

ENVIRONMENTAL-PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	ACO Ahlmann SE & Co. KG
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Valid to	21.12.2027

ACO gravel grid eco ACO Ahlmann SE & Co. KG

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ECO PLATFORM

EPD
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ACO

1. General Information

ACO Ahlmann SE & Co. KG

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-ACO-20220221-IBA1-EN

This declaration is based on the product category rules:

Permanent way materials for outdoor traffic routes, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

22.12.2022

Valid to

21.12.2027

Dipl.-Ing Hans Peters
(chairman of Institut Bauen und Umwelt e.V.)

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

ACO gravel grid eco

Owner of the declaration

ACO Ahlmann SE & Co. KG
Am Ahlmannkai -
24782 Büdelsdorf
Germany

Declared product / declared unit

1m² of the product ACO gravel grid eco, without filling material

Scope:

This EPD refers to 1 m² of the ACO gravel grid eco and is valid for four product variants (eco grey, eco black, eco S and eco M, without filling material). The product is manufactured in Büdelsdorf, Germany. The Life Cycle Assessment is based on data covering the reference year 2022 (from January to May). The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804 bezeichnet*.

Verification

The standard EN 15804 serves as the core PCR	
Independent verification of the declaration and data according to ISO 14025:2011	
<input type="checkbox"/>	internally
<input checked="" type="checkbox"/>	externally

Prof. Dr. Birgit Grahl,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The ACO

gravel grid eco (ACO Kiesstabilisierung eco grey and black article no. 281095 and 281092, ACO Self® Kieswabe eco S and M article no. 281090 and 281091) is used for the simultaneous unsealing and stabilisation of gravel surfaces. The ACO

gravel grid eco is an ecological outdoor reinforcement system that on the one hand,

is used to stabilise gravel and chippings in an environmentally friendly and visually appealing way and, on the other hand, allows rainwater to seep away

naturally directly onto the surface of the property.

Properly laid, a barrier-free, stable and 100% water-permeable surface is created, that can be walked on and driven over. This prevents ponding. The honeycomb structure of the mats holds the gravel securely in place when, for example, pedestrians, cyclists or cars move over the surface. Wheel tracks of any kind are avoided and less gravel is needed compared to loose stones. An individual design is possible with fine chippings or decorative gravel.

The integrated 100% water-permeable geotextile (polypropylene) is untearable connected to the grid. This means that the gravel cannot undermine the product and stays in place. Furthermore, weeds cannot root through the geotextile. The overlap of the geotextile is optimised for laying the ACO gravel grid eco.

The honeycombs are made of 100% recycled polypropylene (post-consumer recycled plastic) and the entire product was awarded the "Blue Angel" in 2021.

Using a patented injection moulding process, the ACO gravel grid eco is produced by ACO in Germany.

For the use and application of the product, the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

Please select one of the following options and delete the header of the selected [alternative]:

[Alternative 1a: Product according to the CPR based on a hEN]:

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration EN xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 1b: Products according to the CPR based on an ETA]:

For the placing of the product on the market in the European Union/European Free Trade Association /EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011 (CPR) applies. The product needs a declaration of performance taking into consideration ETA no. xyz:date, title and the CE-marking.

For the application and use the respective national provisions apply.

[Alternative 2a: Product not harmonised in accordance with the CPR but in accordance with other provisions for harmonisation of the EU]:

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the following legal provisions apply:

- Directive no. xyz: date, title
- Regulation no. xyz: date, title
- and the harmonised standards based on these provisions:
- EN xyz: date, title

The CE-marking takes into account the proof of conformity with the respective harmonized standards based on the legal provisions above.

For the application and use the respective national provisions apply.

