



Environmental product declaration



Self-Declared EPD according to EN 15804+A2:2019 and EN 16783.

Based on projected primary data.

Stone Wool Thermal Insulation

Manufacturer: Flumroc AG

Owner of the declaration:

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Life Cycle Assessment study:

This environmental product declaration is based on a Life Cycle Assessment (LCA) according to EN15804:2012+A2:2019 carried out by: ROCKWOOL A/S

Environmental Product Declarations (EPDs) may not be comparable if they do not comply with the EN 15804:2012+A2:2019 Clause 5.3



Die Naturkraft aus Schweizer Stein





Product

Declared unit

1 m² FLUMROC stone wool thermal insulation product with a thermal resistance of RD = 1 m² K/W.

Intended application of the Environmental Product Declaration

This EPD is intended to communicate the expected environmental profile of products coming from the Flumroc factory in Switzerland, based on projected and estimated input data. The facility started operating with a new electric melting technology with verified renewable electricity from Swiss hydropower. The intention for this self-declaration is to communicate indicative LCA results of Flumroc products, and not the actual results based on documented production data. Hence, the validity of the EPD is limited to one year, until a new LCA is conducted based on annual average production input values.

Product description

Stone wool is a widely used building material and mainly used for thermal insulation. Flumroc 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. 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 -Dämmplatte DUO, with a thickness of 34 mm and a density of 50 kg/m³.

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

Flumroc stone wool insulation is a firesafe¹ 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, Flumroc 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.

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 Flumroc stone wool material is classified as non-combustible (Euroclass A1), the best reaction to fire class according to EN13501-1.
- Flumroc stone wool products are often applied because of their acoustic properties. For example, a well-constructed wall using Flumroc stone wool insulation can help comply with any acoustic regulation requirements in average building typologies.
- Flumroc 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.flumroc.ch

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

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

Flumroc stone wool is recyclable. For waste Flumroc 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 the Flumroc factory for recycling.

Flumroc stone wool waste is classified as non-hazardous. Flumroc 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 m² of product, providing a thermal resistance of RD=1 m² K/W (the declared unit). The reference product is Flumroc-Dämmplatte DUO, with a thickness of 34 mm and a density of 50 kg/m³, resulting in a weight of 1.7 kg.

