ENVIRONMENTAL PRODUCT DECLARATION

B-EPD .BE

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01.00.00

Orbix & Betonagglomeraten Gubbels N.V.

Carbstone full

Sizes: 29/09/19, 29/09/14, 29/14/19, 29/19/19,

ISSUED 29.10.2025
VALID UNTIL 29.10.2030

THIRD PARTY VERIFIED
in accordance with EN 15804+A2
and B-EPD PCR 18.10.2022

FUNTIONAL UNIT AND MODULES DECLARED

1 m^2 of load bearing wall made of Carbstone full including installation, for a reference service life of 100 years (dimension 29/09/14)

A123	A4	A5	B 1-7	C	D
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The intended use of this EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings. This EPD is only valid when registered on www.b-epd.be. The FPS Public Health cannot be held responsible for the information provided by the owner of the EPD.

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1 PRODUCT DESCRIPTION

1.1 Product name

Carbstone full. Sizes: 29/09/19, 29/09/14, 29/14/19, 29/19/19

1.2 Product description and intended use

Carbstones are carbonated full bricks with dimensions .The applied carbonation technique, developed by Orbix, transforms metal slag from the steel industry into circular building products.

Carbstones have the characteristic of absorbing CO_2 through carbonation. This happens because the Carbstones have metal slag as ingredients, which is a calcium-rich material. The calcium reacts with water and CO_2 to form calcium carbonate, a strong binder. Because of this, the Carbstone has a binding agent of CO_2 instead of cement. The building material has the same characteristics as a concrete block. The difference is in capturing the CO_2.

The Carbstones are attached to each other using a specific glue for Carbstones. This EPD reports the results for 1 m^2.

The Carbstones can be used for constructive and non-constructive interior walls.

This is a specific B-EPD for a single company.

1.3 Reference flow / declared unit

The results are declared for 1 m^2 Carbstone full with dimensions 29/09/14. Packaging is included. The results of the remaining sizes can be calculated by multiplying the results of size 29/09/14 with the conversion factors in section 3.15. The Carbstone full 29/09/09 is declared separately.

The weight per reference flow (kg/m2) is.

Carbstone full 29/09/09	218 kg/m2
Carbstone full 29/09/19	223 kg/m2
Carbstone full 29/09/14	221 kg/m2
Carbstone full 29/14/19	341 kg/m2
Carbstone full 29/19/19	477 kg/m2

The density of the product is as followed:

- Carbstone full is 2300 kg / m^3.

1.4 Installation

Materials for fixation and installation are included. This EPD includes the impacts of all processes, fixating materials, jointing material or treatments necessary for installing/mounting the product according to following scenario(s): the Carbstones are glued together with the Masterbloc ECO lijmmortel 950 (packed) of Saint-Gobain Weber Benelux (see reference in Bibliography).

1.5 Composition and content

Components	Composition / content / ingredients	Quantity
Carbstone full	– Mixed sand – Stinox 2/6 – Water – Liquid CO_2	– 20% - 70% – 20% - 70% – 1% - 15% – 1% - 15%
Fixation materials	NA	
Jointing materials	All Carbstones, use a specific glue.	2 mm on the sides of the stones
Treatments	NA	
Packaging	– Wooden pallet – PET straps	– 0,125 - 0,250 kg – < 0,01 kg

The product does not contain materials listed in the “Candidate list of Substances of Very High Concern for authorization”.

1.6 Reference service life

The reference service life is estimated at 100 years.

The RSL is based on SBR 2011, update 2019: 21 Buitwanden, spouwbladen, binnenblad, steenachtig, betonsteen, blokken gelijmd.

