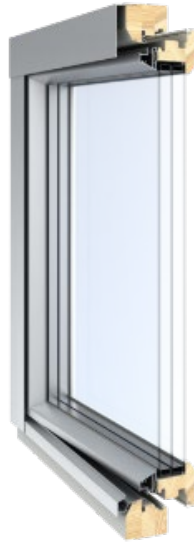



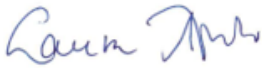


One Leaf Window



Program operator, publisher:	Rakennustietosäätiö RTS, The Building Information Foundation RTS Malminkatu 16 A 00100 Helsinki http://cer.rts.fi
Owner of the declaration:	Fenestra AS
Name of the product:	One Leaf Window
Declaration number:	RTS_350_25
Issue date:	21.2.2025
Valid to:	21.2.2030
Scope of the declaration	This environmental product declaration covers the environmental impacts of the One Leaf Window product. The declaration has been prepared in accordance with EN 15804:2019 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version, 26.8.2020). This declaration covers the life cycle stages from cradle to gate with options, modules C1-C4, and module D
 	 Jukka Seppänen RTS EPD Committee Secretary  Laura Apilo Managing Director
Verified according to the requirements of EN 15804:2019 (product group rules) based on EF 3.1	
Independent verification of the declaration and data, according to ISO14025:2010	
<input type="checkbox"/> Internal	<input checked="" type="checkbox"/> External
Third party verifier: 14.11.2024 Mari Kirss, Rangi Maja OÜ	

GENERAL INFORMATION, OBJECTIVE AND VERIFICATION OF THE STATEMENT

1. Owner of the declaration, manufacturer

Fenestra AS

Kaabli 23 a, 10112 Peetri alevik, Rae vald

Kaidi Orasmae, kaidi.orasmae@fenestra.ee

2. Product name and number

One Leaf Window

3. Place of production

Produced in Estonia: Kaabli 23 a, 10112 Peetri alevik, Rae vald, Harjumaa.

4. Additional information

The One Leaf Window is a representative product for Fenix, Passive Fenix, Primus Fixed, Fenix Fixed, and Swing windows manufactured by Fenestra AS.

5. Product Category Rules and the scope of the declaration

The declaration has been prepared in accordance with EN 15804:2019 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version, 26.8.2020).

6. Author of the life-cycle assessment and declaration

Fabian Diaz, Bureau Veritas Latvia. Duntse iela 17A, Ziemeļu rajons, Rīga, LV-1005, Latvia.

7. Verification

The declaration has been prepared in accordance with EN 15804:2019 and ISO 14025 standards and the additional requirements stated in the RTS PCR (English version, 26.8.2020). The declaration was verified by Mari Kirss from Rangi Maja OÜ according to the abovementioned standards and PCR rules. Third-party verification on 14.11.2024.

8. Declaration issue date and validity

Declaration is valid 21.2.2025- 21.2.2030.

PRODUCT INFORMATION

9. Product description and its use

This declaration is made for the One Leaf Window product, a representative window product manufactured by Fenestra AS that includes the characteristics of the following one-leaf Fenestra AS windows. The creation of an average product was performed because it was not possible to disaggregate the production data in terms of materials, energy consumption, and waste of each product. The average product is thus characteristic of the year 2022 production. The difference in the results in the environmental indicators is anyway included in a range of $\pm 10\%$ among the different products named as follows.

- Fenix

The Fenestra Fenix is a long-lasting, energy-efficient, and easy-to-maintain window suitable for both single-family homes and apartment buildings. A single-frame wooden aluminum window with triple glazing faces inward pivotable or pivotable and tiltable. The window frame and casing are externally covered with aluminum profiles. There are many color options.

- Fenix Fixed

The Fenestra Fenix Fixed is a long-lasting, energy-efficient, and easy-to-maintain window suitable for every home. The single-frame, triple-glazed wooden aluminum window is non-opening, which allows the production of large-sized windows. The window frame and casing are externally covered with aluminum profiles. It can be used in the same window frame next to the openable window, being completely identical in appearance. There are many color options.

- Passive Fixed

The Passive Fixed is a long-lasting, energy-efficient, and easy-to-maintain window that is a good fit for any home. Non-opening wooden aluminum window with improved triple selective glass. The advantage of the non-opening window type is the possibility

of making large-sized windows. The window frames are covered with aluminum profiles. The model has a wide range of different finishing solutions.

