ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

STEEL STRUCTURES

From

UAB VIRITAS

Programme operator: Rakennustieto Oy
EPD registration number: RTS_378_25
Publication date: 1.4.2025
Valid until: 1.4.2030

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GENERAL INFORMATION

MANUFACTURER INFORMATION

Manufacturer	UAB Viritas
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PRODUCT IDENTIFICATION

Product name	Steel structures: Group 1 – Painted Steel Structures Group 2 – Galvanized Steel Structures
EPD type	Product group-specific
CPC code	412 – products of iron or steel
Geographical scope	Europe

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

EPDs within the same product category but registered in different EPD programmes may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison.

EPD INFORMATION

EPD program operator	Rakennustieto Oy
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 (Version 121124) is used.
EPD author	Urtė Valdavičė, UAB Vesta Consulting
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☒ External verification
Verification date	2025-03-21
EPD verifier	Mari Kirss, Meetripuu OÜ
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EPD valid until	1.4.2030

PRODUCT INFORMATION

PRODUCT DESCRIPTION

Steel structures are widely used in construction and engineering due to their high strength, durability, and versatility. They can be painted, uncoated, or galvanized to enhance corrosion resistance and longevity. Below are some common types of steel structures:

Steel Trusses

A steel truss is a structure made of the basic horizontal profiles interconnected by a girder of other profiles. The trusses are usually organized in a triangular spatial structure. The truss structure is best suited to withstand axial forces, commonly used to cover large distances between the supporting points (spans). The structures are characterized by a high structural rigidity and a relatively low weight.

Steel Beams

Seel beams are usually manufactured from H-shaped profiles. They are primarily designed to resist axial forces between the supporting points (spans). The structures are characterized by a high structural rigidity and a relatively low weight.

Steel Columns

Seel columns of buildings are the main part in the form carcasses of buildings made of steel structures. Seel columns are usually made of pipes and beams. Steel is characterized by a high power, light weight, good general stiffness and strength as well as deformation characteristics, making it a perfect option for making columns for long span buildings. Column bases are usually fastened with bolts or firmly fixed to the foundation by concreting or welding to an insert. The top of the column is welded or bolted to the roof frame.

Steel Handrails

Handrails are structures designed to ensure stability and support. Seel handrails are commonly used in industrial buildings for servicing platforms and different types of stairways as well as machinery in various types of access stairs to avoid falls and injuries. Handrails are usually manufactured of round and square tubes.

Steel Stringers

A stringer is a frame of stairs. Stringers are used as a base for fixing stair treads. There are different types of stringers: mono stringers (a step is fixed on one side), central stringer (a step is fixed in the middle), double stringer (a step is fixed on both sides).

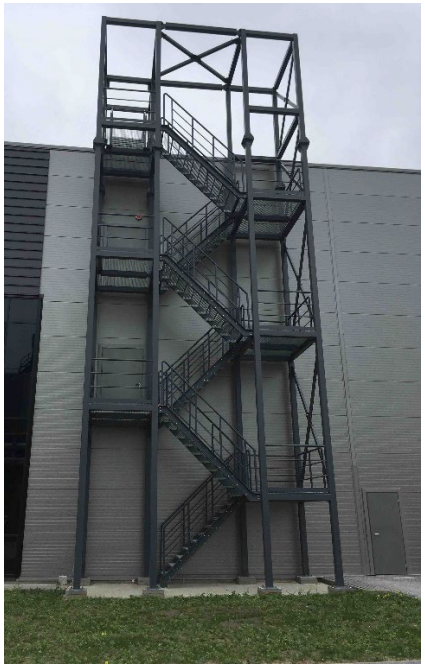
Steel Carports

A Seel carport a functional structure for domestic or industrial use. Carports are used for pergolas, terrace play areas for kids; steel carports are common in private car parks. The structure can also serve as a special storage area or an agricultural hangar.

Inserts

Our VIRITAS® insert plates are manufactured in accordance with EN 1090-2. They are designed to transfer loads from steel structures to concrete structures via a welded joint. The reinforcing bars welded to the insert plate are designed for easy installation on concrete structures. The anchors are made of reinforcing steel without end-plates to avoid intersection with the reinforcement.

Examples of products are presented in pictures below



Surface Finishing Options

To enhance their durability and aesthetic appeal, steel structures can be uncoated or treated with:

- Painting (Group 1) – Provides a protective layer against corrosion and allows for customized colour finishes.
- Galvanization (Group 2) – Involves coating the steel with zinc to prevent rust, extending the structure's lifespan, especially in outdoor and industrial environments.

