ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Xella Baustoffe GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-XEL-20250026-IBA1-EN
Issue date	11.03.2025
Valid to	10.03.2030

Ytong AAC PL

Xella Baustoffe GmbH

Institut Bauen und Umwelt e.V.

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Xella

1. General Information

Xella Baustoffe GmbH

Programme holder

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

Declaration number

EPD-XEL-20250026-IBA1-EN

This declaration is based on the product category rules:

Aereated Concrete, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

11.03.2025

Valid to

10.03.2030

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

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Ytong AAC PL

Owner of the declaration

Xella Baustoffe GmbH
Düsseldorfer Landstraße 395
47259 Duisburg
Germany

Declared product / declared unit

1 m³ of unreinforced autoclaved aerated concrete (Ytong®) with an average bulk density of 502 kg/m³.

Scope:

The life cycle assessment is based on the consumption data of the Polish Xella AAC plant in Sieradz and the database for 2023.
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*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Matthias Klingler,
(Independent verifier)

2. Product

2.1 Product description/Product definition

The products under review are unreinforced blocks of various formats made of autoclaved aerated concrete (AAC). AAC is classified as a porous, steam-cured, lightweight concrete. (EU) Directive No. 305/2011 (*CPR*) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a Declaration of Performance taking consideration of the *EN 771-4:2015, Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units* and CE marking. Use is governed by the respective national regulations.

2.2 Application

Unreinforced building blocks for masonry, monolithic, load-bearing and non-load-bearing walls. Direct contact with water is avoided for technical structure reasons.

2.3 Technical Data

See the Declaration of Performance for the respective product. The following table includes general data.

Structural data

Name	Value	Unit
Gross density	250 - 800	kg/m^3
Compressive strength	1.8 - 6	N/mm^2
Tensile strength	0.24 - 1.2	N/mm^2
Bending strength (longitudinal)	0.44 - 2.2	N/mm^2
Modulus of elasticity	750 - 3250	N/mm^2
Moisture content at 23 °C, 80%	< 4	M.-%
Shrinkage acc. to EN 680	< 0,2	mm/m
Thermal conductivity acc. to EN 12664	0.07 - 0.18	W/(mK)
Water vapour diffusion resistance factor acc. to EN 1745	5/10	-
Sound absorption acc. to DIN 4109-32 für m' ≤ 150 [kg/m²]	32-48	[dB]
Sound absorption acc. to DIN 4109-32 für m' > 150 [kg/m²]	48-56	[dB]

The product's performance values correspond with the Declaration of Performance in terms of its essential properties in accordance with *EN 771-4:2015, Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units.*

2.4 Delivery status

Masonry units acc. to *EN 771-4*.
L · W · H
L = 499 to 624 mm
W = 50 to 500 mm
H = 199 to 599 mm

2.5 Base materials/Ancillary materials

Name	Value	Unit
Sand	50–70	% by mass
Cement	15–30	% by mass
Unhydrated lime	8–20	% by mass
Anhydrite / Gypsum	2–6	% by mass
Aluminium	0.05–0.1	% by mass
Mould oil as an ancillary material		

50 - 75% water by mass (with reference to the solid materials) is also used.

Sand: The sand used is a natural raw material which contains quartz (SiO_2) as a primary mineral as well as natural minor and trace minerals. It is an essential base material for the hydrothermal reaction during steam curing.
Cement: In accordance with *EN 197-1*; cement serves as a binding agent and is largely manufactured from lime marl or a mixture of lime and clay. The natural raw materials are burned before being ground.
Unhydrated lime: In accordance with *EN 459-1*; unhydrated lime serves as a binding agent and is manufactured by burning natural lime.
Anhydrite / Gypsum: In accordance with *EN 13279-1*; the sulphate agent used serves towards influencing the curing time for the AAC and originates from natural reserves or is produced technically.
Aluminium: Aluminium powder or paste serves as a pore-forming agent. Metallic aluminium reacts in the alkaline environment, whereby gaseous hydrogen is formed which generates the pores and then vents after the expansion process.
Water: The availability of water is a fundamental basis for the hydraulic reaction undergone by the binding agents. Water is also required for manufacturing a homogeneous suspension.
Mould oil: Mould oil is used as a release agent between the mould and the raw AAC mixture. PAC (polycyclic aromatic carbons) are used – free mineral oils plus long-chain additives for increasing viscosity. This prevents it from running down in the mould and permits economical application.

