ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH

15804+A2 &

ISO 14025 / ISO 21930

A-BEAM W®

ANSTAR OY

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Anstar Oy
Address	Erstantie 2 15540, Villähde Finland
Contact details	Tatu Heiskanen Quality Manager +358 40 772 9519 tatu.heiskanen@anstar.fi
Website	https://www.anstar.fi/

PRODUCT IDENTIFICATION

Product name	A-BEAM W®
Place of production	Villähde, Finland

Jessica Karhu
RTS EPD Committee secretary

Laura Apilo
Managing Director

EPD INFORMATION

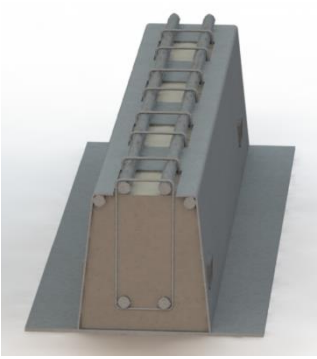
EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

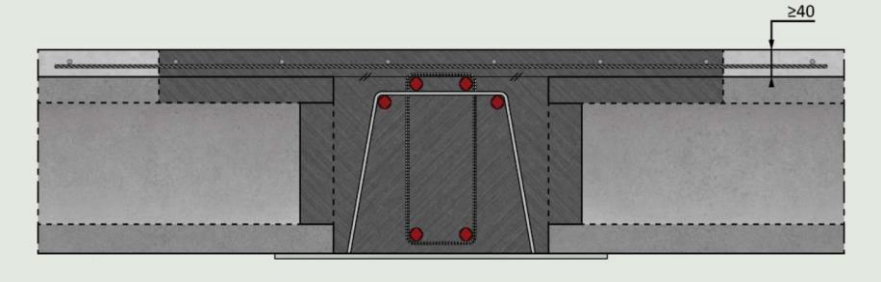
EPD program operator	The Building Information Foundation RTS sr Malminkatu 16 A, 00100 Helsinki, Finland http://cer.rts.fi
EPD standards	This EPD is in accordance with EN 15804+A2 and ISO 14025 / ISO 21930 standards.
Product category rules (PCR)	The CEN standard EN 15804+A2 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used.
EPD author	Ipek Goktas, at Bionova Ltd Suvilahdenkatu 10 B 00500 Helsinki, Finland www.bionova.fi
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	Silvia Vilčeková, Silcert, s.r.o.
Verification date	23.6.2021
EPD number	RTS_133_21
ECO Platform nr.	
Publishing date	28.6.2021
EPD valid until	23.6.2026

PRODUCT INFORMATION

PRODUCT DESCRIPTION

The W-type composite beam acts as the load-bearing composite structure of a low intermediate floor. The steel housing of the beam is filled with concrete at the workshop. The W-type beam is therefore particularly sufficient for winter construction conditions. Composite beams are made in Finland in our own factory.





PRODUCT APPLICATION

A-BEAM® and Anstar's connection technology form part of the frame system, offering cost efficiency and flexibility for construction. The beams are used as both a single-span and continuous-span structure and designed without separate fire protection up to fire resistance class R120. The standard connection is the AEP® hidden bracket to a reinforced concrete column and the AEL hidden bracket to a composite column.

PRODUCT RAW MATERIAL COMPOSITION

Raw materials	Weight [kg]	Post-consumer [%]	Renewable [%]	Material origin
Concrete	593	-	-	Finland
Steel plate	469	21%	-	Finland
Rebar	175	99%	-	Finland
Steel profile	12	13%	-	Finland
Welding wire	3	-	-	Finland
Paint	1	-	-	Finland

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass [%]	Material origin
Metals	> 52.0%	Finland
Minerals	> 47.0%	Finland
Fossil materials	< 0.1%	Finland
Bio-based materials	-	-

