

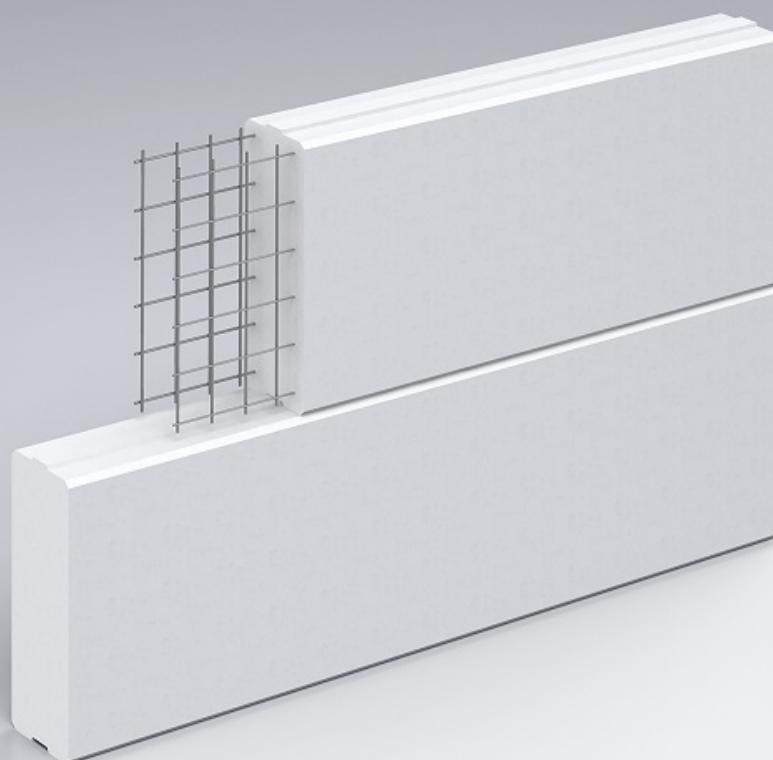
ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	Türk Ytong A.S.
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-TYS-20220218-CCB1-EN
Issue date	19.07.2023
Valid to	18.07.2028

Autoclaved Aerated Concrete Reinforced Panel Türk Ytong Sanayi A.Ş

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General Information

Türk Ytong Sanayi A.Ş

Programme holder

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

Declaration number

EPD-TYS-20220218-CCB1-EN

This declaration is based on the product category rules:

Aerated concrete, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

19.07.2023

Valid to

18.07.2028



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



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

Autoclaved Aerated Concrete Reinforced Panel

Owner of the declaration

Türk Ytong A.Ş.
Aydınevler Mahallesi, İnönü Caddesi, Gökçe Sokak Maltepe No:3
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Turkey

Declared product / declared unit

1 m³ Autoclaved Aerated Concrete Reinforced Panel with an average density of 575.3 kg/m³

Scope:

The EPD is performed for an Autoclaved Aerated Concrete Reinforced Panel manufactured by Türk Ytong Sanayi A.Ş at two production plants located in Dilovası and Antalya in Türkiye. The data is representative for the year 2020.

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



Dr. Matthew Fishwick,
(Independent verifier)

Product

Product description/Product definition

The product investigated in this EPD is an Autoclaved Aerated Concrete Reinforced Panel. Autoclaved aerated concrete is classified as a porous, steam-cured lightweight concrete. The product is also known as a Ytong Panel.

Ytong Panels are large-sized building elements containing double rows of steel reinforcement, produced in various thicknesses and up to 600 cm in length. Ytong panels can be produced in 10, 12.5, 15-30 cm thicknesses; 400, 500, and 600 cm in lengths with a standard width of 60 cm. They are used for completion of walls, roofs, and floors in large square meter buildings such as housing projects, hotels, shopping malls, educational, cultural, sports and industrial buildings. 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 12602:2016 - Prefabricated reinforced components of autoclaved aerated concrete - specification and the CE-marking. For the application and use the respective national provisions apply.

