ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Precast reinforced concrete prestressed beam

Prefabmästarna Sverige AB

EPD HUB, HUB-0437

Publishing date 12 May 2023, last updated on 21 September 2023, valid until 12 May 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Prefabmästarna Sverige AB
Address	Gamla Älvsbyvägen 15
Contact details	jorgen.malmstrom@prefabmastarna.se
Website	www.prefabmastarna.se

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022 EN 16757 Product Category Rules for concrete and concrete elements
Sector	Construction product
Category of EPD	3rd party verified EPD
Scope of the EPD	Cradle to gate & Module (C1-C4), D
EPD author	Jörgen Malmström, Prefabmästarna Sverige AB
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Haiha Nguyen, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. 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.

PRODUCT

Product name	Precast reinforced concrete prestressed beam
Additional labels	BF/FBF
Product reference	-
Place of production	Öjebyn, Sweden
Period for data	Calendar year 2020
Averaging in EPD	No average value
Variation in GWP-fossil for A1-A3	- %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 tonne of precast reinforced concrete prestressed beam
Declared unit mass	1000 kg
GWP-fossil, A1-A3 (kgCO2e)	1,55E2
GWP-total, A1-A3 (kgCO2e)	1,56E2
Secondary material, inputs (%)	5.93
Secondary material, outputs (%)	78.7
Total energy use, A1-A3 (kWh)	473.0
Total water use, A1-A3 (m3e)	1,93E0

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Although Prefabmästarna is a young company with a short history, the business is characterized by a 100-year tradition of concrete casting.

As early as 1916, the first shovelfuls of casting gravel were taken in the ground where the factory is located today. At first, the production mainly consisted of land and VA products. As the years went by, the direction was increasingly directed towards concrete elements for houses and other facility construction.

In the beginning, all material was handled by hand and with the help of horses. Working life in the pit was hard and tiring and few managed to reach the retirement age of the time with their health intact. Looking back at the 100-year history, the factory in Öjebyn is a brilliant industrial historical example of how much has happened in terms of improving the working environment, mechanical development and other technical achievements.

Today, the factory is a modern equipped full-range factory with high efficiency without renouncing our high-quality requirements. Our goal is to constantly develop the business to be one of the leading players on the market. We humbly carry with us the long tradition and history on which our business is based.

Over the years, there have been different owners of the business in Öjebyn. During the summer of 2012, the unit in Öjebyn was acquired by the Finnish companies Lujabetoni and YBT. Both companies are among the leaders in their market areas in Finland. With their solid knowledge in the industry, strong finances and pronounced long-term perspective, their ownership guarantees a business that is set in constant development.

PRODUCT DESCRIPTION

The precast reinforced concrete prestressed beam (BF/FBF) is made of reinforcement, prestressed steel core and concrete, the precast reinforced concrete prestressed beam is an interior beam in buildings.
Every precast reinforced concrete prestressed beam produced is tailored based on the customer's specific requirements, therefore the structure of the precast reinforced concrete prestressed beam surfaces varies based on the orders placed.

All products are manufactured indoors, which ensure a high and even quality. Therefore, precast reinforced concrete prestressed beam can have a life span up to 100 years. The maintenance required for the precast reinforced concrete prestressed beam is low during its lifespan and our product meets all the necessary requirements for moisture, acoustics and fire protection.

During the use phase, cementitious materials (hydration products in the concrete) present on the exterior surface of the precast reinforced concrete prestressed beam chemically reacts with the atmospheric carbon dioxide due to carbonization and calcium carbonate is formed as the result. However, the carbonization is not taken into the account in this study.

This precast reinforced concrete prestressed beam is a standard product, it can be changed from customer to customer or project and where in the country it is to be delivered to. It can be anything from thicker to thinner precast reinforced concrete prestressed beam, the number and sizes can vary.

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

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	3.46	Europe
Minerals	96.54	Sweden
Fossil materials	0	-
Bio-based materials	0	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 tonne of precast reinforced concrete prestressed beam
Mass per declared unit	1000 kg
Functional unit	-
Reference service life	-

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

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

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		
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

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

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Raw materials are purchased and transported to factory. In the factory, the mold is prepared according to the customer requirements. The mold can be made of wood or steel and the mold are often reused between projects. The mold is cleaned, and form oil is applied. Reinforcing mesh, reinforcing bars and sometime montage goods implemented in the mold.

The production of concrete is made factory site. The recipe for the concrete varies between different products and projects. When the concrete is poured into the mold, it´s vibrated to make sure that the concrete fills out the mold. The last step is to prepare the surface according to the customer´s requirements.

