Environmental Product Declaration

as per ISO 14025 and EN 15804

Acrylicon Wall System installed 2016 in a school in Norway, Melhus, Sør-Trøndelag. The floor installed with Acrylicon Flake System.

Owner of the declaration:	AcryliCon Polymers GmbH
Publisher:	Kiwa BCS Öko-Garantie GmbH - Ecobility Experts
Programme holder:	Kiwa BCS Öko-Garantie GmbH - Ecobility Experts
Declaration number:	EPD-AcryliCon Polymers GmbH-058-EN
Issue date:	01.11.2018
Valid to:	31.10.2023

AcryliCon Wall System

This Environmental Product Declaration (EPD) refers to 1 m² AC Wall System from AcryliCon Polymers GmbH. AcryliCon Wall System is an extremely durable, hygienic and long lasting wall covering resin system.

Acrylicon Wall System installed 2016 in a school in Norway, Melhus, Sør-Trøndelag. The floor installed with Acrylicon Flake System

1. General information

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Programme holder
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Declaration number
EPD-AcryliCon Polymers GmbH-058-Eng

This declaration is based on the Product Category Rules
EN 16810: 2017 - Resilient, textile and laminate floor coverings - Environmental product declarations - Product category rules
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Issue date
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Valid to
31.10.2023

Signature
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AcryliCon Wall System

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Declared product/ declared unit
1 m² flooring system

Scope
The AcryliCon Wall System is a flooring system of AcrycliCon Polymers GmbH. The declaration is valid for 1 m² AcryliCon Wall system.
The owner of the declaration shall be liable for the underlying information and evidence. Kiwa BCS Öko-Garantie GmbH – Ecobility Experts shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification
The CEN Norm EN 15804:2012-04 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025: 2011-10

☐internally ✓externally

Signature
Jonas Bunsen,
(Extern verifier of Green Delta GmbH)

2. Product

2.1 Product description

AcryliCon Wall System is an extremely durable, hygienic and long lasting wall covering resin system.

2.2 Application

Designed to be sued on walls in changing rooms, showers, toilets, wet rooms, food processing areas, hospitals, pharmaceutical industries, public areas, abattoirs, breweries, bakeries and many other areas requiring a hygienic and easy to clean surface.

2.3 Technical Data

The technical properties of the AcryliCon system are evaluated to EN, ASTM or ISO standards and the results are average values, delivered under proper installation procedures and recommended conditions.

Characteristic	Data
Product thickness	1.2 mm
Area related mass of the product	2253 g/m²
Compressive Strength EN196-1 (DIN1164), ASTM C349	64 N/mm2 / 9,280 psi
Flexural Strength EN 196-1 (DIN1164) / ASTM C348	19 N/mm2 / 2,750 psi
Water Permeability DIN / EN 1062-3:2008	<0.001 kg/(m2.h0.5)
Tensile Adhesion Strength DIN / EN 1542:1999	Concrete: >2.0 MPa Steel: >2.0 Mpa
Shore Hardness DIN 53505 / ISO 868 / ASTM D2240	78 D
Temperature Resistance	Tolerant of sustained temperatures up to 65°C/149°F
Abrasion Resistance EN ISO 5470-1 (Taber)	<1000 mg (average mass loss)
Chemical Resistance EN13529	Excellent

2.4 Base materials / Ancillary materials

Main component of the flooring system AC Wall is methyl methacrylate. As well as additional co-monomers from the group of methacrylates and/or acrylates. Curing of the product takes place after installation on site. The curing is realized with specific curing components. The amounts of the raw materials vary for the different flooring system. The ranges can be seen for the different flooring system from AcryliCon Polymers GmbH are in the following table:

Description	Unit	Input
Acrylate	wt%	10 - 90
Flame-retardent fillers	wt%	7 - 89
Others	wt%	< 7

2.5 Manufacture

The production takes place by mechanical mixing and homogenization of the constituents of the material. The product components are usually mixed together from the ingredients in batch mode and filled into the barrels. The manufacturing processes follow the CE standard.

