ABETONG
HEIDELBERGCEMENT Group

ENVIRONMENTAL PRODUCT DECLARATION

SISTER EPD REPORT BASED ON RTS_128_21

PREFABRICATED COLUMNS FOR RESIDENTIAL BUILDINGS

ABETONG AB, HEIDELBERG CEMENT GROUP

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Abetong AB, Heidelberg Cement Group
Address	Box 24, S-351 03 VÄXJÖ
Contact details	info@abetong.se
Website	www.abetong.se

PRODUCT IDENTIFICATION

Product name	Prefabricated concrete columns for residential buildings
Places of production	Falkenberg, Sweden Kvicksund, Sweden

Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context. EPDs within the same product category but from different programmes may not be comparable.

EPD INFORMATION

EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPD program operator	-
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 standards.
Product category rules	The CEN standard EN 15804 serves as the core PCR. In addition, the CEN standard 15804+A2 serves as the core PCR, RTS PCR (English version, 26.8.2020) PCR is used.
EPD author	Magnus Jönsson, Abetong AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☑ Internal certification ☐ External verification
Verification date	May 2, 2022
EPD verifier	Stefan Östman, Abetong AB
Original EPD number	RTS_128_21
Original EPD valid until	May 31, 2026

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The product is prefabricated concrete columns for residential buildings consisting of aggregate, binder, reinforcement, and the necessary cast-in-material for transport and assembling.

PRODUCT APPLICATION

The product is used as columns in residential buildings.

TECHNICAL SPECIFICATIONS

Concrete strength C30/37.
Exposure classes up to XC4+XF1.
Life length class L50 (50 years).
Fire classes up to R90.

PRODUCT STANDARDS

The product fulfils the requirements of:
SS-EN 13369:2018 *Common rules for precast concrete products*.

PHYSICAL PROPERTIES OF THE PRODUCT

Typical properties of the product:
Geometry: Length 2.8 m, Cross section 300x300 mm².

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.abetong.se.

PRODUCT RAW MATERIAL COMPOSITION

Material	Weight kg/ton	Usability	Material origin
Cement	147	Non-renewable	Sweden
Blast furnace slag	9	Non-renewable	Sweden
Aggregate	735	Non-renewable	Sweden
Additives	2	Non-renewable	Europe
Water	60	Renewable	Sweden
Reinforcement	42	Recycled	Europe
Cast-in-material	5	Non-renewable	Europe

Product raw material main composition

Raw material category	Amount, mass- %	Material origin
Metals	4.7 %	Europe
Minerals	95.3 %	Sweden

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

The production of prefabricated concrete columns starts by manufacturing the parts needed to build custom-made moulds. At the same time, the reinforcement is prepared by bending and cutting meshes and bars into the designed dimensions. Reinforcement and cast-in-materials are mounted, form oil is applied, and the elements are cast.

As the concrete sets and reaches the right consistency, the surface treatment is applied. After the curing process, concrete columns reach the necessary demoulding strength and are transferred to an intermediate storage area, where they go through quality control and finishing. Finally, the columns are transported out to a storage area and kept ready for delivery to the construction site.

TRANSPORT AND INSTALLATION (A4-A5)

After notification from the construction site, the elements are loaded onto lorries for transport. The transports are optimised for both efficient assembling at the construction site and reducing the number of required vehicles. Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

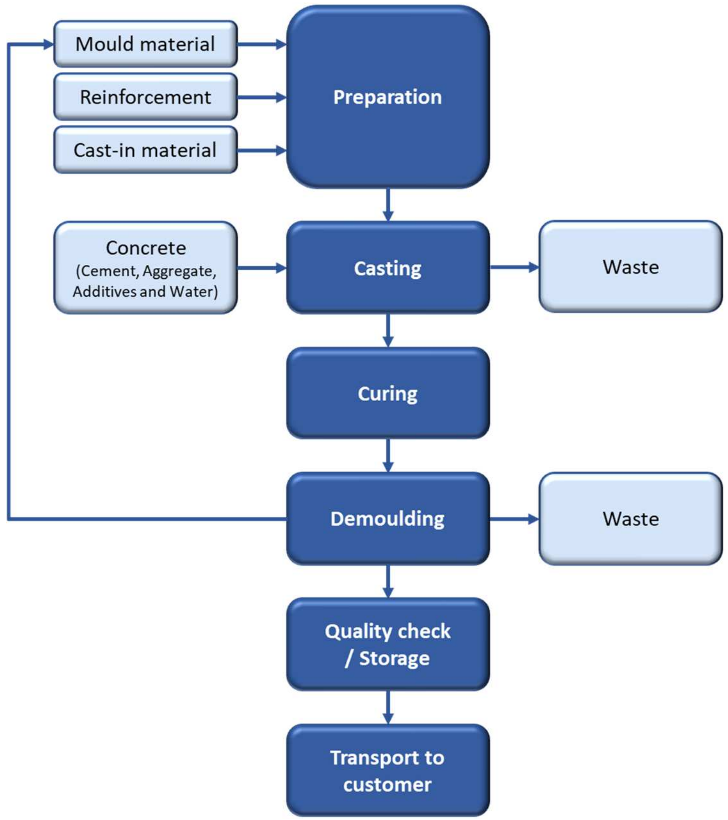
The transportation distance is defined according to RTS PCR. Average distance of transportation from production plant to building site is assumed as 100 km and the transportation method is assumed to be lorry. Transportation does not cause losses.

