool insulation materials.

2.16 Further information

Further information on ROCKWOOL stone wool insulation materials can be found on the Internet at www.rockwool.de.

Declared Unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	159	kg/m ³

The declared unit refers to the saleable and packaged end product delivered in mats, boards or rolls.

The data collected for the average, refers to the mass produced. Except for packaging, this approach is regarded representative, as for production the same manufacturing steps are necessary in the respective plants. Thus, the conversion of the declared unit into a specific product is possible via a mass-related scaling factor.

Facings that are not linearly scalable with the product weight but based on 1 m² are not included in the average and are listed in a separate appendix.

3.2 System boundary

The life cycle assessment of stone wool insulation material includes a *cradle-to-gate* analysis of the products' environmental impacts with the modules C1-C4 and module D (A1-A3 + C + D). Subsequent life cycle phases are part of the analysis:

Module A1–A3 | Production stage

The production stage includes the upstream burdens of raw material supply (basalt, dolomite, sand, secondary raw materials, binding agents, etc.), and of energy carriers, the respective transports to the ROCKWOOL sites. The system boundary for secondary raw materials used in production is set after the end of waste status has been reached. The system boundary for secondary raw materials is defined according to *EN 15804*. During production, melting in the melting furnace, fiberization, injection of binder, compacting, curing, cutting and packaging of the stone wool are considered. The manufacturing process is modelled based on the primary data of all sites considered.

The production of the facings of stone wool products is declared in a separate appendix to the EPD.

Module A4 | Transport to construction site

The transport from the plants to the customer is considered as a weighted average based on a representative scenario (350 km truck transport).

Module A5 | Assembly

For installation in the building, a scenario of 2 % waste is declared according to *EURIMA* (2019). The losses during installation are highly dependent on the building geometry and the specific application. Thus, the percentage of waste can vary greatly in the building context and must be adjusted at the building level according to the actual conditions. In addition to the losses during installation, module A5 includes the environmental impacts from the processing of the packaging of the products.

Module C1 | Deconstruction and demolition

For the disassembly of the stone wool products, a manual dismantling was assumed. Referring energy demand is considered to be negligible.

Module C2 | Transport to disposal

Module C2 includes the transport to waste treatment. In this case, transport by truck over a transport distance of 50 km is assumed. This corresponds to the recommendations according to *EURIMA* (2019).

Module C3 | Waste processing

The declared scenario assumes landfilling of the stone wool, therefore no environmental impacts from the waste treatment of the products are declared in C3.

Module C4 | Disposal

Module C4 refers to the emissions from the disposal of the insulation material. The chosen scenario, therefore, includes the environmental burdens of landfilling of the product. The biogenic carbon in the binder of the products is treated as emissions of biogenic CO₂ from the technosphere into the natural environment.

Module D | Benefits and loads beyond the system boundary

In module D the substitution potential from the energy recovery of the packaging is declared.

3.3 Estimates and assumptions

Assumptions and approximations are applied in case of a lack of representative data. All assumptions and approximations are documented precisely and represent a best-guess representation of reality. In case of uncertainty, a conservative approach is chosen.

3.4 Cut-off criteria

The LCA model covers all available input and output flows, which can be represented based on robust data. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented accordingly. Only data with a contribution lower than 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cut-off material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows. Environmental impacts from the production of machines and infrastructure were not taken into account.

3.5 Background data

This study uses generic background data for the evaluation of upstream environmental impacts from *MLC*-databases as well as recognised literature sources.

3.6 Data quality

Data collection is based on industry-specific questionnaires. It follows an iterative process clarifying questions via e-mail, telephone calls or in web-meetings. Intensive discussions between DEUTSCHE ROCKWOOL GmbH & Co. KG and Daxner & Merl result in an accurate mapping of product-related material and energy flows. This leads to a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044*.

The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *MLC* background datasets refer to the latest versions available (not more than ten years old) and are carefully chosen.

3.7 Period under review

In the course of data collection the site specific life cycle inventories for the production year 2022 were collected. The data is based on annual input and production quantities.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Germany

3.9 Allocation

Upstream processes in the supply chain are mainly based on *MLC* background data sets. In stone wool production, co-products from other production processes, secondary materials as well as internal and external waste are used. These input materials are taken into account according to the specifications of *EN 15804* - Annex A. Co-products from other production processes (e.g. slag) were allocated according to the recommendations of *EURIMA* (2019).

Secondary material is assumed as burden-free. Environmental impacts from transport to the stone wool plants were taken into account on a site-specific basis. External wastes do not reach the end of waste status at the factory gate. Resulting environmental burdens are allocated to

the upstream product system in accordance with a consistent polluter-pays principle.

Co-products (e.g. pig iron) are produced in the considered plants. Due to the small quantities and thus minor contribution to overall revenue, no co-product allocation of environmental burdens is applied.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The *MLC 2023.2* background database in the *LCA FE*-software version 10 was used to calculate the LCA.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The biogenic carbon content quantifies the amount of biogenic carbon in the declared building product.

Information on the biogenic carbon content at the gate

Name	Value	Unit
Biogenic carbon content (in the product)	0.77	kg/m ³
Stored carbon dioxide (in the product)	2.81	kg/m ³
Biogenic carbon content (in the packaging)	0.82	kg/m ³
Stored carbon dioxide (in the packaging)	3.0	kg/m ³

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

The use phase of stone wool insulation materials depends on the respective application and has not been declared. During use, no expenses for inspection, maintenance, servicing, repair or replacement are required. The following table shows the average service lives according to *BBSR 2017*.

Service lives according to BBSR 2017

Name	Value	Unit
Code 335.611: Cavity wall insulation	≥ 50	a
Code 335.641: External thermal insulation composite system (ETICS)	40	a
Code 345.316: Special cladding: Thermal insulation (interior)	≥ 50	a
Code 352.121: Impact sound insulation	≥ 50	a
code 352.122: Floor insulation, including insulation of the top floor	≥ 50	a
Code 353.421: Insulation of the cellar ceiling	≥ 50	a
Code 363.531: Insulation above and between rafters	≥ 50	a
Code 364.211: Insulation above, between and under rafters	≥ 50	a

Transport to construction site (A4)

Name	Value	Unit
Transport distance	350	km
Means of transport	truck	
Capacity utilisation (including empty runs)	61	%

Assembly (A5)

Name	Value	Unit
Loss of material	2	%
Transport distance to landfilling	50	km
Output substances following waste treatment on site - loss of material	3.18	kg
Output substances following waste treatment on site - PE-foil	0.53	kg
Output substances following waste treatment on site - wooden pallets	1.66	kg
Output substances following waste treatment on site - paper/cardboard	0.19	kg

End-of-Life (C1-C4)

Name	Value	Unit
Collected separately waste type	159	kg
Landfilling	159	kg

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 m³ unfaced or uncoated stone wool insulation material with a declared bulk density of 159 kg/m³ (high bulk density range > 120 kg/m³) based on the publication 3.1 of the European Commissions JRC.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ stone wool insulation material (159 kg/m³)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	1.86E+02	4.01E+00	8.31E+00	0	5.73E-01	0	5.08E+00	-1.46E+00
GWP-fossil	kg CO ₂ eq	1.89E+02	3.96E+00	5.64E+00	0	5.66E-01	0	2.36E+00	-1.46E+00
GWP-biogenic	kg CO ₂ eq	-2.63E+00	9.07E-03	2.66E+00	0	1.3E-03	0	2.72E+00	-6.68E-03
GWP-luluc	kg CO ₂ eq	6E-02	3.71E-02	2.23E-03	0	5.3E-03	0	7.43E-03	-9.52E-05
ODP	kg CFC11 eq	1.72E-10	5.22E-13	3.9E-12	0	7.45E-14	0	6.08E-12	-1.15E-11
AP	mol H ⁺ eq	1.3E+00	8.05E-03	2.71E-02	0	1.15E-03	0	1.7E-02	-1.83E-03
EP-freshwater	kg P eq	8.67E-04	1.47E-05	1.79E-05	0	2.09E-06	0	4.81E-06	-2.37E-06
EP-marine	kg N eq	1.4E-01	3.32E-03	3.1E-03	0	4.75E-04	0	4.38E-03	-5.33E-04
EP-terrestrial	mol N eq	3.72E+00	3.78E-02	7.86E-02	0	5.41E-03	0	4.82E-02	-5.71E-03
POCP	kg NMVOC eq	4.26E-01	7.2E-03	9.37E-03	0	1.03E-03	0	1.32E-02	-1.49E-03
ADPE	kg Sb eq	3.18E-05	2.66E-07	6.47E-07	0	3.8E-08	0	1.1E-07	-1.05E-07
ADPF	MJ	2.11E+03	5.46E+01	4.5E+01	0	7.8E+00	0	3.18E+01	-2.69E+01
WDP	m ³ world eq deprived	2.15E+00	4.84E-02	4.68E-01	0	6.92E-03	0	2.62E-01	-1.39E-01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m³ stone wool insulation material (159 kg/m³)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	7.69E+01	3.97E+00	3.19E+01	0	5.18E+00	0	5.18E+00	-7.86E+00
PERM	MJ	6.58E+01	0	-2.87E+01	0	0	0	0	0
PERT	MJ	1.43E+02	3.97E+00	3.25E+00	0	5.68E-01	0	5.18E+00	-7.86E+00
PENRE	MJ	1.95E+03	5.48E+01	6.51E+01	0	7.83E+00	0	3.18E+01	-2.69E+01
PENRM	MJ	1.66E+02	0	-2.01E+01	0	0	0	0	0
PENRT	MJ	2.12E+03	5.48E+01	4.5E+01	0	7.83E+00	0	3.18E+01	-2.69E+01
SM	kg	1.4E+01	0	2.8E-01	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	4.39E-01	4.35E-03	1.89E-02	0	6.22E-04	0	8.04E-03	-6.37E-03