2.6 Product processing/Installation

The AC Wall system are applied by troweling/knife-coating, rolling or pouring during which health and safety measures (hand and eye protection, ventilation) are essential. and consistently adhered to in accordance with the information on the safety data sheet and conditions on site. After mixing the resin and curing agent, they react under the generation of heat (exothermicity). The mixed components must therefore be processed rapidly within the specified pot time. If larger volumes remain in the container, this can lead to strong heat build-up and smoke emission.

2.7 Packaging

The different components will be delivered in barrels (210l) or big bags. Both packages will be reused or recycled in an internal cycle. Wooden reusable pallets are taken back by the building material trade, which returns them to the building product manufacturer who in turn redirects them into the production process. The resins are stored in drum or can made of tinplate. A typical packaging size is 180 kg of material. Quartz sand is packed in paper bags and the flakes and the curing agents are packed in cardboard boxes.

2.8 Condition of use

All liquid components cure during the use phase. After the reaction the material is inert.

2.9 Reference Service Life

More than 20 years, subject to correct installation conditions and substrate preparation. Life expectancy is generally influenced by the use of the system and maintenance regime.

2.10 Re-use phase

According to present knowledge, no environmentally hazardous effects in terms of landfilling are to be generally anticipated through dismantling and recycling building materials to which hardened products based on methacrylate adhere. If methylmethacrylate systems can be removed from the building materials at no great effort, thermal recovery is a practical reutilization variant because of its energy content. Low adhesion levels are negligible for disposal. They do not disturb the disposal/recycling of other building materials.

2.11 Disposal

Individual components which can no longer be recycled must be combined at a specified ratio and hardened. Hardened product residue is not special waste. Nonhardened product residue is special waste. Empty, dried containers (free of drops and scraped clean) are directed to the recycling process. Residue must be directed to proper waste disposal taking consideration of local guidelines.

2.12 Further Information

Further information is available in the product and safety data sheets of AcryliCon Polymers GmbH, which can be requested on the following website: www.acryliconpolymers.com.

3. LCA: Calculation rules

3.1 Declared unit

The declared unit is 1 m² of flooring system.

	Value	Unit
Declared unit	1	m²
AcryliCon Wall System – Conversion factor to 1 kg	2.25	-

3.2 System boundary

This EPD was created in accordance with DIN EN 15804 and monitors the production and construction process stage. According to DIN EN 15804 this corresponds to product phases A1-A5 and D. All inputs including raw materials, primary products, energy and auxiliary materials as well as the accumulated waste are considered in the assessment.

3.3 Estimates and assumptions

The infrastructure of the production facilities is not considered due to the high mass flow. In addition, only the production-related energy consumption (excluding the administration and social areas) is considered and the energy consumption was averaged over the annual production volume.
All specific transport distances of the input materials were recorded and considered accordingly. The transport distances can be found in the life cycle inventory. For all journeys, a truck with a payload of 24.7 t and a total weight of 40 t was assumed (diesel vehicle). For the utilization, a flat rate of 85% was assumed. The losses during the production phase are less than 1 wt% and thus fall below the cut-off criteria. In phase A5 – installation process - a loss of 1% of the material was assumed. The packaging in phase A1-A3 will be reused. Due to the high number of reuse intervals the environmental impact of the packages falls below the cut-off criteria. The packaging produced in A5 will be incinerated in incineration plants. It is assumed that material loss during A5 is 1 wt%.

3.4 Cut-off criteria

All material flows that contribute to more than 1% of the total mass, energy or environmental impact of the system have been considered in the LCA. It can be assumed that the neglected processes in total contributed less than 5% to the considered impact categories. The production of the machines, plants and other infrastructure required for the production of the products was not taken into account in the LCA.

3.5 Period under review

All process-specific data was collected for the operating year 2017. The quantities of raw and auxiliary materials as well as energy consumption have been recorded and averaged over the entire operating year 2017.

3.6 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets were created according to the EN 15804. Product-specific characteristics must be considered. Secondary data for the stage of manufacture is exclusively obtained from the database Gabi 6.

