ENVIRONMENTAL PRODUCT DECLARATION

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

CONSOLIS PARMA LOW CARBON HOLLOW CORE SLAB FORSSA

CONSOLIS PARMA

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Consolis Parma
Address	Hiidenmäentie 20, 03100 Nummela, Finland
Contact details	maarit.julku@consolis.com
Website	https://parma.fi/

PRODUCT IDENTIFICATION

Product name	Consolis Parma low carbon hollow core slab Forssa
Additional label(s)	CE EN 1168:2005+A3:2011, FI TR 15:2017
Product number / reference	GP37
Place(s) of production	Forssa, Finland

The Building Information Foundation RTS sr

EPDs within the same product category but from different programmes may not be comparable.

Jukka Seppänen
RTS EPD Committee Secretary

Laura Apilo
Managing Director

EPD INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. 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.

EPD program operator	The Building Information Foundation RTS sr
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 RTS PCR (Finnish version, 26.8.2020) is used.
EPD author	Maarit Julku, Consolis Parma
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	20.2.2023
EPD verifier	Anastasia Sipari, One Click LCA
EPD number	RTS_205_23
Publishing date	20.2.2023
EPD valid until	20.2.2023

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The product is a low carbon precast hollow core slab with a constant thickness of 370 mm. The precast hollow core slabs are the most widely used type of precast flooring.

This is the new EPD of GP37 low carbon hollow core slab (RTS_116_21) manufactured in Forssa factory.

If LCA results are desired to apply to hollow core slabs of different sizes GP18M (thickness 0,175 m), GP20 (thickness 0,2 m), GP27 (thickness 0,265 m), GP32 (thickness 0,32 m), GP37 (thickness 0,37 m), GP40 and GP40R (thickness 0,4 m), GP50 and GP50R (thickness 0,5 m), it is advisable use a scaling factor table in Annex 3.

PRODUCT APPLICATION

Precast hollow core slabs are used in buildings for floors and roofs. The product is typically used in the upper floors, midsoles or lower floors of terraced houses and multi-storey residential or commercial buildings.

TECHNICAL SPECIFICATIONS

Service life in indoors is 100 years. Service life is defined as project specific.
Slab type: GP37
Compressive strength C50 (options C40, C65)

PRODUCT STANDARDS

The product complies with SFS-EN 1168+A3:2011: Precast concrete products, hollow core slabs.
More information can be found at the company website https://parma.fi/

PHYSICAL PROPERTIES OF THE PRODUCT

The physical properties of the product:
Material density 2 400 kg/m^3
Dimensions: Length according to the project based design, thickness 370 mm

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at https://parma.fi/

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Amount, mass-%	Renewable %	Country Region of origin
Aggregate, 0–8 mm	42	0	Finland
Aggregate, 8–16 mm	38	0	Finland
Binders	15	0	Finland
Aggregate, 0–2 mm	4	0	Finland
Reinforcement	1	0	Europe
Admixtures	1	0	Finland

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	1	EU
Minerals	99	EU

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 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.

The production of the hollow core slab begins with the preparation of the casting bed, which includes cleaning the casting platform and applying form oil. The reinforcement steel braids are put into place at the same time. In this stage, steel tendon braids are pulled by a brush machine to the end of the casting platform. When the reinforcements are in place they are tensioned, after which wet concrete is poured onto the cast by a moving mold. After casting, the slab is covered and left to cure. When the slab is cured it is cut into the desired size. Before cutting, the braids are cut off. In finishing, cavity plugs are added to the cavities at the open ends of the slab.

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.

The finished elements and transported to the construction site. The transportation method is assumed to be a lorry. Transportation does not cause losses as product are packaged properly. The transportation distance is defined according to RTS PCR. Average distance of transportation from production plant to construction site is assumed as 108 km.

