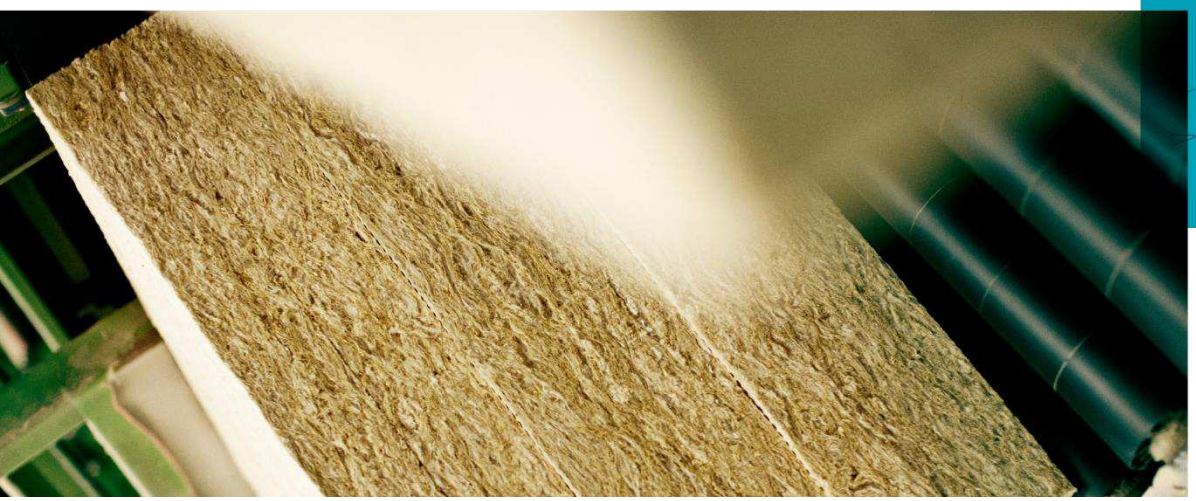
Environmental product declaration



ROCKWOOL®

Stone Wool Thermal Insulation for buildings

EPD according to EN 15804 and ISO 14025 and 3rd party verified
ROCKWOOL Group EPD rules and LCA model

Manufacturer: ROCKWOOL Peninsular S.A.U.
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Date of issue: November 2021
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Program operator: ROCKWOOL International A/S
Code: EPD-RW_11-2021_RW-LAT-ES_EN-0001

Life Cycle Assessment study:
This environmental product declaration is based on a Life Cycle Assessment (LCA) background study according to EN15804:2012+A1:2013 carried out by:
ROCKWOOL International A/S

Verification:

<table>
<tr><td colspan="2">CEN standard EN 15804 serves as the core PCR
(product category rule)</td></tr>
<tr><td rowspan="2">Independent verification of the “Rules for LCAs / EPDs for ROCKWOOL products” and the underlying LCA model described in the rules, in accordance with EN ISO 14025:2010, EN 15804: 2012+A1:2013, with prEN 16783 serving as the PCR:

External</td><td>Independent verification of the calculation and this declaration, in accordance with EN ISO 14025:2010

Internal</td></tr>
<tr><td>Remark: this EPD is issued by ROCKWOOL International and has been internally reviewed by senior experts. The externally reviewed “Rules for LCAs / EPDs for ROCKWOOL products” and LCA model have been applied.</td></tr>
</table>

Environmental Product Declarations (EPDs) may not be comparable if they do not comply with the EN15804:2012+A1: 2013 Clause 5.3

Product



Declared unit

1 m^2 ROCKWOOL stone wool thermal insulation product with a thermal resistance of R_D =1 m^2 K/W.

Intended application of the Environmental Product Declaration

This EPD is intended to be available to ROCKWOOL Peninsular S.A.U. customers. This EPD can also be used in other markets that receive products from the factory in Saint Eloy les Mines, France. Such markets include but are not limited to Portugal, Andorra, South and Central America; excluded is France due to different EPD requirements.

Product description

Stone wool is a widely used building material and mainly used for thermal insulation. ROCKWOOL® insulation products contribute to energy-efficient and fire safe buildings with good acoustics and a comfortable indoor climate.

Stone wool is available with different densities and thermal conductivities and is applicable in all areas of the building, ranging from roofs, loft, walls, floors, foundation, to fire-prevention solutions, HVAC systems and sub-sea pipelines. The products considered in this EPD are boards used for general building insulation, ETICS and flat roofs.