Optional A5 module is not declared.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover use phase. Air, soil, and water impacts during the use phase have not been studied. However, the ability of concrete to bind CO_2 through carbonisation during this phase should not be neglected.

Manufacture Diagram for Concrete Elements



PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase 100% of the waste is assumed to be collected as separate construction waste. The demolition process consumes energy in the form of diesel fuel used by building machines (C1).

The dismantled concrete elements are delivered to the nearest construction waste treatment plant (C2). At the waste treatment plant, waste that can be reused, recycled or recovered for energy is separated and diverted for further use (C3).

Unusable materials are disposed of in a landfill (C4). Due to the recycling potential of reinforcement steel and concrete, they can be used as secondary raw material. This avoids the use of virgin raw materials (D).

C3 waste processing

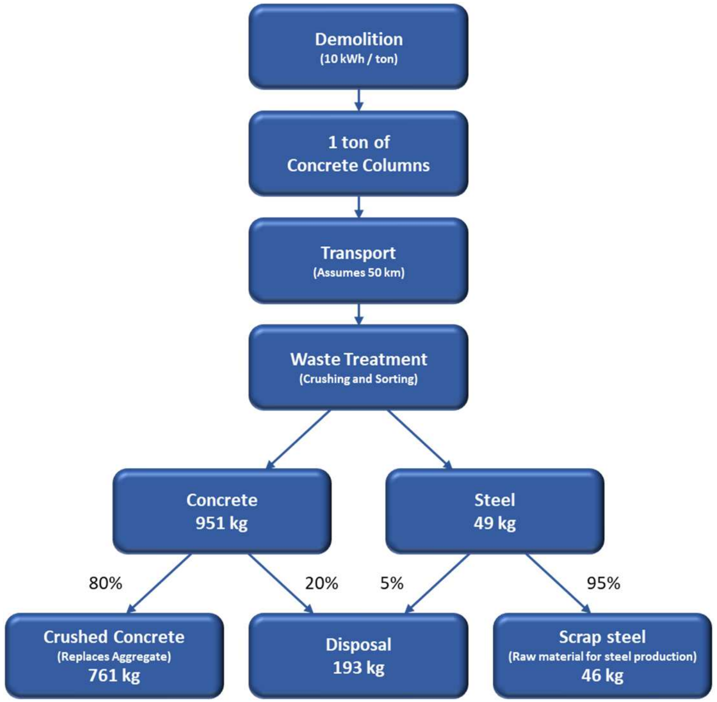
According to European Waste Framework Directive (2008/98/EC) Waste Hierarchy, the waste formation that cannot be prevented should be reused, recycled or otherwise recovered. Landfilling is to be avoided in all cases. Hence, recycling is the most conservative waste treatment scenario for the steel and concrete used in the product.

It was assumed that 100% of products were collected at demolition site and sent directly to recycling facilities. Share of losses in sorting process are assumed to be small and were not considered in the assessment. It was further assumed that any plastic goes with unseparated waste to landfill.

C4 disposal

From the crushed recycled material, it is assumed that 20% of the sorted concrete will be disposed along with 5% of the steel due to e.g. chemical degradation or mixed materials. Both values are conservative compared to the practical experience.

