

Two 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:

Two Leaf Window

Declaration number:

RTS_351_25

Issue date:

21.2.2025

Valid to:

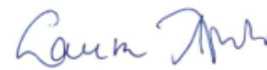
21.2.2030

Scope of the declaration

This environmental product declaration covers the environmental impacts of Two 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

Internal

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

Two Leaf Window

3. Place of production

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

4. Additional information

The Two Leaf Window is a representative product for Primus, Primus Plano, Passive, Polaris, Premium, and Passive Plano 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. Dunties 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 Two Leaf Window product, a representative window product manufactured by Fenestra AS that includes the characteristics of the following two-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.

- Primus

The Fenestra Primus is a long-lasting, energy-efficient, easy-to-maintain window suitable for every home. The frame of the revolving wooden aluminum window is covered with aluminum profiles, and the outer frame is aluminum. The model has a wide range of different finishing solutions.

- Primus Plano

The Fenestra Primus Plano is a long-lasting, energy-efficient, and easy-to-maintain window suitable for every home. A rotatable wooden aluminum window with an outer frame that uses thicker glass than 6 mm, and thanks to that, better noise insulation can be achieved. The window casing is covered with aluminum profiles, and the outer frame is aluminum.

- Passive

The Fenestra Passive is a long-lasting, energy-efficient, and easy-to-maintain window suitable for every home. It is a reversible wooden aluminum window whose frame is covered with aluminum profiles, and the outer frame is made of aluminum. Thanks to special coatings on the glass and the heat-retaining strip, we get excellent heat retention and high sound insulation for the window.

Fenestra Passive is well suited for constructing houses with low energy consumption.

- **Polaris**

The Fenestra Polaris is a long-lasting, energy-efficient, and easy-to-maintain window well-suited for passive houses with low energy consumption. The reversible double-framed and four-glazed wooden aluminum window ensures excellent thermal insulation. The window casings are covered with aluminum profiles, and the outer frame is aluminum.

- **Passive Plano**

The Fenestra Passive Plano is a long-lasting, energy-efficient, and easy-to-maintain window that fits any home well. It is a reversible wooden aluminum window, which has perfect sound insulation thanks to the thicker glass of the outer frame and excellent heat insulation due to the heat-retaining slat and the use of special glasses. The window casings are covered with aluminum profiles, and the outer frame is aluminum.

- **Premium**

The Fenestra Premium is the flagship of opening windows - an energy-efficient window with excellent heat retention characteristics. The Premium is ideally suited to the weather conditions of the Nordic countries, with an inwardly opening, double-framed, four-glazed window. The window casings are covered with aluminum profiles, and the outer frame is aluminum.

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

Product	Share
Primus	80.31%
Primus Plano	2.22%
Passive	16.07%
Polaris	0.91%
Passive Plano	0%
Premium	0.50%

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	1.94E+00	0.00E+00	7.75E-03	4.77E-01	8.62E-04	-2.56E-01
Abiotic depletion potential for non-fossil resources ADP Minerals & Metals)	kg Sb eq./kg	1.05E-05	0.00E+00	2.56E-10	2.56E-07	8.87E-11	5.08E-06
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ. Net calorific value/kg	2.84E+01	0.00E+00	1.02E-01	2.07E-01	4.91E-03	-4.16E+00
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	M3world eq. deprived/kg	5.45E-01	0.00E+00	4.35E-05	1.65E-02	-1.07E-04	3.97E-02
Biogenic carbon content in product	kg C/kg	4.37E+00	-	-	-	-	-
Use of secondary material	kg/kg	4.84E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.84E-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	Primus	Primus Plano	Passive	Polaris	Passive Plano	Premium
Heat retention U, W/(m ² K) with standard glass	1.0	1.0	0.75	0.72	0.76	0.57 G = 0.29
Heat retention U, W/(m ² K) with special glass	0.85	0.79	-	0.70	0.75	-
Sound insulation R _w , dB	42 - 50	42 - 50	42 - 48	44 - 47	42 - 49	44
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	~8	49.07%		x	x	NO/PL
Pine timber structure	~20	0%	x			EE/LV
Single panel glass	~23	0%		x		FI/EE
Double glazed glass	~44	0%		x		LT/FI/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	~10	FI/NO/PL
Stone-based materials (minerals)	~67	FI/LT/EE
Fossil materials	<1	EE
Water-based materials	~3	EE
Bio-based materials	~20	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 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
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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	Rehabilitation	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