The packaging is included in the assessment. Any facings that may be applied to the products, such as glass fleece, aluminium foil or other laminations, are excluded in this EPD. If relevant for a product, their environmental parameter values should be added.

Product specification

ROCKWOOL® stone wool insulation is a firesafe[1] material for insulation against heat, cold, fire, vibrations and noise. It is traditionally made from volcanic rock (typically basalt or dolomite), an increasing proportion of recycled material, and a few percent resin binder (typically 2–3% w/w for external wall and pitched roof products and slightly more for ETICS and flat roof products). The product is wrapped with PE-foil and placed on wooden pallets for further distribution.
The resin binder polymerizes into solid resin during production of the final stone wool product.

Reference service life

ROCKWOOL products are extremely durable and usually provide effective performance for the lifetime of the building or host structure. A reference service life of 50 years has been agreed as the basis of EN 13162 (the product standard for stone wool thermal insulation) but this could be adapted if a longer service life is assumed for a particular building element. In some calculations, a service life equivalent to the lifetime of the building element can be applied.

[1] A1 when tested according to EN 13501-1 (Euroclasses)

Technical information

The product standard that applies is EN 13162:2012+A1:2015 Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification.

Specific characteristics and additional functionalities shall be considered when applying the EPDs in the building context:

- Most ROCKWOOL® stone wool material is classified as non-combustible (Euroclass A1), the best reaction to fire class according to EN13501-1.
- ROCKWOOL® stone wool products are often applied because of their acoustic properties. For example, a well-constructed wall using ROCKWOOL stone wool insulation can help comply with any acoustic regulation requirements in average building typologies.
- ROCKWOOL® stone wool products are durable without any ageing of the thermal performance. They are dimensional stable and both water repellent and moisture resistant. Moisture and nutrient are necessary conditions for mould growth. Since more than 95% of the mass of mineral wool products is inorganic, there is little nutrient source to allow fungi/mould growth [ref. Eurima-health-safety].

More specific product information can be found on www.rockwool.es or through the local ROCKWOOL® sales organizations.

Guidance on safe and effective installation could be provided through the local organization and at the end of this EPD.

ROCKWOOL® stone wool is recyclable. For waste ROCKWOOL® material that may be generated during installation or at end of life, the local organization is happy to discuss the individual requirements of contractors and users considering returning these materials to ROCKWOOL factories for recycling.

ROCKWOOL® stone wool waste is classified as non-hazardous. ROCKWOOL® insulation waste is covered by the non-hazardous entry (17 06 04) in the List of Wastes of the European Waste Catalogue. Leaching tests of mineral wool waste by Eurima demonstrate that they comply with the criteria for acceptance of waste at a landfill for non-hazardous waste and with the criteria for acceptance of waste at a landfill for inorganic waste with low organic content [ref. Hjelmer 2004, Abdelghafour, 2004].

Technical data

The environmental impacts and indicators given in the section “Life Cycle Assessment: Results” of this EPD are for 1 m^2 of product, providing a thermal resistance of R_D=1 m2 K/W (the declared unit). **The reference product is 39 mm thick ROCKWOOL® stone wool with a density of 21 kg/m^3.**

For other specific ROCKWOOL® products, the environmental impacts and indicators are determined by applying the appropriate scaling factors and products R_D-value. (Applying simply refers to multiplying the environmental impacts with the scaling factor in the table below and the R_D-value as indicated on the sold product.

The R_D-values used for scaling give a very good indication of the amount of materials needed to achieve the desired insulation effect of other product types, but it is not an exact measure.

Product specification
Composition of delivered product

Material	% of total weight
Non-scarce natural stone and secondary raw materials	89 %
Binder (resin)	3 %
Oils	< 0,2 %
Packaging	8 %

Scaling factors for other products

Product	Scale factor
Fieltro 128	1,1[1 3]
Manta 129	2,8[1 3]
Rockbardage Solape Simétrico	2,1
Rockciel 444	4,8[2]
Rockin L (dens. 21-25)	1,3
Rockin L (dens. 55)	2,4
Rockin S	3,2
Rockplus Kraft	2,1[1]

Product	Scale factor
Rocksate Contorno (20 mm)	7,2
Rocksate Contorno (30 mm)	5,3
Rocksate Duo Plus	3,3[2]
Rocksate MD Plus	5,3
Rocktop Wood A2	3,3[2]
Rocktop Wood B	3,3[2]
Roulrock Alu	1,1[1]
Roulrock Kraft	1,2[1]

[1] Products with extra features such as facings out of kraft paper, wood fibre or aluminium foil. These extra features are not included in the EPD-calculations. The results for the different facing options can be found in the Annex
[2] Double density products were the average density is calculated while taking the different thicknesses of the layers into account.
[3] HVAC products for which the lambda value varies according to the declared work temperatures. The assumed lambda correlates with the work temperature 10ºC. Please see the product specific websites for details.

