

Environmental Product Declaration



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

DEFENDER DF810LM Aluminum railing system for glass parapets

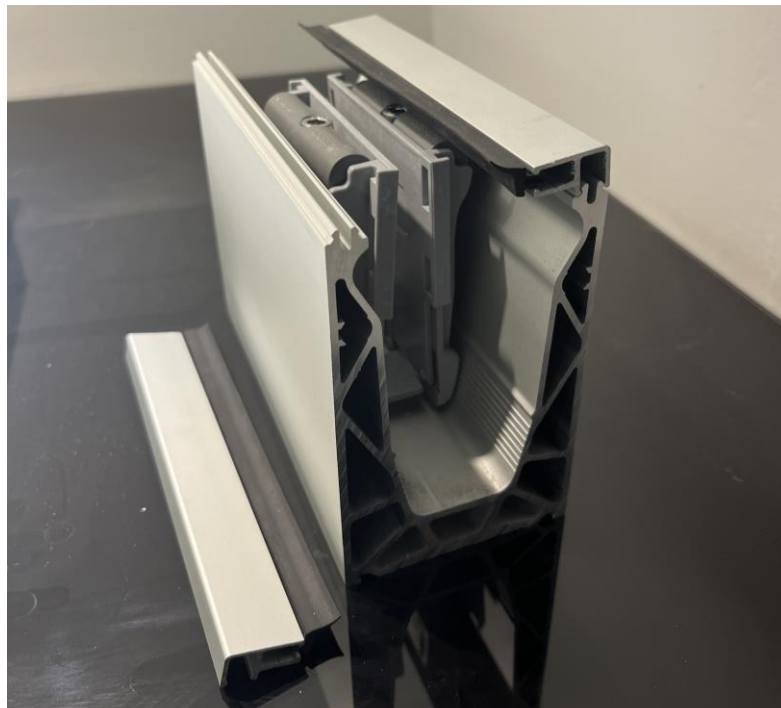
from

Saint-Gobain Italia S.p.A.



| | |
|--------------------------|--|
| Programme: | The International EPD System, www.environdec.com |
| Programme operator: | EPD International AB |
| Type of EPD: | EPD of multiple products, based on the average results of the product group |
| EPD registration number: | EPD-IES-0026357:001 |
| Version date: | 2025-11-06 |
| Validity date: | 2030-11-05 |

An EPD may be updated or depublished if conditions change. To find the latest version of the EPD and to confirm its validity, see 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 |
| E-mail: | support@environdec.com |

| Product Category Rules (PCR) |
|---|
| CEN standard EN 15804 serves as the Core Product Category Rules (PCR) |
| Product Category Rules (PCR): PCR 2019:14- Construction Products version 2.0.1. Publisher on 2025.11.06 valid until: 2030-11-05 |
| PCR review was conducted by: The Technical Committee of the International EPD System. See www.environdec.com for a list of members. Review chair: Rob Rouwette (chair), Noa Meron (co-chair). The review panel may be contacted via the Secretariat www.environdec.com/contact |

| Third-party Verification |
|--|
| Independent third-party verification of the declaration and data, according to ISO 14025:2006, via: |
| <input type="checkbox"/> Individual EPD verification without a pre-verified LCA/EPD tool <input type="checkbox"/> Individual EPD verification with a pre-verified LCA/EPD tool <input type="checkbox"/> EPD process certification* without a pre-verified LCA/EPD tool <input type="checkbox"/> EPD process certification* with a pre-verified LCA/EPD tool <input type="checkbox"/> Fully pre-verified EPD tool <input checked="" type="checkbox"/> EPD Verification by accredited certification body Third-party verifier: <i>Certiquality Srl</i> Accredited by: Accredia, certificate n. 00027VV |
| Procedure for follow-up of data during EPD validity involves third party verifier: |
| <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No |

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

EPDs within the same product category but published in different EPD programmes, may not be comparable. For two EPDs to be comparable, they shall be based on the same PCR (including the same first-digit 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 identical scope in terms of included life-cycle stages (unless the excluded life-cycle stage is demonstrated to be insignificant); apply identical impact assessment methods (including the same version of characterisation factors); and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.



