ENVIRONMENTAL PRODUCT DECLARATION

According to ISO 14025 and EN 15804+A2

Declaration Holder	Federal Association of the Aerated Concrete Industry
Editor	Institute for Building and Environment (IBU)
Program Holder	Institute for Building and Environment (IBU)
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Aerated concrete

Federal Association of the Aerated Concrete Industry

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1. General Information

Federal Association of the Aerated Concrete Industry

Program holder

IBU – Institute for Building and Environment e.V.

Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-BPV-20230453-IBG3-DE

This declaration is based on the product category rules:

Aerated concrete, August 1, 2021
(PCR tested and approved by the Independent Expert Council (SVR))

Issue date

12.12.2023

Valid until

24.10.2028

Dipl.-Ing. Hans Peters
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Aerated concrete

Holder of the declaration

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Germany

Declared product/declared unit

1 m³ of unreinforced aerated concrete with an average bulk density of 428 kg/m³.

Scope:

The life cycle assessment is based on consumption data from member companies of the German Aerated Concrete Industry Association (Bundesverband Aerated Concrete Industry e.V.) with 11 aerated concrete plants and the Association of Building in White e.V. with 10 aerated concrete plants, using data from 2021.The production volume of these aerated concrete plants accounts for over 80% of the German market..

The holder of the declaration is liable for the underlying information and evidence; IBU assumes no liability with regard to manufacturer information, life cycle assessment data and evidence.

The EPD was created according to the specifications of EN 15804+A2. The standard is referred to below as EN 15804.

Verification

The European standard EN 15804 serves as the core PCR
Independent verification of declaration and information according to ISO 14025:2011
☐ intern ☒ extern

Matthias Klingler,
(Independent Verifier)

2. Product

2.1 Product description/product definition

The products mentioned are unreinforced products of various formats made of aerated concrete. Aerated concrete belongs to the group of porous, steam-cured lightweight concretes. Regulation (EU) No. 305/2011 (CPR) applies to the placing of the product on the market within the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance in accordance with DIN EN 771-4: 2015-11, Specifications for masonry units - Part 4: Aerated concrete units, and the CE marking. The respective national regulations apply to its use.

2.2 Application

Unreinforced products for masonry, monolithic, load-bearing, and non-load-bearing walls. Direct contact with water is avoided by design.

2.3 Technical data

See the declaration of performance for the respective product. General information is provided in the table below.

Structural technical data

Designation	Value	Unit
Bulk density	250 - 800	kg/m^3
Compressive strength	1.6 - 10	N/mm^2
Tensile strength	0.24 - 1.2	N/mm^2
Flexural tensile strength (longitudinal)	0.44 - 2.2	N/mm^2
Modulus of elasticity	750 - 3250	N/mm^2
Equilibrium humidity at 23 °C, 80 %	< 4	M.-%
Shrinkage: Total value of drying shrinkage according to DIN EN 680	≤ 0.4	mm/m
Thermal conductivity according to EN 12664	0.07 - 0.18	W/(mK)
Water vapor diffusion resistance factor according to DIN 4108-4	5/10	-
Sound insulation according to DIN 4109-32 for m' ≤ 150 [kg/m²]	32-48	[dB]
Sound insulation according to DIN 4109-32 for m' > 150 [kg/m²]	48-56	[dB]

Performance values of the product according to the declaration of performance with regard to its essential characteristics in accordance with DIN EN 771-4: 2015-11, Specifications for masonry units - Part 4: Aerated concrete units.

2.4 Delivery condition

Products according to DIN 20000-404 and DIN 4166
Formats: L x W x H
L = 304–999 mm
W = 50–500 mm
H = 124–624 mm

2.5 Raw materials/auxiliaries

Designation	Wert	Einheit
Quartz sand	50–70	M.-%
Cement	15–30	M.-%
Quicklime	10–20	M.-%
Anhydrite/Gypsum	2–5	M.-%
Aluminum	0,05–0,1	M.-%
Formwork oil auxiliary	-	

In addition, 50–75 mass% water (based on the solids) is used.