3.7 Allocation

Specific information about allocations within the background data is included in the documentation of the GaBi datasets. The allocation of material and energy consumption was made by AcryliCon Polymers GmbH. The data provided are internal key figures for which no publication is intended. There are no co-products in the raw material supply phase, so no allocation methods were used at this stage. There

are no allocations during the manufacturing phase at the plant. The preparation of the flooring systems is an independent process. Waste which occurs during the construction process is treated in a waste incineration plant.

3.8 Calculation methods

For life cycle assessment, the calculation methods described in ISO 14040: 2006, section 4.3.2 have been applied. The evaluation is based on the phases in the system boundaries.

4. LCA: Scenarios and additional technical information

No scenarios were analysed in this EPD.

5. LCA: Results

The following tables show the results of the indicators of the impact assessment, the resource input as well as the waste materials and other output-flows. The here shown results refer to the declared unit.

Description of the system boundary (X = Included in LCA; MND = Module not declared)																
Product stage			Construction process stage		User stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from manu-facturer to place of use	Construction-installation process	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	MND	MND	MND	X

Results of the LCA – Environmental impact: 1 m² - Wall System					
Parameter	**Unit**	**A1 – A3**	**A4**	**A5**	**D**
Global warming potential	[kg CO_2-Eq.]	6.69E+00	1.09E-01	2.18E+00	6.67E-01
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.20E-10	7.72E-13	1.67E-09	8.19E-13
Acidification potential of land and water	[kg SO_2-Eq.]	1.85E-02	5.00E-04	3.35E-03	3.10E-04
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.87E-02	1.20E-04	1.11E-03	6.72E-05
Formation potential of tropospheric ozone photchemical oxidants	[kg Ethen-Eq.]	1.08E-03	-1.68E-04	3.21E-04	1.89E-05
Abiotic depletion potential for non fossil resources	[kg Sb-Eq.]	5.55E-06	7.47E-09	5.65E-06	1.44E-08
Abiotic depletion potential for fossil resources	[MJ]	1.65E+02	1.48E+00	3.86E+01	4.05E-01

Results of the LCA – Resource use: 1 m² - Wall System					
Parameter	**Unit**	**A1 – A3**	**A4**	**A5**	**D**
Renewable primary energy as energy carrier	[MJ]	IND	IND	IND	IND
Renewable primary energy resources as material utilization	[MJ]	IND	IND	IND	IND
Total use of renewable primary energy resources	[MJ]	7.44E+00	8.48E-02	6.75E+00	7.18E-02
Non renewable primary energy as energy carrier	[MJ]	IND	IND	IND	IND
Non renewable primary energy as material utilization	[MJ]	IND	IND	IND	IND
Total use of non renewable primary energy resources	[MJ]	1.70E+02	1.49E+00	4.36E+01	4.49E-01
Use of secondary material	[kg]	IND	IND	IND	IND
Use of renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of non renewable secondary fuels	[MJ]	IND	IND	IND	IND
Use of net fresh water	[m^3]	6.72E-02	4.71E-03	5.05E-02	3.01E-03

Results of the LCA – Output flows and waste categories: 1 m² - Wall System					
Parameter	**Unit**	**A1 – A3**	**A4**	**A5**	**D**
Hazardous waste disposed	[kg]	2.94E-07	5.21E-07	5.83E-07	3.62E-09
Non hazardous waste disposed	[kg]	9.05E+00	8.05E-03	7.86E+00	1.39E-01
Radioactive waste disposed	[kg]	1.82E-03	3.17E-06	1.98E-03	1.73E-05
Components for re-use	[kg]	IND	IND	IND	IND
Materials for recycling	[kg]	IND	IND	IND	IND
Materials for energy recovery	[kg]	IND	IND	IND	IND
Exported electrical energy	[MJ]	IND	IND	IND	IND
Exported thermal energy	[MJ]	IND	IND	IND	IND

6. LCA: Interpretation

The production stage (A1-A3) is the stage with the greatest influence on the LCA results for almost all impact categories. The influence of the construction process stage (A4-A5) is lower. Due to the disposal of the materials resulting from phase A5. credits will be issued in module D.

In the following paragraph a more specific interpretation is done for the AcryliCon Wall System. The influence of the production stage of the AcryliCon Wall System (A1-A3) is about or above 80% in almost all analyzed impact categories, except the GWP, ADP(e) and ODP. The GWP of the production stage from the AcryliCon Wall System is about 68%.