The product/At least one partial product contains substances from the *ECHA list* of candidates of Substances of Very High Concern (SVHC) exceeding 0.1% by mass: no
The product/At least one partial product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1% by mass in at least one partial product: 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) Regulation on Biocide Products No. 528/2012)*: no

2.6 Manufacture

The ground quartz sand is mixed with unhydrated lime, cement, small quantities of a sulphate agent in the form of gypsum or anhydrite, and autoclaved aerated concrete powder (crushed or ground autoclaved aerated concrete) as production residue, with the addition of water and aluminium powder or paste, in a mixer to form an aqueous suspension and poured into casting moulds. The water slakes the lime under heat generation. The aluminium reacts in an alkaline environment, whereby gaseous hydrogen is formed which generates the pores in the raw mixture and vents without residue. The pores usually have a diameter of 0.5 – 1.5 mm and are exclusively filled with air. The initial binding process results in semi-solid ingots from which the autoclaved aerated concrete components are automatically cut at high accuracy. Cut-off material is slurried and fed back into production.
The final characteristics of the autoclaved aerated concrete are formed during the subsequent steam curing process over 6 to 12 hours at approx. 190 °C and pressure of approx. 12 bar in steam pressure chambers, so-called autoclaves, where the substances used form calcium silicate hydrates which correspond to the mineral tobermorite prevailing in nature. The

material reaction is concluded on removal from the autoclave. The steam is used for other autoclave cycles once the curing process is finished. The condensate incurred is used as process water. This saves energy and avoids pollution by hot steam and waste water.
AAC blocks are then stacked on wooden pallets and shrink-wrapped in recyclable polyethylene (PE) shrink film or stretch-wrapped in polypropylene (PP) film.

2.7 Environment and health during manufacturing
The applicable regulations of the professional liability associations apply; no special measures need to be taken to protect employee health.

2.8 Product processing/Installation
The processing of AAC blocks in accordance with Polish law is carried out by hand or using lifting equipment. Components are cut with band saws or by hand with carbide saws, as these practically only generate coarse dust and no fine dust.
The AAC blocks are connected to each other and to other standardized building materials using the thin-bed method in accordance with *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 butt joint mortar. The AAC components can be plastered, coated or painted. Cladding with small-format parts or the installation of facing formwork is also possible.
No special measures need to be taken to protect the environment during the processing of the building product. The national regulations must be observed.

2.9 Packaging
Packaging and pallets incurred on the building site must be collected separately. The PE shrink and PP stretch films are recyclable. The reusable wooden pallets are taken back by the building materials trade (remunerated deposit system), which returns them to the autoclaved aerated concrete plants.

2.10 Condition of use
As outlined under 2.6 'Manufacturing', autoclaved aerated concrete primarily comprises tobermorite. It also contains non-reacting starting components, primarily coarse quartz and possibly carbonates. Autoclaved aerated concrete recarbonates for decades after leaving the autoclave. This does not adversely affect the product properties. The pores are full of air.

2.11 Environment and health during use
In accordance with the current state of knowledge, autoclaved aerated concrete does not emit any harmful substances such as VOC, for example.
The naturally ionising radiation of autoclaved aerated concrete products is extremely low permitting unlimited use of this material from a radiological perspective (see 7.1 'Radioactivity').

