epd-norge
Global program operatør

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 +A2





The Norwegian EPD Foundation

Owner of the declaration:
Rockfon (part of ROCKWOOL Danmark A/S)

Program holder and publisher:
The Norwegian EPD foundation

Declaration number:
NEPD-5302-4632

Registration Number:
NEPD-5302-4632

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Rockfon® Krios®

Bas/A 20, A 25, D 20, D 25, E 20, X 22, X 25

Manufacturer
Rockfon (part of ROCKWOOL Danmark A/S)

General information

Product:
Rockfon® Krios® - Bas/A 20, A 25, D 20, D 25, E 20, X 22, X 25

Program Operator:

The Norwegian EPD Foundation
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Declaration Number:
NEPD-5302-4632

This declaration is based on Product Category Rules:
CEN Standard EN 15804+A2 serves as core PCR, NPCR Part A Construction products and services and NPCR 012:2018 version 2.0 Part B for Thermal insulation products, 2022

Statements:
The owner of the declaration shall be liable for the underlying information and evidence. EPD Norway shall not be liable with respect to manufacturer, life cycle assessment data and evidence.

Declared unit:
1 m^2 of installed acoustic ceiling tile or wall panel with a service life of 60 years and a declared acoustic performance, when relevant.

Declared unit with option:
-

Functional unit:
-

Verification:
Independent verification of the declaration and data, according to ISO14025:2010

internal ☐ external ☒

Jane Anderson

Dr Jane Anderson, ConstructionLCA Ltd
Independent verifier approved by EPD Norway

Owner of the declaration:
Rockfon (part of ROCKWOOL Danmark A/S)
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Manufacturer:
Rockfon (part of ROCKWOOL Danmark A/S)
Hovedgaden 501, DK-2640, Hedehusene

Place of production:
Cigacice, Poland / Roermond, Netherlands

Management system:
ISO 14001, ISO 9001

Organisation no:
CVR. nr. 42391719

Issue date:
02.11.2023

Valid to:
02.11.2028

Year of study:
2022

Comparability:
EPD of construction products may not be able to compare if they do not comply with EN 15804 and are seen in a building context.

The EPD has been worked out by:
Nikolaos Tsiakmakis, Rockfon (part of ROCKWOOL Danmark A/S)

Approved (Manager of EPD Norway)

Product

Product description and use of the EPD:

Rockfon® Krios® stone wool acoustic tile is a firesafe material traditionally made from volcanic rock (typically basalt or dolomite), an increasing proportion of recycled material, and a low percentage of binder.

The essential component of Rockfon tiles are stone wool fibres, which are monofilament synthetic mineral fibres of non-crystalline structure extracted from a silicate melt. The products described in this EPD are produced in the form of tiles in various densities. The products are supplied in thicknesses of 20 mm up to 25 mm.

The packaging is included in the assessment. Any facings that may be applied to the products, such as glass fleece and water-based paint for coating are included in this EPD. Results are declared with the corresponding facing option applied.

Product specification:

The average composition used for Rockfon products is calculated based on average factory consumption figures for raw materials as a conservative approach. The main raw materials are non-scarce stones and briquettes, which are made of rock mineral wool waste, cement, and other materials. The binder is a water-based phenol-formaldehyde resin which is polymerized into solid resin during production of the final stone wool product.

Materials	%	Function
Stone wool	73-97	Core insulation material
Mineral oil	<0,2	Water repellent
Binder, a thermoset inert polymer resin	<4	Structural binder
Non-woven glass wool facing (optional)	1-15	Facing
Aluminium foil	0-1	Sound blocker
Glue	0,01	Glue
Water-based paints	0-16	Decorative finishing

Technical data:

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 product needs a declaration of performance taking into consideration EN 13964:2014 or EN 13162+A1:2015 and the CE-marking.

Krios® products include acoustic ceiling tiles. They are available with different coatings and facings in a variety of shapes, thicknesses, and densities.

For application and use the respective national provisions apply. The technical specifications for the products described in the EPD are given by the range below based on the reference standards. For the product specific characteristics please refer to the manufacturers' specifications, available online in https://www.rockfon.com/.

Parameter	Performance	Reference Standards
Sound absorption coefficient (αw)	Up to 1	EN 13964
Thermal conductivity	NPD	EN 13964
Airborne sound reduction	Up to 41 dB	EN ISO 10848-2 and EN ISO 717-1
Reaction to Fire	A1	EN 13964
Sound absorption class	A-E	EN 13964

Market:

This EPD is intended for main market areas in Europe, Middle East and Asia that receive products from the factories in Cigacice in Poland and in Roermond in Netherlands. The EPD can also be used in other markets that receive products from these factories .

Reference service life, product:

A reference service life according to ISO 15686 is not declared for this EPD. Instead, a service life is declared according to BBSR. According to this, mineral panels have a service life of more **than 50 years** in a building. For this EPD the declared value is therefore 60 years.

The mineral wool core in Rockfon products is tested to maintain its properties for at least 50 years. Additionally, Krios® products are tested to maintain flatness even in high temperature/ high humidity environments (40°C / 95 % relative humidity). Given this, there is no doubt that Rockfon ceiling tiles could have a technical lifespan of more than 50 years in a normal indoor environment.

Some owners will replace the Rockfon product due to renovations or aesthetics, but not for functional performance reasons. Replacements typically do not happen due to technical failure.

LCA: Calculation rules

Declared unit:

The declared unit is 1 m2 of installed acoustic panels, with a service life of 60 years and a declared acoustic performance class A-E, when applicable. This product family specific EPD will illustrate results per product without the use of scaling factors.

A table with the different products available in the portfolio and their respective thicknesses, weight and acoustic performance is provided under 'additional technical information' section.

