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The Norwegian EPD Foundation

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025 ISO 21930 EN 15804

Owner of the declaration	AS ROCKWOOL
Program holder	The Norwegian EPD Foundation
Publisher	The Norwegian EPD Foundation
Declaration number	00131E rev1
Issue date	25.10.2013
Valid to	25.10.2018 (validity extended to 01.06.2019)

ROCKWOOL® isolering

Product

AS ROCKWOOL

Manufacturer

ROCKWOOL®
FIRESAFE INSULATION



General information

ROCKWOOL® isolering

Product

Program holder:

The Norwegian EPD Foundation
Post Box 5250 Majorstuen, 0303 Oslo
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Declaration number:

00131E rev1

This declaration is based on Product Category Rules:

CEN Standard EN 15804 serve as core PCR
Product Group Insulation materials, NPCR 012rev,

Declared unit:

1 m² of 37mm thick stone wool insulation product with a density of 29 kg/m³ and a thermal resistance of R=1 m² K/W.

Declared unit with option:

Functional unit:

The environmental product declaration has been

worked out by:

Rasmus Nielsen and
Anders Schmidt, Ph.D.,
FORCE Technology,
Lyngby, Denmark



Verification:

Independent verification of data and other environmental information has been carried out in accordance with ISO14025, 8.1.3.

externally internally


President Joep Meijer

(IndependentverifierapprovedbyEPDNorway)

AS ROCKWOOL

Manufacturer

Owner of the declaration:

AS ROCKWOOL
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e-mail: Torkel.Weringsaasen@rockwool.com

Place of production:

Vamdrup and Doense, Denmark
Trondheim and Moss, Norway

Management system:

ISO 9001, ISO14001, EN13.162, EN13.172, EN14303

Org. No:

923828583

Issue date:

25.10.2013

Valid to:

25.10.2018 (validity extended to 01.06.2019)

Comparability:

EPD of construction products may not be comparable if they not comply with EN 15804 and seen in a building context.

Year of study:

2013

Approved according to ISO14025, 8.1.4



Dr. ing. Sverre Fossdal

(ChairmanoftheVerificationGroupofEPD-Norway)

Declared unit:

1 m² of 37 mm thick stone wool insulation product with a density of 29 kg/m³ and a thermal resistance of R=1 m² K/W.

Key environmental indicators	Unit	Cradle to gate A1 - A3	Transport Production site - central warehouse Norway
Global warming	kg CO ₂ -eqv	1,27	1,19*10 ⁻²
Energy use	MJ	13,8	0,17
Dangerous substances	*		

* The product contains no substanses from the REACH Candidate list or the Norwegian priority list

Product

Product description: Stone wool insulation from ROCKWOOL is a firesafe* material for insulation against heat, cold, fire, vibrations and noise. The product is wrapped with PE-foil and placed on wooden pallets for further distribution. Stone wool insulation from ROCKWOOL for the Scandinavian market is supplied by two production sites in Norway (Moss and Trondheim) as well as two sites in Denmark (Doense and Vamdrup), each with two lines. The properties of the ROCKWOOL products from the different production sites are identical. The EPD is based on LCA inventory data from the 4 plants. The reference flow is a weighted average and is calculated using the following distribution of production capacity (2011) on the four production sites: Vamdrup 30,6%, Doense 35,7%, Trondheim 11,9%, Moss 21,7%.

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

Description of manufacturing processes: The furnace used in all four production sites is an oven with coke as the main energy source. The virgin stone raw materials used at all sites are mainly basalt, diabase and dolomite. The Danish sites also use various secondary materials, including internal wool waste, which is mixed with cement into briquettes. The mineral raw materials are melted and spun into fibers at a temperature of about 1500°C. A synthetic binder and a water-repellant agent are added, whereafter the final curing (polymerisation) and forming takes place at a temperature of about 230°C. Finally the product is cut into the desired dimensions and packed in PE foil.

Technical data: Scaling factors for ROCKWOOL Insulation materials in this EPD can be seen in the table below. The scaling factors show how much to multiply the environmental burdens by in order to obtain a thermal resistance of R=1 m² K/W with other ROCKWOOL products. Product and product variations for the declared product are typically less than 10% when using the scaling factors in the table below. The R-values used for scaling gives a good indication of the amount of materials needed to achieve the desired insulation effect of other product types, but is not an exact measure. Stone wool insulation products marked with an asterisk (*) in the table are sold with extra features for special applications e.g. with wire netting, a bitumen membrane or aluminium foil. The extra features are not covered by this LCA. The products covered by the EPD are produced at all production lines in a full year. The variation between production lines has not been determined.