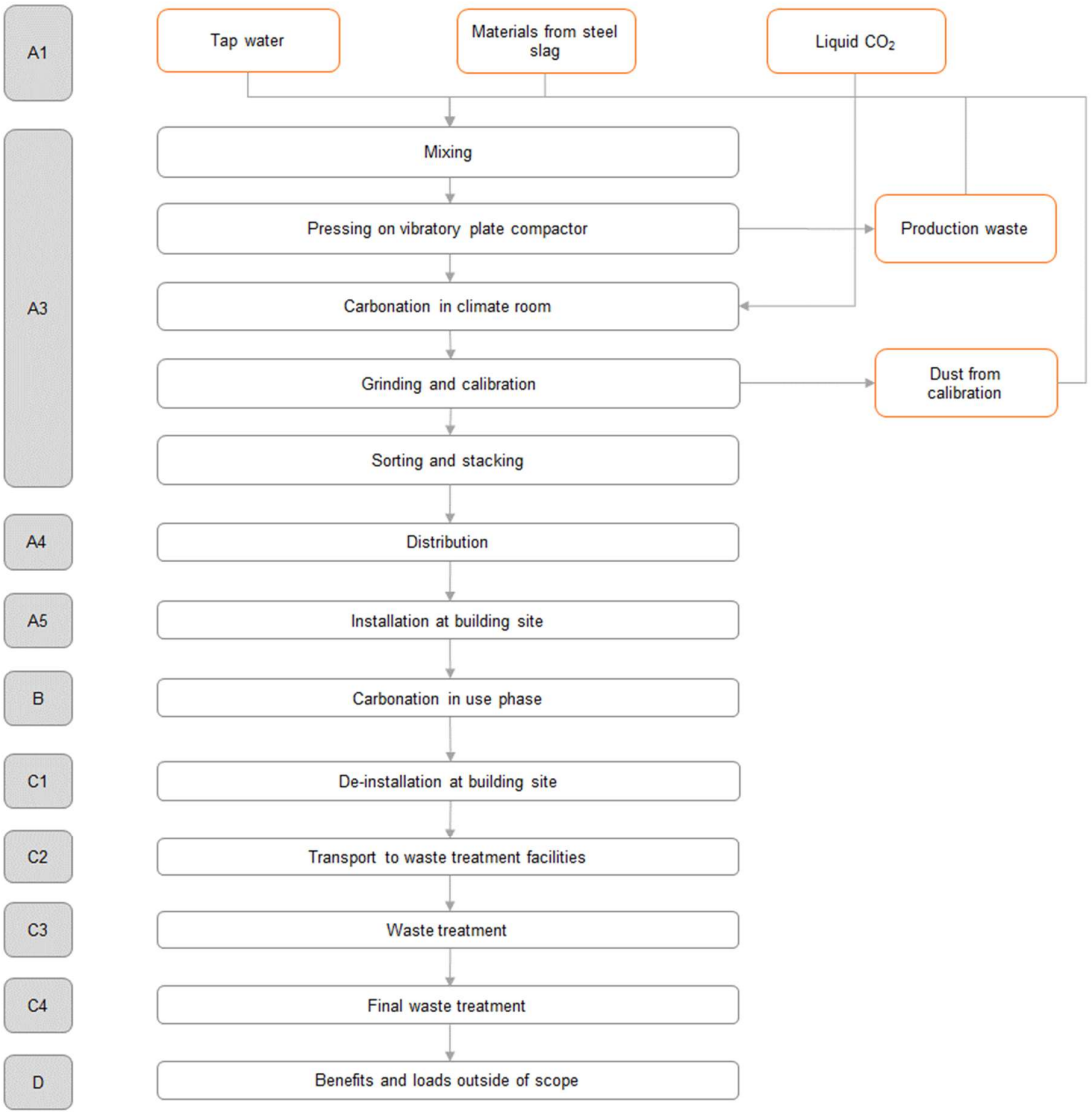
The conditions under which this RSL is valid are as following: natural aging conditions, no moisture uptake.

1.7 Description of geographical representativity

The EPD is representative for the Belgian market.
The Carbstones are produced at the manufacturing facility in Maasmechelen, Belgium.

1.8 Description of the production process and technology

Betonagglomeraten Gubbels N.V. mixes the raw materials and presses this mixture into a block shape on a vibrating press. Next, this pressed mix goes to a climate chamber, here the liquid CO_2 is injected into the process. It is measured how much CO_2 enters the chamber and how much is absorbed by the stones through carbonation and calcium carbonate is created. After this, the stones are polished if necessary. Finally, they go to a stacking/packing machine, which sorts the Carbstones for storage and transport to customers.