Name	Value	Unit
Declared Unit	1	m^2
Grammage	From 2,4 to 4,1	kg/m^2
Thickness of the panels	From 20 to 25	mm

Data quality:

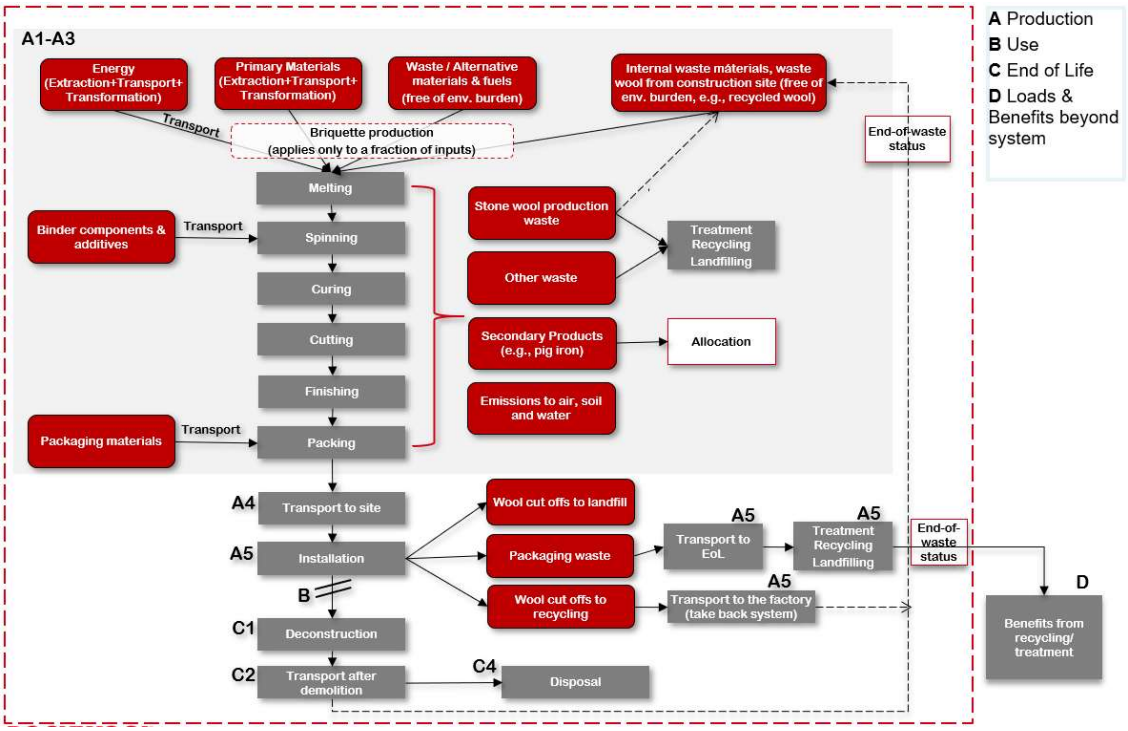
All data represents the applicable geography, time, and technology for the specific and generic data, generally assessed as good and very good. Primary data is collected from respective production sites in Cigacice, Poland and in Roermond, Netherlands, for the reference year 2022 and represents stabilized production. Generic data is from LCA FE (GaBi) database (version 2023.1) with LCA FE (GaBi) Software version 10.7.1.28.

Allocation:

The allocation is made in accordance with the provisions of EN 15804. Production activities, electricity and energy consumption and waste generation are allocated equally among all products from the production site through mass allocation. The environmental impact of co-products coming for example from the steel and electricity plants (e.g. slags, alumina and ashes entering the system as inputs to the manufacturing) is accounted for and economic allocation is applied.

System boundary:

EPD type: Cradle-to-grave and module D (A, B, C and D). All relevant life cycle stages are included. All major raw materials, energy, electricity use, and waste are included for all life cycle modules, as shown in the flowchart below. Use stage B1-7 modules are considered but are not relevant, as there are no activities and no significant environmental impact in the use stage.



Production

The product stage A1-A3 includes:

- Provision of preliminary products and energy and relevant upstream processes;
- Transporting the raw materials and preliminary materials to ROCKWOOL production facilities;
- Production process in the ROCKWOOL production facilities including energy inputs and emissions;
- Electricity consumption;
- Waste processing up to the end-of-waste state or disposal of waste residues, during the production stage;
- Production of packaging material;
- Manufacturing of products and co-product.

Recycled stone wool comes free of environmental burden, as it enters the product system as waste in module A1. The end-of-waste status is considered to be at the factory gate, hence its transport to the factory is accounted for. Modules A1, A2 and A3 are declared as an aggregated module A1-A3.

Construction/Installation

The Construction Stage A4-A5 includes:

- A4 transport to the building site.
- A5 installation to the building.

The transport in A4 is modelled based on volume. The values are based on annual average delivery data. In A5 the default installation is assumed to be manual, therefore no energy consumption or ancillary equipment is needed.

The product waste from installation is assumed to be 7% and according to the modularity principle of EN 15804, its impacts are fully allocated to A5. The 7% assumption is used based on the "common scenarios for LCA" internal document from EURIMA (European Insulation Manufacturers Association) but can, in reality, be significantly lower.

The A5 stage, according to EN 15804 includes also waste processing up to the end-of-waste state or disposal of final residues during the construction process stage and impacts and aspects related to product losses during installation. For this EPD, module A5 includes the corresponding end-of-life considerations for packaging, which are modelled based on EUROSTAT (2020) statistics. The assumed scenario for installation cut-offs at module A5 is 97% landfill, while the rest 3% waste wool returns to ROCKWOOL factories for recycling through the ROCKWOOL/Rockfon recycling service offering (Rockcycle). The transportation impacts of take back wool from the installation phase is accounted for in module A5.

Building Use

The use-stage B1-B7, related to the building fabric includes:

- B1 use or application of the installed product -not part of this EPD;
- B2 maintenance;
- B3 repair;
- B4 replacement;
- B5 refurbishment;
- B6 – Operational energy use:
- B7 – Operational water use:

Rockfon stone wool ceiling tiles are installed permanently in the structure and do not require maintenance, repair, replacement, or refurbishment under normal use conditions. Similarly, Rockfon products do not require any operational energy or water consumption during use phase.

End of Life

The End-of-life stage C1-C4 includes:

- C1 deconstruction, demolition;
- C2 transport to waste processing;
- C3 waste processing for reuse, recovery and/or recycling;
- C4 disposal.

These stages also include the provision and all transport, provision of all materials, products and related energy and water use. Manual deconstruction is assumed for C1, and no impacts are assigned.

Module D

Module D includes reuse, recovery and/or recycling potentials expressed as net loads and benefits. Here the credits from heat and electricity recovery from incineration or material recycling of packaging disposal in A5 and benefits from returned waste wool are considered.

Cut-off criteria:

All major raw materials and all the essential energy are included. The production process for raw materials and energy flows that are included with very small amounts (<1% energy, mass, impact) are not included. This cut-off rule does not apply for hazardous materials and substances. Data sets are complete according to the system boundary within the limits set by the criteria for the exclusion of inputs and outputs. All relevant data, all applied materials according to the recipe and the energy used, originate from the production data and have been considered within the inventory analysis.

LCA: Scenarios and additional technical information

The following information describe information used for the development of scenarios in the different modules of the EPD.