Market: Scandinavia

Reference service life: The service life of the product is >> 60 years and built into a construction and will last the construction lifetime.

Product specification: Material input per functional unit

Material	kg	% of total
Stones	0.902	67.1
Secondary resources mostly slag	0.251	18.7
Cement	0.087	6.46
Formaldehyde (37%)	0.052	3.89
Urea (46%)	0.021	1.57
Phenol	0.016	1.21

Products	Scaling Factor
ALU-BRANDBATT 80*, 80 VENT*	2.6
A-PLADEBATT 10	2.0
A-RULLEBATT M/PAPIR*	1.1
BD-60 FLEXIBATT	1.2
BETONELEMENTBATT 35 (80-250 MM)	2.3
BETONELEMENTBATT 35 (25-79 MM)	2.6
BETONELEMENTBATT NO: BETONGELEMENTPLATE (30-79 MM)	2.8
BETONELEMENTBATT NO: BETONGELEMENTPLATE (80-250 MM)	2.4
BJÄLKLÄGSSKIVA M/VINDSKYDD*	1.1
BLÅSEULL I HORIZONTAL KONSTRUKSJON	2.4
BLÅSEULL I TEGLVEGG	2.2
BLÅSEULL I VERTIKAL KONSTRUKSJON	2.5
B-PLATE	0.9
BRANDBATT 110	3.7
BRANNPLATE 50	1.7
BRANNSEKSJONERINGSSTAV	4.7
BYGG 100	3.3
BYGG 90	2.9
BYGGRULLE M VINDSKYDD (100-250 MM)*	1.3
BYGGRULLE M VINDSKYDD (50 - 99 MM)*	1.4
CONLIT 150	6.0
CONLIT 300	11.2
CONLIT ALU BRANDMATTE*	2.8
CONLIT ALU BRANNPLATE EI30*	4.0
CONLIT ALU BRANNPLATE EI60*	4.7
DK: HARDKILE (50-85), NO/SE: HARDROCK ENERGY TAKFALL (50-85 MM)	4.7
DK: HARDKILE (5-55), NO/SE: HARDROCK ENERGY TAKFALL (5-55 MM)	6.4
DRENSPLATE*	3.8
FALLRÄNNA TF	6.4
FALLUNDERLAG	3.8
FASADBATT	3.1
FLEXEKSTREM 33	1.9
FLEXI 35 PLATE	1.2
FLEXI A-PLATE	1.0
FLEXIBATT	1.1
FLEXIBATT 35	1.2
FLEXISYSTEM BATT, REDAIR BATT	2.2
GRANULAT PRO 28 KG/M3	1.1
GRANULAT PRO 35 KG/M3	1.2
GRANULAT PRO 43 KG/M3	1.5

Products	Scaling Factor
GRANULAT PRO 50 KG/M3	1.7
GULVRENOVERINGSPLADE	4.7
HARDROCK ELEMENTBATT	2.3
HARDROCK ENERGY 100 MM	3.7
HARDROCK ENERGY 120 MM	3.6
HARDROCK ENERGY 150 MM	3.5
HARDROCK ENERGY 180 MM	3.4
HARDROCK ENERGY 50 MM	4.4
HARDROCK ENERGY 80 MM	3.9
HARDROCK FASADEPLATE (50-79) mm	4.0
HARDROCK FASADEPLATE 100	3.7
HARDROCK FASADEPLATE (120-150 MM)	3.6
HARDROCK FASADEPLATE 200	3.4
HARDROCK FASADEPLATE 80	3.8
IKI-BATT*	2.1
I-PLATE A	1.0
ISOLERASJÄLV	1.0
LAMELMÄTTE M/ALU*	1.3
LETT-TAK 37	1.0
LYDABSORPSJONSSTAV	1.0
LYDPLATE	1.7
LYDUNDERLAGSSKIVA*	3.5
MARKPLATE	4.7
MARKSKIVA INDUSTRI	5.0
MURBATT 32	1.8
MURBATT 34	1.3
MURBATT 37	1.0
MURPLATE	1.4
PLÅTUNDERLAGSSKIVA 80	2.6
RENOVERINGSBOARD	4.8
ROCKORBIT*	1.9
ROCKPROFIL SKIVA 40, 60	1.5
ROCKTORV 100 MM	4.0
ROCKTORV 108 MM	3.8
ROCKTORV 150 MM	3.8
ROCKVEGG 33	2.2
ROXREMSA	1.4
RÄNNDA SKIL 180	6.4
SKÄLMURSSKIVA	1.7
SKILLEVÆGSSKIVA	1.1

