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

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Program operator: ROCKWOOL International A/S
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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 Caparroso. Such markets include but are not limited to: France, Portugal, and Italy.

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 specific product referred to in the declared unit is 37 mm thick and has a density of 30 kg/m^3.

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 - or stone wool pallets for further distribution. The resin binder polymerizes into solid resin during production of the final stone wool product.

Reference service life

As the in-use stage of the building (B2 Maintenance, B3 Repair, B4 Replacement, B5 Refurbishment, B6 Operational energy use) is not considered in this EPD, reference service lives are not included.

However, 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 taken into account 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].

Recycled content

ISO 14021 defines recycled content as “the proportion, by mass, of recycled material in a product or packaging”.
It includes:

- « Pre-consumer material »: Material diverted from the waste stream during a manufacturing process. Excluded is reutilization of materials such as rework, regrind or scrap generated in a process and capable of being reclaimed within the same process that generated it.
- « Post-consumer material »: Material generated by households or by commercial, industrial and institutional facilities in their role as end-users of the product, which can no longer be used for its intended purpose. This includes returns of material from the distribution chain.

For products manufactured in Caparroso, recycled content, according to ISO 14021, is > 61%:

- Pre-consumer material: > 60 %
- Post-consumer material: > 1 %

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 37 mm thick ROCKWOOL® stone wool with a density of 30 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



Material	Scale factor
Conlit 150 AF	5,8[1]
Conlit 150 P	5,8
Conlit Alu	6,7[1]
Conlit Duct 120	6,3[1]
Coquilla 880	4,1[3]
Durock 386 Bigpanel	5,2[2]
Durock 387 / Multifix	5,2[1,2]
Durock Energy SP / Multifix (> 95 mm)	3,6 [1,2]
Durock Energy SP / Multifix (≤ 95 mm)	4,1 [2]

Material	Scale factor
Firerock 910.219	3,2 [1]
Hardrock 391 / Bigpanel	5,9[2]
Hardrock 393 / Multifix	5,9[1,2]
Monorock 365	5,2
Monorock 366 / Multifix	5,2[1]
Panel 403	2,8
Panel Claraboya 388	6,0[1]
Rockciel	3,4 [2]
Rockfeu 520	4,3

Material	Scale factor
Rocksol 501	2,9
Rocksol 525	5,3
Rocksupport 360 / Bigpanel	6,6
Rocksupport 369	6,6[1]
Rocksupport Energy (< 80 mm)	4,7
Rocksupport Energy (≥ 80 mm)	4,6
Rocksupport Energy Multifix (< 80 mm)	4,7[1]
Rocksupport Energy Multifix (≥ 80 mm)	4,6[1]
Trapecios Acústicos	3,2

[1] Products with extra features such as facings out of paper, plasterboard, fleece or aluminium foil. These extra features are not included in the EPD-calculations.
[2] Double density products where 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 50ºC. Please see the product specific websites for details.

