

# Environmental Product Declaration

EPD of multiple products, based on worst-case results.

In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for

Product family

Elitfönster Original Alu 100

Model

Top-swing window 3-glass Alu

Product name

AFHC

Standard and energy versions from Elitfönster AB

From

**Elitfönster AB**

**Box 153**

**574 22 Vetlanda**

**Publication date 2024-06-28**

Valid for 5 years until 2029-06-27

## Programme

The International EPD® System, [www.environdec.com](http://www.environdec.com)

## Programme operator

EPD International AB

## EPD registration number

S-P-12880

An EPD should provide current information and may be updated if conditions change.  
The stated validity is therefore subject to the continued registration and publication at  
[www.environdec.com](http://www.environdec.com)



## General information

### Programme information

**Programme:** The International EPD® System

**Address:** EPD International AB  
Box 210 60  
SE-100 31 Stockholm  
Sweden

**Website:** [www.environdec.com](http://www.environdec.com)

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### Accountabilities for PCR, LCA and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): c-PCR-007 Windows and doors EN 17213 (EPD International AB, 2020), UN CPC 42120 and PCR 2019:14 Construction products (EN 15804+A2) (1.3.4)

**PCR review was conducted by:** Not applicable for the c-PCR. For the PCR 2019:14 Construction products (EN 15804+A2) (1.3.4) the PCR review was conducted by: The Technical Committee of the International EPD System. See [www.environdec.com](http://www.environdec.com) for a list of members.

Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat [www.environdec.com/contact](http://www.environdec.com/contact).

#### Life Cycle Assessment (LCA)

LCA accountability: Marcus Bernhard & Oline Haggren, Miljögiraff AB

#### Third-party verification

**Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:**

☒ EPD verification by individual verifier

Third-party verifier: Martyna Mikusinska, Sweco

Approved by: The International EPD® System



Procedure for follow-up of data during EPD validity involves third party verifier:

☐ Yes

☒ No

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

## Environmental Product Declaration

**Environmental Product Declarations (EPD)** present transparent, verified and comparable information about the life-cycle environmental impact of products.

The International EPD® System is a global program for environmental declarations based on ISO 14025 and EN 15804.

## Company information

### Owner of the EPD

Elitfönster AB  
Honnörsgatan 2  
352 36 Växjö

### Contact

Mats Brånäs  
Tel 010-451 42 19  
Mobile 070-388 41 89  
E-mail mats.branas@elitfonster.se

### Description of the organisation

Elitfönster AB is with its wide range of windows Sweden's leading window manufacturer with Småland traditions since 1924. Elitfönster, which is part of Inwido Group, has approximately 1,000 employees and is represented throughout Sweden.

### Product-related or management system-related certifications

ISO 9001:2015, ISO 14001:2015  
Sunda Hus, Byggvarubedomningen, Basta

### EPD on multiple products

This EPD covers both standard and energy-coated versions of the door. The result is based on the energy-coated version which is the worst-case product. The impact category Climate change (GWP-GHG) is less than 1% higher for the energy-type balcony door, compared to the standard version. Since this difference is within +/-10%, both the standard and energy type is covered in this EPD.

## Product information

### Top-swing window 3-glass Alu - AFHC

Elitfönster Original Alu 100 Top-swing window is a window with 3-glazed insulating glass and wooden frame clad with durable aluminium on the outside. The frame and sash consist of impregnated pine which is clad with outer aluminium cladding to ensure long life cycle. The insulating glass consists of three glasses to achieve very good energy management of buildings.

The weight of the finished window is 38,1 kg per m<sup>2</sup>.

According to the Construction Products Regulation CPR (EU) no. 305/2011, the essential properties of the product must be declared in the CE marking and the Declaration of Performance. The technical properties of the window are declared in the Declaration of Performance, DoP nr 61-29-CE1011001 which can be accessed on Elitfönster's website. The product has a building product declaration (eBVD) with document number C-SE556007307301-83.

A picture of the window can be seen to the right.



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## >> Product information

### **Energy glass:**

Energy glass consists of a float glass that is coated with a thin film of metal oxide that lets through short-wave solar energy and reflects long-wave room heat. The coating is almost completely transparent, but there is some difference in light input between coated glass and uncoated glass. Coated glass is used to achieve better insulating ability in a glass, by combining different numbers of coated glass in a window or insulating glass, you can achieve different levels of insulating ability for a window. The greater the number of energy glasses a window has, the better the insulation capacity, but also the darker the glass.

### **Gas:**

An insulating glass consists of glass that is separated from each other by spacers, these spacers can be filled with gas such as argon to give the insulating glass a better insulating ability. Argon does not affect sunlight radiation but improves the insulating ability of the insulating glass. An insulating glass with two glasses consists of an argon gas-filled spacer, and an insulating glass with three glasses has two spacers, here you can choose to fill one or both spacers with argon gas. If you fill both distances with gas, you achieve a better insulation capacity than if only one distance is gas-filled. By combining different sets of energy-coated glass and argon-filled glass spacers, you can get different glass properties for insulation and light input. If you also combine these components with different types of glass spacing and dimensions of constituent components as well as different choices of type of glass, you have an almost infinite number of different combinations. This EPD covers both standard and energy windows, the difference in results is described under "average or specific EPD". The results table is based on the energy glass.

### **Standard:**

The insulating glass consists of three glasses separated by two glass spacers made of plastic (hot edge). The inner glass is energy coated and the inner glass spacer is filled with argon.

### **Energy:**

The same insulating glass construction as standard, except that both the inner and outer glass are energy-coated and that both glass spacers are filled with argon.