INFORMATION ABOUT EPD OWNER

Owner of the EPD: Saint-Gobain Italia S.p.A.

Address: Plant: Saint-Gobain Logli S.r.l. Via Chemnitz 49/51, Prato (PO), Italy

Contact: Phone number: +39.0574.848111 / mail: info@loglimassimo.it / web: www.sg-logli.it

Address and contact information of the LCA practitioner commissioned by the EPD owner:

ICA - Società di Ingegneria Chimica per l'Ambiente S.r.l.

Via Stezzano, 87 -24126 Bergamo (Bg), Italy

c/o: Kilometro Rosso Innovation District

info@studioica.it



Description of the organisation:

Saint-Gobain Logli S.r.l. (Logli) has been active for 34 years, years in which the corporate identity, the quality of products and services offered, the punctuality of deliveries, the continuous availability to invest in research and development, designing, innovating and exceeding the limits set by standardization have gone hand in hand with the evolution of the market. Growth has been continuous and constant, desired and pursued, translated into investments in people and technology to make the company the excellence in its sector, both in Italy and abroad.

Logli products represent, today more than yesterday, highly technological solutions: safe, reliable and always cutting edge.

From glass balustrades to steel and aluminium systems for sliding doors, from hinges to locks and accessories, glass canopies and anchoring and support systems even with next generation UV Technology.

PRODUCT INFORMATION

Product name: DEFENDER DF810LM

Product identification and description: Defender 810LM is an aluminium railing system for glass parapets of the "U" type with anchoring to the structure in line with the profile and bilateral adjustment from the inside and outside

The solutions of the DEFENDER line combine aesthetics and functional technical efficiency, increasing the brightness of the rooms in compliance with all safety regulations.

UN CPC code: 41532

The reference CPC code is 415 "Semi-finished products of copper, nickel, aluminium, lead, zinc and tin or their alloys".

Product description: Aluminium finishing (anodizing and coating) was modelled taking into account the type of sold product during the reference year. Three lengths are available (6m, 3m, 1,5 m)

Name and location of production site(s): Saint-Gobain Logli S.r.l. -Via Chemnitz 49/51, Prato (PO), Italy

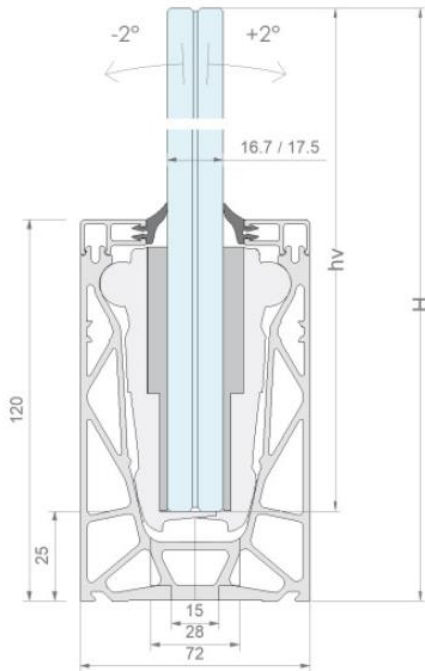


Figure 1 Diagram of the product and its image

CONTENT DECLARATION

The mass (weight) of one unit of a product per declared unit is 1 m of aluminium railing system for glass parapets. Weight 5,3 kg.