Quartz sand: The quartz sand used is a natural raw material containing, in addition to the main mineral quartz (SiO2), natural secondary and trace minerals. It is an essential component for the hydrothermal reaction during steam curing.

Cement: Gem. EN 197-1; Cement serves as a binding agent and is primarily made from limestone marl or a mixture of limestone and clay. The natural raw materials are fired and then ground.

Quicklime: According to EN 459-1; quicklime serves as a binding agent and is produced by burning natural limestone.

Anhydrite/Gypsum: According to EN 13279-1; The sulfate carrier used serves to influence the setting time of the aerated concrete and comes from natural deposits or is produced technically.

Aluminum: Aluminum powder or paste serves as a porosity agent. The metallic aluminum reacts in an alkaline environment, releasing hydrogen gas, which forms the pores and escapes after the blowing process is complete.

Water: The presence of water is essential for the hydraulic reaction of the binders. Water is also necessary to create a homogeneous suspension.

Formwork oil:
Formwork oil is used as a release agent between the mold and the aerated concrete mass. It contains PAH (polycyclic aromatic hydrocarbon)-free mineral oils with the addition of long-chain additives to increase viscosity. This prevents sagging in the mold and enables economical use.

The product/article/at least one sub-article contains substances on the ECHA Candidate List of Substances of Very High Concern (SVHC) above 0.1% by mass: no.

The product/article/at least one sub-article contains other CMR substances of category 1A or 1B that are not on the Candidate List, above 0.1% by mass in at least one sub-article: no.

Biocidal products have been added to this construction product or it has been treated with biocidal products (it is therefore a treated article within the meaning of the Biocidal Products Regulation (EU) No. 528/2012): no.

2.6 Production

Ground quartz sand is mixed with quicklime, cement, a small amount of a sulfate carrier in the form of gypsum or anhydrite, aluminum powder or paste, and production waste in the form of waste sludge (unhardened aerated concrete cuttings mixed with water) and/or aerated concrete rubble/flour (from hardened aerated concrete) in a mixer with the addition of water to form an aqueous suspension. The suspension is then poured into casting molds. The water slaked the lime while generating heat. The aluminum reacts in the alkaline environment. This produces gaseous hydrogen, which creates the pores in the mass and escapes without leaving any residue. The pores usually have a diameter of 0.5–1.5 mm and are filled exclusively with air. After the initial setting, semi-solid raw blocks are created, from which the aerated concrete products are machine-cut with high precision.

The final aerated concrete properties are formed during the subsequent steam curing process, which lasts 5–12 hours at approximately 190°C and a pressure of approximately 12 bar in a steam pressure vessel, the so-called autoclave. Here, calcium silicate hydrates, which correspond to the naturally occurring mineral tobermorite, are formed from the materials used. The reaction of the material is completed when it is removed from the autoclave. After the curing process is complete, the steam is used for subsequent autoclave cycles. The resulting condensate is used as process water. This saves energy and avoids environmental pollution with hot steam and wastewater.

Aerated concrete products are then stacked on wooden pallets and wrapped in recyclable polyethylene (PE) shrink films.

2.7 Environment and health during production
The regulations of the professional associations apply; no special measures are required to protect the health of employees.

2.8 Product processing/installation
Aerated concrete blocks are processed by hand; lifting equipment is required for products weighing more than 25 kg. Blocks are cut using band saws or by hand with carbide-tipped saws, as these generate virtually only coarse dust and no fine dust. High-speed tools, such as angle grinders, must be equipped with appropriate extraction systems due to the release of fine dust.

The aerated concrete products are connected to each other and to other standardized building materials using the thin-bed method according to EN 1996-1-1 in conjunction with EN 1996-1-1/NA and EN 1996-2 in conjunction with EN 1996-2/NA, with or without mortar for butt joints. In special cases, standard or lightweight mortar (11 kg mortar/m³) is also used. The aerated concrete components can be plastered, coated, or painted. Cladding with small-format elements or the installation of facing shells is also possible.