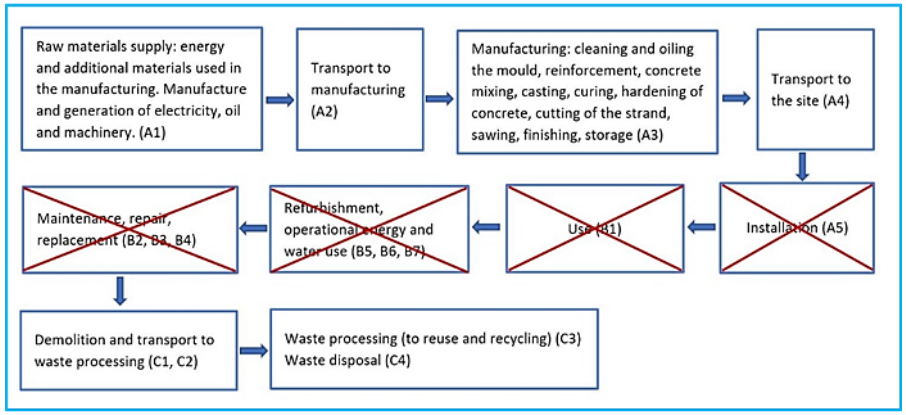
PRODUCT USE AND MAINTENANCE (B1-B7)

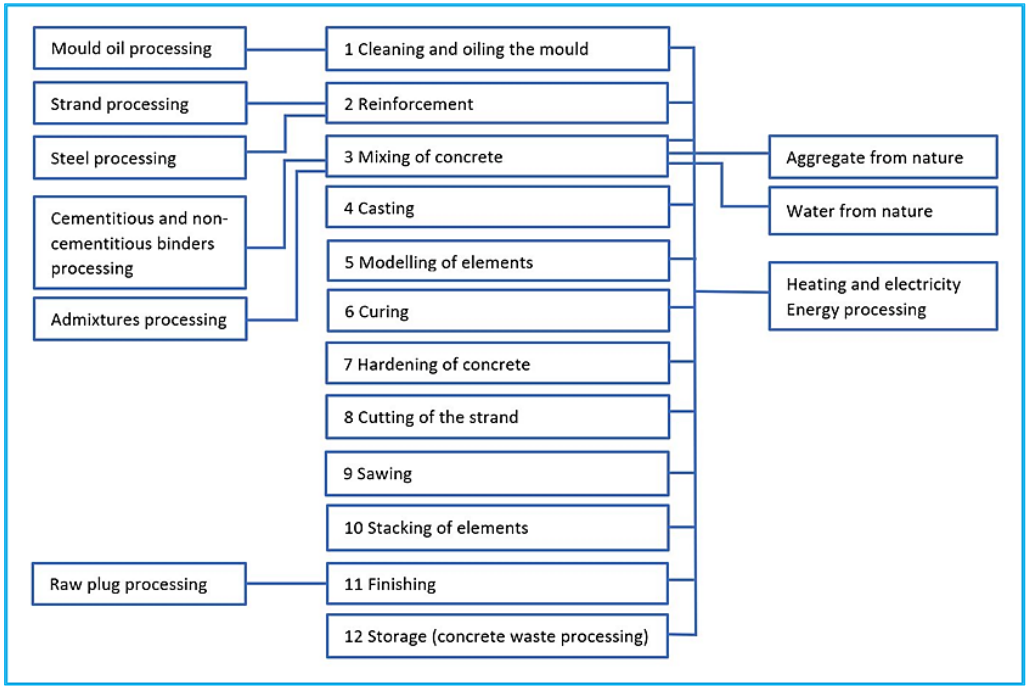
This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

At the end-of-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 hollow core slab is 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 in a landfill (C4). Due to the recycling potential of reinforcement steel and concrete, they can be used as secondary raw materials. This avoids the use of virgin raw materials (D).

MANUFACTURING PROCESS





LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	Calendar year 2021

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 m^2
Mass per declared unit	485 kg

BIOGENIC CARBON CONTENT

The product does not contain biogenic carbon.

SYSTEM BOUNDARY

This EPD covers cradle to gate with options, modules C1–C4 and module D; 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.

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	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

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The modules A5, B1-B7 have not been calculated nor included in the LCA calculations. 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. The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution and end-of-life stages.

The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

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.

Forssa plant produces many different hollow core products which undergo quite similar processing steps. Dividing the plant level data between the products based on production volume provides a close estimate of the actual consumption per one product. Allocation is based on annual production rate of P37 hollow core slab and made with high accuracy and precision.