| Product content | Mass, % | Post-consumer recycled material, mass-% of product | Pre-Consumer recycled material, mass % of product | Biogenic material, mass-% of product | Biogenic material, kg C/product or declared unit |
|--------------------------------|---------|--|---|--------------------------------------|--|
| Aluminium | 86% | 17% | 7% | 0,00 | 0,00 |
| Polyoxymethylene + Glass Fibre | 7% | 0% | 0% | 0,00 | 0,00 |
| Polyamide | 4% | 0% | 0% | 0% | 0,00 |
| Steel | 1,5% | 0% | 0% | 0% | 0,00 |
| Thermoplastic Elastomers | 1,5% | 0% | 0% | 0,00 | 0,00 |

| Packaging materials | Mass, kg/m | Mass-% (versus the product) | Biogenic material, kg C/product or declared unit |
|---------------------|------------|-----------------------------|--|
| Coreboard | 3,47E-01 | 6,5% | 0,156 |
| Packaging film | 2,50E-02 | 0,5% | 0 |

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

Product do not contain substances listed in the “Candidate List of Substances of Very High Concern” (SVHC).

LCA INFORMATION

Declared unit: 1 m of aluminium railing system for glass parapets

Conversion factor to mass if mass is not used as functional/declared unit (not applicable for services).

Time representativeness: 01-01-2024 / 31-12-2024]

Geographical scope: Italy, Europe

Database(s) and LCA software used: Ecoinvent 3.11, SimaPro v. 10.2

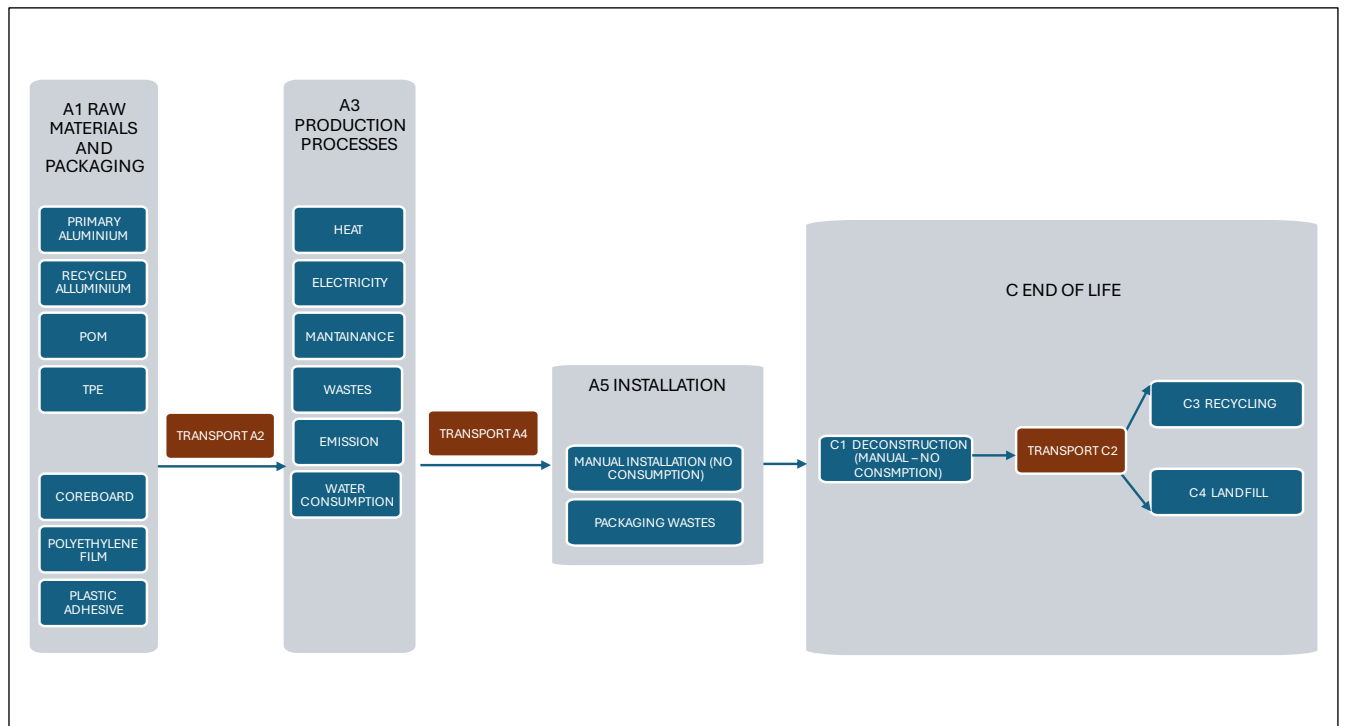
Description of system boundaries:

