ENVIRONMENTAL PRODUCT DECLARATION

ROCKFON CEILING TILES (159-173 KG/M^3)

ROCKFON Alaska® SQ, SLN, SLT, CDX; ROCKFON Sonar® SLN, SLT, SCD, CDX
ROCKFON® Color-all™ SLN, SL, CDX

ROCKFON Sonar® CDX, Guildford Aquatic Centre, Canada

With the continued strain on the world's natural resources, being environmentally responsible is no longer "a nice-to-have," it's a mandate. Standards require it. Building owners demand it. And specifiers must deliver on it.

At ROCKFON, we actively pursue responsible manufacturing and design practices at every turn, and we invite others to follow suit by embracing transparency. ROCKFON Environmental Product Declarations (EPDs) help specifiers make informed decisions regarding the installation of sustainable building products. It's just another example of how we offer a higher level of transparency in all we do to help you do your part to create a better future for all.

UL CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

ROXUL Rockfon

CEILING TILES (159-173 KG/M3)

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Rockfon
DECLARATION NUMBER	4787277886.102.1
DECLARED PRODUCT	Ceiling Tiles (159-173 kg/M3)
REFERENCE PCR	UL/IBU Core PCR: Part A and Part B: Non-Metal Ceiling Panels (Oct 2015)
DATE OF ISSUE	October 25, 2016
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications

The PCR review was conducted by:	Review Panel Chair: Dr. Lindita Bushi epd@ul.com
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

2. Product System Documentation

2.1 Product Description

ROCKFON acoustic panels are intended for indoor use. The panels consist of a fire safe mineral wool core with a colored or painted facing. With no or little organic material, ROCKFON panels will stay flat in humid conditions and are naturally resistant towards microorganisms. Please see manufactures literature for more information. This EPD covers all relevant variations of the products listed above (colors, sizes and edge profiles). The suspension grid is not included. Manufacturing takes place in Cigacice (Poland). A weighted average based on production volumes relevant for the North American market is declared.

This EPD covers a group average for ceiling tiles with a density range of 159 to 173 kg/m^3 for the finished product. The values in this document represent a weighted average of the following products: ROCKFON Alaska® SQ, SLN, SLT, CDX; ROCKFON Sonar® SLN, SLT, SCD, CDX; ROCKFON® Color-all™ SLN, SL, CDX. Products with similar densities for which deviations from the declared values are possible but are expected to be within the same range are: ROCKFON Sonar® SLP, DMT; ROCKFON® Sonar Activity™ SQ, SLT, DMT; ROCKFON Alaska® SLP, SCD, DMT; ROCKFON® Color-All™ CDX; ROCKFON® Medical Plus™ CDX. The composition of the declared product is provided in table 1.

Component	%wt.
Resin bonded mineral wool	87.4%
Facing	6.7%
Coating	5.9%

Table 1: Composition

2.2 Application

Rockfon products are intended for use internally in buildings as ceiling tiles.

2.3 Technical Data

The performance of the declared product is defined in table 2.

Name	Value	Unit
Noise Reduction Coefficient (NRC) *Test Method C423*	0.9-1.0	-
Articulation Class (AC) *Test Method E1111 and Classification E1110*	180-190	-
Ceiling Attenuation Class (CAC) *Test Method E1414 and Classification E413*	22-43	-
Fire Rating *Test Method E84 /S102*	Flame Spread 0-25 Smoke Developed 0-50	-
Light Reflection *Test Method E1477*	0.04-0.86	-

Table 2: TECHNICAL DATA: CEILING PANELS

2.4 Placing on the Market / Application Rules

ROCKFON products conform to ASTM E1264 which cover ceiling products that provide acoustical performance and interior finish in buildings. The classification includes acoustical ceiling types, patterns, and ratings for acoustical performance, light reflectance, and fire safety.

2.5 Delivery Status

The declared product dimensions are defined in table 3. The range of products declared has an area weight of 1.3 to 5.5 kg/m^2, a thickness of 15 mm to 100 mm. Since a range is declared, variations may occur for specific products.

