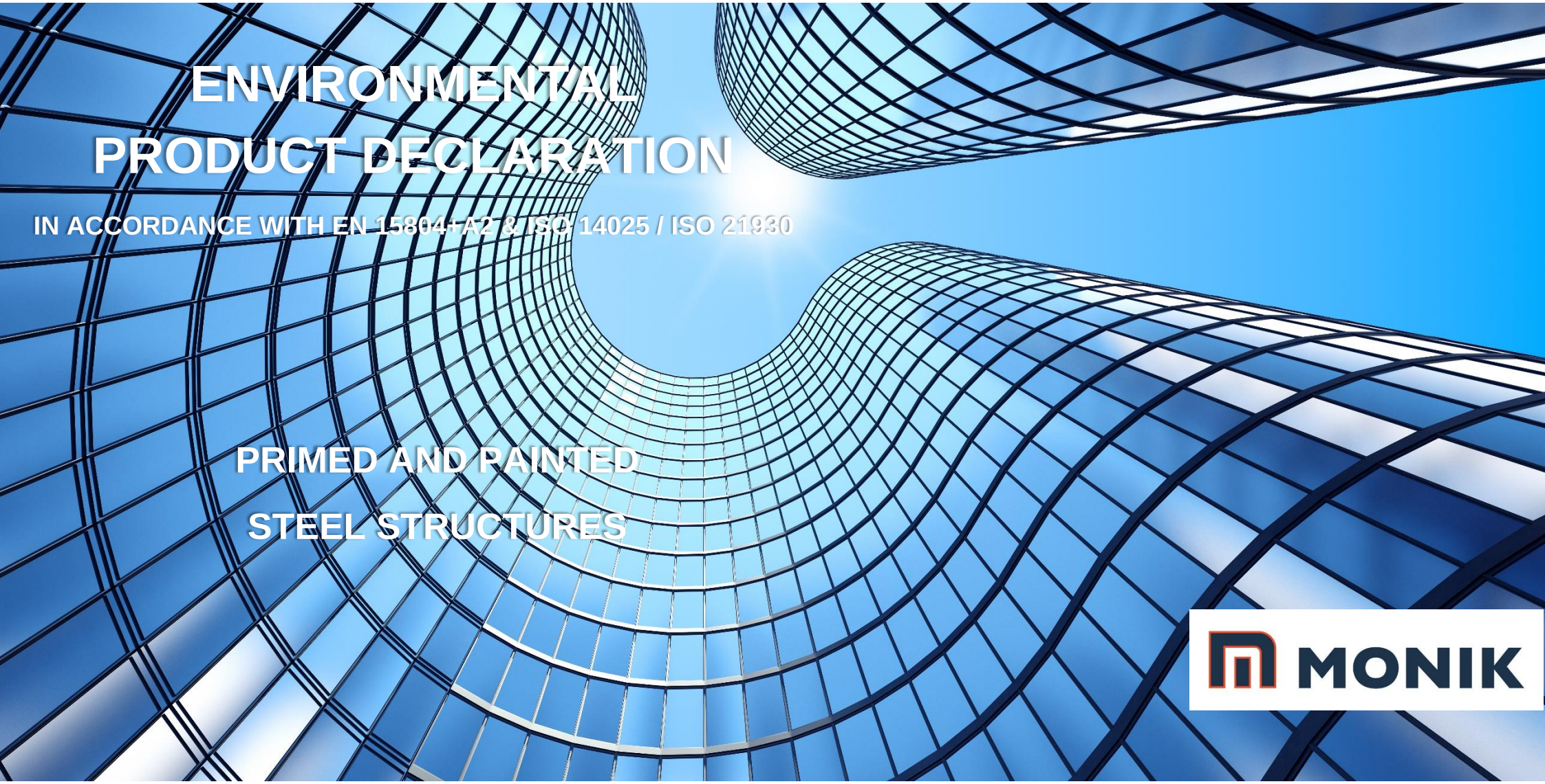


ENVIRONMENTAL PRODUCT DECLARATION

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

PRIMED AND PAINTED STEEL STRUCTURES

MONIK

GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	Monik OÜ
Address	Suur Sõjamäe 30c, 11415 Tallinn, Estonia
Contact details	info@monik.ee
Website	www.monik.ee

PRODUCT IDENTIFICATION

Product name	Primed and painted steel structures
Place of production	Estonia

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 Malminkatu 16 A, FI-00100 Helsinki, Finland
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 (English version, 26.8.2020) is used.
EPD author	Mari Kirss and Anni Oviir Rangi Maja OÜ Läänekaare tn 1, Tallinn Estonia www.lcasupport.com
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
Verification date	02 February 2022
EPD verifier	Sigita Židonienė, Vesta Consulting UAB
EPD number	RTS_177_22
Publishing date	February 25, 2022
EPD valid until	February 25, 2027

PRODUCT INFORMATION

The studied product is an average of all variations.