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

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m³ stone wool insulation material (159 kg/m³)

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	2.58E-07	1.7E-10	5.2E-09	0	2.42E-11	0	6.93E-10	-1.42E-09
NHWD	kg	1.32E+01	8.36E-03	3.5E+00	0	1.19E-03	0	1.59E+02	-1.33E-02
RWD	kg	6E-02	1.03E-04	1.26E-03	0	1.47E-05	0	3.62E-04	-2.09E-03

CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	1.97E-01	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	6.94E+00	0	0	0	0	0
EET	MJ	0	0	1.24E+01	0	0	0	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 m³ stone wool insulation material (159 kg/m³)**

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

The additional and optional impact categories according to EN 15804 are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators 'abiotic depletion potential for non-fossil resources', 'abiotic depletion potential for fossil resources', 'water (user) deprivation potential, deprivation-weighted water consumption', 'potential comparative toxic unit for ecosystems', 'potential comparative toxic unit for humans – cancerogenic', 'Potential comparative toxic unit for humans - not cancerogenic', 'potential soil quality index'.

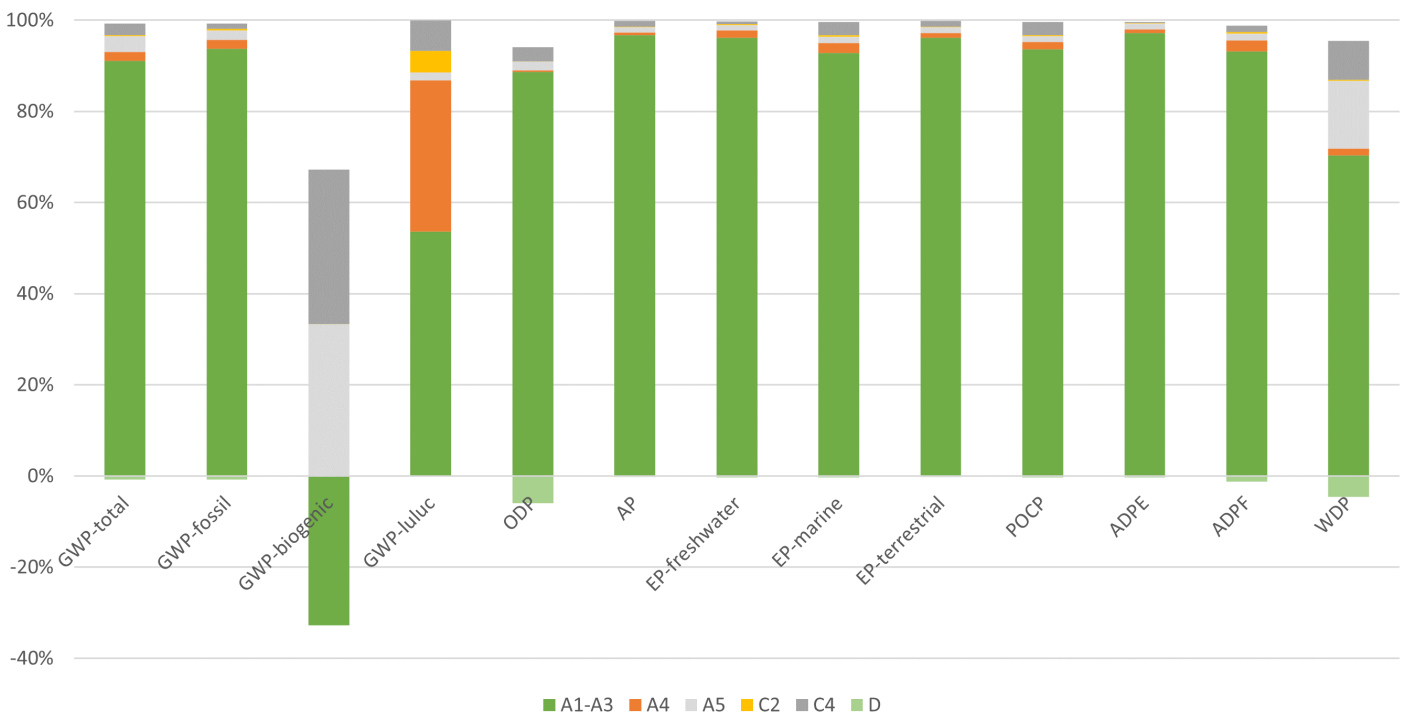
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 m³ unfaced or

uncoated stone wool insulation material.

Relative contribution of considered life cycle stages - high density stone wool



The comparison of the product's life cycle phases shows a clear dominance of the production phase of stone wool (modules A1–A3) in all environmental impact categories. Regarding the contribution of biogenic emissions to climate change (GWP-biogenic), the carbon storage effect of the

glucose in the product and the packaging made from renewable raw materials is visible as a negative value in modules A1–A3. During landfilling of the stone wool in module C4 and energy recovery of the packaging in module A5, the stored carbon is released again in terms of a closed carbon balance.

The direct emissions from the production processes of the products at the ROCKWOOL sites can be identified as the main influencing factor of the potential contribution to climate change (fossil), acidification, eutrophication of marine and terrestrial ecosystems and photochemical ozone creation. The potential contribution to climate change is additionally influenced by the upstream chains of the energy used in production (electricity, natural gas, coke, etc.).

The supply chains of the raw materials and energy sources used represent the dominant factors in the other environmental indicators considered. In particular, the potential abiotic fossil resource use and potential depletion of stratospheric ozone layer are dominated by the provision of the electrical energy

used and the upstream chain of the respective energy sources.

All insulating material produced in the considered bulk density range were included in the average analysis of this EPD in the form of an annual average. The analysis of specific results for the sites identifies a variation of the Carbon Footprint of < 3 %. The potential acidification and terrestrial eutrophication vary more strongly due to the direct emissions from the production process. However, the representativity of the results for the declared product group is still to be considered as high, as the products are placed on the market independent of the production site.

Due to the homogeneous structure of the products their environmental impact correlates directly with the product mass.

7. Requisite evidence

7.1 Biopersistence

The biopersistence of the declared mineral wool fibres is proven by the RAL quality mark "Products made of mineral wool" under the registration number RAL-GZ 388. The requirements of RAL-GZ correspond to the exemption criteria of the *ChemVerbotsV* (Appendix 1 to § 3 entry 4 column 3) and the *German GefStoffV* (Appendix II to § 16 paragraph 2 number 5).

Compliance with the requirements of the *CLP Regulation* (Note Q) is verified by the EUCEB quality mark. Proof of conformity with the quality and test specifications of *Gütegemeinschaft Mineralwolle e. V.* from July 2017 (see www.mineralwolle.de).

7.2 Radioactivity

There are currently no legally defined limit values for the assessment of the radioactivity of building materials in Germany. The nuclides found during measurements are naturally occurring radioactive substances. No artificial radioactive substances were found.

7.3 Leaching

Not relevant, as the products are not used in areas permanently exposed to water.