A1
Tap water
Materials from steel slag
Liquid CO_2
A3
Mixing
Pressing on vibratory plate compactor
Production waste
Carbonation in climate room
Grinding and calibration
Dust from calibration
Sorting and stacking
A4
Distribution
A5
Installation at building site
B
Carbonation in use phase
C1
De-installation at building site
C2
Transport to waste treatment facilities
C3
Waste treatment
C4
Final waste treatment
D
Benefits and loads outside of scope

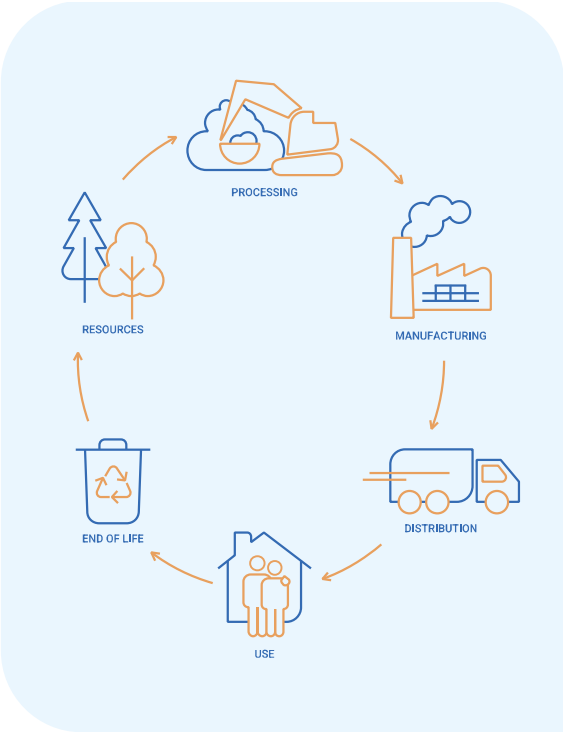
2 TECHNICAL DATA / PHYSICAL CHARACTERISTICS

Technical property	Standard	Value	Unit	Comment
Gross dry volume mass	EN1991-1-2 ANB (2012)	2300	Kg/m^3	
Calculated value of thermal conductivity coefficient λ_{Ui}	EN1991-1-2 ANB (2012)	1,33	W/m.k	
Normalised compressive strength		10	n/mm^2	
Reaction to fire	EN1991-1-2 ANB (2012)	A1	/	
Frost/thaw resistance	NBN B15-231	Sufficient	/	

3 LCA-STUDY

3.1 Date of LCA-study

July 2025



3.2 Software

For the calculation of the LCA results, the software program SimaPro v9.5 has been used.

3.3 Information on allocation

For the raw materials sourced from Orbix used in the Carbstones, allocation takes place in their production. At the production location of Beton Agglomeraten Gubbels, the amount of materials, energy and auxiliary materials in the production processes are allocated per brick based on production quantities from the year 2022.

3.4 Informatie on cut off

The following processes are considered below cut-off (which follows the EN 15804+A2 rules of chapter 6.3.6) because the contribution and environmental impacts are expected to be less than 1% (per unit process for mass and energy) and less than 5% over the total mass and energy:

- Maintenance and use of auxiliary materials and equipment, excluding such processes included in the Ecoinvent background processes.
- Capital equipment and infrastructure processes, excluding such processes included in the Ecoinvent background processes. However, the capital goods of the crushing, screening and separation process at Orbix are included.
- PMD, paper and cardboard, and waste oil are not included because the masses are lower than 0.008%, and these are mainly office waste.

3.5 Information on excluded processes

Only the processes considered below cut-off are excluded from the study. No additional processes are excluded.

3.6 Information on biogenic carbon modelling

The liquid CO_2 used in the process of manufacturing Carbstones is certified from biogenic origin following the physical flow. The biogenic carbon uptake during production of the Carbstones is dependent on the, e.g., amount of carbon reacting materials and the surface area of the Carbstones able to react with water to create calcium carbonate. In A3, the biogenic carbon is emitted and leads almost immediately to carbonation, the emission is modelled in GWPbio and the carbonation is modelled in GWPfossil, clearly following the physical flow. This confirms the physical flow: As the carbon becomes chemically bound to the calcium into calcium carbonate ($CaCO_3$) the mineral form has to be considered from that point on. The carbon is also not released during the waste treatment at EOL. Therefor it can be considered as permanently stored. Therefore, that carbon is no longer reported as "biogenic carbon content in the product. During the use phase there is some remaining carbonation which takes place, but less due to the increased carbonation during the production process.

The wooden pallet also contains biogenic carbon content.