2.12 Reference service life
Autoclaved aerated concrete displays unlimited resistance properties when used as designated. The average service life of solid buildings made of autoclaved aerated concrete corresponds to that of solid buildings in general. According to the available data, the reference service life (RSL) is set at 80 years (*Xella 2021*).

2.13 Extraordinary effects
Fire
In the event of a fire, no toxic gases or vapours can arise.

Fire safety acc. to EN 13501-1

Name	Value
Building material class	A1
Smoke gas development	s1
Burning droplets	d0

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

Mechanical destruction
Not of relevance.

2.14 Re-use phase
Sorted residual autoclaved aerated concrete can be taken back by the AAC manufacturers and reused or recycled. This has been practiced for production breakage for decades. This material is either processed as granulate products or added to the AAC mixture as a substitute for sand. AAC products are fully recyclable.
Based on research results, processed AAC demolition material can be used for various recycling paths: e.g. for the bioactivation of autoclaved aerated concrete and calcium silicate units (CSU) recycling granulates with methane-oxidising bacteria to reduce methane outgassing from domestic waste landfills (*Fb 118 2015, Hlawatsch et al., 2018*).

2.15 Disposal
In accordance with the *Directive 2008/98/EG*, autoclaved aerated concrete must be disposed of in Class I landfills (see 7.2 'Leaching').
Waste key as per *EWC*: 17 01 01

2.16 Further information
More information is available at www.xella.pl.

3. LCA: Calculation rules

3.1 Declared Unit
The declared unit is 1 m³ unreinforced autoclaved aerated concrete with a mean gross density of 502 kg/m³. The average gross density was determined by averaging the data from the factory production control (FPC) in the reference year.

Declared unit

Name	Value	Unit
Declared unit	1	m^3
Gross density	502	kg/m^3
Conversion factor to 1 kg	0.002	-

3.2 System boundary
Type of EPD: cradle to factory gate, with options

Description of the life cycle phases:

Product stage (A1-A3)
Raw material supply and truck transport of raw materials to the plant. Production expenses, in particular the provision and use of energy sources and auxiliary materials, as well as packaging materials Treatment of production waste and waste water.

Construction process stage (A4-A5)
Module A4: transport by truck to the construction site (100 km). Transport distance can be adjusted at building level if necessary (e.g. for 200 km actual transport distance: multiplication of the LCA values by a factor of 2).

Module A5: Thermal packaging treatment and ensuing credits in module D and D1. Offcuts were not taken into account, as they strongly depend on the building context. Offcuts can be estimated approximately via the declared values for the product stage (e.g. 5% offcuts: multiplication of the LCA values by a factor of 0.05).
Installation of the actual products is usually done manually (unencumbered).
Mortar is not considered in this EPD.

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

End-of-life stage (C1-C4)
Module C1: Mechanical demolition (excavator).
Module C2: transport by truck to waste processing (50 km). Transport distance can be adjusted at building level if necessary (e.g. for 100 km actual transport distance: multiplication of the LCA values by a factor of 2).
Module C3: (material recycling scenario): waste processing and material recycling as fill material (incl. credits for substitution of gravel in Module D).
Module C4: (landfilling scenario): average emissions from landfilling.Two alternative scenarios are declared in modules C3 and C4. The environmental loads of these modules must therefore not be added together.

Benefits and loads beyond the system boundaries (D)
Credits from saved expenses through substitution of gravel as fill 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 with regard to interpretation of the LCA results. Few auxiliary materials with a combined mass share of less than one per cent by mass of the total system were estimated with technologically similar upstream processes.

3.4 Cut-off criteria
All data from the operating data survey was taken into consideration in the analysis, i.e. all starting materials used according to the recipe, the thermal energy used, as well as electricity and diesel consumption.
Specific transport distances were considered for all raw materials.
Accordingly, material and energy flows accounting for a share < 1% were also considered.
The manufacture of machinery, plants and other infrastructure required for production of the items under review was not taken into consideration in the LCA.
It can be assumed that the processes ignored would have contributed less than 5% to the impact categories under review.