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

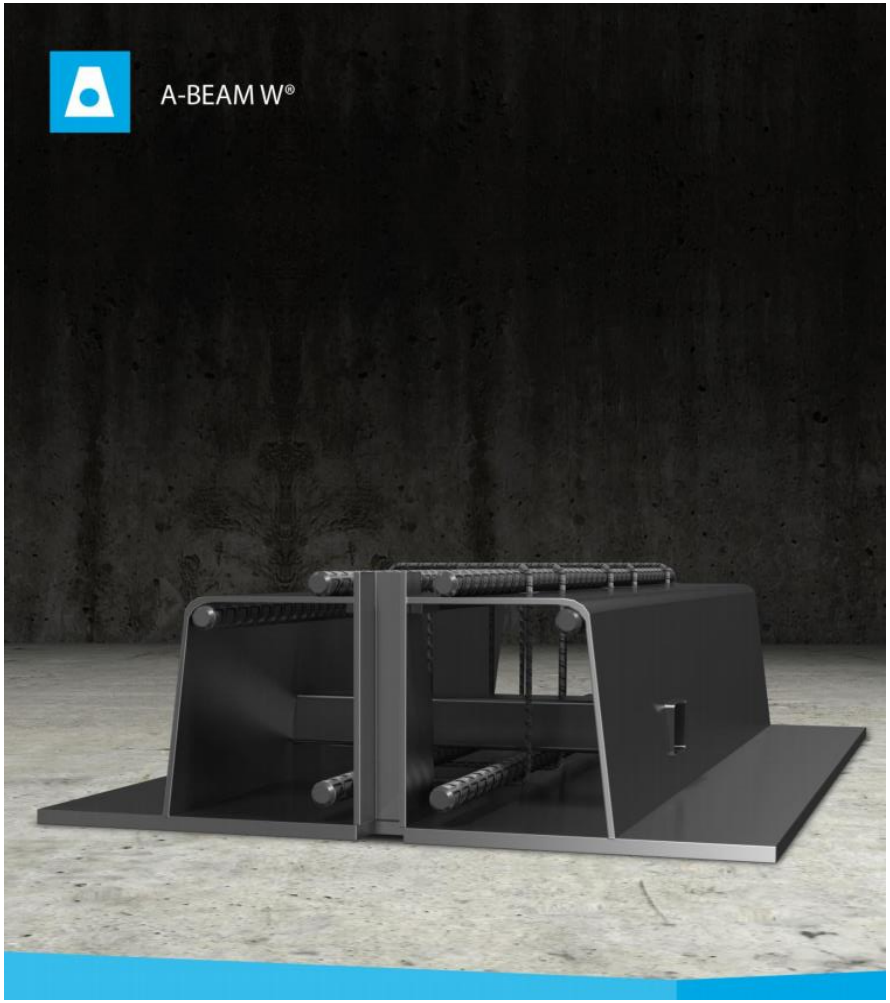
PRODUCT STANDARDS

A-BEAM W® is CE-marked by harmonised standard EN 1090-1.

TECHNICAL SPECIFICATIONS

A-BEAM W® housing is made of steel plates and reinforcement bars. The housing is concreted in factory conditions using rather low water/cement ratio to minimize risk of moisture problems in final concrete floors. The W-type beam works as composite beam already while assembly time. The beam capacity can be extensively adjusted by means of steel plate thickness and reinforcement bar amount and size.

In the final stage, the beam acts as a composite structure with the infill concrete, the hollow-core slabs and the surface casting without separate fire protection. Each beam is designed individually according to project requirements. The relative share of A-BEAM® production materials is rather standard no matter of profile size.



PHYSICAL PROPERTIES OF THE PRODUCT

Detailed physical information can be found from the manufacturer's webpage:
(https://www.anstar.fi/wp-content/uploads/2018/11/A-BEAM_W_Design_Manual_2018.pdf)

ADDITIONAL INFORMATION

Further information:
https://www.anstar.fi/en/products/a-beam/

PRODUCT LIFE CYCLE

MANUFACTURING AND PACKAGING (A1-A3)

Steel plates will be cut to the required shape. Rebars are cut to the required length. Welding A-BEAM® parts consumes welding filler and shielding gas. Casting A-BEAM® with concrete are done in the Anstar factory. Corrosive protection is done by painting product. A-BEAM® storage and packaging consumes recycled wood.