Biogenic carbon content	Biogenic carbon content in accompanying packaging (at the gate) kg C / FU
Carbstone full 29/09/19	4,96E-02
Carbstone full 29/09/14	6,70E-02
Carbstone full 29/14/19	7,43E-02
Carbstone full 29/19/19	9,91E-02

3.7 Information on carbon offsetting

Carbon offsetting is not allowed in the EN 15804+A2 and hence not taken into account in the calculations.

3.8 Additional or deviating characterisation factors

The characterization factors from EC-JRC were applied. No additional or deviating characterisation factors were used.

3.9 Description of the variability

The functional unit is 1 m^2. The sizes of the stones can vary from:

- Length 29 cm;
- Hight between 9 cm – 19 cm;
- Width between 14 cm – 19 cm.

In this EPD, the Carbstone full are reported with the sizes: 29/09/19, 29/09/14, 29/14/19, 29/19/19. The representative Carbstone, has the sizes 29/09/14.

The amount of glue and the amount of carbstone (in mass) differ when other sizes are used. The carbstone has the most influence on environmental impact categories Climate change – total, Resource use minerals and metals, and Respiratory inorganics.

3.10 Specificity

The data used for the LCA are specific for this product which is manufactured by a single manufacturer in a single production site.

3.11 Period of data collection

Manufacturer specific data have been collected for the year 2022.

3.12 Information on data collection.

Company specific data for the product stage have been collected by Betonagglomeraten Gubbels N.V. and were provided to SGS Search.

3.13 Database used for background data

The Ecoinvent v3.6 database is used for background data. The database was released in 2019.

3.14 Energy mix

All electricity used during production comes from renewable sources either by generating energy on-site with PV panels, or from renewable electricity from the grid.

3.15 Conversion factors

The results in this EPD are reported for Carbstone full 29/09/14. A conversion factor from below can be used to get the results for Carbstone full 29/09/19, Carbstone full 29/14/19 and Carbstone full 29/19/19 by multiplying the conversion factor to the results of Carbstone full 29/09/19. Carbstone full 29/09/19 is reported as worst-case stone because it has the lowest negative GWP results.

Carbstone	29/09/14	29/09/19	29/14/19	29/19/19
Conversion factor	1,000	1,009	1,544	2,161

4 PRODUCTION SITES

Manufacturing site located in Maasmechelen, Belgium.

5 SYSTEM BOUNDARIES

Product stage			Construction installation stage		Use stage							End of life stage				Beyond the system boundaries
Raw materials	Transport	Manufacturing	Transport	Construction installation stage	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 = included in the EPD
☐ = module not declared

6 POTENTIAL ENVIRONMENTAL IMPACTS PER REFERENCE FLOW

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
GWP total (kg CO2 equiv/FU)	-1,44E+01			2,81E+00	-2,52E-01	-4,13E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E+00	2,93E-01	1,16E-02	-7,65E-01
GWP fossil (kg CO2 equiv/FU)	-1,41E+01			2,81E+00	-2,45E-01	-4,13E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E+00	2,89E-01	1,16E-02	-7,61E-01
GWP biogenic (kg CO2 equiv/FU)	1,65E-02			9,05E-04	8,97E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,60E-04	6,18E-04	6,04E-06	-5,83E-04
GWP luluc (kg CO2 equiv/FU)	5,07E-03			9,86E-04	3,16E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,92E-04	4,90E-04	3,28E-06	-4,33E-04
ODP (kg CFC 11 equiv/FU)	5,26E-07			6,45E-07	5,08E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,56E-07	6,10E-08	4,86E-09	-1,62E-07
AP (mol H+ eq/FU)	3,22E-02			1,16E-02	1,80E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,61E-03	1,43E-03	1,12E-04	-6,56E-03
EP - freshwater (kg P- equiv/FU)	3,71E-04			2,23E-05	1,48E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,85E-06	6,00E-06	1,32E-07	-6,97E-06
EP - marine (kg N- equiv/FU)	5,94E-03			3,44E-03	3,94E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,37E-03	5,04E-04	3,85E-05	-2,73E-03
EP - terrestrial (mol N- equiv/FU)	7,07E-02			3,81E-02	4,55E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,51E-02	5,67E-03	4,25E-04	-3,05E-02
POCP (kg Ethene equiv/FU)	1,72E-02			9,43E-03	1,16E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,75E-03	1,34E-03	1,05E-04	-7,21E-03
ADP Elements (kg Sb equiv/FU)	4,12E-04			7,68E-05	1,67E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,05E-05	2,58E-06	1,08E-07	-1,76E-05
ADP fossil fuels (MJ/FU)	8,34E+01			4,28E+01	5,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,70E+01	9,28E+00	3,30E-01	-1,44E+01
WDP (m^3 water eq deprived /FU)	1,04E+00			1,17E-01	5,75E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,63E-02	7,87E-02	1,48E-02	-8,84E-02