3.5 Background data
The software system for comprehensive analysis GaBi 10.5 (GaBi ts) developed by Sphera Solutions GmbH was used for modelling the manufacture of autoclaved aerated concrete. In terms of the background system, GaBi data sets with Content Update (CUP) 2021.1 were used.

3.6 Data quality
All of the background data sets of relevance for manufacturing were taken from the GaBi 10.5 CUP 2021.1 (GaBi ts) software database. The background data used was last revised less than 4 years ago.

3.7 Period under review
The data basis for this life cycle assessment is based on data recorded for AAC production in 2023 at the Sieradz plant in Poland.

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: Poland

3.9 Allocation
In addition to the declared quality class, the plant in question also produces AAC blocks with other properties. Raw and auxiliary materials are allocated by mass, taking the recipe into account (Walther, 2023).

During the production process, AAC waste and AAC powder are also incurred which are redirected to the production process (closed-loop recycling). This internal recycling was considered in the calculation.

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. In terms of the background system, GaBi data sets with Content Update (CUP) 2021.1 were used.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
The analysis includes 2.76 kg of returnable wooden pallets (packaging material).

Information describing the biogenic carbon content at the plant gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	1.13	kg C

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The following technical information forms the basis for the declared modules or canbe used for developing specific scenarios in the context of a buildingevaluation if modules are not declared (MND).

Transport to construction site (A4)

Name	Value	Unit
Litres of fuel	0.597	l/100km
Transport distance	100	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	502	kg/m^3

Construction installation process (A5)
Packaging materials are thermally treated in Module A5. The credits due to saved expenses are allocated to Module D.

Use (B1)
See 2.10 Condition of use and 2.12 Reference service life.

Name	Value	Unit
Recarbonation rate (Walther 2022)	95	%

Reference Service Life

Name	Value	Unit
Life Span (Xella 2021)	> 80	a

End-of-life (C1–C4)

Name	Value	Unit
Diesel consumption for demolition (excavator) Module C1	0,06	kg je dekl. Einheit
Transport distance to disposal/waste processing (Module C2)	50	km
Recycling (Module C3, net flow quantity)	561	kg
Landfilling (Module C4)	579	kg

Two alternative scenarios are declared in modules C3 and C4. The environmental loads of these modules must therefore not be added together. A mass loss of 3% during recycling is assumed and taken into consideration.

Further details on the scenarios can be found in section 3.2 'System boundary'.

5. LCA: Results

The environmental impacts of 1 m³ unreinforced autoclaved aerated concrete with a gross density of 502 kg/m³ are outlined below. The modules marked 'x' in accordance with *EN 15804* in the overview are addressed; the modules marked 'MND' (Module not declared) do not form a component of the analysis.
The following tables depict the results of the indicators concerning impact estimates, use of resources as well as the waste and other output flows with reference to the declared unit.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = 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	X	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1m³ Ytong®-autoclaved aerated concrete (AAC) with an average gross density of 502 kg/m³.