Beams are delivered to the site loaded in the vehicle in the order of erection.

Manufacturing flow chart

TRANSPORT AND INSTALLATION (A4-A5)

Annual delivery rates are taken into consideration for delivery scenario. (A4) Transportation impacts occurred from delivering of the product cover direct exhaust emissions of fuel, environmental impacts of fuel production, as well as related infrastructure emissions.

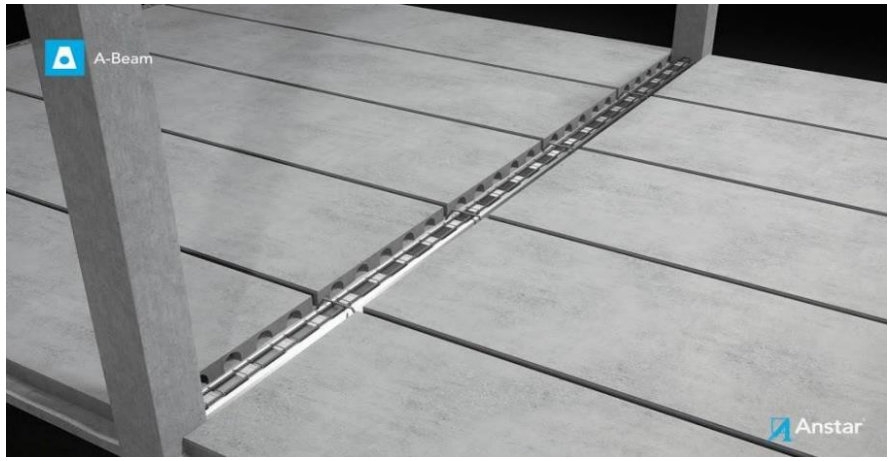
Environmental impacts from installation into the building include waste wood lumber that is used for delivering the product. (A5) The impacts of energy consumption and the used ancillary materials during installation are negligible.

PRODUCT USE AND MAINTENANCE (B1-B7)

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

PRODUCT END OF LIFE (C1-C4, D)

At the end-of-life, in the demolition phase 100% of the end-of-life product is assumed to be collected separately (C1) and sent to the closest facilities for recycling and landfilling by lorry which is the most common transportation method (C2). 95% of end-of-life steel and 80% of end-of-life concrete are recycled (C3); accordingly, 5% of steel and 20% of concrete are landfill waste (C4). Due to the recycling potential of steel and concrete, the end-of-life product is converted into recycled raw materials (D).



LIFE CYCLE ASSESSMENT

LIFE CYCLE ASSESSMENT INFORMATION

Period for data	year 2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 unit of beam "A-BEAM W®"
Mass per declared unit	1253 kg (6000 mm length)

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	2.16

SYSTEM BOUNDARY

The scope of the EPD is "cradle to gate with modules A4, A5, C1-C4 and D". The modules A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), A4 (Transport), A5 (Assembly) as well as C1 (Deconstruction/ demolition), C2 (Transport at end-of-life), C3 (Waste processing), C4 (Disposal) and D (benefits and loads beyond the system boundary) are included in the study.

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	X	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 15804A1:2012+A2:2019* and *RTS PCR, 26.8.2020*. The study does not exclude any hazardous materials or substances.

The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes which data are available for are included in the calculation. There is no neglected unit process more than 1% of total mass and energy flows. The total neglected input and output flows do also not exceed 5% of energy usage or mass. The life cycle analysis includes all industrial processes from raw material acquisition to production, distribution, and end-of-life stages.

The modules B1-B7 have not been calculated nor included in the LCA calculations.

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 based on annual production rate and made with high accuracy and precision. The values for 1 unit of the produced product which is used within this study are calculated by considering the total production per annual production.

