Issuance date: 17.09.2024
Validation: 06.10.2025
Validity date: 17.09.2029

# Access roof lights

**EPD Program Operator:**
Building Research Institute (ITB)
Address: Filtrowa 1
00-611 Warsaw, Poland
Website: www.itb.pl
Contact: energia@itb.pl

**Owner of the EPD:**
FAKRO PP Sp. z o.o.
Address: Węgierska 144A
33-300 Nowy Sącz, Poland
Website: www.fakro.pl
Tel.: (+48) 18 444 0 400
Contact: fakro@fakro.pl

**ITB is the verified member of The European Platform for EPD program operators and LCA practitioner www.eco-platform.org**

## Basic information

This declaration is the Type III Environmental Product Declaration (EPD) based on EN 15804+A2 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 and their aspects verified by the independent body according to ISO 14025. Basically, comparison or evaluation of EPD data is possible only if all the compared data were created according to EN 15804+A2.

**Life cycle analysis (LCA):** A1-A3, C1-C4 and D modules in accordance with EN 15804 (Cradle-to-Gate with options)

**The year of preparing the EPD:** 2024

**Product standard:** EN 14351-1+A2

**Service Life:** 25 years

**PCR:** ITB-PCR A

**Functional unit:** 1 $m^2$, roof light sized 46 x 75 cm and WSZ access roof light sized 54 x 75 cm

**Reasons for performing LCA:** B2B

**Representativeness:** Poland, European

## MANUFACTURER

FAKRO is a private company established in Poland in 1991. The company is manufacturer of wooden and aluminium-clad plastic roof windows of different designs and opening methods, flat roof windows, flashings, automatic control, access roof lights, light tunnels, smoke ventilation, vertical windows, loft ladders, accessories for roof windows: venetian blinds, pleated blinds, internal and external roller shutters, external awning blinds, installation accessories and roofing membranes and underlays. The company employs approximately 4 000 employees. The company has 11 manufacturing companies and 17 distribution companies all over the world. FAKRO has an extended distribution network in over 60 countries where there is a demand for this type of product. Export sales account for 70% of total sales.

*Fig. 1. FAKRO PP Sp. z o.o. manufacturing plant located in Nowy Sącz, Poland.*

## PRODUCTS DESCRIPTION AND APPLICATION

Access roof lights enable fast, safe and easy access to the roof to carry out repair and maintenance works. They illuminate the interior and can be opened to ventilate the room. Access roof lights are designed for uninhabited lofts with the interior temperature similar to the outdoor one.

The frame is made of vacuum impregnated wood, while the sash is made of powder coated aluminium profile. The flashing is an integral part of the access roof light.

Access roof lights include several product varieties:

- **WLI** is a side hung window. It is equipped with the 4-8-4 (or occasionally 3-8-3) glazing unit. It can be installed in left or right opening version. The applied turn limiter holds the sash stable and prevents against accidental closure. The lower part of the access roof light comes with a specially shaped profile which covers the frame and prevents slipping while getting onto the roof.

- **WG** comes with a top hung structure, while its sash is opened upwards. It is available in two versions:
    - **WGT** with a single 4 mm thick glass
    - **WGI** with the 3-8-3 glazing unit

  WGI is equipped with a gas spring which makes opening easier, holds the sash stable and prevents it against accidental closure.

- **WS** features a top hung structure. Semi-circular polycarbonate dome opens upwards up to an angle of 180°. The material used demonstrates increased resistance to weather conditions and provides protection against UV radiation. Available in three different types, depending on the roofing material applied:
    - **WSS** with flashing for flat roofing material
    - **WSZ** with flashing for corrugated roofing material
    - **WSH** with flashing for high-profile roofing material

- **WGU, WGU-X** is a side hung window. It comes with the 3-8-3 glazing unit, a gas spring that holds sash in the open position and a profile that covers the lower part of the frame. WGU-X additionally has a vapour-permeable flashing.

- **WGB** comes with a top hung structure, while its sash is opened upwards. The upper part of the frame is arch-shaped. It is available with the 4-9-4 glazing unit. WGB has a gas spring that makes it easy to lift the sash and holds it in the open position preventing accidental closure.

The WGI access roof light sized 46 x 75 cm and WSZ access roof light sized 54 x 75 cm were adopted as representative windows.