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D	D/1
GWP-total	kg CO_2 eq	1.7E+02	3.08E+00	6.91E+00	-7.62E+01	3.78E-01	1.76E+00	1.56E+00	8.77E+00	-3.93E+00	-2.74E+00
GWP-fossil	kg CO_2 eq	1.74E+02	3.03E+00	1.96E+00	-7.62E+01	3.74E-01	1.73E+00	1.54E+00	8.74E+00	-3.94E+00	-2.74E+00
GWP-biogenic	kg CO_2 eq	-3.93E+00	3.26E-02	4.95E+00	0	5.57E-04	1.87E-02	3.96E-03	3.47E-04	1.82E-02	-3.25E-03
GWP-luluc	kg CO_2 eq	4.8E-02	2.5E-02	5.75E-05	0	2.94E-03	1.43E-02	8.45E-03	2.57E-02	-5.3E-03	-2.84E-04
ODP	kg CFC11 eq	3.7E-13	6.05E-16	7.96E-16	0	7.1E-17	3.46E-16	6.88E-15	3.4E-14	-2.72E-14	-1.57E-14
AP	mol H^+ eq	2.02E-01	3.25E-03	8.99E-04	0	1.8E-03	1.86E-03	1.44E-02	6.23E-02	-1.13E-02	-3.06E-03
EP-freshwater	kg P eq	4.58E-05	9.1E-06	1.09E-07	0	1.07E-06	5.2E-06	3.51E-06	1.47E-05	-5.64E-06	-6.38E-07
EP-marine	kg N eq	6.96E-02	1.04E-03	2.73E-04	0	8.45E-04	5.93E-04	7.11E-03	1.62E-02	-4.23E-03	-9.45E-04
EP-terrestrial	mol N eq	7.66E-01	1.23E-02	4.27E-03	0	9.35E-03	7.04E-03	7.82E-02	1.78E-01	-4.63E-02	-1.03E-02
POCP	kg NMVOC eq	2.02E-01	2.82E-03	7.52E-04	0	2.37E-03	1.61E-03	2.07E-02	4.9E-02	-1.22E-02	-2.73E-03
ADPE	kg Sb eq	1.07E-05	2.71E-07	1.21E-08	0	3.19E-08	1.55E-07	1.7E-06	8.25E-07	-4.49E-07	-2.4E-07
ADPF	MJ	1.24E+03	4.08E+01	1.32E+00	0	4.79E+00	2.33E+01	2.91E+01	1.16E+02	-6.95E+01	-5.17E+01
WDP	m^3 world eq deprived	2.59E+01	2.84E-02	6.91E-01	0	3.34E-03	1.63E-02	2.59E-01	9.38E-01	-2.21E-01	-1.12E-01

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: 1m³ Ytong®-autoclaved aerated concrete (AAC) with an average gross density of 502 kg/m³.

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D	D/1
PERE	MJ	2.91E+02	2.35E+00	4.1E+01	0	2.76E-01	1.34E+00	2.57E+00	1.56E+01	-7.61E+00	-3.03E+00
PERM	MJ	4.08E+01	0	-4.08E+01	0	0	0	0	0	0	0
PERT	MJ	3.32E+02	2.35E+00	2.56E-01	0	2.76E-01	1.34E+00	2.57E+00	1.56E+01	-7.61E+00	-3.03E+00
PENRE	MJ	1.22E+03	4.09E+01	2.9E+01	0	4.81E+00	2.34E+01	2.91E+01	1.16E+02	-6.95E+01	-5.17E+01
PENRM	MJ	2.77E+01	0	-2.77E+01	0	0	0	0	0	0	0
PENRT	MJ	1.25E+03	4.09E+01	1.32E+00	0	4.81E+00	2.34E+01	2.91E+01	1.16E+02	-6.95E+01	-5.17E+01
SM	kg	0	0	0	0	0	0	0	0	5.61E+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	6.77E-01	2.69E-03	1.62E-02	0	3.16E-04	1.54E-03	7.55E-03	2.86E-02	-1.15E-02	-6.56E-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: 1m³ Ytong®-autoclaved aerated concrete (AAC) with an average gross density of 502 kg/m³.

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D	D/1
HWD	kg	1.81E-07	2.16E-09	2.37E-10	0	2.53E-10	1.23E-09	1.69E-09	1.23E-08	-1.05E-08	-7.75E-09

NHWD	kg	1.49E+00	6.42E-03	4.34E-02	0	7.54E-04	3.67E-03	8.38E-03	5.79E+02	-2.34E+01	-1.09E-02
RWD	kg	2.31E-02	7.43E-05	7.34E-05	0	8.72E-06	4.25E-05	2.14E-04	1.22E-03	-5.82E-03	-4.65E-03
CRU	kg	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	5.61E+02	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	1.13E+01	0	0	0	0	0	0	0
EET	MJ	0	0	2.01E+01	0	0	0	0	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: 1m^3 Ytong®-autoclaved aerated concrete (AAC) with an average gross density of 502 kg/m^3.

