peikko group

Rakennustietosäätio RTS Building Information Foundation RTS

RTS EPD, No. 9
Steel structures

Scope of the declaration

This environmental product declaration covers the environmental impacts of the Peikko steel structures. The declaration has been prepared in accordance with EN 15804:2012+A1: 2013 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version, 2.6.2016). This declaration covers the life cycle stages from cradle-to-gate as well as the treatment and recovery of the product at its end-of-life.

RAKENNUSTIETO

14.06.2017
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General information, declaration scope and verification (7.1)

1. Owner of the declaration, manufacturer

Peikko Group Corporation
P.O.Box 104 Voimakatu 3 15101 Lahti, Finland
Veikko Mattila
+358 44 712 3656
veikko.mattila@peikko.com

2. Product name and number

Steel structures

3. Place of production

Lithuania (Kaunas)

4. Additional information

peikko@peikko.com

5. Product Category Rules and the scope of the declaration

This EPD has been prepared in accordance with EN 15804:2012+A1:2013 and ISO 14025 standards together with the RTS PCR (English version, 2.6.2016). Product specific category rules have not been applied in this EPD. EPD of construction materials may not be comparable if they do not comply with EN 15804 and seen in a building context.

6. Author of the life-cycle assessment and declaration

MSc Noora Miilumäki
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Finland, +358 40 820 8552, www.bionova.fi.

7. Verification

This EPD has been verified according to the requirements of ISO 14025:2010, EN 15804: 2012+A1:2013 and RTS PCR by a third party. The verification has been carried out by by MSc Hannu Karppi, Vahanen Environment Oy, Tampellan Esplanadi 2, 33100 Tampere, Finland, +358 40 508 3608, www.vahanen.com.

8. Declaration issue date and validity

6.3.2017 - 5.3.2022

European standard EN 15804: 2014 A1 serves as the core PCR	
Independent verification of the declaration and data, according to ISO14025:2010	
☐ Internal	☑ External
Third party verifier: Hannu Karppi, Vahanen Environment Oy	

Product information

9. Product description

This EPD represents an average Peikko Group steel structure project. Steel structures include components such as trusses, columns and standard steel beams. Steel structures are produced in two Peikko Group factories in Lithuania (Kaunas). The results in this EPD represent the simple average of these plants. The market area is Nordic countries and Europe.

10. Technical specifications

Steel structures contain a mix of different steel grades and handling technologies. They are ordered by clients as custom projects. A typical order cannot be defined. This EPD is valid for an average steel structure project order with the given material composition (production based) and does not represent individual projects.

11. Product standards

Main material standards: EN 10025.

12. Physical properties

Related technical data can be requested from the manufacturer.

13. Raw-materials of the product

Product structure / composition / raw-material	Amount %
Pre-fabricated parts, non-renewable, contain scrap, EU	8
Rebar, non-renewable, contain scrap, EU	10
Steel plate, non-renewable, contain scrap, EU	25
Steel profiles, non-renewable, contain scrap, EU	55
Stainless steel, non-renewable, contain scrap, EU	<1
Welding filler metal, non-renewable, EU	1
Paint, non-renewable, EU	1

14. Substances under European Chemicals Agency's REACH, SVHC restrictions

Name	EC Number	CAS Number
The product does not contain REACH SVHC substances.		

15. Functional / declared unit

1 kg of steel structures

16. System boundary

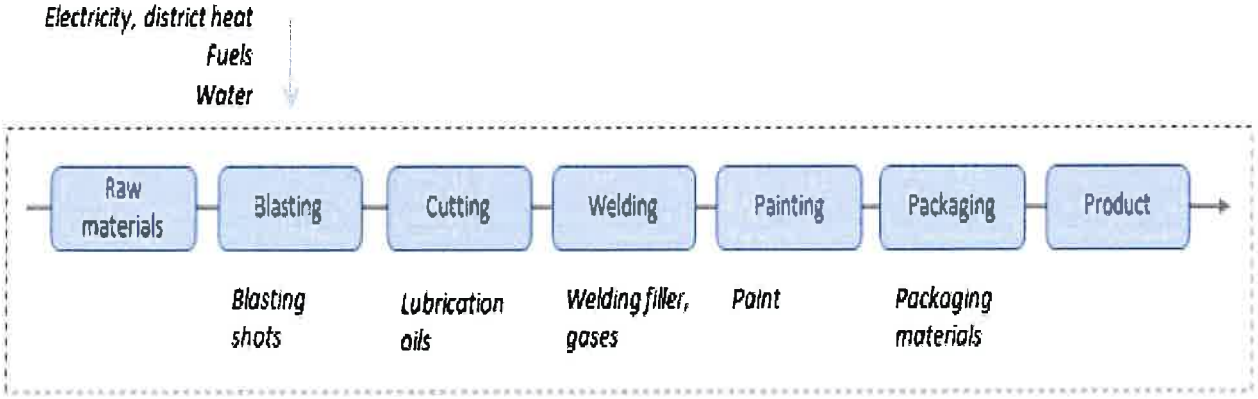
This EPD covers the following modules; A1 (Raw material supply), A2 (Transport) and A3 (Manufacturing), as well as C1 (Deconstruction), C2 (Transport at end-of-life), C3 (Waste processing) and C4 (Disposal). In addition, module D - benefits and loads beyond the system boundary - have been included.