Allocation used in Ecoinvent 3.6 environmental data sources follows the methodology 'allocation, cut-off by classification'. This methodology is in line with the requirements of the EN 15804 -standard.

AVERAGES AND VARIABILITY

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 the production plant to the building site is equal to 108 km. Transportation method is assumed to be lorry. The transportation doesn't cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the packaged products.

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 40 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 taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients.

Module C3: At the beginning of 2020 waste restrictions in Finland were tightened and the amount of waste going to landfill is restricted compared to the last years, so it can be assumed that 100 % of low carbon hollow core slabs are transported to a waste treatment plant, where the slabs are crushed and steel is separated. About 99 % of steel and concrete are recycled. The process losses of the waste treatment plant are assumed to be negligible. Share of losses in sorting process are assumed to be very small, about 1 %.

Module C4: The remaining 1 % of concrete and 1 % of steel are assumed to be send to the landfill. Loss is minimal because products consist only of concrete and steel.

Module D: The recycled 99 % of concrete and 99 % of steel are converted into a raw materials after recycling.

ENVIRONMENTAL IMPACT DATA

Note: additional environmental impact data may be presented in annexes.

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	kg CO_2e	4,04E1	2,19E0	1,91E0	4,44E1	6,85E0	MND	MND	MND	MND	MND	MND	MND	MND	1,62E0	2,54E0	1,96E0	2,56E-2	-5,53E0
GWP – fossil	kg CO_2e	3,98E1	2,19E0	1,86E0	4,38E1	6,91E0	MND	MND	MND	MND	MND	MND	MND	MND	1,62E0	2,54E0	1,97E0	2,55E-2	-5,5E0
GWP – biogenic	kg CO_2e	5,35E-1	1,65E-3	3,58E-2	5,73E-1	4,24E-3	MND	MND	MND	MND	MND	MND	MND	MND	4,49E-4	1,56E-3	-2,52E-3	5,06E-5	-3,08E-2
GWP – LULUC	kg CO_2e	2,18E-2	6,91E-4	1,8E-2	4,05E-2	2,58E-3	MND	MND	MND	MND	MND	MND	MND	MND	1,36E-4	9,47E-4	2,22E-4	7,58E-6	-4,64E-3
Ozone depletion pot.	kg CFC_{-11}e	2,3E-6	5,37E-7	3,25E-7	3,16E-6	1,61E-6	MND	MND	MND	MND	MND	MND	MND	MND	3,49E-7	5,9E-7	4,21E-7	1,05E-8	-3,78E-7
Acidification potential	mol H^+e	1,45E-1	7,22E-3	1,35E-2	1,66E-1	2,08E-2	MND	MND	MND	MND	MND	MND	MND	MND	1,69E-2	7,66E-3	2,06E-2	2,42E-4	-3,09E-2
EP-freshwater[3)]	kg Pe	8,26E-4	1,85E-5	1,66E-4	1,01E-3	6,22E-5	MND	MND	MND	MND	MND	MND	MND	MND	6,53E-6	2,29E-5	1,14E-5	3,09E-7	-3,08E-4
EP-marine	kg Ne	3,33E-2	1,59E-3	3,5E-3	3,84E-2	4,27E-3	MND	MND	MND	MND	MND	MND	MND	MND	7,46E-3	1,57E-3	8,98E-3	8,35E-5	-6,42E-3
EP-terrestrial	mol Ne	3,88E-1	1,77E-2	4,83E-2	4,54E-1	4,76E-2	MND	MND	MND	MND	MND	MND	MND	MND	8,18E-2	1,75E-2	9,86E-2	9,19E-4	-8,09E-2
POCP (“smog”)	kg NMVOCe	1,1E-1	6,87E-3	1,14E-2	1,28E-1	1,84E-2	MND	MND	MND	MND	MND	MND	MND	MND	2,25E-2	6,77E-3	2,71E-2	2,67E-4	-2,65E-2
ADP-minerals & metals	kg Sbe	4,88E-4	3,89E-5	9,72E-6	5,36E-4	1,87E-4	MND	MND	MND	MND	MND	MND	MND	MND	2,47E-6	6,86E-5	5,87E-6	2,33E-7	-4,01E-4
ADP-fossil resources	MJ	2,79E2	3,55E1	5,17E1	3,66E2	1,07E2	MND	MND	MND	MND	MND	MND	MND	MND	2,22E1	3,94E1	2,71E1	7,14E-1	-6,57E1
Water use[2)]	m^3e depr.	1,12E1	1,32E-1	4,14E-1	1,17E1	3,84E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,15E-2	1,41E-1	5,96E-2	3,3E-2	-6,74E0