The following figure shows the results after a normalization to the reference area Europe.

The photochemical Formation potential of tropospheric ozone (POCP) has an at the phase A4 negative value. It is caused by the direct emission during transport. The ozone is decomposed by the reaction with the emitted nitrogen monoxide, thus nitrogen dioxide and oxygen are formed. This has a positive effect on the photochemical formation potential of tropospheric ozone (POCP).

The results – resource use – show that the use of non-renewable primary energy resources is dominating over the use of renewable primary energy resources in all analysed phases. The analysed waste categories show that most of the occurring waste is non-hazardous waste.

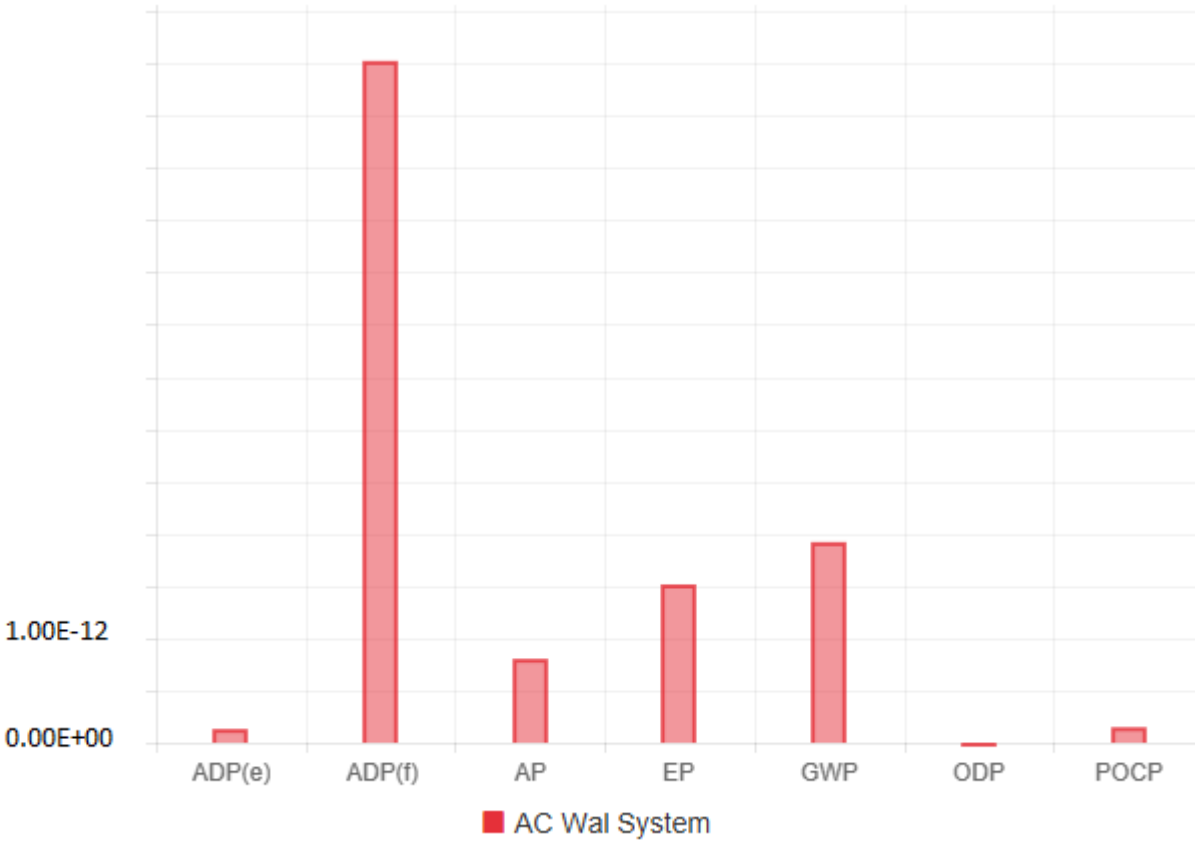

Figure 1: Normalization of the AC Wall System on the reference area Europe

7. References

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