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 %



Life Cycle Assessment: Calculation rules

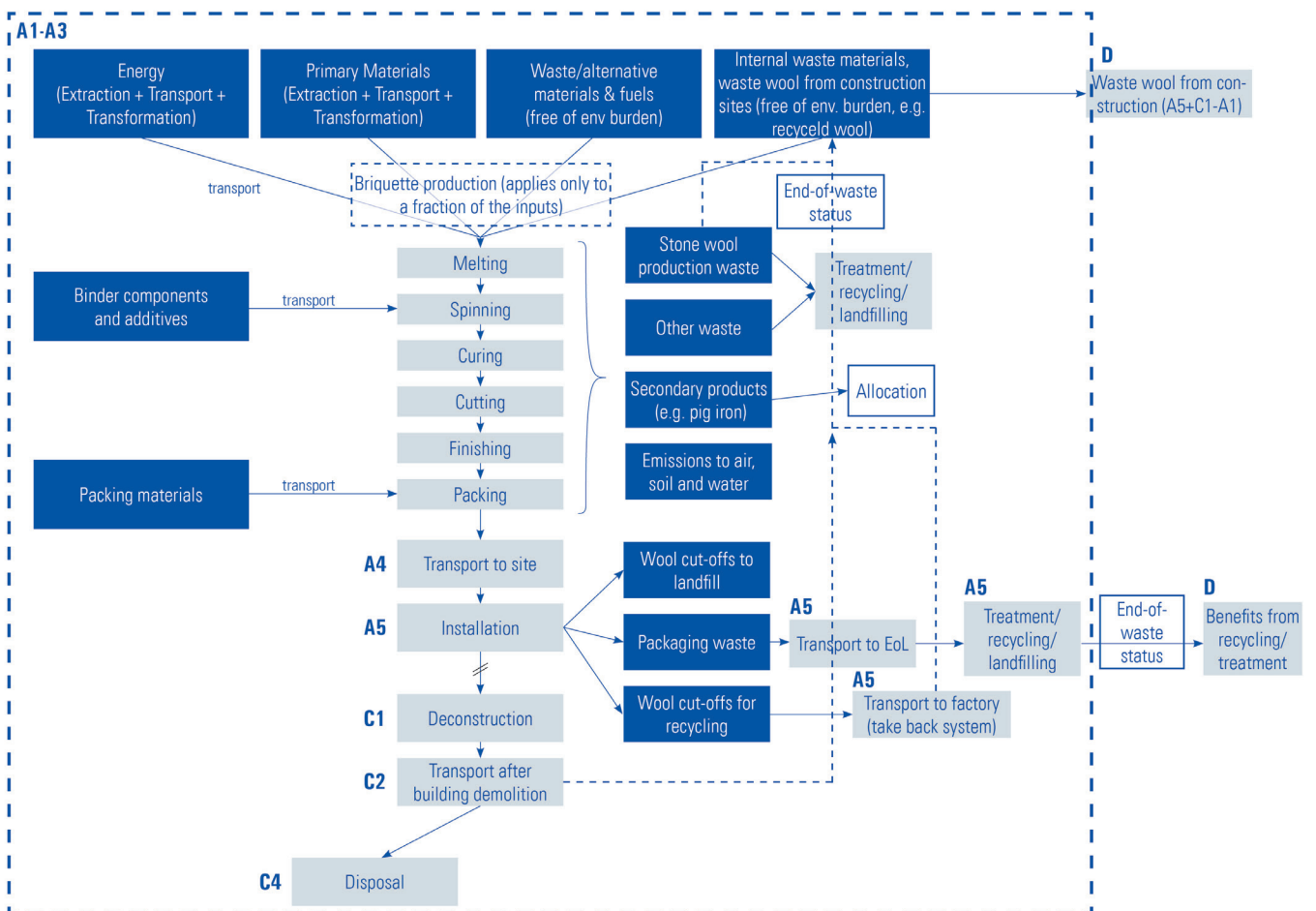
Flow diagram system boundaries

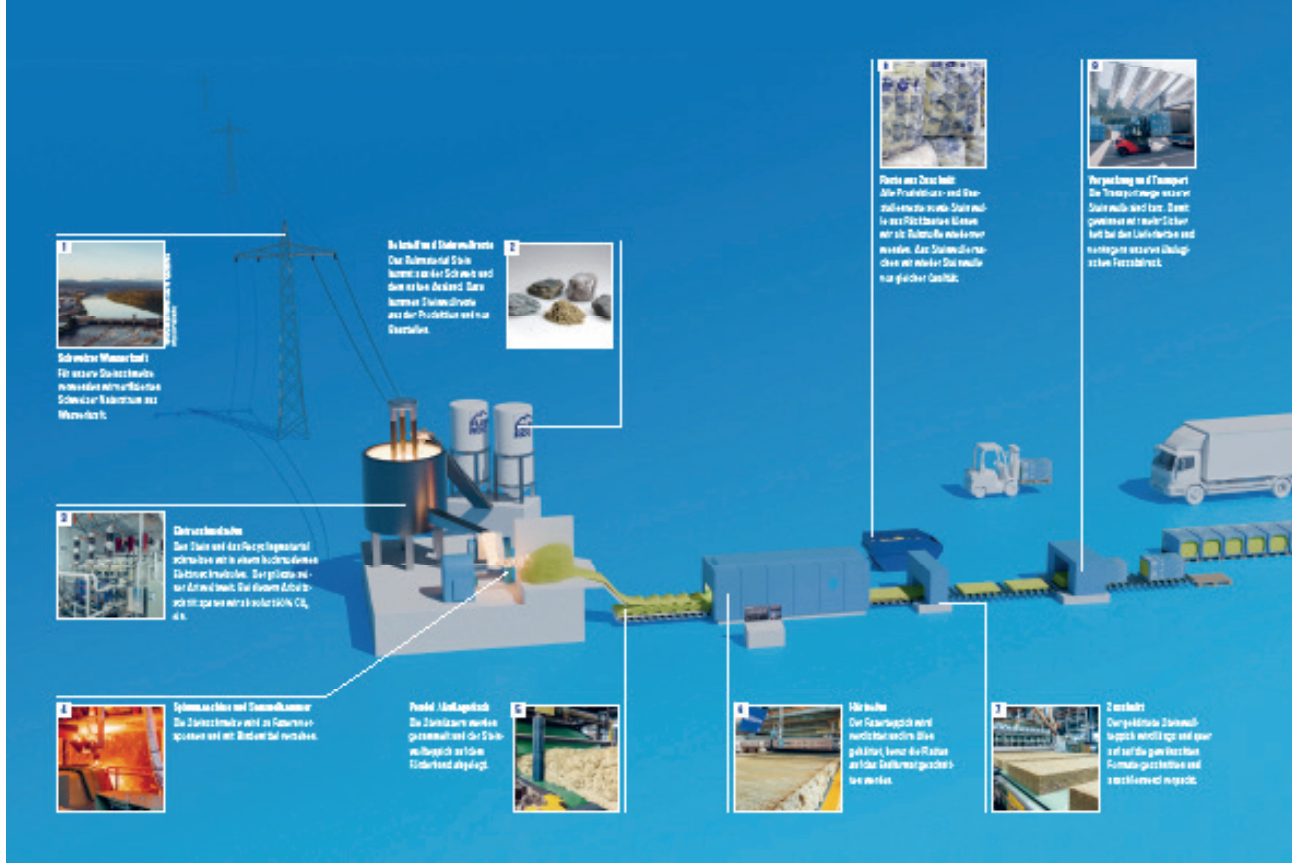
EPD type

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

Flumroc 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 are weighed and led into the smelter where they are melted.

The melted mass from the smelter 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.

Regarding the melting technology, Flumroc recently implemented a change from a cupola oven to an electric melter with renewable electricity from Swiss hydro sources.

The data included in this LCA reflects experts' projections and estimations for the amount of materials, energy and emissions that are expected to occur as a result of the melting process change. The results of this EPD are only indicative and may differ when the stone wool production is stabilized.

Cut-off criteria

Included are all the expected basic materials used as per formulation, utilized thermal energy, internal fuel consumption and electric power consumption, all expected packaging materials (plastic wrapping, pallets, labels), any possible direct production waste, and all projected emission measurements. 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 cannot be assessed since the LCA is using projected and estimated input values. However, the inputs have been critically assessed by internal experts to provide a comprehensive scenario of how the change in technology would affect the Life Cycle Inventory.

Background datasets are taken from LCAFE database, version 2023.1



Life Cycle Assessment: Results

Limitations

Conservative choices, estimations and projected values have been used in the LCA.

Therefore, the results can only be considered as indicative, and the EPD should be reassessed when one year production data is obtained.

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	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	x	MNA	x	x

Flumroc stone wool thermal insulation product for buildings

1 m² of Flumroc-Dämmplatte DUO, with a thermal resistance of RD=1 m²K/W (thickness of 34 mm; density of 50 kg/m³)