End-of-Life Scenario Diagram



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	The period for data represents the calendar year 2021

DECLARED AND FUNCTIONAL UNIT

Declared unit	The declared unit of the study is 1 tonne of concrete columns supplied to the client.
Mass per declared unit	1000 kg

BIOGENIC CARBON CONTENT

The product does not contain any biogenic carbon, so the biogenic content at the factory gate is 0 kg. The product is delivered without packaging.

SYSTEM BOUNDARY

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	MND	MND	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

This EPD covers cradle to gate with options scope with following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport) as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary is included.

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and RTS PCR. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes which data are available for are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total neglected input and output flows do also not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. In this study, as per EN 15804, allocation is conducted in the following order; 1. Allocation should be avoided. 2. Allocation should be based on physical properties (e.g. mass, volume) when the difference in revenue is small. 3. Allocation should be based on economic values.

As it is impossible to collect raw material, ancillary material, energy consumption and waste production data separately for each product produced the in the plant, data is allocated. Allocation is based on annual production rate and made with high accuracy and precision. No separate allocation of co-products is necessary as all kind of products are included in the allocation based on concrete production.

The values of 1 tonne of prefabricated concrete columns are calculated considering the total annual production based on weight. In the factories, several kinds of concrete elements are produced; since the production processes of these products are similar, the annual total raw materials, energy consumption, form materials and the generated waste per the declared unit are allocated.

This LCA study is conducted in accordance with all methodological considerations, such as performance, system boundaries, data quality, allocation procedures, and decision rules to evaluate inputs and outputs. All estimations and assumptions are given below:

• Module A4: The transportation distance is defined according to RTS PCR. It was assumed that typical installation place is situated in the region of the production plant. Average distance of transportation from production plant to building site is assumed to be 100 km. The mode of transportation is assumed to be lorry. The transportation does not cause losses.

• Module C1: Energy consumption of a demolition process is on the average 10 kWh/m^2 (Bozdağ, Ö & Seçer, M. 2007). In multi-storey residential buildings, an average mass of a reinforced concrete is about 1 ton/m^2. Therefore, energy consumption for demolition is estimated to 10 kWh/ton. The source of energy is diesel fuel used by construction machinery.

• Module C2: It is estimated that there is no mass loss during the use of the product, therefore the end-of-life product is assumed that it has the same weight with the declared product. All of the end-of-life product is assumed to be sent to the closest facilities such as recycling and landfill. Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is lorry which is the most common.

• Module A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. In reality, it may vary but as role of transportation emission in total results is small, the variety in load is assumed to be negligible. Empty returns are not included as it is assumed that return trip is used by the transportation company to serve the needs of other clients.

• Module C3: It was assumed that 100% of products were collected at demolition site and that attached recyclable materials are sent directly to recycling facilities. Share of losses in sorting process are assumed to be small and were not considered in the assessment.

• Module C4: From the crushed recycled material, it is assumed that 20% of the sorted concrete will be disposed along with 5% of the steel due to e.g. chemical degradation or mixed materials. Both values are conservative compared to practical experience.

• Module D: Benefits of recyclable waste generated in the phase C3 are considered in the phase D. The recycled steel and crushed concrete have been modelled to avoid use of primary materials. The scrap content in the studied product has been acknowledged and only the mass of primary steel in the product provides the benefit in order to avoid double counting.

AVERAGES AND VARIABILITY

The size and shape of individual concrete elements can vary significantly to fit the needs of the building for which it was manufactured. The amount of reinforcement and cast-in-material also depends to a substantial extent on the requirements of the construction. This is included in the analysis by calculating averages for reinforcement and cast-in-material based on the annual production of elements used in residential buildings.