- **Primus Fixed**

The Primus Fixed is a long-lasting, energy-efficient, and easy-to-maintain window that is a good fit for any home. The wood-aluminum window with triple glazing is non-opening, which allows the production of large-sized windows. The outer frame and casing of the window are externally covered with aluminum profiles. The model has a wide range of different finishing solutions.

- **Swing**

The Swing is a long-lasting, energy-efficient, and easy-to-maintain window that is a good fit for any home. The wooden-aluminum window opens outwards, and the frame depth is 115 mm. The window frame and casing are externally covered with aluminum profiles. For washing, it is possible to turn the outer frame of the window inwards, and thus, the outer glass can be washed from the side of the room (two washable surfaces). The model has a wide range of different finishing solutions.

The volume production for each of the products for the year 2022 is reported in the table below.

Product	Share
Fenix	60.74%
Fenix Fixed	10.07%
Passive Fixed	7.05%
Primus Fixed	21.85%
Swing	0.29%

10. Results of environmental information reported per kilogram*

Information content	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO ₂ eq./kg	1.85E+00	0.00E+00	7.75E-03	4.65E-01	2.23E-03	-2.02E-01
Abiotic depletion potential for non-fossil resources ADP Minerals & Metals)	kg Sb eq./kg	6.65E-06	0.00E+00	2.56E-10	1.67E-07	2.29E-10	3.81E-06
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ. Net calorific value/kg	2.77E+01	0.00E+00	1.02E-01	1.54E-01	1.27E-02	-3.27E+00
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	M3world eq. deprived/kg	5.13E-01	0.00E+00	4.35E-05	1.10E-02	-2.77E-04	2.78E-02
Biogenic carbon content in product	kg C/kg	4.34E-00	-	-	-	-	-
Use of secondary material	kg/kg	1.58E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.41E-01

* Compulsory table

11. Product standards (c-PCR)

No c-PCR has been followed.

12. Physical properties

The physical properties of the products are reported in the table below.

Physical properties	Fenix	Fenix fixed	Passive fixed	Primus fixed	Swing
Heat retention U, W/(m ² K) with standard glass	0.83	0.83	0.75	0.89	0.83
Heat retention U, W/(m ² K) with special glass	0.79	0.79	-	0.78	0.8
Sound insulation Rw, dB	33 - 42	33 - 42	32 - 48	32 - 48	33 - 45
Glass thickness	Average of 52 mm				

13. Raw materials of the product and product information (used in production)

Product structure/composition/raw material	quantity p%*	Share of scrap	Usability			Origin of the raw materials
			Renewable	Non-renewable	Recycled	
Steel hardware	~2	55%		x	x	FI
Aluminum profile	~5	49.07%		x	x	NO/PL/EE
Pine timber structure	~21	0%	x			EE/LV
Triple glazed glass	~69	0%		x		LT/EE
Water based color	~3	0%		x		EE
Gasket	<1	0%		x		EE
Silicone	<1	0%		x		EE

*Order of magnitude, not exact composition.

N.B. All the wood used in the product comes from a sustainable forestry management system.

Product main composition.

Product structure/composition/raw material	quantity p%*	Origin of the raw materials
Metals	~7	FI/NO/PL/EE
Stone-based materials (minerals)	~69	LT/EE
Fossil materials	<1	EE
Water-based materials	~3	EE
Bio-based materials	~21	EE/LV

* Order of magnitude, not exact composition

14. Packaging material content

Product structure/composition/raw-material	quantity p%*
Plastic	~6
Paper and cardboard	~1
Aluminum	<1
Wood	~93

* Order of magnitude, not exact composition

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

The water-based color contains some components that are included in the REACH list. Their composition is anyway lower than 1% of the total product mass.

Name	EC Number	CAS Number
2-butoxyethanol	203-905-0	111-76-2
2-methyl-2H-isothiazol-3-one	220-239-6	2682-20-4
(2-methoxymethylethoxy) propanol	252-104-2	34590-94-8
2,4,7,9-tetramethyldec-5-yne-4,7-diol	-	126-86-3

SCOPE OF LIFE CYCLE ASSESSMENT

Mark all the covered modules of the EPD with X. Mandatory modules are marked blue in the table below. This declaration covers “cradle-to-gate with options”. “R” represents relevant stages, and “NR” the non-relevant ones.