PRODUCT DESCRIPTION

This EPD represents primed and painted (or HDG) steel structures such us columns, trusses, beams, bracings, supports and secondary steel structures. Structures are produced in various sizes and depend on the specific project. A typical order cannot be defined but the production process is similar for all products.
This EPD is valid for an average steel structure project order and does not represent individual projects.

PRODUCT APPLICATION

Primed and painted steel structures are used as frame structures for private, public, and industrial buildings. The main market areas are Scandinavia.

TECHNICAL SPECIFICATIONS

Main steel material grades used are S235 - S420. Dimensions of the products vary based on specific project requirements.
The steel structures are produced in Tallinn, Estonia at the MONIK factory.

PRODUCT STANDARDS

The steel structures are fabricated according to EN 1090-2 up to EXC 4 and CE- marked.
The quality management system is certified according to ISO 9001:2015 standard. Welding processes are certified according to EN ISO 3834-2 standard.

PHYSICAL PROPERTIES OF THE PRODUCT

Dimensions of the products vary based on specific project requirements.

ADDITIONAL TECHNICAL INFORMATION

Further information can be found at www.monik.ee.

PRODUCT RAW MATERIAL COMPOSITION

Product and Packaging Material	Weight, kg	Post-consumer %	Renewable %	Country Region of origin
Steel	984	60	0	EU & non-EU
Welding wire	9	-	0	EU & non-EU
Coating	7	-	0	EU & non-EU
Packaging	4	-	100	EU

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	99	EU & non-EU
Minerals	0	-
Fossil materials	>1	EU & non-EU
Bio-based materials	0	-

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)

After arrival to Monik factory, all materials are cleaned using the shotblasting machine, and then sent to the prefabrication department. According to project documentation and requirements, the material is cut using gas cutting machines, and then bent and drilled at the factory. Hydraulic oils are used to reduce the wear of the machines. Prefabricated details are sent for assembling and welding. Welding works are carried out either manually or with welding machines, depending on the type of the structures. The main method of surface coating in the factory is wet painting. The cleaned products are primed and painted using mainly two-component paints. Before the painting process, the surfaces of welded products are cleaned in a chamber using steel shotblasting. After drying the painted surfaces, the product is packaged and transported to the end user.

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 final products are transported to various cities in Scandinavia. The transport distances are 380 km by ferry and 85 km by lorry. A weighted average is used in the calculations.

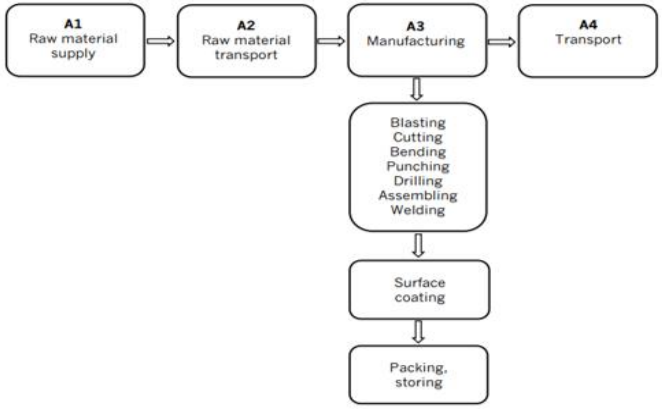
PRODUCT USE AND MAINTENANCE (B1-B7)

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 end-of-life product is collected (C1) and 97.86% of the product is assumed to be sent (C2) to recycling (C3). The distance to the recycling plant is 25 km. 2.14% is sent to landfill (C4). Due to the recycling potential of steel, some of the end-of-life product is converted into recycled raw materials (D).