Transport from production facility to assembly/user (A4)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck	85	Euro 6, with a 17,3 payload	100	Diesel: 0,023 l/tkm	2,3

The A4 distance is calculated as a weighted average distance

Product Name	Weighted average transport distance (km)
A 20 / Bas	261
A 25	330
D 20	405
D 25	405
E 20	261
X 22	405
X 25	405

Assembly/Installation (A5)

Parameter	Unit	Value
Auxiliary	Kg	NA
Water consumption	m3	NA
Electricity consumption	kWh	NA
Other energy carriers	MJ	NA
Material loss	Kg	7%
Output materials from waste treatment	Kg	0,0962
Dust in the air	kg	NA

Use stage (B1, B2, B3, B4, B5, B6, B7)

There are no consumables, maintenance (B2), repair (B3), replacements (B4) or refurbishments (B5) during the use of thermal insulation products in standard conditions. They do not use energy (B6) or water (B7) during their operational life. There are no emissions released from the product during the use stage (B1). Therefore, modules B1-B7 have zero impacts.

End of Life (C1, C3, C4)

Parameter	Unit	Value

Hazardous waste disposed	%	0
Collected as mixed construction waste	%	100
Reuse	%	0
Recycling	%	0-2
Energy recovery	%	0
To landfill	%	98-100

For some markets, a take back system is established for Rockfon ceiling tiles as part of ROCKWOOL's Rockcycle-system. This service, allows the recirculation of post-consumer (EoL) stonewool-based ceilings tiles back to the supply chain, through an energy efficient process that reduces the amount of raw materials extracted, the amount of waste sent to landfill and the amount of energy materials needed at the melting stage. Recycling volumes vary considerably between markets over the years but are generally growing. As Rockfon tiles are often mixed with other stonewool material when collected for recycling exact volumes are presently hard to track, but a conservative estimate is 0-2%. Rockcycle also allows the collection and distribution of construction and demolition stone-wool waste back to the factories, having a continuous focus on circularity, while aiming at zero-waste construction sites and increased recycled content in our products.

Transport to waste processing (C2)

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck, Euro 6	50%	Truck, with a 17,3 t payload	50 km	Diesel: 0,035 l/tkm	1,75 l/t

The transport to landfill is assumed to be 50 km.

Rockcycle take back system is expected to increase in the following years. If a Rockcycle take back system is established for stone wool waste and recycling of stone wool, as in the Dutch factory, the following scenario can be used.

Type	Capacity utilisation (incl. return) %	Type of vehicle	Distance KM	Fuel/Energy consumption	value (l/t)
Truck, Euro 6	50%	Truck, with a 17,3 t payload	261 km	Diesel: 0,035 l/tkm	9,1 l/t

Benefits and loads beyond the system boundaries (D)

Parameter	Unit	Value
Packaging recycled	kg	0,15 - 0,51
Energy recovered	MJ	0,39 - 1,27
Stone wool for recycling	kg	0 - 0,04

Benefits in module D are created from packaging materials treatment after installation and recycling potential of stone wool in the end of life. Quantities of packaging materials include both recycled materials and materials sent for energy recovery. Recycling potential of net stone wool material is considered here.

Additional technical information

Below there is a list of Krios® products covered by this EPD with their respective sound absorption class, thickness, and weight.

Product Name	Sound absorption class	Thickness (mm)	Weight (Kg)
A 20 / Bas	E	20	2,4
A 25	A	25	2,5
D 20	A	20	3,4
D 25	A	25	4,1
E 20	A	20	2,8
X 22	A	22	3,6
X 25	A	25	4,1

Krios® Bas is ideal for sound reflection and not sound absorption, to promote speech intelligibility and sound amplification such as in music / music practice rooms, / specific localised areas within lecture theatres and conference rooms etc. Therefore it has sound absorption class E.

LCA: Results

Limitations

Conservative choices are made in the LCA as described in the ROCKWOOL® Group LCA rules. Therefore, the results can be considered to be conservative and worst case.

System boundaries (X=included, MND= module not declared, MNR=module not relevant)

Production stage			Assembly stage		Use stage							End of life stage				Benefits & loads beyond system boundary
Raw materials	Transport	Manufacturing	Transport	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	X	X	X	X	X	X	X	X	X	X	X	X

Core environmental impact indicators

Results are presented for each product, expressed in a declared unit of 1 m2 including facing

