ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Standard and Green Line ring sets

RDT Solutions Oy

EPD number RTS_352_25

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Created with One Click LCA

THE RESPONSIBLE CHOICE

GENERAL INFORMATION

MANUFACTURER

Manufacturer	RDT Solutions Oy
Address	Hämeenkatu 26 A, 33200 Tampere
Website	www.rdtech.fi

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	Rakennustieto
Owner of the declaration	RTD Solutions Oy
Reference standard	EN 15804+A2:2019 and ISO 14025. The EN 15804 reference package is based on EF 3.1.
PCR	RTS PCR (English version, 26.8.2020)
Sector	Construction product
Category of EPD	Third-party verified Environmental Product Declaration
Scope of the EPD	Cradle to gate and modules C1-C4, D
EPD author	Sanni Mallat and Juha Seppälä, Sitowise
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Mari Kirss, Product LCA/EPD Specialist mari.kirss@lcasupport.com Rangi Maja OÜ, LCA Support, www.lcasupport.com

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. 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.

PRODUCTS

Product name	Standard and Green Line ring sets
Place of production	Tampere, Finland
Period for data	2023-2024 (12 months)
Averaging in EPD	No averaging

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kilogram of the product
Declared unit mass	1 kg
Standard ring sets:	
GWP-fossil, A1-A3 ($kgCO_2e$)	1.47E+00
GWP-total, A1-A3 ($kgCO_2e$)	4.54+00
Green Line ring sets:	
GWP-fossil, A1-A3 ($kgCO_2e$)	4.32+E-01
GWP-total, A1-A3 ($kgCO_2e$)	5.56+E-01

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

RDT Solutions Oy is shaping a sustainable future in manufacturing and distributing foundation, well drilling and geotechnical drilling equipment. From utilizing eco-friendly materials to implementing circular design principles, our commitment to sustainability runs deep.

PRODUCT DESCRIPTION AND APPLICATION

Ring bit sets are a part of Casing advancement system (CAS) that provide a fast, reliable method for installing casings across all ground conditions. Designed for high productivity, precision and minimal environmental disruption, these systems are ideal for urban construction and sensitive environments. In drilling, ring bit sets act as the first contact point between the ground and casing, making way for the casing to advance.

In this EPD, data on the Standard and Green Line ring sets is presented. The products do not differ in terms of purpose, characteristics, or production methods. The difference between the products is that recycled steel is used in the production of the Green Line ring set.

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kilogram of the product
Mass per declared unit	1 kg
Reference service life	Not applicable

PRODUCT RAW MATERIAL COMPOSITION

Materials, Standard ring sets	Weight, kg	Post-consumer %
Mild alloyed steel	0,97	98,5 %
Tungsten carbide	0,03	-
Materials, Green Line ring sets	**Weight, kg**	**Post-consumer %**
Mild alloyed steel	0,97	100 %
Tungsten carbide	0,03	100 %

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate per declared unit.

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0.001 kg C
Mass of packaging, kg	0.002 kg

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

RESULTS OF ENVIRONMENTAL INFORMATION REPORTED PER KILOGRAM

Standard ring sets

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	4.54E+00	3.61E-02	5.39E-03	5.33E-02	9.37E-04	2.30E+00
ADP-minerals & metals[4)]	kg Sbe	2.15E-04	1.29E-08	1.50E-08	1.91E-08	1.49E-09	-1.77E-04
ADP-fossil resources	MJ	6.74E+01	4.72E-01	7.81E-02	6.97E-01	2.30E-02	2.35E+01
Water use[5)]	m^3e depr.	1.19E+00	1.18E-03	3.86E-04	1.74E-03	6.63E-05	8.16E-01
Biogenic carbon content in product	kg C/kg	0.00E+00					
Biogenic carbon content in packaging	kg	1.00E-03					
Use of secondary material	kg/kg	1.88E+00	1.96E-04	3.32E-05	2.90E-04	5.78E-06	-1.026E+00