Cradle to gate with options, modules A4, C1–C4, module D and with optional modules (A1–A3 + A4 + A5 + C + D). The list of life-cycle stages is indicated in the table below, according to EN 15804

Process flow diagram:

The production of the DEFENDERDF810LM system at the Logli plant begins with the procurement of the aluminum profile, produced from a mix of primary/recycled aluminium alloy billets. The profile is then packaged with all the components for installation: gasket profiles, aluminium finishing profiles and clamps. Once packaged at the Logli plant, the package is shipped and delivered to the end customer who will complete the installation of the parapet by procuring and installing the glass inside the DEFENDER 810LM channel.

Figure below is a simplified process with system boundaries where all instances of the figure are included in the assessment. Infrastructure, construction, production equipment, and tools directly consumed in the production process, travelling by personnel and research and development activities are excluded, in accordance with the PCR.



More information and Assumption

Electricity

The purchased electricity used in the manufacturing process of module A3 accounts for less than 30% of the GWP-GHG results of modules A1-A3, nevertheless the energy source behind the purchased electricity and its climate impact as kg CO₂ eq./kWh (using the GWP-GHG indicator) has been reported. In detail the electricity is modelled by using the residual mix 2024 and its emission factor is 0,58 kg CO₂ eq./kWh.

Module A4

Product transport from manufacturer to customer is considered. For the downstream transportation an average distance via trucks has been considered: 300 km for the transportation at national level (Lorri >7,5 metric ton) and 1000km for transportation in Europe and extra Europe (UK and Switzerland) (Lorri >32 metric ton). The environmental class is assumed as 5.

Module A5

No impact was assumed during the installation phase. End of life of packaging waste is calculated under this module.

Module C2 + C3 + C4

Modules C1 and C4 concern the end-of-life stage of the profile and are based on scenarios deemed reliable according to industry experience and statistics. The following assumptions were made.

C1: In this section, where the impacts caused by the disassembly of the product are calculated, the impact is considered as zero since the disassembly of the product is done manually.

C2 – Transport of the end-of-life product for disposal: a distance of 100 km by lorry 16-32 tonnes euro 4 from construction/demolition sites to disposal sites has been chosen as a conservative assumption.

C3 – Profile recovery: Aluminium profiles are not sent for energy recovery. For material recovery, a 90% recycling rate is assumed (source: European Aluminium). The polyamide and TPE parts are assumed to be sent to incineration without energy recovery. Waste processing considers the electricity consumption of waste sorting. Recycling process, other than sorting, are not considered.

C4: The remaining 10% of the profile that is not recovered as material is sent to landfill.

Since the declared scenario in EPD is a mix of end-of life alternatives (reuse, recycling, incineration with energy recovery, landfill, etc.), then the corresponding 100% scenarios (100% recycling, 100% landfill) is declared as alternative results.

Module D

The module D comprises avoided impacts and environmental burdens related to aluminium recycling process.

Data Quality:

In accordance with the UNI EN 15804 standard, three qualitative criteria were adopted to evaluate the quality of the data input to the model in terms of temporal, geographical and technological representativeness. The quality levels refer to table E.2 of Annex E. The overall quality level of the data used for the inventory is good quality.

Allocation:

Where possible, the allocation has been avoided by identifying the specific consumption relating to the product. Primary data relating to the reference year were collected for energy and utilities consumption, as well as for emissions and waste, allocated on the basis of the annual turnover.

Background Data:

For all LCA modelling and calculation, with the Ecoinvent database (v3.11) and SimaPro (v10.2) LCA software were used. Characterization factors of EN 15804 reference package based on EF 3.1 are utilized. Impact of infrastructure and capital goods are excluded from the analysis.