The mold is removed after one day and then the product is moved to the warehouse.

Rejected concrete is landfilled in-situ; steel scraps are sent to a local waste manager for recycling; wastewater is treated in the municipal treatment plant and wooden molds are incinerated for energy.

TRANSPORT AND INSTALLATION (A4-A5)

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.

Transportation, A4 and A5 Assembly is not included in the EPD.

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

At the end of the service life, it is assumed that 100% of the waste in the demolition phase is collected as separate construction waste. The demolition process consumes energy in the form of diesel fuel used in construction machinery. The energy consumption for a demolition process is on average 10 kWh / m2 (Bozdağ, Ö & Seçer, M., Energy consumption of RC buildings during their life cycle. Izmr, Dokuz University (2007). Based on a Level project, the average mass of a reinforced concrete building is

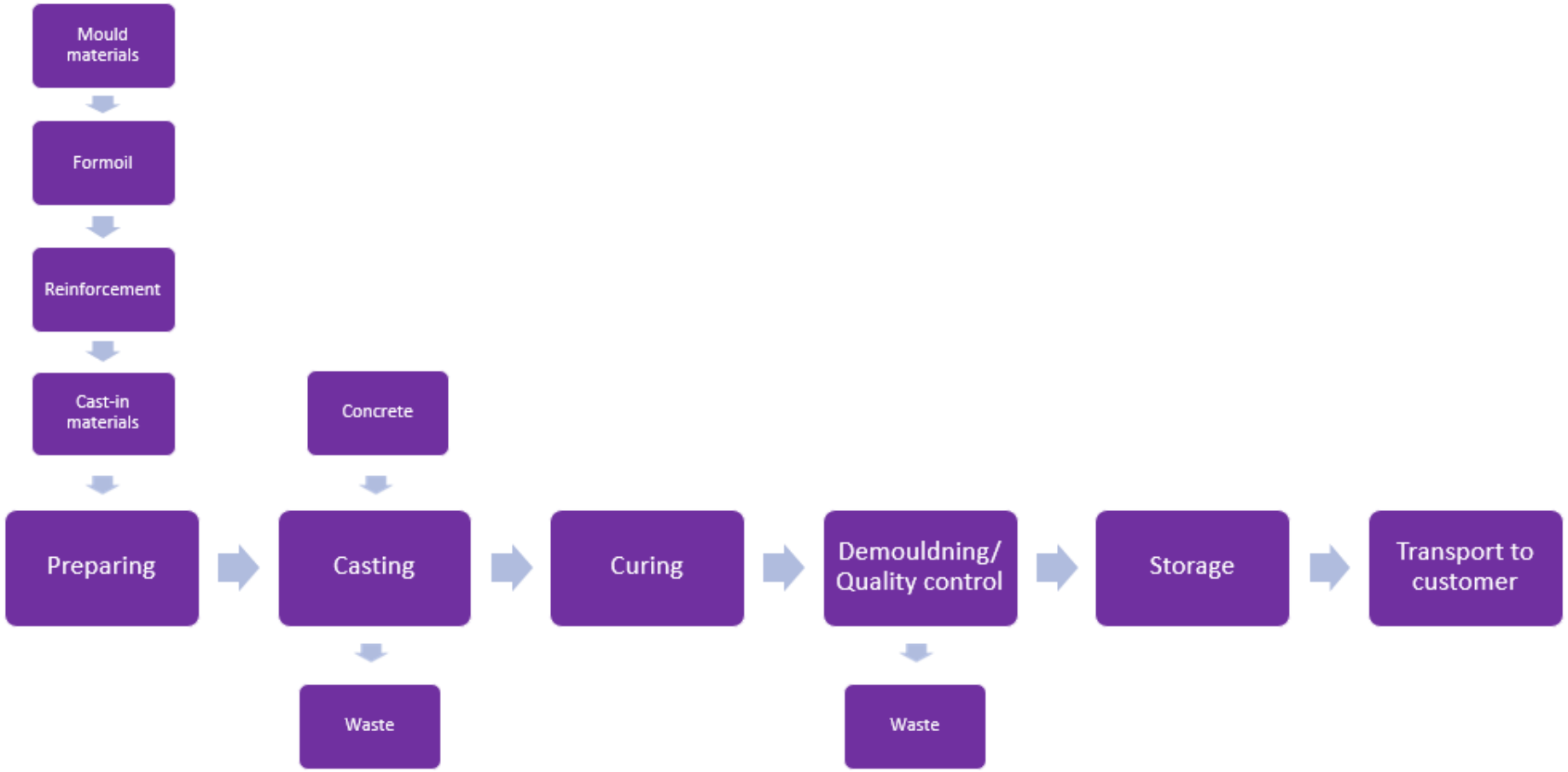
approximately 1000 kg / m2. Therefore, demolition of energy consumption is assumed to be 10 kWh / 1000 kg = 0.01 kWh / kg. The energy source is diesel fuel used by work machines (C1).