The environmental impacts of a specific product (product X) can be calculated using the formula:

$$\textbf{Environmental Impact per m}^2\ _{\text{product X-without facing}} = \textbf{Environmental Impact}\ _{\text{reference product}} \times \textbf{Scale factor}\ _{\text{product X}}$$

To account for the facing options, please refer to the Annex.

Life Cycle Assessment: Calculation rules

EPD type

Cradle-to-grave. Included are all relevant life cycle stages.

ROCKWOOL stone wool insulation products do not require maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) during use in standard conditions.

They do not use energy (B6) or water (B7) during use of the building.

EPD type

Cradle-to-grave and module D (A, B, C and D). All relevant life cycle stages are included.

System boundaries

The product stage **A1-A3** includes:

- Provision of preliminary products and energy
- and relevant upstream processes
- Transporting the raw materials and preliminary materials to the plant
- Production process in the plant 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
- Manufacturing of products and co-product

In the product system under assessment, the slags, alumina and ashes are considered by-products from the steel and coal fired electricity production respectively with the application of economic allocation, so their environmental impact is accounted for. Recycled stone wool comes free of environmental burden, as it enters the product system as waste. Recycled fuels also come free of environmental burden, but their transport to the factory is accounted for. During the melting of raw materials pig iron is created in the cupola furnace. Pig iron is a co-product, which is subsequently sold to the market and economic allocation is applied.
Modules A1, A2 and A3 are be declared as an aggregated Module A1-3.
The Construction Stage **A4-A5** includes:

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

The transport in A4 is modelled by volume, as the most conservative approach. The default vehicle is the truck and all 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 2% and according to the modularity principle of EN15804 its impacts are fully allocated to A5. The A5 stage 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. Finally, the A5 module includes also the corresponding end-of-life considerations for packaging. The credits from heat and electricity recovery from incineration, or material recycling from module A5 are attributed to module D.

For the use-stage **B1-B7**, the impacts in stages B2-B7 are zero. ROCKWOOL stone wool insulation products do not require maintenance (B2), repair (B3), replacement (B4), or refurbishment (B5) during use in standard conditions. They do not use energy (B6) or water (B7) during use of the building related to the building fabric. Stages B2-B7 are thus not assessed.

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

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

These stages also include provision and all transport, provision of all materials, products and related energy and water use. Manual deconstruction is assumed for C1; therefore, no impacts are assigned. Waste wool recycling processes and avoided raw materials are part of the manufacturing of the new stone wool, no process is considered in C3 since the processing of waste wool takes place in the factory. The credits from disposal (heat or electricity recovery) are assigned to module D.
The landfill scenario for stone wool is considered here.

Module D includes reuse, recovery and/or recycling potentials expressed as net impacts and benefits. Here the credits for the packaging disposal in A5 and the recycling potential of ROCKWOOL material in C are considered.

Below a schematic representation of the system boundaries is shown.

