epddanmark

ECO PLATFORM EPD VERIFIED

Owner: Hi-Con ApS
No.: MD-23200-EN
Issued: xx-xx-xxxx
Valid to: xx-xx-xxxx

3rd PARTY **VERIFIED**

EPD

VERIFIED ENVIRONMENTAL PRODUCT DECLARATION | **ISO 14025 & EN 15804**

Owner of declaration
Hi-Con ApS
Hjallerup Erhvervspark 1
DK-9320 Hjallerup
VAT no. 26020387

Programme
EPD Danmark
www.epddanmark.dk

☐ Industry EPD
☒ Product EPD

Declared product(s)
1 m^3 precast high strength concrete balcony

Number of declared datasets/product variations: 1

Production site
Hi-Con ApS.
Hjallerup Erhvervspark 1
9320 Hjallerup, Denmark.

Hi-Con ApS purchases green electricity from wind power for their production.

Use of Guarantees of Origin
☐ No certificates used
☒ Electricity covered by GoO
☐ Biogas covered by GoO

Declared/ functional unit
1 m^3 precast reinforced concrete balcony (without balcony railings)

Year of production site data (A3)
2022

EPD version
3

Issued:
xx-xx-xxxx

Valid to:
xx-xx-xxxx

Basis of calculation
This EPD is developed in accordance with the European standard EN 15804+A2.

Comparability
EPDs of construction products may not be comparable if they do not comply with the requirements in EN 15804. EPD data may not be comparable if the datasets used are not developed in accordance with EN 15804 and if the background systems are not based on the same database.

Validity
This EPD has been verified in accordance with ISO 14025 and is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental information for construction products, for the purpose of assessing the environmental performance of buildings.

EPD type
☐Cradle-to-gate with modules C1-C4 and D
☐Cradle-to-gate with options, modules C1-C4 and D
☒Cradle-to-grave and module D
☐Cradle-to-gate
☐Cradle-to-gate with options

CEN standard EN 15804 serves as the core PCR

Independent verification of the declaration and data, according to EN ISO 14025

☐ internal ☒ external

Third party verifier:

Guangli Du, Aalborg University

Martha Katrine Sørensen
EPD Danmark

Life cycle stages and modules (MND = module not declared)																
Product			Construction process		Use							End of life				Beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport	Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Re-use, recovery and 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	X	X	X	X	X	X	X	X	X	X	X

Product information

Product description

The general composition of the high strength concrete recipe for Hi-Con ApS precast balconies is shown in the table below. The values are characteristics to all Hi-Con ApS balconies for which this document is valid. Due to confidentiality reasons, they are specified in ranges and some minor components are not shown.

Material	Weight-% of declared product
Cement	25-30%
Silica fume (white or grey)	5-10%
Sand and gravel	50-60%
Steel reinforcement and fibers	10-20%
Others*	<1-5%

*Others represent specified constituents, water and superplasticizer.

The balconies are precast in wooden molds for which the materials: wood, glue, lacquer, screws and bolts as well as polypropylene cloth are used.

The recipe was updated in 2026, but the ranges of the above table are still valid. The updates include new D-carb cement from Aalborg Portland which affects the amount needed of the remaining ingredients to ensure high-strength concrete.

Product packaging:

No packaging materials are used to package the final concrete elements.

Representativity

This declaration, including data collection and the modeled foreground system including results, represents the production of high strength balconies on the production site located in Hjallerup, Denmark. Product specific data are based on average values collected in the period 2022. Background data are based on LCA for Experts 10.7 and Ecoinvent 3.8 databases and are less than 10 years old. Generally, the used background datasets are of high quality, and the majority of the datasets are only a couple of years old.

The products are manufactured and sold in Denmark. Therefore, a Danish use and EoL scenario is included, and the geographical region covered is Denmark.

