Building Research Institute

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FAKRO

Environmental Product Declaration

for wooden roof windows

ITB is the verified member of The European Platform for EPD program operators and LCA practitioner
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Basic information

This declaration is the type III Environmental Product Declaration (EPD) based on EN 15804 and verified according to ISO 14025 by an external auditor. It contains the information on the impacts of the declared construction materials on the environment. Their aspects were verified by the independent body according to ISO 14025. Basically, a comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804 (see point 5.3 of the standard). Life cycle analysis (LCA): A1-A3 modules in accordance with EN 15804 (Cradle to Gate)

The year of preparing the EPD: 2018
Product standard: EN 14351–1:2006+A2:2016
Declared durability: for standard product – 25 years

PCR: ITB-PCR A (PCR based on **EN 15804**)
Declared unit: 1 wooden roof window
Reasons for performing LCA: B2B
Representativeness: Polish product

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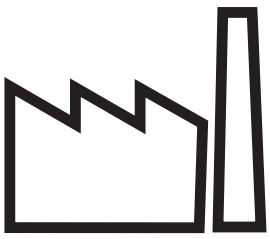
MANUFACTURER AND PRODUCT INFORMATION

The FAKRO Group is an international company operating in the construction industry since 1991. The Group, which employs more than 3 300 people, consists of 12 production companies and 16 distribution companies. The main products manufactured by FAKRO are primarily wooden roof windows. In addition to roof windows, the product offering includes light tunnels, access roof lights, loft ladders and vertical windows. The company also offers a wide range of accessories designed for roof and vertical windows. More than 1 000 products can be found in the company's offering, and so far over 7.5 million roof windows have been sold all over the world. The company's head office is located in Nowy Sącz where FAKRO can take advantage of over 230,000 square meters of production, warehouse and office space.

The impact of purchased products on the environment is increasingly important for both consumers and manufacturers. Therefore, the production process at FAKRO undergoes numerous assessments, which has been confirmed by numerous certificates granted to FAKRO. The wood used for the production of windows has the FSC certificate, which confirms the origin of the raw material from sustainable forest resources and other controlled sources.

Wooden elements in selected models of FAKRO windows are coated with an ecological water-based varnish that protects their surface against damaging influence of external factors. The varnish received the Blue Angel certification which highlights its extraordinary eco-friendly characteristics.

Roof windows by FAKRO pose no health risk to users, feature very low emission of harmful chemical compounds, have the highest (the best) emissivity class (A+) of volatile organic compounds according to NF EN ISO 16000 standards.



PRODUCT

Wooden roof windows are pivot windows, manufactured in pine, vacuum impregnated and coated with an acrylic varnish. They are equipped with a handle 'Elegant' positioned in the base of the sash for easy operation and two step micro-opening. A hinge in the middle of the window enables the sash to be rotated and left open. The sash can be rotated through 180° and locked allowing cleaning of the outer pane. topSafe system provides operational safety and burglary resistance. The windows possess quadruple sealing system in which glazing seal provides additional tightness and reduces micro vibrations of the cladding profiles.