7.4 Formaldehyde- and VOC-emissions

Eurofins Product Testing A/S Smedeskovvej 38, DK-8464 Galten, Denmark, various tests

Procedure: Testing of product emissions according to *AgBB* (German Committee for Health-Related Evaluation of Building Products)

AgBB results overview (28 days [$\mu\text{g}/\text{m}^3$])

Name	Value	Unit
TVOC (C6 - C16)	<= 1	mg/m ³
Total SVOC (C16 - C22)	<= 0.1	mg/m ³
R (dimensionless)	< 1	
VOC without NIK	<= 0.1	mg/m ³
Carcinogens	<= 0.001	mg/m ³
Formaldehyde	<= 120	$\mu\text{g}/\text{m}^3$

AgBB results overview (3 days [$\mu\text{g}/\text{m}^3$])

Name	Value	Unit
TVOC (C6 - C16)	<= 10	mg/m ³
Carcinogens	<= 0.01	mg/m ³

8. References

Standards

DIN 4108-4

DIN 4108-4:2020-11, Thermal insulation and energy economy in buildings – Part 4: Hygrothermal design values.

DIN 4108-10

DIN 4108-10:2021-11, Thermal insulation and energy saving in buildings – Part 10: Application-related requirements for thermal insulation materials

EN 13501-1

EN 13501-1:2019-05, Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire test.

EN 13162

EN 13162:2015-04, Thermal insulation products for buildings - Factory made mineral wool (MW) products - Specification.

EN 14303

EN 14303:2016-08, Thermal insulation products for building equipment and industrial installations - Factory made mineral wool (MW) products - Specification.

EN 15804

EN 15804:2020-03, Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

EN 16516

EN 16516:2020-10, Construction products: Assessment of release of dangerous substances - Determination of emissions into indoor air.

EN 16733

EN 16733:2016-07, Reaction to fire tests for building products - Determination of a building product's propensity to undergo continuous smouldering.

ISO 9001

ISO 9001:2015-11, Quality management systems - Requirements.

ISO 14001

ISO 14001:2015-11, Environmental management systems - Requirements with guidance for use.

ISO 14025

ISO 14025:2011-10, Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

ISO 14044

ISO 14044:2006-10, Environmental management – Life cycle assessment – Requirements and guidelines.

ISO 15686

ISO 15686, Buildings and constructed assets - Service life planning, various parts.

ISO/IEC 17067

ISO/IEC 17067:201312, Conformity assessment - Fundamentals of product certification and guidelines for product certification schemes.

Further references**AgBB**

Ausschuss zur gesundheitlichen Bewertung von Bauprodukten (AgBB) (Committee for health-related evaluation of building products): Vorgehensweise bei der gesundheitlichen Bewertung der Emissionen von flüchtigen organischen Verbindungen (VOC und SVOC) aus Bauprodukten.

AGI-Q 132

AGI worksheet Q132 on mineral wool as insulation material for industrial installations, Arbeitsgemeinschaft Industriebau e.V., Bensheim, December 2016.

BBSR 2017

Service life of building components for lifecycle analysis in accordance with BNB, version dated 24 February 2017.

Biocidal Products Regulation

Regulation (EU) No 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products.

ChemVerbotsV

Chemicals Prohibition Ordinance (German designation: Chemikalien-Verbotsverordnung – ChemVerbotsV) of 20 January 2017 (Federal Law Gazette I p. 94; 2018 I p. 1389), last amended by Article 300 of the Ordinance of 19 June 2020 (Federal Law Gazette I p. 1328).

CLP Regulation

Regulation (EC) No 1272/2008 of the European Parliament and of the Council of 16 December 2008 on classification, labelling and packaging of substances and mixtures, last amended by Commission Delegate Regulation (EU) No 2020/217 of 4 October 2019 (OJ L 44, 18.02.2020, p. 1-14).

DGUV Information 213-031

Deutsche Gesetzliche Unfallversicherung e. V.: DGUV Information 213-031 "Activities with mineral wool insulation materials (glass wool, stone wool)", July 2019.

ECHA Candidate List

Candidate List of Substances of Very High Concern (ECHA

Candidate List), published in accordance with Article 59 (10) of the REACH Regulation Helsinki: European Chemicals Agency.

EURIMA

EURIMA, 2019. Common Scenarios for developing LCA for mineral wool. A EURIMA internal Document. Version 1. 09.09.2019.

GefStoffV

Ordinance on Hazardous Substances (German designation: Gefahrstoffverordnung – GefStoffV) of 26 November 2010 (Federal Law Gazette I p. 1643, 1644), last amended by Article 2 of the Law of 21 July 2021 (Federal Law Gazette I p. 3115).

IBU 2022

Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V., Version 2.1, Berlin: Institut Bauen und Umwelt e.V. 2022
www.ibu-epd.com

Insulation KEYMARK Scheme Rules 2.1

European INSULATION KEYMARK Scheme for Thermal Insulation Products; Revision: 2.1, CEN, September 2019.

JRC

European Commission-Joint Research Centre, 2022. Environmental Footprint reference package, EF reference package 3.1.

LCA FE

LCA for Experts Software System and Database for Life Cycle Engineering; Sphera Solutions GmbH, Leinfelden-Echterdingen, 1992-2023

MLC

Managed LCA Content Database, Sphera Solutions GmbH, Leinfelden-Echterdingen, database version 2023.2, 2023

PCR Part A

Institut Bauen und Umwelt e.V. (IBU), 2022. Product Category Rules for Building-Related Products and Services. Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report according to EN 15804+A2:2019. Version 1.3. Berlin: Institut Bauen und Umwelt e.V., 2022.

PCR: Mineral insulating materials

Institut Bauen und Umwelt e.V., 2024. Product Category Rules for Building-Related Products and Services. Part B: Requirements on the EPD for Mineral insulating materials. Version 10 Berlin: Institut Bauen und Umwelt e.V., 2024.

RAL-GZ 388

RAL Deutsches Institut für Gütesicherung und Kennzeichnung e.V.: Products made of mineral wool; Quality assurance RAL-GZ 388. Bonn, May 2024

TA Luft

New version of the First General Administrative Regulation to the Federal Immission Control Act (Technical Instructions on Air Quality Control - TA Luft) of 18 August 2021.

UBA-Text 30/94

Federal Environment Agency (Ed.): Investigations on indoor contamination by fibrous fine dust from installed mineral wool products; UBA text 30/94, Federal Environmental Agency (Umweltbundesamt – UBA), 1994, Berlin.

VDI 2055

Thermal insulation of heated and refrigerated operational installations, various sheets.

Regulation (EU) No 305/2011 (CPR)

Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and

repealing Council Directive 89/106/EEC.

2014/955/EU

Commission Decision 2014/955/EU of 18 December 2014 amending Decision 2000/532/EC on the list of waste pursuant to Directive 2008/98/EC.

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Annex

Facings

For ROCKWOOL stone wool insulation

to the

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	DEUTSCHE ROCKWOOL GmbH & Co. KG
Declaration number	EPD-DRW-20240315-IBC3-EN EPD-DRW-20240316-IBC3-EN EPD-DRW-20240317-IBC3-EN
Issue date	30.08.2024
Valid to	29.08.2029

www.ibu-epd.com | <https://epd-online.com>



General Information

This Annex contains the life cycle impact assessment results for the declared unit of **1 m² of following facings** for ROCKWOOL stone wool insulation materials:

- **Glass fleece** with a weight of 100 g/m²
- **Glass silk** with a weight of 100 g/m²
- **Mineral fleece** with a weight of 346 g/m²
- **Silicate coating** with a weight of 110 g/m²
- **Aluminium sandwich foil** with a weight of 95 g/m²
- **Masterrock facing** with a weight of 283 g/m²
- **Glass fibre reinforced cementitious coating** with a weight of 5 250 g/m²
- **PE foil** with a weight of 20 g/m²
- **Wired net** with a weight of 302 g/m²

General Information on the product

By adding the environmental impacts of the stone wool and the declared facings, a simplified calculation of the environmental impacts of faced products shall be made possible. For this purpose, the volume-based declaration of the stone wool is to be related to the square meters used, taking into account the specific product thickness.

In the case of double-sided facing, the environmental impact from 1 m² of facing is to be considered twice.

LCA: Scenarios and additional technical information

The facings declared represent surface-applied layers.

The following life cycle phases of the facing are taken into account for the analysis:

- Module A1-A3: The production stage includes the upstream burdens of raw material supply, their transports over 500 km and the production of the facings.

- Module A4: Transport to the construction site (350 km transport distance)

- Module A5: 2% loss of material

- Module C2: Transport to landfill (50 km default-scenario)

- Module C4: Landfilling of the composite material (share of facing).

Module C1 and C3 of the facings do not contain any relevant environmental impacts and are to be declared as "0".

It should be noted that the data and methodological assumptions used for the preparation of the LCAs of the products listed comply with the requirements of *EN 15804+A2* as well as *IBU, PCR Part A* and are thus suitable for use in an EPD.