Name	Value	Unit
Declared unit	1	m^2
Grammage	3.4	kg/m^2
Thickness	2.1	cm
Conversion factor to 1 kg	0.29	-

Table 3: Declared product dimensions

2.6 Base materials / Ancillary materials

This EPD only covers the ceiling tiles. The grid and any other ancillary materials are not included.

The mineral wool core consists of fibres spun from melted minerals based on vulcanoic mass, such as diabase or basalt, from recycled mineral wool and other secondary mineral resources. The product contains no substances as listed in Annex XIV and Annex XVII of REACH regulation No 1907/2006.

2.7 Manufacture

Stone and briquettes are melted in a cupola and melted material is spun on wheels that create stone fibres. These fibres are collected into a mat while resin is applied according to production specification. The resin is cured and mineral oil is applied. The mat moves through a line process where compression, cutting and finishing are done to create the panel. The panels then move through a finishing line where the fleeces, coatings and edge details are applied. Rockfon products are then packaged. Mostly on pallet, in cardboard boxes and a plastic wrap. Internal waste is recycled on-site.

2.8 Environment and Health during Manufacturing

According to LEED v4: International Alternative Compliance Path – REACH Optimization. ROCKFON products are not known to contain substances that meet REACH criteria for substances of very high concern. Products covered by this EPD are produced in Cigacice (Poland). The facility is certified after ISO 14001. The ROCKWOOL group report on Corporate Social Responsibility is available www.rockwool.com.

2.9 Product processing / Installation

Appropriate engineering controls : Provide adequate ventilation. Ensure the ventilation system is regularly maintained and tested. A washing facility/water for eye and skin cleaning purposes should be present.

Personal protective equipment : Avoid all unnecessary exposure. In case of dust production: protective goggles.

Gloves. Protective clothing. For certain operations, additional Personal Protection Equipment (PPE) may be required.

Hand protection : Wear protective gloves.

Eye protection : In case of dust production: protective goggles. Chemical goggles or safety glasses. Skin and body protection : Long sleeved protective clothing. Respiratory protection : Wear appropriate mask. With heavy dust development and in confined spaces, use disposable face masks - NIOSH approved dust mask.

2.10 Packaging

Information on product-specific packaging: type, composition and possible reuse of packaging materials (paper, pallets, foils etc.) is included in table 6.

Packaging material	Value	Unit
Pallet	0.28	kg
Cardboard	0.14	kg
Plastic foil	0.07	kg

Table 6: Declared product dimensions

2.11 Condition of Use

The use phase modules are not applicable. There is no need for functional cleaning and as such this is left out of the scope. There are no replacements necessary from a technical perspective, although some projects replace the ceiling tiles for aesthetic reasons.

2.12 Environment and Health during Use

Stone Wool fiber has been classified as “not classifiable as to its carcinogenicity to humans” (Group 3) by the International Agency for Research on Cancer (IARC). Coarse fibers can cause itching on skin or foreign body effect in the upper respiratory system (mucous membranes) and eyes. Physical effects will generally abate in short time after end of exposure and no chemical effects ensue. Follow SDS to reduce any effects.

This product meets the testing and product requirements of GREENGUARD Gold Certification standard that includes health based criteria for additional chemicals and also requires lower total VOC emissions levels to ensure that products are acceptable for use in environments such as schools and healthcare facilities. In addition to limiting emissions of more than 360 VOCs and total chemical emissions, GREENGUARD Gold Certified products must also comply with requirements of the State of California’s Department of Public Health (CDPH) “Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1 (2010)” (also known as California Section 01350).

2.13 Reference Service Life (RSL)

The RSL is 75 years. An assumed Estimated Service Life (ESL) of 75 years shall be used for building life.

2.14 Extraordinary effects

FIRE

ASTM E84 and CAN/ULC S102 surface burning characteristics. Flame Spread Index 25 or less. Smoke Developed Index 50 or less (UL labeled).