The regulations of the professional associations apply. No special environmental protection measures are required during the processing of the construction product.

2.9 Packaging
Packaging and pallets generated on the construction site must be collected separately. Polyethylene shrink wrap is recyclable. Uncontaminated PE wrap and reusable wooden pallets are taken back by building materials retailers (reusable pallets are refunded through the deposit system).

The film is then returned to the aerated concrete plants, which then forward it to the film manufacturers for recycling.

2.10 Usage status
As explained in 2.6 "Production," aerated concrete consists predominantly of tobermorite. It also contains unreacted starting components, primarily coarse quartz and possibly carbonates. Aerated concrete recarbonates over decades after leaving the autoclave. This has no adverse effect on the product properties. The pores are completely filled with air.

2.11 Environment and health during use
According to current knowledge, aerated concrete does not emit any harmful substances such as volatile organic compounds. The natural ionizing radiation emitted by aerated concrete products is extremely low, allowing unrestricted use of this material from a radiological perspective (see 7.1 "Radioactivity").

2.12 Reference service life
When used as intended, aerated concrete is durable indefinitely. The average service life of solid buildings made of aerated concrete is equivalent to that of solid buildings in general. Based on available data, the reference service life (RSL) is set at 80 years (Xella 2021).

2.13 Extraordinary Events

Fire
In case of fire, no toxic gases or vapors can be produced.

Fire protection according to EN 13501-1

Designation	Value
Building material class	A1
Smoke gas development	s1
Burning dripping	d0

Water
When exposed to water (e.g., flooding), aerated concrete reacts with a slightly alkaline reaction. No substances that could be hazardous to water are washed out.

Mechanical destruction
Not relevant.

2.14 Reuse phase
Aerated concrete waste from construction sites can be taken back by the aerated concrete plant via a return system (e.g., a big bag system). Other sorted aerated concrete waste can also be taken back by the aerated concrete manufacturers and recycled or reused. This is already practiced for production waste and construction site waste. This material is either processed into granulate products or added to the aerated concrete mix as a sand substitute.

Aerated concrete products are fully recyclable. Based on research results, processed aerated concrete demolition material can be used for various recycling paths: for example, for the bioactivation of aerated concrete and sand-lime brick recycling granules with methane-oxidizing bacteria to reduce methane emissions from municipal waste landfills (Fb 118 2015; Hlawatsch et al. 2018).

2.15 Disposal
According to the German Landfill Ordinance of 27 April 2009 (DepV), aerated concrete must be disposed of in Class I landfills (see 7.2 "Leaching Behavior").

Waste code according to EAKV: 17 01 01

2.16 Further information

Further information can be found at www.bv-porenbeton.de.

3. LCA: Calculation rules

3.1 Declared unit
The declared unit is 1 m³ of unreinforced aerated concrete with a bulk density of 428 kg/m³. This average bulk density was determined by dividing the total material input in the reference year and the production quantities of unreinforced aerated concrete.

To convert the results to one ton of aerated concrete, the LCA results can be divided by the bulk density (428 kg/m³) of the aerated concrete and multiplied by 1,000.

Declared unit

Designation	Value	Unit
Declared unit	1	m^3
Bulk density	428	kg/m^3
Conversion factor to 1 kg	0.00234	-
Conversion factor to 1 t	2.34	-

3.2 System boundary
EPD type: Cradle to gate with options.

Description of the life cycle phases:

Product stage (A1–A3)
Raw material provision and truck transport of raw materials to the factory. Production costs, particularly the provision and use of energy sources and auxiliary materials, as well as packaging materials. Treatment of production waste and wastewater. Allocation of all environmental impacts by mass between associated co-products (e.g., scrap for use and marketing as cat litter or oil binder) and the main product.

Stage of construction of the building (A4–A5)
Module A4: Truck transport to the construction site (100 km). Transport distance can be adjusted at the building level if necessary (e.g., for an actual transport distance of 200 km: multiply the life cycle assessment values by a factor of 2).