2. LCA: Results

2.1 Glass fleece

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² glass fleece (100 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	1.89E-01	2.52E-03	3.87E-03	0.00E+00	3.60E-04	0.00E+00	1.43E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	1.88E-01	2.49E-03	3.85E-03	0.00E+00	3.56E-04	0.00E+00	1.48E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1.24E-03	5.70E-06	2.40E-05	0.00E+00	8.14E-07	0.00E+00	-5.10E-05 ¹	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	5.36E-05	2.33E-05	1.70E-06	0.00E+00	3.33E-06	0.00E+00	4.67E-06	0.00E+00
ODP	[kg CFC11-Eq.]	1.80E-12	3.28E-16	3.60E-14	0.00E+00	4.68E-17	0.00E+00	3.82E-15	0.00E+00
AP	[mol H ⁺ -Eq.]	1.20E-03	5.06E-06	2.42E-05	0.00E+00	7.23E-07	0.00E+00	1.07E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	5.39E-07	9.21E-09	1.11E-08	0.00E+00	1.32E-09	0.00E+00	3.02E-09	0.00E+00
EP-marine	[kg N-Eq.]	1.99E-04	2.09E-06	4.08E-06	0.00E+00	2.98E-07	0.00E+00	2.75E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	1.81E-03	2.38E-05	3.74E-05	0.00E+00	3.40E-06	0.00E+00	3.03E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	4.99E-04	4.52E-06	1.03E-05	0.00E+00	6.46E-07	0.00E+00	8.31E-06	0.00E+00
ADPE	[kg Sb-Eq.]	3.19E-08	1.67E-10	6.44E-10	0.00E+00	2.39E-11	0.00E+00	6.94E-11	0.00E+00
ADPF	[MJ]	3.28E+00	3.43E-02	6.69E-02	0.00E+00	4.90E-03	0.00E+00	2.00E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	1.94E-02	3.04E-05	3.93E-04	0.00E+00	4.35E-06	0.00E+00	1.65E-04	0.00E+00

Caption GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² glass fleece (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	8.87E-01	2.50E-03	1.79E-02	0.00E+00	3.57E-04	0.00E+00	3.26E-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
PERT	[MJ]	8.87E-01	2.50E-03	1.79E-02	0.00E+00	3.57E-04	0.00E+00	3.26E-03	0.00E+00
PENRE	[MJ]	2.93E+00	3.45E-02	5.99E-02	0.00E+00	4.92E-03	0.00E+00	2.00E-02	0.00E+00
PENRM	[MJ]	3.50E-01	0.00E+00	6.99E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	3.28E+00	3.45E-02	6.69E-02	0.00E+00	4.92E-03	0.00E+00	2.00E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	6.82E-04	2.74E-06	1.38E-05	0.00E+00	3.91E-07	0.00E+00	5.05E-06	0.00E+00

Caption 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

¹ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear.

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² glass fleece (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	2.93E-10	1.07E-13	5.88E-12	0.00E+00	1.52E-14	0.00E+00	4.36E-13	0.00E+00
NHWD	[kg]	2.40E-02	5.25E-06	2.48E-03	0.00E+00	7.50E-07	0.00E+00	1.00E-01	0.00E+00
RWD	[kg]	9.23E-05	6.45E-08	1.85E-06	0.00E+00	9.21E-09	0.00E+00	2.28E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

Caption HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² glass fleece (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.2 Glass silk

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² glass silk (100 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	1.85E-01	2.52E-03	3.79E-03	0.00E+00	3.60E-04	0.00E+00	1.43E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	1.84E-01	2.49E-03	3.76E-03	0.00E+00	3.56E-04	0.00E+00	1.48E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1.26E-03	5.70E-06	2.43E-05	0.00E+00	8.14E-07	0.00E+00	-5.10E-05 ²	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	5.36E-05	2.33E-05	1.70E-06	0.00E+00	3.33E-06	0.00E+00	4.67E-06	0.00E+00
ODP	[kg CFC11-Eq.]	1.88E-12	3.28E-16	3.76E-14	0.00E+00	4.68E-17	0.00E+00	3.82E-15	0.00E+00
AP	[mol H ⁺ -Eq.]	1.28E-03	5.06E-06	2.60E-05	0.00E+00	7.23E-07	0.00E+00	1.07E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	5.54E-07	9.21E-09	1.14E-08	0.00E+00	1.32E-09	0.00E+00	3.02E-09	0.00E+00
EP-marine	[kg N-Eq.]	1.89E-04	2.09E-06	3.89E-06	0.00E+00	2.98E-07	0.00E+00	2.75E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	1.86E-03	2.38E-05	3.83E-05	0.00E+00	3.40E-06	0.00E+00	3.03E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	5.22E-04	4.52E-06	1.07E-05	0.00E+00	6.46E-07	0.00E+00	8.31E-06	0.00E+00
ADPE	[kg Sb-Eq.]	3.41E-08	1.67E-10	6.86E-10	0.00E+00	2.39E-11	0.00E+00	6.94E-11	0.00E+00
ADPF	[MJ]	3.05E+00	3.43E-02	6.23E-02	0.00E+00	4.90E-03	0.00E+00	2.00E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	2.09E-02	3.04E-05	4.22E-04	0.00E+00	4.35E-06	0.00E+00	1.65E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² glass silk (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	9.25E-01	2.50E-03	1.86E-02	0.00E+00	3.57E-04	0.00E+00	3.26E-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
PERT	[MJ]	9.25E-01	2.50E-03	1.86E-02	0.00E+00	3.57E-04	0.00E+00	3.26E-03	0.00E+00
PENRE	[MJ]	2.86E+00	3.45E-02	5.84E-02	0.00E+00	4.92E-03	0.00E+00	2.00E-02	0.00E+00
PENRM	[MJ]	1.94E-01	0.00E+00	3.89E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	3.05E+00	3.45E-02	6.23E-02	0.00E+00	4.92E-03	0.00E+00	2.00E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	6.85E-04	2.74E-06	1.39E-05	0.00E+00	3.91E-07	0.00E+00	5.05E-06	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² glass silk (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	2.43E-10	1.07E-13	4.88E-12	0.00E+00	1.52E-14	0.00E+00	4.36E-13	0.00E+00
NHWD	[kg]	2.57E-02	5.25E-06	2.52E-03	0.00E+00	7.50E-07	0.00E+00	1.00E-01	0.00E+00
RWD	[kg]	9.57E-05	6.45E-08	1.92E-06	0.00E+00	9.21E-09	0.00E+00	2.28E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

² The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear.

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² glass silk (100 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index								

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.3 Mineral fleece

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² mineral fleece (346 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	2.13E-01	8.72E-03	4.56E-03	0.00E+00	1.25E-03	0.00E+00	4.96E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	2.08E-01	8.62E-03	4.46E-03	0.00E+00	1.23E-03	0.00E+00	5.12E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	4.76E-03	1.97E-05	9.22E-05	0.00E+00	2.82E-06	0.00E+00	-1.76E-04 ³	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	1.34E-04	8.07E-05	4.86E-06	0.00E+00	1.15E-05	0.00E+00	1.61E-05	0.00E+00
ODP	[kg CFC11-Eq.]	1.26E-12	1.13E-15	2.56E-14	0.00E+00	1.62E-16	0.00E+00	1.32E-14	0.00E+00
AP	[mol H ⁺ -Eq.]	7.91E-04	1.75E-05	1.70E-05	0.00E+00	2.50E-06	0.00E+00	3.69E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	4.63E-07	3.19E-08	1.02E-08	0.00E+00	4.55E-09	0.00E+00	1.05E-08	0.00E+00
EP-marine	[kg N-Eq.]	2.43E-04	7.23E-06	5.21E-06	0.00E+00	1.03E-06	0.00E+00	9.53E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	1.64E-03	8.23E-05	3.67E-05	0.00E+00	1.18E-05	0.00E+00	1.05E-04	0.00E+00
POCP	[kg NMVOC-Eq.]	3.53E-03	1.57E-05	7.16E-05	0.00E+00	2.24E-06	0.00E+00	2.87E-05	0.00E+00
ADPE	[kg Sb-Eq.]	2.13E-08	5.78E-10	4.45E-10	0.00E+00	8.26E-11	0.00E+00	2.40E-10	0.00E+00
ADPF	[MJ]	4.26E+00	1.19E-01	8.94E-02	0.00E+00	1.70E-02	0.00E+00	6.92E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	1.37E-02	1.05E-04	2.87E-04	0.00E+00	1.51E-05	0.00E+00	5.71E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² mineral fleece (346 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	6.40E-01	8.64E-03	1.32E-02	0.00E+00	1.23E-03	0.00E+00	1.13E-02	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
PERT	[MJ]	6.40E-01	8.64E-03	1.32E-02	0.00E+00	1.23E-03	0.00E+00	1.13E-02	0.00E+00
PENRE	[MJ]	3.22E+00	1.19E-01	6.86E-02	0.00E+00	1.70E-02	0.00E+00	6.93E-02	0.00E+00
PENRM	[MJ]	1.04E+00	0.00E+00	2.08E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	4.26E+00	1.19E-01	8.94E-02	0.00E+00	1.70E-02	0.00E+00	6.93E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	7.23E-04	9.47E-06	1.50E-05	0.00E+00	1.35E-06	0.00E+00	1.75E-05	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² mineral fleece (346 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	5.19E-10	3.69E-13	1.04E-11	0.00E+00	5.27E-14	0.00E+00	1.51E-12	0.00E+00
NHWD	[kg]	1.46E-02	1.82E-05	7.22E-03	0.00E+00	2.60E-06	0.00E+00	3.46E-01	0.00E+00
RWD	[kg]	6.82E-05	2.23E-07	1.39E-06	0.00E+00	3.19E-08	0.00E+00	7.88E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

³ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear.