Green Line ring sets

Impact category	Unit	A1-A3	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	5.56E-01	3.61E-02	4.58E-03	5.33E-02	9.37E-04	3.44E+00
ADP-minerals & metals[4)]	kg Sbe	5.70E-06	1.29E-08	1.28E-08	1.91E-08	1.49E-09	5.18E-06
ADP-fossil resources	MJ	2.49E+01	4.72E-01	6.64E-02	6.97E-01	2.30E-02	3.56E+01
Water use[5)]	m^3e depr.	7.13E-01	1.18E-03	3.28E-04	1.74E-03	6.63E-05	1.31E+00
Biogenic carbon content in product	kg C/kg	0.00E+00					
Biogenic carbon content in packaging	kg	1.00E-03					
Use of secondary material	kg/kg	1.92E+00	1.96E-04	2.83E-05	2.90E-04	5.78E-06	-1.08E+00

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

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		
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR

MANUFACTURING AND PACKAGING (A1-A3)

A1: This module considers the extraction and processing of raw materials and packaging materials.
A2: This module covers the transportation of raw materials to the production site
A3: This module includes the manufacture of the products. It has considered all the electricity consumption and waste generated in the production site.

TRANSPORT AND INSTALLATION (A4-A5)

This EPD does not cover the transport and installation stage. The GWP (global warming potential) of A4 stage is less than 20% of the GWP of modules A1–A3 and transportation distance less than 1000 km, so it is not mandatory to declare. According to RTS PCR, A5 is mandatory to declare if the atmospheric carbon dioxide uptake of packaging material is allocated to module A1. The carbon dioxide uptake of packaging is balanced in the stage A1, so it is not mandatory to declare.

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. However, it is estimated that the environmental impacts during the use phase are very minimal, if not negligible.

PRODUCT END OF LIFE (C1-C4, D)

Typical end-of-life scenario for the product is that, after being used appropriately, it remains as part of the foundation or structure in the ground where it was utilized—for example, steel piles used in the foundation of an apartment building. However, a scenario was developed here where the product is excavated from the ground at the end of its life cycle and delivered for recycling to be used as secondary raw material. Data used in these modules represents the world.

C1: This stage accounts for the processes involved in deconstructing or demolishing the product at the end of its life. It includes energy use, and any emissions associated with these activities.

C2: This module considers the transportation of the demolished or deconstructed product components to waste processing or disposal sites. Emissions and fuel consumption from transportation are included here. Assumed transport distance was 50 kilometres.

C3: This module covers the recycling of the product. It was assumed based on World Steel Association (2020), that 85 % of the product is recycled, and 15 % is landfilled.

C4: This stage includes the final disposal of any product materials that cannot be reused or recycled. This module covers the steel landfilling as it was assumed that 15 % of the product is landfilled.

D: This stage includes the benefits of recycling of the products.