In the production plants, several kinds of products are produced; since the production processes of these products are similar, the annual production rates are taken into consideration for allocation. According to the ratio of the annual production of the declared product to the total annual production at the factory, the annual total energy consumption and the generated by-products per the declared product are allocated. Energy consumption per by-product is allocated considering the mass ratios of the declared product and the generated by-products.

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.

- Modules A2, A4 & C2: Vehicle capacity utilization volume factor is assumed to be 1 which means full load. It may vary but as the role of transportation emission in total results is small and so the variety in load assumed to be negligible. Empty returns are not considered as it is assumed that return trip is used by transportation companies to serve the needs of other clients.
- Module A4: Transportation doesn't cause losses as products are packaged properly. Also, volume capacity utilisation factor is assumed to be 1 for the nested packaged products. Additionally, transportation distances and vehicle types are assumed according to the delivery in the last year.
- Module C1: Energy consumption of a demolition process is 10 kWh/m^2 according to the reference *Bozdağ, Ö. & Seçer, M., 2007*. Basing on a Level(s) project, an average mass of a reinforced concrete building is about 1000 kg/m^2. Therefore, energy consumption demolition is 0.01 kWh/kg (= 10 kWh/1000 kg). The source of energy consumed by work machines is assumed as diesel fuel.
- Module C2: Transportation distance to the closest disposal area is estimated as 50 km and the transportation method is assumed as lorry which is the most common.
- Modules C3, C4: It is assumed that 95% of end-of-life steel and 80% of end-of-life concrete are recycled according to *World Steel Association, 2020* and *Betoniteollisuus ry., 2020* respectively. Hence, 5% of steel, 20% of concrete and paint are landfill waste. Ash from recycling processes is negligible.
- Module D: Primary contents of the recycled end-of-life concrete and steel are assumed to be raw materials for further productions. The benefits of energy recovering from the packaging material 'wood beam' are taken into consideration.

AVERAGES AND VARIABILITY

Any average and variation are not concerned since this EPD refers one specific product produced in one production plant.

ENVIRONMENTAL IMPACT DATA

The LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Note: "ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930" and "ENVIRONMENTAL IMPACTS - TRACI 2.1" are presented in ANNEX-1 and ANNEX-2 respectively.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Climate change – total	kg CO_2e	1.24E+03	8.80E+00	3.48E+01	1.29E+03	1.13E+01	8.05E+00	MND	4.13E+00	7.99E+00	4.27E+01	8.05E-01	-5.33E+02
Climate change – fossil	kg CO_2e	1.24E+03	8.79E+00	4.25E+01	1.29E+03	1.14E+01	1.34E-01	MND	4.13E+00	7.98E+00	4.27E+01	8.03E-01	-5.37E+02
Climate change – biogenic	kg CO_2e	1.95E+00	6.37E-03	-7.79E+00	-5.83E+00	8.30E-03	7.92E+00	MND	1.15E-03	4.89E-03	5.15E-02	1.59E-03	3.88E+00
Climate change – LULUC	kg CO_2e	6.93E-01	2.65E-03	1.57E-01	8.53E-01	3.44E-03	3.77E-05	MND	3.49E-04	2.82E-03	9.79E-03	2.38E-04	6.52E-03
Ozone depletion	kg CFC11e	7.64E-05	2.07E-06	8.87E-06	8.74E-05	2.69E-06	2.11E-08	MND	8.92E-07	1.83E-06	8.88E-06	3.31E-07	-1.46E-05
Acidification	mol H^+e	6.06E+00	3.69E-02	1.66E-01	6.27E+00	4.80E-02	1.14E-03	MND	4.32E-02	3.29E-02	4.29E-01	7.62E-03	-2.09E+00
Eutrophication, aquatic freshwater [1]	kg Pe	7.15E-02	7.15E-05	4.18E-04	7.20E-02	9.30E-05	1.80E-06	MND	1.67E-05	6.90E-05	3.62E-04	9.70E-06	-2.18E-02
Eutrophication, aquatic marine	kg Ne	1.20E+00	1.11E-02	4.88E-02	1.26E+00	1.45E-02	5.02E-04	MND	1.91E-02	9.74E-03	1.85E-01	2.62E-03	-4.13E-01
Eutrophication, terrestrial	mol Ne	1.38E+01	1.23E-01	5.44E-01	1.45E+01	1.60E-01	5.31E-03	MND	2.09E-01	1.08E-01	2.03E+00	2.89E-02	-4.40E+00
Photochemical ozone formation	kg NMVOCe	5.82E+00	3.95E-02	1.56E-01	6.01E+00	5.14E-02	1.38E-03	MND	5.75E-02	3.38E-02	5.57E-01	8.40E-03	-2.82E+00
Abiotic depletion, minerals & metals [2]	kg Sbe	2.41E-02	1.51E-04	8.00E-05	2.44E-02	1.95E-04	2.58E-06	MND	6.31E-06	1.99E-04	9.35E-05	7.34E-06	-9.65E-04
Abiotic depletion of fossil resources [2]	MJ	1.40E+04	1.37E+02	8.01E+02	1.49E+04	1.78E+02	1.64E+00	MND	5.68E+01	1.22E+02	6.00E+02	2.24E+01	-3.99E+03
Water use [2]	m^3e deprived	7.05E+02	5.08E-01	5.06E+00	7.11E+02	6.61E-01	-4.46E-02	MND	1.06E-01	4.33E-01	2.51E+00	1.04E+00	-8.28E+01