Core Environmental impact Indicators

Indicator	Unit	A1-3	A4	A5	B1-B7*	C2	C4	D
GWP Total	kg CO ₂ eq	6.25E-01	6.11E-02	1.10E-01	0.00E+00	5.21E-03	5.26E-02	-5.68E-02
GWP fossil	kg CO ₂ eq	7.40E-01	6.06E-02	2.43E-02	0.00E+00	5.16E-03	2.57E-02	-5.21E-02
GWP biogenic	CO ₂ eq	-1.16E-01	0.00E+00	9.07E-02	0.00E+00	0.00E+00	2.68E-02	-4.75E-03
GWP LULUC	CO ₂ eq	6.59E-04	5.56E-04	2.77E-05	0.00E+00	4.73E-05	7.55E-05	-6.96E-06
ODP	kg CFC11 eq	8.06E-10	5.25E-15	1.15E-10	0.00E+00	4.47E-16	9.98E-17	-1.62E-13
AP	mol H ⁺ eq	6.21E-03	7.12E-05	1.54E-04	0.00E+00	6.43E-06	1.83E-04	-1.24E-04
EP freshwater	kg PO ₄ ³⁻ eq	9.82E-06	2.19E-07	2.64E-07	0.00E+00	1.86E-08	4.32E-08	-4.87E-08
EP marine	kg PO ₄ ³⁻ eq	6.70E-04	2.4E-05	2.42E-05	0.00E+00	2.23E-06	4.75E-05	-2.58E-05
EP terrestrial	kg PO ₄ ³⁻ eq	2.40E-02	2.91E-04	5.84E-04	0.00E+00	2.68E-05	5.22E-04	-2.80E-04
POCP	kg Ethene eq	1.58E-03	6.11E-05	5.76E-05	0.00E+00	5.55E-06	1.44E-04	-8.17E-05
ADP-M&M ¹	kg Sb eq	2.26E-07	3.87E-09	5.05E-09	0.00E+00	3.29E-10	2.43E-09	-3.59E-09
ADP-fossil ¹	kg Sb eq	1.25E+01	8.16E-01	3.59E-01	0.00E+00	6.94E-02	3.41E-01	-1.18E+00
WDP ¹	MJ	1.24E-01	6.92E-04	1.17E-02	0.00E+00	5.88E-05	2.76E-03	-1.50E-02

GWP-total: Global Warming Potential; **GWP-fossil:** Global Warming Potential fossil fuels; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-LULUC:** Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP:** Acidification potential, Accumulated Exceedance; **EP-freshwater:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-marine:** Eutrophication potential, fraction of nutrients reaching freshwater end compartment; **EP-terrestrial:** Eutrophication potential, Accumulated Exceedance; **POCP:** Formation potential of tropospheric ozone; **ADP-M&M:** Abiotic depletion potential for non-fossil resources (minerals and metals); **ADP-fossil:** Abiotic depletion potential for fossil resources; **WDP:** Water deprivation potential, deprivation weighted water consumption

*There is no activity in any of the B modules, as described under the Use Stage previously. All the B modules are zero, thus the result is presented in a single column B1-B7 in all the tables.

¹The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator

Additional Environmental impact Indicators

Indicator	Unit	A1-3	A4	A5	B1-B7	C2	C4	D
PM	Disease incidence	1.67E-07	4.83E-10	3.57E-09	0.00E+00	4.35E-11	2.27E-09	-1.73E-09
IRP ²	kBq U235 eq	1.12E-02	1.53E-04	1.34E-03	0.00E+00	1.30E-05	3.76E-04	-4.85E-03
ETP-fw ¹	CTUe	6.29E+00	5.69E-01	1.81E-01	0.00E+00	4.84E-02	1.94E-01	-9.64E-02
HTP-c ¹	CTUh	2.69E-09	1.16E-11	5.68E-11	0.00E+00	9.85E-13	2.87E-11	-9.42E-12
HTP-nc ¹	CTUh	6.41E-09	6.14E-10	3.81E-10	0.00E+00	5.23E-11	3.16E-09	-2.46E-10
SQP ¹	Dimensionless	2.06E+01	3.40E-01	4.41E-01	0.00E+00	2.90E-02	6.89E-02	-8.89E-01

PM: Particulate matter emissions; IRP: Ionising radiation, human health; ETP-fw: Ecotoxicity (freshwater); HTP-c: Human toxicity, cancer effects; HTP-nc: Human toxicity, non-cancer effects; SQP: Land use related impacts / soil quality (Dimensionless).