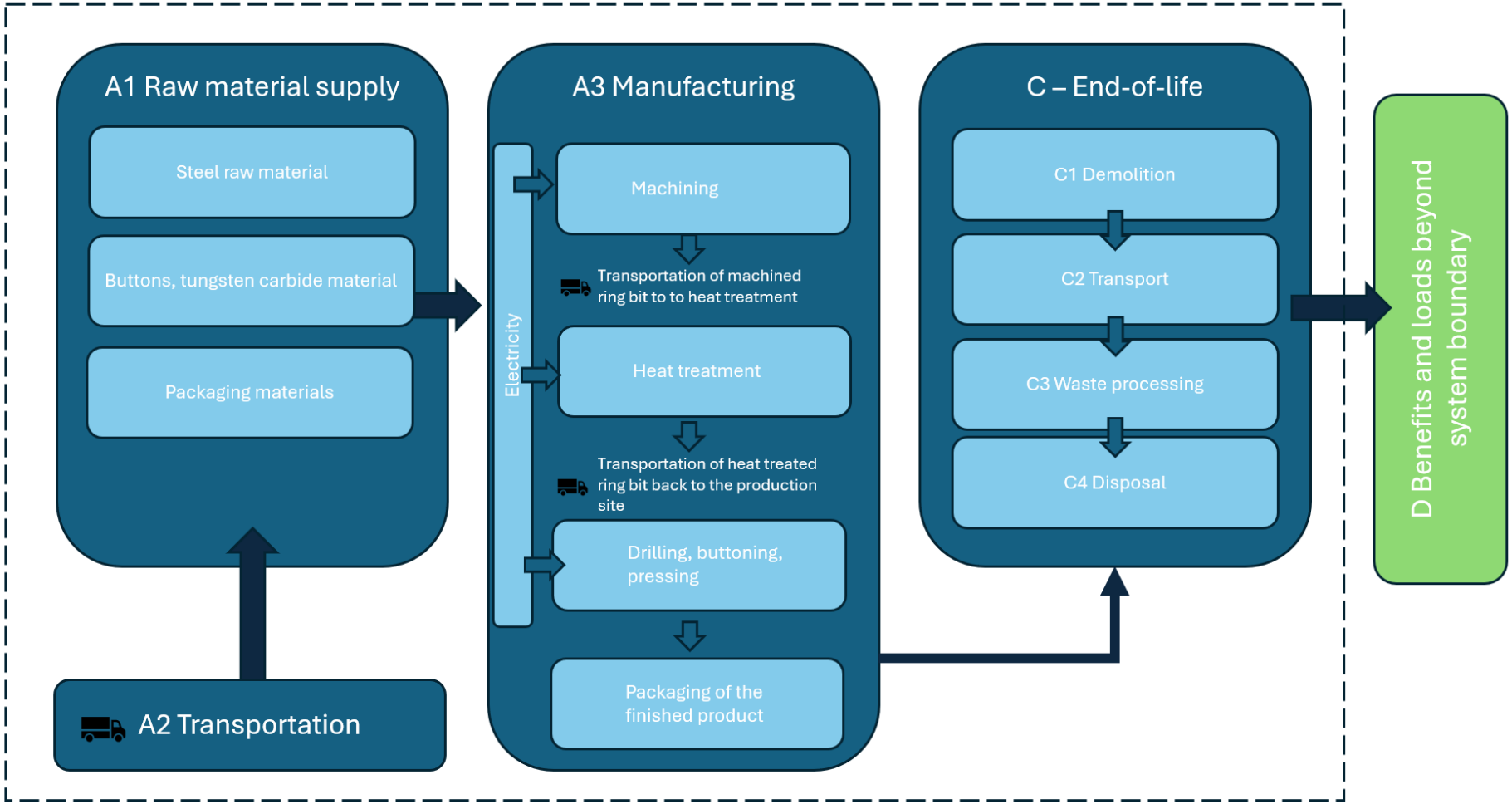
For Standard ring sets, it was assumed that 85 % of the steel is recycled and 15 % is landfilled based on World Steel Association (2020, pg 19). Life cycle inventory (LCI) study.

Benefits from steel recycling have not been calculated for Green Line ring sets, as the steel used is already recycled material. Recycled steel cannot be used to account for additional benefits beyond the product's lifecycle due to the risk of double-counting benefits that were already accounted for in a previous system.

Scenarios included are currently in use and are representative for one of the most probable alternatives.

MANUFACTURING PROCESS

The manufacturing process and system boundaries of the products are shown in the figure below. System boundaries do not differ between products, except that the Green Line ring sets uses recycled material (steel raw material and tungsten carbide buttons) in A1 module.



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR, except the module A4. 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.

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, allocation was applied only to packaging materials to estimate the amount of each packaging material (e.g., wooden pallet, collar, carton lid) allocated per product. The amount was determined based on the weight of the packaging material and the typical number of finished products that fit within one complete packaging unit. No other allocation was necessary.

The raw material supplier guarantees the use of recycled steel in the tube products purchased from them. The raw materials used in Greenline products are always procured per order and production batch from the material supplier, ensuring that recycled steel is consistently used in Greenline products. Additionally, the raw materials for other products are predefined and ordered from specific suppliers, meaning the raw material used is always known for each production batch. As a result, the mass-balance approach is not applied.

AVERAGES AND VARIABILITY

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10 and One Click LCA databases as sources of environmental data.