ENVIRONMENTAL IMPACT DATA

Note: ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930 are presented in Annex.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO_2e	1,38E2	4,32E0	4,37E0	1,47E2	8,63E0	MND	MND	MND	MND	MND	MND	MND	MND	3,3E0	4,36E0	4,13E0	1,02E0	-1,06E1
Climate change – fossil	kg CO_2e	1,37E2	4,32E0	4,34E0	1,46E2	8,71E0	MND	MND	MND	MND	MND	MND	MND	MND	3,3E0	4,35E0	4,19E0	1,01E0	-1,05E1
Climate change – biogenic	kg CO_2e	1,14E0	2,74E-3	2,98E-2	1,17E0	6,6E-3	MND	MND	MND	MND	MND	MND	MND	MND	9,17E-4	3,3E-3	-6,51E-2	2,01E-3	-4,63E-2
Climate change – LULUC	kg CO_2e	7,17E-2	1,58E-3	4,19E-4	7,37E-2	2,74E-3	MND	MND	MND	MND	MND	MND	MND	MND	2,79E-4	1,37E-3	1,56E-3	3,01E-4	-8,04E-3
Ozone depletion	kg CFC11e	3,1E-6	1,04E-6	7,31E-7	4,87E-6	2,14E-6	MND	MND	MND	MND	MND	MND	MND	MND	7,12E-7	1,07E-6	8,23E-7	4,18E-7	-6,82E-7
Acidification	mol H^+e	3,76E-1	2,48E-2	2,16E-2	4,23E-1	2,8E-2	MND	MND	MND	MND	MND	MND	MND	MND	3,45E-2	1,4E-2	4,58E-2	9,63E-3	-5,74E-2
Eutrophication, aquatic freshwater	kg PO_4e	1,91E-3	3,52E-5	1,31E-4	2,07E-3	7,39E-5	MND	MND	MND	MND	MND	MND	MND	MND	1,33E-5	3,7E-5	9,17E-5	1,23E-5	-5,73E-4
Eutrophication, aquatic marine	kg Ne	6,57E-2	5,52E-3	1,13E-2	8,25E-2	6,16E-3	MND	MND	MND	MND	MND	MND	MND	MND	1,52E-2	3,08E-3	1,71E-2	3,32E-3	-1,19E-2
Eutrophication, terrestrial	mol Ne	1,28E0	6,15E-2	9,78E-2	1,44E0	6,85E-2	MND	MND	MND	MND	MND	MND	MND	MND	1,67E-1	3,43E-2	1,9E-1	3,65E-2	-1,48E-1
Photochemical ozone formation	kg NMVOCe	3,62E-1	2,02E-2	2,71E-2	4,09E-1	2,69E-2	MND	MND	MND	MND	MND	MND	MND	MND	4,59E-2	1,34E-2	5,22E-2	1,06E-2	-5,1E-2
Abiotic depletion, minerals & metals	kg Sbe	1,76E-3	7,32E-5	6,67E-6	1,84E-3	1,55E-4	MND	MND	MND	MND	MND	MND	MND	MND	5,03E-6	7,75E-5	6,84E-5	9,27E-6	-6,98E-4
Abiotic depletion of fossil resources	MJ	1,01E3	6,86E1	6,47E1	1,14E3	1,41E2	MND	MND	MND	MND	MND	MND	MND	MND	4,54E1	7,07E1	5,78E1	2,84E1	-1,21E2
Water use	m^3e depr.	2,83E1	2,49E-1	3,35E-1	2,89E1	5,26E-1	MND	MND	MND	MND	MND	MND	MND	MND	8,46E-2	2,63E-1	3,04E-1	1,31E0	-1,18E1

EN 15804+A2 disclaimer for Abiotic depletion and Water use indicators and all optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.
Eutrophication aquatic freshwater is reported as *kg PO_4 eq,* although the reference given ("EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe") uses the unit *kg P eq.*

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	3,96E-6	3,55E-7	5,12E-7	4,82E-6	7,64E-7	MND	MND	MND	MND	MND	MND	MND	MND	9,14E-7	3,82E-7	4,04E-6	1,87E-7	-7,79E-7
Ionizing radiation, human health	kBq U235e	6,33E3	2,99E-1	1,32E-1	6,33E3	6,18E-1	MND	MND	MND	MND	MND	MND	MND	MND	1,94E-1	3,09E-1	2,59E-1	1,16E-1	-5,25E-1
Eco-toxicity (freshwater)	CTUe	8,12E2	5,18E1	6,64E1	9,3E2	1,08E2	MND	MND	MND	MND	MND	MND	MND	MND	2,66E1	5,4E1	9,24E1	1,79E1	-2,48E2
Human toxicity, cancer effects	CTUh	2,62E-7	1,49E-9	1,49E-9	2,65E-7	2,72E-9	MND	MND	MND	MND	MND	MND	MND	MND	9,53E-10	1,36E-9	2,55E-9	4,24E-10	-6,54E-9
Human toxicity, non-cancer effects	CTUh	1,89E-6	5,82E-8	3,11E-8	1,98E-6	1,23E-7	MND	MND	MND	MND	MND	MND	MND	MND	2,35E-8	6,17E-8	1,01E-7	1,31E-8	5,82E-7
Land use related impacts/soil quality	-	8,8E2	9,56E1	1,36E0	9,77E2	2,13E2	MND	MND	MND	MND	MND	MND	MND	MND	1,16E0	1,07E2	5,05E0	4,82E1	-6,99E1