1) GWP = Global Warming Potential; EP = Eutrophication potential; POCP = Photochemical ozone formation; ADP = Abiotic depletion potential. 2) EN 15804+A2 disclaimer for Abiotic depletion and Water use and 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. 3) Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO_4e.

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	1,31E-6	1,91E-7	2,82E-7	1,78E-6	4,87E-7	MND	MND	MND	MND	MND	MND	MND	MND	4,48E-7	1,79E-7	2,43E-6	4,71E-9	-4,09E-7
Ionizing radiation[5)]	kBq U235e	1,2E0	1,55E-1	1,12E0	2,47E0	4,69E-1	MND	MND	MND	MND	MND	MND	MND	MND	9,53E-2	1,72E-1	1,16E-1	2,93E-3	-3,09E-1
Ecotoxicity (freshwater)	CTUe	5,42E2	2,71E1	7,88E1	6,48E2	8,44E1	MND	MND	MND	MND	MND	MND	MND	MND	1,3E1	3,1E1	1,86E1	4,51E-1	-1,25E2
Human toxicity, cancer	CTUh	3,09E-8	6,86E-10	1,14E-9	3,27E-8	2,4E-9	MND	MND	MND	MND	MND	MND	MND	MND	4,67E-10	8,83E-10	6,31E-10	1,07E-11	-3,64E-9
Human tox. non-cancer	CTUh	6,84E-7	3,09E-8	3,82E-8	7,53E-7	9,29E-8	MND	MND	MND	MND	MND	MND	MND	MND	1,15E-8	3,41E-8	1,73E-8	3,29E-10	2,42E-7
SQP	-	6,98E2	5,34E1	2,83E0	7,55E2	1,15E2	MND	MND	MND	MND	MND	MND	MND	MND	5,71E-1	4,23E1	8,6E-1	1,21E0	-3,93E1

4) SQP = Land use related impacts/soil quality. 5) 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
Renew. PER as energy	MJ	1,88E1	4,46E-1	5,59E1	7,52E1	1,57E0	MND	MND	MND	MND	MND	MND	MND	MND	1,2E-1	5,77E-1	2,58E-1	5,77E-3	-4,24E0
Renew. PER as material	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,88E1	4,46E-1	5,59E1	7,52E1	1,57E0	MND	MND	MND	MND	MND	MND	MND	MND	1,2E-1	5,77E-1	2,58E-1	5,77E-3	-4,24E0
Non-re. PER as energy	MJ	2,73E2	3,55E1	5,17E1	3,6E2	1,07E2	MND	MND	MND	MND	MND	MND	MND	MND	2,22E1	3,94E1	2,71E1	7,14E-1	-6,57E1
Non-re. PER as material	MJ	5,77E0	0E0	0E0	5,77E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	2,79E2	3,55E1	5,17E1	3,66E2	1,07E2	MND	MND	MND	MND	MND	MND	MND	MND	2,22E1	3,94E1	2,71E1	7,14E-1	-6,57E1
Secondary materials	kg	1,13E0	0E0	5,09E-4	1,13E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	8,78E-1
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. 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	2,13E0	7,38E-3	1,36E-2	2.15	2,03E-2	MND	MND	MND	MND	MND	MND	MND	MND	1,96E-3	7,44E-3	2,63E-3	7,81E-4	-5,29E-1