ENVIRONMENTAL IMPACT DATA – STANDARD RING SETS

In the following tables the potential environmental impacts are reported per the declared unit and per life cycle stage for Standard ring sets. The impact categories presented here are consistent with the reference PCR. The results are presented in scientific form. According to the EN 15804 standard, environmental declarations for construction products may not be comparable if they have not been prepared in accordance with that standard or if a different declared unit has been used.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	3.74E+00	5.10E-01	2.88E-01	4.54E+00	3.61E-02	5.39E-03	5.33E-02	9.37E-04	2.30E+00
GWP – fossil	kg CO_2e	8.00E-01	5.09E-01	1.63E-01	1.47E+00	3.60E-02	5.38E-03	5.33E-02	9.36E-04	2.31E+00
GWP – biogenic	kg CO_2e	2.93E+00	1.28E-04	1.24E-01	3.06E+00	3.68E-06	1.22E-06	-5.44E-06	-2.98E-07	1.14E-03
GWP – LULUC	kg CO_2e	1.04E-02	2.26E-04	6.12E-05	1.07E-02	3.69E-06	2.41E-06	5.46E-06	5.35E-07	-1.56E-03
Ozone depletion pot.	kg $CFC\text{-}_{11}e$	7.20E-08	1.04E-08	1.49E-08	9.73E-08	5.52E-10	7.95E-11	8.16E-10	2.71E-11	7.88E-09
Acidification potential	mol H^+e	4.56E-02	1.40E-03	1.77E-03	4.88E-02	3.25E-04	1.84E-05	4.81E-04	6.64E-06	-1.54E-02
EP-freshwater[2)]	kg Pe	1.05E-02	4.26E-05	5.16E-05	1.06E-02	1.04E-06	4.19E-07	1.54E-06	7.70E-08	-4.67E-03
EP-marine	kg Ne	7.79E-03	3.91E-04	2.17E-04	8.39E-03	1.51E-04	6.03E-06	2.23E-04	2.53E-06	-1.31E-03
EP-terrestrial	mol Ne	1.47E-01	4.22E-03	4.68E-03	1.56E-01	1.65E-03	6.56E-05	2.44E-03	2.76E-05	-8.15E-02
POCP ("smog")[3)]	kg NMVOCe	1.66E-02	2.26E-03	6.27E-04	1.95E-02	4.93E-04	2.70E-05	7.28E-04	9.90E-06	3.62E-03
ADP-minerals & metals[4)]	kg Sbe	2.12E-04	1.46E-06	1.77E-06	2.15E-04	1.29E-08	1.50E-08	1.91E-08	1.49E-09	-1.77E-04
ADP-fossil resources	MJ	5.14E+01	7.63E+00	8.37E+00	6.74E+01	4.72E-01	7.81E-02	6.97E-01	2.30E-02	2.35E+01
Water use[5)]	m^3e depr.	4.79E-01	4.48E-02	6.66E-01	1.19E+00	1.18E-03	3.86E-04	1.74E-03	6.63E-05	8.16E-01

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, PEF

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	Incidence	2.42E-07	4.92E-08	1.16E-08	3.03E-07	9.25E-09	5.39E-10	1.37E-08	1.51E-10	3.15E-08
Ionizing radiation[6)]	kBq U235e	4.81E-02	1.34E-02	2.55E-01	3.17E-01	2.09E-04	6.80E-05	3.09E-04	1.44E-05	7.73E-02
Ecotoxicity (freshwater)	CTUe	4.91E+01	9.48E-01	3.14E+00	5.32E+01	2.60E-02	1.10E-02	3.84E-02	1.93E-03	-2.67E+01
Human toxicity, cancer	CTUh	1.74E-09	8.85E-11	7.50E-11	1.90E-09	3.71E-12	8.88E-13	5.48E-12	1.73E-13	4.17E-09
Human tox. non-cancer	CTUh	8.96E-08	4.88E-09	2.45E-09	9.69E-08	5.87E-11	5.06E-11	8.67E-11	3.97E-12	2.13E-08
SQP[7)]	-	1.31E+01	7.51E+00	1.45E+00	2.20E+01	3.30E-02	7.87E-02	4.88E-02	4.52E-02	-4.43E+00