[1] The required characterisation method and data are in kg P-eq; to get PO_4e, multiply the result by 3.07.

[2] EN 15804+A2 Disclaimer 2: "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."

Reading Example: 1.00E-03 = $1.00 \times 10^{-3} = 0.001$
1.00E+03 = $1.00 \times 10^{+3} = 1000$

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1.04E-04	7.94E-07	9.60E-07	1.06E-04	1.03E-06	1.42E-08	MND	1.15E-06	6.16E-07	1.29E-05	1.48E-07	-3.82E-05
Ionizing radiation, human health [3]	kBq U235e	3.92E+01	5.97E-01	1.18E+01	5.16E+01	7.77E-01	5.57E-03	MND	2.44E-01	5.32E-01	2.64E+00	9.21E-02	5.65E+00
Eco-toxicity (freshwater) [2]	CTUe	5.04E+04	1.04E+02	4.31E+02	5.10E+04	1.36E+02	1.88E+00	MND	3.33E+01	9.51E+01	3.78E+02	1.42E+01	-1.76E+04
Human toxicity, cancer effects [2]	CTUh	1.06E-05	2.67E-09	2.03E-08	1.06E-05	3.48E-09	2.47E-10	MND	1.19E-09	2.69E-09	1.30E-08	3.35E-10	-1.21E-07
Human toxicity, non-cancer effects [2]	CTUh	1.20E-04	1.24E-07	2.39E-07	1.20E-04	1.61E-07	1.12E-08	MND	2.94E-08	1.09E-07	3.24E-07	1.03E-08	9.02E-05
Land use related impacts/soil quality [2]	-	3.37E+03	2.06E+02	2.62E+01	3.60E+03	2.68E+02	1.46E+00	MND	1.46E+00	1.36E+02	9.53E+01	3.82E+01	-9.90E+02

[2] EN 15804+A2 Disclaimer 2: "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."

[3] EN 15804+A2 Disclaimer 1: "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-B7	C1	C2	C3	C4	D
Renewable PER used as energy	MJ	1.36E+03	1.72E+00	2.65E+02	1.62E+03	2.24E+00	2.87E-02	MND	3.07E-01	1.73E+00	9.16E+00	1.81E-01	-2.45E+01
Renewable PER used as materials	MJ	0.00E+00	0.00E+00	7.61E+01	7.61E+01	0.00E+00	-7.16E+01	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable PER	MJ	1.36E+03	1.72E+00	3.41E+02	1.70E+03	2.24E+00	-7.15E+01	MND	3.07E-01	1.73E+00	9.16E+00	1.81E-01	-2.45E+01
Non-renewable PER used as energy	MJ	1.40E+04	1.37E+02	8.01E+02	1.49E+04	1.78E+02	1.64E+00	MND	5.68E+01	1.22E+02	6.00E+02	2.24E+01	-3.99E+03
Non-renewable PER used as materials	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable PER	MJ	1.40E+04	1.37E+02	8.01E+02	1.49E+04	1.78E+02	1.64E+00	MND	5.68E+01	1.22E+02	6.00E+02	2.24E+01	-3.99E+03
Use of secondary materials	kg	3.00E+02	0.00E+00	0.00E+00	3.00E+02	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.49E+02
Use of renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.05E+01	2.84E-02	1.29E-01	1.06E+01	3.70E-02	1.42E-03	MND	5.02E-03	2.31E-02	8.36E-02	2.46E-02	-4.09E+00