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² mineral fleece (346 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.4 Silicate coating

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² silicate coating (110 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	6.95E-03	2.77E-03	2.34E-04	0.00E+00	3.96E-04	0.00E+00	1.58E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	5.26E-03	2.74E-03	2.00E-04	0.00E+00	3.91E-04	0.00E+00	1.63E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1.65E-03	6.27E-06	3.21E-05	0.00E+00	8.96E-07	0.00E+00	-5.61E-05 ⁴	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	3.67E-05	2.57E-05	1.42E-06	0.00E+00	3.67E-06	0.00E+00	5.13E-06	0.00E+00
ODP	[kg CFC11-Eq.]	1.14E-15	3.61E-16	1.15E-16	0.00E+00	5.15E-17	0.00E+00	4.20E-15	0.00E+00
AP	[mol H ⁺ -Eq.]	9.49E-06	5.57E-06	5.51E-07	0.00E+00	7.95E-07	0.00E+00	1.17E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	1.47E-08	1.01E-08	5.93E-10	0.00E+00	1.45E-09	0.00E+00	3.33E-09	0.00E+00
EP-marine	[kg N-Eq.]	3.87E-06	2.30E-06	1.90E-07	0.00E+00	3.28E-07	0.00E+00	3.03E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	4.49E-05	2.62E-05	2.16E-06	0.00E+00	3.74E-06	0.00E+00	3.33E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	1.41E-03	4.98E-06	2.85E-05	0.00E+00	7.11E-07	0.00E+00	9.14E-06	0.00E+00
ADPE	[kg Sb-Eq.]	2.62E-10	1.84E-10	1.10E-11	0.00E+00	2.63E-11	0.00E+00	7.64E-11	0.00E+00
ADPF	[MJ]	5.56E-02	3.78E-02	2.41E-03	0.00E+00	5.39E-03	0.00E+00	2.20E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	5.47E-04	3.35E-05	1.53E-05	0.00E+00	4.78E-06	0.00E+00	1.81E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² silicate coating (110 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	4.28E-03	2.75E-03	2.20E-04	0.00E+00	3.93E-04	0.00E+00	3.58E-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
PERT	[MJ]	4.28E-03	2.75E-03	2.20E-04	0.00E+00	3.93E-04	0.00E+00	3.58E-03	0.00E+00
PENRE	[MJ]	5.58E-02	3.79E-02	2.42E-03	0.00E+00	5.41E-03	0.00E+00	2.20E-02	0.00E+00
PENRM	[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
PENRT	[MJ]	5.58E-02	3.79E-02	2.42E-03	0.00E+00	5.41E-03	0.00E+00	2.20E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	1.60E-05	3.01E-06	5.00E-07	0.00E+00	4.30E-07	0.00E+00	5.56E-06	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² silicate coating (110 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	2.30E-13	1.17E-13	1.69E-14	0.00E+00	1.68E-14	0.00E+00	4.79E-13	0.00E+00
NHWD	[kg]	3.77E-04	5.78E-06	2.21E-03	0.00E+00	8.25E-07	0.00E+00	1.10E-01	0.00E+00
RWD	[kg]	1.79E-07	7.09E-08	1.02E-08	0.00E+00	1.01E-08	0.00E+00	2.51E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

⁴ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear.

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² silicate coating (110 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.5 Aluminium sandwich foil
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² aluminium sandwich foil (95 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	5.81E-01	2.39E-03	1.17E-02	0.00E+00	3.42E-04	0.00E+00	1.36E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	5.81E-01	2.37E-03	1.17E-02	0.00E+00	3.38E-04	0.00E+00	1.41E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	5.56E-04	5.41E-06	1.03E-05	0.00E+00	7.73E-07	0.00E+00	-4.84E-05 ⁵	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	1.08E-04	2.22E-05	2.76E-06	0.00E+00	3.17E-06	0.00E+00	4.43E-06	0.00E+00
ODP	[kg CFC11-Eq.]	1.78E-12	3.11E-16	3.57E-14	0.00E+00	4.45E-17	0.00E+00	3.63E-15	0.00E+00
AP	[mol H ⁺ -Eq.]	1.99E-03	4.81E-06	4.01E-05	0.00E+00	6.87E-07	0.00E+00	1.01E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	5.54E-07	8.75E-09	1.13E-08	0.00E+00	1.25E-09	0.00E+00	2.87E-09	0.00E+00
EP-marine	[kg N-Eq.]	3.82E-04	1.98E-06	7.74E-06	0.00E+00	2.83E-07	0.00E+00	2.62E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	4.15E-03	2.26E-05	8.41E-05	0.00E+00	3.23E-06	0.00E+00	2.88E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	1.22E-03	4.30E-06	2.47E-05	0.00E+00	6.14E-07	0.00E+00	7.89E-06	0.00E+00
ADPE	[kg Sb-Eq.]	3.22E-08	1.59E-10	6.49E-10	0.00E+00	2.27E-11	0.00E+00	6.60E-11	0.00E+00
ADPF	[MJ]	9.53E+00	3.26E-02	1.92E-01	0.00E+00	4.66E-03	0.00E+00	1.90E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	3.05E-02	2.89E-05	6.13E-04	0.00E+00	4.13E-06	0.00E+00	1.57E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² aluminium sandwich foil (95 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	2.65E+00	2.37E-03	5.31E-02	0.00E+00	3.39E-04	0.00E+00	3.10E-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
PERT	[MJ]	2.65E+00	2.37E-03	5.31E-02	0.00E+00	3.39E-04	0.00E+00	3.10E-03	0.00E+00
PENRE	[MJ]	8.18E+00	3.27E-02	1.65E-01	0.00E+00	4.68E-03	0.00E+00	1.90E-02	0.00E+00
PENRM	[MJ]	1.36E+00	0.00E+00	2.71E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	9.54E+00	3.27E-02	1.92E-01	0.00E+00	4.68E-03	0.00E+00	1.90E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	4.50E-03	2.60E-06	9.01E-05	0.00E+00	3.71E-07	0.00E+00	4.80E-06	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² aluminium sandwich foil (95 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	4.65E-10	1.01E-13	9.31E-12	0.00E+00	1.45E-14	0.00E+00	4.14E-13	0.00E+00
NHWD	[kg]	1.13E-01	4.99E-06	4.15E-03	0.00E+00	7.13E-07	0.00E+00	9.51E-02	0.00E+00
RWD	[kg]	5.35E-04	6.13E-08	1.07E-05	0.00E+00	8.75E-09	0.00E+00	2.16E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