17. Cut-off criteria

A1 raw material supply, A2 transportation, A3 manufacturing. All used materials, energy, packing and transportation until the end-of-waste state have been included. Modules A4-A5 and B have not been studied in this LCA (PCR provisions are met). All of module C has been included as conservative assumptions; C1 demolition, C2 demolition waste transportation where distance estimated to be 250 km, C3 which includes sorting the product from the construction waste and C4 landfilling of the 10% (conservative assumption) of the material which cannot be recovered. Module D considers the benefits of recycling the virgin steel (39%) from the product which could be recovered (90%).

18. Production process

The steel materials are blasted to wanted surface conditions using cast iron steel shots and cut to required shapes. Hydraulic oils, cutting emulsions and other lubrication oils are used during the process to reduce the wear of machines and to ensure stable cutting conditions. The final products are welded from the different steel components. The welding process consumes welding fillers as well as gases used as shielding. The ready products are then painted and packaged for shipping. The manufacturing process requires electricity and fuels for the different equipment as well as heating, unless district heating is used. The steel waste produced at the plant is directed into recycling. The loss of material is considered.



Scope of the Life-Cycle Assessment (7.2.1-2)

Mark all the covered modules of the EPD with X. Mandatory modules are marked with blue in the table below. This declaration covers "cradle-to-gate with options". For other fields mark MND (module not declared) or MNR (module not relevant)

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	MNR	MNR	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Mandatory modules
Mandatory as per the RTS PCR section 6.2.1 rules and terms
Optional modules based on scenarios

Environmental impacts and raw-material use (7.2.3-7.2.4)

19. Environmental impacts

The calculated impacts represent the average product composition inside the product group. Products with the following material composition ranges are within 10% variability of the A1-A3 impacts; profiles 52-58 w%, plate 22-28 w% (total 80%). The remaining share consists of pre-fabricated parts, steel profiles, stainless steel, welding fillers and paint for which the w% can vary inside the 20w%. The variance from the original values is +- 3% for the GWP.

Environmental impact									
Parameter	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**	
Global warming potential	kg CO2 -eqv	1,97E0	MND	5,77E-2	1,54E-2	2,78E-3	1,06E-3	-6,18E-1	
Depletion of stratospheric ozone layer	kg CFC11-eqv	1,63E-7	MND	1,06E-8	3,4E-9	1,5E-10	2,72E-10	-3,11E-8	
Formation of photochemical ozone	kg C2H4 -eqv	9,37E-4	MND	1,17E-5	2,34E-6	6,02E-7	3,4E-7	-4,62E-4	
Acidification	kg SO2 -eqv	1,8E-2	MND	4,38E-4	7,85E-5	1,96E-5	7,3E-6	-2,67E-3	
Eutrophication	kg PO4 3--eqv	5,6E-3	MND	1E-4	1,8E-5	8,86E-6	2,2E-6	-8,91E-4	
Abiotic depletion of non fossil resources	kg Sb-eqv	1,93E-5	MND	1,79E-8	4,06E-8	2,18E-9	1,4E-9	-1,71E-7	
Abiotic depletion of fossil resources	MJ	2,31E1	MND	8,43E-1	4,17E-1	2,93E-2	2,5E-2	-6,25E0	