Life Cycle Assessment: Calculation rules

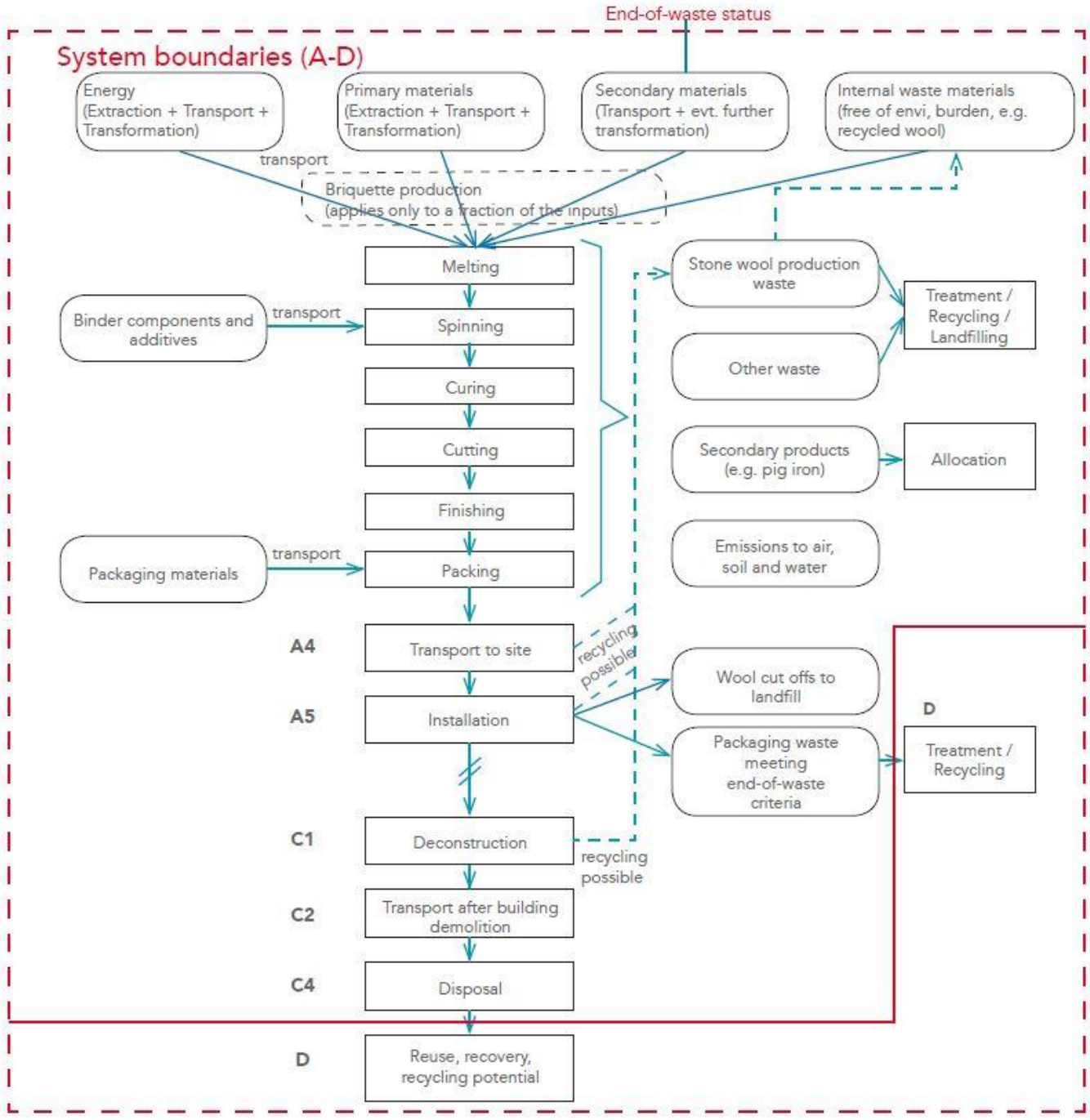
Flow diagram system boundaries

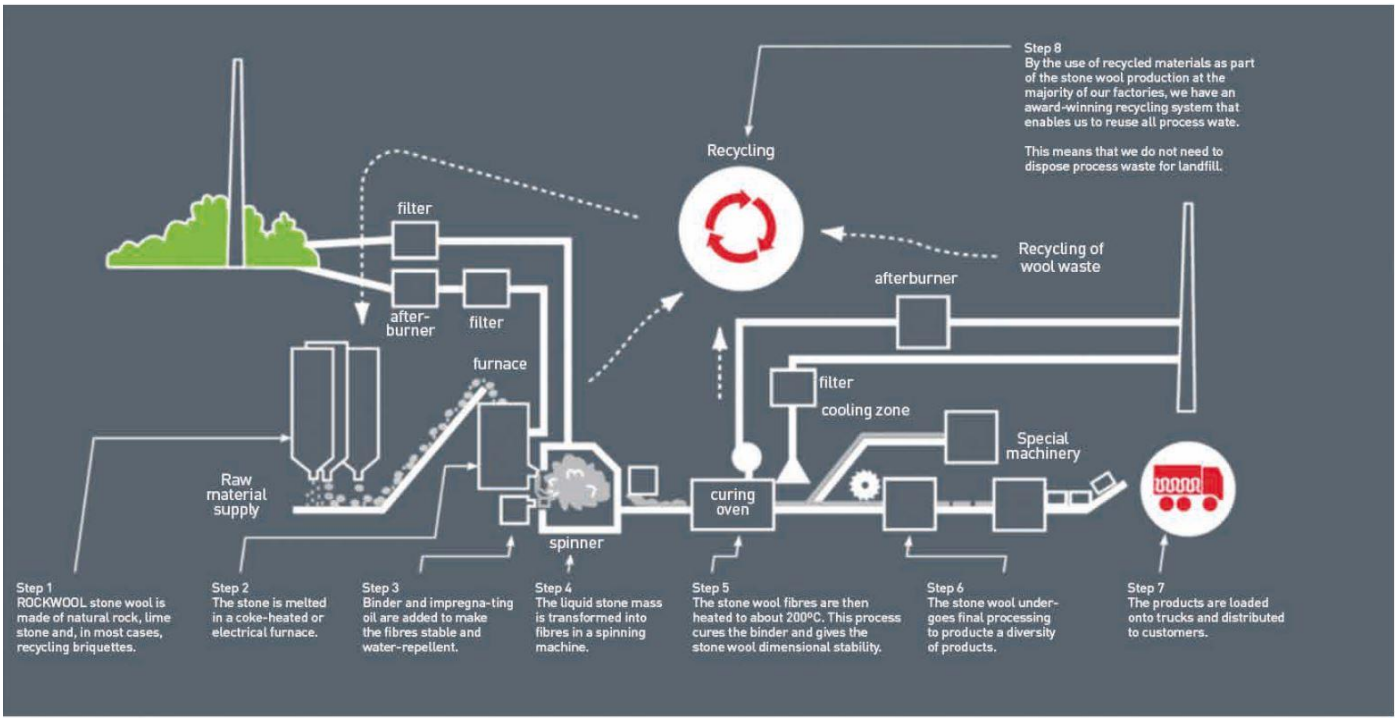
EPD type

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.





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 Caparroso.

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 2019. Adjusted secondary LCIs are taken from the DEAM, Plastics Europe and eco invent databases.

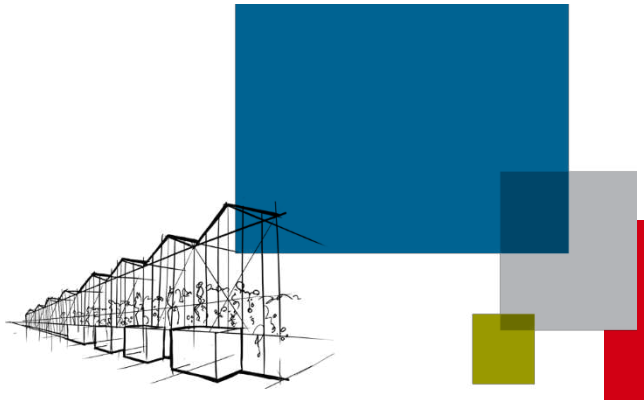
Life Cycle Assessment: Results

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	MNA	x	MNA	x	x



ROCKWOOL® stone wool thermal insulation product for buildings

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	9.6E-01	4.1E-01	1.5E-01	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3.5E-03	MNA	1.5E-02	-7.2E-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	1.7E-10	6.7E-17	1.5E-10	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	5.8E-19	MNA	8.1E-17	-5.3E-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	6.2E-03	3.2E-04	1.6E-04	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3.0E-06	MNA	9.4E-05	-2.2E-04
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	7.8E-04	6.5E-05	3.0E-05	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6.4E-07	MNA	1.1E-05	-1.6E-05
Excessive enrichment of waters and continental surfaces with nutrients, and the associated adverse biological effects.															
Photochemical ozone creation (POCP) kg Ethene eqv	2.6E-04	-1.4E-06	9.9E-06	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	-1.2E-07	MNA	7.1E-06	-3.1E-05
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	4.0E-07	3.4E-08	9.4E-09	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2.9E-10	MNA	5.7E-09	-3.5E-08
Abiotic depletion potential for fossil resources (ADP-fossils) MJ	1.1E+01	5.6E+00	4.7E-01	0,0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4.8E-02	MNA	2.1E-01	-2.1E+00
Consumption of non-renewable resources, thereby lowering their availability for future generations.															