⁵ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² aluminium sandwich foil (95 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.6 Masterrock
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² Masterrock facing (283 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	7.21E-01	7.13E-03	1.47E-02	0.00E+00	1.02E-03	0.00E+00	4.06E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	7.19E-01	7.05E-03	1.46E-02	0.00E+00	1.01E-03	0.00E+00	4.19E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1.99E-03	1.61E-05	3.73E-05	0.00E+00	2.30E-06	0.00E+00	-1.44E-04 ⁶	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	2.09E-04	6.60E-05	5.95E-06	0.00E+00	9.43E-06	0.00E+00	1.32E-05	0.00E+00
ODP	[kg CFC11-Eq.]	3.10E-12	9.28E-16	6.22E-14	0.00E+00	1.33E-16	0.00E+00	1.08E-14	0.00E+00
AP	[mol H ⁺ -Eq.]	1.19E-03	1.43E-05	2.46E-05	0.00E+00	2.05E-06	0.00E+00	3.02E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	1.63E-06	2.61E-08	3.33E-08	0.00E+00	3.72E-09	0.00E+00	8.56E-09	0.00E+00
EP-marine	[kg N-Eq.]	3.58E-04	5.91E-06	7.46E-06	0.00E+00	8.44E-07	0.00E+00	7.79E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	3.81E-03	6.73E-05	7.94E-05	0.00E+00	9.62E-06	0.00E+00	8.57E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	1.63E-03	1.28E-05	3.34E-05	0.00E+00	1.83E-06	0.00E+00	2.35E-05	0.00E+00
ADPE	[kg Sb-Eq.]	4.94E-08	4.73E-10	1.00E-09	0.00E+00	6.75E-11	0.00E+00	1.96E-10	0.00E+00
ADPF	[MJ]	2.24E+01	9.71E-02	4.51E-01	0.00E+00	1.39E-02	0.00E+00	5.66E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	6.72E-02	8.62E-05	1.35E-03	0.00E+00	1.23E-05	0.00E+00	4.67E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² Masterrock facing (283 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	1.75E+00	7.07E-03	3.54E-02	0.00E+00	1.01E-03	0.00E+00	9.22E-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
PERT	[MJ]	1.75E+00	7.07E-03	3.54E-02	0.00E+00	1.01E-03	0.00E+00	9.22E-03	0.00E+00
PENRE	[MJ]	1.22E+01	9.75E-02	2.48E-01	0.00E+00	1.39E-02	0.00E+00	5.66E-02	0.00E+00
PENRM	[MJ]	1.02E+01	0.00E+00	2.04E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	2.24E+01	9.75E-02	4.52E-01	0.00E+00	1.39E-02	0.00E+00	5.66E-02	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	4.05E-03	7.74E-06	8.15E-05	0.00E+00	1.11E-06	0.00E+00	1.43E-05	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² Masterrock facing (283 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1.25E-09	3.02E-13	2.51E-11	0.00E+00	4.31E-14	0.00E+00	1.23E-12	0.00E+00
NHWD	[kg]	8.62E-03	1.49E-05	5.84E-03	0.00E+00	2.12E-06	0.00E+00	2.83E-01	0.00E+00
RWD	[kg]	2.88E-04	1.82E-07	5.77E-06	0.00E+00	2.61E-08	0.00E+00	6.45E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

⁶ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² Masterrock facing (283 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.7 Glass fibre reinforced cementitious coating

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² glass fibre reinforced cementitious coating (5 250 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	2.28E+00	1.32E-01	5.01E-02	0.00E+00	1.89E-02	0.00E+00	7.53E-02	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	2.27E+00	1.31E-01	4.99E-02	0.00E+00	1.87E-02	0.00E+00	7.77E-02	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	8.36E-03	2.99E-04	1.21E-04	0.00E+00	4.27E-05	0.00E+00	-2.68E-03 ⁷	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	2.06E-03	1.23E-03	7.41E-05	0.00E+00	1.75E-04	0.00E+00	2.45E-04	0.00E+00
ODP	[kg CFC11-Eq.]	1.39E-11	1.72E-14	2.82E-13	0.00E+00	2.46E-15	0.00E+00	2.00E-13	0.00E+00
AP	[mol H ⁺ -Eq.]	6.48E-03	2.66E-04	1.47E-04	0.00E+00	3.80E-05	0.00E+00	5.59E-04	0.00E+00
EP-freshwater	[kg P-Eq.]	4.23E-06	4.84E-07	9.87E-08	0.00E+00	6.91E-08	0.00E+00	1.59E-07	0.00E+00
EP-marine	[kg N-Eq.]	1.54E-03	1.10E-04	3.61E-05	0.00E+00	1.57E-05	0.00E+00	1.45E-04	0.00E+00
EP-terrestrial	[mol N-Eq.]	1.67E-02	1.25E-03	3.95E-04	0.00E+00	1.78E-04	0.00E+00	1.59E-03	0.00E+00
POCP	[kg NMVOC-Eq.]	4.34E-03	2.38E-04	1.01E-04	0.00E+00	3.39E-05	0.00E+00	4.36E-04	0.00E+00
ADPE	[kg Sb-Eq.]	1.69E-07	8.77E-09	3.65E-09	0.00E+00	1.25E-09	0.00E+00	3.64E-09	0.00E+00
ADPF	[MJ]	2.14E+01	1.80E+00	4.89E-01	0.00E+00	2.57E-01	0.00E+00	1.05E+00	0.00E+00
WDP	[m ³ world-Eq deprived]	9.90E-02	1.60E-03	2.19E-03	0.00E+00	2.28E-04	0.00E+00	8.66E-03	0.00E+00

Caption GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² glass fibre reinforced cementitious coating (5 250 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	7.20E+00	1.31E-01	1.50E-01	0.00E+00	1.87E-02	0.00E+00	1.71E-01	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
PERT	[MJ]	7.20E+00	1.31E-01	1.50E-01	0.00E+00	1.87E-02	0.00E+00	1.71E-01	0.00E+00
PENRE	[MJ]	1.91E+01	1.81E+00	4.44E-01	0.00E+00	2.58E-01	0.00E+00	1.05E+00	0.00E+00
PENRM	[MJ]	2.27E+00	0.00E+00	4.54E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	2.14E+01	1.81E+00	4.90E-01	0.00E+00	2.58E-01	0.00E+00	1.05E+00	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	5.65E-03	1.44E-04	1.22E-04	0.00E+00	2.05E-05	0.00E+00	2.65E-04	0.00E+00

Caption 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² glass fibre reinforced cementitious coating (5 250 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1.61E-10	5.60E-12	3.81E-12	0.00E+00	8.00E-13	0.00E+00	2.29E-11	0.00E+00
NHWD	[kg]	1.43E-01	2.76E-04	1.08E-01	0.00E+00	3.94E-05	0.00E+00	5.26E+00	0.00E+00
RWD	[kg]	8.64E-04	3.39E-06	1.76E-05	0.00E+00	4.84E-07	0.00E+00	1.20E-05	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

⁷ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear

Caption	HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy
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RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² glass fibre reinforced cementitious coating (5 250 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND

Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index
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The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.8 PE foil
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² PE foil (20 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	4.17E-02	5.04E-04	8.52E-04	0.00E+00	7.20E-05	0.00E+00	2.87E-04	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	4.14E-02	4.98E-04	8.46E-04	0.00E+00	7.12E-05	0.00E+00	2.96E-04	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	2.94E-04	1.14E-06	5.71E-06	0.00E+00	1.63E-07	0.00E+00	-1.02E-05 ⁸	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	1.09E-05	4.67E-06	3.43E-07	0.00E+00	6.67E-07	0.00E+00	9.33E-07	0.00E+00
ODP	[kg CFC11-Eq.]	3.03E-13	6.56E-17	6.07E-15	0.00E+00	9.37E-18	0.00E+00	7.64E-16	0.00E+00
AP	[mol H ⁺ -Eq.]	5.87E-05	1.01E-06	1.24E-06	0.00E+00	1.45E-07	0.00E+00	2.13E-06	0.00E+00
EP-freshwater	[kg P-Eq.]	9.15E-08	1.84E-09	1.88E-09	0.00E+00	2.63E-10	0.00E+00	6.05E-10	0.00E+00
EP-marine	[kg N-Eq.]	1.72E-05	4.18E-07	3.65E-07	0.00E+00	5.97E-08	0.00E+00	5.51E-07	0.00E+00
EP-terrestrial	[mol N-Eq.]	1.81E-04	4.76E-06	3.85E-06	0.00E+00	6.80E-07	0.00E+00	6.06E-06	0.00E+00
POCP	[kg NMVOC-Eq.]	5.43E-05	9.05E-07	1.14E-06	0.00E+00	1.29E-07	0.00E+00	1.66E-06	0.00E+00
ADPE	[kg Sb-Eq.]	3.05E-09	3.34E-11	6.20E-11	0.00E+00	4.77E-12	0.00E+00	1.39E-11	0.00E+00
ADPF	[MJ]	1.53E+00	6.87E-03	3.08E-02	0.00E+00	9.81E-04	0.00E+00	4.00E-03	0.00E+00
WDP	[m ³ world-Eq deprived]	1.50E-03	6.09E-06	3.07E-05	0.00E+00	8.70E-07	0.00E+00	3.30E-05	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² PE foil (20 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	1.60E-01	5.00E-04	3.22E-03	0.00E+00	7.14E-05	0.00E+00	6.52E-04	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
PERT	[MJ]	1.60E-01	5.00E-04	3.22E-03	0.00E+00	7.14E-05	0.00E+00	6.52E-04	0.00E+00
PENRE	[MJ]	6.06E-01	6.89E-03	1.24E-02	0.00E+00	9.84E-04	0.00E+00	4.00E-03	0.00E+00
PENRM	[MJ]	9.21E-01	0.00E+00	1.84E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	[MJ]	1.53E+00	6.89E-03	3.08E-02	0.00E+00	9.84E-04	0.00E+00	4.00E-03	0.00E+00
SM	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	2.04E-04	5.47E-07	4.12E-06	0.00E+00	7.82E-08	0.00E+00	1.01E-06	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² PE foil (20 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1.01E-10	2.13E-14	2.03E-12	0.00E+00	3.05E-15	0.00E+00	8.72E-14	0.00E+00
NHWD	[kg]	4.32E-04	1.05E-06	4.09E-04	0.00E+00	1.50E-07	0.00E+00	2.00E-02	0.00E+00
RWD	[kg]	2.27E-05	1.29E-08	4.56E-07	0.00E+00	1.84E-09	0.00E+00	4.56E-08	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