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2020

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 tonne
Mass per declared unit	1000 kg

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

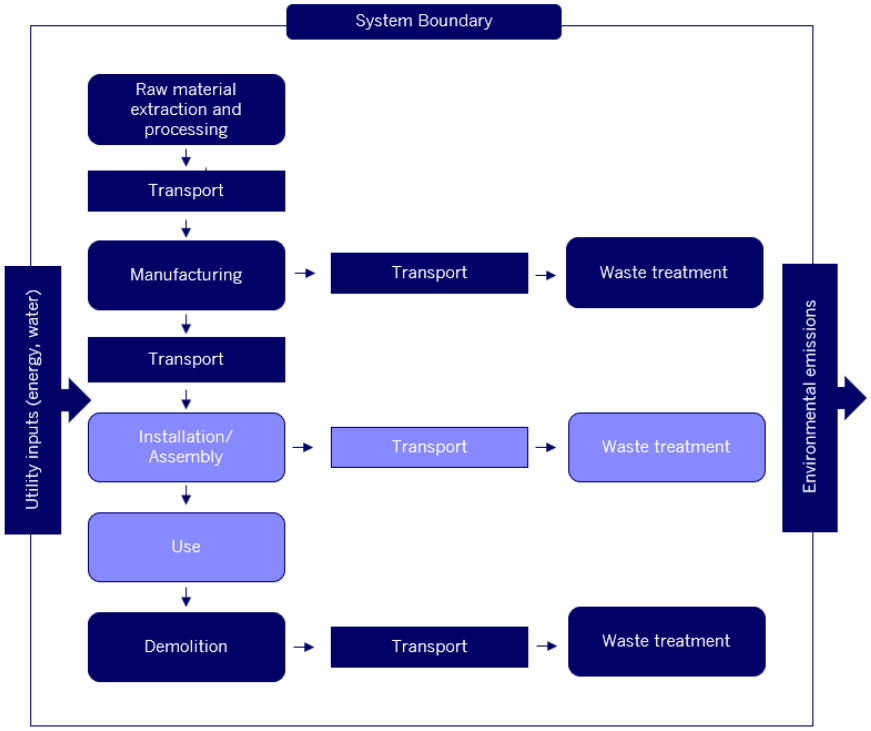
Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	3.6

SYSTEM BOUNDARY

This EPD covers the cradle to gate with options scope with following modules; 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. Modules not relevant = MNR.



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 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 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.

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.

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 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 and so 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 transportation company to serve the needs of other clients.

• Module A4
The transportation distance is defined according to RTS PCR. The typical installation place was assumed as a weighted average of all options – 85 km by lorry and 380 km by ferry. According to the manufacturer, 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. Density of the product is on average 7850 kg/m3, however bulk density varies depending on product type and thickness.

• Module C1
Demolition is assumed to take 0.01 kWh/kg (Bozda ğ , Ö & Seçer, M (2007)). It is assumed that 100% of the waste is collected.

• 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 to have 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 25 km and the transportation method is assumed as lorry which is the most common option.

• Module C3

97.86% of steel (World Steel Association, 2022) is recycled. Losses in the sorting process are assumed to be very small and not considered in the assessment.

• Module C4

The remaining 2.14% of steel is assumed to be sent to landfill.

• Module D

Benefits of recyclable waste generated in the Module C3 are considered.

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	C1	C2	C3	C4	D
GWP – total	kg CO_2e	1.61E3	1.23E2	5.01E2	2.23E3	4.9E1	3.3E0	4.09E0	2.28E1	1.13E-1	-5.52E2
GWP – fossil	kg CO_2e	1.6E3	1.22E2	5.12E2	2.24E3	4.94E1	3.3E0	4.08E0	2.41E1	1.13E-1	-5.56E2
GWP – biogenic	kg CO_2e	3.09E0	8.23E-2	-1.15E1	-8.38E0	-3.78E-3	9.17E-4	2.2E-3	-1.38E0	2.23E-4	4.13E0
GWP – LULUC	kg CO_2e	1.57E0	4.01E-2	4.08E-1	2.02E0	2.81E-2	2.79E-4	1.47E-3	2.74E-2	3.35E-5	1.54E-2
Ozone depletion pot.	kg CFC_{-11}e	1.03E-4	2.96E-5	9.48E-5	2.27E-4	1.03E-5	7.12E-7	9.29E-7	3.47E-6	4.64E-8	-1.48E-5
Acidification potential	mol H^+e	7.95E0	5.08E-1	4.41E0	1.29E1	1.4E0	3.45E-2	1.17E-2	2.93E-1	1.07E-3	-2.15E0
EP-freshwater	kg Pe	1.08E-1	1.08E-3	6.59E-3	1.16E-1	2.4E-4	1.33E-5	3.47E-5	1.67E-3	1.36E-6	-2.23E-2
EP-marine	kg Ne	1.58E0	1.15E-1	6.78E-1	2.38E0	3.48E-1	1.52E-2	2.33E-3	6.46E-2	3.68E-4	-4.22E-1
EP-terrestrial	mol Ne	1.74E1	1.28E0	7.13E0	2.59E1	3.87E0	1.67E-1	2.6E-2	7.49E-1	4.06E-3	-4.47E0
POCP (“smog”)	kg NMVOCe	7.25E0	4.55E-1	2.22E0	9.92E0	1.01E0	4.59E-2	9.95E-3	2.05E-1	1.18E-3	-2.92E0
ADP-minerals & metals	kg Sbe	2.14E-2	2.72E-3	5.73E-4	2.47E-2	4.13E-4	5.03E-6	1.13E-4	1.34E-3	1.03E-6	-5.52E-4
ADP-fossil resources	MJ	1.81E4	2.13E3	7.35E3	2.75E4	6.57E2	4.54E1	6.17E1	3.35E2	3.15E0	-4.1E3
Water use	m^3e depr.	9.09E2	7.52E0	3.06E1	9.47E2	1.47E0	8.46E-2	2.02E-1	4.75E0	1.46E-1	-7.91E1