GWP TOTAL = TOTAL GLOBAL WARMING POTENTIAL (CLIMATE CHANGE); GWP-LULUC = GLOBAL WARMING POTENTIAL (CLIMATE CHANGE) LAND USE AND LAND USE CHANGE; ODP = OZONE DEPLETION POTENTIAL; AP = ACIDIFICATION POTENTIAL FOR SOIL AND WATER; EP = EUTROPHICATION POTENTIAL; POCP = PHOTOCHEMICAL OZONE CREATION; ADPE = ABIOTIC DEPLETION POTENTIAL – ELEMENTS; ADPF = ABIOTIC DEPLETION POTENTIAL – FOSSIL FUELS; WDP = WATER USE (WATER (USER) DEPRIVATION POTENTIAL, DEPRIVATION-WEIGHTED WATER CONSUMPTION)

7 RESOURCE USE

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
PERE (MJ/FU, net calorific value)	-1,62E+01			6,04E-01	9,17E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,40E-01	9,04E-01	2,67E-03	-5,78E-01
PERM (MJ/FU, net calorific value)	4,11E+01			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT (MJ/FU, net calorific value)	2,40E+01			6,04E-01	9,17E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,40E-01	9,04E-01	2,67E-03	-5,78E-01
PENRE (MJ/FU, net calorific value)	9,53E+01			4,54E+01	5,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,81E+01	9,57E+00	3,50E-01	-1,50E+01
PENRM (MJ/FU, net calorific value)	3,84E-01			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT (MJ/FU, net calorific value)	8,88E+01			4,54E+01	5,86E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,81E+01	9,57E+00	3,50E-01	-1,50E+01
SM (kg/FU)	1,97E+02			0,00E+00	-2,81E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	-5,81E+01	-1,35E+02	0,00E+00
RSF (MJ/FU, net calorific value)	3,51E-02			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NRSF (MJ/FU, net calorific value)	2,27E-02			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW (m^3 water eq/FU)	5,22E-02			4,51E-03	2,33E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,79E-03	2,48E-03	3,52E-04	-6,08E-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 = NET USE OF FRESH WATER

8 WASTE CATEGORIES & OUTPUT FLOWS

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
Hazardous waste disposed (kg/FU)	4,52E-04			1,12E-04	4,44E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,46E-05	9,82E-06	4,93E-07	-2,76E-05
Non-hazardous waste disposed (kg/FU)	1,74E+00			2,05E+00	2,19E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,13E-01	1,70E-02	2,24E+00	-5,53E-02
Radioactive waste disposed (kg/FU)	3,03E-04			2,92E-04	2,73E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,16E-04	8,59E-05	2,17E-06	-1,14E-04
Components for re-use (kg/FU)	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling (kg/FU)	3,54E-02			0,00E+00	2,81E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,42E+01	0,00E+00	0,00E+00
Materials for energy recovery (kg/FU)	0,00E+00			0,00E+00	1,21E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy (MJ/FU)	0,00E+00			0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

9 IMPACT CATEGORIES ADDITIONAL TO EN 15804

	Production			Construction process stage		Use stage							End-of-life stage				
	A1 Raw material	A2 Transport	A3 manufacturing	A4 Transport	A5 Installation	B1 Use	B2 Maintenance	B3 Repair	B4 Replacement	B5 Refurbishment	B6 Operational energy use	B7 Operational water use	C1 Deconstruction / demolition	C2 Transport	C3 Waste processing	C4 Disposal	D Reuse, recovery, recycling
PM (disease incidence)	2,55E-07			2,45E-07	2,18E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,74E-08	2,70E-08	2,23E-09	-1,66E-07
IRHH (kg U235 eq/FU)	2,80E-01			1,87E-01	2,19E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,43E-02	9,63E-02	1,35E-03	-1,02E-01
ETF (CTUe/FU)	1,93E+02			3,43E+01	9,05E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,36E+01	4,49E+00	2,14E-01	-8,11E+00
HTCE (CTUh/FU)	6,96E-09			9,63E-10	3,32E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,83E-10	1,59E-10	4,94E-12	-3,34E-10
HTnCE (CTUh/FU)	1,83E-07			3,74E-08	8,24E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,48E-08	3,20E-09	1,52E-10	-7,13E-09
Land Use Related impacts (dimensionless)	6,78E-08			4,47E-09	3,17E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,77E-09	9,01E-10	1,68E-11	-8,94E-10