Flow diagram system boundaries



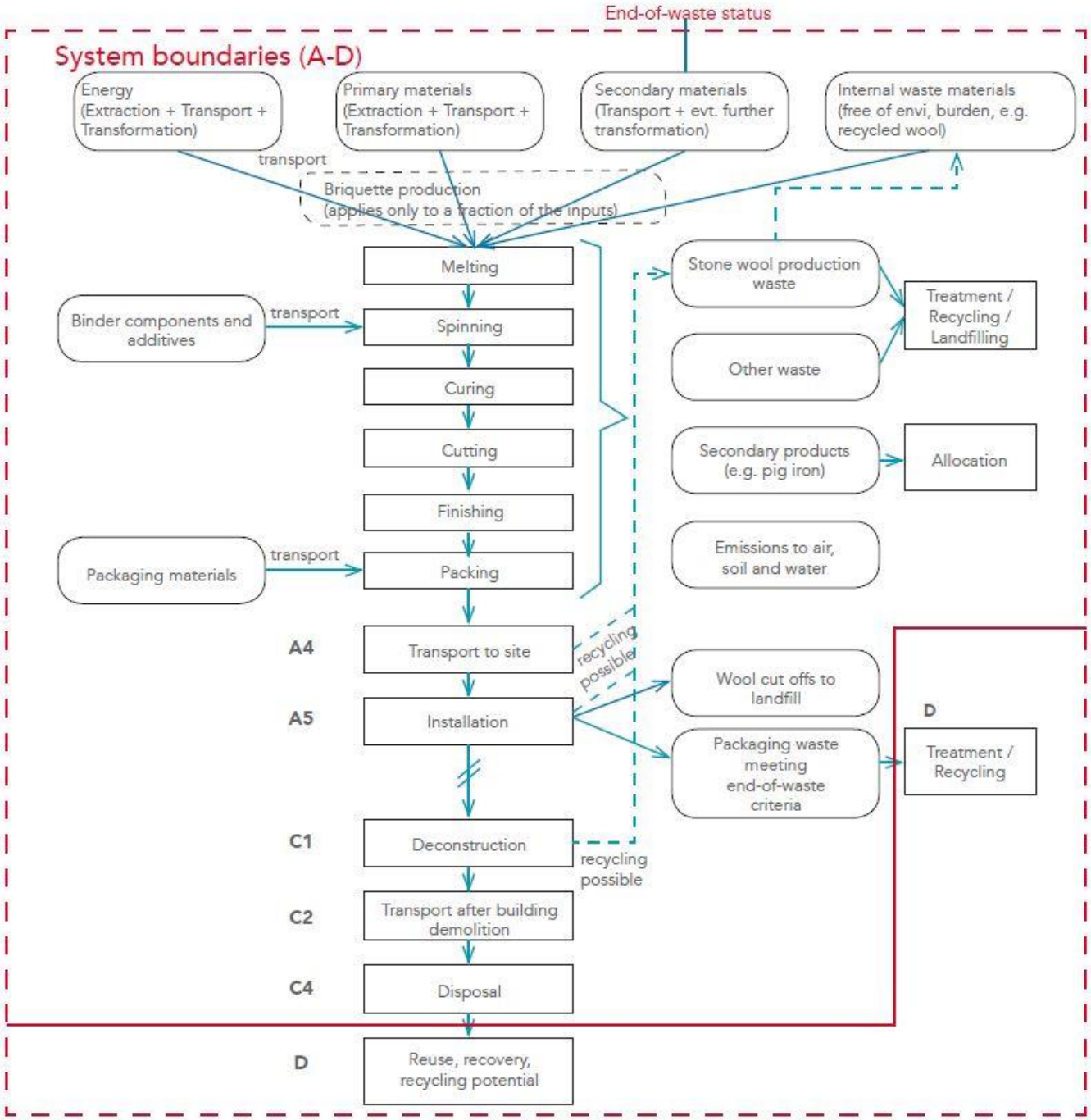


Figure 1: System boundaries for ROCKWOOL production system

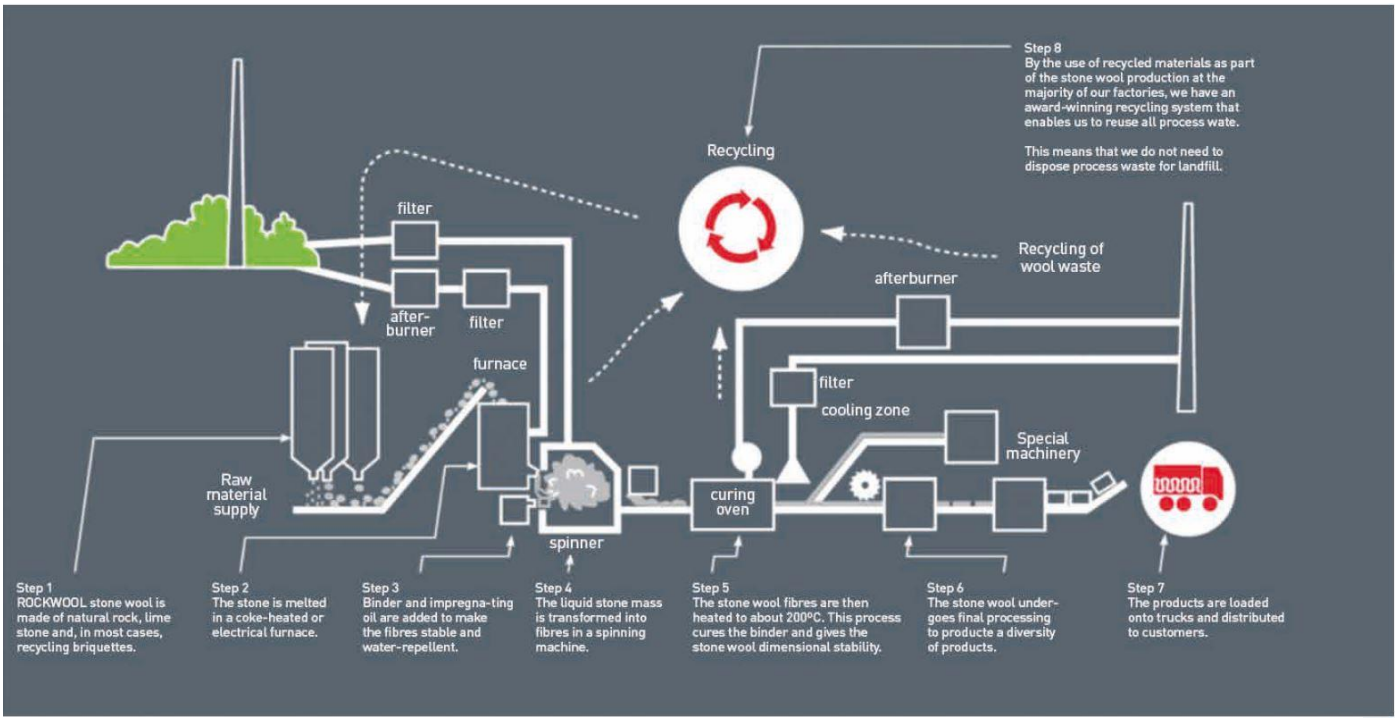


Figure 2: Graphical representation of manufacturing process in ROCKWOOL

Description of production process

Stone wool is produced as follows:

Raw materials, mainly basaltic rocks and secondary raw materials and coke are weighed and led into the cupola oven where they are melted.

The melted mass from the cupola then goes through a spinning machine in order to create fibres. At this stage also, binder is applied, and fibres are formed. This moist pack of stone wool (uncured binder) is fed into the curing oven where the binder is polymerized.

Once removed from the oven, the products are cooled down and go through a series of confectioning stages in order to give each product its final dimensions before packaging.

For cleaning the air of the melting process and the curing oven several after-burners, installations and filters (made of stone wool) are used. Off-cuts and stone wool air filters are all recycled back into the production.

The collected data reflects the actual stone wool produced by the ROCKWOOL® plant in St Eloy les Mines, France.