6) 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	1,42E0	3,45E-2	1,1E-1	1,56E0	1,14E-1	MND	MND	MND	MND	MND	MND	MND	MND	2,39E-2	4,19E-2	0E0	6,66E-4	-4,96E-1
Non-hazardous waste	kg	3,78E1	3,8E0	2,79E0	4,44E1	9,1E0	MND	MND	MND	MND	MND	MND	MND	MND	2,56E-1	3,34E0	0E0	4,85E0	-1,36E1
Radioactive waste	kg	1,24E-3	2,44E-4	5,11E-4	2E-3	7,32E-4	MND	MND	MND	MND	MND	MND	MND	MND	1,56E-4	2,69E-4	0E0	4,72E-6	-2,29E-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	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	4,8E2	0E0	0E0
Materials for energy rec	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
GWP – total	kg CO_2e	8,32E-2	4,51E-3	3,94E-3	9,16E-2	1,43E-2	MND	MND	MND	MND	MND	MND	MND	MND	3,33E-3	5,24E-3	4,05E-3	5,28E-5	-1,14E-2
ADP-minerals & metals	kg Sbe	1,01E-6	8,02E-8	2E-8	1,11E-6	3,85E-7	MND	MND	MND	MND	MND	MND	MND	MND	5,09E-9	1,42E-7	1,21E-8	4,81E-10	-8,28E-7
ADP-fossil	MJ	5,75E-1	7,32E-2	1,07E-1	7,55E-1	2,21E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,58E-2	8,12E-2	5,58E-2	1,47E-3	-1,36E-1
Water use	m^3e depr.	2,3E-2	2,72E-4	8,53E-4	2,42E-2	7,93E-4	MND	MND	MND	MND	MND	MND	MND	MND	8,55E-5	2,91E-4	1,23E-4	6,81E-5	-1,39E-2
Secondary materials	kg	2,33E-3	0E0	1,05E-6	2,33E-3	0E0	MND	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	1,81E-3
Biog. C 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
Biog. C 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

7) Biog. C in product = Biogenic carbon content in product

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Market for electricity, high voltage (Reference product: electricity, high voltage) Ecoinvent 3.6 Finland, year: 2019
Electricity CO_2e / kWh	0,24
District heating data source and quality	Heat and power co-generation, wood chips, 6667 kw, state-of-the-art 2014 (Reference product: heat, district or industrial, other than natural gas) Ecoinvent 3.6 Finland, year: 2019
District heating CO_2e / kWh	0,0031
Diesel data source and quality	Diesel, burned in diesel-electric generating set, 10mw (Reference product: diesel, burned in diesel-electric generating set, 10mw) Ecoinvent 3.6 Global, year: 2019
Diesel CO_2e / kWh	0,0873

Transport scenario documentation (A4)

Scenario parameter	Value
Specific transport CO_2e emissions, kg CO_2e / tkm	0,13
Average transport distance, km	108
Capacity utilization (including empty return) %	100
Bulk density of transported products kg/m^3	1 310
Volume capacity utilization factor	100 %

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	485
Collection process – kg collected with mixed waste	-
Recovery process – kg for re-use	-
Recovery process – kg for recycling	480,15
Recovery process – kg for energy recovery	-
Disposal (total) – kg for final deposition	4,85
Scenario assumptions e.g. transportation	End-of-life product is transported approximately 40 km with a lorry.

BIBLIOGRAPHY

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.

Ecoinvent database v3.6 (2019) 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.

RTS PCR (Finnish version, 26.8.2020)

Consolis Parma low carbon hollow core slab Forssa LCA background report 18.01.2023

ABOUT THE MANUFACTURER

Consolis Parma is leading precast concrete producer in Finland belonging to CONSOLIS group. The company employs over 650 employees. https://parma.fi.

CONSOLIS is a European leader in precast concrete solutions for the building and utilities sectors, specialized in designing and manufacturing high-performance concrete solutions.
www.consolis.com

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Consolis Parma
EPD author	Maarit Julku, Consolis Parma
EPD verifier	Anastasia Sipari, One Click LCA
EPD program operator	The Building Information Foundation RTS sr
Background data	This EPD is based on Ecoinvent 3.6 (cut-off)
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Concrete and cement-based products

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 EN 15804, 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 background report (project report) for this EPD

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	Anastasia Sipari, One Click LCA
EPD verification started on	10.11.2022
EPD verification completed on	03.02.2023
Approver of the EPD verifier	The Building Information Foundation RTS sr

Author & tool verification	Answer
EPD author	Maarit Julku, Consolis Parma
EPD Generator module	Concrete and cement-based products
Independent software verifier	Anni Oviir, Rangi Maja OÜ
Software verification date	27.6.2020

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 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.