Application

Ytong Autoclaved Aerated Concrete (AAC) Reinforced Panel is used in many areas such as warehouses, factories, shopping malls, office spaces etc. It is produced with double row steel reinforcement and applied with dry mounting technique, for example:

- Horizontal wall panels; external and internal walls, fire walls.
- Vertical wall panels; external and internal walls, fire walls.
- Load-Bearing wall panels; load bearing walls of panel system buildings, load bearing fire walls.
- Roof panels; building roofs
- Floor panels; building floors
- Lintels; door and window openings in external and internal walls.

Technical Data

Technical properties of the Autoclaved Aerated Concrete Reinforced Panel are provided in the below table.

Technical Properties

Name	Value	Unit
Compressive strength	2 - 6	N/mm ²
Gross density	350 - 600	kg/m ³
Tensile strength	0.4 - 1	N/mm ²
Modulus of elasticity	1000 - 2250	N/mm ²
Thermal conductivity	0.09 - 0.16	W/(mK)
Water vapour diffusion resistance factor	0.5	-
Moisture content at 23 °C, 80%	<4	M.-%
Bending strength (longitudinal)	0.4 - 1	N/mm ²
Shrinkage	<0.2	mm/m

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to EN 12602:2016 - Prefabricated reinforced components of autoclaved aerated concrete.

Base materials/Ancillary materials

The main materials used in the product are listed below in terms of mass percentages.

Name	Value	Unit
Water	40-50	%
Silica Sand	25-35	%
Cement	7-14	%
Lime	5-10	%
Steel	2-5	%
Gypsum	1-3	%
Kaolin	1-2	%
*Others	0-1	%

Cement: Portland cement is used in the production of autoclaved aerated concrete reinforced panels. Portland cement is produced according to EN 197-1. The cement in the mixture serves as a binding agent.

Lime: The lime used in the AAC production is obtained by burning natural limestone which serves as a binder.

Steel Reinforcement: Since the product is reinforced AAC, double rows of steel reinforcement are placed inside the cake during production.

Water: Throughout the production, water and water vapour are used for different processes.

Gypsum: The gypsum used in the product which comes from natural sources, helps to reduce the setting time, and increase the strength of the product.

***Others:** Some minor additives such as kaolin, aluminium powders/pastes, and anticorrosive agents are used during production.

No substances included in the Candidate List of Substances of Very High Concern for authorization under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

Manufacturing

The ground quartz sand is mixed with the other raw materials with the addition of water and aluminium powder/paste in a mixer and poured into moulds. The lime is slaked by water exothermically.

The aluminum reacts in an alkaline environment, thus gaseous hydrogen is formed, which fills the pores of the mass. The pores usually have a diameter of 0.5 – 1.5 mm and are filled with air. After setting, the semi-solid cake, is cut into a final dimension with high accuracy.

The steel reinforcement is manufactured in the plant. The reinforcement elements are installed in the moulds after the anti-corrosion treatment.

The formation of the final properties of the components takes place during the subsequent steam curing for 6-12 hours at around 190°C and a pressure of approx. 12 bar in steam pressure boilers, the so-called autoclaves. The substances turned into calcium silicate hydrates like those found in nature, correspond to the mineral tobermorite.

The steam is released back into the system after the completion of the curing process to condensate for further autoclave cycles. The resulting condensate is called process water. In this way, energy is saved and there is no waste water during the production process.

Packaging

A wooden pallet and a steel wire are used as packaging materials.

Environment and health during use

When the products are used as designated and according to the current state of knowledge, there are no hazards to water, air and soil. When used normally and in accordance with the designated purpose, no health risks or restrictions are to be anticipated.

LCA: Calculation rules

Declared Unit

The declared unit is 1 m³ of Autoclaved Aerated Concrete Reinforced Panel with an average density of 575.3 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	m ³
Gross density	575.3	kg/m ³

The product investigated is an average product. Türk Ytong produces AAC wall panels between 350 - 600 kg/m³.

System boundary

System boundary of this EPD is cradle to grave with module D (A + B + C + D).

A1: Raw Material Supply

This stage considers the impact of raw materials used in the product. These raw materials are lime, Portland cement, gypsum, silica sand, kaolin, paraffin, reinforcement steel and aluminium powder.

A2: Transport to manufacturer

The transport routes and distances are calculated from supplier-specific information.

A3: Manufacturing

The manufacturing stage includes the following processes.