Throughout its factories, ROCKWOOL® stone wool products are manufactured with the same underlying technology and pass through the same production processes in different production plants.

Cut-off criteria

Included are all the basic materials used as per formulation, utilized thermal energy, internal fuel consumption and electric power consumption, all packaging materials (plastic wrapping, pallets, labels), any direct production waste, and all emission measurements available. Machines and facilities required during production are treated as capital goods and their production is therefore not included in the LCA.

Allocation

Besides stone wool, pig iron is produced during the melting process of raw materials and sold. The iron is considered a co-product. Iron as a co-product is allocated by economic value. This is in line with EN15804.

Data quality

The quality of the data of this specific EPD is assessed as good and appropriate by internal experts. The data gathering approach for all EPDs is assessed as good and appropriate by the external verifier. Data was collected consistently and based on the financial year 2020.

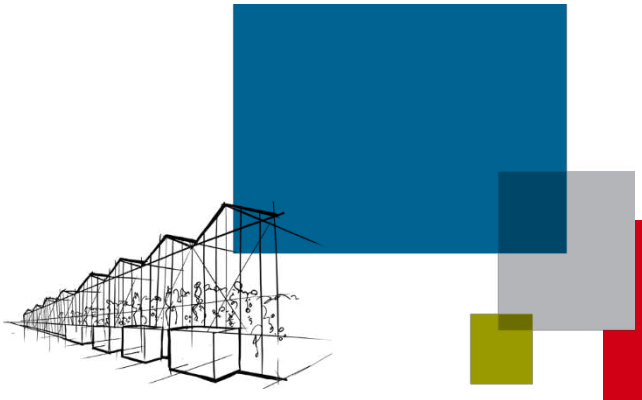
Life Cycle Assessment: Results

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.