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
GWP [kg CO2 eq]	A1-3	2,36E+00	2,48E+00	2,37E+00	2,62E+00	2,95E+00	2,41E+00	2,67E+00
	A4	4,80E-02	6,37E-02	1,11E-01	1,31E-01	6,08E-02	1,18E-01	1,33E-01
	A5	3,65E-01	4,60E-01	6,36E-01	7,95E-01	5,48E-01	7,00E-01	7,95E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,54E-02	1,37E-02	1,82E-02	1,78E-02	1,51E-02	1,71E-02	1,87E-02
	C3	4,69E-04	3,04E-04	0,00E+00	0,00E+00	7,03E-04	0,00E+00	0,00E+00
	C4	6,12E-02	8,36E-02	2,83E-01	3,49E-01	8,13E-02	3,09E-01	3,50E-01
	D	-1,39E-01	-1,74E-01	-2,60E-01	-3,25E-01	-2,08E-01	-2,86E-01	-3,25E-01
Global Warming Potential-total is the sum of GWP-fossil, GWP-biogenic and GWP luluc. GWP measures the Carbon Dioxide (CO2) and other greenhouse gas emissions associated with the product								
GWP-Fossil [kg CO2 eq]	A1-3	2,67E+00	2,81E+00	3,05E+00	3,40E+00	3,34E+00	3,11E+00	3,47E+00
	A4	4,75E-02	6,31E-02	1,10E-01	1,30E-01	6,02E-02	1,17E-01	1,31E-01
	A5	1,58E-01	2,00E-01	2,46E-01	3,07E-01	2,36E-01	2,70E-01	3,07E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,52E-02	1,36E-02	1,80E-02	1,76E-02	1,50E-02	1,69E-02	1,85E-02
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	3,81E-02	4,26E-02	5,77E-02	6,73E-02	4,67E-02	6,09E-02	6,79E-02
	D	-6,80E-02	-8,49E-02	-1,27E-01	-1,59E-01	-1,02E-01	-1,40E-01	-1,59E-01
GWP-fossil takes into account the GWP of greenhouse gas emissions from fossil fuels or fossil carbon containing substances (e.g. combustion, landfilling, etc.).								
GWP - biogenic [kg CO2 eq.]	A1-3	-3,16E-01	-3,37E-01	-6,84E-01	-7,90E-01	-3,93E-01	-7,11E-01	-8,04E-01
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	2,08E-01	2,60E-01	3,89E-01	4,87E-01	3,11E-01	4,28E-01	4,87E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	4,69E-04	3,04E-04	0,00E+00	0,00E+00	7,03E-04	0,00E+00	0,00E+00
	C4	2,30E-02	4,09E-02	2,25E-01	2,82E-01	3,45E-02	2,48E-01	2,82E-01
	D	-7,06E-02	-8,82E-02	-1,32E-01	-1,65E-01	-1,06E-01	-1,46E-01	-1,65E-01
GWP-biogenic represents the atmospheric CO2 absorbed from biomass growth and emitted during e.g., incineration or natural decay.								
GWP - luluc [kg CO2 eq.]	A1-3	1,78E-03	1,97E-03	4,45E-03	5,35E-03	2,34E-03	4,77E-03	5,39E-03
	A4	4,36E-04	5,80E-04	1,01E-03	1,19E-03	5,53E-04	1,07E-03	1,21E-03
	A5	3,02E-04	4,58E-04	9,31E-04	1,16E-03	4,53E-04	1,02E-03	1,16E-03
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,40E-04	1,25E-04	1,65E-04	1,62E-04	1,37E-04	1,55E-04	1,70E-04
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	1,12E-04	1,25E-04	1,70E-04	1,98E-04	1,37E-04	1,79E-04	2,00E-04
	D	-2,80E-04	-3,50E-04	-5,25E-04	-6,56E-04	-4,20E-04	-5,78E-04	-6,56E-04
GWP-land use and land use change (luluc) takes into account greenhouse gas emissions from changes in carbon stock as a result of land use and land use change, eg deforestation								
ODP [kg CFC-11 eq.]	A1-3	4,25E-09	5,35E-09	1,37E-08	1,71E-08	6,33E-09	1,51E-08	1,71E-08
	A4	1,53E-14	1,37E-14	1,95E-14	1,84E-14	1,33E-14	1,80E-14	1,95E-14
	A5	3,68E-10	4,64E-10	1,10E-09	1,37E-09	5,51E-10	1,21E-09	1,37E-09
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,32E-15	1,18E-15	1,57E-15	1,53E-15	1,30E-15	1,47E-15	1,61E-15
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	1,48E-16	1,66E-16	2,24E-16	2,61E-16	1,82E-16	2,37E-16	2,64E-16
	D	-3,41E-13	-4,26E-13	-6,39E-13	-7,99E-13	-5,11E-13	-7,03E-13	-7,99E-13
The Ozone Depletion Potential, describes the potential for degradation of the ozone layer. High ODP substances are forbidden today								
AP [Mole of H+ eq.]	**A1-3**	1,60E-02	1,83E-02	2,05E-02	2,35E-02	2,02E-02	2,14E-02	2,39E-02
	A4	2,07E-04	1,86E-04	2,65E-04	2,50E-04	1,80E-04	2,44E-04	2,65E-04
	A5	8,39E-04	1,10E-03	1,30E-03	1,62E-03	1,26E-03	1,43E-03	1,62E-03
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,84E-05	1,65E-05	2,19E-05	2,16E-05	1,82E-05	2,07E-05	2,26E-05
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	2,72E-04	3,04E-04	4,12E-04	4,81E-04	3,34E-04	4,35E-04	4,85E-04
	D	-2,37E-04	-2,95E-04	-4,41E-04	-5,51E-04	-3,55E-04	-4,85E-04	-5,51E-04
The Acidification Potential reflects the potential to cause the acid deposition or "acid rain"								
EP - freshwater [kg P eq.]	**A1-3**	2,80E-05	2,80E-05	5,63E-05	6,88E-05	3,95E-05	6,10E-05	6,90E-05
	A4	6,35E-07	5,70E-07	8,13E-07	7,67E-07	5,53E-07	7,47E-07	8,11E-07
	A5	2,05E-06	2,22E-06	4,42E-06	5,53E-06	3,07E-06	4,86E-06	5,53E-06
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	5,51E-08	4,90E-08	6,50E-08	6,34E-08	5,41E-08	6,09E-08	6,67E-08
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	6,42E-08	7,17E-08	9,71E-08	1,13E-07	7,87E-08	1,03E-07	1,14E-07
	D	-9,17E-07	-1,15E-06	-1,72E-06	-2,15E-06	-1,38E-06	-1,89E-06	-2,15E-06
Eutrophication Potential-freshwater represents potential excessive growth of algae and damage of the ecosystems from nutrients emissions reaching the freshwater end compartment.								
EP - marine [kg N eq.]	**A1-3**	2,15E-03	2,52E-03	4,07E-03	4,73E-03	2,61E-03	4,27E-03	4,79E-03
	A4	7,00E-05	6,27E-05	8,94E-05	8,44E-05	6,09E-05	8,22E-05	8,93E-05
	A5	1,34E-04	1,86E-04	3,20E-04	4,00E-04	2,00E-04	3,52E-04	4,00E-04
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	6,29E-06	5,66E-06	7,53E-06	7,43E-06	6,26E-06	7,10E-06	7,79E-06
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	7,06E-05	7,89E-05	1,07E-04	1,25E-04	8,65E-05	1,13E-04	1,26E-04
	D	-1,06E-04	-1,32E-04	-1,97E-04	-2,47E-04	-1,59E-04	-2,17E-04	-2,47E-04
As above, but emitted to the marine end compartment								
EP - terrestrial [Mole of N eq.]	**A1-3**	3,49E-02	4,25E-02	7,05E-02	8,43E-02	4,56E-02	7,53E-02	8,49E-02
	A4	8,47E-04	7,60E-04	1,08E-03	1,02E-03	7,37E-04	9,96E-04	1,08E-03
	A5	2,10E-03	2,88E-03	5,04E-03	6,31E-03	3,15E-03	5,55E-03	6,31E-03
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	7,58E-05	6,81E-05	9,07E-05	8,95E-05	7,54E-05	8,56E-05	9,39E-05
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	7,75E-04	8,66E-04	1,17E-03	1,37E-03	9,50E-04	1,24E-03	1,38E-03
	D	-1,12E-03	-1,39E-03	-2,08E-03	-2,60E-03	-1,67E-03	-2,28E-03	-2,60E-03
Eutrophication Potential-terrestrial. Indicator for enrichment of terrestrial ecosystems w. nitrogen based nutrients, e.g. ammonia								
POCP [kg NMVOC eq.]	**A1-3**	5,94E-03	6,53E-03	9,32E-03	1,04E-02	6,90E-03	9,52E-03	1,06E-02
	A4	1,78E-04	1,59E-04	2,27E-04	2,15E-04	1,55E-04	2,09E-04	2,27E-04
	A5	3,21E-04	4,41E-04	6,81E-04	8,52E-04	4,82E-04	7,49E-04	8,52E-04