Products	Scaling Factor
SKRÅVÆGSSATT 34	1.3
SKRÅVÆGSSATT 32	1.8
STØPEPLATE PLUSS 100 MM	3.6
STØPEPLATE PLUSS 150 MM	3.4
STØPEPLATE PLUSS 50 MM	4.0
STØPEPLATE PLUSS 80 MM	3.7
STÅLREGELSKIVA 37	1.0
STÅLREGELSKIVA 40	0.9
STÅLSTENDERPLATE	1.0
STÅLUNDERLAG ENERGY 50 MM	3.9
STÅLUNDERLAG ENERGY 60 MM	3.8
STÅLUNDERLAG ENERGY 80 MM	3.4
SUPER VENTI-BATT	1.7
TAKBOARD FLIES*	6.0
Takkil	5.3
TAKSTOLPLATE*	1.0
TERRÆNBATT ERHVERV	3.8
TF TAKKILE	6.4
TF-FALLPLATE	5.3
TF-KILE	6.4
TF-PLADE	6.0
TF-PLADE NO: TF-PLATE	6.4
TF-RENNEPLATE	6.4
TOPROCK 230	2.9
TOPROCK 250, 280	2.8
TOPROCK 310, 360	2.7
TOPROCK 430, 530	2.6
TOPROCK CTF System 1, 1B	2.8
TOPROCK CTF System 2, 2B, 3, 3B, 4	2.7
TOPROCK CTF System 5, 6	2.6
TOPROCK CTF System UL	2.4
TP 50	5.0
TRINNLYDPLATE*	5.3
TRÅDVÆVSMÄTTE 80*	2.8
TUNGPLATE 150	4.7
UNDERLAG ENERGY	3.0
UNIVERSALRØRSKÅL*	2.4
VÄGGBOARD*	5.3
VÄSTKUSTSKIVA	2.8

* Products marked with an * are specialty products with extra features such as wire netting, paper facing, aluminium foil, ... The extra features are not included in the EPD calculations