HTCE = HUMAN TOXICITY – CANCER EFFECTS; HTNCE = HUMAN TOXICITY – NON CANCER EFFECTS; ETF = ECOTOXICITY – FRESHWATER; (POTENTIAL COMPARATIVE TOXIC UNIT)
PM = PARTICULATE MATTER (POTENTIAL INCIDENCE OF DISEASE DUE TO PM EMISSIONS);
IRHH = IONIZING RADIATION – HUMAN HEALTH EFFECTS (POTENTIAL HUMAN EXPOSURE EFFICIENCY RELATIVE TO U235);

9.1 Environmental impact categories explained

Global Warming Potential	The global warming potential of a gas refers to the total contribution to global warming resulting from the emission of one unit of that gas relative to one unit of the reference gas, carbon dioxide, which is assigned a value of 1. It is split up in 4: – Global Warming Potential total (GWP-total) which is the sum of GWP-fossil, GWP-biogenic and GWP-luluc – Global Warming Potential fossil fuels (GWP-fossil) : The global warming potential related to greenhouse gas (GHG) emissions to any media originating from the oxidation and/or reduction of fossil fuels by means of their transformation or degradation (e.g. combustion, digestion, landfilling, etc). – Global Warming Potential biogenic (GWP-biogenic) : The global warming potential related to carbon emissions to air (CO2, CO and CH4) originating from the oxidation and/or reduction of aboveground biomass by means of its transformation or degradation (e.g. combustion, digestion, composting, landfilling) and CO2 uptake from the atmosphere through photosynthesis during biomass growth - i.e. corresponding to the carbon content of products, biofuels or above ground plant residues such as litter and dead wood. – Global Warming Potential land use and land use change (GWP-luluc): The global warming potential related to carbon uptakes and emissions (CO2, CO and CH4) originating from carbon stock changes caused by land use change and land use. This sub-category includes biogenic carbon exchanges from deforestation, road construction or other soil activities (including soil carbon emissions).
Ozone Depletion	Destruction of the stratospheric ozone layer which shields the earth from ultraviolet radiation harmful to life. This destruction of ozone is caused by the breakdown of certain chlorine and/or bromine containing compounds (chlorofluorocarbonsor halons), Which break down when they reach the stratosphere and then catalytically destroy ozone molecules.
Acidification potential	Acid depositions have negative impacts on natural ecosystems and the man-made environment incl. buildings. The main sources for emissions of acidifying substances are agriculture and fossil fuel combustion used for electricity production, heating and transport.
Eutrophication potential	The potential to cause over-fertilization of water and soil, which can result in increased growth of biomass and following adverse effects. It is split up in 3: – Eutrophication potential - freshwater: The potential to cause over-fertilization of freshwater, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - marine: The potential to cause over-fertilization of marine water, which can result in increased growth of biomass and following adverse effects. – Eutrophication potential - terrestrial: The potential to cause over-fertilization of soil, which can result in increased growth of biomass and following adverse effects.
Photochemical ozone creation	Chemical reactions brought about by the light energy of the sun creating photochemical smog. The reaction of nitrogen oxides with hydrocarbons in the presence of sunlight to form ozone is an example of a photochemical reaction.
Abiotic depletion potential for non-fossil ressources	Consumption of non-renewable resources, thereby lowering their availability for future generations. Expressed in comparison to Antimonium (Sb). 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.
Abiotic depletion potential for fossil ressources	Measure for the depletion of fossil fuels such as oil, natural gas, and coal. The stock of the fossil fuels is formed by the total amount of fossil fuels, expressed in Megajoules (MJ). 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.

