ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

Tiivi Kristalli Plus 1+2

Pihla Group Oy

EPD HUB, HUB-0384

Publishing date 07 April 2023, last updated date 07 April 2023, valid until 07 April 2028

Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	Pihla Group Oy
Address	Äyritie 16, 01510 Vantaa
Contact details	asiakaspalvelu@tiivi.fi
Website	www.tiivi.fi

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804+A2:2019 and ISO 14025
PCR	EPD Hub Core PCR version 1.0, 1 Feb 2022 EN 17213 Windows and doors
Sector	Construction product
Category of EPD	Third party verified EPD
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Timo Nissinen Pihla Group Oy
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal certification ☑ External verification
EPD verifier	H.U as an authorized verifier acting for EPD Hub Limited

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.

PRODUCT

Product name	Tiivi Kristalli Plus 1+2
Additional labels	
Product reference	
Place of production	Haapajärvi
Period for data	2021
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	%

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 m2 of window
Declared unit mass	41.87 kg
GWP-fossil, A1-A3 (kgCO2e)	7.43E1
GWP-total, A1-A3 (kgCO2e)	5E1
Secondary material, inputs (%)	0.667
Secondary material, outputs (%)	47.3
Total energy use, A1-A3 (kWh)	398.0
Total water use, A1-A3 (m3e)	0.433

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Pihla Group Oy is a domestic window and door operator whose goal is to improve people´s quality of life with windows and doors. We develop and manufacture Finland´s best window and door solutions for consumers, housing associations and construction industry customers as well under the Pihla, PihlaPRO, Tiivi, Profin, Klas1, Sydänpuu, Metallityö Välimäki and Puuseppien brands. Our wide range of brands serves all our customers, from renovation and new projects to the most architecturally challenging projects and various public and administrative buildings.

PRODUCT DESCRIPTION

The studied product is a double-sash, inward opening wood-aluminium window with a double-glazed insulating glass unit in the inner sash. The outer sash is made of aluminium and has one pane of glass. The studied product is based on 1,23 x 1,48 m size. Tiivi Kristalli Plus window is equipped with an advanced locking system and no visible hinges.

Further information can be found at www.tiivi.fi.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass- %	Material origin
Metals	7.4	EU
Minerals	57.7	EU
Fossil materials	2.9	EU
Bio-based materials	32.0	EU

BIOGENIC CARBON CONTENT

Product’s biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	6.08
Biogenic carbon content in packaging, kg C	2.27

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 m2 of window
Mass per declared unit	41.87 kg
Functional unit	--
Reference service life	

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

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	x	x	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	Deconstr./demol.	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

The product is made of a mixture of primary and secondary metals, the inner sash has double insulating glass unit and the outer sash has single glass. The product also contains some plastic material. The materials are transported to Pihla Group production facility, where the main manufacturing processes include cutting of wood and aluminum parts, surface treatment, glazing and assembly. The finished products are packed on pallets and sent to the customer. The manufacturing process requires electricity and fuels for the different equipment as well as heating. Certain ancillary materials are also included.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

The transportation distance is defined according to the PCR. Average distance of transportation from production plant to building site is assumed as 413 km and the transportation method is assumed to be lorry. Empty returns are not taken into account as it is assumed that return trip is used by the transportation company to serve the needs of other clients. Transportation does not cause losses as product are packaged properly.

PRODUCT USE AND MAINTENANCE (B1-B7)

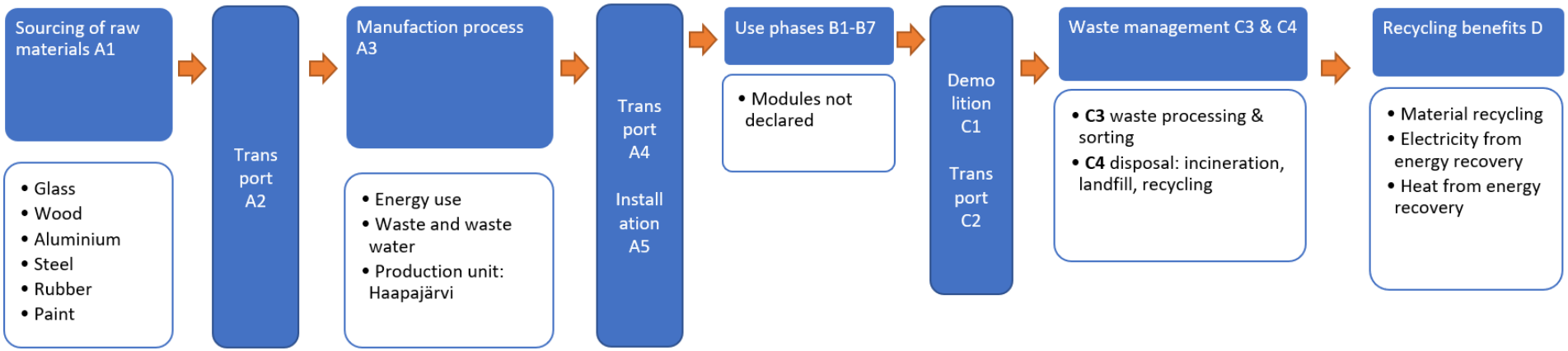
This EPD does not cover the use phase and its effects have not been studied.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Consumption of energy and natural resources in demolition process is assumed to be negligible. End-of-life scenario according EN 17213:2020 has been used. The scenario recommends using a conservative recycling efficiency of 90 % for all types of secondary materials entering Module D. It is assumed that the waste is collected as mixed construction waste and transported to the waste treatment center. Transportation distance to treatment is assumed as 50 km and the transportation method is assumed to be lorry (C2). Module C3 accounts for energy and resource inputs for sorting and treating these waste streams for recycling and incineration with energy recovery.