Composition and percentage of input materials of access roof light WGI and WSZ and packaging materials produced by FAKRO PP Sp. z o.o.

*Table 1. Composition and percentage of input materials of access roof lights and packaging materials produced by FAKRO PP Sp. z o.o.*

| *MATERIAL* | *WGI 46x75* |
|---|---|
| GLASS | 53% |
| WOOD | 16% |
| METAL | 28% |
| OTHER | 3% |

| MATERIAL | *WSZ 54x75* |
|---|---|
| POLYCARBON | 22% |
| WOOD | 48% |
| METAL | 21% |
| OTHER | 9% |

| *MATERIAL* | *PACKAGING* |
|---|---|
| CARDBOARD | 99% |
| PAPER | 1% |

Detailed parameters of access roof lights are specified in their Declarations of Performance, which can be downloaded from the FAKRO PP Sp. z o.o. website: *www.fakro.com*

## LIFE CYCLE ASSESSMENT (LCA) – general rules applied

### Allocation

The allocation rules used for this EPD are based on general ITB PCR A v. 1 .6. Production of access roof lights is a line process conducted in the manufacturing plan located in Nowy Sącz (Poland). All impacts from raw materials extraction and processing are allocated in A1 module of EPD. Impacts from the FAKRO production were inventoried on the annual production volume expressed in kg. Water and energy consumption, associated emissions and generated wastes are allocated to module A3. Energy supply was inventoried for whole production process. Packaging materials were taken into consideration.

**System limits**

The life cycle analysis (LCA) of the declared products covers: product stage – modules A1-A3, end of life – modules C1-C4 and benefits and loads beyond the system boundary – module D (cradle-to-gate with options) in accordance with EN 15804 + A2 and ITB PCR A v. 1.6. Energy and water consumption, emissions as well as information on generated wastes were inventoried and were included in the calculations. It can be assumed that the total sum of omitted processes does not exceed 5% of all impact categories. In accordance with EN 15804 + A2, machines and facilities (capital goods) required for the production as well as transportation of employees were not included in LCA.