The installation phase of the precast balconies varies from project to project. Therefore, a representative project was chosen for consumption of materials and energy during installation and transport to construction site. Product specific data including materials for the concrete recipe for the precast balconies, energy consumption and waste generation is based on average values collected in the period 2022.

Hazardous substances

The product does not contain substances listed in the "Candidate List of Substances of Very High Concern for authorisation"

(http://echa.europa.eu/candidate-list-table)

Essential characteristics

High strength concrete balconies are covered by European Technical Assessment ETA 17/0330. Declaration of performance according to EU regulation 305/2011 is available for all declared product variations.

Further technical information can be obtained by contacting the manufacturer or on the manufacturer's website:

https://www.hi-con.dk/

Reference Service Life (RSL)

In agreement with the PCR (EN 16757:2022), the RSL is equal to the required service life (ReqSL) of the building in which the concrete balcony is installed. The RSL is 50 years.

Picture of product

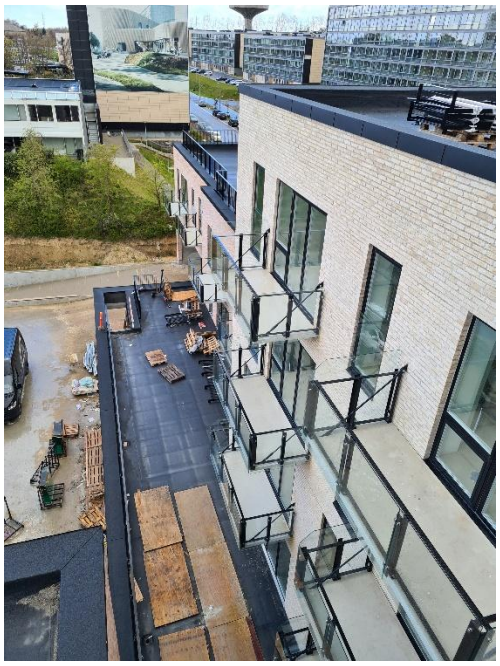


Figure 1 & 2: Ryhavevej 28, Aarhus in the construction phase.

LCA background

Declared unit

The LCI and LCIA results in this EPD relate to the declared unit of 1 m^3 reinforced concrete balcony as stated in the table below, which can be scaled to a specific balcony at building level.

Name	Value	Unit
Declared unit	1	m^3
Density	2575	kg/m^3
Conversion factor to 1 kg.	3,88*10-4	-

Functional unit

Not defined.

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804, and EN 16757:2022 "Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements"

Guarantee of Origin – certificates

Foreground system:

Guarantees of origin is used for green electricity produced by Danish wind power. For modelling energy production, a dataset for Danish win power is used, in accordance with the recommendations from EPD Denmark.