EN 15804+A2 disclaimer for Ionizing radiation, human health. 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.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	8,73E1	8,37E-1	1,18E2	2,07E2	1,78E0	MND	MND	MND	MND	MND	MND	MND	MND	2,45E-1	8,9E-1	2,73E0	2,29E-1	-7,28E0
Renewable PER used as materials	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renewable PER	MJ	8,73E1	8,37E-1	1,18E2	2,07E2	1,78E0	MND	MND	MND	MND	MND	MND	MND	MND	2,45E-1	8,9E-1	2,73E0	2,29E-1	-7,28E0
Non-renew. PER used as energy	MJ	9,85E2	6,86E1	6,47E1	1,12E3	1,41E2	MND	MND	MND	MND	MND	MND	MND	MND	4,54E1	7,07E1	5,78E1	2,84E1	-1,21E2
Non-renew. PER used as materials	MJ	2,44E1	0E0	0E0	2,44E1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-renewable PER	MJ	1,01E3	6,86E1	6,47E1	1,14E3	1,41E2	MND	MND	MND	MND	MND	MND	MND	MND	4,54E1	7,07E1	5,78E1	2,84E1	-1,21E2
Use of secondary materials	kg	3,99E1	0E0	0E0	3,99E1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	1,97E0
Use of renewable secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of non-renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	2,96E0	1,37E-2	1,31E-1	3,11E0	2,94E-2	MND	MND	MND	MND	MND	MND	MND	MND	4,01E-3	1,47E-2	1,02E-2	3,1E-2	-9,26E-1

PER abbreviation stands for primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,23E1	6,87E-2	5,89E-2	1,25E1	1,37E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,88E-2	6,87E-2	0E0	2,65E-2	-9,76E-1
Non-hazardous waste	kg	1,74E2	6,89E0	1,14E0	1,82E2	1,52E1	MND	MND	MND	MND	MND	MND	MND	MND	5,22E-1	7,6E0	0E0	1,93E2	-2,49E1
Radioactive waste	kg	4,49E-3	4,72E-4	2,04E-4	5,16E-3	9,71E-4	MND	MND	MND	MND	MND	MND	MND	MND	3,18E-4	4,86E-4	0E0	1,88E-4	-3,92E-4

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	8,07E2	0E0	0E0
Materials for energy recovery	kg	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

Key information table (RTS) – key information per kg of product

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Climate change – total	kg CO_2e	1,38E-1	4,32E-3	4,37E-3	1,47E-1	8,72E-3	MND	MND	MND	MND	MND	MND	MND	MND	3,3E-3	4,36E-3	4,13E-3	1,02E-3	-1,06E-2
Abiotic depletion, minerals & metals	kg Sbe	1E-6	7,32E-8	6,67E-9	1,08E-6	1,55E-7	MND	MND	MND	MND	MND	MND	MND	MND	5,03E-9	7,75E-8	6,84E-8	9,27E-9	-6,98E-7
Abiotic depletion of fossil resources	MJ	6,1E-1	6,86E-2	6,47E-2	7,43E-1	1,41E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,54E-2	7,07E-2	5,78E-2	2,84E-2	-1,21E-1
Water use	m^3e depr.	2,83E-2	2,49E-4	3,35E-4	2,89E-2	5,26E-4	MND	MND	MND	MND	MND	MND	MND	MND	8,46E-5	2,63E-4	3,04E-4	1,31E-3	-1,18E-2
Use of secondary materials	kg	1,13E-1	0E0	0E0	1,13E-1	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	1,97E-3
Biogenic carbon content in product	kg C	N/A	N/A	0E0	0E0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon content in packaging	kg C	N/A	N/A	0E0	0E0	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, run-of-river (Reference product: electricity, high voltage), Ecoinvent v3.6, Sweden, year: 2019.
GWP-value for Electricity	0.0039 kg CO_2e / kWh

Transport scenario documentation

Scenario parameter	Value
A4 specific transport CO_2e emissions	0.0863 kg CO_2e / tkm
A4 average transport distance	100 km
Capacity utilization (including empty return)	100%
Bulk density of transported products	2450 kg/m³
Volume capacity utilization factor	>1*

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1000 kg
Recovery process – kg for recycling	807.4 kg
Disposal (total) – kg for final deposition	192.6 kg
Scenario assumptions e.g. transportation	Assume energy use to 10 kWh/ton element for demolition. Assume 50 km to the closest recycle facility for construction material.