[Alternative 2b: Product harmonized as well in accordance with the CPR as with other provisions for harmonisation of the EU]:

For the placing of the product on the market in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) the Regulation (EU) No. 305/2011/ (CPR) and the following other provisions for harmonisation apply:

- Directive (EU) xyz: date, title
- Regulation (EU) no. xyz: date, title

The product needs a declaration of performance in accordance with the CPR taking into consideration /EN xyz: date/, title or /ETA no. xyz/:date, title respectively and the CE-marking.

The CE-marking for the product takes into account the Declaration of Performance in accordance with the CPR and the proof of conformity with the following harmonised standards or based on the other provisions for harmonisation:

- EN xyz: date, title
- Source, date, title

For the application and use the respective national provisions apply.

[Alternative 3: Product for which no legal provisions for harmonisation of the EU exist]:

For the use and application of the product the respective national provisions at the place of use apply, in Germany for example the building codes of the federal states and the corresponding national specifications.

2.2 Application

The ACO gravel grid eco can be used in a variety of ways in the design of unsealed outdoor areas with a slope of up to 10%, such as garden paths and terraces, municipal landscaping (e. g. parks, cemeteries), seating areas, courtyard areas, parking spaces, access roads and driveways.

The ACO gravel grid is both walkable and in its installed state drivable by bicycle, wheelchair, motorbike and car with a load of up to 300 t/m² (according to DIN EN 1991-1-1). ACO gravel grid eco is approved for vehicles with an axle load of 2.2 t and a max. total weight of 3.5 t.

2.3 Technical Data

The technical specifications of the products within the scope of the EPD shall be listed, including the reference to the test methods/test standards for each specification.

For products with CE marking, the technical specifications must be specified in accordance with information in the declaration of performance. The properties relevant to the product should be specified in the table below. If no information is given for properties, an explanation must be given in the background report to the EPD as to why the property is not relevant to the product.

Constructional data

Name	Value	Unit
Gross density acc. DIN EN ISO 845	910	kg/m ³
Deviation of the dimensions (acceptable), acc. DIN 16742 TG5	3	mm
Permissible difference of the two diagonals (only for rectangular blocks with sizes of over 300 mm.), acc. DIN 16742 TG5	5	mm
Pressure stable, acc. DIN EN 1991-1-1	300	t/m ²
Tensile elastic modulus, acc. DIN EN ISO 527-1	1100	MPa
UV-stable	UV-stable	-
Live load (axle load 2.2 t and max. total weight 3.5 t)	approved	-

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

2.4 Delivery status

The dimensions (l x w x h) of the ACO gravel grid eco are as follows:

eco grey and black 120 x 160 x 3 cm

eco M: 120
x 80 x 3 cm

eco S: 80
x 60 x 3 cm

The products are delivered on euro-pallets with total weight per pallet of approx. 70 kg and dimensions 120 x 80 x 117 cm (l x w x h).

2.5 Base materials/Ancillary materials

The ACO gravel grid eco is made completely of polypropylene with 96 M.-% post-consumer recycling polypropylene for the honeycombs and 4 M.-% primary polypropylene for the geotextile.

This product/article/at least one partial article contains substances listed in *the candidate list* (date: 10.06.2022) exceeding 0.1 percentage by mass: **no**

This product/article/at least one partial article contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on *the candidate list*, exceeding 0.1 percentage by mass: **no**

Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) *Ordinance on Biocide Products No. 528/2012*): **no**

2.6 Manufacture

The ACO gravel grid eco is produced using an injection moulding process at the production site in Germany, Büdelsdorf. The polypropylene granules are melted in an extruder and the product is formed by injection moulding. During injection moulding, the product is actively cooled. After forming the product is passively cooled. The product is then demoulded and palletised.

The ACO Ahlmann SE & Co. KG production site is certified according to the *ISO 9001* quality management system.

2.7 Environment and health during manufacturing

During the manufacturing process, no environmentally hazardous or harmful emissions are produced. The product is made completely of polypropylene and there are no mixtures of materials. The production losses are fully recycled.

The ACO Ahlmann SE & Co. KG production site is certified according to the *ISO 50001* energy management system and *ISO 14001* environmental management system.