Product stage			Construction process stage		Use stage							End-of-life stage				Supplementary information beyond the life cycle		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	NR	NR	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
Raw material supply	Transport	Manufacturing	Transport	Construction - installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling



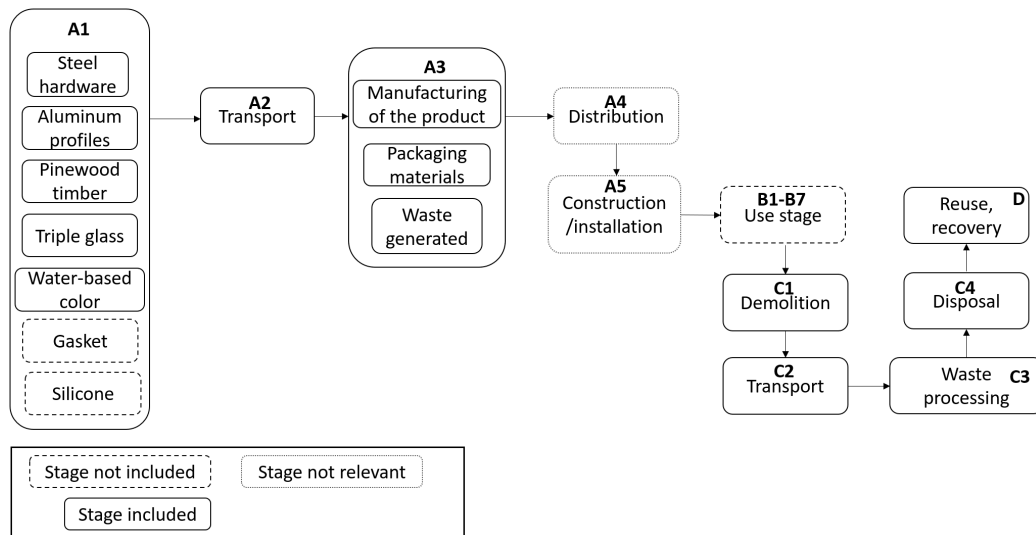
Mandatory modules
 Mandatory as per the RTS PCR section 6.2.1 rules and terms
 Optional modules based on scenarios

16. Declared unit

Indicators are reported per 1m² of the One Leaf Window product. The weight of the declared unit is equal to 40.36 kg. The related packaging is 0.98 kg.

17. System boundary

This EPD covers the following modules: A1 (Raw material supply), A2 (Transport), and A3 (Manufacturing). In addition, the end-of-life stage includes information from C1- C4 and beyond the life cycle information from the D module. The scenarios included are currently in use and are representative of one of the most likely scenario alternatives. The figure below provides information on the system boundaries.