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 for EP-freshwater are in kg P-eq. Multiply by 3,07 to get PO_4e.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1.96E3	2.66E1	9.82E2	2.97E3	4.89E0	2.45E-1	8.84E-1	5.25E1	2.55E-2	5.45E1
Renew. PER as material	MJ	0E0	0E0	1.13E2	1.13E2	0E0	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1.96E3	2.66E1	1.09E3	3.08E3	4.89E0	2.45E-1	8.84E-1	5.25E1	2.55E-2	5.45E1
Non-re. PER as energy	MJ	1.81E4	2.13E3	7.34E3	2.76E4	6.57E2	4.54E1	6.17E1	3.35E2	3.15E0	-4.1E3
Non-re. PER as material	MJ	2.3E2	0E0	3.35E0	2.34E2	0E0	0E0	0E0	0E0	0E0	0E0
Total use of non-re. PER	MJ	1.84E4	2.13E3	7.35E3	2.79E4	6.57E2	4.54E1	6.17E1	3.35E2	3.15E0	-4.1E3
Secondary materials	kg	6.44E2	0E0	1.05E0	6.45E2	0E0	0E0	0E0	0E0	0E0	2.6E2
Renew. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	1.19E1	4.26E-1	1.13E0	1.35E1	7.37E-2	4.01E-3	1.07E-2	1.37E-1	3.45E-3	-3.69E0

4) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	4.57E2	2.25E0	1.03E1	4.7E2	6.98E-1	4.88E-2	6.35E-2	0E0	2.94E-3	-6.68E1
Non-hazardous waste	kg	4.13E3	2.12E2	2.08E2	4.55E3	2.03E1	5.22E-1	4.38E0	0E0	2.14E1	-7.52E2
Radioactive waste	kg	1.61E-1	1.45E-2	4.75E-2	2.23E-1	4.6E-3	3.18E-4	4.23E-4	0E0	2.08E-5	3.01E-3

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	0E0	0E0	3.07E1	3.07E1	0E0	0E0	0E0	9.72E2	0E0	0E0
Materials for energy rec	kg	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0	0E0

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
GWP – total	kg CO_2e	1.61E0	1.23E-1	5.01E-1	2.23E0	4.94E-2	4.09E-3	4.09E-3	2.28E-2	1.13E-4	-5.52E-1
ADP-minerals & metals	kg Sbe	2.3E-5	2.14E-6	5.73E-7	2.57E-5	4.13E-7	1.13E-7	1.13E-7	1.34E-6	1.03E-9	-5.52E-7
ADP-fossil	MJ	1.9E1	1.96E0	7.35E0	2.83E1	6.57E-1	6.17E-2	6.17E-2	3.35E-1	3.15E-3	-4.1E0
Water use	m^3e depr.	9.09E-1	7.52E-3	3.06E-2	9.47E-1	1.47E-3	2.02E-4	2.02E-4	4.75E-3	1.46E-4	-7.91E-2
Secondary materials	kg	8.88E-1	0E0	1.05E-3	8.89E-1	0E0	0E0	0E0	0E0	0E0	2.6E-1
Biog. C in product	kg C	N/A	N/A	0E0	0E0	N/A	N/A	N/A	N/A	N/A	N/A
Biog. C in packaging	kg C	N/A	N/A	3.6E-3	3.6E-3	N/A	N/A	N/A	N/A	N/A	N/A