2.8 Product processing/Installation

The subfloor profile must be determined according to local conditions and with a view to suitability for the anticipated load. For detailed processing steps regarding the different applications (walkable and drivable), please refer to the installation instructions. Generally, a levelled sand layer over a crushed stone layer is required. For the use of footpaths and cycle paths, the gravel layer may be omitted. In any case, the soil structure must be mechanically compacted (e. g. vibrating plate compactor).

The mats are laid staggered on the compacted sand layer. It is advantageous to lay the mats in a bond, preferably across the direction of travel. The ACO gravel grid eco can be laid on surfaces with a slope of up to 10%. From a slope of 5%, additional ground nails must be used. The ACO gravel grid eco is then filled with gravel and compacted.

For maximum longevity the ACO gravel grid eco should always be completely covered with a gravel layer of approx. 1.5 to 2 cm.

2.9 Packaging

The ACO gravel grid eco is palletised on a euro-pallet and wrapped with polyethylene foil. The edges are secured with cardboard.

2.10 Condition of use

No unusual material changes in the state of installation are known for the



materials used in the ACO gravel grid eco. The used materials polypropylene and recycled polypropylene are UV-stabilised and weather-resistant. The ACO gravel grid eco is resistant to engine oils and fuels, for example.

2.11 Environment and health during use

There are no known negative interactions between the ACO gravel grid, the environment and health. ACO gravel grids help to create unsealed drivable surfaces and support the natural water cycle.

The ACO gravel grid eco is a 100% water-permeable product. The infiltration capacity depends on the condition of the soil and not on the product.

2.12 Reference service life

The ACO gravel grid eco is a long-lasting product. The polypropylene materials used have a service life of 100 years. Due to the stresses in the installed state and based on the service life data of selected components from the "Institut für Erhaltung und Modernisierung von Bauwerken e. V. (IEMB 2008)", the reference service life corresponds to 20 years. Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

2.13 Extraordinary effects

Fire
Information on the fire performance is not relevant as the product is only used outdoors.

Water
ACO gravel grids support natural water circulation as the declared products are 100% water-permeable. Furthermore, it contributes to the reduction of water-impermeable surfaces and thus to the reduction of flooding.

The materials of the declared products are selected in such a way that, when properly installed, they do not release water-soluble substances into the environment that could lead to the contamination of water bodies according to *DIN EN ISO 71-3*

and *DIN EN 62321-3-1*.

Mechanical destruction

If installed and used properly, the top layer of 1.5 to 2 cm protects the ACO gravel grid eco mats. In the event of unforeseen mechanical destruction, the ACO gravel grid eco can be replaced and recycled.

2.14 Re-use phase

Sustainable recycling is possible with the ACO gravel grid eco. It is made completely of polypropylene, which consequently does not require a hazardous waste disposal. The mats can be added back to the recycling system without prior separation. The top layer protects the product from environmental influences, so that reuse is conceivable.

2.15 Disposal

The waste key codes in accordance with the European Waste Catalogue (EWC) are listed below.

Product waste
EWC 17 02 03 Plastic

Packaging waste

EWC 15 01 02 Plastic packaging
EWC 15 01 03 Wooden packaging

2.16 Further information

Further information about the company, products and contact details can be found on the following websites:

English
<https://www.aco.com/en/>
<https://www.buildingmaterial.aco>

German
<https://www.aco-hochbau.de>
<https://www.aco.shop/de/de/hochbau>

3. LCA: Calculation rules

3.1 Declared Unit

The declared unit is 1 m², with 1.44 kg/m².

Declared unit

Name	Value	Unit
Declared unit	1	m ²
Grammage	1.44	kg/m ²

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

3.2 System boundary

The type of the EPD is "cradle-to-gate" with options. The modules considered in the Life Cycle Assessment are modules A1-A3, A4, A5, C and D. The declaration for Module B was excluded as the product does not cause any environmental impacts during its service life.