WATER

The product is water repellant and no hazards are expected including full immersion.

MECHANICAL DESTRUCTION

The product is durable and no hazards are foreseen.

3. LCA Calculation Rules

3.1 Declared and Functional Unit

The declared unit for ceiling panels is defined as one square foot (12”x12”) of ceiling panel.

The declared unit, the mass reference and the conversion factor to 1 kg are indicated in the table 7.

Name	Value	Unit
Declared unit	1	m^2
Declared thickness	2.1	cm
Service weight per declared unit	3.4	kg/m^2
Conversion to 1 m^2	0.093	m^2/ft^2

Table 7: Declared product dimensions

For purposes of defining a functional unit and reference unit, an ESL of a building in North America of 75 years shall be applied. A functional unit includes installed product and take into consideration 7% installation waste, which is part of the values reported in this EPD under module [A5].

3.2 System Boundary

The EPD results are declared for “cradle-to-gate study with options”, addressing all relevant life cycle stages identified in the EN15804 as defined in table 8. Module [A1-3] covers the the produced product, module [A5] covers installation and installation losses.

Product Stage			Construction installation		Use Stage							End of Life Stage				
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	X	X	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X

Table 8 : Life Cycle Modules within scope – summary

MND: module not declared **X**: declared

3.3 Estimate and Assumptions

The EPD results are based on a weighted product average using sales volumes. Specific products within the grouping may vary. The EPD covers all relevant variations (colors, sizes and edge profiles).

3.4 Cut-Off Criteria

The unit processes have been modelled to be as complete as possible and all fall within the following summary cut-off criteria as follows:

- Mass – If a flow is less than 1% of the cumulative mass of the model it may be excluded, providing its environmental relevance is not a concern.
- Energy – If a flow is less than 1% of the cumulative energy of the model it may be excluded, providing its environmental relevance is not a concern.
- Environmental relevance – If a flow meets the above criteria for exclusion, yet is thought to potentially have a significant environmental impact, it will be included. Material flows which leave the system (emissions) and whose environmental impact is greater than 1% of the whole impact of an impact category that has been considered in the assessment have been covered. This judgment is done based on experience and documented as necessary, but also relies on the used literature data.
- The sum of the neglected material or energy flows does not exceed 5% of mass, energy or environmental relevance for flows indirectly related to the process (e.g. operating materials).

3.5 Background Data

Since manufacturing takes place in Europe Ecoinvent 3.1 data is used for the background data.

3.6 Data Quality

All data represents the applicable geography and technology for the specific and generic data. Manufacturing data represents the year 2013. Quality assurance for the ROCKWOOL data has been performed by multiple checks against data from previous years and comparisons between production lines for energy resources, material resources, emissions, waste and production volumes. The results are considered accurate and have all been third party verified.

Some generic data is European, but those are the best available data. Most data is current or recent; some literature data is older, up to 10 years, which is appropriate according to the EN15804 and the PCR used for this EPD.

3.7 Period under Review

Data collection is representative for 2013.

3.8 Allocation

Co-product allocation: line specific manufacturing data has been assigned to individual products have been assigned to products based on the amounts of wool as a general rule. The same applies to the briquettes produced in the recycling factory. Material consumables and emission related to the use of binder have been assigned to the products based on the binder content. Some of the waste products are sold to external treatment facilities. Where there is a positive economic impact, recycling process and substitution benefits are included. Plant level data for ROCKWOOL is limited to the waste produced. Waste has been assigned to product based on the amount of wool in the product. Some of the waste products are sold to external treatment facilities. Where there is a positive economic impact,

recycling process and substitution benefits are included.

Use of secondary energy and material resources: some secondary energy and material resources are used at ROCKWOOL for the wool lines. Examples are the use of blast furnace slag, fly ash and anode cokes. The processes to be able to utilize these secondary resources as well as the transportation to ROCKWOOL are included in the system boundaries whereas the production process where it originates is cut-off.

Benefits and loads for recycling are reported under Module D.