	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,58E-05	1,42E-05	1,89E-05	1,86E-05	1,57E-05	1,78E-05	1,95E-05
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	2,14E-04	2,39E-04	3,23E-04	3,77E-04	2,62E-04	3,42E-04	3,81E-04
	D	-2,86E-04	-3,57E-04	-5,34E-04	-6,68E-04	-4,30E-04	-5,87E-04	-6,68E-04
Photochemical Ozone Creation Potential, most commonly manifested as smog.								
ADP-M&M[1] [kg Sb eq.]	**A1-3**	6,10E-07	5,98E-07	9,46E-07	1,15E-06	8,39E-07	1,02E-06	1,15E-06
	A4	1,12E-08	1,01E-08	1,44E-08	1,36E-08	9,77E-09	1,32E-08	1,43E-08
	A5	3,73E-08	3,82E-08	6,55E-08	8,19E-08	5,59E-08	7,20E-08	8,19E-08
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	9,73E-10	8,67E-10	1,15E-09	1,13E-09	9,55E-10	1,08E-09	1,18E-09
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	3,60E-09	4,03E-09	5,46E-09	6,37E-09	4,42E-09	5,76E-09	6,42E-09
	D	-9,65E-09	-1,20E-08	-1,80E-08	-2,25E-08	-1,45E-08	-1,98E-08	-2,25E-08
Abiotic Depletion Potential for fossil resources (oil, gas, coal). Indicator for the depletion of fossil resources for energy use or as feedstock for the petrochemical industry.								
ADP-fossil [MJ]	**A1-3**	3,28E+01	3,20E+01	4,61E+01	5,01E+01	3,71E+01	4,63E+01	5,14E+01
	A4	2,37E+00	2,13E+00	3,04E+00	2,87E+00	2,07E+00	2,79E+00	3,03E+00
	A5	1,57E+00	2,01E+00	3,33E+00	4,16E+00	2,36E+00	3,66E+00	4,16E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,05E-01	1,83E-01	2,43E-01	2,37E-01	2,01E-01	2,28E-01	2,49E-01
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,07E-01	5,66E-01	7,67E-01	8,95E-01	6,21E-01	8,10E-01	9,02E-01
	D	-1,16E+00	-1,45E+00	-2,18E+00	-2,72E+00	-1,75E+00	-2,40E+00	-2,72E+00
Abiotic Depletion Potential for fossil resources (oil, gas, coal). Indicator for the depletion of fossil resources for energy use or as feedstock for the petrochemical industry.								
WDP [m^3 world equiv.]	**A1-3**	3,89E-01	3,17E-01	8,01E-01	8,43E-01	3,95E-01	7,80E-01	8,79E-01
	A4	2,01E-03	1,80E-03	2,57E-03	2,43E-03	1,75E-03	2,37E-03	2,57E-03
	A5	2,18E-02	2,69E-02	6,01E-02	7,51E-02	3,28E-02	6,61E-02	7,51E-02
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,74E-04	1,55E-04	2,06E-04	2,01E-04	1,71E-04	1,93E-04	2,11E-04
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	4,10E-03	4,57E-03	6,19E-03	7,22E-03	5,02E-03	6,54E-03	7,28E-03
	D	-9,42E-03	-1,18E-02	-1,77E-02	-2,21E-02	-1,41E-02	-1,94E-02	-2,21E-02
Water Deprivation Potential, a "water scarcity footprint" indicator for the potential impact of water use , linked to water deficiency to downstream human users and ecosystems								

Additional environmental impact indicators

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
PM Disease incidence	**A1-3**	3,48E-07	4,11E-07	5,78E-07	6,97E-07	4,82E-07	6,20E-07	7,02E-07
	A4	1,40E-09	1,26E-09	1,80E-09	1,70E-09	1,22E-09	1,65E-09	1,79E-09
	A5	2,15E-08	2,71E-08	3,87E-08	4,84E-08	3,22E-08	4,26E-08	4,84E-08
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,25E-10	1,05E-10	1,49E-10	1,46E-10	1,23E-10	1,40E-10	1,53E-10
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