Modules A1-A3

The product stage involves raw material supply, the transport of the raw materials and the manufacturing process of injection moulding, including all energy and water consumption during manufacturing. The production of the packaging is also

included in module A3.

For the environmental impact, the use of green electricity was calculated. The proportion of the electricity demand covered by green electricity in the total electricity demand is 100%.

Module A4

This module considers the environmental impact of transport from the production site to the construction site.

Module A5

The installation is indicated without the filling material and sand or gravel for the underground preparation, as different quantities are required for the installation depending on the subgrade and the application of the load class. The environmental impacts of the incineration of plastic, cardboard and wood packaging are indicated.

Module C1

The deconstruction of the product is done manually, therefore no energy is needed.

Module C2

This module includes the transport to waste treatment.

Module C3

This module includes the environmental impacts of waste



treatment of the product at the end of life. Two scenarios were declared.

Module C3/1

100% recycling of the product.

Module C3/2

100% incineration of the product and energy recovery.

Module C4

No landfilling scenario is considered for the Life Cycle Assessment, so this module is declared zero.

Module D

According to module C3, two scenarios for module D are declared.

The potential benefits for energy recovery from the incineration of packaging material in module A5 are declared in both scenarios.

Module D/1

This module includes potential benefits for the recycling of primary polypropylene, but no benefits for recycled polypropylene are declared.

Module D/2

This module includes potential benefits from energy recovery of the incineration of the product.

3.3 Estimates and assumptions

The recycling polypropylene is declared as secondary material and modelled as a burden-free input. Therefore, no benefits are declared in module D/1 for recycling.

3.4 Cut-off criteria

A slip additive with 0.5 M.-% and UV stabilizers with 0.2 M.-% were not included in the Life Cycle Assessment. The safety data sheets of the slip additive and UV stabilizers show that there is no environmental hazard.

3.5 Background data

The model of the ACO gravel grid eco was made using the *GaBi ts* software. For the background data of the Life

Cycle Assessment the database *ecoinvent 3* (version 3.6) was used.

3.6 Data quality

The data was compiled product-specifically and under consistent methodical and boundary conditions. The data quality for the foreground data can be described as good, and the data quality for the background data can be described as mean because some data sets are older than 10 years.

3.7 Period under review

The foreground data refers to the manufacturing process for the year 2022 (January to May). The data refers to an average of this time period and can be transferred as an average value to a whole year.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Unbekannt

3.9 Allocation

During the manufacturing process, no co-products are generated. Input and output flows are all allocated to the calculated product system. No allocation in the foreground data for the considered product system is necessary. Information about allocations of the background data can be found in the documentation of the data sets for the *ecoinvent 3* database.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account.

The used background database has to be mentioned.

4. LCA: Scenarios and additional technical information

Characteristic product properties

Information on biogenic carbon

The product does not contain biogenic carbon. The packaging (euro-pallet and cardboard) contains 0.09 kg biogenic carbon for the declared unit of 1 m² ACO gravel grid eco. In module A5 the biogenic carbon of the packaging leaves the product system.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.09	kg C

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

Transport from the gate to the site (A4)

Name	Value	Unit
Transport distance	100	km
Capacity utilisation (including empty runs)	67	%

Assembly (A5)

Name	Value	Unit
PE foil (*46 MJ/kg)	0.009	kg
Cardboard (*18 MJ/kg)	0.1	kg
Euro-pallet (*18 MJ/kg)	0.1	kg

*Heating value

Reference service life

Name	Value	Unit
Reference service life (according to IEMB, see § 2.12)	20	a

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by BNB is declared.

End of life (C1-C4)



Name	Value	Unit
Collected separately waste type waste type	1.44	kg
Recycling (C3/1)	1.44	kg
Energy recovery (C3/2)	1.44	kg
Waste for disposal C4	0	kg
Transport distance	50	km
Capacity utilisation (including empty runs)	67	%

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

In D/1 the potential benefit of the recycling of the primary polypropylene (geotextile) and the incineration of the packaging is declared. In module D/2 the potential benefit of the energy recovery for the incineration of the product and the packaging is declared.