## LCA information

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
|-------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Functional Unit</b>              | <p><b>The functional unit used in this report is 1 m<sup>2</sup>.</b><br/> <b>The weight is 38,1 kg per m<sup>2</sup>.</b></p> <p>Standard size for AFHC is 1230x1480 mm.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Reference Service Life (RSL)</b> | The RSL is set to 50 years. The RSL is based on the fact that windows with aluminum-clad windows have a longer service life than similar windows made of PVC or wood.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Product group classification</b> | UN CPC 42120                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Manufacturing Site</b>           | Industrigatan, 360 73, Lenhovda, Sverige                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Geographical Area</b>            | Sweden                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| <b>Compliant with</b>               | <p>This EPD follows the "Book-keeping" LCA approach which is defined as an attributional LCA in the ISO 14040 standard.</p> <p>The EPD is compliant with:</p> <ul style="list-style-type: none"> <li>• ISO 14025</li> <li>• EN 15804:2012+A2:2019/AC:2021</li> <li>• PCR 2019:14 Construction products (EN 15804+A2) (1.3.4)</li> <li>• Sub-PCR-007 Windows and doors (EN 17213)</li> </ul>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Cut-Off Rules</b>                | <p>The procedure below is followed for the exclusion of inputs and outputs according to the EN 15804:2012+ A2:2019 standard:</p> <ul style="list-style-type: none"> <li>• In the case of insufficient input data or data gaps for a unit process, the cut-off criterion is 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input to that unit process.</li> <li>• The maximum neglected input flows per declared module (A1- A3) is 5 % of energy usage and mass.</li> </ul> <p>No cut-offs have been made concerning specific data in this study.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| <b>Foreground data</b>              | All site-specific data is collected from the year 2023.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Background Data</b>              | The background LCI datasets are from ecoinvent 3.10. When available, published EPDs have been used to represent specific raw materials.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
| <b>Electricity data</b>             | Electricity consumption in the A3 module comes from 100% hydro power certified by Guarantee of Origin, Electricity is represented by data in ecoinvent 3.10 regionalized for Sweden. The carbon footprint of the electricity is 0,0044 kg CO <sub>2</sub> -eq/kWh.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>Assumptions</b>                  | <p>In A4 the transport distance is assumed to be 295 km, based on average distances 2023. The used window is assumed to be transported 75km to the closest waste management facility. There it is disassembled, and the following waste treatment activities performed:</p> <ul style="list-style-type: none"> <li>• In A4 the transport distance is assumed to be 295 km, based on average distances 2023. The used window is assumed to be transported 75km to the closest waste management facility. There it is disassembled, and the following waste treatment activities performed:</li> <li>• Aluminum and steel are recycled.</li> <li>• Glass is landfilled at 100% landfilling rate.</li> <li>• Wood, paint, plastic, rubber and misc. is assumed to be incinerated with energy recovery at a municipal incineration plant.</li> <li>• For windows maintenance: <ul style="list-style-type: none"> <li>o Soap once a year (10 ml/year)</li> <li>o Window cleaning 4 times a year (0,3 dl/time)</li> <li>o Lubricant for hinges and locking fittings once a year (5 ml oil)</li> </ul> </li> </ul> |

## >> LCA information

|                            |                                                                                                                                                                                                                                                                                                                                                                            |
|----------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Allocations</b>         | <p>Polluter Pays / Allocation by Classification</p> <p>Two allocation rules are applied:</p> <p>1) the raw material necessary for manufacturing is allocated to products based on complexity and product size of the declared unit</p> <p>2) the energy necessary for manufacturing is allocated to products based on complexity and product size of the declared unit</p> |
| <b>Infrastructure</b>      | <p>Specific data for infrastructure/capital goods have not been collected in either upstream, core, or downstream processes in accordance with PCR 2019:14 Construction product. However,ecoinvent generally includes infrastructure in many processes. These have not been removed from the background data.</p>                                                          |
| <b>Based on LCA Report</b> | 1339_LCA_Rapport_Elitfönster.docx                                                                                                                                                                                                                                                                                                                                          |
| <b>LCA Practitioner</b>    | Marcus Bernhard & Oline Haggren, Miljögiraff AB                                                                                                                                                                                                                                                                                                                            |
| <b>Software</b>            | Ecoinvent 3.10 and SimaPro 9.6 using EF 3.1 as EN 15804 reference package.                                                                                                                                                                                                                                                                                                 |

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.



## System Boundary

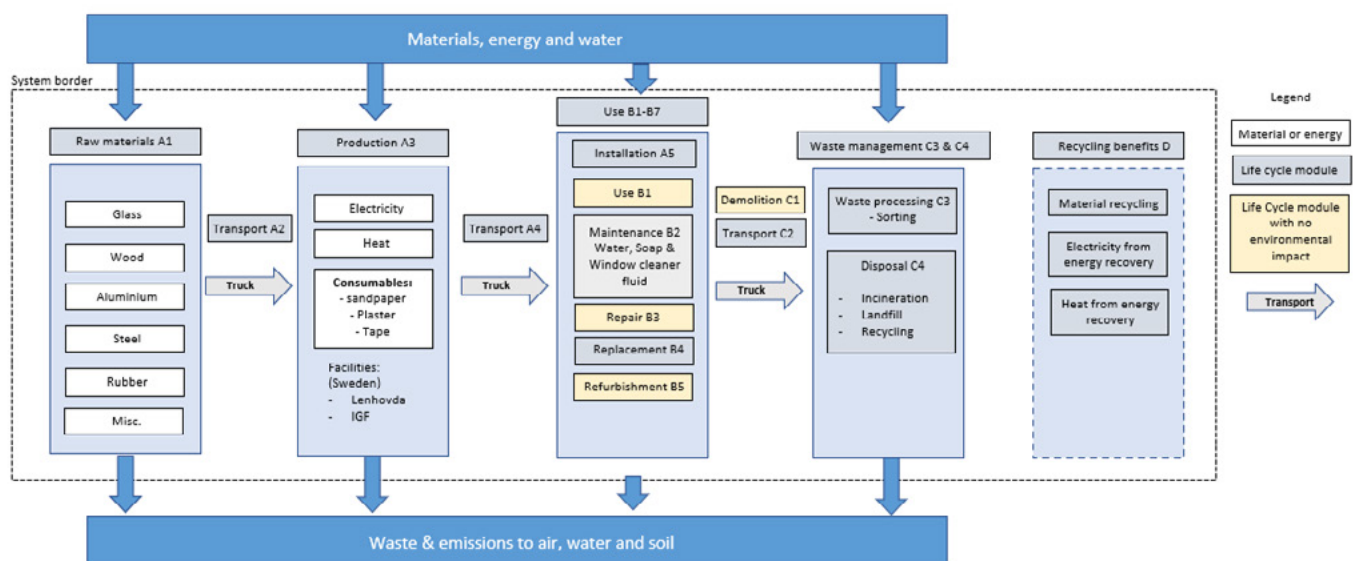
Cradle-to-Grave with modules A+B+C+D (see Table 1 for included modules). The system boundary means that all processes needed for raw material extraction, transport, manufacturing, and disposal are included in the study. For an overview of the included processes see Figure 1.