¹The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

²This 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.

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
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	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
	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

Indicator	Unit	A1-3	A4	A5	B1-B7	C2	C4	D
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	1.09E+01	5.78E-02	1.07E+00	0.00E+00	4.91E-03	4.59E-02	-1.71E-01
Use of renewable primary energy resources used as raw materials	MJ	1.34E+00	0.00E+00	-7.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	1.22E+01	5.78E-02	2.76E-01	0.00E+00	4.91E-03	4.59E-02	-1.71E-01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	1.20E+01	8.18E-01	3.75E-01	0.00E+00	6.96E-02	3.41E-01	-1.18E+00
Use of non-renewable primary energy resources used as raw materials	MJ	5.43E-01	0.00E+00	-1.63E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.26E+01	8.18E-01	3.59E-01	0.00E+00	6.96E-02	3.41E-01	-1.18E+00
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	1.28E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water	m ³	1.75E-02	6.36E-05	5.78E-04	0.00E+00	5.41E-06	8.42E-05	-3.97E-04

End of Life (EoL) - Waste

Indicator	Unit	A1-3	A4	A5	B1-B7	C2	C4	D
Hazardous waste disposed	kg	3.87E-0	3.03E-12	1.21E-11	0.00E+00	2.58E-13	3.62E-11	-5.41E-11
Non-hazardous waste disposed	kg	2.32E-01	1.18E-04	5.81E-03	0.00E+00	1.00E-05	1.70E+00	-2.63E-04
Radioactive waste*		5.26E-05	1.06E-06	8.24E-06	0.00E+00	9.00E-08	3.57E-06	-2.92E-05

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

End of Life (EoL) - Output flow

Indicator	Unit	A1-3	A4	A5	B1-B7	C2	C4	D
Component for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable primary Materials for recycling	kg	0.00E+00	0.00E+00	1.59E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	MJ	0.00E+00	0.00E+00	9.44E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy	MJ	0.00E+00	0.00E+00	5.54E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Reading example: 9.0 E -03 = 9.0*10⁻³ = 0.009

Information describing the biogenic carbon content at the factory gate

*Biogenic carbon content	Unit	Value
Biogenic carbon content in product	kg C	7.46E-03
Biogenic carbon content in product packaging	kg C	2.50E-02

*NOTE - 1kg biogenic carbon is equivalent to 44/12 of CO₂

Other Information

Dangerous substances

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

Mineral wool fibres produced by Flumroc 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 Flumroc fibres are registered with REACH under the following definition: "Man-made vitreous (silicate) fibres with random orientation with alkaline oxide and alkali earth oxide ($\text{Na}_2\text{O}+\text{K}_2\text{O}+\text{CaO}+\text{MgO}+\text{BaO}$) content greater than 18 % by weight and fulfilling one of the Note Q conditions".

Flumroc 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".

Dangerous substances

Flumroc stone wool products fulfil the national demands in the EU regarding emission to indoor climate. Flumroc 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.flumroc.ch



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.

Bibliography

Abdelghafour, Mohamed: Adaptation of the up-flow percolation test TS 14 405 for mineral wools, Preparation and analyses of eluates. Insavalor, Division Polden, Villeurbanne, FRANCE, February 2004.

EN 13162:2012+A1:2015 – Thermal insulation products for buildings – Factory made mineral wool (MW) products – Specification.

EN 15804:2012+A2:2019 – Sustainability of construction works – Environmental product declaration

Hjelmer, Ole: Results of column leaching tests performed on 4 mineral wool products, DHI Water & Environment. Internal ROCKWOOL report (Ref. 5256), March 22, 2004. 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

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>.