With their high strength-to-weight ratio, adaptability, and protective finishing options, steel structures are an indispensable solution for modern construction and engineering applications.

PRODUCT APPLICATION

Steel structures are essential components in construction, widely used in buildings, industrial facilities, and bridges due to their strength, durability, and versatility. Handrails play a crucial role in preventing injuries from falls, ensuring safety in various environments. Stringers form the structural framework of stairs, providing a stable base for fixing stair treads. Steel carports serve as functional shelters for both domestic and industrial use, offering protection for vehicles and equipment. Insert plates are designed to fit into narrow spaces within walls or ceilings and are also used to reinforce beams and columns, ensuring structural stability.

PRODUCT STANDARDS

VIRITAS is authorized to manufacture steel building structural components of Execution Class 2 (EXC2) in compliance with EN 1090-2:2018+A1 standards. Surface preparation follows EN ISO 8501-1 requirements, with a preparation grade of P2 and surface treatment of Sa2.5. To ensure durability and corrosion resistance, anti-corrosion coatings are applied according to ISO 12944 standards, covering corrosivity categories from C1 to C5. Customers can select colours from the RAL Colour Chart to meet specific requirements. Wet (airless) painting is available for structures up to 15 meters in length. Additionally, hot-dip galvanization, conforming to LST EN ISO 1461, is offered for steel components up to 15 meters long to enhance protection and longevity.

TECHNICAL SPECIFICATIONS AND PHYSICAL PROPERTIES OF THE PRODUCT

Steel structures are made from carbon steel grades S235, S275, and S355, and can be either painted or hot-dip galvanized for protection.

PRODUCT RAW MATERIAL COMPOSITION

Group 1 – painted steel structures

Product Material	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-%	Biogenic material, kg C/DU
Steel	990,50	7,80	-	-
Steel paint	6,50	-	-	-
Paint curing agent	2,50	-	-	-
Paint thinner	0,50	-	-	-
TOTAL	**1000,00**	**7,73**	**-**	**-**

Group 2 – galvanized steel structures

Product Material	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-%	Biogenic material, kg C/DU
Steel	991,10	7,80	-	-
Zinc	8,89	-	-	-
TOTAL	**1000,00**	**7,73**	**-**	**-**

Group 1 and Group 2 – painted and galvanized steel structure packaging

Packaging Material	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-%	[3]Biogenic material, kg C/DU
LDPE film	0,04	-	-	-
[1]Cardboard	0,15	-	2.39	0,06
[2]Wood	6,09	-	96.97	2,51
TOTAL	**6,28**	**-**	**99,36**	**2,57**

[1]Global Warming Potential biogenic: -1,5 kg CO_{2e} / kg
[2]Global Warming Potential biogenic: -936,73 kg CO_{2e} / m^3 (density 620 kg/m^3)
[3]Conversion factor for converting kg CO_{2e} to kg C equal to 44/14 = 3,67

The average steel supplied contains 62,3% recycled material, including 7,8% from post-consumer sources.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	99,05 – 99,11	EU
Minerals	0,00 – 0,89	EU
Fossil materials	0,00 – 0,69	EU
Water	0	-
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)

A1: This module considers the extraction and processing of raw materials.

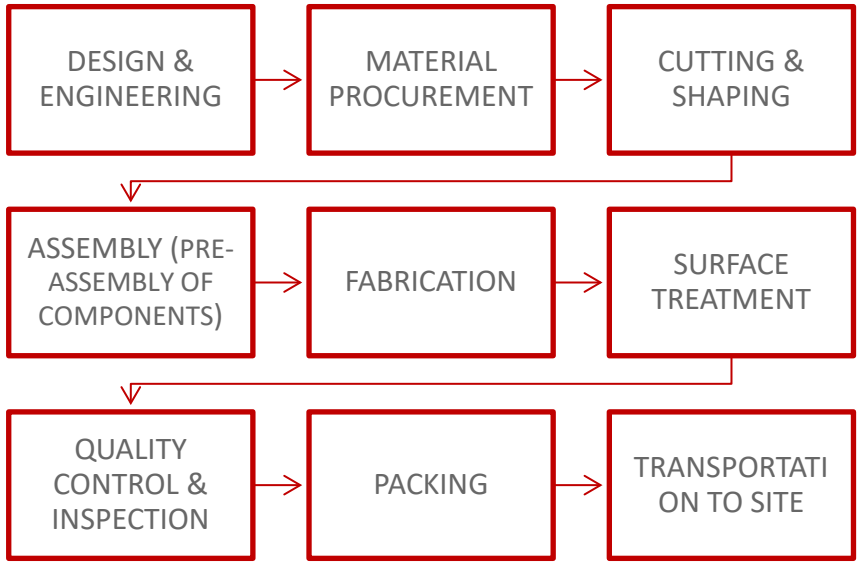
A2: The raw materials are transported to the production site. Vehicle capacity utilization volume factor is assumed to be 1 which means full load. Empty returns are not considered.