The dismantled solid wall / solid slab is delivered to the nearest construction waste treatment plant. It is estimated that there is no mass loss when using the product, therefore the final product is assumed to have the same weight as the declared product. The transport distance to the nearest landfill is estimated at 50 km and the transport method is the most common truck (C2).

At the waste treatment plant, waste that can be reused, recycled or recycled for energy is separated for further use. At the beginning of 2020, waste restrictions were tightened in Sweden and the amount of waste that goes to landfill is limited compared to recent years, so it can be assumed that 100% of solid wall / solid slab are transported to a waste treatment plant, where the solid wall / solid slab are crushed and steel is separated. About 95% of steel (World Steel Association. 2020) and 80% of concrete (Betoniteollisuus ry, 2020) are recycled. Steel scrap are sent to a local waste manager for recycling; wastewater is treated in the municipal treatment plant and wooden molds are incinerated for energy.
The process losses of the waste treatment plant are assumed to be negligible (C3). The remaining 20% concrete and 5% steel are assumed to be sent to the landfill (C4).

Due to the recycling potential of reinforcing steel and concrete, they can be used as a secondary raw material, which avoids the use of virgin raw materials, 80% concrete and 95% steel.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied 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, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do 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. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	Allocated by mass or volume
Packaging materials	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No average value
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	- %

N/A

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

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
GWP – total[1)]	kg CO_2e	1,45E2	5,04E0	6,55E0	1,56E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,31E0	0E0	3,42E0	1,02E0	-6,21E0
GWP – fossil	kg CO_2e	1,44E2	5,04E0	5,05E0	1,55E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,31E0	0E0	3,42E0	1,02E0	-6,2E0
GWP – biogenic	kg CO_2e	3,08E-2	5,58E-4	0E0	3,14E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
GWP – LULUC	kg CO_2e	5,69E-2	1,82E-3	1,5E0	1,55E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,3E-4	0E0	7,24E-4	9,64E-4	-8,53E-3
Ozone depletion pot.	kg $CFC_{-11}e$	5,45E-6	1,19E-6	1,13E-6	7,77E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	7,07E-7	0E0	7,02E-7	4,13E-7	-5,05E-7
Acidification potential	mol H^+e	4,06E-1	2,11E-2	5,26E-2	4,8E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,44E-2	0E0	3,63E-2	9,6E-3	-4,02E-2
EP-freshwater[2)]	kg Pe	1,82E-2	3,64E-5	8,1E-5	1,83E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,1E-5	0E0	2,73E-5	1,07E-5	-3,52E-4
EP-marine	kg Ne	6,17E-2	6,36E-3	1,91E-2	8,71E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,52E-2	0E0	1,51E-2	3,32E-3	-8,7E-3
EP-terrestrial	mol Ne	1,17E0	7,01E-2	2,36E-1	1,48E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,67E-1	0E0	1,66E-1	3,65E-2	-1,13E-1
POCP ("smog")[3)]	kg NMVOCe	3,9E-1	2,25E-2	5,7E-2	4,7E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,59E-2	0E0	4,57E-2	1,06E-2	-2,91E-2
ADP-minerals & metals[4)]	kg Sbe	4,58E-4	1,18E-5	1,35E-5	4,83E-4	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,68E-6	0E0	4,42E-5	2,35E-6	-6,04E-5
ADP-fossil resources	MJ	8,35E2	7,67E1	7,01E1	9,82E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,45E1	0E0	4,6E1	2,8E1	-8,97E1
Water use[5)]	m^3e depr.	3,22E1	3,51E-1	4,89E1	8,14E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,2E-1	0E0	1,95E-1	8,88E-2	-1,19E1