5. LCA: Results

In the table "Description of the system boundary", all declared modules are indicated with an "X". As default the modules B3, B4, B5 are marked as "MNR" module not relevant. Module B is not relevant for the product system, so modules B1, B2, B6 and B7 are marked as "ND" not declared. The categories of waste disposed are marked as "ND", because the waste categories cannot be declared from the datasets of the *ecoinvent 3.6* database.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	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	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m² ACO gravel grid eco

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4	D/1	D/2
GWP-total	kg CO ₂ eq	2.48E-01	2.28E-02	3.19E-01	0	9.38E-03	5.3E-01	3.43E+00	0	-1.71E-01	-1.16E-01
GWP-fossil	kg CO ₂ eq	5.44E-01	2.27E-02	2.6E-02	0	9.37E-03	5.32E-01	3.43E+00	0	-1.69E-01	-1.14E-01
GWP-biogenic	kg CO ₂ eq	-2.96E-01	1.72E-05	2.93E-01	0	7.1E-06	-2.22E-03	2.41E-04	0	-1.79E-03	-2.03E-03
GWP-luluc	kg CO ₂ eq	5.55E-04	7.22E-06	6.23E-07	0	2.97E-06	3.12E-04	2.06E-05	0	-1.31E-04	-1.59E-04
ODP	kg CFC11 eq	6.62E-08	5.59E-09	2.6E-10	0	2.3E-09	3.87E-08	8.14E-09	0	-9.22E-09	-1.14E-08
AP	mol H ⁺ eq	2.46E-03	7.32E-05	3.6E-05	0	3.01E-05	1.53E-03	7.91E-04	0	-6.26E-04	-4.56E-04
EP-freshwater	kg P eq	1.4E-04	1.68E-06	1.38E-06	0	6.92E-07	7.99E-05	9.76E-06	0	-5.85E-05	-6.8E-05
EP-marine	kg N eq	5.2E-04	1.64E-05	1.87E-05	0	6.75E-06	5.81E-04	4.45E-04	0	-1.1E-04	-8.04E-05
EP-terrestrial	mol N eq	5.27E-03	1.79E-04	1.81E-04	0	7.37E-05	4.61E-03	3.79E-03	0	-1.12E-03	-7.84E-04
POCP	kg NMVOC eq	1.83E-03	7.03E-05	4.44E-05	0	2.89E-05	1.5E-03	9.19E-04	0	-4.28E-04	-2.18E-04
ADPE	kg Sb eq	7.19E-06	4.05E-07	4.22E-08	0	1.67E-07	6.55E-06	1.14E-06	0	-1.13E-06	-5.11E-07
ADPF	MJ	1.14E+01	3.71E-01	3.04E-02	0	1.53E-01	5.51E+00	6.7E-01	0	-4.91E+00	-2.32E+00
WDP	m ³ world eq deprived	2.84E-01	1.81E-03	-1.74E-03	0	7.44E-04	1.21E-01	2.18E-01	0	-7.61E-02	-5.19E-02

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; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 m² ACO gravel grid eco

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4	D/1	D/2
PERE	MJ	4.9E+00	4.65E-03	4.86E+00	0	1.92E-03	2.58E-01	2.37E-02	0	-2.25E-01	-2.63E-01
PERM	MJ	3.24E+00	0	-3.24E+00	0	0	0	0	0	0	0
PERT	MJ	9.76E+00	4.65E-03	6.36E-04	0	1.92E-03	2.58E-01	2.37E-02	0	-2.25E-01	-2.63E-01
PENRE	MJ	8.63E+00	3.71E-01	4.44E-01	0	1.53E-01	7.68E+00	3.02E+00	0	-4.91E+00	-2.32E+00
PENRM	MJ	2.76E+00	0	-4.14E-01	0	0	-2.35E+00	-2.35E+00	0	0	0
PENRT	MJ	1.14E+01	3.71E-01	3.04E-02	0	1.53E-01	5.51E+00	6.7E-01	0	-4.91E+00	-2.32E+00
SM	kg	1.41E+00	0	0	0	0	0	0	0	5.16E-02	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0
FW	m ³	6.61E-03	4.2E-05	-4.05E-05	0	1.73E-05	2.83E-03	5.07E-03	0	-1.77E-03	-1.21E-03