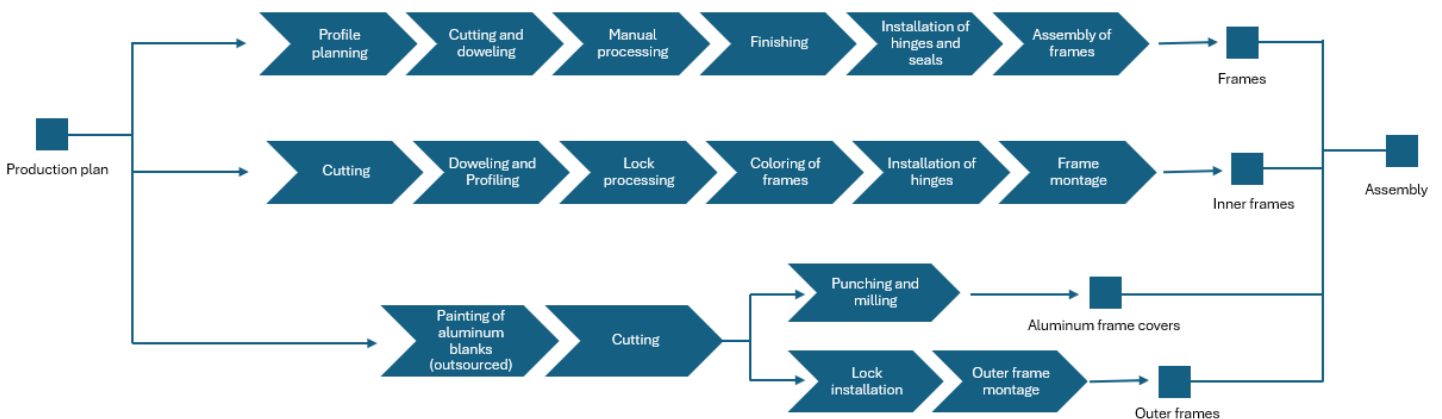


18. Cut-off criteria

For the purpose of the review, data for A1-A3 and C and additional information on scenarios in Module D have been collected. Modules A1 to A3 include all the raw materials used, energy production (electricity, heat, and fuels), primary production and processing of raw materials and fuels, transport, and final disposal or processing of products. All material and energy inputs have been considered in the procurement of raw materials. Raw materials with a mass amount of less than 1% of the total product are reported but excluded from the model calculation. Any REACH SVHC substances are excluded from this cut-off. In addition, the energy required for the manufacturing stage is added. It also includes the waste and the air emissions produced during this stage. As stated in the PCR, since the distribution phase (A4) and the construction stage (A5) have an impact of <20% compared to the A1-A3 for the GWP, they are not reported. The production of equipment and means of transport, as well as the machinery, equipment, and premises (production goods) needed for production and in production, are excluded from the scope of the assessment, as is the commuting of workers.

19. Production process

The wooden frames and casings are processed from pine timber, which undergoes surface treatment on-site. Metal hardware is installed to the casings and frames, which are then assembled, gasketed, and glazed. Aluminum profiles are already treated and, thus, on-site assembled for the window. Then, the window product is packed and stacked on pallets, covered with plastic wrap, and ready for shipping. The flow diagram of the production process is reported below.



ENVIRONMENTAL IMPACT RESULTS

20. Environmental impacts. Expressed per declared unit

The results of the impact assessment are relative. They do not predict the effects on the weighted values of the categories, the exceedance limits, safety margins, and risks. The unit is expressed per functional or declared unit (e.g., kg/kg).

Indicators	Unit	A1-A3	C1	C2	C3	C4	D
Global Warming Potential total (GWP-total)	kg CO2 eq.	7.47E+01	0.00E+00	3.13E-01	1.88E+01	8.99E-02	-8.17E+00
Global Warming Potential fossil fuels (GWP-fossil)	kg CO2 eq.	8.96E+01	0.00E+00	3.13E-01	2.80E+00	8.99E-02	-8.00E+00
Global Warming Potential biogenic (GWP-biogenic)	kg CO2 eq.	-1.60E+01	0.00E+00	0.00E+00	1.60E+01	0.00E+00	0.00E+00
Global Warming Potential Land Use and Land Use Change (GWP-luluc)	kg CO2 eq.	1.07E+00	0.00E+00	7.68E-06	4.72E-04	1.99E-06	-1.65E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	1.41E-06	0.00E+00	6.38E-09	1.50E-08	7.10E-10	-1.52E-07
Acidification potential, Accumulated Exceedance (AP)	mol H ⁺ eq.	6.54E-01	0.00E+00	7.79E-04	2.81E-03	2.35E-04	-4.53E-02
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq.	2.48E-02	0.00E+00	2.26E-06	3.84E-04	1.29E-04	-3.43E-03
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	1.13E-01	0.00E+00	2.99E-04	9.58E-04	2.75E-03	-6.95E-03
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	1.17E+00	0.00E+00	3.27E-03	8.38E-03	7.86E-04	-6.46E-02
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	3.80E-01	0.00E+00	1.36E-03	2.30E-03	6.71E-04	-3.04E-02
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb eq.	2.68E-04	0.00E+00	1.03E-08	6.76E-06	9.25E-09	1.54E-04
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ. Net calorific value	1.12E+03	0.00E+00	4.13E+00	6.20E+00	5.12E-01	-1.32E+02
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	M3 world eq. deprived	2.07E+01	0.00E+00	1.75E-03	4.45E-01	-1.12E-02	1.12E+00

OTHER INDICATORS

23. Biogenic carbon content. Expressed per declared unit

Biogenic carbon content	Unit	A1
Biogenic carbon content in product	kg C	4.34E+00
Biogenic carbon content in packaging	kg C	4.65E-01

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg CO₂

24. End of life – Waste. Expressed per declared unit

Waste categories	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	8.90E-02	0.00E+00	2.74E-05	2.17E-05	3.23E-06	1.90E-03
Non-hazardous waste disposed	kg	6.43E+00	0.00E+00	1.23E-04	9.75E-02	2.06E+00	-1.09E-01
Radioactive waste disposed	kg	2.31E-03	0.00E+00	3.88E-07	2.58E-05	5.95E-07	-5.60E-04

25. Other environmental indicators. Expressed per declared unit

Other environmental indicators	Unit	A1-A3	C1	C2	C3	C4	D
Components for reuse	kg	2.94E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	4.65E+00	0.00E+00	0.00E+00	3.32E+01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy (heat)	MJ	1.04E+00	0.00E+00	0.00E+00	1.74E+01	0.00E+00	0.00E+00
Exported energy (electricity)	MJ	5.18E-01	0.00E+00	0.00E+00	8.72E+00	0.00E+00	0.00E+00