Modules declared, geographical scope, share of specific data (in GWP-GHG results) and data variation (in GWP-GHG results):

**Table 1, show an overview of the included and accounted life cycle phases.**

|                             | Product stage       |           |               | Construction process stage |                           | Use stage |             |        |             |               |                        |                       | End of life stage          |           |                  |          | Resource recovery stage            |
|-----------------------------|---------------------|-----------|---------------|----------------------------|---------------------------|-----------|-------------|--------|-------------|---------------|------------------------|-----------------------|----------------------------|-----------|------------------|----------|------------------------------------|
|                             | Raw material supply | Transport | Manufacturing | Transport                  | Construction installation | Use       | Maintenance | Repair | Replacement | Refurbishment | Operational energy use | Operational water use | De-construction demolition | Transport | Waste processing | Disposal | Reuse-Recovery-Recycling-potential |
| <b>Module</b>               | A1                  | A2        | A3            | A4                         | A5                        | B1        | B2          | B3     | B4          | B5            | B6                     | B7                    | C1                         | C2        | C3               | C4       | D                                  |
| <b>Modules declared</b>     | X                   | X         | X             | X                          | X                         | X         | X           | X      | X           | X             | ND                     | ND                    | X                          | X         | X                | X        | X                                  |
| <b>Geography</b>            | SE                  | SE        | SE            | SE                         | SE                        | SE        | SE          | SE     | SE          | SE            |                        |                       | SE                         | SE        | SE               | SE       | SE                                 |
| <b>Specific data used</b>   | ~60%                |           |               |                            |                           | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |
| <b>Variation – products</b> | <1%                 |           |               |                            |                           | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |
| <b>Variation – sites</b>    | 0%                  |           |               |                            |                           | -         | -           | -      | -           | -             | -                      | -                     | -                          | -         | -                | -        | -                                  |

**Figure 1, shows what is included in the different modules.**





## Content and life cycle information

The product consists of 18 raw materials. The weight per FU and the share of post-consumer material, as well as the amount of biogenic material are shown in Table 2 below.

**Table 2, show the weight and part recycled material for the raw material.**

| Products components        | Weight, kg/m <sup>2</sup> | Post-consumer material, weight-% per m <sup>2</sup> | Biogenic material, weight-% per m <sup>2</sup> and kg C/m <sup>2</sup> |
|----------------------------|---------------------------|-----------------------------------------------------|------------------------------------------------------------------------|
| Energy coated glass        | 14,970                    | Unknown, 0% assumed                                 | 0% and 0                                                               |
| Uncoated glass             | 7,485                     | Unknown, 0% assumed                                 | 0% and 0                                                               |
| Argon                      | 0,043                     |                                                     | 0% and 0                                                               |
| Spacer bars                | 0,280                     |                                                     | 0% and 0                                                               |
| Edge sealing compound      | 0,650                     |                                                     | 0% and 0                                                               |
| Butyl                      | 0,051                     |                                                     | 0% and 0                                                               |
| Absorbent                  | 0,123                     |                                                     | 0% and 0                                                               |
| Pinewood                   | 9,199                     |                                                     | 97% and 3,93                                                           |
| Surface treatment for pine | 0,748                     |                                                     | 0% and 0                                                               |
| Aluminium                  | 1,670                     | 1%                                                  | 0% and 0                                                               |
| Powder coating aluminium   | 0,074                     |                                                     | 0% and 0                                                               |
| Steel                      | 2,123                     | Market average assumed, 23%                         | 0% and 0                                                               |
| Plastic                    | 0,219                     |                                                     | 0% and 0                                                               |
| Rubber EPDM                | 0,326                     |                                                     | 0% and 0                                                               |
| Rubber TPE                 | 0,019                     |                                                     | 0% and 0                                                               |
| Glue                       | 0,021                     |                                                     | 0% and 0                                                               |
| Sealants                   | 0,044                     |                                                     | 0% and 0                                                               |
| Impregnation               | 0,004                     |                                                     | 0% and 0                                                               |
| TOTAL                      | 38,1                      | 1%                                                  | 23% and 3,93                                                           |

| Packaging materials         | Weight, kg/m <sup>2</sup> | Weight-% per m <sup>2</sup> (versus the product) | Biogenic material, weight-% per m <sup>2</sup> and kg C/m <sup>2</sup> |
|-----------------------------|---------------------------|--------------------------------------------------|------------------------------------------------------------------------|
| Plastic film                | 0,027                     |                                                  | 0% and 0                                                               |
| Plywood                     | 0,197                     |                                                  | 100% and 0,09                                                          |
| Screws (steel)              | 0,009                     |                                                  | 0% and 0                                                               |
| Edge protection (cardboard) | 0,104                     | 62%                                              | 100% and 0,05                                                          |
| Cardboard angles            | 0,031                     | 62%                                              | 100% and 0,01                                                          |
| Top cover (plastic film)    | 0,033                     |                                                  | 0% and 0                                                               |
| Pallet (wood)               | 1,428                     |                                                  | 100% and 0,63                                                          |
| TOTAL                       | 1,829                     | 5%                                               | 96% and 0,78                                                           |

The product does not contain any Substances of Very High Concern (SVHC) that exceeds 0.1% of the product weight. Furthermore, the product does not contain any substances from the Norwegian priority list.