ADDITIONAL (OPTIONAL) 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	7,07E-6	5,89E-7	1,08E-6	8,74E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	9,22E-7	0E0	6,66E-6	1,93E-7	-5,18E-7
Ionizing radiation[6)]	kBq U235e	6,05E3	3,87E-1	3,6E-1	6,05E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,05E-1	0E0	2,4E-1	1,27E-1	-1,33E0
Ecotoxicity (freshwater)	CTUe	1,37E3	6,52E1	2,14E2	1,65E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,68E1	0E0	4,45E1	1,83E1	-1,13E2
Human toxicity, cancer	CTUh	1,02E-6	1,69E-9	3,96E-9	1,03E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,03E-9	0E0	1,56E-9	4,57E-10	-6,25E-9
Human tox. non-cancer	CTUh	7,99E-6	6,77E-8	1E-7	8,16E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,94E-8	0E0	4,47E-8	1,19E-8	-1,15E-7
SQP[7)]	-	1,41E3	8,91E1	3,51E2	1,85E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,79E0	0E0	1,41E1	5,99E1	-8,61E1

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
Renew. PER as energy[8)]	MJ	1,23E2	9,57E-1	1,58E2	2,82E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-1	0E0	1E0	2,43E-1	-8,06E0
Renew. PER as material	MJ	0E0	0E0	-1,35E-3	-1,35E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,23E2	9,57E-1	1,58E2	2,82E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,54E-1	0E0	1E0	2,43E-1	-8,06E0
Non-re. PER as energy	MJ	9,59E2	7,67E1	6,58E1	1,1E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,45E1	0E0	4,6E1	2,8E1	-8,97E1
Non-re. PER as material	MJ	4,73E0	0E0	8,04E-4	4,73E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-3,78E0	-9,5E-1	0E0
Total use of non-re. PER	MJ	9,64E2	7,67E1	6,58E1	1,11E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,45E1	0E0	4,23E1	2,7E1	-8,97E1
Secondary materials	kg	5,93E1	2,15E-2	2,69E-2	5,93E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,74E-2	0E0	2,11E-2	5,88E-3	-9,86E-2
Renew. secondary fuels	MJ	9,25E1	1,97E-4	1,54E-4	9,25E1	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,7E-5	0E0	3,02E-4	1,54E-4	-7,06E-4
Non-ren. secondary fuels	MJ	1,51E2	0E0	0E0	1,51E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	8,45E-1	1,01E-2	1,07E0	1,93E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,7E-3	0E0	5,05E-3	3,06E-2	-2,85E-1

8) PER = 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	8,56E0	8,77E-2	9,96E-2	8,74E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,96E-2	0E0	8,5E-2	0E0	-5,25E-1
Non-hazardous waste	kg	6,24E2	1,5E0	4,82E1	6,74E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,19E-1	0E0	1,32E0	1,94E2	-1,55E1
Radioactive waste	kg	1,09E-3	5,24E-4	4,16E-4	2,03E-3	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,13E-4	0E0	3,19E-4	0E0	-4,47E-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 re-use	kg	9,2E-2	0E0	0E0	9,2E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	2,16E0	2,16E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	7,87E2	0E0	0E0
Materials for energy rec	kg	0E0	0E0	4,42E-1	4,42E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0

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 Pot.	kg CO_2e	1,67E2	5,71E0	6,45E0	1,79E2	MND	MND	MND	MND	MND	MND	MND	MND	MND	3,27E0	0E0	3,38E0	1E0	-6,05E0
Ozone depletion Pot.	kg CFC_{-11}e	6,14E-6	1,06E-6	8,22E-7	8,02E-6	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,6E-7	0E0	5,57E-7	3,27E-7	-4,19E-7
Acidification	kg SO_2e	4E-1	1,89E-2	2,8E-2	4,47E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	2,45E-2	0E0	2,62E-2	7,25E-3	-3,11E-2
Eutrophication	kg PO_4^3e	1,68E-1	4,28E-3	6,76E-3	1,79E-1	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,69E-3	0E0	6,4E-3	1,56E-3	-1,46E-2
POCP (“smog”)	kg C_2H_4e	2,99E-2	7,39E-4	9,76E-4	3,16E-2	MND	MND	MND	MND	MND	MND	MND	MND	MND	5,36E-4	0E0	6,26E-4	3,04E-4	-2,12E-3
ADP-elements	kg Sbe	4,76E-4	1,31E-5	1,21E-5	5,01E-4	MND	MND	MND	MND	MND	MND	MND	MND	MND	1,65E-6	0E0	4,42E-5	2,31E-6	-5,97E-5
ADP-fossil	MJ	1,08E3	8,71E1	6,68E1	1,24E3	MND	MND	MND	MND	MND	MND	MND	MND	MND	4,45E1	0E0	4,6E1	2,8E1	-8,97E1

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY 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 reference standard.

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.

HaiHa Nguyen, as an authorized verifier acting for EPD Hub Limited
21.09.2023

VERIFIED ISO 14025