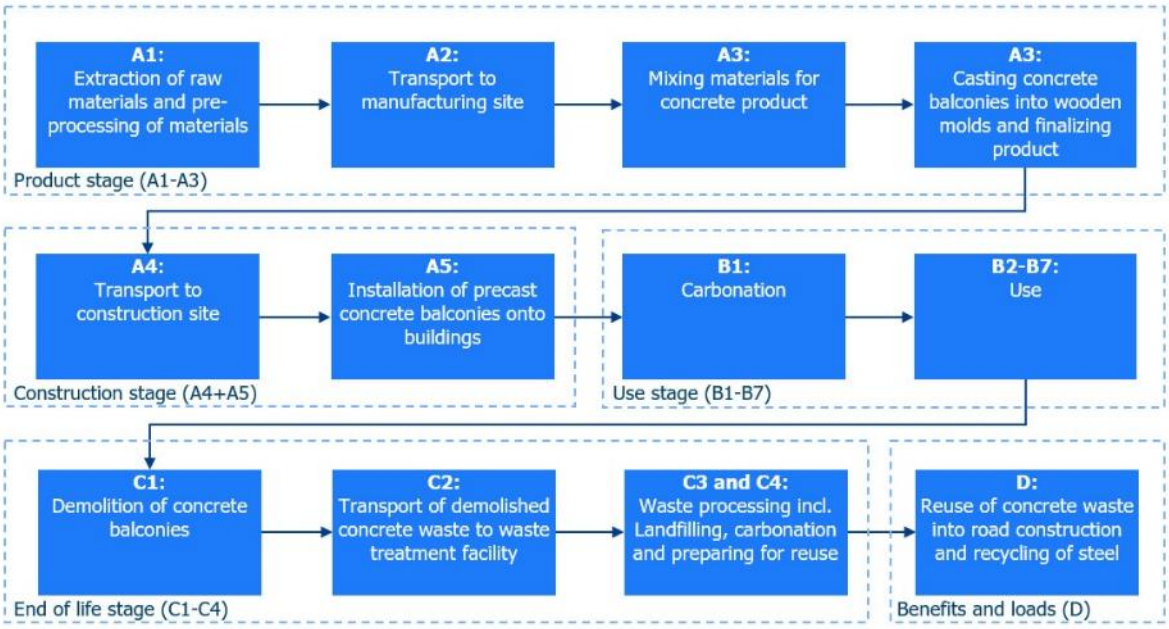
Information about the energy mix in the foreground system:

Energy mix	EF	Unit
Wind power	0,01	kg CO_2e/kWh
District heating	0,07	kg CO_2e/MJ

Background system:

Upstream processes are modelled using residual grid mix. Downstream processes are modelled using consumption mix.

Flowdiagram



System boundary

This EPD is based on a cradle-to-grave LCA, in which 100 %-weight of the product has been accounted for.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes.

Allocation is performed in accordance with EN 15804 and EN 16757. This includes recycled outputs in the product stage (A1-A3) that are allocated as co-products. Also reuse of wooden molds for precasting the reinforced concrete balconies are taken into account by considering the number of reuses over a year, 2022.

Product stage (A1-A3) includes:

A1 – Extraction and processing of raw materials
A2 – Transport to the production site
A3 – Manufacturing processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to the production site, packaging and waste processing up to the ”end-of-waste” state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

The raw materials for the concrete recipe are mixed followed by casing and curing into wooden molds. The production of needed ancillary materials such as lubrication and wax for molds are handled by a supplier and a part of the product stage.

No packaging materials are used for the final concrete balconies.

Construction process stage (A4-A5) includes:

Each balcony varies across customers and projects, and no balcony for different projects are identical. Therefore, a representative project was chosen to cover the installation and construction stage, see the chosen project depicted in Figure 1. The project was selected as the closest representative for a standard Hi-Con ApS high-strength concrete balcony.

The construction process stage includes transportation of the precast elements by truck to the building site (A4). Installation into the building (A5) implies using small cranes for lifting and a total of 263 kg/m^3 ancillary materials, such as brackets and bolts, for assembling and fixing the elements in place on site.

Use stage (B1-B7) includes:

The use stage is included although the only environmental impact occurring in the use stage is carbonation. The carbonation is accounted for in B1. Thus, no maintenance (B2), repair (B3), replacements (B4) or refurbishment (B5) is needed for the normal use of Hi-Con ApS high strength concrete balconies. Also, no operational energy (B6) or water (B7) is required during the use of the product. However, it is acknowledged that some cleaning may occur, for example if a person spills on the balcony.

End of Life (C1-C4) includes:

At the End-of-Life stage, the concrete balconies are demolished, and the concrete is excavated (C1). Next, the concrete is transported to the waste processing site (C2) where it is crushed to gravel size and steel is separated and recycled (C3). This EPD assumes that 97% of the crushed concrete is recycled (D) and the remaining 3% is disposed in landfill (C4). At the disposal of concrete waste on landfill, carbonation in module C4 is considered, complying with EN 16757:2022.