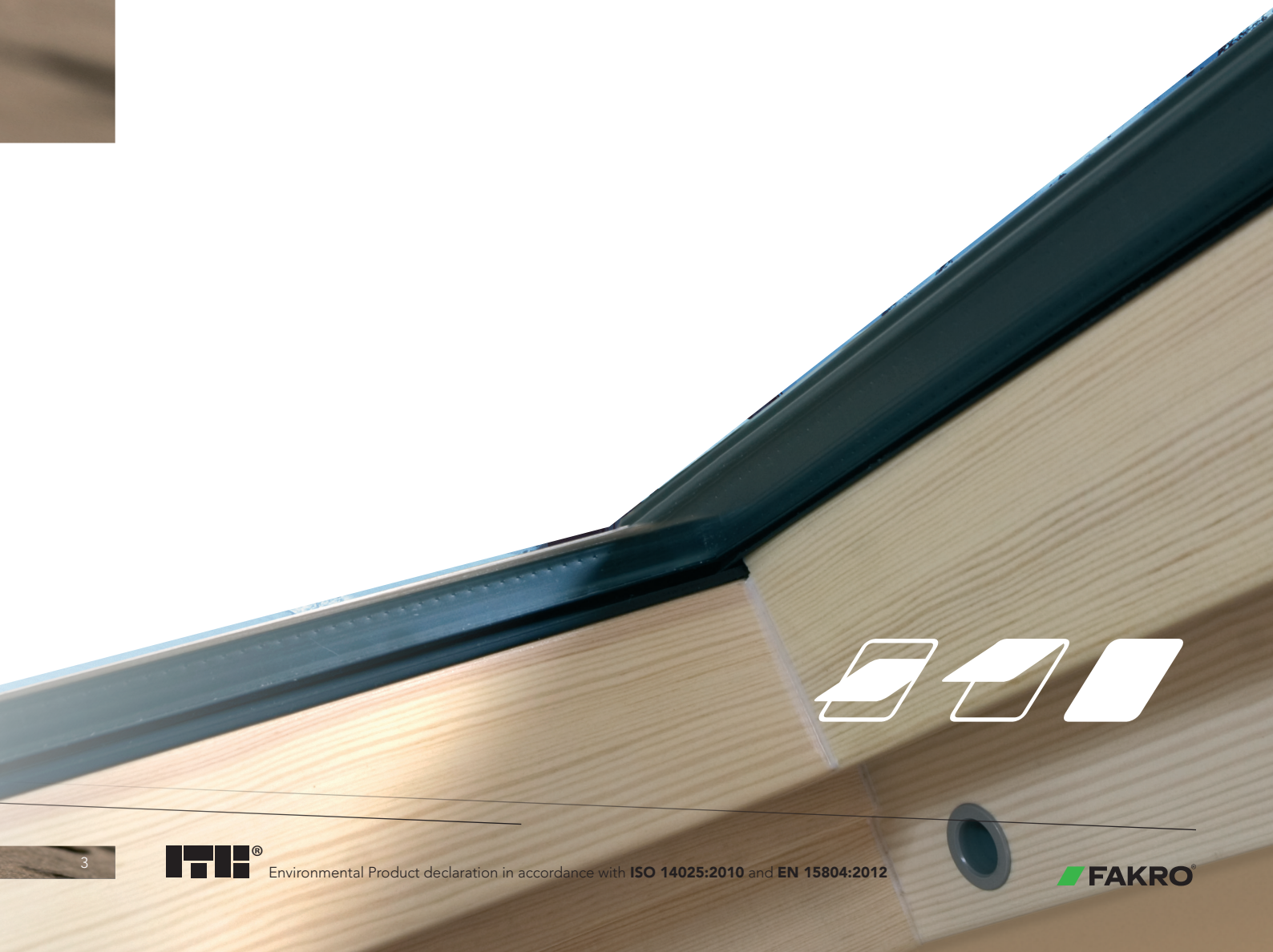
Equipped with the V40P air inlet which by automatic adjustment of the flow channel size provides an optimum amount of air into the room.

FTP-V U3 windows equipped with single chamber glazing unit.

FTP-V U5 windows equipped with double chamber glazing unit. The window is particularly recommended for buildings where special emphasis is put on thermal energy savings.

FTP-V P2 windows equipped with single chamber glazing unit and internal glass laminated, anti-burglary class P2A. In case of any damage to laminated glass, the glass pieces remain stuck with the film.

FTP R1 windows are equipped with a soundproof glazing unit. Suitable for pitches from 15° - 90°.



APPLICATION

Wooden roof window – a construction with a clear or transparent infill determined for installation in inclined roof structures. It fullfils the function of protection against unfavourable climatic influences.

Wooden roof window FAKRO are designed to be built into roof slopes of one family houses with habitable loft spaces and other habitable loft spaces designed for permanent dwelling e.g. offices, hotels, schools.

The FAKRO roof windows can be installed in the roofs with pitches between 15° and 90°. Those windows can be installed in any climatic zone. The window is intended for installation on battens and rafters. It is integrated with roofing by means of a flashing. Depending on roofing type and architectural considerations, the roof windows can be installed at 3 depths:
V – standard (frame bottom 60 mm below upper battens level);
N – 3 cm higher than V (frame bottom 30 mm below upper battens level);
J – 3 cm lower than V (frame bottom 90 mm below upper battens level).