Description of the system boundaries (x=included, MNA = Module not assessed)

Production stage			Construction stage		Use stage							End-of-life stage				Benefits and loads beyond the system boundaries
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	MNA	MNA	MNA	MNA	MNA	MNA	x	x	x	x	x



ROCKWOOL® stone wool thermal insulation product for buildings

1 m^2 stone wool thermal insulation product with a thermal resistance of R_D=1 m^2 K/W (thickness of 39 mm; density of 21 kg/m^3)

LCA Results

Environmental impact

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Global warming potential (GWP) kg CO_2 eqv	**6,9E-01**	**5,4E-01**	**1,1E-01**	**0**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**MNA**	**2,6E-03**	**0**	**1,1E-02**	**-2,8E-02**
The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1.															
Ozone depletion potential (ODP) kg CFC11 eqv	9,6E-10	9,4E-17	1,3E-10	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,6E-19	0	6,2E-17	-5,2E-15
Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbons or halons), which break down when they reach the stratosphere and then catalytically destroy ozone molecules.															
Acidification potential (AP) kg SO^2 eqv	3,6E-03	3,9E-04	9,7E-05	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,1E-06	0	6,9E-05	-5,9E-05
Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.															
Eutrophication potential (EP) kg PO_4 ^{3}- eqv	6,2E-04	8,4E-05	2,3E-05	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,6E-07	0	7,8E-06	-6,8E-06
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.															
Photochemical ozone creation (POCP) kg Ethene eqv	1,9E-04	1,9E-06	6,8E-06	8,5E-11	MNA	MNA	MNA	MNA	MNA	MNA	MNA	8,6E-08	0	5,2E-06	-8,2E-06
Chemical reactions brought about by the light energy of the sun. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction															
Abiotic depletion potential for non-fossil resources (ADP-elements) kg Sb eqv	2,1E-07	4,7E-08	4,0E-09	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,3E-10	0	4,2E-09	-3,9E-09
Abiotic depletion potential for fossil resources (ADP-fossils) MJ	8,8E+00	7,3E+00	3,8E-01	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,6E-02	0	1,6E-01	-7,3E-01
Consumption of non-renewable resources, thereby lowering their availability for future generations.															

LCA Results

Resource use

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	8,1E-01	4,1E-01	1,1E+00	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,0E-03	0	2,2E-02	-9,4E-02
Use of renewable primary energy resources used as raw materials - MJ/FU	1,1E+00	0,0E+00	-1,1E+00	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Total use of renewable primary energy resources - MJ/FU	1,9E+00	4,1E-01	6,5E-02	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,0E-03	0	2,2E-02	-9,4E-02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	1,1E+01	7,4E+00	8,9E-01	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,6E-02	0	1,6E-01	-9,1E-01
Use of non-renewable primary energy resources used as raw materials - MJ/FU	4,4E-01	0,0E+00	-4,4E-01	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Total use of non-renewable primary energy resources - MJ/FU	1,2E+01	7,4E+00	4,5E-01	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,6E-02	0	1,6E-01	-9,1E-01
Use of secondary materials - kg/FU	0	0	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Use of renewable secondary fuels - MJ/FU	0	0	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Use of non-renewable secondary fuels - MJ/FU	0	0	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Net use of fresh water - m3/FU	5,4E-03	4,7E-04	3,1E-04	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,3E-06	0	3,9E-05	-2,9E-04

LCA Results

Waste categories

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Hazardous waste disposed - kg	1,9E-07	3,7E-10	3,8E-09	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,8E-12	0	1,7E-11	-2,1E-10
Non-hazardous waste disposed - kg	5,5E-02	1,1E-03	2,2E-02	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,3E-06	0	8,0E-01	-2,4E-03
Radioactive waste disposed - kg	1,1E-03*	8,9E-06	2,8E-05	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,3E-08	0	1,7E-06	-5,9E-05

* There is never radioactive waste from a ROCKWOOL plant (A3), but potentially in its upstream chain (A1 & A2).

Output flows

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Component for re-use - kg	0	0	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Use of renewable primary Materials for recycling - kg	0	0	1,1E-02	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	2,2E-02	0	0
Materials for energy recovery - kg	0	0	5,1E-02	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Exported electrical energy - MJ	0	0	8,3E-02	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0
Exported thermal energy - MJ	0	0	2,5E-01	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0	0	0	0

Annex: LCA results for the facing options

For products with extra features such as facings out of paper, plasterboard, fleece or aluminium foil, the results from impact assessment data of particular facing must be added. Results for the facings are expressed per m2 and no additional conversion is needed, the final result is given by the formula:

$$\text{Environmental Impact per m}^2_{\text{product X-with facing}} = \text{Environmental Impact}_{\text{reference product}} \times \text{Scale factor}_{\text{product X}} + \text{Environmental Impact}_{\text{facing material}}$$