ANNEX 1 : 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	3,93E1	2,17E0	1,83E0	4,33E1	6,85E0	MND	MND	MND	MND	MND	MND	MND	MND	1,6E0	2,52E0	1,95E0	2,51E-2	-5,33E0
Ozone depletion Pot.	kg CFC_{-11}e	2,01E-6	4,27E-7	3,77E-7	2,81E-6	1,28E-6	MND	MND	MND	MND	MND	MND	MND	MND	2,76E-7	4,7E-7	3,33E-7	8,33E-9	-3,44E-7
Acidification	kg SO_2e	1,23E-1	4,8E-3	8,67E-3	1,37E-1	1,44E-2	MND	MND	MND	MND	MND	MND	MND	MND	2,38E-3	5,3E-3	3,23E-3	1,01E-4	-2,02E-2
Eutrophication	kg PO_4^3e	3,37E-2	9,53E-4	3,25E-3	3,79E-2	3,03E-3	MND	MND	MND	MND	MND	MND	MND	MND	4,2E-4	1,11E-3	6,61E-4	1,96E-5	-1,1E-2
POCP (“smog”)	kg C_2H_4e	6,07E-3	2,71E-4	3,65E-4	6,71E-3	8,49E-4	MND	MND	MND	MND	MND	MND	MND	MND	2,46E-4	3,12E-4	3,1E-4	7,41E-6	-2,66E-3
ADP-elements	kg Sbe	4,88E-4	3,89E-5	9,72E-6	5,36E-4	1,87E-4	MND	MND	MND	MND	MND	MND	MND	MND	2,47E-6	6,86E-5	5,87E-6	2,33E-7	-4,01E-4
ADP-fossil	MJ	2,79E2	3,55E1	5,17E1	3,66E2	1,07E2	MND	MND	MND	MND	MND	MND	MND	MND	2,22E1	3,94E1	2,71E1	7,14E-1	-6,57E1

ANNEX 2 : ENVIRONMENTAL IMPACTS – TRACI 2.1. / 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	3,93E1	2,17E0	1,84E0	4,33E1	6,84E0	MND	MND	MND	MND	MND	MND	MND	MND	1,6E0	2,51E0	1,94E0	2,49E-2	-5,25E0
Ozone Depletion	kg CFC_{-11}e	2,59E-6	5,68E-7	4,66E-7	3,62E-6	1,7E-6	MND	MND	MND	MND	MND	MND	MND	MND	3,68E-7	6,26E-7	4,45E-7	1,11E-8	-4,6E-7
Acidification	kg SO_2e	1,43E-1	6,1E-3	1,12E-2	1,6E-1	1,75E-2	MND	MND	MND	MND	MND	MND	MND	MND	1,55E-2	6,42E-3	1,89E-2	2,15E-4	-2,6E-2
Eutrophication	kg Ne	1,26E-2	1,03E-3	1,28E-3	1,49E-2	3,07E-3	MND	MND	MND	MND	MND	MND	MND	MND	1,37E-3	1,13E-3	1,67E-3	2,57E-5	-3,57E-3
POCP (“smog”)	kg O_3e	2,09E0	1E-1	2,16E-1	2,41E0	2,68E-1	MND	MND	MND	MND	MND	MND	MND	MND	4,75E-1	9,86E-2	5,71E-1	5,31E-3	-3,91E-1
ADP-fossil	MJ	2,57E1	5,09E0	2,2E0	3,3E1	1,53E1	MND	MND	MND	MND	MND	MND	MND	MND	3,29E0	5,61E0	3,97E0	1,03E-1	-4,15E0

ANNEX 3 : A SCALING FACTOR TABLE

Hollow core	Design bearing area [mm]	Weight [kg/m²]	Scaling factor	Weight with pointed joint [kg/m²]
GP18M	60	225	0,46	240
GP20	60	245	0,51	260
GP27	60	360	0,74	380
GP32	60	380	0,78	400
GP37	60	485	1,00	510
GP40	100	435	0,90	465
GP40R	100	475	0,98	505
GP50	100	560	1,15	600
GP50R	100	600	1,24	640