Module A5: Thermal packaging treatment and resulting credits in Module D. Waste wastage was not considered, as it depends heavily on the building context. Waste can be approximately estimated using the declared values for the production stage (e.g., 5% waste: multiply the life cycle assessment values by a factor of 0.05).

The installation of the products themselves is usually done manually (load-free).

Mortar is not included in this EPD.

Use stage (B1)
Recarbonation of reactive product components (e.g., CaO). A recarbonation rate of 95% is assumed (Walther 2022).

Disposal stage (C1–C4)
Module C1: Mechanical demolition (excavator).
Module C2: Truck transport to waste processing (50 km). Transport distance can be adjusted at the building level if necessary (e.g., for an actual transport distance of 100 km: multiply the life cycle assessment values by a factor of 2).
Module C3: (Material recycling scenario): Waste processing and material recycling as fill material (including credits for substitution of gravel in Module D).
Module C4: (Landfill scenario): Average emissions from landfill.

Credits and debits outside the system boundaries (D)
Credits from saved expenditures through substitution of gravel as backfill material (from module C3) and credits for energy substitution from packaging treatment.

3.3 Estimates and assumptions
The product system does not contain any important assumptions or estimates regarding the interpretation of the life cycle assessment results. A few auxiliary materials with a combined mass fraction of less than one percent of the total system were estimated using technologically similar upstream processes.

3.4 Cut-off rules
All data from the operational data collection, i.e., all raw materials used according to the recipe, the thermal energy used, as well as electricity and diesel consumption, were included in the life cycle assessment.

Specific transport distances were considered for all raw materials.

This also included material and energy flows with a share of < 1%.

The manufacture of the machinery, equipment, and other infrastructure required to produce the items under consideration was not included in the life cycle assessments.

It can be assumed that the neglected processes would have contributed less than 5% to the impact categories considered.

3.5 Background data
Zur Modellierung der Porenbeton-Herstellung wurde das von der Sphera Solutions GmbH entwickelte Software-System zur Ganzheitlichen Bilanzierung "GaBi 10.5" eingesetzt (*GaBi ts*). Im Sinne des Hintergrundsystems wurden GaBi Datensätze mit dem Content Update (CUP) 2021.1 verwendet.

3.6 Data quality
All background datasets relevant for production were taken from the GaBi 10.5 CUP 2021.1 (GaBi ts) software database. The last revision of the background data used was less than three years ago.

3.7 Period under review
The data basis of this life cycle assessment is based on data recordings for aerated concrete production from 2021 by member companies of the Federal Association of the Aerated Concrete Industry (Bundesverband Aerated Concrete Industry e.V.) with 11 aerated concrete plants and of the Association Building in White e.V. with 10 aerated concrete plants.

3.8 Geographical representativeness
Country or region in which the declared product system is manufactured and, where applicable, used and treated at the end of life: Germany

3.9 Allocation
During production, aerated concrete rubble is generated, which is further processed into aerated concrete granulate. The environmental impacts of aerated concrete block production and the rubble used to produce aerated concrete granulate were allocated by mass. The production process also generates aerated concrete rubble and aerated concrete powder, which are processed into

be returned to the production process (closed-loop recycling). This internal recycling was taken into account in the calculation.

3.10 Comparability
In principle, a comparison or evaluation of EPD data is only possible if all data sets to be compared were created according to EN 15804

The building context and product-specific performance characteristics must be taken into account. The software system for holistic assessment "GaBi 10.5" (GaBi ts) developed by Sphera Solutions GmbH was used to model the aerated concrete production process. GaBi datasets with the Content Update (CUP) 2021.1 were used as the background system.

4. LCA: Scenarios and further technical information

Characteristic product properties of biogenic carbon
The balance includes 2.087 kg of reusable wooden pallets (packaging material).
Note: 1 kg of biogenic carbon is equivalent to 44/12 kg CO2.