	C4	3,37E-09	3,77E-09	5,12E-09	5,97E-09	4,13E-09	5,40E-09	6,02E-09
	D	-1,27E-08	-1,72E-08	-2,37E-08	-2,97E-08	-1,90E-08	-2,61E-08	-2,97E-08
Particulate Matter. An indicator for potential disease incidences (occurrences) linked to emissions of particulate matter from, e.g. diesel engines.								
IRP[2] kBq U235 eq.	**A1-3**	7,24E-02	6,63E-02	8,53E-02	8,10E-02	6,88E-02	7,85E-02	8,57E-02
	A4	4,43E-04	3,97E-04	5,67E-04	5,35E-04	3,86E-04	5,21E-04	5,66E-04
	A5	1,89E-03	2,62E-03	3,51E-03	4,39E-03	2,83E-03	3,87E-03	4,39E-03
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	3,84E-05	3,40E-05	4,54E-05	4,44E-05	3,76E-05	4,26E-05	4,66E-05
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,58E-04	6,23E-04	8,44E-04	9,84E-04	6,85E-04	8,91E-04	9,93E-04
	D	-1,02E-02	-1,98E-02	-1,91E-02	-2,38E-02	-1,52E-02	-2,10E-02	-2,38E-02
Ionising radiation Potential relates to the possible damage to human health from exposure to low level radiation linked to generation of nuclear energy only.								
ETP[1]-fw CTUe	**A1-3**	1,67E+01	1,41E+01	1,34E+01	1,38E+01	2,09E+01	1,30E+01	1,44E+01
	A4	1,66E+00	4,32E+00	2,12E+00	2,00E+00	1,44E+00	1,95E+00	2,12E+00
	A5	1,09E+00	3,83E+00	1,40E+00	1,75E+00	1,63E+00	1,54E+00	1,75E+00
	B1-7	2,76E-03	3,12E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	2,76E-03	3,12E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,46E-01	3,22E+00	1,70E-01	1,66E-01	1,40E-01	1,59E-01	1,74E-01
	C3	2,76E-03	3,12E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	2,91E-01	3,34E+00	4,36E-01	5,08E-01	3,54E-01	4,60E-01	5,12E-01
	D	-3,76E-01	2,88E+00	-7,08E-01	-8,85E-01	-5,69E-01	-7,79E-01	-8,85E-01
Ecotoxicity Potential-freshwater. Potential toxic effects on freshwater species of emissions of substances/chemicals.								
HTP[1]-c CTUh	**A1-3**	5,63E-09	3,81E-09	6,51E-09	6,14E-09	5,89E-09	5,90E-09	6,57E-09
	A4	3,36E-11	3,02E-11	4,31E-11	4,06E-11	2,93E-11	3,96E-11	4,30E-11
	A5	1,94E-10	1,60E-10	2,82E-10	3,52E-10	2,90E-10	3,10E-10	3,52E-10
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,91E-12	2,59E-12	3,45E-12	3,37E-12	2,86E-12	3,23E-12	3,54E-12
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	4,25E-11	4,75E-11	6,45E-11	7,52E-11	5,21E-11	6,81E-11	7,59E-11
	D	-1,55E-11	-2,92E-11	-2,90E-11	-3,62E-11	-2,33E-11	-3,18E-11	-3,62E-11
Human toxicity potential - cancer effects. Potential carcinogenic impacts on people from the emissions of substances and chemicals								
HTP[1]-nc CTUh	**A1-3**	2,37E-07	8,77E-08	2,47E-07	1,04E-07	1,43E-07	1,37E-07	1,53E-07
	A4	1,78E-09	1,60E-09	2,28E-09	2,15E-09	1,55E-09	2,10E-09	2,28E-09
	A5	1,66E-09	1,96E-09	3,40E-09	4,25E-09	2,50E-09	3,74E-09	4,25E-09
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,54E-10	1,37E-10	1,83E-10	1,79E-10	1,51E-10	1,71E-10	1,88E-10
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	4,69E-09	5,24E-09	7,10E-09	8,29E-09	5,75E-09	7,50E-09	8,36E-09
	D	-7,21E-10	-1,59E-09	-1,34E-09	-1,67E-09	-1,08E-09	-1,47E-09	-1,67E-09
Human toxicity Potential - non-cancer effects. Potential toxic effects on humans other than carcinogenic from the emission of substances and chemicals.								
SQP[1] Dimensionless	**A1-3**	5,34E+01	6,65E+01	1,37E+02	1,65E+02	7,05E+01	1,47E+02	1,66E+02
	A4	9,90E-01	8,88E-01	1,27E+00	1,20E+00	8,62E-01	1,16E+00	1,26E+00
	A5	3,01E+00	4,13E+00	9,22E+00	1,15E+01	4,52E+00	1,01E+01	1,15E+01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	8,54E-02	7,34E-02	1,01E-01	9,87E-02	8,39E-02	9,48E-02	1,04E-01

	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	1,02E-01	1,14E-01	1,55E-01	1,80E-01	1,25E-01	1,63E-01	1,82E-01
	D	-1,22E+01	-1,02E+01	-2,29E+01	-2,86E+01	-1,83E+01	-2,52E+01	-2,86E+01
Soil Quality Potential. Indicator representing factors impacting soil quality, e.g. erosion, filtration ability and groundwater regeneration.								

Classification of disclaimers to the declaration of core and additional environmental impact indicators

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
	Acidification potential, Accumulated Exceedance (AP)	None
ILCD type / level 2	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator

Resource use

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
RPEE [MJ]	A1-3	8,32E+00	7,62E+00	1,50E+01	1,65E+01	8,36E+00	1,53E+01	1,69E+01
	A4	1,67E-01	1,50E-01	2,14E-01	2,02E-01	1,46E-01	1,97E-01	2,14E-01
	A5	7,50E-01	9,13E-01	1,61E+00	2,01E+00	1,12E+00	1,77E+00	2,01E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,45E-02	1,29E-02	1,72E-02	1,68E-02	1,43E-02	1,61E-02	1,77E-02
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	6,82E-02	7,61E-02	1,03E-01	1,20E-01	8,36E-02	1,09E-01	1,21E-01
	D	-1,04E+00	-1,29E+00	-1,94E+00	-2,43E+00	-1,55E+00	-2,14E+00	-2,43E+00
Renewable Primary Energy used as Energy carrier only. Typically, renewable energy from Biomethane, windmills or hydropower								
RPEM [MJ]	A1-3	4,54E+00	5,83E+00	1,09E+01	1,36E+01	6,82E+00	1,20E+01	1,36E+01
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	-4,91E-01	-6,03E-01	-7,56E-01	-9,45E-01	-7,36E-01	-8,31E-01	-9,45E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renewable primary energy resources used as raw materials – indicates the consumption of energy resources as raw materials e.g. wood, or biomethane as feedstock for bioplastic.								
TPE [MJ]	A1-3	1,29E+01	1,35E+01	2,59E+01	3,01E+01	1,52E+01	2,72E+01	3,05E+01
	A4	1,67E-01	1,50E-01	2,14E-01	2,02E-01	1,46E-01	1,97E-01	2,14E-01
	A5	2,59E-01	3,10E-01	8,55E-01	1,07E+00	3,88E-01	9,40E-01	1,07E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,45E-02	1,29E-02	1,72E-02	1,68E-02	1,43E-02	1,61E-02	1,77E-02
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	6,82E-02	7,61E-02	1,03E-01	1,20E-01	8,36E-02	1,09E-01	1,21E-01
	D	-1,04E+00	-1,29E+00	-1,94E+00	-2,43E+00	-1,55E+00	-2,14E+00	-2,43E+00
Total use of renewable primary energy resources (RPEE+RPEM)								
NRPE [MJ]	A1-3	3,28E+01	3,20E+01	4,61E+01	5,01E+01	3,71E+01	4,63E+01	5,14E+01
	A4	2,38E+00	2,13E+00	3,04E+00	2,87E+00	2,07E+00	2,80E+00	3,04E+00
	A5	1,57E+00	2,03E+00	3,39E+00	4,23E+00	2,36E+00	3,73E+00	4,23E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,06E-01	1,83E-01	2,43E-01	2,38E-01	2,02E-01	2,28E-01	2,50E-01
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,07E-01	5,66E-01	7,67E-01	8,95E-01	6,21E-01	8,10E-01	9,03E-01
	D	-1,16E+00	-1,46E+00	-2,18E+00	-2,73E+00	-1,75E+00	-2,40E+00	-2,73E+00
Non-renewable primary energy used as Energy carrier, e.g. energy from fossil fuel power plants or transportation								
NRPM [MJ]	A1-3	9,70E-02	1,21E-01	1,82E-01	2,27E-01	1,46E-01	2,00E-01	2,27E-01
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	-3,03E-02	-3,78E-02	-5,68E-02	-7,10E-02	-4,54E-02	-6,24E-02	-7,10E-02
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable primary energy resources used as raw materials, e.g. oil deviates used as feedstock material for the petrochemical industry / plastics								
	A1-3	3,29E+01	3,21E+01	4,63E+01	5,04E+01	3,73E+01	4,65E+01	5,16E+01
	A4	2,38E+00	2,13E+00	3,04E+00	2,87E+00	2,07E+00	2,80E+00	3,04E+00
	A5	1,54E+00	1,99E+00	3,33E+00	4,16E+00	2,32E+00	3,66E+00	4,16E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
TRPE [MJ]	**C1**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,06E-01	1,83E-01	2,43E-01	2,38E-01	2,02E-01	2,28E-01	2,50E-01
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,07E-01	5,66E-01	7,67E-01	8,95E-01	6,21E-01	8,10E-01	9,03E-01
	D	-1,16E+00	-1,46E+00	-2,18E+00	-2,73E+00	-1,75E+00	-2,40E+00	-2,73E+00
Total use of non-renewable primary energy resources (NRPE+NRPM)								
	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
SM [kg]	**C1**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	-2,88E-02	-1,87E-02	0,00E+00	0,00E+00	-4,32E-02	0,00E+00	0,00E+00
Secondary materials, use of recycled material, e.g. return wool								
	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF [MJ]	**C1**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Renewable secondary fuels. E.g. used frying oil. Renewable secondary fuels can represent a limited resource because increased consumption potentially can create shortages.								
	A1-3	3,74E+00	2,43E+00	0,00E+00	0,00E+00	5,62E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	2,62E-01	1,70E-01	0,00E+00	0,00E+00	3,93E-01	0,00E+00	0,00E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF [MJ]	**C1**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Non-renewable secondary fuels, e.g. waste oil								
	A1-3	1,04E-02	1,10E-02	2,98E-02	3,50E-02	1,23E-02	3,14E-02	3,54E-02
	A4	1,85E-04	1,66E-04	2,37E-04	2,23E-04	1,61E-04	2,18E-04	2,36E-04
	A5	6,90E-04	8,97E-04	2,32E-03	2,91E-03	1,04E-03	2,56E-03	2,91E-03
W [m3]	**B1-7**	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,60E-05	1,42E-05	1,89E-05	1,85E-05	1,57E-05	1,77E-05	1,94E-05