The flashings (single and for combinations types E... or K...) made of aluminium sheet and used for windows tight integration with roofing are the same for all FAKRO roof windows. The type of flashing depends on the roofing material.

The FAKRO roof window may be offered under other trade symbols as well e.g. FTU-V (window FTP-V coated with white polyurethane varnish) FTW-V , FPP-V, FXP and others.

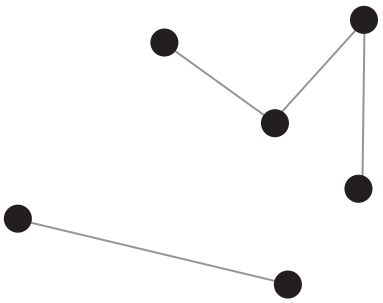


TABLE 1-0. SPECIFICATION OF WOODEN ROOF WIDOWS PRODUCED BY FAKRO PP SP. Z O.O.

Product Name	Symbol of Glass	Class of window	Uw coeffi-cient, W/m²K	Ug coeffi-cient, W/m²K	Rw coeffi-cient, dB	Glass set	Gas	Harde-ned outer glass	Type of ventilator	Efficiency of the ventilator, m³/h	Varnis-hing of wood	Seals	Micro-trushing of the window	Handle	size analyzed
FTS-V	U2	STANDARD	1,3	1,1	32 (-1;-5)	4H – ST16Ar – 4T	Argon	+	V22	Up to 31	once	2	+	Standard	78x118
FTP-V FTW-V FTU-V	U3	PROFI	1,3	1,0	32 (-1;-5)	4H – Tg16Ar – 4T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	78x118
	P2	PROFI	1,3	1,0	35 (-1;-3)	4H – Tg15Ar – 33.2T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	
	U5	LUX	0,97	0,5	33 (-2;-6)	4HT–Tg10Kr–4H–Tg10Kr–4HT	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
	P5	LUX	0,97	0,5	35 (-2;-4)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
FPP-V FPW-V FPU-V	U3	LUX	1,3	1,0	32 (-1;-5)	4H – Tg16Ar – 4T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	78x118
	P2	LUX	1,3	1,0	35 (-1;-3)	4H – Tg15Ar – 33.2T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	
	U5	LUX	0,97	0,5	33 (-2;-6)	4HT–Tg10Kr–4H–Tg10Kr–4HT	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
	P5	LUX	0,97	0,5	35 (-2;-4)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
FYP-V FYW-V FYU-V	U3	PROFI	1,3	1,0	32 (-1;-5)	4H – Tg16Ar – 4T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	78x118
	P2	PROFI	1,3	1,0	35 (-1;-3)	4H – Tg15Ar – 33.2T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	
	U5	LUX	0,97	0,5	31 (-1;-4)	4HT–Tg10Kr–4H–Tg10Kr–4HT	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
	P5	LUX	0,97	0,5	33 (-1;-3)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	V40P	Up to 49	twice	4	+	Elegant	
FDY-V FDY-V/W FDY-V/U	U3	LUX	1,3	1,0	32 (-1;-5)	4H – Tg16Ar – 4T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	78x118
	P2	LUX	1,3	1,0	35 (-1;-5)	4H – Tg14Ar – 33.2T	Argon	+	V40P	Up to 49	twice	4	+	Elegant	
FWP FWW FWU	U3	PROFI	1,3	1,0	33 (-1;5)	4H – Tg16Ar – 4T	Argon	+	-	-	twice	4	+	Elegant	78x118
	P2	PROFI	1,3	1,0	35 (-1;-5)	4H – Tg15Ar – 33.2T	Argon	+	-	-	twice	4	+	Elegant	
	U5	LUX	1,0	0,5	33 (-1;-4)	4HT–Tg10Kr–4H–Tg10Kr–4HT	Krypton	+	-	-	twice	4	+	Elegant	
	P5	LUX	1,0	0,5	36 (-1;-4)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	-	-	twice	4	+	Elegant	
FSR FSR/U FSR/W	P1	LUX	npd	1,1	npd	4H – ST14Ar – 33.2T	Argon	+	-	-	twice	2	-	-	78x118
FSP	P1	LUX	npd	1,1	npd	4H – ST14Ar – 33.2T	Argon	+	-	-	twice		-	-	78x118
BDR/L	P2	PROFI	1,3	1,1	37 (-2;-5)	4H – Tg14Ar – 33.2T	Argon	+	-	-	twice	2	-	Elegant	78x118
	P5	LUX	0,88	0,5	38 (-2;-5)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Kypton	+	-	-	twice	2	-	Elegant	
BVP	P2	PROFI	1,3	1,1	37 (-2;-5)	4H – Tg14Ar – 33.2T	Argon	+	-	-	twice	2	-	Elegant	
	P5	LUX	0,88	0,5	38 (-2;-5)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	-	-	twice	2	-	Elegant	
BXP	P2	PROFI	1,3	1,1	37 (-2;-5)	4H – Tg14Ar – 33.2T	Argon	+	-	-	twice	2	-	Elegant	
	P5	LUX	0,88	0,5	38 (-2;-5)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	-	-	twice	2	--	Elegant	
FGH-V FGH-V/U FGH-V/W	P2	LUX	1,5	1,1	35 (-1;-3)	4H – Tg14Ar – 33.2T	Argon	+	V40P	Up to 49	twice	4	-	Elegant	94x255
	P5	LUX	1,1	0,5	34 (-1;-4)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	V40P	Up to 49	twice	4	-	Elegant	
FNP FNU FNW	U3	PROFI	1,3	1	32 (-1;-5)	4H – Tg16Ar – 4T	Argon	+	-	-	twice	4	-	-	78x118
	P2	PROFI	1,3	1	35 (-1;-3)	4H – Tg15Ar – 33.2T	Argon	+	-	-	twice	4	-	-	
	U5	LUX	0,97	0,5	33 (-2;-6)	4HT–Tg10Kr–4H–Tg10Kr–4HT	Krypton	+	-	-	twice	4	-	-	
	P5	LUX	0,97	0,5	35 (-2;-4)	4HS–Tg10Kr–4HT–Tg8Kr–33.2T	Krypton	+	-	-	twice	4	-	-	
FTT FTT/W FTT/U	U6	LUX	0,8	0,5	38 (-1;-4)	6H-Tg18Ar-4HT-Tg18Ar-33.2T	Argon	+	-	-	twice	5	+	Elegant	78x118
	U8	LUX	0,58	0,3	36 (-2;-5)	4H-Tg12Kr-4HT-Tg12Kr-4HT-Tg12Kr-4HT	Krypton	+	-	-	twice	5	+	Elegant	
	R3	LUX	0,81	0,5	42 (-2;-4)	8H-Tg16Ar-4HT-Tg18Ar-33.2SR T	Argon	+	-	-	twice	5	+	Elegant	