Ecotoxicity for aquatic fresh water	The impacts of chemical substances on ecosystems (freshwater). 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.
Human toxicity (carcinogenic effects)	The impacts of chemical substances on human health via three parts of the environment: air, soil and water. 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.
Human toxicity (non-carcinogenic effects)	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.
Particulate matter	Accounts for the adverse health effects on human health caused by emissions of Particulate Matter (PM) and its precursors (NOx, SOx, NH3)
Resource depletion (water)	Accounts for water use related to local scarcity of water as freshwater is a scarce resource in some regions, while in others it is not. 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.
Ionizing radiation - human health effects	This impact category deals mainly with the eventual impact on human health of low dose ionizing radiation 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.
Land use related impacts	The indicator is the “soil quality index” which is the result of an aggregation of following four aspects: – Biotic production – Erosion resistance – Mechanical filtration – Groundwater The aggregation is done based on a JRC model. The four aspects are quantified through the LANCA model for land use. 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.

10 DETAILS OF THE UNDERLYING SCENARIOS USED TO CALCULATE THE IMPACTS

10.1 A1 - raw material supply

This module takes into account the extraction and processing of all raw materials and energy which occur upstream to the studied manufacturing process. These are materials of Orbix , water, glue, packaging materials and liquid CO_2. Primary data of the production process at Orbix has been used to model the materials.

10.2 A2 – transport to the manufacturer

The raw materials are transported to the manufacturing site.

10.3 A3 – manufacturing

This module takes into account the production process.

At Betonagglomeraten Gubbels, Orbix raw materials are mixed and pressed as a mixture in a block form on a vibrating press. Next, this pressed mix goes to a climate chamber, here the liquid CO_2 is injected into the process. It is measured how much CO_2 enters the chamber and how much is absorbed by the stones through carbonation and calcium carbonate is created. After this, the stones are polished if necessary. Finally, they go to a stacking/packing machine, which sorts the Carbstones for storage and transport to customers.

10.4 A4 – transport to the building site

Fuel type and consumption of vehicle or vehicle type used for transport	Truck 16-32 ton 0,256 l diesel / km		
Distance	75 km		
Capacity utilisation (including empty returns)	50%		
Bulk density of transported products	Ecoinvent		
Volume capacity utilisation factor	Ecoinvent		

Betonagglomeraten Gubbels NV had reported that deliveries are made to several locations to distributors. The average distance to the middlemen is 40 km.

There is also flat rate that should be used in the absence of specific data, which is the case here. This distance from the distributor to the construction site is 35 km.

The following transport steps apply:

- 100% is transported over 40 km from supplier to distributors with a 16-32 ton lorry (ecoinvent record: 'Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U')
- 100% is transported over 35 km from distributor to construction site with a 16-32 ton lorry (ecoinvent record: 'Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U')

10.5 A5 – installation in the building

At the construction site, packaging materials are released. Also 3% material losses have been taken into account of the Carbstone and 15% of the glue.

The Carbstone has a similar function to concrete, therefore it was also chosen to follow this waste scenario. This means 99% recycling and 1% landfill. This differs from the concrete waste scenario prescribed by B-EPD, the OVAM prescribes (based on Article 4.3.2 Vlarema) that construction rubble must be completely separated and recycled. As it is difficult in practice to recycle all construction rubble 100%, a conservative approach of 1% landfill has been assumed. Since the glue is not collected and processed separately, it follows the same waste scenario as the Carbstone.

Parts of the installation	quantity	Description
Material losses – Carbstone Material losses – glue	*3%* *15%*	THE QUANTITY OF MATERIAL LOST DUE TO CUTTING IT IN THE RIGHT SHAPE
Packaging – Wooden Pallet Packaging – PET straps	0.125 kg – 0,250 kg < 0,1 kg	THE PACKAGING WASTE AT THE CONSTRUCTION SITE

10.6 B – use stage (excluding potential savings)

In the use phase, carbonation also takes place over the years. This is because there are still CaOH present that will eventually react with CO2 from the ambient air, this is converted to calcium carbonates. The carbonation the full blocks in the use phase it is 1,87%.

10.7 C – end of life

The Carbstone has a similar function to concrete, therefore it was also chosen to follow this waste scenario. This means 99% recycling and 1% landfill. This differs from the concrete waste scenario prescribed by B-EPD, the OVAM prescribes (based on Article 4.3.2 Vlarema) that construction rubble must be completely separated and recycled. As it is difficult in practice to recycle all construction rubble 100%, a conservative approach of 1% landfill has been assumed.