No credits from recycling or energy recovery from the end of life of the product are included in this EPD.

3.9 Comparability

A comparison or evaluation of EPD data is only possible if all data sets to be compared are 1) created according to EN 15804 and 2) are considered in a whole building context or utilize identical defined use stage scenarios. Comparisons are only allowable when EPDs report cradle-to-grave information using a functional unit. Refer to section 5.3 of EN 15804 for further information.

4. LCA: Scenarios and additional technical information

The following technical information is the basis for the declared modules.

Transport to the building site (A4)

Transportation for North America includes delivery from Poland to both the West and the East coast and represents a weighted average for all Rockfon products on the North American market.

Name	Value	Unit
Liters of fuel	0.043	l/100km
Transport distance	12483	km
Capacity utilization (including	72.5	%
Gross density of products	150	kg/m^3
Capacity utilization volume factor	1	-

Installation into the building (A5)

The product is applied directly into the ceiling using a suspended grid (which is not included). Estimated installation losses are 7% and included in this EPD.

Name	Value	Unit
Material loss	0.24	kg
Output substances following waste treatment on site	0.72	Kg

End of life (C2-X4)

Products can be removed manually for recycling. The percentage assumed is 5%. Most is collected as part of mixed construction waste that goes to landfill. Mineral wool products are typically not reused or used for energy recovery

Name	Value	Unit
Collected separately	0.00	kg
Collected as mixed construction	3.45	kg
Reuse	0.00	kg
Recycling	0.00	kg
Energy recovery	0.00	kg
Landfilling	3.45	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Part of the waste from packaging material from the construction site is recycled and the substitution of materials, adjusted for a recycling efficiency factor, is declared in Module D.

Name	Value	Unit
Net energy benefit from energy recovery from waste treatment declared as exported energy in C3 (R>0.6)	0.00	MJ
Net energy benefit from thermal energy due to treatment of waste declared as exported energy in C4 (R<0.6)	0.00	MJ
Net energy benefit from material flow declared in C3 for energy recovery	0.00	MJ

5. LCA: Results

The EPD results are expressed in the declared unit of “one square foot of installed acoustic ceiling panel applied for a period of 75 years in a building”. The Life Cycle Impact Assessment (LCIA) results are calulated using TRACI 2.1 version are presented in table 9.

LIFE CYCLE ENVIRONMENTAL IMPACT RESULTS: [one m^2 of installed acoustic ceiling panel]

Table 9. North American LCA Environmental Impact Results

TRACI 2.1 Impact Assessment, October 2013								
Parameter	Unit	Product Stage	Construction installation stage		End of Life Stage			
		A1-A3	A4	A5	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	6.79E+00	4.73E-01	1.51E+00	6.80E-01	2.94E-02	0.00E+00	2.94E-02
ODP	[kg CFC-11 Eq.]	8.39E-07	6.09E-08	3.74E-07	7.75E-08	7.29E-09	0.00E+00	7.29E-09

AP	[kg SO_2-Eq.]	5.46E-02	3.21E-03	1.43E-02	4.37E-03	1.17E-04	0.00E+00	1.17E-04
EP	[kg N-Eq.]	5.31E-03	3.54E-04	9.80E-04	7.44E-04	1.52E-05	0.00E+00	1.52E-05
POCP	[kg O_3-Eq.]	2.93E-01	4.33E-02	2.64E-01	3.66E-02	3.01E-03	0.00E+00	3.01E-03
ADP	Surplus energy per extracted MJ, kg or m^3 fossil fuel, as a result of lower quality resources	2.52E-02	8.97E-04	3.88E-02	3.90E-03	1.32E-05	0.00E+00	3.28E-04
GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion potential - fossil fuels								

LCA RESULTS - RESOURCE USE: [one m^2 of installed acoustic ceiling panel]