Parameter	Unit	A1-A3	A4	A5	B1	C1	C2	C3	C4	D	D/1
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

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

Limitation note 1 – applies to the indicator 'Potential impact of exposure to people to U235':
This impact category mainly addresses the potential impact of low-dose ionising radiation on human health in the nuclear fuel cycle. This does not consider impacts attributable to possible nuclear accidents and occupational exposure, or to the disposal of radioactive waste in underground facilities. Potential ionising radiation from soil, radon and some building materials is also not measured by this indicator.
Limitation note 2 – applies to the indicators: 'Potential for Abiotic Resource Depletion – Non-Fossil Resources', 'Potential for Abiotic Resource Depletion – Fossil Fuels', 'Water Depletion Potential (User)', 'Potential Ecosystem Toxicity Comparison Unit', 'Potential Human Toxicity Comparison Unit – Carcinogenic Effect', 'Potential Human Toxicity Comparison Unit – Non-Carcinogenic Effect', 'Potential Soil Quality Index'.
The results of this environmental impact indicator must be used with caution, as the uncertainties in these results are high as there is only limited experience with the indicator.
This EPD was created using a software tool.

6. LCA: Interpretation

The manufacturing phase (Modules A1-A3) is of highest importance for the environmental profile of the product. All impact categories with the exception of GWP-biog. are dominated by the binding agents used.
The energy sources used are also of great importance for the environmental profile. Both the use of thermal energy and electrical energy make relevant contributions in all impact categories.
In the case of biogenic global warming potential, the uptake of atmospheric carbon dioxide during plant growth is shown in connection with the packaging (wooden pallet). Packaging makes moderate contributions in all impact categories.
Relevant contributions to the indicators acidification, resource consumption (minerals and metals), and water consumption arise from the use of aluminium powder.
The upstream chain processes from the aggregate used (sand) make low contributions overall in all impact categories, although it is the largest fraction by mass.

7. Requisite evidence

Manufacturer's declarations are available according to which the composition of base materials, the manufacturing process and product features of the autoclaved aerated concrete products under review have remained unchanged since the evidence outlined below was issued. Accordingly, the evidence applies in full.

7.1 Radioactivity
Method: Measurements of the nuclide content in Bq/kg, determining the Activity Index I
Summarising report: BfS-SW-14/12, Salzgitter, November 2012
Result: The samples were evaluated in accordance with the European Commission Guideline "Radiation Protection 112" (Radiological Protection Principles concerning the Natural Radioactivity of Building Materials, 1999). The Index values I established are in all cases lower than the exclusion level which dispenses with a requirement for any additional controls. From a radiological perspective, the natural radioactivity of the building material permits unlimited use thereof.

7.2 Leaching performance
Leaching by landfilled autoclaved aerated concrete is of significance for assessing its environmental impact after use, *Xella 2023*.
Measuring agency: CLG Chemisches Labor Dr. Graser KG
Result: In accordance with *Directive 2008/98/EC* of 19 November 2008, autoclaved aerated concrete is assigned to the landfill class 'non-hazardous waste'.

8. References

Standards, directives 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 (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.

Decision 2003/33/EC
Decision 2003/33//EC: Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of Annexe II to Directive 1999/31/EC.

DIN 4108-4
DIN 4108-4: 2020-11, Thermal insulation and energy economy in buildings – Part 4: Technical thermal and moisture protection rated values.

DIN 4109-32
DIN 4109-32:2016-07, Sound insulation in buildings – Part 32: Input data for verifying sound insulation by calculation (parts catalogue) – Solid structures.