	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	1,25E-04	1,39E-04	1,89E-04	2,20E-04	1,53E-04	2,00E-04	2,22E-04
	D	-5,09E-04	-6,36E-04	-9,54E-04	-1,19E-03	-7,63E-04	-1,05E-03	-1,19E-03
Net freshwater consumption. Fresh water is a limited resource because high consumption of fresh water can create local shortages								

End of life (EoL) – Waste

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
HW [kg]	**A1-3**	3,13E-07	4,21E-07	6,83E-07	8,53E-07	4,68E-07	7,51E-07	8,53E-07
	A4	8,76E-12	7,86E-12	1,12E-11	1,06E-11	7,63E-12	1,03E-11	1,12E-11
	A5	2,23E-08	3,00E-08	4,86E-08	6,08E-08	3,34E-08	5,35E-08	6,08E-08
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	7,62E-13	6,78E-13	9,00E-13	8,79E-13	7,48E-13	8,44E-13	9,23E-13
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,38E-11	6,01E-11	8,13E-11	9,49E-11	6,59E-11	8,59E-11	9,57E-11
	D	-7,47E-10	-8,88E-10	-1,26E-09	-1,57E-09	-1,12E-09	-1,38E-09	-1,57E-09
Hazardous waste, collected and sent special treatment								
NHW [kg]	**A1-3**	6,19E-01	3,66E-01	5,85E-01	3,41E-01	5,05E-01	3,88E-01	4,33E-01
	A4	3,41E-04	3,07E-04	4,37E-04	4,13E-04	2,98E-04	4,02E-04	4,37E-04
	A5	1,49E-01	1,87E-01	2,72E-01	3,40E-01	2,24E-01	2,99E-01	3,40E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,97E-05	2,64E-05	3,51E-05	3,43E-05	2,91E-05	3,29E-05	3,60E-05
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	2,53E+00	2,82E+00	3,82E+00	4,45E+00	3,10E+00	4,03E+00	4,49E+00
	D	-3,93E-03	-3,14E-03	-1,82E-03	-2,28E-03	-5,90E-03	-2,00E-03	-2,28E-03
Non-Hazardous Waste Disposed consists of inactive (inert) waste e.g. construction waste that typically is sent to landfill. An increased fraction is sent to reuse or recycling.								
RW* [kg]	**A1-3**	5,05E-04	4,38E-04	5,55E-04	5,13E-04	4,51E-04	5,06E-04	5,44E-04
	A4	3,06E-06	2,74E-06	3,92E-06	3,70E-06	2,66E-06	3,60E-06	3,91E-06
	A5	1,06E-05	1,34E-05	2,07E-05	2,59E-05	1,60E-05	2,28E-05	2,59E-05
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	2,66E-07	2,37E-07	3,15E-07	3,07E-07	2,61E-07	2,95E-07	3,23E-07
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	5,31E-06	5,92E-06	8,02E-06	9,36E-06	6,50E-06	8,47E-06	9,44E-06
	D	-6,11E-05	-7,64E-05	-1,15E-04	-1,43E-04	-9,17E-05	-1,26E-04	-1,43E-04
Radioactive Waste Disposed. Mainly represents waste from nuclear power plants.								