⁸ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² PE foil (20 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[-]	ND	ND	ND	ND	ND	ND	ND	ND
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index								

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

2.9 Wired net
DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED); MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE			USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential	
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² wired net (302 g/m²)

Kernindikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	[kg CO ₂ -Eq.]	1.07E+00	7.61E-03	2.17E-02	0.00E+00	1.09E-03	0.00E+00	4.33E-03	0.00E+00
GWP-fossil	[kg CO ₂ -Eq.]	1.07E+00	7.52E-03	2.16E-02	0.00E+00	1.07E-03	0.00E+00	4.47E-03	0.00E+00
GWP-biogenic	[kg CO ₂ -Eq.]	1.57E-03	1.72E-05	2.87E-05	0.00E+00	2.46E-06	0.00E+00	-1.54E-04 ⁹	0.00E+00
GWP-luluc	[kg CO ₂ -Eq.]	6.15E-04	7.05E-05	1.42E-05	0.00E+00	1.01E-05	0.00E+00	1.41E-05	0.00E+00
ODP	[kg CFC11-Eq.]	6.21E-12	9.90E-16	1.25E-13	0.00E+00	1.41E-16	0.00E+00	1.15E-14	0.00E+00
AP	[mol H ⁺ -Eq.]	7.70E-03	1.53E-05	1.55E-04	0.00E+00	2.18E-06	0.00E+00	3.22E-05	0.00E+00
EP-freshwater	[kg P-Eq.]	1.92E-06	2.78E-08	3.92E-08	0.00E+00	3.97E-09	0.00E+00	9.13E-09	0.00E+00
EP-marine	[kg N-Eq.]	7.79E-04	6.31E-06	1.59E-05	0.00E+00	9.01E-07	0.00E+00	8.31E-06	0.00E+00
EP-terrestrial	[mol N-Eq.]	8.62E-03	7.18E-05	1.76E-04	0.00E+00	1.03E-05	0.00E+00	9.15E-05	0.00E+00
POCP	[kg NMVOC-Eq.]	2.42E-03	1.37E-05	4.91E-05	0.00E+00	1.95E-06	0.00E+00	2.51E-05	0.00E+00
ADPE	[kg Sb-Eq.]	4.32E-05	5.05E-10	8.63E-07	0.00E+00	7.21E-11	0.00E+00	2.10E-10	0.00E+00
ADPF	[MJ]	1.39E+01	1.04E-01	2.81E-01	0.00E+00	1.48E-02	0.00E+00	6.04E-02	0.00E+00
WDP	[m ³ world-Eq deprived]	1.97E-01	9.20E-05	3.95E-03	0.00E+00	1.31E-05	0.00E+00	4.98E-04	0.00E+00

Caption: GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² wired net (302 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	[MJ]	3.72E+00	7.54E-03	7.47E-02	0.00E+00	1.08E-03	0.00E+00	9.84E-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
PERT	[MJ]	3.72E+00	7.54E-03	7.47E-02	0.00E+00	1.08E-03	0.00E+00	9.84E-03	0.00E+00
PENRE	[MJ]	1.39E+01	1.04E-01	2.82E-01	0.00E+00	1.49E-02	0.00E+00	6.05E-02	0.00E+00
PENRM	[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
PENRT	[MJ]	1.39E+01	1.04E-01	2.82E-01	0.00E+00	1.49E-02	0.00E+00	6.05E-02	0.00E+00
SM	[kg]	3.07E-02	0.00E+00	6.14E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[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
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
FW	[m ³]	5.61E-03	8.26E-06	1.13E-04	0.00E+00	1.18E-06	0.00E+00	1.53E-05	0.00E+00

Caption: 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

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² wired net (302 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	[kg]	1.88E-11	3.22E-13	4.10E-13	0.00E+00	4.60E-14	0.00E+00	1.32E-12	0.00E+00
NHWD	[kg]	1.40E-01	1.59E-05	8.85E-03	0.00E+00	2.27E-06	0.00E+00	3.02E-01	0.00E+00
RWD	[kg]	4.03E-04	1.95E-07	8.08E-06	0.00E+00	2.78E-08	0.00E+00	6.88E-07	0.00E+00
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE	[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
EET	[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

Caption: HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EEE = Exported thermal energy

⁹ The negative value here stems from the MLC-background dataset for inert matter on landfill. The reason for the negative value is unclear

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 m² wired net (302 g/m²)

Indikator	Einheit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	[Disease Incidence]	ND	ND	ND	ND	ND	ND	ND	ND
IRP	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	[CTUe]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	[CTUh]	ND	ND	ND	ND	ND	ND	ND	ND
SQP	[–]	ND	ND	ND	ND	ND	ND	ND	ND
Caption	PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index								

The additional and optional impact categories according to *EN 15804+A2* are not declared, as the uncertainty of these indicators is to be classified as high.

Disclaimer – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP:

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.

ANNEX 2 – Assignment of ROCKWOOL products to the EPDs

All product names used at the time of EPD publication are listed below. The list is not exhaustive, i.e. products developed after publication can also be covered by the EPDs, provided they consist of unfaced or uncoated stone wool or their facings or coatings are shown in Annex 1.

PART 1: ROCKWOOL products in the low bulk density range

The following ROCKWOOL products are covered by the IBU-EPD "ROCKWOOL stone wool insulation materials in the **low bulk density range**".

202
AKOE INLEG 553 (über 25 mm Dicke)
AKOE INLEG 562
Akustik-Profilfüller RAF-SE
Akustik-Profilfüller RAF-SE/V
Akustik-Profilfüller RAF-SE/VV
Bouwplaat 236
Brandschutz-Profilfüller-40
Brickrock SL 260
Confectieplaat 205032
Corerock
Deltarock Plus
Fixrock 035
Fixrock 035 Austria
Fixrock 035 LB
Fixrock 035 VS
Fixrock 035 VS Austria
Fixrock 035 VS LB
Fixrock 040
Fixrock 040 VS
Fixrock Pro
Fixrock Pro VS
Fixrock Pro LB
Fixrock Pro VS LB
Flexirock
Flexirock 035
Formrock 035
Gaprock
Kernrock 035
Kernrock 035 VS
Kernrock Pro
Kernrock Pro VS
Klemmrock 035
Metaalbouwplaat 207
Metaalbouwplaat 207 sono
Metaalbouwplaat 209 duo
Metaalbouwplaat 209 duo-sono
Pentarock 035
Pentarock 040
Pentarock 040 DOM
Planarock Basic
Polyrock

ProRox LF 970
ProRox MA 520 ALU
RAF
RAF-SE
RFS 12/40
RFS 15/50
Rockfit Duo
Rockfit Mono
Rockfit Mono Silver
Rockfit Premium
Rockfit Premium Silver
Rockfon Bass Plus
Rockroof Delta
Rockroof Flexi
Rockroof Flexi Plus
Rocksono Base
Rocksono Base Vario
Rocksono Extra
Rocksono Solid
Rocksono Solid Alu
Rocksono Solid black
Rockvent Base
Rockvent Base black
Rockvent Dual
Rockvent Solid
Rockvent Solid Black
Rockwool 133
Rockwool 133 EF
ROCKWOOL Aluboard
ROCKWOOL Klimafix
ROCKWOOL Klimarock
ROCKWOOL LM Klima
Rockwool Lose Wolle RL
ROCKWOOL Prolit Lamella mat
ROCKWOOL Prolit LM
Roofrock Delta
RoofRock Flexi
RoofRock Flexi Plus
RP Dämmauflage
RPF-I 035
RPI-2.5
RPI-3