- Mixing of ground quartz with other raw materials with the addition of water and aluminium powder.
- Pouring of the slurry into moulds.
- Slaking of lime by water exothermically.
- Formation of gaseous hydrogen which fills the pores of the mass.
- Final sizing, shaping and cutting of AAC wall panels.
- Preparation of steel reinforcement.
- Installation of steel reinforcement in the molds.
- Steam curing process for 6-12 hours at around 190°C and a pressure of approx. 12 bar in steam pressure boilers, so-called autoclaves.
- Releasing of steam after completion of the curing process for further cycles. Condensation of water which will be used for further productions.

A4: Transportation to building site

Transport of the final product to the customers is taken as the weighted average values for transport to customers in 2020.

A5: Installation into building

The use of cement mortar and additional steel reinforcement during the installation is considered in this stage.

B1: Use/Application

CO₂ absorption of AAC wall panel during its service life is calculated in this module.

C1: Deconstruction/Demolition

It is assumed that 0.239 MJ energy is needed for the deconstruction/demolition of 1 kg of final product according to JRC technical report called 'Model for Life Cycle Assessment (LCA) of buildings' prepared by Dos Santos Gervasio, H. and

Reference service life

A 50 year reference service life is considered.

Dimova, S. in 2018 and published by the publication's office of the European Union.

C2: Transport to EoL

A 100 km distance is assumed as the transport distance of the waste product to the waste processing area.

C3: Waste processing for reuse, recovery or recycling

This module is considered zero since there is no need for the after-life processes of the product.

C4: Disposal

It is estimated that the amount of steel reinforcement used in the product is recycled whereas the rest is landfilled. This means that around 98 % of the product is landfilled and the rest is recycled.

D: Benefits

Following a conservative approach, it is assumed that the scrap will follow electric arc furnace (EAF) route. Thus, no benefit is allocated at this stage.

Geographic Representativeness

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

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.

Cut-Off Criteria

A 1% cut-off was applied. Data for elementary flows to and from the product system contributing to a minimum of 99% of the declared environmental impacts have been included.

Allocations

Water consumption, energy consumption and raw material transportation were weighted according to 2020 production volumes. In addition, hazardous and non-hazardous waste amounts were also allocated from the 2020 total waste generation.

LCA Modelling, Calculation and Data Quality

The results of the LCA with the indicators as per EPD requirements are given in the LCA result tables. Life cycle impacts were calculated using the EN15804+A2 method implementation which has an aligned methodology based on EF 3.0 method. For resource use calculations (PERE, PERM, PERT, PENRE, PENRT), {CED LHV}, (Cumulative Energy Demand) – Lower Heating Values) method which is prepared by PRé consultants is used. The mandatory indicators according to EN15804+A2 are declared for the EPD. The characterization methodology referenced in the EN15804+A2 is used for the calculation.

SimaPro 9.3 LCA software and the ecoinvent 3.8 LCA database were used to model the product life cycle. Country-specific electricity mix is used for electricity consumption.

Geographical Scope

The geographical scope of this EPD for the manufacturing of the declared product is Türkiye whereas the geographical scope for the other modules is global.

LCA: Scenarios and additional technical information

Characteristic product properties biogenic carbon

The raw material used in the product do not include biogenic carbon. For the packaging, the use of a wooden pallet contributes to the biogenic carbon. However, since the total mass of biogenic carbon containing materials is less than 5 % of the total mass of the product and accompanying packaging, the declaration of biogenic carbon content is omitted.

Scenario Information

Transport to the building site (A4)

Relevant transport information of the final products to the customers are provided in the below table. All the transport distances and routes are supplier-specific.

Name	Value	Unit
Transport distance - Average distance by truck	212	km
Capacity utilisation (including empty runs)	100	%
Gross density of products transported	575.3	kg/m ³
Transport distance - Average distance by container ship	910	km

Installation into the building (A5)

Impacts of using cement mortar and additional steel reinforcement during the installation are considered. The

amounts are displayed below for 1 m³ of AAC wall panel.

Name	Value	Unit
Other resources - Cement mortar	11.9	kg
Other resources - Steel reinforcement	1.8	kg

According to the manufacturer, reference service life of the product is 50 years.