PER abbreviation stands for primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Hazardous waste	kg	4.06E+02	1.33E-01	7.73E-01	4.07E+02	1.73E-01	2.53E-02	MND	6.12E-02	1.27E-01	0.00E+00	2.09E-02	-6.43E+01
Non-hazardous waste	kg	3.66E+03	1.47E+01	1.43E+01	3.69E+03	1.91E+01	4.77E+00	MND	6.54E-01	1.05E+01	0.00E+00	1.52E+02	-7.33E+02
Radioactive waste	kg	3.65E-02	9.38E-04	7.36E-03	4.47E-02	1.22E-03	8.48E-06	MND	3.98E-04	8.33E-04	0.00E+00	1.49E-04	2.60E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	4.74E+02	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	6.26E+02	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.51E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION TABLE (RTS) – KEY INFORMATION PER KG OF PRODUCT

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Climate change – total	kg CO_2e	9.93E-01	7.02E-03	2.78E-02	1.03E+00	9.13E-03	6.43E-03	MND	3.30E-03	6.38E-03	3.41E-02	6.42E-04	-4.25E-01
Abiotic depletion. minerals & metals [2]	kg Sbe	1.93E-05	1.20E-07	6.39E-08	1.94E-05	1.56E-07	2.06E-09	MND	5.03E-09	1.59E-07	7.46E-08	5.86E-09	-7.70E-07
Abiotic depletion of fossil resources [2]	MJ	1.11E+01	1.09E-01	6.40E-01	1.19E+01	1.42E-01	1.31E-03	MND	4.54E-02	9.72E-02	4.79E-01	1.79E-02	-3.19E+00
Water use [2]	m^3e deprived	5.63E-01	4.05E-04	4.04E-03	5.67E-01	5.28E-04	-3.56E-05	MND	8.46E-05	3.45E-04	2.00E-03	8.28E-04	-6.61E-02
Use of secondary materials	kg	2.40E-01	0.00E+00	0.00E+00	2.40E-01	0.00E+00	0.00E+00	MND	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.99E-01
Biogenic carbon content in product	kg C	N/A	N/A	0.00E+00	0.00E+00	N/A	N/A	MND	N/A	N/A	N/A	N/A	N/A
Biogenic carbon content in packaging	kg C	N/A	N/A	1.72E-03	1.72E-03	N/A	N/A	MND	N/A	N/A	N/A	N/A	N/A

[2] EN 15804+A2 Disclaimer 2: "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."

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity, high voltage, production mix, Ecoinvent v3.6, Finland, 2019
Electricity CO_2e/kWh	0.0579 kg CO2e / kWh
District heating data source and quality	Heat production, propane, at industrial furnace >100kw Ecoinvent v3.6, World, 2019
District heating CO_2e/kWh	0.3125 kg CO2e / kWh

Transport scenario documentation

Scenario parameter	Value
A4 specific transport CO2e emissions, kg CO_2e / tkm	0.0901
A4 average transport distance, km	100

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1253.00
Collection process – kg collected with mixed waste	0.00
Recovery process – kg for re-use	0.00
Recovery process – kg for recycling	1100.81
Recovery process – kg for energy recovery	0.00
Disposal (total) – kg for final deposition	152.19
Scenario assumptions for transportation	End-of-life product is transported 50 km with an average lorry