Table 10. LCA Results: Resource Use

Parameter	Unit	Product Stage	Construction installation stage		End of Life Stage			
		A1-A3	A4	A5	C2	C3	C4	D
PERE	[MJ]	7.94E+00	2.65E-01	5.01E-01	3.89E-03	0.00E+00	6.90E-03	-6.14E-03
PERM	[MJ]	6.05E+00	1.76E-01	3.78E-01	3.57E-03	0.00E+00	1.29E-02	-9.35E-01
PERT	[MJ]	1.40E+01	4.41E-01	8.78E-01	7.46E-03	0.00E+00	1.98E-02	-9.41E-01
PENRE	[MJ]	1.54E+02	2.83E+01	1.11E+01	5.53E-01	0.00E+00	1.07E+00	-4.08E-01
PENRM	[MJ]	2.91E+00	0.00E+00	1.75E-01	0.00E+00	0.00E+00	0.00E+00	-2.17E-01
PENRT	[MJ]	1.56E+02	2.83E+01	1.13E+01	5.53E-01	0.00E+00	1.07E+00	-6.25E-01
SM	[kg]	2.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m^3]	1.22E-01	6.08E-03	7.81E-03	1.19E-04	0.00E+00	7.02E-04	-3.41E-04
PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water								

LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES[one m^2 of installed ceiling panel]

Table 11. LCA Results: Output Flows and Waste Categories

Parameter	Unit	Product Stage	Construction installation stage		End of Life Stage			
		A1-A3	A4	A5	C2	C3	C4	D
HWD	[kg]	6.61E+00	6.44E-01	4.46E-01	1.07E-02	0.00E+00	1.79E-02	-1.40E-02
NHWD	[kg]	6.54E+00	7.96E-01	6.58E-01	2.08E-02	0.00E+00	3.39E+00	-1.54E-03
RWD	[kg]	2.50E-01	1.09E-02	1.59E-02	1.48E-04	0.00E+00	2.64E-04	-4.21E-04

CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.38E-02	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy

OPTIONAL ADDITIONAL LIFE CYCLE ENVIRONMENTAL IMPACT RESULTS: [one ft^2 of installed acoustic ceiling panel]

Table 12. North American LCA Environmental Impact Results

TRACI 2.1 Impact Assessment, October 2013								
Parameter	**Unit**	**Product Stage**	**Construction installation stage**		**End of Life Stage**			
		A1-A3	A4	A5	C2	C3	C4	D
GWP	[kg CO_2-Eq.]	6.31E-01	4.39E-02	1.40E-01	6.32E-02	2.74E-03	0.00E+00	2.74E-03
ODP	[kg CFC-11 Eq.]	7.79E-08	5.66E-09	3.47E-08	7.20E-09	6.77E-10	0.00E+00	6.77E-10
AP	[kg SO_2-Eq.]	5.07E-03	2.99E-04	1.33E-03	4.06E-04	1.09E-05	0.00E+00	1.09E-05
EP	[kg N-Eq.]	4.93E-04	3.28E-05	9.11E-05	6.92E-05	1.42E-06	0.00E+00	1.42E-06
POCP	[kg O_3-Eq.]	2.72E-02	4.03E-03	2.45E-02	3.40E-03	2.80E-04	0.00E+00	2.80E-04
ADP	Surplus energy per extracted MJ, kg or m^3 fossil fuel, as a result of lower quality resources	2.34E-03	8.33E-05	3.61E-03	3.62E-04	1.23E-06	0.00E+00	3.05E-05

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADP = Abiotic depletion potential - fossil fuels

LCA RESULTS - RESOURCE USE: [one ft^2 of installed acoustic ceiling panel]

Table 13. LCA Results: Resource Use

Parameter	**Unit**	**Product Stage**	**Construction installation stage**		**End of Life Stage**			
		A1-A3	A4	A5	C2	C3	C4	D
PERE	[MJ]	7.38E-01	2.46E-02	4.65E-02	3.61E-04	0.00E+00	6.41E-04	-5.71E-04
PERM	[MJ]	5.62E-01	1.64E-02	3.51E-02	3.31E-04	0.00E+00	1.20E-03	-8.69E-02
PERT	[MJ]	1.30E+00	4.10E-02	8.16E-02	6.93E-04	0.00E+00	1.84E-03	-8.75E-02
PENRE	[MJ]	1.43E+01	2.63E+00	1.03E+00	5.14E-02	0.00E+00	9.98E-02	-3.79E-02
PENRM	[MJ]	2.70E-01	0.00E+00	1.62E-02	0.00E+00	0.00E+00	0.00E+00	-2.01E-02