A3: This module includes the manufacture of products. It has considered all the energy consumption in the production plant.

MANUFACTURING PROCESS

The manufacturing process of steel structures follows a systematic approach to ensure durability, precision, and compliance with industry standards. It begins with design and engineering, where structural specifications are developed. Once finalized, material procurement takes place, sourcing high-quality carbon steel grades S235, S275, and S355. The raw materials then undergo cutting and shaping to achieve the required dimensions before moving to pre-assembly, ensuring proper component alignment. During fabrication, elements are securely joined through welding or bolting. To enhance longevity, surface treatment is applied, including cleaning, painting, or hot-dip galvanization in accordance with LST EN ISO 1461. Quality control and inspection are conducted to verify compliance with standards such as EN 1090-2:2018+A1 and ISO 12944. After passing inspection, components are packed and prepared for transportation to the site, ensuring efficient and secure delivery. This structured process guarantees high-performance steel structures for various construction and industrial applications.

The manufacturing process is presented below.



TRANSPORT AND INSTALLATION (A4-A5)

A4: This EPD does not cover the transport module. The GWP (global warming potential) of A4 stage is less than 20% of the GWP of modules A1–A3 and less than 1000 km, so it is not mandatory to declare.

A5: This EPD does not cover the Installation phase. However, module A5 is declared for “balancing-out reporting” since packaging of products contains more than 5% biogenic carbon. The uptake of this biogenic carbon, as biogenic CO_2, in module A1 shall be balanced out by an equal amount of emission of biogenic CO_2 in module A5.

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)

C1: Demolition is assumed to be done by mobile machinery (10 kWh/t)[1] and that that 100% of the waste is collected and treated.

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 as the declared product. All the end-of-life products are assumed to be sent to the closest facilities such as recycling and landfill. 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 option.

C3: It is assumed that 95% of steel is converted into secondary material at recycling plants, following circular economy principles, with the goal of achieving a recycling rate of up to this level in Europe [2].

C4: It is assumed that 5% of steel is collected with mix construction waste and is sent to landfills.

D: Module D contains credits from the recycling of the steel in module C3. The steel recycled is credited with the avoided production of the raw material. The loads of recycling process and the benefits of substitution of virgin raw materials have been considered. The average steel from suppliers is considered to have 62.30 % recycled material content.

CALCULATION RULES FOR AVERAGING DATA

Steel structures are categorized into two groups: uncoated and painted (Group 1) and galvanized (Group 2) steel structures. Products within the groups are with identical or similar functions, manufactured by a single company at single manufacturing site, with the same major steps in the A3/core processes.

Average product calculations were chosen because the products in the groups share common characteristics in their manufacturing process and material composition. Moreover, the variation between product environmental impact indicator results is less than 10%. Using an average product value allows for streamlined analysis and decision-making while maintaining a fair representation of the group as a whole.

[1] O. Bozdag and M. Secer. (2007). *Energy Consumption of RC Buildings during Their Life Cycle*. Sustainable Construction, Materials and Practices: Challenge of the Industry for the New Millennium, Minho.

[2] European Steel Association (EUROFER). (2023). *Manifesto 2023: The European Steel Industry's Commitment to Sustainability, Competitiveness, and Innovation*. EUROFER.

LIFE-CYCLE ASSESSMENT

LIFE-CYCLE ASSESSMENT INFORMATION

Period for data	2024

DECLARED AND FUNCTIONAL UNIT

Declared unit	1 tonne
Mass per declared unit	1000 kg

BIOGENIC CARBON CONTENT

Biogenic carbon content in product, kg C	-
Biogenic carbon content in packaging, kg C	2,57

SYSTEM BOUNDARY

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	MND	MND*	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
EU	EU	EU	-	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU		
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.