End of life (EoL) – output flow

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
CR [kg]	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for Re-Use. Materials or components which are re-used outside the system boundary.								
MR [kg]	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	1,54E-01	1,92E-01	2,89E-01	3,61E-01	2,31E-01	3,17E-01	3,61E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	2,88E-02	1,87E-02	0,00E+00	0,00E+00	4,32E-02	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for Recycling. Materials recycled outside the system boundary								
MER [kg]	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for Energy Recovery. Materials utilised in power plants as secondary fuels outside the system boundary								
EEE [kg]	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	1,22E-01	1,52E-01	2,28E-01	2,85E-01	1,82E-01	2,51E-01	2,85E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported electrical energy: Electrical energy from incineration of waste or landfill gas								
ETE [kg]	A1-3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	A5	2,66E-01	3,32E-01	4,98E-01	6,23E-01	3,98E-01	5,48E-01	6,23E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

	C2	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	D	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported thermal energy. Thermal energy, e.g. steam from incineration of waste or landfill gas								

Information describing the biogenic carbon content at the factory gate

Biogenic carbon content	Unit	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
Biogenic carbon content in product	kg C	6,40E-03	1,12E-02	6,14E-02	7,68E-02	9,59E-03	6,76E-02	7,68E-02
Biogenic carbon content in the accompanying packaging	kg C	1,14E-01	1,43E-01	2,14E-01	2,68E-01	1,71E-01	2,36E-01	2,68E-01

*NOTE – 1kg biogenic carbon is equivalent to 44/12 of CO_2

Reading example: 9,0 E-03 = 9,0*10-3 = 0,009

Additional Norwegian requirements

Location based electricity mix from the use of electricity in the manufacturing

National production mix from import, low voltage (production of transmission lines, in addition to direct emissions and losses in grid) of applied electricity for the manufacturing prosess (foreground/core) per kg of declared unit. The chosen datasets are taken from LCA FE, 2023.1.

National electricity grid	Foreground / core [kWh]	GWPtotal (kg CO2 – eq/kWh)	SUM (kgCO2 – eq)
Electricity grid mix, Poland	3,18E-01	8,14E-01	2,59E-01
Electricity grid mix, Netherlands	3,59E-01	4,16E-01	1,49E-01

Guarantees of origin from the use of electricity in the manufacturing phase

The guarantee of origin utilized in this EPD is provided by AXPO for biomass and wind power in Poland and hydro and wind power in the Netherlands. As 100% of the electricity consumption is covered with GoO, no residual mix calculation has been made for these two factories.

Electricity source	Foreground / core [kWh]	GWPtotal (kg CO2 – eq/kWh)	SUM (kgCO2 – eq)
Amount of guarantee of origin electricity used in the foreground (Electricity, Biomass power, *Poland*)	7,87E-02	4,35E-02	3,42E-03
Amount of guarantee of origin electricity used in the foreground (Electricity, Wind power, *Poland*)	2,39E-01	1,23E-02	2,94E-03
Amount of residual mix electricity used in the foreground, *Poland*	0	-	0
Amount of guarantee of origin electricity used in the foreground (Electricity, Hydro power, *Netherlands*)	1,22E-01	5,44E-03	1,29E-03
Amount of guarantee of origin electricity used in the foreground (Electricity, Wind power, *Netherlands*)	2,37E-01	1,06E-02	2,51E-03
Amount of residual mix electricity used in the foreground, *Netherlands*	0	-	0

Additional environmental impact indicators required in NPCR Part A for construction products

In order to increase the transparency of biogenic carbon contribution to climate impact, the indicator GWP-IOBC is required as it declares climate impacts calculated according to the principle of instantaneous oxidation. GWP-IOBC is also referred to as GWP-GHG in context to Swedish public procurement legislation. In addition, EP-freshwater is also declared as P-eq.

Parameter	Module	A 20 / Bas	A 25	D 20	D 25	E 20	X 22	X 25
GWP-IOBC [kg CO2 eq.]	A1-3	2,67E+00	2,82E+00	3,05E+00	3,41E+00	3,34E+00	3,12E+00	3,48E+00
	A4	4,80E-02	6,38E-02	1,11E-01	1,31E-01	6,08E-02	1,18E-01	1,33E-01
	A5	1,58E-01	2,00E-01	2,47E-01	3,08E-01	2,37E-01	2,71E-01	3,08E-01
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	1,54E-02	1,37E-02	1,82E-02	1,78E-02	1,51E-02	1,71E-02	1,87E-02
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	3,82E-02	4,27E-02	5,79E-02	6,75E-02	4,69E-02	6,11E-02	6,81E-02
	D	-6,83E-02	-8,53E-02	-1,28E-01	-1,60E-01	-1,02E-01	-1,40E-01	-1,60E-01
Global warming potential calculated according to the principle of instantaneous oxidation								
EP-freshwater [kg P-eq.]	A1-3	1,50E-03	1,81E-03	3,13E-03	3,77E-03	1,99E-03	3,36E-03	3,79E-03
	A4	9,52E-06	1,26E-05	2,19E-05	2,60E-05	1,21E-05	2,33E-05	2,63E-05
	A5	7,12E-05	9,14E-05	1,48E-04	1,85E-04	1,07E-04	1,63E-04	1,85E-04
	B1-7	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C1	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C2	3,09E-06	2,78E-06	3,74E-06	3,69E-06	3,05E-06	3,53E-06	3,87E-06
	C3	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
	C4	2,48E-05	2,77E-05	3,75E-05	4,37E-05	3,04E-05	3,96E-05	4,41E-05
	D	-4,35E-05	-5,45E-05	-8,10E-05	-1,01E-04	-6,53E-05	-8,91E-05	-1,01E-04
Eutrophication potential, fraction of nutrients reaching freshwater end compartment. Declared as P-eq								

Hazardous substances

The declaration is based upon reference to threshold values and/or test results and/or material safety data sheets provided to EPD verifiers. Documentation available upon request to EPD owner.

- ■ The product contains no substances given by the REACH Candidate list or the Norwegian priority list.
- □ The product contains substances given by the REACH Candidate list or the Norwegian priority list that are less than 0,1 % by weight.
- □ The product contains dangerous substances, more than 0,1% by weight, given by the REACH Candidate List or the Norwegian Priority list, see table.
- □ The product contains no substances given by the REACH Candidate list or the Norwegian priority list. The product is classified as hazardous waste (Avfallsforskiften, Annex III), see table.

Mineral wool fibers produced by ROCKWOOL are classified as non-hazardous under /REACH/ (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). ROCKWOOL are registered with /REACH/ under the following definition: "Man-made vitreous (silicate) fibers with random orientation with alkaline oxide and alkali earth oxide ($Na_2O+K_2O+CaO+MgO+BaO$) content greater than 18% by weight and fulfilling one of the Note Q conditions". ROCKWOOL products produced in Europe fulfil the Note Q requirements. This is certified by the independent certification body /EUCEB/ (European Certification Board for mineral wool products). More information on EUCEB can be found at /www.euceb.org/.

Indoor environment

The product meets the requirements for low emissions.

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Nikolaos Emmanouil	Background LCA report for Rockfon EPDs, Sept. 2023
Larisa Xanthopoulou	ROCKWOOL Rules for publishing EPDs, ver.3, December 2021

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