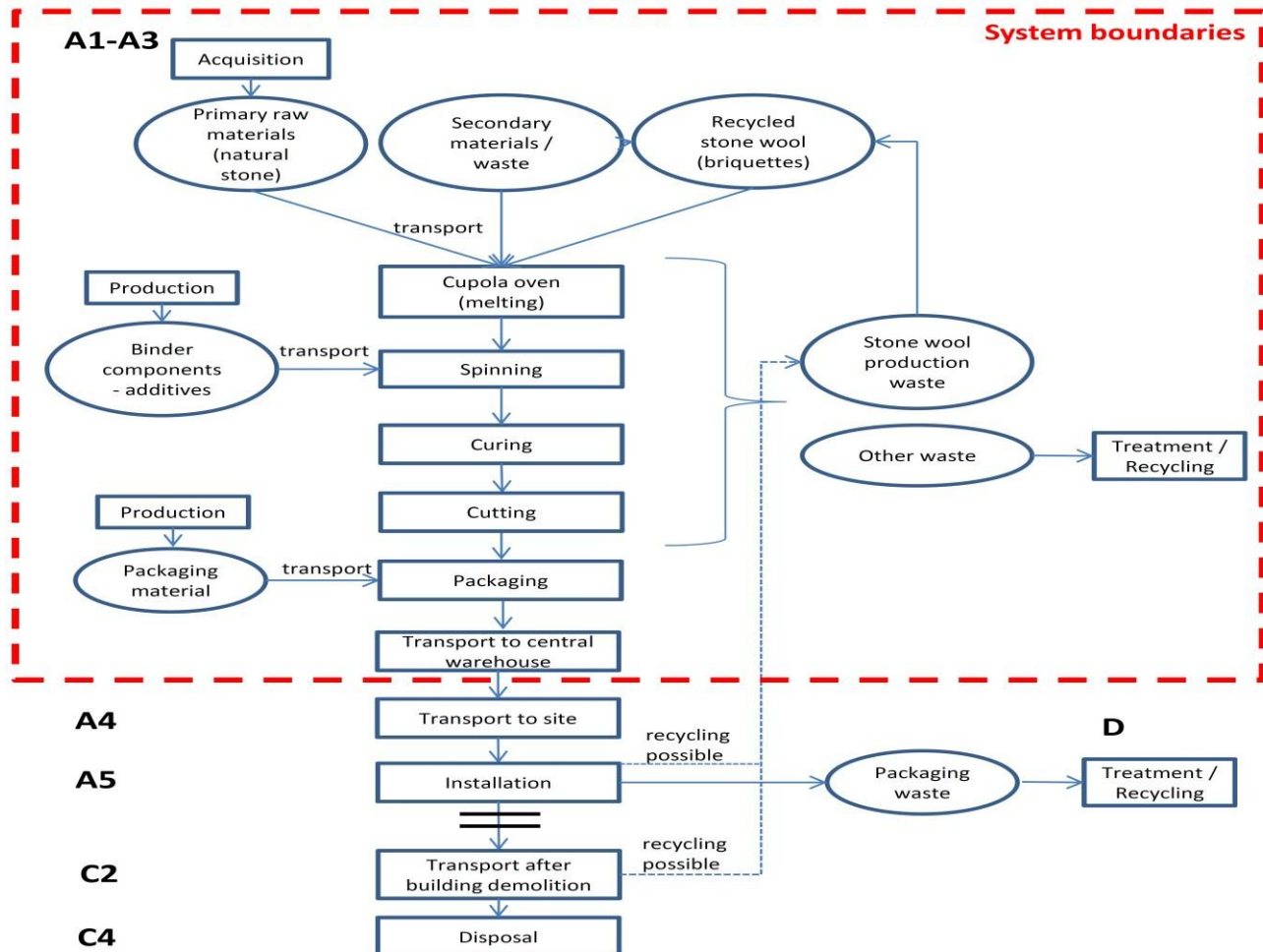
LCA: Calculation rules

Declared unit:

1 m² of 37 mm thick stone wool insulation product with a density of 29 kg/m³ and a thermal resistance of R=1 m² K/W.

System boundary:

The overall system boundaries include extraction and transportation of raw materials as well as all manufacturing processes (cradle-to-gate). Transport from all factories to a central storage in Norway has been included. See Figure below for details



Data quality:

High quality data from GaBi 6 and ecoinvent have been used for acquisition of raw materials and transportation. Legally required information has been used for manufacturing processes at ROCKWOOL. The age of the oldest dataset in the database is 13 years and the vast majority of datasets are under 5 years old. The data collected from the sites are from 2011. Accordingly, the overall quality is judged to be good to very good.

Allocation:

Allocation has been made according to the provisions in EN 15804. Impacts from recycled material have been allocated to the primary product, except transportation. ROCKWOOL supply district heating in Denmark. Respectively 7,3% and 9,4% of the energy consumed in the two production sites in Denmark have been allocated to district heating, using the energy content as the allocation key. The emissions associated with energy production have been allocated in the same way. A sensitivity analysis of the results using a different allocation key, such as the economic value, or substitution approach has not been performed.

Cut-off criteria:

All inputs of raw materials and energy have been included. Please note that products with special features e.g. wire netting, bitumen membrane or alufoil are not included in the EPD. Please consult ROCKWOOL AS for more information.

LCA: Scenarios and additional technical information

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

Transport from production site to central warehouse in Norway

Type	Capacity utilisation	Gross density of products	Type of vehicle	Distance km	Fuel/Energy consumption	Value (l/t)
Truck*	30		****	127	$1,7 \cdot 10^{-2}$ l/tkm	2,16
Truck**	30		****	50	$1,7 \cdot 10^{-2}$ l/tkm	0,860
Boat***	48		*****	149	$4,6 \cdot 10^{-3}$ l/tkm	0,685

- * Transport by Truck (weighted average). From Danish production sites to Moss in Norway
- ** Transport by Truck. From Moss and Trondheim to central warehouse in Norway
- *** Transport by Boat (weighted average). From Denmark to Norway (Frederikshavn terminal to Oslo)
- **** Dataset from GaBi with a Euro class 3 truck-trailer with a payload of 22 tons.
- ***** Dataset from GaBi with a Bulk commodity carrier with 1,500-20,000 dwt. payload capacity and light fuel oil driven.