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	3.0E+00	3.1E-01	9.6E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2.7E-03	MNA	2.8E-02	-4.5E-01
Use of renewable primary energy resources used as raw materials - MJ/FU	1.2E+00	0,00E+00	-8.4E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Total use of renewable primary energy resources - MJ/FU	4.2E+00	3.1E-01	1.3E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2.7E-03	MNA	2.8E-02	-4.5E-01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - MJ/FU	8.8E+00	5.6E+00	5.8E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4.8E-02	MNA	2.1E-01	-2.3E+00
Use of non-renewable primary energy resources used as raw materials - MJ/FU	2.6E+00	0,00E+00	-7.0E-02	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Total use of non-renewable primary energy resources - MJ/FU	1.1E+01	5.6E+00	5.1E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	4.8E-02	MNA	2.1E-01	-2.3E+00
Use of secondary materials - kg/FU	0.0E+00	0.0E+00	0.0E+00	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Use of renewable secondary fuels - MJ/FU	0.0E+00	0.0E+00	0.0E+00	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Use of non-renewable secondary fuels - MJ/FU	0.0E+00	0.0E+00	0.0E+00	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Net use of fresh water - m3/FU	2.9E-03	3.6E-04	3.6E-04	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	3.1E-06	MNA	5.4E-05	-8.8E-04

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	2.8E-07	2.6E-07	1.1E-08	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	2.2E-09	MNA	3.3E-09	-6.2E-10
Non-hazardous waste disposed - kg	8.4E-02	8.5E-04	3.2E-02	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	7.4E-06	MNA	1.1E+00	-3.3E-03
Radioactive waste disposed - kg	3.8E-05*	6.9E-06	1.4E-05	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	6.0E-08	MNA	2.4E-06	-1.2E-06

* There is never radioactive waste from a ROCKWOOL plant (A3), but potentially in its upstream chain (A1 & A2), which is not taken into account here.

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	0.0E+00	0.0E+00	0.0E+00	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	0.0E+00	0.0E+00	0.0E+00
Use of renewable primary Materials for recycling - kg	0.0E+00	0.0E+00	3.5E-02	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	3.0E-02	0.0E+00	0.0E+00
Materials for energy recovery - kg	0.0E+00	0.0E+00	0.0E+00	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00
Exported energy - MJ	0.0E+00	0.0E+00	4.4E-01	0.0E+00	MNA	MNA	MNA	MNA	MNA	MNA	MNA	0.0E+00	MNA	0.0E+00	0.0E+00

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

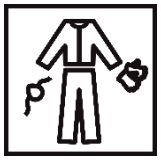
ROCKWOOL® stone wool products fulfil the national demands in the EU regarding emission to indoor climate. ROCKWOOL® stone wool products have small impact on emission levels in buildings. Salthammer et al. 2010 notes that “the presence of mineral wool had no influence on the formaldehyde level in the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

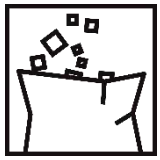
Safe use instruction sheets are also available from www.rockwool.es.



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



Clean area using vacuum equipment.



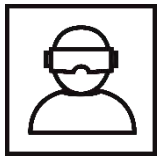
Waste should be disposed of according to local regulations.



Rinse in cold water before washing.



Ventilate working area if possible.



Wear goggles when working overhead.

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ISO 14025:2006 - Environmental labels and declarations – Type III environmental declarations – Principles and procedures.

Note Q: http://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2008:353:0001:1355:EN:PDF, p. 335. Accessed January 2015

ROCKWOOL® International A/S: Primary data for Caparroso production side, entered in verified parameter template for calculation in verified LCA model. (internal due to confidentiality), August, 2020.

ROCKWOOL® International A/S: Rules for calculating Life Cycle Assessments (LCAs) / Environmental Product Declarations (EPDs) for ROCKWOOL products. 3rd party verification by IBU verifier Dr. Frank Werner, in November 2018.

Salthammer, Tunga; Sibel Mentese, Sibel; & Marutzky, Rainer: Formaldehyde in the indoor environment, Chemical Reviews. In Chemical Review, 110 (4), 2536–72, 2010; accessed December 2014: http://pubs.acs.org/doi/abs/10.1021/cr800399g.