Re-use, recovery and recycling potential (D) includes:

Hi-Con ApS has the ambition to implement several Take-Back options, e.g. where the customer has the option of selling the balconies back to Hi-Con after 50 years. The balconies can then be stored and ideally re-used and undergo an additional life cycle. Since no Hi-Con balcony has reached the End-of-Life phase yet, the Take-Back scheme is not implemented in scale. Therefore, the End-of-Life phase is assessed following a conservative approach. Thus, in module (D), the crushed concrete is being used as road filling as a substitution for gravel and steel substituting virgin production of steel.

LCA results

ENVIRONMENTAL IMPACTS PER [m³]										
Indicator	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
GWP-total	kg CO_2 eq.	8,25E+02	3,16E+01	7,21E+02	-2,21E+00	1,05E+00	1,04E+01	7,90E+00	-3,61E+00	-1,09E+02
GWP-fossil	kg CO_2 eq.	8,17E+02	3,05E+01	7,20E+02	-2,21E+00	1,04E+00	9,96E+00	7,82E+00	-3,61E+00	-1,09E+02
GWP-biogenic	kg CO_2 eq.	6,78E+00	1,05E+00	2,15E-01	0,00E+00	3,71E-03	4,22E-01	8,05E-02	-4,50E-03	1,15E-01
GWP-luluc	kg CO_2 eq.	4,25E-01	5,74E-03	1,29E-01	0,00E+00	3,27E-04	1,02E-03	5,93E-03	5,70E-03	-6,32E-02
ODP	kg CFC 11 eq.	4,70E-06	8,61E-12	1,29E-05	0,00E+00	4,90E-13	1,53E-12	1,93E-10	3,87E-12	-7,94E-11
AP	mol H^+ eq.	3,20E+00	5,54E-02	1,96E+00	0,00E+00	4,11E-03	1,36E-02	1,55E-02	9,83E-03	-2,64E-01
EP-freshwater	kg P eq.	2,41E-03	1,41E-05	2,19E-03	0,00E+00	8,04E-07	2,52E-06	2,10E-05	2,07E-06	-5,70E-05
EP-marine	kg N eq.	3,65E-01	1,89E-02	4,64E-01	0,00E+00	1,57E-03	5,20E-03	5,11E-03	2,57E-03	-6,60E-02
EP-terrestrial	mol N eq.	8,38E+00	2,11E-01	5,03E+00	0,00E+00	1,72E-02	5,85E-02	5,64E-02	2,80E-02	-7,13E-01
POCP	kg NMVOC eq.	2,52E+00	6,17E-02	1,63E+00	0,00E+00	5,25E-03	1,46E-02	1,28E-02	7,70E-03	-2,17E-01
ADPm[1]	kg Sb eq.	1,58E-03	1,66E-06	7,75E-03	0,00E+00	9,48E-08	2,97E-07	1,52E-06	8,61E-08	-1,83E-06
ADPf[1]	MJ	9,34E+03	7,70E+02	8,61E+03	0,00E+00	4,39E+01	1,37E+02	1,25E+02	1,82E+01	-8,63E+02
WDP[1]	m^3 world eq. deprived	4,75E+01	1,46E-01	-7,87E+01	0,00E+00	8,33E-03	2,61E-02	1,83E-01	1,50E-01	-1,25E+00
Caption	GWP-total = Global Warming Potential - total; GWP-fossil = Global Warming Potential - fossil fuels; GWP-biogenic = Global Warming Potential - biogenic; GWP-luluc = Global Warming Potential - land use and land use change; ODP = Ozone Depletion; AP = Acidifcation; EP-freshwater = Eutrophication – aquatic freshwater; EP-marine = Eutrophication – aquatic marine; EP-terrestrial = Eutrophication – terrestrial; POCP = Photochemical zone formation; ADPm = Abiotic Depletion Potential – minerals and metals; ADPf = Abiotic Depletion Potential – fossil fuels; WDP = water use									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									
Disclaimer	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.									