LCA: Results

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

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Environmental impact

Parameter	A1 - A3								
GWP	1,27								
ODP	$1,48 \cdot 10^{-9}$								
POCP	$6,92 \cdot 10^{-4}$								
AP	$8,96 \cdot 10^{-3}$								
EP	$8,87 \cdot 10^{-4}$								
ADPM	$2,52 \cdot 10^{-7}$								
ADPE	12,5								

GWP Global warming potential (kg CO₂-eqv.); **ODP** Depletion potential of the stratospheric ozone layer (kg CFC11-eqv.); **POCP** Formation potential of tropospheric photochemical oxidants (kg C₂H₄-eqv.); **AP** Acidification potential of land and water (kg SO₂-eqv.); **EP** Eutrophication potential (kg PO₄⁻³-eqv.); **ADPM** Abiotic depletion potential for non fossil resources (kg Sb -eqv.); **ADPE** Abiotic depletion potential for fossil resources (MJ)

Reading example: $9,0 \cdot 10^{-3} = 0,009$

Resource use

Parameter	A1 - A3								
RPEE	0,543								
RPEM	0,906								
TPE	1,45								
NRPE	12,97								
NRPM	0,00								
TRPE	12,97								
SM	0,281								
RSF	$3,89 \cdot 10^{-2}$								
NRSF	0,202								
W	$3,39 \cdot 10^{-3}$								

RPEE Renewable primary energy resources used as energy carrier (MJ); **RPEM** Renewable primary energy resources used as raw materials (MJ); **TPE** Total use of renewable primary energy resources (MJ); **NRPE** Non renewable primary energy resources used as energy carrier (MJ); **NRPM** Non renewable primary energy resources used as materials (MJ); **TRPE** Total use of non renewable primary energy resources (MJ); **SM** Use of secondary materials (kg); **RSF** Use of renewable secondary fuels (MJ); **NRSF** Use of non renewable secondary fuels (MJ); **W** Use of net fresh water (m³)

End of life - Waste

Parameter	A1 - A3								
HW	$7,22 \cdot 10^{-3}$								
NHW	0,226								
RW	n/a								

HW Hazardous waste disposed (kg); **NHW** Non hazardous waste disposed (kg), **RW** Radioactive waste disposed (kg)

End of life - Output flow

Parameter	A1 - A3								
CR	0								
MR	$2,63 \cdot 10^{-2}$								
MER	$8,29 \cdot 10^{-4}$								
EEE	0								
ETE	0								

CR Components for reuse (kg); **MR** Materials for recycling (kg); **MER** Materials for energy recovery (kg); **EEE** Exported electric energy (MJ); **ETE** Exported thermal energy (MJ)

Reading example: $9,0 \cdot 10^{-3} = 0,009$

Specific Norwegian requirements

Electricity

Electricity used in the manufacturing processes has been accounted for using the process Danish Electricity grid mix (1kV-60kV) from GaBi6 (reference year 2009).

Greenhouse gas emissions 0,139 kg CO₂ eqv/MJ

and the process Norwegian Electricity grid mix (1kV-60kV) from GaBi6 (reference year 2009).

Greenhouse gas emissions 0,011 kg CO₂ eqv/MJ

Dangerous substances

None of the following substances have been added to the product: Substances on the REACH Candidate list of substances of very high concern (of 25.10.2013) substances on the Norwegian Priority list (pr.25.10.2013) and substances that lead to the product being classified as hazardous waste. The chemical content of the product complies with regulatory levels as given in the Norwegian Product Regulations.

Transport

Transport from production site to central warehouse in Norway is 326 km

Indoor environment





In general, ROCKWOOL products have been assessed using the Finnish M1 emission classes for building material. In total 32 specific ROCKWOOL products have been tested representing a wide range of products. To be granted the M1 quality label, an emission test (incl. ammonia, formaldehyde, and carcinogens) and an odour test has to be performed. The time period of testing is 28 days. Criteria: TVOC (Minimum of 70% of the compounds shall be identified): <0,2 mg/m²h, Formaldehyde (HCOH): < 0,05 mg/m²h, Ammonia (NH₃): <0,03 mg/m²h, Carcinogenic compounds (belonging to category 1 of IARC monographs): <0,005 m./m²h, Odour (dissatisfaction with odour shall be below 15%): No Odour. The M1 is the highest achievable best rank in the classification system.
(<https://www.rakennustieto.fi/index/english/emissionclassificationofbuildingmaterials.html>)

Carbon footprint

Carbon footprint has not been worked out for the product.

Bibliography

ISO 14025:2006	<i>Environmental labels and declarations - Type III environmental declarations - Principles and procedures</i>
ISO 14044:2006	<i>Environmental management - Life cycle assessment - Requirements and guidelines</i>
EN 15804:2012	<i>Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products</i>
ISO 21930:2007	<i>Sustainability in building construction - Environmental declaration of building products</i>
Schmidt A, Nielsen. R. (2013).	<i>LCA of stone wool insulation on the Scandinavian market from ROCKWOOL, Project report, FORCE Technology, 2013</i>
PCR 2012	<i>Product-Category Rules. NPCR 12 rev. Insulation materials, epd-norge.no, 2012</i>

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