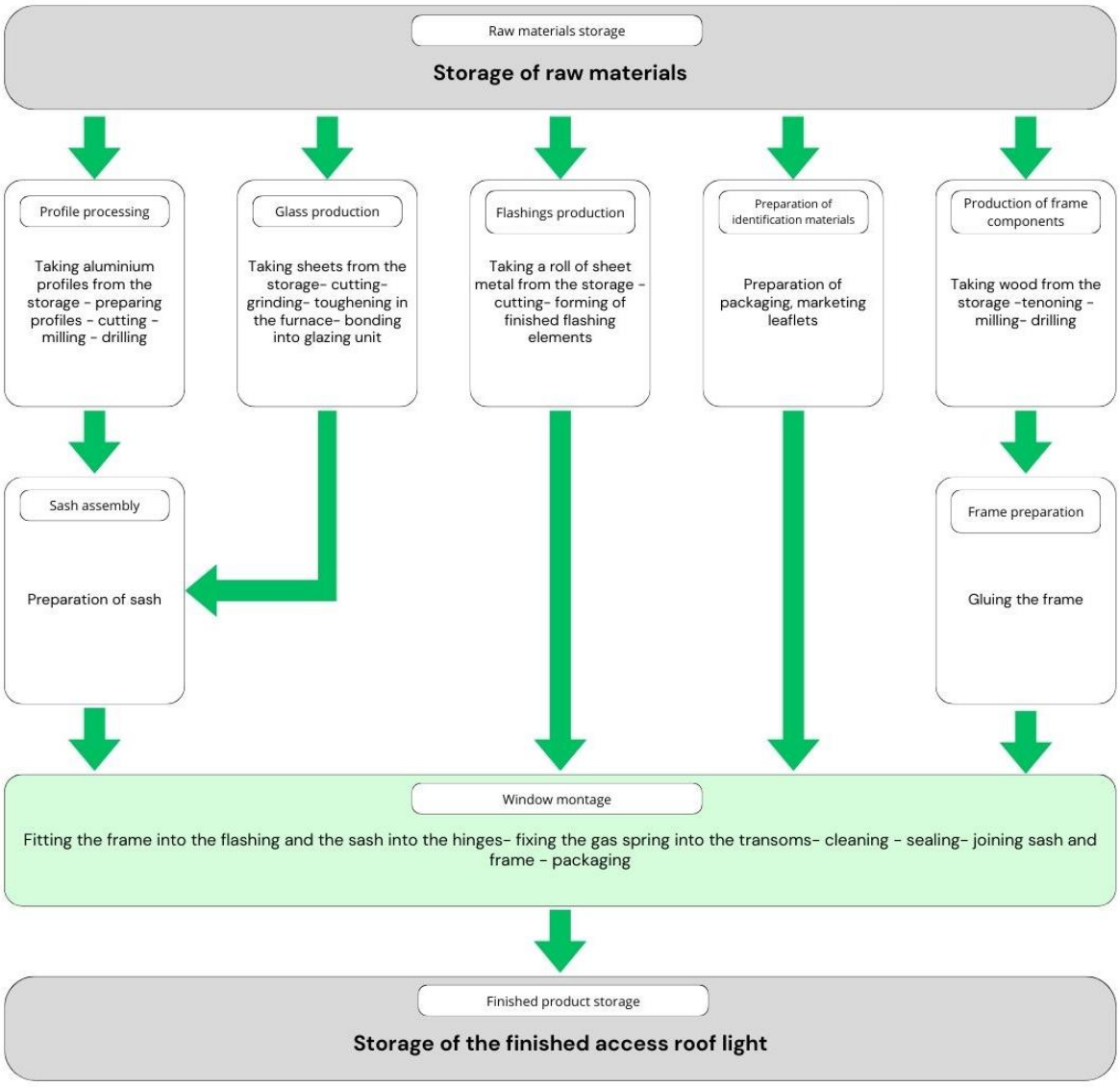


*Fig. 2. A scheme of access roof lights production by FAKRO PP Sp. z o. o.*

**Modules A1 and A2: *Raw materials supply and transport***

Raw materials such as aluminium, steel, pinewood, glass or polycarbonate are produced in Poland and others European plants of leading chemical manufacturers whereas other ancillary items come from both local and foreign suppliers. Data on transport of the different products to the manufacturing plants is collected and modelled for factory by assessor. Means of transport include small truck (<

10 t e.g. couriers), average (10 – 16 t) and big (>16 t) trucks are applied. Based on data provided by the manufacturer, all input of transport resources was inventoried in details. European standards for average combustion were used for calculations.

**Module A3: *Production***

A scheme of access roof lights production process is presented in Fig. 2.

**Modules *C1-C4 and D: End-of-life (EoL)***

It is assumed that at the end-of-life, 100% of access roof lights are demounted using electric tools (module C1) and it is transported to waste processing plant distant by 60 km, on 16-32 t lorry (Euro 6) (module C2). Materials recovered from dismantled products are prepared to recycling, incineration (module C3) and landfilling (module C4) according to a realistic treatment practice for industrial waste what is presented in Table 2.
It is assumed that 95 % of aluminium and steel undergo recycling after sorting and cutting while the remaining 5 % is forwarded to landfill as mixed construction and demolition wastes. In turn, 50 % of wood is incinerated while the 50 % remaining waste materials are forwarded to landfill in the form of mixed construction and demolition wastes. In the case of glass, 30% is energy/material recovery, while 70% goes to landfill. A potential credit resulting from the recycling of wood, aluminium, steel and glass are presented in module D. Utilization of packaging material was not taken into consideration.

*Table 2. End-of-life scenario for access roof lights manufactured by FAKRO PP Sp. z o. o.*

| Material | Waste processing (energy / material recovery) | Landfilling |
|---|---|---|
| wood | 50 % | 50 % |
| aluminium, steel | 95 % | 5 % |
| glass | 30 % | 70 % |

**Data quality**

The data selected for LCA analysis originates from ITB-LCI questionnaires completed by FAKRO PP Sp. z o. o. using the inventory data, ITB and Ecoinvent database v. 3.10 and KOBiZE. KOBiZE data is supplemented with Ecoinvent v. 3.10 data on the national electricity mix impact where no specific indicator data is provided. No specific data collected is older than five years and no generic datasets used are older than ten years. The representativeness, completeness, reliability, and consistency are judged as good.

**Data collection period**

The data for manufacture of the declared products refers to period between 01.01.2023 – 01.01.2024 (1 year). The life cycle assessments were prepared for Poland and Europe as reference area.