PENRT	[MJ]	1.45E+01	2.63E+00	1.05E+00	5.14E-02	0.00E+00	9.98E-02	-5.81E-02
SM	[kg]	1.91E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	[m³]	1.14E-02	5.64E-04	7.26E-04	1.10E-05	0.00E+00	6.52E-05	-3.17E-05

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

LCA RESULTS: OUTPUT FLOWS AND WASTE CATEGORIES[one ft^2 of installed ceiling panel]

Table 14. LCA Results: Output Flows and Waste Categories

Parameter	Unit	Product Stage	Construction installation stage		End of Life Stage			
		A1-A3	A4	A5	C2	C3	C4	D
HWD	[kg]	6.14E-01	5.98E-02	4.14E-02	9.95E-04	0.00E+00	1.66E-03	-1.30E-03
NHWD	[kg]	6.07E-01	7.40E-02	6.11E-02	1.93E-03	0.00E+00	3.15E-01	-1.43E-04
RWD	[kg]	2.33E-02	1.02E-03	1.48E-03	1.38E-05	0.00E+00	2.46E-05	-3.91E-05
CRU	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-03	0.00E+00	0.00E+00
MER	[kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	[MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EE = Exported energy

6. LCA: Interpretation

The product itself defines most of the environmental impacts as is shown in figure 1, see [A1-A3]. Losses during installation and delivery [A5] also have a noticable contribution. All other declared modules have an unsignificant contribution to the overall environmental performance of the declared products.

Different product features for ROCKFON products can lead to a relevant variation in the declared results. Examples are the thickness and weight and the amount and type of surface treatment.

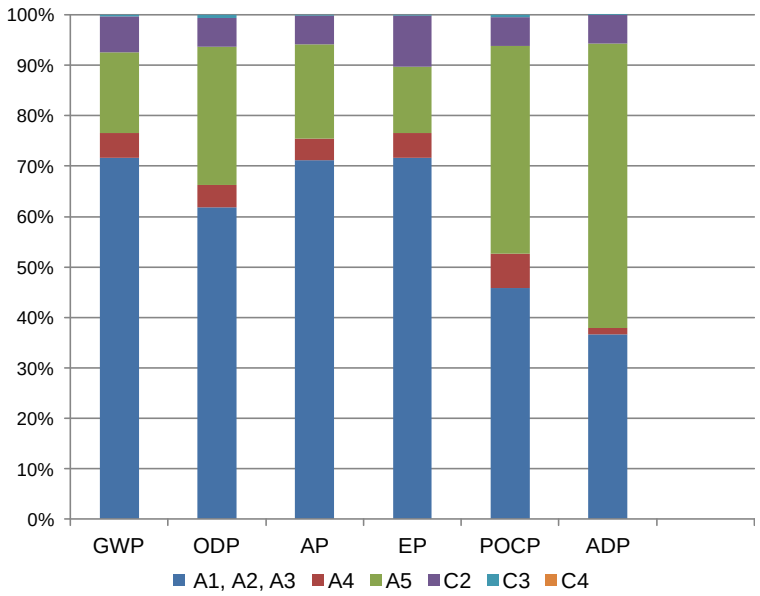

Figure 1: LCIA - North American LCA Environmental Impact Results

7. Supporting Documentation

The underlying reviewed project report includes all the elements required to support the content declared in an EPD created using this document are specified in “Part A: Calculations for the Life Cycle Assessment and Requirements on the Project Report.” These project report elements include general information (Part A: Section 4), study goal (Part A: Section 5), study scope (Part A: Section 6), and the life cycle inventory analysis, impact assessment, and interpretation (Part A: Section 7, 8, and 9). Additionally, the project report shall include additional required supporting documentation specified in this Part B and according to Part A: Section 10.