Reference service life

Name	Value	Unit
Life Span according to the manufacturer	50	a

End of life (C1-C4)

Considering common sector practices, the steel reinforcement used in the product is recycled whereas the rest of the product is landfilled. Quantities displayed in below table is for 1 m³ of the final product.

Name	Value	Unit
Collected as mixed construction waste	575.3	kg
Landfilling	545.8	kg
Recycled	29.5	kg
Energy recovery	-	kg

LCA: Results

Disclaimer:

EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; <http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>)

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	X	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 m³ Ytong® Reinforced Autoclaved Aerated Wall Panel with average density of 575.3 kg/m³

Parameter	Unit	A1	A2	A3	A4	A5	B1	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	1.39E+02	1.47E+01	2.3E+01	4.31E+01	4.54E+00	-8.58E+01	2.44E+01	9.38E+00	0	5.83E+00	0
GWP-fossil	kg CO ₂ eq	1.37E+02	1.47E+01	2.26E+01	4.3E+01	4.4E+00	-8.58E+01	2.39E+01	9.37E+00	0	5.76E+00	0
GWP-biogenic	kg CO ₂ eq	1.71E+00	1.24E-02	2.28E-01	2.87E-02	1.01E-01	0	2.44E-01	8.09E-03	0	5.88E-02	0
GWP-luluc	kg CO ₂ eq	5.41E-01	5.95E-03	1.61E-01	2E-02	2.34E-02	0	1.74E-01	3.75E-03	0	5.86E-03	0
ODP	kg CFC11 eq	5.99E-06	3.39E-06	5.8E-07	9.68E-06	2.18E-07	0	5.61E-07	2.17E-06	0	1.75E-06	0
AP	mol H ⁺ eq	5.1E-01	4.66E-02	1.45E-01	3.76E-01	1.75E-02	0	1.57E-01	2.66E-02	0	4.87E-02	0
EP-freshwater	kg P eq	3.1E-02	9.55E-04	2.28E-02	2.54E-03	1.37E-03	0	2.47E-02	6.14E-04	0	1.67E-03	0
EP-marine	kg N eq	1.28E-01	9.59E-03	2.46E-02	8.84E-02	4.35E-03	0	2.64E-02	5.41E-03	0	1.68E-02	0
EP-terrestrial	mol N eq	1.38E+00	1.05E-01	2.23E-01	9.78E-01	4.53E-02	0	2.39E-01	5.89E-02	0	1.83E-01	0
POCP	kg NMVOC eq	3.7E-01	3.86E-02	6.15E-02	2.8E-01	1.26E-02	0	6.57E-02	2.27E-02	0	5.28E-02	0
ADPE	kg Sb eq	9.8E+02	2.22E+02	2.45E+02	6.32E+02	3.68E+01	0	2.57E+02	1.42E+02	0	1.35E+02	0
ADPF	MJ	6.37E-04	5.16E-05	3.26E-05	1.34E-04	2.37E-05	0	3.28E-05	3.32E-05	0	1.88E-05	0
WDP	m³ world eq deprived	3.56E+03	6.72E-01	1.16E+03	1.78E+00	1.95E+00	0	8.74E+00	4.32E-01	0	5.9E+00	0

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 m³ Ytong® Reinforced Autoclaved Aerated Wall Panel with average density of 575.3 kg/m³

Parameter	Unit	A1	A2	A3	A4	A5	B1	C1	C2	C3	C4	D
PERE	MJ	9.69E+01	3.15E+00	5.13E+01	8.21E+00	5.37E+00	0	5.54E+01	2.03E+00	0	2.29E+00	0
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	9.69E+01	3.15E+00	5.13E+01	8.21E+00	5.37E+00	0	5.54E+01	2.03E+00	0	2.29E+00	0
PENRE	MJ	9.82E+02	2.22E+02	2.45E+02	6.32E+02	3.68E+01	0	2.57E+02	1.42E+02	0	1.35E+02	0
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	9.82E+02	2.22E+02	2.45E+02	6.32E+02	3.68E+01	0	2.57E+02	1.42E+02	0	1.35E+02	0
SM	kg	2.95E+01	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m³	6.64E+01	3.69E-02	2.09E+01	9.75E-02	7.57E-02	0	9.78E-02	2.38E-02	0	1.53E-01	0