BIBLIOGRAPHY

Bozdağ, Ö and Seçer, M., Energy consumption of RC buildings during their life cycle. Izmir, Dokuz University (2007).

Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008 on waste and repealing certain Directives.

Ecoinvent database v3.6 and One Click LCA database.

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

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations. Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

RTS PCR, Protocol for drawing up Environmental Product Declarations of building products. Complies with standard EN 15804+A2:2019. Published by the Building Information Foundation RTS 26.8.2020.

ABOUT THE MANUFACTURER

Abetong AB is one of the country's leading companies for the development, manufacture and sale of concrete elements and concrete-based products. The company employs more than 500 employees and has a turnover of approximately SEK 1.3 billion per year and is part of the international building materials group Heidelberg Cement. The company's production of concrete elements and products takes place in a responsible manner in one of the six factories. The finished parts are then transported out to construction sites, where Abetong or the customer handles the assembly. Customers are found in both the construction and agriculture sectors.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Abetong AB, Heidelberg Cement Group
EPD author	Magnus Jönsson, Abetong AB
EPD verifier	Stefan Östman, Abetong AB
EPD program operator	-
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Cementitious Products

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This sister-EPD has been verified internally by reviewing changes from the original EPD (RTS_128_21).

Why does verification transparency matter? Read more online.

VERIFICATION OVERVIEW

Following independent third party has verified this specific EPD:

EPD verification information	Answer
Independent EPD verifier	Stefan Östman, Abetong AB
EPD verification completed on	May 2, 2022

Author & tool verification	Answer
EPD author	Magnus Jönsson, Abetong AB
EPD author training completion	March 2, 2021
EPD Generator module	Cementious Products
Independent software verifier	Anni Oviir, Rangi Maja OÜ
Software verification date	June 27, 2020

VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of

- the data collected and used in the LCA calculations,
- the way the LCA-based calculations have been carried out,
- the presentation of environmental data in the EPD, and
- other additional environmental information, as present

with respect to the procedural and methodological requirements in ISO 14025:2010 and EN 15804:2012+A2:2019.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Stefan Östman
Research Engineer
Abetong AB

ANNEX: Environmental Impacts – EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global warming potential	kg CO_2e	1,38E2	4,28E0	4,27E0	1,46E2	8,63E0	MND	MND	MND	MND	MND	MND	MND	MND	3,27E0	4,32E0	4,15E0	9,96E-1	-1,02E1
Depletion of stratospheric ozone	kg CFC11e	6,53E-6	8,26E-7	5,67E-7	7,93E-6	1,7E-6	MND	MND	MND	MND	MND	MND	MND	MND	5,63E-7	8,5E-7	6,61E-7	3,31E-7	-6,19E-7
Acidification	kg SO_2e	3,56E-1	1,82E-2	5,13E-3	3,79E-1	1,85E-2	MND	MND	MND	MND	MND	MND	MND	MND	4,87E-3	9,25E-3	1,32E-2	4,01E-3	-3,81E-2
Eutrophication	kg $(PO_4)^3$e	1,52E-1	2,7E-3	2,61E-3	1,57E-1	3,74E-3	MND	MND	MND	MND	MND	MND	MND	MND	8,57E-4	1,87E-3	4,33E-3	7,77E-4	-2,07E-2
Photochemical ozone formation	kg C_2H_4e	2,32E-2	7,53E-4	4,56E-4	2,44E-2	1,06E-3	MND	MND	MND	MND	MND	MND	MND	MND	5,01E-4	5,32E-4	8,69E-4	2,94E-4	-5,37E-3
Abiotic depletion of non-fossil res.	kg Sbe	1,76E-3	7,32E-5	6,67E-6	1,84E-3	1,55E-4	MND	MND	MND	MND	MND	MND	MND	MND	5,03E-6	7,75E-5	6,84E-5	9,27E-6	-6,98E-4
Abiotic depletion of fossil resources	MJ	1,01E3	6,86E1	6,47E1	1,14E3	1,41E2	MND	MND	MND	MND	MND	MND	MND	MND	4,54E1	7,07E1	5,78E1	2,84E1	-1,21E2