**Assumptions and estimates**

Impacts were inventoried and calculated for access roof lights with glass with dimensions of 46 x 75 cm (0,345 $m^2$) and access roof lights with polycarbonate dome with dimensions of 54 x 75 cm (0,405

$m^2$) which are a standard and representative for the access roof lights group system. The area of a representative access roof light is also the conversion factor from 1 $m^2$ to representative unit. The results for 1 $m^2$ of access roof lights with glass are presented in Tables 4-7 and for 1 $m^2$ of access roof lights with polycarbonate dome in Tables 8-11.

### Calculation rules

LCA was performed using ITB-LCA tool developed in accordance with EN 15804 + A2. LCA was performed using Open LCA tool developed in accordance with EN15804+A2. Emission of greenhouse gases was calculated using the IPCC GWP method with a 100-year horizon and all other with the EF 3.1. method. No mass balance approach was used. The biogenic carbon content in a pinewood used for access roof lights with glass with dimensions of 46 x 75 cm is 2.36 kg C and 3.65 kg C in packing. The biogenic carbon content in a pinewood used for access roof lights with polycarbonate dome with dimensions of 54 x 75 cm is 5.35 kg C and 7.39 kg C in packing.

### Databases

The data for the processes comes from Ecoinvent v. 3.10 and ITB-Database. Specific data quality analysis was a part of external audit. Specific data quality analysis was a part of external audit. Polish electricity mix used (production) is 0.685 kg $CO_2$/kWh (KOBiZE 2023).

## LIFE CYCLE ASSESSMENT (LCA) – Results

### Declared unit

The declaration refers to declared unit (DU) – 1 $m^2$ access roof light with glass and polycarbonate dome manufactured by FAKRO PP Sp. z o. o.

*Table 3. System boundaries for the environmental characteristic of access roof lights with glass and polycarbonate dome.*

| Environmental assessment information (MD – Module Declared, MND – Module Not Declared, INA – Indicator Not Assessed) | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Product stage | | | Construction process | | Use stage | | | | | | | End of life | | | | Benefits and loads beyond the system boundary |
| 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 | Reuse-recovery-recycling potential |
| A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| MD | MD | MD | MND | MND | MND | MND | MND | MND | MND | MND | MND | MD | MD | MD | MD | MD |

*Table 4. LCA results of access roof lights with glass – environmental impacts (DU: 1 $m^2$, 29.46 kg with packing)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Global Warming Potential | eq. kg $CO_2$ | 6.55E+01 | 1.13E+00 | 2.08E+01 | 8.74E+01 | 1.75E-01 | 3.36E-01 | 1.29E+01 | 1.26E+01 | -4.27E+00 |
| Greenhouse gas potential - fossil | eq. kg $CO_2$ | 9.05E+01 | 1.13E+00 | 2.06E+01 | 1.12E+02 | 1.72E-01 | 3.36E-01 | 2.70E-01 | 1.64E-01 | -3.89E+00 |
| Greenhouse gas potential - biogenic | eq. kg $CO_2$ | -2.48E+01 | 7.43E-04 | 1.84E-01 | -2.47E+01 | 3.10E-03 | 2.21E-04 | 1.26E+01 | 1.24E+01 | -3.75E-01 |
| Global warming potential - land use and land use change | eq. kg $CO_2$ | 5.54E-01 | 3.83E-04 | 1.58E-02 | 5.70E-01 | 4.04E-05 | 1.12E-04 | 5.11E-04 | 1.32E-04 | -2.54E-03 |
| Stratospheric ozone depletion potential | eq. kg CFC 11 | 6.43E-06 | 2.24E-08 | 6.37E-07 | 7.09E-06 | 3.02E-09 | 6.68E-09 | 1.29E-08 | 3.55E-08 | -1.29E-07 |
| Soil and water acidification potential | eq. mol H+ | 1.25E+00 | 2.34E-03 | 2.43E-01 | 1.49E+00 | 1.67E-03 | 6.99E-04 | 1.69E-03 | 1.39E-03 | -2.70E-02 |
| Eutrophication potential - freshwater | eq. kg P | 3.31E-02 | 7.82E-05 | 3.29E-02 | 6.60E-02 | 2.86E-04 | 2.27E-05 | 9.62E-05 | 1.74E-05 | -1.15E-03 |
| Eutrophication potential - seawater | eq. kg N | 1.12E-01 | 5.55E-04 | 4.96E-02 | 1.62E-01 | 2.38E-04 | 1.68E-04 | 5.77E-04 | 1.34E-03 | -3.77E-03 |
| Eutrophication potential - terrestrial | eq. mol N | 1.55E+00 | 5.99E-03 | 4.77E-01 | 2.03E+00 | 2.04E-03 | 1.81E-03 | 5.11E-03 | 5.67E-03 | -6.91E-02 |
| Potential for photochemical ozone synthesis | eq. kg NMVOC | 4.26E-01 | 3.86E-03 | 2.06E-01 | 6.36E-01 | 5.71E-04 | 1.16E-03 | 1.56E-03 | 1.75E-03 | -1.10E-02 |
| Potential for depletion of abiotic resources - non-fossil resources | eq. kg Sb | 1.68E-02 | 3.92E-06 | 3.56E-05 | 1.68E-02 | 2.27E-07 | 1.12E-06 | 5.90E-06 | 4.28E-07 | -1.27E-04 |
| Abiotic depletion potential - fossil fuels | MJ | 6.99E+02 | 1.58E+01 | 3.31E+02 | 1.05E+03 | 2.57E+00 | 4.72E+00 | 3.30E+00 | 3.55E+00 | -2.98E+01 |
| Water deprivation potential | eq. $m^3$ | 1.12E+02 | 7.91E-02 | 7.10E+00 | 1.19E+02 | 5.23E-02 | 2.31E-02 | 4.93E-02 | 1.61E-02 | -2.76E+00 |