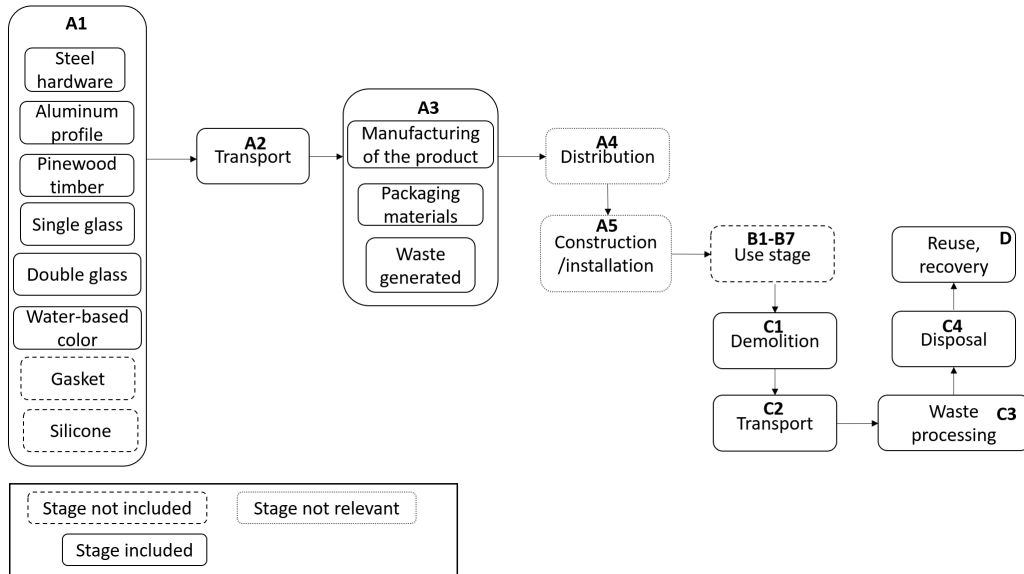
16. Declared unit

Indicators are reported per 1m² of the Two Leaf Window product. The weight of the declared unit is equal to 44.52 kg. The related packaging is 1.06 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.