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

26. Energy in the manufacturing phase

Parameter	Quantity	Data quality
A3 - Electricity information and CO ₂ emission kg CO ₂ eq. /kWh	6.25E-01	Electricity emissions have been calculated using the residual energy mix for Estonia on Ecoinvent 3.10

27. End-of-life process description

The end-of-life scenarios are applicable to the Baltic area of Estonia and Finland. The countries where the One Leaf Window is distributed and considering the share of the sales: Estonia 85% and Finland 15%. For the incineration process, it is plausible to assume an efficiency of >98% (U.S. Environmental Protection Agency, 2022).

EoL information	EoL process/activity	% of DU (expressed in mass) in each EoL process
Collection process specified by type	Collected separately	100%
	Collected with mixed construction waste	0%
Recovery system specified by material (wood) (Estonia)	Recycled	7.61%
	Residual incineration	8.60%
	Residual landfill	4.93%
Recovery system specified by material (wood) (Finland)	Recycled	0.19%
	Residual incineration	3.36%
	Residual landfill	0.18%
Recovery system specified by material (Aluminum) (Estonia)	Recycled	4.12%
	Residual incineration	0%
	Residual landfill	0%
Recovery system specified by material (Aluminum) (Finland)	Recycled	0.62%
	Residual incineration	0.11%
	Residual landfill	0.00%
Recovery system specified by material	Recycled	58.46%

(Glass) (Estonia)	Residual incineration	0%
	Residual landfill	0%
Recovery system specified by material (Glass) (Finland)	Recycled	10.05%
	Residual incineration	0.26%
	Residual landfill	0.00%
Recovery system specified by material (Steel) (Estonia)	Recycled	1.27%
	Residual incineration	0.00%
	Residual landfill	0.00%
Recovery system specified by material (Steel) (Finland)	Recycled	0.19%
	Residual incineration	0.03%
	Residual landfill	0.00%
EoL fate specified by type	Tot for re-use	0%
	Tot for recycling	83%
	Tot for incineration	12%
Disposal specified by type	Tot product or material for final deposition	5%
Assumptions for scenario development	km of waste transportation	50 km

*These values are based on the current estimation of end-of-life processes

The following materials are assumed to be substituted in Module D:

- PE from packaging = low density polyethylene
- Cardboard from packaging = cardboard
- Aluminum from packaging = aluminum primary ingot
- Wood from packaging = wooden pallet
- Wood from the product = cleft timber
- Aluminum from the product = aluminum primary ingot
- Glass from the product = fine aggregates (i.e., sand)
- Steel from the product = low alloyed steel

The exported electricity and heat from incineration are assumed to substitute in Module D:

- Electricity = Estonian electricity grid
- Heat = district or industrial heating with natural gas

28. Other technical information

Not specified for the industry average windows.

29. Additional information

Emissions to soil

There are no soil emissions during the One Leaf Window life stage.

Emissions to water

There are no water emissions during the One Leaf Window life stage.

Emissions to indoor air

There are no indoor air emissions during the One Leaf Window life stage.

30. LCA modeling software and data

SimaPro version 9.6 is used in LCA modeling. Primary data from 2022 is obtained from the manufacturer. The best available secondary data from Ecoinvent 3.10 databases are used in modeling. As a principle, secondary data with a maximum of 10 years of age was used in the modeling when available. The method of analysis used was EN 15804 + A2 (adapted) with EF 3.1 characterization factors.

31. Reference of the common information

ISO 14025:2011-10 Environmental labels and declarations. Type III environmental declarations. Principles and procedures
EN 15804:2012+A2:2019/AC:2021 – Sustainability of construction Works – Environmental product declarations – Core rules for the product category of construction products.

U.S. Environmental Protection Agency, 2022. Air Pollution Control Technology Fact Sheet. EPA-452/F-03-022.

Pine timber EPD. Laminated wood, AS Barrus. EPD HUB, HUB-0100.

RTS EPD, general rules (29 January 2020).

The Building Information Foundation RTS (PT 18 RTS EPD Product Category Rules). Rakennustietosäätiö RTS sr (RTS EPD PCR menetelmäohje 15804:2019)

32. Product information (volunteer, verified information)

Fenestra AS respects the quality certificate ISO 9001:2015 of sales, installation, and production processes and CE marking.