The adhesive follows the scenario finishing layers stuck to stony waste. It is assumed that the glue follows the same scenario, they are also not separated so therefore follow the same processes.

Module C2 – Transport to waste processing

Waste processing	Type of vehicle (truck/boat/etc.)	Fuel consumption (litres/km)	Distance (km)	Capacity utilisation (%)	Density of products (kg/m3)	Assumptions
Recycling	Truck 16-32 ton	0,256 l diesel/km	130	50%	Ecoinvent scenario	Ecoinvent scenario
Landfill	Truck 16-32 ton	0,256 l diesel/km	80	50%	Ecoinvent scenario	Ecoinvent scenario

End-of-life modules – C3 and C4	
Parameter	Value (%)
Wastes collected separately	
Wastes collected as mixed construction waste	
Waste for re-use	
Waste for recycling	99%
Waste for energy recovery	
Waste for final disposal	1%

10.8 D – benefits and loads beyond the system boundaries

QUANTITATIVE DESCRIPTION OF THE LOADS BEYOND THE SYSTEM BOUNDARIES	No loads
QUANTITATIVE DESCRIPTION OF THE BENEFITS BEYOND THE SYSTEM BOUNDARIES	Avoided production of stone granulates.

11 RELEASE OF DANGEROUS SUBSTANCES TO INDOOR AIR, SOIL AND WATER DURING THE USE STAGE

11.1 Indoor air

Not applicable.

11.2 Soil and water

Not applicable.

12 DEMONSTRATION OF VERIFICATION

EN 15804+A2 serves as the core PCR

Independent verification of the environmental declaration and data according to standard EN ISO 14025:2010
Internal ☐ External ☒

Third party verifier:
Vinçotte nv
Ramses Sterckx
Jan Olieslagerslaan 35 1800 Vilvoorde
rsterckx@vincotte.be

13 APPLICATION UNIT

This table gives information on the applied product. The table gives information on the length, width and height.

Product group	Length	Width	Height
Carbstone full	*29 cm*	*9 – 19 cm*	*14– 19 cm*

For more information please check the Additional rules complimentary to B-EPD PCR v18.10.2022 on www.b-epd.be

14 ADDITIONAL INFORMATION ON REVERSIBILITY

Description	Type of fixing	Level of reversibility	Simplicity of disassembly	Speed of disassembly	Ease of handling (size and weight)	Robustness of material (material resistance to disassembly)
Stones joint together to form an internal wall	Specific glue	Non reversible connections			Easy to manipulate by hand : one worker should be sufficient	

15 BIBLIOGRAPHY

ISO 14040:2006: Environmental Management-Life Cycle Assessment-Principles and framework.
ISO 14044:2006: Environmental Management-Life Cycle Assessment-Requirements and guidelines.
ISO 14025:2006: Environmental labels and Declarations-Type III Environmental Declarations-Principles and procedures.
NBN EN 15804+A2:2019
B-EPD PCR 18.10.2022
Masterbloc ECO lijmmortel 950 (packed), valid until 02 June 2030. Excecuted by R<think, Comissioned by Weber Beamix

OVAM, Sorteren, inzamelen en verwerken van bouw- en sloopafval.
https://ovam.vlaanderen.be/sortereneninzamelenbouwensloop.
Afval en mest verwerkingsselectiesysteem, houtafval. Bron: https://afss.emis.vito.be/afvalstroom/houtafval#group_legislation.

General information

Owner of the EPD, Responsible for the data,
LCA and information

Betonagglomeraten Gubbels nv,
Steenweg naar As 4 - B-3630 Maasmechelen
For more information you can contact: info@masterbloc.be

Author(s) of the LCA and EPD

Odile Koenders, SGS Search, odile.koenders@sgs.com
Project report: 29.23.00039

Verifier

Ramses Sterckx Vinçotte nv
Date of verification: 29.08.2025
External independent verification of the declaration and data according to EN ISO 14025 and relevant PCR documents

Comparing EPDs is not possible unless they are conform to the same PCR and taking into account the building context.
The program operator cannot be held responsible for the information supplied by the owner of the EPD nor LCA practitioner.

B-EPD program operator
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