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

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 m² ACO gravel grid eco

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4	D/1	D/2
HWD	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
NHWD	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

RWD	kg	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	1.61E-02	0	0	0	0	1.44E+00	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	3.48E-01	0	0	0	1.8E-01	0	0	0
EET	MJ	0	0	6.97E-01	0	0	0	3.52E-01	0	0	0

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; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:

1 m² ACO gravel grid eco

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3/1	C3/2	C4	D/1	D/2
PM	Disease incidence	3.48E-08	2E-09	3.58E-10	0	8.22E-10	2.65E-08	3.74E-09	0	-3.66E-09	-1.33E-09
IR	kBq U235 eq	5.58E-02	1.88E-03	6.9E-05	0	7.75E-04	2.87E-02	2.08E-03	0	-2.98E-02	-3.68E-02
ETP-fw	CTUe	1.13E+01	3.07E-01	5.59E-02	0	1.26E-01	6.09E+00	7.2E+00	0	-1.34E+00	-1.25E+00
HTP-c	CTUh	2.81E-10	7.14E-12	8.99E-12	0	2.94E-12	5.64E-10	2.99E-10	0	-3.91E-11	-3.06E-11
HTP-nc	CTUh	6.61E-09	2.8E-10	4.58E-10	0	1.15E-10	7.67E-09	1.18E-08	0	-1.26E-09	-1.05E-09
SQP	SQP	3.82E+01	4.22E-01	9.34E-03	0	1.74E-01	4.22E+00	2.06E-01	0	-3.46E-01	-3.74E-01

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”.

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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”.

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

6. LCA: Interpretation

The LCA results of the potential environmental impacts of the ACO gravel grid eco show the highest relevance in fossil resource consumption (ADPF) in module A1-A3 with 11.39 MJ and in module C3/1 with 5.51 MJ. The second highest relevance is the fossil greenhouse potential with 0.544 kg CO₂-eq. in modules A1-A3 and 0.532 and 3.43 kg CO₂-eq. in modules C3/1 and C3/2, respectively. This is followed by water consumption with 0.2835 m³ in modules A1-A3 and 0.121 and 0.218 m³ in modules C3/1 and C3/2, respectively. The relevance of ozone depletion and mineral resource

consumption is particularly low. All other parameters of the core indicators follow the scheme with the highest environmental impacts in A1-A3 followed by module C3.

The potential environmental impacts of the ACO gravel grid eco in modules A1-A3 result mainly from the raw material supply of the PP geotextile from primary material use and the transport of the raw materials in A2. Electrical energy has a minor impact compared to the raw material supply and the impact is further reduced as green electricity is used in the product system.

7. Requisite evidence

Eluate analysis was carried out in accordance with *DIN EN 71-3* and *DIN EN 62321-3-1*. All parameters measured there were below the migration limits (test report *ASO-PA B202004*).

7.1 Radioactivity

[Measurement of the nuclide content in Bq/kg for Ra-226, Th-232, K-40. In Germany, there are currently no statutory limit values specified for assessing the radioactivity of building materials. Assessment can be performed on the basis of the - EU Commission "Radiation Protection 112" document

- OENORM 5200

- Nordic Countries' Recommendation 2000 7.2 Leaching
For outer components: Eluate analysis in accordance with DIN 38414, Part 4 or the trough method in accordance with the LAGA Directive EW 98 T. The method applied must be documented.