Aluminium foil: Environmental Impact

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Global warming potential (GWP) kg CO_2 eqv	7,26E-01	1,67E-03	**0**	**0**	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,6E-03	0	1,21E-03	0,00E+00
Ozone depletion potential (ODP) kg CFC11 eqv	8,33E-12	7,50E-16	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,6E-19	0	1,23E-15	0,00E+00
Acidification potential (AP) kg SO^2 eqv	3,47E-03	2,50E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,1E-06	0	7,18E-06	0,00E+00
Eutrophication potential (EP) kg PO_4 ^{3}- eqv	2,15E-04	4,17E-07	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,6E-07	0	9,78E-07	0,00E+00
Photochemical ozone creation (POCP) kg Ethene eqv	2,21E-04	8,33E-09	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	8,6E-08	0	5,65E-07	0,00E+00
Abiotic depletion potential for non-fossil resources (ADP-elements) kg Sb eqv	3,52E-07	2,50E-10	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,3E-10	0	4,35E-10	0,00E+00
Abiotic depletion potential for fossil resources (ADP-fossils) MJ	8,18E+00	3,33E-02	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,6E-02	0	1,57E-02	0,00E+00

Annex: LCA results for the facing options

Aluminium foil: Resource Use

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	5,26E-01	5,83E-03	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,86E-03	0	7,84E-03	0
Use of renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of renewable primary energy resources - MJ/FU	5,26E-01	5,83E-03	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,86E-03	0	7,84E-03	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	8,25E+00	1,25E-01	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,70E-02	0	6,64E-02	0
Use of non-renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of non-renewable primary energy resources - MJ/FU	8,25E+00	1,25E-01	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,70E-02	0	6,64E-02	0
Use of secondary materials - kg/FU	3,16E-02	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of non-renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Net use of fresh water - m3/FU	3,32E-03	1,17E-05	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,46E-06	0	1,28E-05	0

Annex: LCA results for the facing options

Aluminium foil: Output flows and waste categories

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Hazardous waste disposed - kg	7,36E-09	1,60E-09	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4,72E-10	0	4,72E-10	0
Non-hazardous waste disposed - kg	1,87E-01	2,34E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,88E-07	0	6,88E-07	0
Radioactive waste disposed - kg	6,25E-04	4,17E-08	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,23E-08	0	1,23E-08	0
Component for re-use - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable primary Materials for recycling - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Materials for energy recovery - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported electrical energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported thermal energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0

Annex: LCA results for the facing options

Kraft Paper: Environmental Impact

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Global warming potential (GWP) kg CO_2 eqv	-9,37E-02	2,50E-03	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	7,67E-04	0	9,85E-02	0
Ozone depletion potential (ODP) kg CFC11 eqv	8,33E-12	9,17E-16	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,59E-16	0	1,55E-14	0
Acidification potential (AP) kg SO^2 eqv	1,76E-04	2,50E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,98E-07	0	2,66E-05	0
Eutrophication potential (EP) kg PO_4 ^{3}- eqv	5,03E-05	5,00E-07	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,47E-07	0	3,41E-05	0
Photochemical ozone creation (POCP) kg Ethene eqv	2,33E-05	8,33E-09	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,28E-09	0	2,45E-05	0
Abiotic depletion potential for non-fossil resources (ADP-elements) kg Sb eqv	3,26E-08	2,50E-10	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,12E-11	0	1,31E-09	0
Abiotic depletion potential for fossil resources (ADP-fossils) MJ	5,18E-01	3,33E-02	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,05E-02	0	9,06E-02	0

Annex: LCA results for the facing options

Kraft paper: Resource Use

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	3,14E+00	1,67E-03	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,26E-04	0	6,90E-03	0
Use of renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of renewable primary energy resources - MJ/FU	3,14E+00	1,67E-03	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,26E-04	0	6,90E-03	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	6,02E-01	3,33E-02	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,06E-02	0	9,40E-02	0
Use of non-renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of non-renewable primary energy resources - MJ/FU	6,02E-01	3,33E-02	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,06E-02	0	9,40E-02	0
Use of secondary materials - kg/FU	3,16E-02	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of non-renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Net use of fresh water - m3/FU	4,43E-04	3,33E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	9,83E-07	0	1,22E-05	0

Annex: LCA results for the facing options

Kraft Paper: Output flows and waste categories

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Hazardous waste disposed - kg	3,81E-08	1,88E-09	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,54E-10	0	3,65E-10	0
Non-hazardous waste disposed - kg	9,27E-04	2,74E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	8,07E-07	0	6,52E-02	0
Radioactive waste disposed - kg	3,55E-05	4,89E-08	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	1,44E-08	0	1,43E-06	0
Component for re-use - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable primary Materials for recycling - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Materials for energy recovery - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported electrical energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported thermal energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0