MANUFACTURING PROCESS

Manufacturing process



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. 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 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. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging materials	Allocated by mass or volume
Ancillary materials	Not applicable
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	%

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. Ecoinvent and One Click LCA databases were used as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	4.77E1	1.64E0	5.97E-1	5E1	1.74E0	8.41E0	MND	MND	MND	MND	MND	MND	MND	0E0	3.83E-1	2.46E1	3.58E0	0E0
GWP – fossil	kg CO_2e	7.01E1	1.64E0	2.46E0	7.43E1	1.76E0	2.12E-1	MND	MND	MND	MND	MND	MND	MND	0E0	3.83E-1	3.58E0	2.34E0	-4.01E1
GWP – biogenic	kg CO_2e	-2.35E1	8.99E-4	-1.87E0	-2.54E1	1.28E-3	8.2E0	MND	MND	MND	MND	MND	MND	MND	0E0	2.06E-4	2.1E1	1.25E0	-3.48E0
GWP – LULUC	kg CO_2e	1.15E0	5.88E-4	7.76E-3	1.16E0	5.29E-4	1.15E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1.38E-4	1.95E-3	4.22E-4	-4.76E-1
Ozone depletion pot.	kg $CFC_{-11}e$	6.68E-6	3.74E-7	2.64E-7	7.32E-6	4.14E-7	1.48E-8	MND	MND	MND	MND	MND	MND	MND	0E0	8.71E-8	1.94E-7	1.84E-7	-4.09E-6
Acidification potential	mol H^+e	5.26E-1	4.83E-3	1.91E-2	5.5E-1	7.39E-3	4.58E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1.1E-3	2.98E-2	9.33E-3	-3.12E-1
EP-freshwater[2)]	kg Pe	8.96E-3	1.39E-5	2.52E-4	9.22E-3	1.43E-5	5.05E-6	MND	MND	MND	MND	MND	MND	MND	0E0	3.26E-6	2.4E-4	5.25E-5	-1.82E-3
EP-marine	kg Ne	7.94E-2	9.96E-4	5.89E-3	8.63E-2	2.23E-3	9.97E-5	MND	MND	MND	MND	MND	MND	MND	0E0	2.18E-4	2.6E-3	1.37E-3	-3.76E-2
EP-terrestrial	mol Ne	9.01E-1	1.11E-2	6.58E-2	9.78E-1	2.46E-2	1.14E-3	MND	MND	MND	MND	MND	MND	MND	0E0	2.44E-3	3.34E-2	1.69E-2	-4.42E-1
POCP ("smog")[3)]	kg NMVOCe	2.69E-1	4.18E-3	2.24E-2	2.96E-1	7.91E-3	3.35E-4	MND	MND	MND	MND	MND	MND	MND	0E0	9.33E-4	9.43E-3	7.45E-3	-1.33E-1
ADP-minerals & metals[4)]	kg Sbe	1.55E-3	4.44E-5	3.68E-5	1.64E-3	3E-5	9.89E-7	MND	MND	MND	MND	MND	MND	MND	0E0	1.06E-5	1.39E-4	1.09E-5	-3.83E-4
ADP-fossil resources	MJ	6.47E2	2.49E1	4.24E1	7.15E2	2.74E1	1.64E0	MND	MND	MND	MND	MND	MND	MND	0E0	5.79E0	2.68E1	1.58E1	-5.41E2
Water use[5)]	m^3e depr.	5.78E6	8.2E-2	-2.12E0	5.78E6	1.02E-1	1.42E-2	MND	MND	MND	MND	MND	MND	MND	0E0	1.89E-2	1.56E0	3.96E-1	-4.81E0