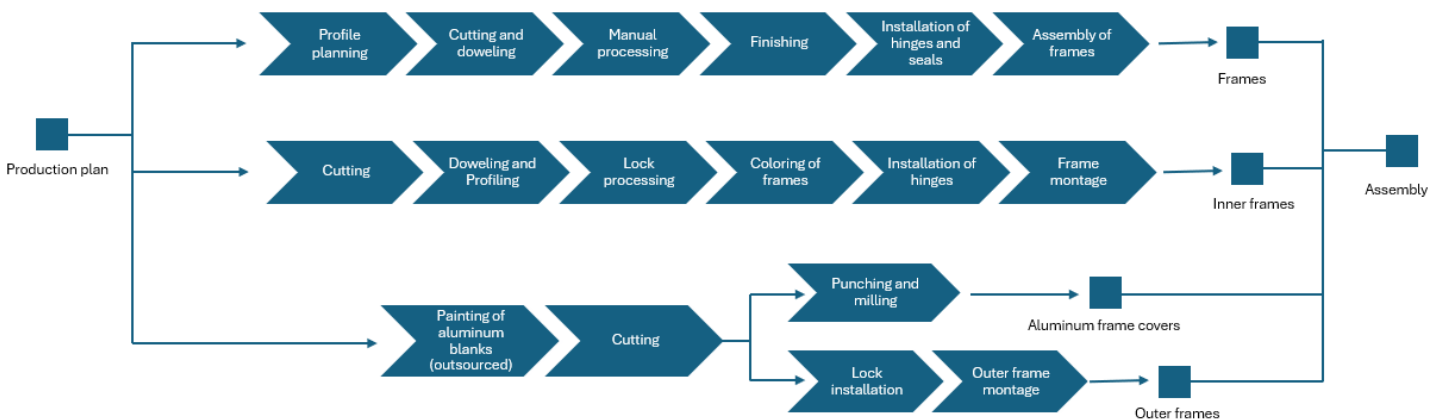


18. Cut-off criteria

Data for A1-A4 and C and additional information on scenarios in Module D have been collected for review. 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 procuring raw materials. Raw materials with a mass of less than 1% of the total product are reported but excluded from the model calculation. Any REACH SVHC substances from this cut-off are excluded. 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 production 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 are 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, 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.	8.64E+01	0.00E+00	3.45E-01	2.12E+01	3.84E-02	-1.14E+01
Global Warming Potential fossil fuels (GWP-fossil)	kg CO2 eq.	1.01E+02	0.00E+00	3.45E-01	5.17E+00	3.84E-02	-1.12E+01
Global Warming Potential biogenic (GWP- biogenic)	kg CO2 eq.	-1.61E+01	0.00E+00	0.00E+00	1.61E+01	0.00E+00	0.00E+00
Global Warming Potential Land Use and Land Use Change (GWP-luluc)	kg CO2 eq.	1.27E+00	0.00E+00	8.47E-06	6.06E-04	8.52E-07	-2.15E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 eq.	2.02E-06	0.00E+00	7.04E-09	2.49E-08	3.03E-10	-2.22E-07
Acidification potential, Accumulated Exceedance (AP)	mol H ⁺ eq.	7.55E-01	0.00E+00	8.59E-04	4.69E-03	1.00E-04	-6.15E-02
Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater)	kg P eq.	2.71E-02	0.00E+00	2.49E-06	6.33E-04	5.52E-05	-4.40E-03
Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine)	kg N eq.	1.29E-01	0.00E+00	3.30E-04	1.71E-03	1.18E-03	-9.38E-03
Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	mol N eq.	1.34E+00	0.00E+00	3.61E-03	1.50E-02	3.36E-04	-8.80E-02
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.	4.39E-01	0.00E+00	1.50E-03	4.05E-03	2.87E-04	-4.01E-02
Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	kg Sb eq.	4.69E-04	0.00E+00	1.14E-08	1.14E-05	3.95E-09	2.26E-04
Abiotic depletion for fossil resources potential (ADP-fossil)	MJ. Net calorific value	1.26E+03	0.00E+00	4.56E+00	9.22E+00	2.19E-01	-1.85E+02
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	M3 world eq. deprived	2.43E+01	0.00E+00	1.94E-03	7.33E-01	-4.78E-03	1.77E+00

OTHER INDICATORS

23. Biogenic carbon content. Expressed per declared unit

Biogenic carbon content	Unit	A1
Biogenic carbon content in product	kg C	4.37E+00
Biogenic carbon content in packaging	kg C	5.01E-01

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

Waste categories	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	kg	2.65E-01	0.00E+00	3.02E-05	3.74E-05	1.38E-06	2.85E-03
Non-hazardous waste disposed	kg	1.41E+01	0.00E+00	1.35E-04	1.82E-01	8.80E-01	-1.41E-01
Radioactive waste disposed	kg	2.58E-03	0.00E+00	4.28E-07	3.27E-05	2.54E-07	-7.85E-04

25. Other environmental indicators. Expressed per declared unit

Other environmental indicators	Unit	A1-A3	C1	C2	C3	C4	D
Components for reuse	kg	3.10E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	6.04E+00	0.00E+00	0.00E+00	3.42E+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	1.12E+00	0.00E+00	0.00E+00	3.28E+01	0.00E+00	0.00E+00
Exported energy (electricity)	MJ	4.58E-02	0.00E+00	0.00E+00	1.64E+01	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 Two Leaf Window is distributed and considering the share of the sales: Estonia 19% and Finland 81%. For the incineration process 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	1.58%
	Residual incineration	1.78%
	Residual landfill	1.02%
Recovery system specified by material (wood) (Finland)	Recycled	0.93%
	Residual incineration	16.85%
	Residual landfill	0.91%
Recovery system specified by material (Aluminum) (Estonia)	Recycled	1.37%
	Residual incineration	0%
	Residual landfill	0%
Recovery system specified by material (Aluminum) (Finland)	Recycled	4.97%
	Residual incineration	0.86%
	Residual landfill	0.01%
Recovery system specified by material (Glass) (Estonia)	Recycled	12.77%
	Residual incineration	0%
	Residual landfill	0%

Recovery system specified by material (Glass) (Finland)	Recycled	53.01%
	Residual incineration	1.39%
	Residual landfill	0.02%
Recovery system specified by material (Steel) (Estonia)	Recycled	0.48%
	Residual incineration	0%
	Residual landfill	0%
Recovery system specified by material (Steel) (Finland)	Recycled	1.74%
	Residual incineration	0.30%
	Residual landfill	0.01%
Recovery system specified by type	Tot for re-use	0%
	Tot for recycling	75%
	Tot for incineration	22%
Disposal specified by type	Tot product or material for final deposition	3%
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 Two Leaf Window life stage.

Emissions to water

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

Emissions to indoor air

There are no indoor air emissions during the Two 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.

Pinewood EPD. 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, production processes and CE marking.