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	A2	A3	A1-A3	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	4.56E+01	1.69E-01	1.32E+00	4.71E+01	2.99E-03	1.07E-03	4.41E-03	2.22E-04	7.05E-01
Renew. PER as material	MJ	4.23E+00	0.00E+00	0.00E+00	4.23E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER	MJ	4.99E+01	1.69E-01	1.32E+00	5.14E+01	2.99E-03	1.07E-03	4.41E-03	2.22E-04	7.05E-01
Non-re. PER as energy	MJ	8.98E+01	7.63E+00	8.37E+00	1.06E+02	4.72E-01	7.81E-02	6.97E-01	2.30E-02	2.35E+01
Non-re. PER as material	MJ	8.10E-06	0.00E+00	0.00E+00	8.10E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-re. PER	MJ	8.98E+01	7.63E+00	8.37E+00	1.06E+02	4.72E-01	7.81E-02	6.97E-01	2.30E-02	2.35E+01
Secondary materials	kg	1.88E+00	3.71E-03	4.87E-04	1.88E+00	1.96E-04	3.32E-05	2.90E-04	5.78E-06	-1.026E+00
Renew. secondary fuels	MJ	1.79E-04	4.08E-05	2.54E-05	2.45E-04	5.12E-07	4.22E-07	7.57E-07	1.20E-07	3.57E-05
Non-ren. secondary fuels	MJ	1.75E-07	0.00E+00	0.00E+00	1.75E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	1.14E-02	1.28E-03	6.10E-03	1.88E-02	3.12E-05	1.15E-05	4.61E-05	2.39E-05	-1.69E-02

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	6.37E-02	1.25E-02	1.01E-02	8.63E-02	5.25E-04	1.32E-04	7.76E-04	2.54E-05	6.61E-01
Non-hazardous waste	kg	2.12E+01	2.59E-01	3.76E-01	2.19E+01	7.15E-03	2.45E-03	1.06E-02	5.80E-04	5.30E+00
Radioactive waste	kg	9.19E-05	3.37E-06	1.13E-04	2.08E-04	5.18E-08	1.69E-08	7.65E-08	3.58E-09	1.96E-05

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.75E-04	0.00E+00	0.00E+00	1.75E-04	0.00E+00	0.00E+00	8.50E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	6.47E-16	0.00E+00	0.00E+00	6.47E-16	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	0.00E+00	0.00E+00	0.00E+00

ENVIRONMENTAL IMPACT DATA – GREEN LINE RING SETS

In the following tables the potential environmental impacts are reported per the declared unit and per life cycle stage for Green Line ring sets.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	8.52E-02	1.82E-01	2.89E-01	5.56E-01	3.61E-02	4.58E-03	5.33E-02	9.37E-04	3.44E+00
GWP – fossil	kg CO_2e	8.54E-02	1.82E-01	1.65E-01	4.32E-01	3.60E-02	4.57E-03	5.33E-02	9.36E-04	3.44E+00
GWP – biogenic	kg CO_2e	-2.00E-04	4.11E-05	1.24E-01	1.24E-01	3.68E-06	1.04E-06	-5.44E-06	-2.98E-07	2.82E-03
GWP – LULUC	kg CO_2e	4.78E-05	8.12E-05	6.34E-05	1.92E-04	3.69E-06	2.05E-06	5.46E-06	5.35E-07	1.85E-03
Ozone depletion pot.	kg CFC_{-11}e	3.93E-09	2.68E-09	1.47E-08	2.13E-08	5.52E-10	6.75E-11	8.16E-10	2.71E-11	1.74E-08
Acidification potential	mol H^+e	3.34E-04	6.18E-04	1.80E-03	2.75E-03	3.25E-04	1.56E-05	4.81E-04	6.64E-06	1.30E-02
EP-freshwater[2)]	kg Pe	3.46E-06	1.41E-05	5.19E-05	6.95E-05	1.04E-06	3.56E-07	1.54E-06	7.70E-08	1.50E-03
EP-marine	kg Ne	6.75E-05	2.03E-04	2.33E-04	5.03E-04	1.51E-04	5.12E-06	2.23E-04	2.53E-06	3.19E-03
EP-terrestrial	mol Ne	7.37E-04	2.21E-03	4.86E-03	7.80E-03	1.65E-03	5.58E-05	2.44E-03	2.76E-05	3.07E-02
POCP (“smog”)[3)]	kg NMVOCe	3.27E-04	9.12E-04	6.60E-04	1.90E-03	4.93E-04	2.30E-05	7.28E-04	9.90E-06	1.08E-02
ADP-minerals & metals[4)]	kg Sbe	3.42E-06	5.07E-07	1.77E-06	5.70E-06	1.29E-08	1.28E-08	1.91E-08	1.49E-09	5.18E-06
ADP-fossil resources	MJ	1.39E+01	2.64E+00	8.37E+00	2.49E+01	4.72E-01	6.64E-02	6.97E-01	2.30E-02	3.56E+01
Water use[5)]	m^3e depr.	3.37E-02	1.30E-02	6.66E-01	7.13E-01	1.18E-03	3.28E-04	1.74E-03	6.63E-05	1.31E+00