*Table 5. LCA results of access roof lights with glass – additional impacts indicators (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Particulate matter | disease incidence | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential human exposure efficiency relative to U235 | eg. kBq U235 | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for ecosystems | CTUe | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (cancer effects) | CTUh | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (non-cancer effects) | CTUh | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential soil quality index | dimensionless | INA | INA | INA | INA | INA | INA | INA | INA | INA |

*Table 6. LCA results of access roof lights with glass - the resource use (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 3.31E+02 | 2.86E-01 | 3.54E+02 | 6.85E+02 | 1.87E-01 | 8.11E-02 | -2.35E+01 | -3.30E+01 | -1.95E+00 |
| Consumption of renewable primary energy resources used as raw materials | MJ | 2.11E+02 | 0.00E+00 | 0.00E+00 | 2.11E+02 | 0.00E+00 | 0.00E+00 | 2.35E+01 | 3.30E+01 | 0.00E+00 |
| Total consumption of renewable primary energy resources | MJ | 5.42E+02 | 2.86E-01 | 3.54E+02 | 8.96E+02 | 1.87E-01 | 8.11E-02 | 2.92E-01 | 4.45E-02 | -4.44E+00 |
| Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 1.07E+03 | 1.58E+01 | 3.38E+02 | 1.43E+03 | 2.72E+00 | 4.72E+00 | 1.60E+00 | 1.08E+00 | -1.83E+01 |
| Consumption of non-renewable primary energy resources used as raw materials | MJ | 5.26E+01 | 0.00E+00 | 9.75E+00 | 6.23E+01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total consumption of non-renewable primary energy resources | MJ | 1.13E+03 | 1.58E+01 | 3.48E+02 | 1.49E+03 | 2.72E+00 | 4.72E+00 | 3.30E+00 | 3.56E+00 | -2.98E+01 |
| Consumption of secondary materials | kg | 2.71E+00 | 7.52E-03 | 4.58E-02 | 2.76E+00 | 2.08E-04 | 2.19E-03 | 3.39E-03 | 1.28E-03 | -2.25E-02 |
| Consumption of renewable secondary fuels | MJ | 3.03E+00 | 9.29E-05 | 2.81E-04 | 3.03E+00 | 1.14E-06 | 2.77E-05 | 2.05E-04 | 2.45E-05 | -1.66E+00 |
| Consumption of non-renewable secondary fuels | MJ | 8.24E-02 | 0.00E+00 | 0.00E+00 | 8.24E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Net consumption of freshwater resources | $m^3$ | 1.08E+00 | 2.18E-03 | 1.84E-01 | 1.27E+00 | 8.37E-04 | 6.35E-04 | 1.49E-03 | 3.45E-03 | -7.40E-02 |