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ANNEX-1: ENVIRONMENTAL IMPACTS - EN 15804+A1, CML / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global warming potential	kg CO_2e	1.20E+03	8.71E+00	4.22E+01	1.25E+03	1.13E+01	1.44E-01	MND	4.10E+00	7.91E+00	4.23E+01	7.88E-01	-5.11E+02
Depletion of stratospheric ozone	kg CFC11e	6.87E-05	1.64E-06	8.00E-06	7.83E-05	2.14E-06	1.71E-08	MND	7.06E-07	1.46E-06	7.07E-06	2.62E-07	-1.29E-05
Acidification	kg SO_2e	4.82E+00	1.79E-02	1.27E-01	4.97E+00	2.33E-02	6.67E-04	MND	6.10E-03	1.63E-02	1.28E-01	3.18E-03	-1.63E+00
Eutrophication	kg $(PO_4)^{3-}e$	3.06E+00	3.61E-03	2.81E-02	3.09E+00	4.70E-03	1.30E-03	MND	1.07E-03	3.38E-03	1.77E-02	6.15E-04	-9.03E-01
Photochemical ozone formation	kg C_2H_4e	6.37E-01	1.13E-03	5.98E-03	6.44E-01	1.47E-03	2.78E-05	MND	6.28E-04	1.05E-03	6.65E-03	2.33E-04	-4.19E-01
Abiotic depletion of non-fossil resources	kg Sbe	2.41E-02	1.51E-04	8.00E-05	2.44E-02	1.95E-04	2.58E-06	MND	6.31E-06	1.99E-04	9.35E-05	7.34E-06	-9.65E-04
Abiotic depletion of fossil resources	MJ	1.40E+04	1.37E+02	8.01E+02	1.49E+04	1.78E+02	1.64E+00	MND	5.68E+01	1.22E+02	6.00E+02	2.24E+01	-3.99E+03

ANNEX-2: ENVIRONMENTAL IMPACTS - TRACI 2.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1-B7	C1	C2	C3	C4	D
Global warming potential	kg CO_2e	1.18E+03	8.70E+00	4.22E+01	1.23E+03	1.13E+01	1.46E-01	MND	4.08E+00	7.90E+00	4.21E+01	7.83E-01	-4.95E+02
Ozone depletion	kg CFC11e	9.19E-05	2.19E-06	1.04E-05	1.05E-04	2.85E-06	2.24E-08	MND	9.42E-07	1.94E-06	9.43E-06	3.49E-07	-1.87E-05
Acidification	kg SO_2e	5.19E+00	3.22E-02	1.44E-01	5.37E+00	4.18E-02	1.04E-03	MND	3.96E-02	2.86E-02	3.92E-01	6.76E-03	-1.74E+00
Eutrophication	kg Ne	7.74E-01	4.52E-03	1.94E-02	7.98E-01	5.88E-03	3.27E-04	MND	3.49E-03	4.04E-03	3.55E-02	8.09E-04	-2.60E-01
Photochemical smog formation	kg O_3e	7.28E+01	7.05E-01	3.09E+00	7.66E+01	9.17E-01	3.06E-02	MND	1.21E+00	6.17E-01	1.17E+01	1.67E-01	-2.36E+01
Depletion of non-renewable energy	MJ	8.48E+02	1.96E+01	7.59E+01	9.43E+02	2.55E+01	2.28E-01	MND	8.41E+00	1.74E+01	8.45E+01	3.25E+00	-6.69E+01

ABOUT THE MANUFACTURER

Anstar Oy (https://www.anstar.fi/en/) is a Finnish family business specialising in the sales and manufacture of concrete structure connections and composite beams. We are an international operator, and one of the pioneers in the field. Anstar will help you with all your questions relating to concrete connections. Anstar's specialists may also develop solutions to customer-specific connection problems.

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Background data	This EPD is based on Ecoinvent 3.6 (cut-off)
LCA software	One Click LCA Pre-Verified Generator for Primary Steel and Aluminium and all Metal-Based Products