5) Biog. C = Biogenic carbon content

SCENARIO DOCUMENTATION

Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Market for electricity, high voltage (Reference product: electricity, high voltage). Estonia. Ecoinvent 3.6. year: 2019
Electricity CO_2e / kWh	0.84
District heating data source and quality	Heat and power co-generation, natural gas, 1mw electrical, lean burn (Reference product: heat, district or industrial, natural gas). Estonia. Ecoinvent 3.6. year: 2019
District heating CO_2e / kWh	0.10

Transport scenario documentation (A4)

Scenario parameter	Value
Specific transport CO_2e emissions, kg CO_2e / tkm	0.086 by lorry, 0.11 by ferry
Average transport distance, km	85 by lorry, 380 by
Capacity utilization (including empty return) %	100
Bulk density of transported products	7850
Volume capacity utilization factor	100

End of life scenario documentation

Scenario parameter	Value
Collection process – kg collected separately	1000
Collection process – kg collected with mixed waste	0
Recovery process – kg for re-use	0
Recovery process – kg for recycling	972
Recovery process – kg for energy recovery	0
Coatings incinerated during steel recycling	7
Disposal (total) – kg for final deposition	21
Scenario assumptions e.g., transportation	End-of-life product is transported 25 km with an average 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.

ISO 21930:2017 Sustainability in buildings and civil engineering works. Core rules for environmental product declarations of construction products and services.

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.

EN 15804:2012+A1:2013 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

RTS PCR (English version, 26.8.2020)

Primed and painted steel structures LCA background report. January 2022

Bozdağ, Ö & Seçer, M. 2007. Energy consumption of RC buildings during their life cycle.

World Steel Association. 2022. Steel industry key facts. [website]

ABOUT THE MANUFACTURER

Monik is among the top ten largest and most experienced producers of steel structures in Estonia.
For 30 years of trouble-free operation, the steel products manufactured and installed by us have found application in construction, woodworking, mining, engineering and oil and gas industries in many countries.
The company quality management system is certified according to ISO 9001:2015. Welding processes are certified according to EN ISO 3834-2 standard.
The steel structures are fabricated according to EN 1090-2 up to EXC 4 and CE- marked.
Monik offers a full range of corrosion protection services, including wet painting, hot dip galvanizing, powder painting, and fire protection.
Further information can be found at www.monik.ee.

EPD AUTHOR AND CONTRIBUTORS

Manufacturer	Monik OÜ
EPD author	Mari Kirss and Anni Oviir Rangi Maja OÜ Läänekaare tn 1, Tallinn Estonia www.lcasupport.com
EPD verifier	Sigita Židonienė, Vesta Consulting UAB
EPD program operator	The Building Information Foundation RTS sr
Background data	This EPD is based on Ecoinvent 3.6 (cut-off) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD Generator for Primary Steel and Aluminium and all Metal-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	Sigita Židonienė
EPD verification started on	24 January 2022
EPD verification completed on	02 February 2022
Approver of the EPD verifier	The Building Information Foundation RTS sr

Author & tool verification	Answer
EPD author	Mari Kirss and Anni Oviir
EPD Generator module	Primary Steel and Aluminium and all Metal-Based Products

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.

Signature

Sigita Židonienė

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

Impact category	Unit	A1	A2	A3	A1-A3	A4	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	1.53E3	1.33E2	5.04E2	2.17E3	4.9E1	3.27E0	4.05E0	2.38E1	1.11E-1	-5.29E2
Ozone depletion Pot.	kg CFC_{-11}e	7.95E-5	2.55E-5	7.77E-5	1.83E-4	8.13E-6	5.63E-7	7.39E-7	2.94E-6	3.68E-8	-1.31E-5
Acidification	kg SO_2e	6.04E0	2.91E-1	3.72E0	1.01E1	1.11E0	4.87E-3	8.24E-3	1.82E-1	4.46E-4	-1.68E0
Eutrophication	kg PO_4^3e	3.56E0	6.02E-2	3.96E-1	4.01E0	1.27E-1	8.57E-4	1.7E-3	7.43E-2	8.63E-5	-9.32E-1
POCP (“smog”)	kg C_2H_4e	7.73E-1	1.64E-2	1.51E-1	9.41E-1	2.91E-2	5.01E-4	4.93E-4	8.53E-3	3.27E-5	-4.36E-1
ADP-elements	kg Sbe	2.14E-2	2.72E-3	5.73E-4	2.47E-2	4.13E-4	5.03E-6	1.13E-4	1.34E-3	1.03E-6	-5.52E-4
ADP-fossil	MJ	1.81E4	2.13E3	7.35E3	2.75E4	6.57E2	4.54E1	6.17E1	3.35E2	3.15E0	-4.1E3