Information describing the biogenic carbon content at the factory gate

Designation	Value	Unit
Biogenic carbon in the product	-	kg
Biogenic carbon in the associated packaging (wooden pallet)	0.87	kg

The following technical information is the basis for the declared modules or can be used to develop specific scenarios in the context of a building assessment if modules are not declared (ND).

Transport to the construction site (A4)

Designation	Value	Unit
Liters of fuel	0.597	l pro 100 km
Transport distance	100	km
Capacity utilization (including empty runs)	61	%
Bulk density of the transported products	428	kg/m^3

Installation in the building (Module A5)
Packaging materials are thermally treated in Module A5. Credits from saved expenditures are allocated to Module D.

Use (B1)
See 2.10 Usage Condition and 2.12 Reference Service Life

Recarbonation rate

Designation	Value	Unit
Recarbonation rate (Walther 2022)	95	%

Reference service life

Designation	Value	Unit
Lifespan (Xella 2021)	80	a

End of life (C1–C4)

Designation	Value	Unit
Diesel consumption demolition (excavator) module C1	0.06	kg per decl. Unit
Transport distance for disposal/waste treatment (Module C2)	50	km
For recycling (Module C3, net flow)	415	kg
For landfill (Module C4)	428	kg

Further details on the scenarios can be found in Chapter 3.2 System Boundary.

5. LCA: Results

The following is a presentation of the environmental impacts for 1 m³ of unreinforced aerated concrete with a bulk density of 428 kg/m³. The modules marked with "x" in the overview according to EN 15804+A2 are addressed here; the modules marked with "MND" (module not declared) are not considered.
The following tables show the results of the indicators of the impact assessment, resource use, and waste and other output streams based on the declared unit.

STATEMENT OF SYSTEM BOUNDARIES (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Production stage			Stage of Construction of the building		Stage of use							Disposal stage				Credits and loads outside the System boundary
Raw material supply	Transport	Manufacturing	Transport from Manufacturer for Place of use	Assembly	Usage/Application	Maintenance	Repair	Substitute	Rrenewal	Energy consumption for operating the building	Water use for operating the building	Dismantling/demolition	Transport	Waste treatment	Elimination	Reuse, recovery or recycling potential
A1	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
X	X	X	X	X	X	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA – ENVIRONMENTAL IMPACTS according to EN 15804+A2: 1m³ of aerated concrete with a density of 428 kg/m³

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	kg CO_2-Äq.	2.07E+02	2.63E+00	5.75E+00	-8.01E+01	2.8E-01	1.31E+00	1.15E+00	6.5E+00	-3.21E+00
GWP-fossil	kg CO_2-Äq.	2.1E+02	2.58E+00	1.95E+00	-8.01E+01	2.77E-01	1.28E+00	1.14E+00	6.48E+00	-3.22E+00
GWP-biogenic	kg CO_2-Äq.	-2.87E+00		3.8E+00	0	4....13E-04	1.38E-02	2.94E-03	2.57E-04	1.32E-02
GWP-luluc	kg CO_2-Äq.	7.43E-02	2.14E-02	4.65E-05	0	2.18E-03	1.06E-02	6.26E-03	1.9E-02	-3.96E-03
ODP	kg CFC11-Äq.	4.73E-13	5.16E-16	6.45E-16	0	5.26E-17	2.56E-16	5.1E-15	2.52E-14	-2.19E-14
AP	mol H^+-Äq.	1.67E-01	2.77E-03	7.34E-04	0	1.34E-03	1.38E-03	1.07E-02	4.61E-02	-8.69E-03
EP-freshwater	kg P-Äq.	9.6E-05	7.76E-06	8.79E-08	0	7.92E-07	3.86E-06	2.6E-06	1.09E-05	-4.25E-06
EP-marine	kg N-Äq.	5.86E-02	8.85E-04	2.19E-04	0	6.26E-04	4.4E-04	5.27E-03	1.2E-02	-3.24E-03
EP-terrestrial	mol N-Äq.	6.4E-01	1.05E-02	3.48E-03	0	6.93E-03	5.22E-03	5.79E-02	1.32E-01	-3.55E-02
POCP	kg NMVOC-Äq.	1.71E-01	2.41E-03	6.05E-04	0	1.75E-03	1.2E-03	1.3E-02	3.63E-02	-9.31E-03
ADPE	kg Sb-Äq.	1.18E-05	2.32E-07	9.81E-09	0	2.36E-08	1.15E-07	1.26E-06	6.11E-07	-3.59E-07
ADPF	MJ	1.38E+03	3.48E+01	1.07E+00	0	3.55E+00	1.73E+01	2.16E+01	8.6E+01	-5.72E+01
WDP	m^3 Welt-Äq. entzogen	2.27E+01	2,42E-02	5.71E-01	0	2.47E-03	1.2E-02	1.92E-01	6.95E-01	-176E-01