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 m³ Ytong® Reinforced Autoclaved Aerated Wall Panel with average density of 575.3 kg/m³

Parameter	Unit	A1	A2	A3	A4	A5	B1	C1	C2	C3	C4	D
HWD	kg	0	0	8.4E-01	0	0	0	0	0	0	0	0
NHWD	kg	0	0	1.5E-01	0	0	0	0	0	0	0	0

RWD	kg	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	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:

1 m³ Ytong® Reinforced Autoclaved Aerated Wall Panel with average density of 575.3 kg/m³

Parameter	Unit	A1	A2	A3	A4	A5	B1	C1	C2	C3	C4	D
PM	Disease incidence	6.58E-06	1.17E-06	6.37E-07	3.04E-06	2.59E-07	0	6.73E-07	7.55E-07	0	9.9E-07	0
IR	kBq U235 eq	8.9E+00	1.14E+00	2.47E-01	3.19E+00	4E-01	0	2.06E-01	7.32E-01	0	6.32E-01	0
ETP-fw	CTUe	2.26E+03	1.74E+02	2.37E+02	4.77E+02	8.85E+01	0	2.52E+02	1.11E+02	0	1.06E+02	0
HTP-c	CTUh	9.17E-07	5.67E-09	1.09E-08	1.83E-08	5.2E-08	0	4.47E-09	3.59E-09	0	4.23E-09	0
HTP-nc	CTUh	1.62E-06	1.75E-07	1.97E-07	4.58E-07	6.64E-08	0	2.05E-07	1.13E-07	0	6.51E-08	0
SQP	SQP	1.13E+03	1.53E+02	2.17E+01	3.79E+02	4.44E+01	0	2.22E+01	9.9E+01	0	3.24E+02	0

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 nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from 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 or as there is limited experienced with the indicator.

This EPD was created using a software tool.

References

EN 197-1

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

Characterisation factors, first edition.

Institut Bauen und Umwelt

Institut Bauen und Umwelt e.V., Berlin(pub.): Generation of Environmental Product Declarations (EPDs); www.ibu-epd.de

EN 12602:2016

Prefabricated reinforced components of autoclaved aerated concrete

REACH

Directive (EG) No. 1907/2006 of the European Parliament and of the Council dated 18 December 2006 on the registration, evaluation, approval and restriction of chemical substances (REACH), for establishing a European Agency for chemical substances, for amending Directive 1999/45/EC and for annulment of Directive (EEC) No. 793/93 of the Council, Directive (EC) No. 1488/94 of the Commission, Guideline 76/769/EEC of the Council and Guidelines 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC of the Commission

ISO 14025

DIN EN ISO 14025:2011-10: Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN ISO 14040

EN ISO 14044:2014 Environmental management - Life cycle assessment - Requirements and guidelines

EN ISO 14044

EN ISO 14044:2014 Environmental management - Life cycle assessment - Requirements and guidelines

EN 15804

EN 15804:2012+A2:2019: Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction product

Regulation (EU) No 305/2011

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

EUTREND Model

Struijs, J., Beusen, A., van Jaarsveld, H. and Huijbregts, M.A.J. (2009b). Aquatic Eutrophication. Chapter 6 in: Goedkoop, M., Heijungs, R., Huijbregts, M.A.J., De Schryver, A., Struijs, J., Van Zelm, R. (2009). ReCiPe 2008 A life cycle impact assessment method which comprises harmonised category indicators at the midpoint and the endpoint level. Report I:

PCR Part A

Institut Bauen und Umwelt e.V., Berlin (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. April 2013

PCR Part B

Part B: Requirements on the EPD for Aerated concrete, Version 1.5, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2017

Ecoinvent

Ecoinvent dataset, developed by the Swiss Centre for Life Cycle Inventories, Technoparkstrasse 1, 8005 Zurich,

Switzerland <https://ecoinvent.org/>

SimaPro

SimaPro software for LCA calculations, developed by PRé Sustainability, Stationsplein 121, 3818 LE Amersfoort, Netherlands, <https://simapro.com>

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