## >> Content and life cycle information

### A1-A3

Raw pine wood is supplied by FSC-certified and/or PEFC-certified suppliers who laminate and finger-joint the raw wood. The wood material is cut, planed, processed, and fitted at Elitfönster's facilities in Lenhovda. The finished wooden components are vacuum impregnated and surface-treated with a solvent-based paint system. Insulating glass units are manufactured at Elitfönster's own window factory IGF in Lenhovda or purchased from Pressglas in Poland. At IGF's production of insulating glass units, glass is cut from Europe's largest flat glass suppliers, spacer bars are cut and bent, and filled with desiccant before being sealed. The insulating glass is then assembled on an assembly line, sealed with edge sealing compound, and packed on return pallets. The glass is fitted into the product at Elitfönster's manufacturing unit in Lenhovda. Aluminum profiles are supplied by Hydro Extrusion in Vetlanda, powder-coated at A-lackering in Sävsjö, and processed and finally assembled at Elitfönster's facilities in Lenhovda. The finished windows are packed on pallets with plywood, cardboard corners, and wrapped in shrink plastic.

To produce 1 m<sup>2</sup> product, 19,3 kWh of electricity and 18,75 kWh of heat is used. Electricity is certified hydro power electricity. The heat comes from own combustion from wood waste created during production.

In total, around 18% of the total incoming raw materials becomes production waste. A large part of the waste is wood.

### A4-A5

All the finished products are loaded onto a truck, which is then transported a transport distance of 294.59 km within Sweden. The transport distance is based on an average distance for shipments reported by Schenker in 2023.

The plastic packaging materials are assumed to be incinerated while cardboard is assumed to be recycled 75% and incinerated 25%. The wood packaging is assumed to be incinerated.

### B1-B5

No impact is expected to occur for module B1, B3 and B5. For B2, cleaning consumables and lubrication has been added for the products lifetime of 50 years.

To comply with EN 17213, a change of insulating glass unit (IGU) has been added after 31 years for module B4. However, due to the enhanced durability of an aluminium clad window's physical properties such a change of IGU is likely not needed (Carlsson, 2005).

During usage, no indoor emissions arise.

### C1-C4

No impact is assumed to occur in module C1. The product is assumed to be transported 75 km to the nearest waste treatment facility (C2). There it is assumed to be fragmented using 0,87 kWh per m<sup>2</sup> of window. The materials that are separated are wood that is sent to energy recycling, plastic that is sent to energy recycling, steel that is sent to material recycling and aluminium that is sent to material recycling (B3). Other material, including the glass, is sent to landfill where it serves as construction material (B4).

## >> Content and life cycle information

This EPD uses input data from other EPDs, the used EPDs can be viewed below:

**Table 3 Overview of utilized EPDs as input data**

| Material                       | EPD name                                                                              | EPD specifications                                                                                                             |
|--------------------------------|---------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------|
| Uncoated glass by Pilkington   | Pilkington Float Glass                                                                | EPD Owner: Pilkington Group Limited<br>EPD Platform: The International EPD® System<br>Publication number: S-P-08816            |
| Coated glass by Pilkington     | Pilkington Offline Coated Float Glass                                                 | EPD Owner: Pilkington Group Limited<br>EPD Platform: The International EPD® System<br>Publication number: S.P.08819            |
| Uncoated glass by Saint-gobain | PLANICLEAR®<br>2 mm - 19 mm<br>Clear float glass                                      | EPD Owner: Saint-Gobain Glass Industry, Europe<br>EPD Platform: The International EPD® System<br>Publication number: S-P-00882 |
| Spacer bars                    | Spacers<br>SP12, SP13 and SP14                                                        | EPD Owner: Technoform<br>EPD platform: INIES<br>Publication number: 7-333:2019<br>Publication date: 2019-06-15                 |
| Pine by Stora Enso             | Industrial Components                                                                 | EPD Owner: Stora Enso<br>EPD platform: The International EPD® System<br>Publication number: S-P-02154                          |
| Pine, laminated wood           | Laminated wood                                                                        | EPD Owner: AS Barrus<br>EPD platform: EPD Hub<br>Publication number: EPD HUB, HUB-0100                                         |
| Aluminium parts                | Aluminium profiles implemented<br>with hydro redux a billet;<br>mill finished profile | EPD Owner: Hydro Extrusion Sweden AB<br>EPD platform: The International EPD® System<br>Publication number: S-P-07377           |