GWP = Global Warming Potential; ODP = Stratospheric Ozone Depletion Potential; AP = Soil and Water Acidification Potential; EP = Eutrophication Potential; POCP = Tropospheric Ozone Formation Potential; ADPE = Abiotic Non-Fossil Resource Depletion Potential (ADP); ADPF = Abiotic Fossil Fuel Depletion Potential (ADP); WDP = Water Withdrawal Potential (Users)

RESULTS OF THE LCA – INDICATORS TO DESCRIBE THE USE OF RESOURCES according to EN 15804+A2: 1m³ of aerated concrete with a density of 428 kg/m³

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	1.4E+02	2E+00	3.15E+01	0	2.04E-01	9.95E-01	1.91E+00	1.16E+01	-5.97E+00
PERM	MJ	3.13E+01	0	-3.13E+01	0	0	0	0	0	0
PERT	MJ	1.72E+02	2E+00	2.07E-01	0	2.04E-01	9.95E-01	1.91E+00	1.16E+01	-5.97E+00
PENRE	MJ	1.36E+03	3.49E+01	2.89E+01	0	3.56E+00	1.74E+01	2.16E+01	8.6E+01	-5.72E+01
PENRM	MJ	2.78E+01	0	-2.78E+01	0	0	0	0	0	0
PENRT	MJ	1.38E+03	3.49E+01	1.07E+00	0	3.56E+00	1.74E+01	2.16E+01	8.6E+01	-5.72E+01
SM	kg	2.95E+01	0	0	0	0	0	0	0	4.16E+02
RSF	MJ	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0
FW	m^3	6.5E-01	2.29E-03	1.34E-02	0	2.34E-04	1.14E-03	5.59E-03	2.12E-02	-9.26E-03

PERE = Renewable primary energy as an energy carrier; PERM = Renewable primary energy for material use; PERT = Total renewable primary energy; PENRE = Non-renewable primary energy as an energy carrier; PENRM = Non-renewable primary energy for material use; PENRT = Total non-renewable primary energy; SM = Use of secondary materials; RSF = Renewable secondary fuels; NRSF = Non-renewable secondary fuels; FW = Net use of freshwater resources.

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1m³ of aerated concrete with a density of 428 kg/m³

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	kg	2.67E-07	1.84E-09	1.92E-10	0	1.88E-10	9.15E-10	1.25E-09	9.3E-09	-8.64E-09
NHWD	kg	2.19E+00	5.48E-03	3.5E-02	0	5.59E-04	2.72E-03	6.21E-03	4.29E+02	-1.73E+01

RWD	kg	3.64E-02	6.34E-05	5.94E-05	0	6.46E-06	3.5E-05	1.59E-04	9.03E-04	-4.83E-03
CRU	kg	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	4.28E+02	0	0
MER	kg	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	9.58E+00	0	0	0	0	0	0
EET	MJ	0	0	1.71E+01	0	0	0	0	0	0