**This EPD does not cover the transportation module (A4) and the use stage (B1-B7). Module A5 is declared only for "balancing-out reporting" since product packaging contains more than 5% biogenic carbon*

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. The cut-off criteria were applied in the study due to the minimal contribution of the paint additives (paint curing agent and paint thinner), which accounted for only 0.03 % of the total mass of the declared unit. Furthermore, datapoints for these additives were scarce and challenging to locate, making it difficult to gather comprehensive and accurate data for their inclusion in the analysis. 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. 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.

The allocations in the Ecoinvent 3.10.1 datasets used in this study follow the Ecoinvent system model 'Allocation, cut-off, EN15804'.

Scenarios included in the LCA are based on realistic scenarios which are currently in use and are representative for one of the most likely scenario alternatives.

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks. Usage of results from A1-A3 without considering the results of module C is not encouraged.

Module A5 is declared only for “balancing-out reporting” since product packaging contains more than 5% biogenic carbon.

The declared unit of the study is 1 tonne of the product supplied to the client.

GROUP 1 – PAINTED STEEL STRUCTURES

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, (REFERENCE PACKAGE EF 3.1)

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	1,74E+03	MND	2,25E-01	MND	MND	MND	MND	MND	MND	MND	3,61E+00	5,38E+00	2,58E+01	3,12E-01	-6,04E+02
GWP – fossil	kg CO_2e	1,74E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,60E+00	5,38E+00	2,58E+01	3,12E-01	-6,04E+02
GWP – biogenic	kg CO_2e	-2,25E-01	MND	2,25E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	8,33E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,69E-04	2,41E-03	3,04E-02	1,78E-04	-7,13E-02
Ozone depletion pot.	kg CFC_{-11}e	1,06E-04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,52E-08	7,95E-08	2,78E-07	9,04E-09	-1,99E-06
Acidification potential	mol H^+e	1,08E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,25E-02	1,84E-02	2,76E-01	2,21E-03	-2,39E+00
EP-freshwater[2)]	kg Pe	6,32E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,04E-04	4,19E-04	1,40E-02	2,57E-05	-2,59E-01
EP-marine	kg Ne	1,70E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,51E-02	6,03E-03	6,14E-02	8,44E-04	-5,31E-01
EP-terrestrial	mol Ne	1,81E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,65E-01	6,56E-02	6,92E-01	9,21E-03	-5,82E+00
POCP (“smog”)[3)]	kg NMVOCe	1,04E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,93E-02	2,70E-02	2,04E-01	3,30E-03	-1,98E+00
ADP-minerals & metals[4)]	kg Sbe	1,36E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,29E-06	1,50E-05	1,52E-03	4,96E-07	-5,85E-03
ADP-fossil resources	MJ	2,03E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Water use[5)]	m^3e depr.	8,58E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-01	3,86E-01	4,82E+00	2,21E-02	-1,01E+02

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) 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 experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, (REFERENCE PACKAGE EF 3.1)

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	1,00E-04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	9,25E-07	5,39E-07	3,86E-06	5,04E-08	-4,00E-05
Ionizing radiation[6)]	kBq U235e	1,01E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,09E-02	6,80E-02	1,09E+00	4,82E-03	2,27E+01
Ecotoxicity (freshwater)	CTUe	2,55E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,60E+00	1,10E+01	1,77E+02	6,43E-01	-1,48E+03
Human toxicity, cancer	CTUh	9,45E-06	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,71E-10	8,88E-10	2,07E-08	5,75E-11	-9,67E-08
Human tox. non-cancer	CTUh	3,03E-05	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,87E-09	5,06E-08	1,32E-06	1,32E-09	-4,76E-06
SQP[7)]	-	4,46E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,30E+00	7,87E+01	5,77E+02	1,51E+01	-1,74E+03

6) 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	2,15E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,99E-01	1,07E+00	4,74E+01	7,39E-02	-3,79E+02
Renew. PER as material	MJ	8,27E+01	MND	-8,27E+01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	2,23E+03	MND	-8,27E+01	MND	MND	MND	MND	MND	MND	MND	2,99E-01	1,07E+00	4,74E+01	7,39E-02	-3,79E+02
Non-re. PER as energy	MJ	1,50E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Non-re. PER as material	MJ	1,71E+00	MND	-1,71E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	1,50E+04	MND	-1,71E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Secondary materials	kg	5,13E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,96E-02	3,32E-02	3,53E-01	1,93E-03	3,58E+02
Renew. secondary fuels	MJ	6,36E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,12E-05	4,22E-04	1,60E-02	3,99E-05	-4,98E-02
Non-ren. secondary fuels	MJ	1,88E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,74E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,12E-03	1,15E-02	1,33E-01	7,97E-03	-1,33E+00

8) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	7,75E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,25E-02	1,32E-01	2,38E+00	8,46E-03	-2,00E+02
Non-hazardous waste	kg	5,42E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,15E-01	2,45E+00	6,69E+01	1,93E-01	-1,55E+03
Radioactive waste	kg	7,19E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,12E-06	1,67E-05	2,69E-04	1,17E-06	5,89E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	6,09E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	9,50E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	6,18E-03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	9,27E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	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-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	1,74E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,61E-03	5,39E-03	2,58E-02	3,12E-04	-6,05E-01
ADP-minerals & metals	kg Sbe	2,11E-06	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,26E-09	1,46E-08	1,52E-06	4,86E-10	-5,84E-06
ADP-fossil	MJ	5,06E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,68E-02	7,70E-02	2,88E-01	7,58E-03	-5,90E+00
Water use	m^3e depr.	8,58E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-04	3,86E-04	4,82E-03	2,21E-05	-1,01E-01
Secondary materials	kg	5,13E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,96E-05	3,32E-05	3,53E-04	1,93E-06	3,58E-01
Biog. C in product[9)]	kg C	0,00E+00	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	0,00E+00	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

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

GROUP 2 – GALVANIZED STEEL STRUCTURES

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, (REFERENCE PACKAGE EF 3.1)

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	2,39E+03	MND	2,25E-01	MND	MND	MND	MND	MND	MND	MND	3,61E+00	5,38E+00	2,58E+01	3,12E-01	-6,04E+02
GWP – fossil	kg CO_2e	2,38E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,60E+00	5,38E+00	2,58E+01	3,12E-01	-6,04E+02
GWP – biogenic	kg CO_2e	-2,25E-01	MND	2,25E-01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
GWP – LULUC	kg CO_2e	2,38E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,69E-04	2,41E-03	3,04E-02	1,78E-04	-7,13E-02
Ozone depletion pot.	kg CFC_{-11}e	1,25E-04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,52E-08	7,95E-08	2,78E-07	9,04E-09	-1,99E-06
Acidification potential	mol H^+e	7,40E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,25E-02	1,84E-02	2,76E-01	2,21E-03	-2,39E+00
EP-freshwater[2)]	kg Pe	1,06E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,04E-04	4,19E-04	1,40E-02	2,57E-05	-2,59E-01
EP-marine	kg Ne	4,44E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,51E-02	6,03E-03	6,14E-02	8,44E-04	-5,31E-01
EP-terrestrial	mol Ne	2,93E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,65E-01	6,56E-02	6,92E-01	9,21E-03	-5,82E+00
POCP ("smog")[3)]	kg NMVOCe	1,37E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,93E-02	2,70E-02	2,04E-01	3,30E-03	-1,98E+00
ADP-minerals & metals[4)]	kg Sbe	2,01E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,29E-06	1,50E-05	1,52E-03	4,96E-07	-5,85E-03
ADP-fossil resources	MJ	3,13E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Water use[5)]	m^3e depr.	1,42E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-01	3,86E-01	4,82E+00	2,21E-02	-1,01E+02

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) 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 experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, (REFERENCE PACKAGE EF 3.1)

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	7,07E-04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	9,25E-07	5,39E-07	3,86E-06	5,04E-08	-4,00E-05
Ionizing radiation[6)]	kBq U235e	2,14E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,09E-02	6,80E-02	1,09E+00	4,82E-03	2,27E+01
Ecotoxicity (freshwater)	CTUe	8,25E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,60E+00	1,10E+01	1,77E+02	6,43E-01	-1,48E+03
Human toxicity, cancer	CTUh	1,06E-05	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,71E-10	8,88E-10	2,07E-08	5,75E-11	-9,67E-08
Human tox. non-cancer	CTUh	6,62E-05	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,87E-09	5,06E-08	1,32E-06	1,32E-09	-4,76E-06
SQP[7)]	-	7,60E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,30E+00	7,87E+01	5,77E+02	1,51E+01	-1,74E+03