TABLE 1-2.
SPECIFICATION OF WOODEN ROOF WIDOWS PRODUCED BY FAKRO PP SP. Z O.O.

Equivalents of FAKRO glass packages	
double glazed	U3, U2, U3F, U3E
duble glazed + laminated glass	P2, L3, P4, G2, G2F, R1, G61,
triple glazed	U5, R3, U4, T4,
triple glazed + laminated glass	P5, R5, L5, R4, R3, U6,
quadruple glazed	U8

LIFE CYCLE ASSESSMENT (LCA) – GENERAL RULES APPLIED

ALLOCATION

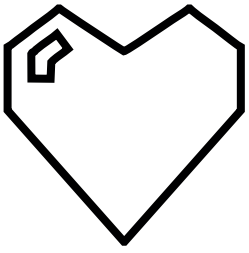
The allocation rules used for this EPD are based on general ITB PCR A. Production of wooden roof windows is a line process in one factory of FAKRO in Nowy Sącz. Allocation was done on product mass basis. All impacts from raw materials (i.a. aluminium, steel, wood, polyolefins) extraction are allocated in A1 module of the EPD. All impacts from line production of FAKRO were inventoried and 42% were allocated to the production of wooden roof windows. Municipal waste and waste water of whole factory were allocated to module A3. Energy supply was inventoried for whole production process. Emissions in the factory are measured and were allocated to module A3.