8. References

UL ENVIRONMENT

UL Environment General Program Instructions April 2015, version 2. PCR Part A: UL Environment and Institute of Construction and Environment e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. July 2014, version 1.3

SUSTAINABILITY REPORTING STANDARDS

EN 15804: 2012-04 - Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product.

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

ISO 14040: 2006 - Environmental management – Life cycle assessment – Principles and framework

ISO 14044:2006 - Environmental management – Life cycle assessment – Requirements and guidelines

ISO 14046:2013 - Environmental management- Water footprint- Principles, requirements and guidelines

ISO 15392:2008 - Sustainability in building construction- General principles

ISO 15686-1:2011 - Buildings and constructed assets- Service life planning- Part 1: General principles

ISO 15686-2:2008 - Buildings and constructed assets- Service life planning Part 2: Service life prediction procedures

ISO 15686-7:2008 - Buildings and constructed assets- Service life planning Part 7: Performance evaluation for feedback of service life data from practice

ISO 15686-8:2008 - Buildings and constructed assets- Service life planning Part 8: Reference service life and service life estimation

ISO 21930: 2007 - Sustainability in building construction -- Environmental declaration of building products

TESTING AND CLASSIFICATION REFERENCES

ASTM C423 - Standard Test Method for Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

ASTM C636 - Standard Practice for Installation of Metal Ceiling Suspension Systems for Acoustic Panel and Lay-in Panels

ASTM E84 - Test Method for Surface Burning Characteristics of Building Materials

ASTM E1110 - Standard Classification for Determination of Articulation Class

ASTM E1111 - Standard Test Method for Measuring the Interzone Attenuation of Open Office Components

ASTM E1264 - Standard Classification for Acoustical Ceiling Products

ASTM E1414 - Standard Test Method for Airborne Sound Attenuation Between Rooms Sharing a Common Ceiling Plenum

ASTM E1477 - Standard Test Method for Luminous Reflectance Factor of Acoustical Materials by Use of Integrating-Sphere Reflectometers

ASTM E413 - Classification for Rating Sound Insulation

CA Specification 01350 Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers - Version 1.1

RELEVANT FEDERAL STANDARDS AND SOPS

Environment Canada, National Pollutant Release Inventory (http://www.ec.gc.ca/inrp-npri/)

EPCRA 313 Toxic Release Inventory Reporting (U.S.) (http://www2.epa.gov/toxics-release-inventory-tri-Program) PCR Guidance for Building-Related Products and Services: Non-Metal Ceiling Panel EPD Requirements

Environmental Product Declaration Part B: Non-metal Ceiling Panels

US EPA, ORD/NRMRL/Sustainable Technology Division, Systems Analysis Branch, SOP No. S-10637-OP-1-0- Tool for the Reduction and Assessment of Chemical and other Environmental Impacts (TRACI), Software Name and Version Number: TRACI version 2.1, USER'S MANUAL, 24 July, 2012

US: Resource Conservation and Recovery Act (RCRA), Clause C (http://www.epa.gov/region6/rcra/)

RELEVANT PCRS

Product Category Rules for Building-Related Products and Services, From the range of Environmental Product Declarations of UL Environment and Institute Construction and Environment e.V. (IBU): "Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report," June 2014, v1.3

PCR Guidance-Texts for Building-Related Products and Services, From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), "Part B: Requirements on the EPD for Glass wall and ceiling coverings," October 2012.

PCR Guidance-Texts for Building-Related Products and Services, From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), Part B: Requirements of the EPD of mineral boards, 2011-06.

PCR Guidance-Texts for Building-Related Products and Services, From the range of Environmental Product Declarations of Institute Construction and Environment (IBU) e.V. 2010 Requirements on the EPD for Ceiling Panels for suspended ceiling systems.