6) 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	3,32E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	2,99E-01	1,07E+00	4,74E+01	7,39E-02	-3,79E+02
Renew. PER as material	MJ	8,27E+01	MND	-8,27E+01	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renew. PER	MJ	3,41E+03	MND	-8,27E+01	MND	MND	MND	MND	MND	MND	MND	2,99E-01	1,07E+00	4,74E+01	7,39E-02	-3,79E+02
Non-re. PER as energy	MJ	2,60E+04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Non-re. PER as material	MJ	1,71E+00	MND	-1,71E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-re. PER	MJ	2,60E+04	MND	-1,71E+00	MND	MND	MND	MND	MND	MND	MND	4,72E+01	7,81E+01	3,05E+02	7,66E+00	-5,48E+03
Secondary materials	kg	5,18E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,96E-02	3,32E-02	3,53E-01	1,93E-03	3,58E+02
Renew. secondary fuels	MJ	7,77E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,12E-05	4,22E-04	1,60E-02	3,99E-05	-4,98E-02
Non-ren. secondary fuels	MJ	1,86E-02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	3,10E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,12E-03	1,15E-02	1,33E-01	7,97E-03	-1,33E+00

8) PER = Primary energy resources

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1,29E+02	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,25E-02	1,32E-01	2,38E+00	8,46E-03	-2,00E+02
Non-hazardous waste	kg	2,10E+03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	7,15E-01	2,45E+00	6,69E+01	1,93E-01	-1,55E+03
Radioactive waste	kg	1,01E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	5,12E-06	1,67E-05	2,69E-04	1,17E-06	5,89E-03

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0,00E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for recycling	kg	5,83E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	9,50E+02	0,00E+00	0,00E+00
Materials for energy rec	kg	6,17E-03	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy	MJ	4,72E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	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-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total	kg CO_2e	2,39E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	3,61E-03	5,39E-03	2,58E-02	3,12E-04	-6,05E-01
ADP-minerals & metals	kg Sbe	1,89E-04	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,26E-09	1,46E-08	1,52E-06	4,86E-10	-5,84E-06
ADP-fossil	MJ	1,38E+01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	4,68E-02	7,70E-02	2,88E-01	7,58E-03	-5,90E+00
Water use	m^3e depr.	1,42E+00	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,18E-04	3,86E-04	4,82E-03	2,21E-05	-1,01E-01
Secondary materials	kg	5,18E-01	MND	0,00E+00	MND	MND	MND	MND	MND	MND	MND	1,96E-05	3,32E-05	3,53E-04	1,93E-06	3,58E-01
Biog. C in product[9)]	kg C	0,00E+00	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	2,57E-03	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

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

SCENARIO DOCUMENTATION

MANUFACTURING ENERGY SCENARIO DOCUMENTATION

Scenario parameter	Value
Electricity data source and quality	Electricity, low voltage, residual mix Data sources: ecoinvent 3.10.1 Country: Lithuania
Electricity CO_2e / kWh	0,65
District heating data source and quality	Heat and power co-generation, diesel, 200kW electrical, SCR-NOx reduction Data sources: ecoinvent 3.10.1 Country: World
District heating CO_2e / kWh	0,1292

END OF LIFE SCENARIO DOCUMENTATION

Scenario parameter	Value
Collection process – kg collected separately	1000,00
Collection process – kg collected with mixed waste	-
Recovery process – kg for re-use	-
Recovery process – kg for recycling	950,00
Recovery process – kg for energy recovery	-
Disposal (total) – kg for final deposition	50,00
Scenario assumptions e.g. transportation	Dismantled product is transported 50 km

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Steel Structures LCA background report

ABOUT THE MANUFACTURER

VIRITAS UAB is a rapidly evolving and developing company engaged in the production of steel structures. The company was founded in 2016 as a small partnership. Rapid progress and significant growth led to quick restructuring of the partnership into a Limited Liability Company in less than six months. VIRITAS specializes in the production of a wide range of steel structures with the primary focus on the quality of our products. By investing into high qualified personnel and equipment the company produces steel structures that meet the highest quality standards.

VIRITAS is entitled to produce steel building structural components of Execution Class 2 (EXC2) in accordance with the requirements of EN 1090-2:2018+A1.

Manufacturer	UAB Viritas
EPD author	Urtė Valdavičė, UAB Vesta Consulting
EPD verifier	Mari Kirss, Meetripuu OÜ
EPD program operator	Rakennustieto Oy
Background data	This EPD is based on Ecoinvent 3.10.1 (Allocation, cut-off, EN15804) and One Click LCA databases.
LCA software	The LCA and EPD have been created using One Click LCA Pre-Verified EPD tool. The EN 15804 reference package used is based on EF 3.1.