HWD = Hazardous Waste to Landfill; NHWD = Non-Hazardous Waste to Be Disposed of; RWD = Radioactive Waste to Be Disposed of; CRU = Components for Reuse; MFR = Materials for Recycling; MER = Materials for Energy Recovery; EEE = Exported Energy - Electrical; EET = Exported Energy - Thermal

LCA RESULTS – additional impact categories according to EN 15804+A2-optional: 1m³ aerated concrete with a bulk density of 428 kg/m³

Indicator	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D
PM	Cases of illness	ND	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235-Äq.	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential occurrence of diseases due to particulate matter emissions; IR = Potential effect from human exposure to U235; ETP-fw = Potential Ecosystem Toxicity Comparator Unit; HTP-c = Potential Human Toxicity Comparator Unit (carcinogenic effect); HTP-nc = Potential Human Toxicity Comparator Unit (non-carcinogenic effect); SQP = Potential Soil Quality Index

Limitation note 1 – applies to the IR indicator: This impact category primarily addresses the potential impact on human health of low-dose ionizing radiation in the nuclear fuel cycle. It does not consider impacts resulting from potential nuclear accidents and occupational exposure, nor from the disposal of radioactive waste in underground facilities. Potential ionizing radiation from soil, radon, and some building materials is also not measured by this indicator.

Limitation note 2 – applies to the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP: The results of this environmental impact indicator must be used with caution due to high uncertainties in these results or limited experience with the indicator.

This EPD was created using a software tool.

6. LCA: Interpretation

The manufacturing phase (Modules A1–A3) is of utmost importance for the product's environmental profile. All impact categories, with the exception of GWP-biog., are dominated by the binders used.

The energy sources used continue to be of great importance for the environmental profile. Both the use of thermal energy and electrical energy make relevant contributions to all impact categories.

The biogenic global warming potential reflects the absorption of atmospheric carbon dioxide during plant growth in connection with packaging (wooden pallets).

Packaging makes moderate contributions to all impact categories.

Relevant contributions to the indicators of acidification, resource consumption (minerals and metals), and water consumption arise from the use of aluminum powder.

The upstream processes of the aggregates used make small contributions overall to all impact categories, even though they represent the largest fraction by mass.

7. Evidence

Manufacturer declarations exist stating that the raw material composition, manufacturing process, and product properties of the aerated concrete products mentioned have remained unchanged since the date of issue of the following certificates. The certificates are therefore fully valid.

7.1 Radioactivity

Method: Measurements of the nuclide content in Bq/kg, determination of the activity index I.
Summary report: BfS-SW-14/12, Salzgitter, November 2012.

Result: The samples were evaluated according to the European Commission's "Radiation Protection 112" (Radiological Protection Principles concerning the Natural Radioactivity of Building Materials, 1999). The determined index values I are in all cases lower than the exclusion level.

Therefore, no further controls are required. The natural radioactivity of this building material allows for unrestricted use from a radiological perspective.

7.2 Leaching behavior

The leaching behavior of aerated concrete is important for assessing its environmental impact after use during landfilling. LGA 2007, LGA 2011

Measuring point: LGA
Institute for Environmental Geology and Contaminated Sites GmbH, Nuremberg

Result: All criteria for disposal in Class I landfills according to the German Landfill Ordinance (DepV) of April 27, 2009, are met. According to Council Decision 2003/33/EC of December 19, 2002, aerated concrete is classified as "non-hazardous waste."

8. Literature references

Standards, guidelines and regulations

Biocidal Products Regulation
Regulation (EU) No 528/2012 concerning the making available on the market and use of biocidal products.

CPR
Construction Products Regulation: Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC..

DepV
Ordinance on Landfills and Long-Term Storage - Landfill Ordinance of April 27, 2009 (Federal Law Gazette I, p. 900); last amended by Article 7 V of November 26, 2010.

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DIN 20000-404
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EAKV
European Waste Catalogue EWC or 'European Waste Catalogue EWC' as amended by Commission Decision 2001/118/EC of 16 January 2001 amending Decision 2000/532/EC establishing a list of wastes.

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EN 1996-2
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