## Results of the environmental performance indicators

### Mandatory and voluntary impact category indicators according to EN 15804

#### Results per functional unit

| Indicator                                              | Unit                   | A1-A3     | A4       | A5       | B1 | B2        | B3 | B4       | B5 |
|--------------------------------------------------------|------------------------|-----------|----------|----------|----|-----------|----|----------|----|
| <b>Climate change – Fossil</b>                         | kg CO <sub>2</sub> eq. | 6,16E+01  | 2,17E+00 | 1,70E-01 | 0  | 2,01E+00  | 0  | 3,81E+01 | 0  |
| <b>Climate change – Biogenic</b>                       | kg CO <sub>2</sub> eq. | -1,65E+01 | 1,49E-03 | 1,22E+00 | 0  | -3,88E-01 | 0  | 6,63E-03 | 0  |
| <b>Climate change – Land use and LU change</b>         | kg CO <sub>2</sub> eq. | 2,26E-01  | 7,09E-04 | 8,00E-06 | 0  | 1,24E-01  | 0  | 1,45E-01 | 0  |
| <b>Climate change</b>                                  | kg CO <sub>2</sub> eq. | 4,54E+01  | 2,17E+00 | 1,39E+00 | 0  | 1,74E+00  | 0  | 3,83E+01 | 0  |
| <b>Ozone depletion</b>                                 | kg CFC 11 eq.          | 3,92E-06  | 4,31E-08 | 4,43E-10 | 0  | 5,92E-08  | 0  | 2,44E-06 | 0  |
| <b>Acidification</b>                                   | mol H <sup>+</sup> eq. | 3,26E-01  | 6,79E-03 | 2,42E-04 | 0  | 1,27E-02  | 0  | 1,97E-01 | 0  |
| <b>Eutrophication, freshwater</b>                      | kg P eq.               | 4,36E-03  | 1,67E-05 | 3,31E-07 | 0  | 1,21E-04  | 0  | 3,14E-03 | 0  |
| <b>Eutrophication, marine</b>                          | kg N eq.               | 6,54E-02  | 2,26E-03 | 1,12E-04 | 0  | 3,59E-03  | 0  | 4,16E-02 | 0  |
| <b>Eutrophication, terrestrial</b>                     | mol N eq.              | 7,91E-01  | 2,49E-02 | 1,19E-03 | 0  | 2,69E-02  | 0  | 5,22E-01 | 0  |
| <b>Photochemical ozone formation</b>                   | kg NMVOC eq.           | 2,44E-01  | 1,06E-02 | 3,23E-04 | 0  | 1,40E-02  | 0  | 1,48E-01 | 0  |
| <b>Resource use, minerals and metals<sup>1 3</sup></b> | kg Sb eq.              | 7,46E-04  | 6,94E-06 | 6,62E-08 | 0  | 2,17E-05  | 0  | 5,98E-04 | 0  |
| <b>Resource use, fossils<sup>1 3</sup></b>             | MJ                     | 8,57E+02  | 3,05E+01 | 3,17E-01 | 0  | 4,03E+01  | 0  | 5,18E+02 | 0  |
| <b>Water use<sup>1</sup></b>                           | m <sup>3</sup>         | 2,67E+01  | 1,25E-01 | 5,84E-03 | 0  | 1,77E+00  | 0  | 1,85E+01 | 0  |
| <b>Particulate matter</b>                              | disease inc.           | 4,53E-06  | 1,70E-07 | 3,44E-09 | 0  | 1,35E-07  | 0  | 6,57E-07 | 0  |
| <b>Ionising radiation<sup>2</sup></b>                  | kBq U-235 eq           | 2,07E+00  | 1,39E-02 | 1,62E-04 | 0  | 4,92E-02  | 0  | 1,48E-01 | 0  |
| <b>Ecotoxicity, freshwater<sup>1 3</sup></b>           | CTUe                   | 6,74E+02  | 8,18E+00 | 5,63E-01 | 0  | 2,56E+01  | 0  | 2,80E+02 | 0  |
| <b>Human toxicity, cancer<sup>1 3</sup></b>            | CTUh                   | 4,20E-07  | 1,52E-08 | 3,77E-10 | 0  | 1,09E-08  | 0  | 9,16E-08 | 0  |
| <b>Human toxicity, non-cancer<sup>1 3</sup></b>        | CTUh                   | 7,00E-07  | 1,90E-08 | 2,37E-09 | 0  | 2,29E-08  | 0  | 1,68E-07 | 0  |
| <b>Land use<sup>1 3</sup></b>                          | Pt                     | 6,84E+02  | 1,81E+01 | 1,65E-01 | 0  | 2,76E+01  | 0  | 6,96E+01 | 0  |

Disclaimer: It is discouraged to use the results of modules A1 to A3 without considering the results of module C.

<sup>1</sup> Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

<sup>2</sup> Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effect due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from construction materials is also not measured by this indicator.