*Table 7. LCA results of access roof lights with glass – waste categories (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste neutralized | kg | 1.46E+01 | 2.33E-02 | 4.47E-01 | 1.51E+01 | 5.32E-07 | 6.89E-03 | 1.95E-02 | 5.12E-03 | -2.81E-01 |
| Non-hazardous waste neutralised | kg | 3.75E+01 | 5.03E-01 | 8.32E+00 | 4.63E+01 | 1.52E-02 | 1.46E-01 | 1.26E+00 | 7.66E-02 | -7.92E+00 |
| Radioactive waste | kg | 1.20E-02 | 5.43E-06 | 2.54E-04 | 1.22E-02 | 2.21E-06 | 1.52E-06 | 8.74E-06 | 1.58E-05 | -8.28E-05 |
| 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 | 1.88E+00 | 1.24E-04 | 7.01E-03 | 1.89E+00 | 1.56E-05 | 3.59E-05 | 7.74E+00 | 1.23E-03 | -6.76E+00 |
| Materials for energy recovery | kg | 2.43E-03 | 9.35E-07 | 1.93E-03 | 4.36E-03 | 2.19E-08 | 3.04E-07 | 3.38E-07 | 2.04E-07 | -6.87E-06 |
| Energy exported | MJ | 1.17E+00 | 1.00E-02 | 8.63E-01 | 2.05E+00 | 7.46E-03 | 1.99E-03 | 5.45E-02 | 7.10E-03 | -4.00E-01 |

*Table 8. LCA results of access roof lights with polycarbonate dome – environmental impacts (DU: 1 $m^2$, 22.23 kg with packing)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Global Warming Potential | eq. kg $CO_2$ | 2.99E+01 | 1.13E+00 | 2.08E+01 | 5.18E+01 | 1.75E-01 | 2.54E-01 | 2.42E+01 | 2.38E+01 | -2.68E+00 |
| Greenhouse gas potential - fossil | eq. kg $CO_2$ | 7.19E+01 | 1.13E+00 | 2.06E+01 | 9.36E+01 | 1.72E-01 | 2.53E-01 | 3.35E-01 | 8.52E-02 | -1.90E+00 |
| Greenhouse gas potential - biogenic | eq. kg $CO_2$ | -4.75E+01 | 7.43E-04 | 1.84E-01 | -4.74E+01 | 3.10E-03 | 1.67E-04 | 2.39E+01 | 2.38E+01 | -7.82E-01 |
| Global warming potential - land use and land use change | eq. kg $CO_2$ | 3.63E-01 | 3.83E-04 | 1.58E-02 | 3.79E-01 | 4.04E-05 | 8.43E-05 | 7.94E-04 | 5.79E-05 | -1.31E-03 |
| Stratospheric ozone depletion potential | eq. kg CFC 11 | 3.12E-06 | 2.24E-08 | 6.37E-07 | 3.78E-06 | 3.02E-09 | 5.04E-09 | 7.35E-09 | 1.80E-09 | -5.38E-08 |
| Soil and water acidification potential | eq. mol H+ | 6.75E-01 | 2.34E-03 | 2.43E-01 | 9.19E-01 | 1.67E-03 | 5.28E-04 | 1.88E-03 | 6.11E-04 | -1.31E-02 |
| Eutrophication potential - freshwater | eq. kg P | 2.57E-02 | 7.82E-05 | 3.29E-02 | 5.86E-02 | 2.86E-04 | 1.72E-05 | 8.77E-05 | 1.34E-05 | -5.47E-04 |
| Eutrophication potential - seawater | eq. kg N | 7.05E-02 | 5.55E-04 | 4.96E-02 | 1.21E-01 | 2.38E-04 | 1.27E-04 | 6.37E-04 | 2.09E-03 | -2.19E-03 |
| Eutrophication potential - terrestrial | eq. mol N | 8.51E-01 | 5.99E-03 | 4.77E-01 | 1.33E+00 | 2.04E-03 | 1.37E-03 | 6.22E-03 | 2.57E-03 | -3.53E-02 |
| Potential for photochemical ozone synthesis | eq. kg NMVOC | 2.96E-01 | 3.86E-03 | 2.06E-01 | 5.05E-01 | 5.71E-04 | 8.77E-04 | 1.97E-03 | 9.68E-04 | -6.49E-03 |
| Potential for depletion of abiotic resources - non-fossil resources | eq. kg Sb | 6.89E-03 | 3.92E-06 | 3.56E-05 | 6.93E-03 | 2.27E-07 | 8.43E-07 | 3.75E-06 | 1.54E-07 | -5.77E-05 |
| Abiotic depletion potential - fossil fuels | MJ | 8.59E+02 | 1.58E+01 | 3.31E+02 | 1.21E+03 | 2.57E+00 | 3.56E+00 | 4.33E+00 | 1.65E+00 | -1.45E+01 |
| Water deprivation potential | eq. $m^3$ | 1.69E+01 | 7.91E-02 | 7.10E+00 | 2.41E+01 | 5.23E-02 | 1.74E-02 | 4.99E-02 | 8.62E-03 | -1.16E+00 |