Additional environmental impacts, as declared in the project report of this EPD:

ADDITIONAL ENVIRONMENTAL IMPACTS PER [m³]										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PM	[Disease incidence]	4,87E-05	6,22E-07	7,01E-05	0,00E+00	4,98E-08	1,47E-07	1,36E-07	1,22E-07	-4,88E-06
IRP[2]	[kBq U235 eq.]	9,39E+01	1,82E-01	9,90E+00	0,00E+00	1,04E-02	3,25E-02	8,65E-01	2,15E-02	5,96E-01
ETP-fw[1]	[CTUe]	7,20E+03	5,71E+02	1,28E+03	0,00E+00	3,25E+01	1,02E+02	4,92E+01	1,44E+01	-1,58E+02
HTP-c[1]	[CTUh]	1,17E-06	8,73E-09	4,44E-07	0,00E+00	4,97E-10	1,56E-09	6,08E-09	2,43E-10	-1,70E-07
HTP-nc[1]	[CTUh]	4,63E-05	1,43E-07	2,72E-06	0,00E+00	8,14E-09	2,55E-08	5,52E-08	9,08E-09	-1,48E-07
SQP[1]	-	2,34E+04	4,70E+00	4,98E+02	0,00E+00	2,68E-01	8,38E-01	5,44E+01	4,50E+00	4,42E+01
Caption	PM = Particulate Matter emissions; IRP = Ionizing radiation – human health; ETP-fw = Eco toxicity – freshwater; HTP-c = Human toxicity – cancer effects; HTP-nc = Human toxicity – non cancer effects; SQP = Soil Quality									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^2$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									
Disclaimers	[1] The results of this environmental indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. [2] 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.									

RESOURCE USE PER [m³]										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
PERE	[MJ]	3,71E+03	5,56E+00	2,96E+02	0,00E+00	3,16E-01	9,91E-01	8,55E+01	3,52E+00	1,05E+02
PERM	[MJ]	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]	3,71E+03	5,56E+00	2,96E+02	0,00E+00	3,16E-01	9,91E-01	8,55E+01	3,52E+00	1,05E+02
PENRE	[MJ]	9,34E+03	7,70E+02	8,61E+03	0,00E+00	4,39E+01	1,37E+02	1,25E+02	1,82E+01	-8,63E+02
PENRM	[MJ]	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]	9,34E+03	7,70E+02	8,61E+03	0,00E+00	4,39E+01	1,37E+02	1,25E+02	1,82E+01	-8,63E+02
SM	[kg]	1,17E+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
RSF	[MJ]	2,01E+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
NRSF	[MJ]	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	[m³]	1,57E+00	6,04E-03	-1,11E+00	0,00E+00	3,44E-04	1,08E-03	3,05E-02	4,40E-03	-8,21E-02
Caption	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									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^{2}$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									

WASTE CATEGORIES AND OUTPUT FLOWS PER [m³]										
Parameter	**Unit**	**A1-A3**	**A4**	**A5**	**B1-B7**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	[kg]	6,79E-02	2,92E-08	9,54E-05	0,00E+00	1,66E-09	5,21E-09	1,85E-07	3,99E-09	2,94E-07
NHWD	[kg]	6,71E+01	6,85E-02	1,39E+01	0,00E+00	3,90E-03	1,22E-02	8,61E-02	9,11E+01	-9,42E+01
RWD	[kg]	2,76E-01	1,29E-03	9,23E-03	0,00E+00	7,34E-05	2,30E-04	8,61E-03	1,94E-04	8,51E-03
CRU	[kg]	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
MFR	[kg]	1,64E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,48E+03	0,00E+00	0,00E+00
MER	[kg]	6,14E-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
EEE	[MJ]	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
EET	[MJ]	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
Caption	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									
	The numbers are declared in scientific notation, fx 1,95E+02. This number can also be written as: $1,95*10^{2}$ or 195, while 1,12E-11 is the same as $1,12*10^{-11}$ or 0,0000000000112.									