SYSTEM LIMITS

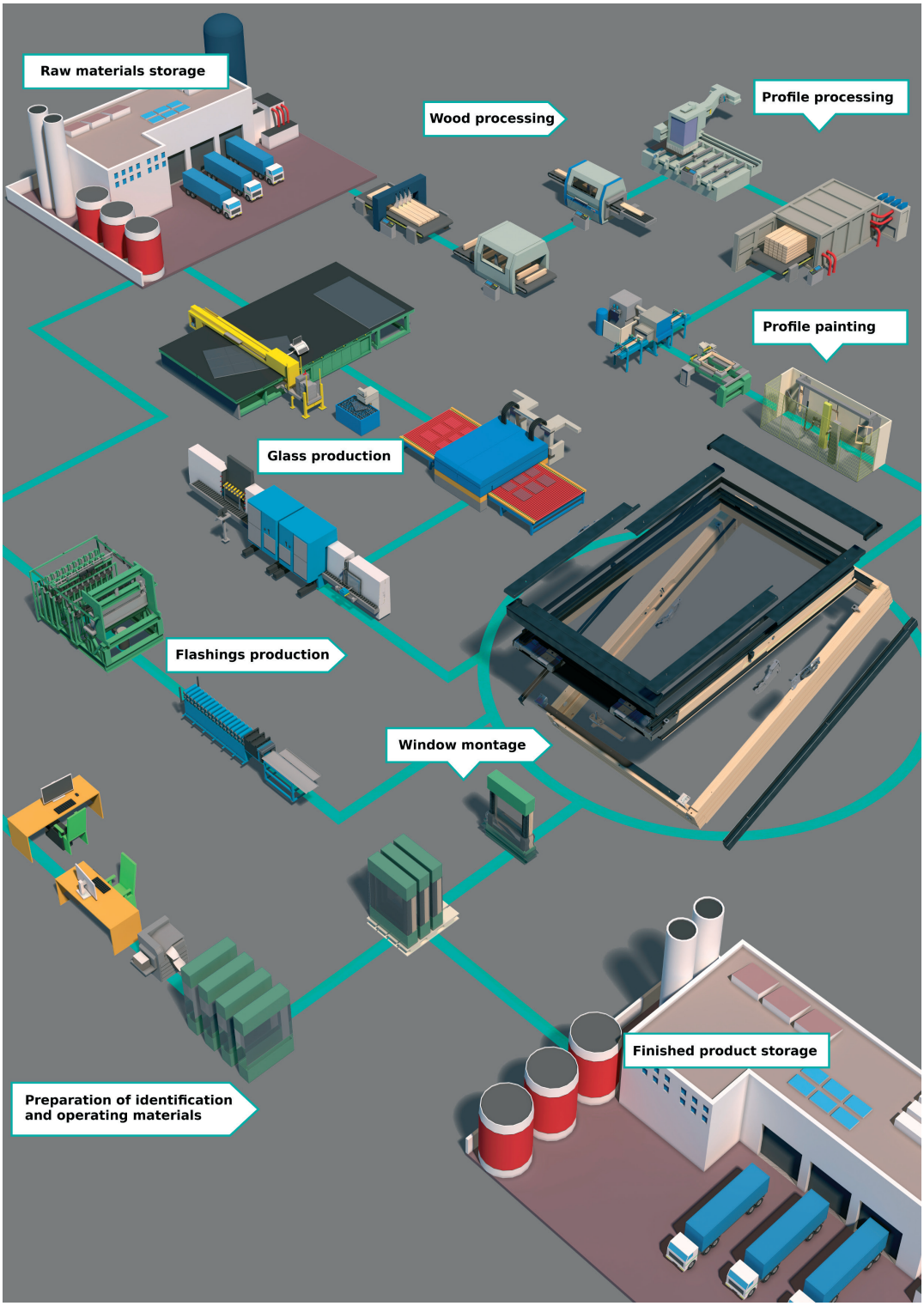
The life cycle analysis of the declared products covers "Product Stage", A1-A3 modules (Cradle to Gate) in accordance with EN 15804+A1 and ITB PCR A. The details of systems limits are provided in product technical report. All materials (excluding filler gases such as argon and krypton) and energy consumption inventoried in factory were included in calculation. Office impacts were also taken into consideration. In the assessment, all significant parameters from gathered production data are considered, i.e. all material used per formulation, utilised thermal energy, internal fuel and electric power consumption, direct production waste, and all available emission measurements. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804+A1, machines and facilities (capital goods) required for and during production are excluded, as is transportation of employees.