<sup>3</sup> Disclaimer: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

## >> Results of the environmental performance indicators

### Results per functional unit

| Indicator                                              | Unit                   | C1 | C2       | C3       | C4       | D         |
|--------------------------------------------------------|------------------------|----|----------|----------|----------|-----------|
| <b>Climate change – Fossil</b>                         | kg CO2 eq              | 0  | 5,52E-01 | 3,76E+00 | 1,32E-01 | -1,29E+01 |
| <b>Climate change – Biogenic</b>                       | kg CO2 eq              | 0  | 3,79E-04 | 1,57E+01 | 3,38E-04 | -1,16E-02 |
| <b>Climate change – Land use and LU change</b>         | kg CO2 eq              | 0  | 1,81E-04 | 3,19E-03 | 2,11E-05 | -2,94E-01 |
| <b>Climate change</b>                                  | kg CO2 eq              | 0  | 5,53E-01 | 1,94E+01 | 1,33E-01 | -1,32E+01 |
| <b>Ozone depletion</b>                                 | kg CFC11 eq            | 0  | 1,10E-08 | 5,54E-09 | 4,93E-09 | -2,36E-07 |
| <b>Acidification</b>                                   | mol H+ eq              | 0  | 1,73E-03 | 2,74E-03 | 8,23E-04 | -6,07E-02 |
| <b>Eutrophication, freshwater</b>                      | kg P eq                | 0  | 4,25E-06 | 4,61E-06 | 7,46E-07 | -6,55E-04 |
| <b>Eutrophication, marine</b>                          | kg PO4 eq              | 0  | 5,76E-04 | 1,24E-03 | 3,51E-04 | -1,06E-02 |
| <b>Eutrophication, terrestrial</b>                     | kg N eq                | 0  | 6,34E-03 | 1,32E-02 | 3,85E-03 | -1,20E-01 |
| <b>Photochemical ozone formation</b>                   | mol N eq               | 0  | 2,71E-03 | 3,55E-03 | 1,55E-03 | -4,71E-02 |
| <b>Resource use, minerals and metals<sup>1 3</sup></b> | kg NMVOC eq            | 0  | 1,77E-06 | 1,22E-06 | 1,66E-07 | 1,29E-04  |
| <b>Resource use, fossils<sup>1 3</sup></b>             | kg Sb eq               | 0  | 7,76E+00 | 7,01E+00 | 3,29E+00 | -2,77E+02 |
| <b>Water use<sup>1</sup></b>                           | MJ                     | 0  | 3,18E-02 | 1,70E-01 | 1,14E-02 | -6,03E-01 |
| <b>Particulate matter</b>                              | m <sup>3</sup> depriv. | 0  | 4,32E-08 | 3,27E-08 | 2,08E-08 | -1,03E-06 |
| <b>Ionising radiation<sup>2</sup></b>                  | disease inc.           | 0  | 3,54E-03 | 1,31E-01 | 1,06E-03 | -4,50E+00 |
| <b>Ecotoxicity, freshwater<sup>1 3</sup></b>           | kBq U-235 eq           | 0  | 2,08E+00 | 7,31E+00 | 3,36E-01 | -3,74E+02 |
| <b>Human toxicity, cancer<sup>1 3</sup></b>            | CTUe                   | 0  | 3,86E-09 | 5,64E-09 | 5,56E-10 | -1,52E-06 |
| <b>Human toxicity, non-cancer<sup>1 3</sup></b>        | CTUh                   | 0  | 4,84E-09 | 3,31E-08 | 4,85E-10 | -3,18E-08 |
| <b>Land use<sup>1 3</sup></b>                          | CTUh                   | 0  | 4,62E+00 | 2,54E+00 | 6,66E+00 | -1,74E+02 |

Disclaimer: It is discouraged to use the results of modules A1 to A3 without considering the results of module C.

<sup>1</sup> Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

<sup>2</sup> Disclaimer: This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effect due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from construction materials is also not measured by this indicator.

<sup>3</sup> Disclaimer: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

## Climate impact – IPCC 2021 GWP100

### Results per functional unit

|                            | Unit                   | A1-A3 | A4   | A5   | B1   | B2     | B3   | B4    | B5   |
|----------------------------|------------------------|-------|------|------|------|--------|------|-------|------|
| <b>GWP-GHG<sup>4</sup></b> | Kg CO <sub>2</sub> ,eq | 62,06 | 2,17 | 0,17 | 0,00 | 2,13   | 0,00 | 38,46 | 0,00 |
|                            | Unit                   | C1    | C2   | C3   | C4   | D      |      |       |      |
| <b>GWP-GHG<sup>4</sup></b> | Kg CO <sub>2</sub> ,eq | 0,00  | 0,55 | 3,77 | 0,13 | -13,18 |      |       |      |

<sup>4</sup> This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO<sub>2</sub> is set to zero.

## Resource use indicators

### Results per functional unit

|                 | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | A1-A3    | A4       | A5        | B1       | B2        | B3 | B4       | B5 |
|-----------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------|-----------|----------|-----------|----|----------|----|
| <b>PERE</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 4,85E+02 | 5,17E-01 | 7,57E-03  | 0        | 9,44E+00  | 0  | 4,33E+01 | 0  |
| <b>PERM</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2,97E+02 | 0,00E+00 | -3,30E+01 | 0        | 0,00E+00  | 0  | 0,00E+00 | 0  |
| <b>PERT</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7,82E+02 | 5,17E-01 | -3,30E+01 | 0        | 9,44E+00  | 0  | 4,33E+01 | 0  |
| <b>PENRE</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 7,79E+02 | 3,24E+01 | 3,41E-01  | 0        | 4,34E+01  | 0  | 5,22E+02 | 0  |
| <b>PENRM</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 9,59E+01 | 0,00E+00 | -1,86E+00 | 0        | 0,00E+00  | 0  | 0,00E+00 | 0  |
| <b>PENRT</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 8,75E+02 | 3,24E+01 | -1,52E+00 | 0        | 4,34E+01  | 0  | 5,22E+02 | 0  |
| <b>SM</b>       | Kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 5,89E-01 | 0,00E+00 | 0,00E+00  | 0        | 0,00E+00  | 0  | 0,00E+00 | 0  |
| <b>RSF</b>      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0        | 0,00E+00  | 0  | 0,00E+00 | 0  |
| <b>NRSF</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0,00E+00 | 0,00E+00 | 0,00E+00  | 0        | 0,00E+00  | 0  | 0,00E+00 | 0  |
| <b>FW</b>       | M3                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 2,36E-01 | 4,53E-03 | 5,46E-04  | 0        | 8,04E-02  | 0  | 6,47E-02 | 0  |
|                 | Unit                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | C1       | C2       | C3        | C4       | D         |    |          |    |
| <b>PERE</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 1,32E-01 | 2,57E+00  | 6,74E-02 | -1,66E+02 |    |          |    |
| <b>PERM</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 0,00E+00 | -2,64E+02 | 0,00E+00 | 0,00E+00  |    |          |    |
| <b>PERT</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 1,32E-01 | -2,62E+02 | 6,74E-02 | -1,66E+02 |    |          |    |
| <b>PENRE</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 8,25E+00 | 7,28E+00  | 3,50E+00 | -2,87E+02 |    |          |    |
| <b>PENRM</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 0,00E+00 | -9,40E+01 | 0,00E+00 | 0,00E+00  |    |          |    |
| <b>PENRT</b>    | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 8,25E+00 | -8,68E+01 | 3,50E+00 | -2,87E+02 |    |          |    |
| <b>SM</b>       | Kg                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 0,00E+00 | 0,00E+00  | 0,00E+00 | 0,00E+00  |    |          |    |
| <b>RSF</b>      | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 0,00E+00 | 0,00E+00  | 0,00E+00 | 0,00E+00  |    |          |    |
| <b>NRSF</b>     | MJ                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | 0        | 0,00E+00 | 0,00E+00  | 0,00E+00 | 0,00E+00  |    |          |    |
| <b>FW</b>       | m <sup>3</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        | 0        | 1,15E-03 | 7,56E-03  | 3,51E-03 | -6,75E-02 |    |          |    |
| <b>Acronyms</b> | <p>PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials<br/> PERM = Use of renewable primary energy resources used as raw materials<br/> PERT = Total use of renewable primary energy resources<br/> PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials<br/> PENRM = Use of non-renewable primary energy resources used as raw materials<br/> PENRT = Total use of non-renewable primary energy re-sources<br/> SM = Use of secondary material<br/> RSF = Use of renewable secondary fuels<br/> NRSF = Use of non-renewable secondary fuels<br/> FW = Use of net fresh water</p> |          |          |           |          |           |    |          |    |