RPI-3.5
RPI-4
RPI-4 035
RPI-4 035 [4,2]
RPI-4.5 035
RPI-5
RPI-5 035
RP-KD 035 VS
RP-KD 040
RP-KD 040 VS
RP-V
RTP-W
RZ-BR
SeaRox LM 915 ALU
Silkrock 2.5 SE hygienic
Silkrock 2.5 SZ hygienic
Silkrock 3 SE
Silkrock 3 SE hygienic
Silkrock 3 SE RAL hygienic
Silkrock 3 SZ
Silkrock 3 SZ hygienic
Silkrock 3 SZ RAL hygienic
Silkrock 4 SE
Silkrock 4 SE hygienic
Silkrock 5 SE
Silkrock 5 SE hygienic
Silkrock 5 SZ
Sonorock
Sonorock komprimiert
Sonorock 035

Sonorock Akustik
Sonorock Akustik komprimiert
Sonorock Plus
Soundrock 3 NE
Soundrock 3 NZ
Soundrock 3 SE
Soundrock 3 SZ
Soundrock 4 NE
Soundrock 4 NZ
Soundrock 4 SE
Soundrock 4 SZ
Soundrock 5 NE
Soundrock 5 NZ
Soundrock 5 SZ
Soundrock 5 SE
Steelrock 035
Steelrock 035 Plus
Steelrock 040
Steelrock 040 Plus
Teclit LM Cold
Teclit LM Cold EF
Termarock 30
Termarock 30 komprimiert
Termarock 40
Termarock 40 komprimiert
Termarock 50
Termarock 50 komprimiert
Varirock 035
Woodrock 035

PART 2: ROCKWOOL products in the medium bulk density range

The following ROCKWOOL products are covered by the IBU-EPD "ROCKWOOL stone wool insulation materials in the medium bulk density range".

A-Underlagsplade
AKOE INLEG 553 (bis 25 mm Dicke)
AKOE INLEG 554
Betorock
Betorock 035
Brandschutz-Profilfüller-90
Brickrock SL 240
Caproxx
Caproxx Energy
Ceilrock
Ceilrock Top
Comfortrock ID
Conlit Firesafe
Conrock 10
Conrock 10 P
Conrock 6
Conrock 7
Conrock 7 P
Conrock 8
Conrock 8 P
Conrock 9
Conrock 9 P
Conrock Plus 10
Conrock Q3
Conrock Q5
Coverrock
Coverrock BR 035
Coverrock Deko
Coverrock II
Coverrock Laibungsplatte
Coverrock X
Coverrock X-2
Decrock
Ecorock Duo
Ecorock Duo PR
Facett Pure
Facett Pure schwarz
Fillrock KD
Fillrock KD Plus
Fillrock RG
Fillrock RG Plus
Fixrock 032 Austria
Fixrock 032 VS Austria
Fixrock 033
Fixrock 033 LB
Fixrock 033 VS
Fixrock BWM Brandriegel L
Fixrock BWM Brandriegel M

Fixrock BWM Brandriegel S
Fixrock BWM Brandriegel XL
Fixrock HB
Fixrock Premium
Fixrock Premium LB
Fixrock Premium VS
Fixrock Protect
Floorrock Acoustic CP5
Floorrock RST Plus
Frontrock 120
Frontrock Max E 036
Frontrock Max Plus
Interrock 035
Interrock 9
Interrock 10
Kernrock 033
Kernrock 033 VS
Kernrock Premium
Kernrock Premium VS
Masterrock 033 kaschiert
Masterrock 035
Masterrock 035 kaschiert
Masterrock 035 Kleinformat
Paneelrock
Planarock Paint
Planarock Top
ProRox WM 210
ProRox WM 220
ProRox WM 950
ProRox WM 960
PT A 036
PT A 036 II
Quadrrock N
Randdämmstreifen RST
RFP 035
RFP 035 VS
RFS 5350
RFS LK 6464
RMZ 4040
RMZ LK 5454
RMZ LK 6464
RMZ-LKG
Rockacier B NU Energy
Rockfit Fulfill
Rockfit Supra
Rockfit Supra Silver
RockFloor Base
RockSATE Duo Plus

Rockvent Extra new
ROCKWOOL 800
Rondorock G
Rondorock N
Rondorock N Schiedel
RPB-K
RPB-K 1
RPB-K 3
RPB-K 3 SE
RPI-6 035
RPI-7
RPI-7 032 Austria
RPI-7 033
RPI-7 035
RPI-8 035
RPI-8 H
RPI-9 035
RPI-10
RPI-10 035
RP-PL
RP-VII
RP-X
RSG 10
RSG 12
RWD-034-CS20
Silkrock 6 SE
Silkrock 6 SE hygienic
Silkrock 7 SE
Silkrock 8 SE
Silkrock 9 SE
Silkrock 10 SE
Silkrock 10 SE hygienic
Silkrock 10 SZ
Soundrock 6 NZ
Soundrock 6 SE
Soundrock 6 SZ
Soundrock 7 NZ 035
Soundrock 7 SE
Soundrock 8 NE
Soundrock 8 NZ
Soundrock 8 SE
Soundrock 9 NE
Soundrock 9 SE
Soundrock 9 SZ
Soundrock 10 NE
Soundrock 10 SE
Soundrock 10 SZ
Spanrock L
Spanrock L LAM
Spanrock M
Spanrock M LAM
Spanrock M Plus

Spanrock M Plus LAM
Spanrock S
Spanrock S LAM
Spanrock TT
Spanrock TT LAM
Spanrock XL
Spanrock XL LAM
Speedrock II
Splitrock MW
Steelrock 70-035
Streetrock 95 SE
Streetrock 105 SE
Streetrock 120 SE
Teclit PS Cold
Tegarock
Tegarock L
Termarock 100

PART 1: ROCKWOOL products in the high bulk density range

The following ROCKWOOL products are covered by the IBU-EPD "ROCKWOOL stone wool insulation materials in the **high bulk density range**".

504
Alurock
Baserock 90
Bitrock
Bondrock 040 MV
BONDROCK MV 038
Brandschutz-Profilfüller-150
Conlit 150
Conlit 150 U
Conlit Duct Board 90
Conlit Fire Plug
Conlit Muffenrohrschale
Conlit Muffenrohrschale S
Conlit Penetration Board
Conlit PS 150 Sprinkler Bogen
Conlit PS 150 Sprinkler Cap
Conlit PS 150 Sprinkler Section
Conlit PS EIS 90
Conlit Steelprotect Board
Conlit Steelprotect Board Alu
Conlit Steelprotect Section
Conlit Steelprotect Section Alu
Conrock 12.5
Conrock 12.5 P
Conrock 15
Conrock 15 Schiffbau
Conrock Plus 12.5
Conrock Q7
Conrock Q9
Durock 037
Durock 038
Durock 038 Shedrock 1900
Durock 040
Durock Austria 035
Durock Austria 038
Eurorock
Floorrock Acoustic CP2
Floorrock Acoustic CP3
Floorrock Heat
Floorrock Heat CP3
Floorrock Therm
Frontrock
Georock 038
Georock 040
Georock 040 MV
Hardrock 038
Hardrock 040
Interrock

Interrock 037
Keprock
Keprock MV
Lamellen W 12
Lamellen W 20
Lamellen W 50
Lolamat
Lolamat W12
Madeira
Masterrock 036
Masterrock 036 kaschiert
Monorock Max
Panrock
Panrock 140
Panrock 140 LAM
Prima
Prorock 036
ProRox WM 970
Raftrock
RDK
RP-GF 70 038
RFS 11063
RFS 30
RFS 60
RFS 5341
RFS 5833
RFS 6040
RFS 6053
RFS 6543
RFS 7260
RFS 7543
RFS 8643
RFS 9060
RFS 9060 G
RFS 11270
RFS 11460
RFS 18063
RFS LK 7564
RFS LK 10357
RFS LK 11564
Rhinox
Rhinox Afschot / Pente
Rhinox D
RMZ 5240
Rockacier B NU
Rockacier B NU Energy
Rockacier C NU
Rockacier C NU Energy

RockFloor Extra
RockFloor Solid
RockFloor Therm
Rockmax Plano
Rockmax Sigma
Roofrock 038 Austria
RP-GF
RP-GF 70
RP-GF 90
RPI-12
RPI-12 T
RPI-13.5
RPI-15
RPI-17
RP-KGD
RP-PT
RP-PT 040
RP-PT/M
RP-SD
RP-SD GF
RP-TF
RP-XV
RSK
RZ-AF
SeaRox SL 440 WEN
SeaRox SL 450
SeaRox SL 470
Silkrock 12 SE
Solarrock
Soundrock 12 NE
Soundrock 12 SE
Soundrock 15 SE
Spanrock YL
Spanrock YL LAM
Spanrock ZL
Splitrock
Streetrock 140 SE
Tauroxx
Tauroxx Plus
Teclit Dämmkappe
Teclit Hanger
W20 OP RWD
W25 OP RWD
W44 OP RWD
W50 OP RWD
Woodrock Protect