*Table 9. LCA results of access roof lights with polycarbonate dome – additional impacts indicators (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Particulate matter | disease incidence | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential human exposure efficiency relative to U235 | eg. kBq U235 | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for ecosystems | CTUe | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (cancer effects) | CTUh | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential comparative toxic unit for humans (non-cancer effects) | CTUh | INA | INA | INA | INA | INA | INA | INA | INA | INA |
| Potential soil quality index | dimensionless | INA | INA | INA | INA | INA | INA | INA | INA | INA |

*Table 10. LCA results of access roof lights with polycarbonate dome - the resource use (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Consumption of renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 1.52E+02 | 2.86E-01 | 3.54E+02 | 5.07E+02 | 1.87E-01 | 6.12E-02 | -5.33E+01 | -7.48E+01 | -1.10E+00 |
| Consumption of renewable primary energy resources used as raw materials | MJ | 3.70E+02 | 0.00E+00 | 0.00E+00 | 3.70E+02 | 0.00E+00 | 0.00E+00 | 5.34E+01 | 7.49E+01 | 0.00E+00 |
| Total consumption of renewable primary energy resources | MJ | 5.23E+02 | 2.86E-01 | 3.54E+02 | 8.78E+02 | 1.87E-01 | 6.12E-02 | 2.88E-01 | 2.89E-02 | -2.09E+00 |
| Consumption of non-renewable primary energy - excluding renewable primary energy sources used as raw materials | MJ | 9.17E+02 | 1.58E+01 | 3.38E+02 | 1.27E+03 | 2.72E+00 | 3.56E+00 | 3.62E+00 | 1.65E+00 | -9.95E+00 |
| Consumption of non-renewable primary energy resources used as raw materials | MJ | 2.02E+02 | 0.00E+00 | 9.75E+00 | 2.12E+02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total consumption of non-renewable primary energy resources | MJ | 1.12E+03 | 1.58E+01 | 3.48E+02 | 1.48E+03 | 2.72E+00 | 3.56E+00 | 4.33E+00 | 1.65E+00 | -1.45E+01 |
| Consumption of secondary materials | kg | 1.29E+00 | 7.52E-03 | 4.58E-02 | 1.35E+00 | 2.08E-04 | 1.65E-03 | 3.45E-03 | 6.36E-04 | -1.12E-02 |
| Consumption of renewable secondary fuels | MJ | 2.17E+00 | 9.29E-05 | 2.81E-04 | 2.17E+00 | 1.14E-06 | 2.09E-05 | 1.33E-04 | 1.87E-05 | -3.77E+00 |
| Consumption of non-renewable secondary fuels | MJ | 5.01E-02 | 0.00E+00 | 0.00E+00 | 5.01E-02 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Net consumption of freshwater resources | $m^3$ | 7.02E-01 | 2.18E-03 | 1.84E-01 | 8.88E-01 | 8.37E-04 | 4.79E-04 | 1.35E-03 | 1.44E-03 | -3.08E-02 |