## Waste production and output flows

### Waste indicators

| Indicator                     | Unit | A1-A3 | A4   | A5   | B1   | B2   | B3   | B4    |
|-------------------------------|------|-------|------|------|------|------|------|-------|
| Hazardous waste disposed      | kg   | 13,81 | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 13,73 |
| Non-hazardous waste disposed  | kg   | 7,96  | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 1,24  |
| Radioactive waste disposed    | kg   | 0,01  | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 | 0,01  |
|                               |      |       |      |      |      |      |      |       |
| Indicator                     | Unit | B5    | C1   | C2   | C3   | C4   | D    |       |
| Materials for energy recovery | kg   | 0,00  | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |       |
| Exported energy, electricity  | MJ   | 0,00  | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |       |
| Exported energy, thermal      | MJ   | 0,00  | 0,00 | 0,00 | 0,00 | 0,00 | 0,00 |       |

### Output flow indicators

| Indicator                     | Unit | A1-A3 | A4   | A5    | B1     | B2   | B3   | B4   |
|-------------------------------|------|-------|------|-------|--------|------|------|------|
| Components for re-use         | kg   | 0,00  | 0,00 | 0,00  | 0,00   | 0,00 | 0,00 | 0,00 |
| Material for recycling        | kg   | 3,83  | 0,00 | 0,00  | 0,00   | 0,00 | 0,00 | 0,26 |
| Materials for energy recovery | kg   | 0,03  | 0,00 | 0,00  | 0,00   | 0,00 | 0,00 | 0,00 |
| Exported energy, electricity  | MJ   | 0,00  | 0,00 | 8,36  | 0,00   | 0,00 | 0,00 | 0,00 |
| Exported energy, thermal      | MJ   | 0,01  | 0,00 | 19,52 | 0,00   | 0,00 | 0,00 | 0,00 |
|                               |      |       |      |       |        |      |      |      |
| Indicator                     | Unit | B5    | C1   | C2    | C3     | C4   | D    |      |
| Components for re-use         | kg   | 0,00  | 0,00 | 0,00  | 0,00   | 0,00 | 0,00 |      |
| Material for recycling        | kg   | 0,00  | 0,00 | 0,00  | 6,00   | 0,00 | 0,00 |      |
| Materials for energy recovery | kg   | 0,00  | 0,00 | 0,00  | 0,00   | 0,00 | 0,00 |      |
| Exported energy, electricity  | MJ   | 0,00  | 0,00 | 0,00  | 61,07  | 0,00 | 0,00 |      |
| Exported energy, thermal      | MJ   | 0,00  | 0,00 | 0,00  | 142,51 | 0,00 | 0,00 |      |



## Voluntary use stage scenario based on energy balance calculation according to Annex C in EN 17213 – AFHC energy glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

| General information                          |                                   |                                                                                                                                              |
|----------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                                              |                                   | Comments                                                                                                                                     |
| Heating method according to EN 17213 annex C | District heating from natural gas | LCI dataset: Heat, central or small-scale, natural gas {RER}  market group for   Cut-off, U                                                  |
| Cooling method according to EN 17213 annex C | Electricity powered air cooler    | LCI dataset: Electricity, low voltage {SE}  market for   Cut-off, U                                                                          |
| Climate Zone                                 | III                               | According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute |
| Annual average temperature                   | 6,6 °C                            | Stockholm                                                                                                                                    |
| Min indoor temperature                       | 21 °C                             | Heating stops at this temperature                                                                                                            |
| Max indoor temperature                       | 27 °C                             | Cooling stops at this temperature                                                                                                            |
| Cooling Factor                               | 3                                 | kWh cooling delivered per kWh of electricity                                                                                                 |
| Model (Calculation)                          | Single room                       |                                                                                                                                              |
| Orientation                                  | West (270°)                       |                                                                                                                                              |
| Calculation method                           | Hourly                            |                                                                                                                                              |
| Modelling program                            | BIM Energy 2024                   | Modelled as a 1 m <sup>2</sup> room with concrete flooring and no walls or internal loads                                                    |
| Environmental Impact assessment model        | Environmental Footprint 3.1       |                                                                                                                                              |

| Technical specifications  |                           |
|---------------------------|---------------------------|
| U-value                   | 0,81 w/m <sup>2</sup> , K |
| Gg-value                  | 53 %                      |
| Gw-value                  | 38 %                      |
| Air leakage class         | 4                         |
| Daylight factor, LT-value | 74 %                      |
| Glass/frame ratio         | 0,71                      |
| Total heating demand      | 58 kWh heat/year          |
| Total cooling demand      | 17 kWh electricity/year   |

## >>Voluntary use stage scenario based on energy balance calculation according to Annex C in EN 17213 – AFHC energy glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO<sub>2</sub>, eq as mol H<sup>+</sup>, eq