A1 AND A2 MODULES: RAW MATERIALS SUPPLY AND TRANSPORT

Raw materials such as wood and glass came from Polish suppliers as well as steel and steel made components while aluminium and aluminium made elements originated from Norway. The other components such as coatings, polymers (100% from recycling) and ancillary items come from local suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include trucks and Polish and European fuel averages are applied.



WINDOW MANUFACTURE SCHEME



The production process of a roof window starts at the Wood Processing Department where the frieze taken from the warehouse is subjected to gluing, planing, profiling, tenoning, milling and drilling processes. The obtained frame and sash elements are then transported to the Profile Preparation Department where they go through the vacuum impregnation process. Once this process is completed, elements are subjected to subsequent milling and drilling processes. The frame elements are lacquered in the next stage. The Profile Preparation Department also deals with the process of preparing ventilation strips. Strips are transferred to the Window Assembly Department. Ready frame and sash elements are transported in the next stage to the Profile Lacquering Department. Frames and sashes are glued there. Once sashes are glued, they are lacquered. Frames and sashes prepared in this way are transported to the Window Assembly Department.

In addition to frames and sashes, other elements such as glazing units, window cladding elements and installation sets are transferred directly to the Window Assembly Department from other production departments. The Glazing Unit Department is responsible for the preparation of the glazing unit where the glasses are cut, toughened and joined together. The department produces single, double and triple chamber glasses filled with argon or krypton depending on needs. Window cladding is made by the Sheet Metalworking Department where the sheet metal is subjected to the shaping process. The main production processes at the department include cutting, profiling, punching, bending and pressing of the sheet metal. The department deals with the preparation of the hood, glass clamping profiles, sash covering profiles as well as the upper and lower trapezoids. Another window element is the installation set prepared at the Metal Processing Department. The department produces installation brackets which are made on the mechanical forming press with multi-stage die and then the other elements of the set are completed and packed into the box.

When all elements reach the Window Assembly Department it is possible to start the roof window assembly process. In addition to the final assembly of the window, other processes occur such as the preparation of seals, glass clamping profiles, packaging and welding of the foil bag.

The window assembly process takes place on the assembly line and starts with applying hardware elements to the frame and sash, then elements are put together by means of hinges and subjected to the glazing process, profile assembly and window packing. Packed and foiled windows pass through the foil shrinking furnace where they are then palletised and handed over to the Ready Product Warehouse.

DATA COLLECTION PERIOD

The data for manufacture of the declared products refer to period between 01.01.2016 – 01.01.2017 (1 year). The life cycle assessments were prepared for Poland as reference area.

DATA QUALITY

The values determined to calculate the LCA originate from verified FAKRO PP Sp. z o.o. inventory data.

ASSUMPTIONS AND ESTIMATES

The impacts of the representative wooden roof windows were aggregated using weighted average. Impacts were inventoried and calculated for all products of wooden roof windows.

CALCULATION RULES

LCA was done in accordance with ITB PCR A document.

DATABASES

The data for the processes come from the following databases: Ecoinvent, specific EPDs, ELCD, Ullmann's, ITB-Data. Specific data quality analysis was a part of external ISO 14001 audit. Characterization factors are CML ver. 4.2 based on EN 15804:2012+ A1:2013 version (PN-EN 15804+A1:2014-04).

LIFE CYCLE ASSESSMENT (LCA) – RESULTS

DECLARED UNIT

The declaration refers to functional unit (FU) – 1 wooden roof window produced by FAKRO PP Sp. z o.o. in Nowy Sącz.