*Table 11. LCA results of access roof lights with polycarbonate dome – waste categories (DU: 1 $m^2$)*

| Indicator | Unit | A1 | A2 | A3 | A1-A3 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|
| Hazardous waste neutralized | kg | 2.32E+00 | 2.33E-02 | 4.47E-01 | 2.79E+00 | 5.32E-07 | 5.20E-03 | 2.01E-02 | 1.56E-03 | -1.38E-01 |
| Non-hazardous waste neutralised | kg | 9.45E+01 | 5.03E-01 | 8.32E+00 | 1.03E+02 | 1.52E-02 | 1.10E-01 | 5.21E-01 | 4.55E-02 | -3.89E+00 |
| Radioactive waste | kg | 4.69E-03 | 5.43E-06 | 2.54E-04 | 4.95E-03 | 2.21E-06 | 1.15E-06 | 6.28E-06 | 4.96E-07 | -3.73E-05 |
| 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 | 9.67E-01 | 1.24E-04 | 7.01E-03 | 9.75E-01 | 1.56E-05 | 2.71E-05 | 4.33E+00 | 6.96E-04 | -3.78E+00 |
| Materials for energy recovery | kg | 4.73E-04 | 9.35E-07 | 1.93E-03 | 2.40E-03 | 2.19E-08 | 2.30E-07 | 3.84E-07 | 5.22E-08 | -3.35E-06 |
| Energy exported | MJ | 1.58E+00 | 1.00E-02 | 8.63E-01 | 2.46E+00 | 7.46E-03 | 1.50E-03 | 3.14E-02 | 9.29E-04 | -2.12E-01 |

## 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 + A2 and ITB PCR A |
|---|
| Independent verification corresponding to ISO 14025 (subclause 8.1.3)<br>[x] external [ ] internal |
| External verification of EPD: Halina Prejzner, PhD Eng<br>LCA, LCI audit and input data verification: Mateusz Kozicki, PhD<br>Verification of LCA: Michał Piasecki, PhD. DSc. Eng |

Note 1: The declaration owner has the sole ownership, liability and responsibility for the information provided and contained in EPD. Declarations within the same product category but from different programs may not be comparable. Declarations of construction products may not be comparable if they do not comply with EN 15804 + A2. For further information about comparability, see EN 15804 + A2 and ISO 14025. Depending on the application, a corresponding conversion factor such as the specific weight per surface area must be taken into consideration.

Note 2: ITB is a public Research Organization and Notified Body (EC Reg. no 1488) to the European Commission and to other Member States of the European Union designated for the tasks concerning the assessment of building products' performance. ITB acts as the independent, third-party verification organization (17065/17025 certified). ITB-EPD program is recognized and registered member of The European Platform – Association of EPD program operators and ITB-EPD declarations are registered and stored in the international ECO-PORTAL.

## Normative references


- ITB PCR A v. 1.6 General Product Category Rules for Construction Products
- EN 14351-1+A2 Windows and doors – Product standard, performance characteristics – Part 1: windows and external pedestrian doorsets
- ISO 14025:2006. Environmental labels and declarations – Type III environmental declarations – Principles and procedures
- 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+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products
- ISO 14067:2018 Greenhouse gases - Carbon footprint of products - Requirements and guidelines for quantification
- EN 15942:2012 Sustainability of construction works – Environmental product declarations – Communication format business-to-business
- KOBiZE Emissions ($CO_2$, $SO_2$, $NO_x$, CO and total dust) from electricity, 2023


**LCA, LCI audit and input data verification**
**Mateusz Kozicki, PhD**

*qualified electronic signature*

**Head of the Thermal Physic, Acoustics and Environment Department**
**Agnieszka Winkler-Skalna, PhD**

*qualified electronic signature*

Instytut Techniki Budowlanej
00-611 Warsaw, Filtrowa 1

Thermal Physics, Acoustics and Environment Department
02-656 Warsaw, Ksawerów 21

# CERTIFICATE № 671/2024
# of TYPE III ENVIRONMENTAL DECLARATION

Products:

**Access roof lights**

Manufacturer:

**FAKRO PP Sp. z o.o.**
Węgierska 144a, Nowy Sącz, Poland

confirms the correctness of the data included in the development of
Type III Environmental Declaration and accordance with the requirements of the standard

**EN 15804+A2**

**Sustainability of construction works.**
**Environmental product declarations.**
**Core rules for the product category of construction products.**

This certificate, issued on 17th September 2024 is valid for 5 years
or until amendment of mentioned Environmental Declaration

Head of the Thermal Physic, Acoustics and Environment Department
Agnieszka Winkler-Skalna, PhD

INSTYTUT TECHNIKI BUDOWLANEJ

Deputy Director for Research and Innovation
Krzysztof Kuczyński, PhD

Warsaw, September 2024