Eutrophication: 0.33 to report kg PO<sub>4</sub>-<sup>3</sup>, eq. Kg P, eq

Photochemical Ozone Creation Potential: 1.69 to report kg C<sub>2</sub>H<sub>4</sub>, eq as kg NMVOC, eq

| Yearly environmental impacts                   |                                                   |                                               |                                               |
|------------------------------------------------|---------------------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Environmental impact category                  | Unit                                              | Environmental impacts of heating, natural gas | Environmental impacts of cooling, electricity |
| Global Warming Potential                       | kg CO <sub>2,eq</sub>                             | 16,2                                          | 0,6                                           |
| Ozone Depletion Potential                      | kg CFC-11 <sub>eq</sub>                           | 6,47E-07                                      | 1,68E-08                                      |
| Acidification Potential                        | kg SO <sub>2,eq</sub>                             | 9,65E-03                                      | 5,26E-03                                      |
| Eutrophication Potential                       | kg PO <sub>4</sub> - <sup>3</sup> , <sub>eq</sub> | 1,59E-03                                      | 1,51E-03                                      |
| Photochemical Ozone Creation Potential         | kg C <sub>2</sub> H <sub>4</sub>                  | 1,64E-02                                      | 1,64E-03                                      |
| Abiotic Depletion Potential, minerals & metals | kg Sb, <sub>eq</sub>                              | 1,59E-05                                      | 6,74E-05                                      |
| Abiotic Depletion Potential, fuels.            | MJ                                                | 2,55E+02                                      | 7,52E+01                                      |

## Voluntary use stage scenario based on energy balance calculation according to Annex C in EN 17213 – AFHC standard glass

Use stage environmental impacts illustrates the annual environmental impacts due to the energy balance of the windows, based on Stockholm heating demand average and an energy balance formula based on the described scenario.

| General information                          |                                   |                                                                                                                                              |
|----------------------------------------------|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------|
|                                              |                                   | Comments                                                                                                                                     |
| Heating method according to EN 17213 annex C | District heating from natural gas | LCI dataset: Heat, central or small-scale, natural gas {RER}  market group for   Cut-off, U                                                  |
| Cooling method according to EN 17213 annex C | Electricity powered air cooler    | LCI dataset: Electricity, low voltage {SE}  market for   Cut-off, U                                                                          |
| Climate Zone                                 | III                               | According to Swedish building standards, used climate file: "Stockholm 1981-2010" from the Swedish Meteorological and Hydrological Institute |
| Annual average temperature                   | 6,6 °C                            | Stockholm                                                                                                                                    |
| Min indoor temperature                       | 21 °C                             | Heating stops at this temperature                                                                                                            |
| Max indoor temperature                       | 27 °C                             | Cooling stops at this temperature                                                                                                            |
| Cooling Factor                               | 3                                 | kWh cooling delivered per kWh of electricity                                                                                                 |
| Model (Calculation)                          | Single room                       |                                                                                                                                              |
| Orientation                                  | West (270°)                       |                                                                                                                                              |
| Calculation method                           | Hourly                            |                                                                                                                                              |
| Modelling program                            | BIM Energy 2024                   | Modelled as a 1 m <sup>2</sup> room with concrete flooring and no walls or internal loads                                                    |
| Environmental Impact assessment model        | Environmental Footprint 3.1       |                                                                                                                                              |

| Technical specifications  |                           |
|---------------------------|---------------------------|
| U-value                   | 1,05 w/m <sup>2</sup> , K |
| Gg-value                  | 60 %                      |
| Gw-value                  | 43 %                      |
| Air leakage class         | 4                         |
| Daylight factor, LT-value | 75 %                      |
| Glass/frame ratio         | 0,71                      |
| Total heating demand      | 77 kWh heat/year          |
| Total cooling demand      | 17 kWh electricity/year   |

## >>Voluntary use stage scenario based on energy balance calculation according to Annex C in EN 17213 – AFHC standard glass

The results below are the environmental impacts that are presented in line with instructions from EN 17213 appendix C. It is worth noting that some units are differing from units that are presented in results for the LCA. For comparison, multiply the result below by the following factors:

Acidification: 1.31 to report kg SO<sub>2</sub>, eq as mol H<sup>+</sup>, eq

Eutrophication: 0.33 to report kg PO<sub>4</sub>-<sup>3</sup>, eq. Kg P, eq

Photochemical Ozone Creation Potential: 1.69 to report kg C<sub>2</sub>H<sub>4</sub>, eq as kg NMVOC, eq

| Yearly environmental impacts                   |                                       |                                               |                                               |
|------------------------------------------------|---------------------------------------|-----------------------------------------------|-----------------------------------------------|
| Environmental impact category                  | Unit                                  | Environmental impacts of heating, natural gas | Environmental impacts of cooling, electricity |
| Global Warming Potential                       | kg CO <sub>2</sub> ,eq                | 21,6                                          | 0,6                                           |
| Ozone Depletion Potential                      | kg CFC-11 <sub>eq</sub>               | 8,59E-07                                      | 1,68E-08                                      |
| Acidification Potential                        | kg SO <sub>2</sub> ,eq                | 1,28E-02                                      | 5,26E-03                                      |
| Eutrophication Potential                       | kg PO <sub>4</sub> - <sup>3</sup> ,eq | 2,11E-03                                      | 1,51E-03                                      |
| Photochemical Ozone Creation Potential         | kg C <sub>2</sub> H <sub>4</sub>      | 2,18E-02                                      | 1,64E-03                                      |
| Abiotic Depletion Potential, minerals & metals | kg Sb <sub>eq</sub>                   | 2,12E-05                                      | 6,74E-05                                      |
| Abiotic Depletion Potential, fuels.            | MJ                                    | 3,38E+02                                      | 7,52E+01                                      |

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