Annex: LCA results for the facing options

Wood fibre: Environmental Impact

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Global warming potential (GWP) kg CO_2 eqv	-1,01E+01	1,38E-01	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,92E-02	0	1,51E+01	0
Ozone depletion potential (ODP) kg CFC11 eqv	1,02E-13	3,70E-17	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,83E-18	0	2,07E-15	0
Acidification potential (AP) kg SO^2 eqv	5,49E-03	1,05E-04	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,94E-05	0	3,07E-03	0
Eutrophication potential (EP) kg PO_4 ^{3}- eqv	1,10E-03	2,32E-05	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,62E-06	0	1,21E-02	0
Photochemical ozone creation (POCP) kg Ethene eqv	1,08E-03	7,96E-07	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	-6,62E-07	0	3,76E-03	0
Abiotic depletion potential for non-fossil resources (ADP-elements) kg Sb eqv	1,66E-06	1,38E-08	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,42E-09	0	1,17E-07	0
Abiotic depletion potential for fossil resources (ADP-fossils) MJ	8,64E+01	1,87E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,33E-01	0	9,09E+00	0

Annex: LCA results for the facing options

Wood fibre: Resource Use

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - MJ/FU	1,71E+02	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of renewable primary energy resources - MJ/FU	1,71E+02	1,08E-01	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,98E-02	0	6,82E-01	0
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	9,18E+01	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of non-renewable primary energy resources used as raw materials - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Total use of non-renewable primary energy resources - MJ/FU	9,18E+01	1,88E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5,35E-01	0	9,36E+00	0
Use of secondary materials - kg/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of non-renewable secondary fuels - MJ/FU	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Net use of fresh water - m3/FU	2,49E-02	1,23E-04	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3,41E-05	0	1,99E-03	0

Annex: LCA results for the facing options

Wood fibre: Output flows and waste categories

	Production stage	Construction stage		Use stage							End-of-life stage				
Parameter	A1-A3	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 De-construction/ demolition	C2 Transport	C3 Waste treatment	C4 Disposal	D Benefits and loads beyond the boundaries of the system
Hazardous waste disposed - kg	2,57E-08	9,90E-11	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2,69E-11	0	1,69E-09	0
Non-hazardous waste disposed - kg	4,34E-02	2,94E-04	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	7,94E-05	0	5,34E+00	0
Radioactive waste disposed - kg	2,29E-03	3,40E-06	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6,46E-07	0	1,09E-04	0
Component for re-use - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Use of renewable primary Materials for recycling - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Materials for energy recovery - kg	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported electrical energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0
Exported thermal energy - MJ	0,00E+00	0,00E+00	0	0	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0,00E+00	0	0,00E+00	0

Other Information

Dangerous substances

ROCKWOOL® stone wool does not contain substances from the Candidate List of Substances of Very High Concern.

Mineral wool fibres 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).

The ROCKWOOL® fibres are registered with REACH under the following definition: “Man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkali earth oxide (Na2O+K2O+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 [ref. Note Q]. This is certified by the independent certification body EUCEB. More information on EUCEB can be found at www.euceb.org

The International Agency for Research on Cancer (IARC), part of the World Health Organization, revised its classification of mineral wool fibres in October 2001, including them in Group 3 as an agent “not classifiable as to its carcinogenicity to humans”.

Indoor air

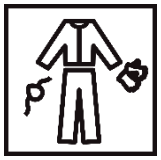
ROCKWOOL® stone wool products fulfil the national demands in the EU regarding emission to indoor climate. ROCKWOOL® stone wool products have small impact on emission levels in buildings. Salthammer et al. 2010 notes that “the presence of mineral wool had no influence on the formaldehyde level in the house”.

Instruction for safe installation

Due to the well-known mechanical effect of coarse fibres, mineral wool products may cause temporary skin itching. Mineral wool fibres cannot cause a chemical or allergic reaction.

To diminish the mechanical effect of coarse fibres and avoid unnecessary exposure to mineral wool dust, information on good practice is available on the packaging of all mineral wool products with pictograms and/or written information (see pictograms on this page).

Safe use instruction sheets are also available from www.rockwool.es.



Cover exposed skin. When working in unventilated area wear disposable face mask.



Clean area using vacuum equipment.



Waste should be disposed of according to local regulations.



Rinse in cold water before washing.



Ventilate working area if possible.



Wear goggles when working overhead.

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