Measuring agency / Protocol / Date / Result
If necessary, explain why this is not relevant.

8. References

Blue Angel

The Blue Angel (Der Blaue Engel) is the ecolabel of the German federal government. "Zeichenbenutzungsvertrag Nr. 35974 zur DE-UZ 30a Ausgabe 2019", label dated 27.08.2021. Blue Angel | The German Ecolabel (blauer-engel.de)

Candidate List of SVHC

European Chemicals Agency (ECHA) Candidate List of Substances of Very High Concern (SVHC) for Authorisation <https://echa.europa.eu/candidate-list-table> (dated 10.06.2022)

DIN 16742

DIN 16742:2013-10, Plastics moulded parts - Tolerances and acceptance conditions

DIN EN 1991-1-1-1

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DIN EN 62321-3-1

DIN EN 62321-3-1:2014-10, VDE 0042-1-3-1:2014-10, Determination of certain substances in electrotechnical products - Part 3-1: Screening - Lead, mercury, cadmium, total chromium and total bromine by X-ray fluorescence spectrometry (IEC 62321-3-1:2013); German version EN 62321-3-1:2014

DIN EN 71-3

DIN EN 71-3:2021-06, Safety of toys - Part 3: Migration of certain elements; German version EN 71-3:2019+A1:2021

DIN EN ISO 527

Plastics - Determination of tensile properties - Part 1: General principles (ISO 527-1:2019)

DIN EN ISO 845

DIN EN ISO 845:2009-10, Cellular plastics and rubbers - Determination of apparent density (ISO 845:2006)

EN 15804

EN 15804:2012+A1:2013, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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EWC

The European Waste Catalogue, Commission Decision 2000/532/EC of the European Parliament and of the Council. "Abfallverzeichnis-Verordnung vom 10. Dezember 2001 (BGBl. I S. 3379), die zuletzt durch Artikel 1 der Verordnung vom 30. Juni 2020 (BGBl. I S. 1533) geändert worden ist".

IBU

2021

General

Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021. www.ibu-epd.com

IEMB 2008

Nutzungsdauerangaben von ausgewählten Bauteilen und Bauteilschichten des Hochbaus für den Leitfaden „Nachhaltiges Bauen“ (Information on the service life of selected components and component layers in building construction for the "Sustainable Building" guideline), p. 113, No. 1299, Institut für Erhaltung und Modernisierung von Bauwerken e. V., TU Berlin (2008)

ISO 14025

EN ISO 14025:2011, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

ISO 14001

DIN EN ISO 14001:2015-11, Environmental management systems - Requirements with guidance for use (ISO 14001:2015)

ISO 50001

DIN EN ISO 50001:2018-12, Energy management systems - Requirements with guidance for use (ISO 50001:2018)

ISO 9001

DIN EN ISO 9001:2015-11, Quality management systems - Requirements (ISO 9001:2015)

KBA 2020

Krafftahrtbundesamt, Statistik zur

Güterbeförderung, 2020,

<https://www.kba.de/DE/Statistik/Kraftverkehr/deutscherLastkraftfahrzeuge>

Ordinance on Biocide Products

European Chemicals Agency (ECHA)

<https://echa.europa.eu/regulations/biocidal-products-regulation/understanding-bpr>

<https://echa.europa.eu/regulations/biocidal-products-regulation/legislation> (dated 10.06.2022)

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Software/database

Software GaBi ts

Database ecoinvent 3, Swiss Center of Life Cycle Inventories, Version 3.6, 2019

Test

report ASO-PA B202004

Test report ASO-PA

B202004 according to DIN EN 71-3 and DIN EN 62321-3-1, Institute Analytik

Service Obernburg ASO, dated 25.11.2020

The literature referred to in the Environmental Product Declaration must be listed in full. Standards already fully quoted in the EPD do not need to be listed here again.

The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.



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