20. Use of natural resources

Resource use									
Parameter	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**	
Renewable primary energy resources used as energy carrier	MJ	2,34E0	MND	4,94E-3	5,25E-4	4,06E-3	7,88E-4	-1,22E-1	
Renewable primary energy resources used as raw materials	MJ	0E0	MND	0E0	0E0	0E0	0E0	0E0	
Total use of renewable primary energy resources	MJ	2,34E0	MND	4,94E-3	5,25E-4	4,06E-3	7,88E-4	-1,22E-1	
Nonrenewable primary energy resources used as energy carrier	MJ	2,73E1	MND	8,97E-1	3,46E-1	3,72E-2	2,72E-2	-6,71E0	
Nonrenewable primary energy resources used as materials	MJ	1,13E-2	MND	0E0	0E0	0E0	0E0	0E0	
Total use of nonrenewable primary energy resources	MJ	2,74E1	MND	8,97E-1	3,46E-1	3,72E-2	2,72E-2	-6,71E0	
Use of secondary materials	kg	6,64E-1	MND	5,95E-6	0E0	0E0	0E0	0E0	
Use of renewable secondary fuels	MJ	8,59E-7	MND	0E0	0E0	0E0	0E0	0E0	
Use of nonrenewable secondary fuels	MJ	8,82E-6	MND	0E0	0E0	0E0	0E0	0E0	
Use of net fresh water	m^3	5,75E-3	MND	2,61E-5	1,27E-5	7,76E-6	2,69E-6	-4,4E-4	

21. End of life - Waste

Waste									
Parameter	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**	
Hazardous waste	kg	1,81E-4	MND	3,61E-7	1,39E-7	5,02E-8	2,01E-8	-6,36E-5	
Non-hazardous waste	kg	8,13E-1	MND	9,01E-4	3,03E-2	1,62E-4	1E-1	-2,5E-2	
Radioactive waste	kg	1,01E-4	MND	5,95E-6	2E-6	1,2E-7	1,55E-7	-7,24E-6	

22. End of life - Output flow

Output flow									
Parameter	**Unit**	**A1-A3**	**A4**	**C1**	**C2**	**C3**	**C4**	**D**	
Components for reuse	kg	0E0	MND	0E0	0E0	0E0	0E0	0E0	
Materials for recycling	kg	8,88E-2	MND	0E0	0E0	9E-1	0E0	0E0	
Materials for energy recovery	kg	0E0	MND	0E0	0E0	0E0	0E0	0E0	
Exported energy	MJ	0E0	MND	0E0	0E0	0E0	0E0	0E0	

Scenarios and additional technical information (7.3)

23. Electricity in the manufacturing phase (7.3.A3)

Object	Value	Data quality
A3 data quality of electricity and CO2 emission kg CO2 eq. / kWh	LI 0.612	Based on country specific fuel mix for the production year 2013 from IEA (2016). Imported electricity has been considered. The environmental impacts of the fuels are based on ecoinvent 3.3 database. The impacts include all upstream processes as well as transmission losses.

24. End-of-life process description (7.3.4)

Processes	Unit (expressed per functional unit or per declared unit of components products or materials and by type of material)	Amount kg/kg Data quality
Collection process specified by type	kg collected separately	-
	kg collected with mixed construction waste	1*
Recovery system specified by type	kg for re-use	-
	kg for recycling	0.90*
	kg for energy recovery	-
Disposal specified by type	kg product or material for final deposition	0.10*
Assumptions for scenario development, e.g. transportation	units as appropriate	Transportation distance estimation based on average recycling facility locations; 250 km

* Assumed that 100% of the waste is collected from the demolition site. Conservative consideration that the steel is collected as mixed construction waste. Based on conservative estimation 90% of the steel is recovered while 10% cannot be separated and is assumed to be landfilled.

25. Additional information (7.4)

Air, soil and water impacts during the use phase have not been studied.

26. Bibliography

Standards:
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.
EN 15804:2012+A1 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.
RTS PCR 2.6.2016 RTS PCR protocol: EPDs published by the Building Information Foundation RTS sr. PT 18 RT EPD Committee. (English version).

Other:
IEA (2016) International Energy Agency – Statistics – Statistics Search – Electricity and Heat. https: //www.iea.org/statistics/statisticssearch/ [7.7.2016].
Miilumäki, N - Peikko Group product EPDs, LCA report as per EN 15804 and ISO 14025, Bionova Ltd, March 6th, 2017.
Statistics Finland (2014) Production of electricity and heat [e-publication]. ISSN=1798-5099. 2013, Appendix table 1. Electricity and heat production by production mode and fuel in 2013. http://www.stat.fi/til/salatuo/2013/salatuo_2013_2014-10-16_tau_001_en.html [13.8.2016].
World Steel Association (2015) LCI data for steel products. Data requested by Bionova, data provided by World Steel Association on the 15th of May, 2015.
Wernet, G., Bauer, C., Steubing, B., Reinhard, J., Moreno-Ruiz, E., and Weidema, B. (2016) The ecoinvent database version 3 (part I): overview and methodology. The International Journal of Life Cycle Assessment, [online] 21(9), pp.1218–1230. http://link.springer.com/10.1007/s11367-016-1087-8 [13.10.2016].