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, PEF

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Particulate matter	Incidence	5.39E-09	1.82E-08	1.18E-08	3.54E-08	9.25E-09	4.58E-10	1.37E-08	1.51E-10	2.88E-07
Ionizing radiation[6)]	kBq U235e	1.68E-03	2.30E-03	2.55E-01	2.59E-01	2.09E-04	5.78E-05	3.09E-04	1.44E-05	1.17E-01
Ecotoxicity (freshwater)	CTUe	2.16E+00	3.73E-01	3.15E+00	5.68E+00	2.60E-02	9.39E-03	3.84E-02	1.93E-03	1.87E+01
Human toxicity, cancer	CTUh	3.73E-10	3.00E-11	7.52E-11	4.78E-10	3.71E-12	7.55E-13	5.48E-12	1.73E-13	6.03E-09
Human tox. non-cancer	CTUh	3.25E-09	1.71E-09	2.46E-09	7.42E-09	5.87E-11	4.30E-11	8.67E-11	3.97E-12	1.08E-07
SQP[7)]	-	1.48E-01	2.65E+00	1.45E+00	4.25E+00	3.30E-02	6.69E-02	4.88E-02	4.52E-02	8.09E+00

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	A2	A3	A1-A3	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	9.26E-01	3.61E-02	1.32E+00	2.28E+00	2.99E-03	9.10E-04	4.41E-03	2.22E-04	1.90E+00
Renew. PER as material	MJ	3.61E-02	0.00E+00	0.00E+00	3.61E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renew. PER	MJ	9.62E-01	3.61E-02	1.32E+00	2.32E+00	2.99E-03	9.10E-04	4.41E-03	2.22E-04	1.90E+00
Non-re. PER as energy	MJ	1.60E+01	2.64E+00	8.37E+00	2.71E+01	4.72E-01	6.64E-02	6.97E-01	2.30E-02	3.56E+01
Non-re. PER as material	MJ	4.17E-05	0.00E+00	0.00E+00	4.17E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-re. PER	MJ	1.60E+01	2.64E+00	8.37E+00	2.71E+01	4.72E-01	6.64E-02	6.97E-01	2.30E-02	3.56E+01
Secondary materials	kg	1.92E+00	1.12E-03	4.85E-04	1.92E+00	1.96E-04	2.83E-05	2.90E-04	5.78E-06	1.08E+00
Renew. secondary fuels	MJ	0.00E+00	1.42E-05	2.54E-05	3.96E-05	5.12E-07	3.59E-07	7.57E-07	1.20E-07	2.07E-04
Non-ren. secondary fuels	MJ	1.75E-07	0.00E+00	0.00E+00	1.75E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m^3	2.66E-02	3.90E-04	6.10E-03	3.31E-02	3.12E-05	9.81E-06	4.61E-05	2.39E-05	-7.30E-03

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Hazardous waste	kg	6.82E-04	4.46E-03	1.02E-02	1.54E-02	5.25E-04	1.12E-04	7.76E-04	2.54E-05	7.97E-01
Non-hazardous waste	kg	5.60E-02	8.26E-02	3.78E-01	5.16E-01	7.15E-03	2.08E-03	1.06E-02	5.80E-04	2.50E+01
Radioactive waste	kg	4.64E-05	5.72E-07	1.13E-04	1.60E-04	5.18E-08	1.44E-08	7.65E-08	3.58E-09	2.96E-05

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	3.90E-05	0.00E+00	0.00E+00	3.90E-05	0.00E+00	0.00E+00	8.50E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	2.01E-13	0.00E+00	0.00E+00	2.01E-13	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	0.00E+00	0.00E+00	0.00E+00

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 reference standard, 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 digital background data for this EPD

This EPD has been generated by One Click LCA EPD generator.

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 reference standard.

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.

MANUFACTURING ENERGY DOCMENTATION

Parameter	Value
Electricity data source and quality	Electricity data sources: • Nuclear power, World, 2023 • Solar power, World, 2023 • Electricity, Finland, 2022 Data quality is considered to be good.
Electricity CO2-eq./kWh	0.102

REFERENCES

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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.

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