Directive 2008/98/EC
Directive 2008/98/EC of the European Parliament and Council dated 19 November 2008 on waste; published on 19 November 2008.

ECHA list
Candidate list of Substances of Very High Concern (SVHC) for authorisation (published in accordance with Article 59, paragraph 10 of the REACH Directive), https://echa.europa.eu/de/candidate-list-table; last amended on 13 December 2021.

EN 197-1
EN 197-1:2011; Cement – Part 1: Composition, specifications and conformity criteria for common cements.

EN 459-1
EN 459-1:2015; Building lime – Part 1: Definitions, specifications and conformity criteria.

EN 680
EN 680:2005; Determination of the drying shrinkage of autoclaved aerated concrete.

EN 771-4
EN 771-4:2011+A1:2015; Specification for masonry units - Part 4: Autoclaved aerated concrete masonry units.

EN 998-2
EN 998-2:2016; Specifications for mortar for masonry – Part 2: Masonry mortar.

EN 1745
EN 1745:2020; Masonry and masonry products - Methods for determining thermal properties.

EN 12664
EN 12664:2001; Thermal performance of building materials and products – Determination of thermal resistance by means of guarded hot plate and heat flow meter methods – Dry and moist products with medium and low thermal resistance.

EN 13279-1
EN 13279-1:2008; Gypsum binders and gypsum plasters – Part 1: Definitions and requirements.

EN 13501-1
EN 13501-1:2018; Fire classification of construction products and building elements - Part 1: Classification using data from reaction to fire tests; German version.

EN 15804+A2
EN 15804:2012 + A2:2019 + AC:2021; Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

EN 1996-1-1
EN 1996-1-1:2005+A1:2012; Eurocode 6: Design of masonry structures - Part 1-1: General rules for reinforced and unreinforced masonry structures; German version.

EN 1996-1-1/NA
DIN EN 1996-1-1/NA: 2019-12; Nationaler Anhang - National festgelegte Parameter - Eurocode 6: Bemessung und Konstruktion von Mauerwerksbauten - Teil 1-1: Allgemeine Regeln für bewehrtes und unbewehrtes Mauerwerk.

EN 1996-2
EN 1996-2:2006 + AC:2009; Eurocode 6: Design of masonry structures – Part 2: Design considerations, selection of materials and execution of masonry.

EN 1996-2/NA
DIN EN 1996-2/NA: 2012-01; Nationaler Anhang - National festgelegte Parameter - Eurocode 6: Bemessung und Konstruktion von Mauerwerksbauten - Teil 2: Planung, Auswahl der Baustoffe und Ausführung von Mauerwerk.

EWC
European Waste Catalogue in the version of the Commission Decision 2001/118/EC dated 16 January 2001 amending Decision 2000/532/EC on a waste directory.

General instructions
General instructions for the EPD Programme of Institut Bauen und Umwelt e.V., Version 2.1, 01.10.2022. Berlin: Institut Bauen und Umwelt e.V. (pub.); www.ibu-epd.com.

ISO 14025
ISO 14025:2006-07 Environmental labels and declarations – Type III Environmental Declarations – Principles and processes.

PCR: Autoclaved aerated concrete
Product category rules for building-related products and services Part B: Requirements on an EPD for autoclaved aerated concrete; version 01.08.2021; Berlin; Institut Bauen und Umwelt e.V. (pub.); www.ibu-epd.com.

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Council Directive Radiation Protection 112: Radiological protection principles concerning the natural radioactivity of building materials, European Communities, 2000.

Further literature

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Walther, H.: Nutzungsdauer von Porenbeton, LB-RS-461, Xella Technologie- und Forschungsgesellschaft mbH 2021.

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Xella LCA Tool
This Declaration is based on calculations by Xella Baustoffe GmbH using a pre-verified LCA tool based on GaBi Envision: Xella LCA Tool, Version 1.0, 2021 corrected 2023.

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