BIOGENIC CARBON CONTENT PER [m³]		
Parameter	**Unit**	**At the factory gate**
Biogenic carbon content in product	[kg C]	6,82E-01
Biogenic carbon content in accompanying packaging	[kg C]	0,00E+00
Note		1 kg biogenic carbon is equivalent to 44/12 kg of CO_2

Additional information

LCA interpretation

The raw material extraction and processing (A1) module as well as the installation (A5) are dominating the impact results across all core environmental indicators. This is linked to the production of cement for the concrete recipe for impacts in module A1. For impacts in module A5 it is linked to the production of galvanized steel for brackets and threaded bars for installing the precast balcony.

Technical information on scenarios

Transport to the building site (A4) per m³ precast concrete balcony

Scenario information	Value	Unit
Fuel type	Diesel mix	-
Vehicle type	Truck-trailer, Euro 6 (34-40 t total cap., 27t payload)	-
Transport distance	150	km
Capacity utilisation (including empty runs)	61	%
Gross density of products transported	2575	kg

Installation of the product in the building (A5) per m³ precast concrete balcony

Scenario information	Value	Unit
Ancillary materials*	263	kg
Crane truck (using 3,19 kg-diesel/hour)	338	MJ
Crane lift (using 0,924 kg-diesel/hour)	162	MJ

*The ancillary materials include materials such as steel brackets, screws and bolts for assembling and fixing the elements in place on site.

Reference service life

RSL information		Unit
Reference service Life	50	Years

Use (B1-B7) per m³ precast concrete balcony

Scenario information	Value	Unit
B1 – Use		
Carbonation (according to EN 16757)	2,21	kg-CO_2e

End of life (C1-C4) per m³ precast concrete balcony

Scenario information	Value	Unit
Collected separately	-	kg
Collected with mixed waste	-	kg
For reuse	-	kg
For recycling (97% for road filling and steel recycling)	2497,8	kg
For energy recovery	-	kg
For final disposal (3% for landfill)*	77,3	kg
Assumptions for scenario development	-	As appropriate

*During landfill carbonation takes place where a conservative scenario considering an uptake of 5 kg-CO_2e/m³ is included, according to En 16757 and the products in scope.

Re-use, recovery and recycling potential (D) per m³ precast concrete balcony

Scenario information/Materiel	Value	Unit
Crushed concrete for road filling	2222,8	kg
Recycled steel from steel reinforcement	275	kg

*Includes losses during recycling

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.1.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on the relevant measurements are not available. Read more in EN15804+A1 chapter 7.4.2.

References

Publisher	www.epddanmark.dk Template version 2023.1
Programme operator	Danish Technological Institute Buildings & Environment Gregersensvej DK-2630 Taastrup www.teknologisk.dk
LCA-practitioner	Gritt Cortnum Andersen Charlotte Merlin FORCE Technology Park Allé 345 2605 Brøndby www.forcetechnology.com
LCA software /background data	LCA for Experts (GaBi) v. 10.7 (www.sphera.com) and Ecoinvent 3.8 (www.ecoinvent.org)
3rd party verifier	Guangli Du Aalborg University A.C. Meyers Vænge 15 2450 København SV www.aau.dk

General programme instructions
General Programme Instructions, version 2.0, spring 2020
www.epddanmark.dk

EN 15804
DS/EN 15804 + A2:2019 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

EN 16757
EN 16757:2022 "Sustainability of construction works – Environmental product declarations – Product Category Rules for concrete and concrete elements"

EN 15942
DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025
DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040
DS/EN ISO 14040:2008 – ” Environmental management – Life cycle assessment – Principles and framework”

ISO 14044
DS/EN ISO 14044:2008 – ” Environmental management – Life cycle assessment – Requirements and guidelines”s