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	4.1E-6	1.07E-7	1.39E-6	5.59E-6	1.59E-7	5.04E-9	MND	MND	MND	MND	MND	MND	MND	0E0	2.44E-8	1.33E-7	9.65E-8	-2.88E-6
Ionizing radiation[6)]	kBq U235e	2.59E0	1.09E-1	1.76E-1	2.87E0	1.2E-1	1.1E-2	MND	MND	MND	MND	MND	MND	MND	0E0	2.53E-2	1.02E-1	4.01E-2	-3.95E0
Ecotoxicity (freshwater)	CTUe	1.3E3	1.93E1	1.11E2	1.43E3	2.09E1	1.12E0	MND	MND	MND	MND	MND	MND	MND	0E0	4.49E0	2.36E2	1.46E2	-8.29E2
Human toxicity, cancer	CTUh	4.42E-8	5.52E-10	5.28E-9	5E-8	5.35E-10	3.95E-11	MND	MND	MND	MND	MND	MND	MND	0E0	1.29E-10	4.29E-9	9.21E-10	-4.35E-8
Human tox. non-cancer	CTUh	2.55E-6	2.12E-8	1.16E-7	2.69E-6	2.48E-8	1.33E-9	MND	MND	MND	MND	MND	MND	MND	0E0	4.91E-9	2.69E-7	9.13E-8	-9.68E-8
SQP[7)]	-	2.54E2	2.19E1	8.45E0	2.84E2	4.13E1	1.14E0	MND	MND	MND	MND	MND	MND	MND	0E0	4.9E0	7.02E0	1.85E1	-4.54E1

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	2.34E2	3.54E-1	1.18E2	3.52E2	3.44E-1	1.61E-1	MND	MND	MND	MND	MND	MND	MND	0E0	8.29E-2	3.84E0	5E-1	-1.77E2
Renew. PER as material	MJ	3.36E2	0E0	7.85E1	4.14E2	0E0	-7.85E1	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-1.94E2	-1.02E1	2.73E2
Total use of renew. PER	MJ	5.7E2	3.54E-1	1.96E2	7.66E2	3.44E-1	-7.83E1	MND	MND	MND	MND	MND	MND	MND	0E0	8.29E-2	-1.9E2	-9.72E0	9.54E1
Non-re. PER as energy	MJ	1.01E3	2.49E1	4.05E1	1.08E3	2.74E1	1.64E0	MND	MND	MND	MND	MND	MND	MND	0E0	5.79E0	2.68E1	1.58E1	-5.41E2
Non-re. PER as material	MJ	7.45E1	0E0	1.91E0	7.64E1	0E0	-1.91E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	-1.65E1	-5.8E-1	1.1E1
Total use of non-re. PER	MJ	1.09E3	2.49E1	4.24E1	1.16E3	2.74E1	-2.7E-1	MND	MND	MND	MND	MND	MND	MND	0E0	5.79E0	1.04E1	1.52E1	-5.3E2
Secondary materials	kg	2.78E-1	0E0	7.42E-4	2.79E-1	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	2.52E0
Renew. secondary fuels	MJ	4E-2	0E0	0E0	4E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	9.34E-2	0E0	0E0	9.34E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m^3	4.15E-1	4.34E-3	1.32E-2	0.433	5.7E-3	4.62E-4	MND	MND	MND	MND	MND	MND	MND	0E0	1E-3	1.63E-2	1.18E-2	-1.99E-1

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	5.31E0	2.55E-2	3.99E-1	5.74E0	2.66E-2	4.83E-3	MND	MND	MND	MND	MND	MND	MND	0E0	5.96E-3	0E0	3.75E-1	-5.94E0
Non-hazardous waste	kg	8.95E1	1.81E0	5.28E0	9.66E1	2.94E0	3.27E-1	MND	MND	MND	MND	MND	MND	MND	0E0	4.1E-1	0E0	1.81E1	-5.86E1
Radioactive waste	kg	4.03E-3	1.7E-4	1.69E-4	4.37E-3	1.88E-4	1.08E-5	MND	MND	MND	MND	MND	MND	MND	0E0	3.96E-5	0E0	5.43E-5	-2.91E-3

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0E0	0E0	0E0	0E0	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	3.22E-2	0E0	0E0	3.22E-2	0E0	0E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	1.02E1	0E0	0E0
Materials for energy rec	kg	2.93E-2	0E0	2.25E0	2.28E0	0E0	7.4E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	9.6E0	0E0	0E0
Exported energy	MJ	1.64E-1	0E0	0E0	1.64E-1	0E0	1.41E0	MND	MND	MND	MND	MND	MND	MND	0E0	0E0	1.05E1	0E0	0E0

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

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

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.

Hetal Udas, as an authorized verifier acting for EPD Hub Limited
07.04.2023