TABLE 2
SYSTEM BOUNDARIES FOR ENVIRONMENTAL CHARACTERISTIC FOR WOODEN ROOF WINDOWS

Environmental assessment information (MNA – Module not assessed, MD – Module Declared, INA – Indicator Not Assessed)															
Product stage			**Construction process**		**Use stage**							**End of life**			
Raw material supply	Transport	Manufacturing	Transport to construction site	Construction-installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
MD	MD	MD	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA	MNA

Environmental impacts: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO2 eq.]	2,86E+01	1,42E+00	3,13E+01	6,13E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,20E-06	0,00E+00	6,49E-05	6,61E-05
Acidification potential of soil and water	[kg SO2 eq.]	2,02E-01	1,03E-02	3,96E-02	2,52E-01
Formation potential of tropospheric ozone	[kg Ethene eq.]	5,66E-02	7,52E-04	3,05E-02	8,78E-02
Eutrophication potential	[kg (PO4)3- eq.]	3,88E-02	1,81E-03	2,26E-03	4,28E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	9,21E-05	0,00E+00	1,16E-04	2,08E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3,06E+02	2,04E+01	9,50E+01	4,22E+02

Environmental aspects on resource use: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	2,59E+02	1,43E+00	7,31E+00	2,68E+02
Use of renewable primary energy resources used as raw materials	[MJ]	7,93E+02	0,00E+00	0,00E+00	7,93E+02
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,05E+03	1,43E+00	7,31E+00	1,06E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	3,23E+02	2,14E+01	9,97E+01	4,44E+02
Use of secondary material	[kg]	2,83E+00	0,00E+00	0,00E+00	2,83E+00
Use of renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	1,91E-03	1,91E-03
Use of non-renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	[dm3]	1,76E+02	2,71E-07	2,03E-02	1,96E-01

Other environmental information describing waste categories: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,79E-03	5,72E-04	7,31E-02	7,55E-02
Non-hazardous waste disposed	[kg]	5,63E+00	5,31E-01	5,79E-01	6,74E+00
Radioactive waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for re-use	[kg]	3,03E-03	0,00E+00	0,00E+00	3,03E-03
Materials for recycling	[kg]	2,73E-01	0,00E+00	9,91E-01	1,26E+00
Materials for energy recover	[kg]	7,70E-05	0,00E+00	4,45E+00	4,45E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA

Environmental impacts: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO2 eq.]	3,13E+01	1,42E+00	3,13E+01	6,40E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,31E-06	0,00E+00	6,49E-05	6,63E-05
Acidification potential of soil and water	[kg SO2 eq.]	2,29E-01	1,03E-02	3,96E-02	2,78E-01
Formation potential of tropospheric ozone	[kg Ethene eq.]	6,08E-02	7,52E-04	3,05E-02	9,20E-02
Eutrophication potential	[kg (PO4)3- eq.]	4,15E-02	1,81E-03	2,26E-03	4,56E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1,28E-04	0,00E+00	1,16E-04	2,44E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3,27E+02	2,04E+01	9,50E+01	4,42E+02

Environmental aspects on resource use: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	2,59E+02	1,43E+00	7,31E+00	2,68E+02
Use of renewable primary energy resources used as raw materials	[MJ]	7,94E+02	0,00E+00	0,00E+00	7,94E+02
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,05E+03	1,43E+00	7,31E+00	1,06E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	3,51E+02	2,14E+01	9,97E+01	4,72E+02
Use of secondary material	[kg]	3,98E+00	0,00E+00	0,00E+00	3,98E+00
Use of renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	1,91E-03	1,91E-03
Use of non-renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	[dm3]	1,77E+02	2,71E-07	2,03E-02	1,98E-01

Other environmental information describing waste categories: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,85E-03	5,72E-04	7,31E-02	7,55E-02
Non-hazardous waste disposed	[kg]	5,74E+00	5,31E-01	5,79E-01	6,85E+00
Radioactive waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for re-use	[kg]	4,54E-03	0,00E+00	0,00E+00	4,54E-03
Materials for recycling	[kg]	2,73E-01	0,00E+00	9,91E-01	1,26E+00
Materials for energy recover	[kg]	1,15E-04	0,00E+00	4,45E+00	4,45E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA

Environmental impacts: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Global warming potential	[kg CO2 eq.]	3,40E+01	1,42E+00	3,13E+01	6,67E+01
Depletion potential of the stratospheric ozone layer	[kg CFC 11 eq.]	1,42E-06	0,00E+00	6,49E-05	6,64E-05
Acidification potential of soil and water	[kg SO2 eq.]	2,55E-01	1,03E-02	3,96E-02	3,05E-01
Formation potential of tropospheric ozone	[kg Ethene eq.]	6,49E-02	7,52E-04	3,05E-02	9,61E-02
Eutrophication potential	[kg (PO4)3- eq.]	4,42E-02	1,81E-03	2,26E-03	4,83E-02
Abiotic depletion potential (ADP-elements) for non-fossil resources	[kg Sb eq.]	1,63E-04	0,00E+00	1,16E-04	2,79E-04
Abiotic depletion potential (ADP-fossil fuels) for fossil resources	[MJ]	3,47E+02	2,04E+01	9,50E+01	4,63E+02

Environmental aspects on resource use: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	2,59E+02	1,43E+00	7,31E+00	2,68E+02
Use of renewable primary energy resources used as raw materials	[MJ]	7,94E+02	0,00E+00	0,00E+00	7,94E+02
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	1,05E+03	1,43E+00	7,31E+00	1,06E+03
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Use of non-renewable primary energy resources used as raw materials	[MJ]	INA	INA	INA	INA
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	3,79E+02	2,14E+01	9,97E+01	5,00E+02
Use of secondary material	[kg]	5,14E+00	0,00E+00	0,00E+00	5,14E+00
Use of renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	1,91E-03	1,91E-03
Use of non-renewable secondary fuels	[MJ]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Net use of fresh water	[dm3]	1,79E+02	2,71E-07	2,03E-02	1,99E-01

Other environmental information describing waste categories: (FU) 1 wooden roof window					
Indicator	**Unit**	**A1**	**A2**	**A3**	**A1-A3**
Hazardous waste disposed	[kg]	1,91E-03	5,72E-04	7,31E-02	7,56E-02
Non-hazardous waste disposed	[kg]	5,85E+00	5,31E-01	5,79E-01	6,96E+00
Radioactive waste disposed	[kg]	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Components for re-use	[kg]	6,05E-03	0,00E+00	0,00E+00	6,05E-03
Materials for recycling	[kg]	2,74E-01	0,00E+00	9,91E-01	1,26E+00
Materials for energy recover	[kg]	1,54E-04	0,00E+00	4,45E+00	4,45E+00
Exported energy	[MJ per energy carrier]	INA	INA	INA	INA

VERIFICATION

The process of verification of this EPD is in accordance with ISO 14025 and ISO 21930. After verification, this EPD is valid for a 5-year-period. EPD does not have to be recalculated after 5 years, if the underlying data have not changed significantly.

The basis for LCA analysis was EN 15804 and ITB PCR A

Independent verification corresponding to ISO 14025 (subclause 8.1.3.)

x external internal

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NORMATIVE REFERENCES

ITB PCR A General Product Category Rules for Construction Products.
ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations.
– Principles and procedure

- ISO 21930:2017 Sustainability in buildings and civil engineering works
  – Core rules for environmental product declarations of construction products and services
- ISO 14044:2006 Environmental management
  – Life cycle assessment
  – Requirements and guidelines
- ISO 15686-1:2011, Buildings and constructed assets
  – Service life planning – Part 1: General principles and framework
- ISO 15686-8:2008 Buildings and constructed assets
  – Service life planning
  – Part 8: Reference service life and service-life estimation
- EN 15804:2012+A1:2013 Sustainability of construction works
  – Environmental product declarations
  – Core rules for the product category of construction products
- EN 15942:2012 Sustainability of construction works
  – Environmental product declarations
  – Communication format business-to-business
- KOBiZE Wskaźniki emisyjności CO2, SO2, NOx, CO i pyłu całkowitego dla energii elektrycznej, grudzień 2017

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