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

| | 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 |
| Module | A1 | A2 | A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
| Modules declared | X | X | X | X | X | ND | ND | ND | ND | ND | ND | ND | X | X | X | X | X |
| Geography | GLO | GLO | IT | EU | EU | | | | | | | | EU | EU | EU | EU | EU |
| Primary data | 3% | | | | | | | | | | | | | | | | |
| Variation – products | 0% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |
| Variation – sites | 0% | | | | | - | - | - | - | - | - | - | - | - | - | - | - |

The share of primary data is calculated based on GWP-GHG results. It is a simplified indicator for data quality that supports the use of more primary data, to increase the representativeness of and comparability between EPDs. Note that the indicator does not capture all relevant aspects of data quality and is not comparable across product categories.

| Process | Source type | Source | Reference year | Data category | Share of primary data, of GWP-GHG results for A1-A3 |
|--|----------------|---|----------------|------------------------------|---|
| Manufacturing of product | Collected data | EPD owner | 2024 | Primary data | 0% |
| Generation of electricity used in manufacturing of product | Database | Ecoinvent v3.11, AIB | 2024 | Primary data | 1% |
| Transport of raw materials to manufacturing site | Database | Ecoinvent v3.11 | 2024 | Primary data | 1% |
| Production of primary aluminium | Database | Ecoinvent v3.11 | 2024 | Secondary data | 24% |
| Production of Recycled aluminium | Database | Ecoinvent v3.11 | 2024 | Primary data, Secondary data | 64% |
| Production of Other Raw materials | Database | Ecoinvent v3.11 | 2024 | Primary data, Secondary data | 8% |
| Production of packaging | Database | Ecoinvent v3.11 | 2024 | Primary data, secondary data | 0% |
| Other processes | Database | Ecoinvent v3.11, USA Input-output databases | 2019–2024 | Secondary data | 0% |
| Total share of primary data, of GWP-GHG results for A1-A3 | | | | | 3% |

ENVIRONMENTAL PERFORMANCE

LCA results of the product(s) - main environmental performance results

Mandatory impact category indicators according to EN 15804

The characterization factors of the EN 15804 standard have been used to estimate the potential environmental impacts (Method EN 15804 +A2 (adapted) v 1.01 / EF 3.1 normalization and weighting set). With respects to the results corresponding to the rest of the parameters under study, the CED Method (Cumulative Energy Demand LHV v 1.01) has been used. Estimated impact results are only relative statements that do not indicate impact category endpoints, exceedances of assessed thresholds, safety margins or risks. Results obtained in both the product stage (module A1-A3) and installation stage (modules A4-A5) should not be used without considering those results obtained in modules C. Regarding C4 module, locally and additional calculation will be necessary based on the local applicable waste treatment scenario. All infrastructure and capital goods are excluded for the core processes.

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-----------------------------------|---------------------------------|----------|----------|----------|----------|-----------|-----------|
| | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Global warming potential - total (GWP-total) | kg CO ₂ eq. | 4,39E+01 | 7,36E-01 | 1,50E-01 | 1,01E-01 | 9,13E-01 | 7,31E-03 | -1,97E+01 |
| Global warming potential - fossil fuels (GWP-fossil) | kg CO ₂ eq. | 4,36E+01 | 7,36E-01 | 5,05E-02 | 1,01E-01 | 8,18E-01 | 7,07E-03 | -1,91E+01 |
| Global warming potential - biogenic (GWP-biogenic) | kg CO ₂ eq. | 5,77E-03 | 3,83E-04 | 9,92E-02 | 6,98E-05 | 9,45E-02 | 2,36E-04 | -8,91E-02 |
| Global warming potential - land use and land use change (GWP-luluc) | kg CO ₂ eq. | 3,52E-01 | 2,71E-04 | 2,85E-05 | 3,37E-05 | 7,88E-04 | 1,77E-06 | -5,06E-01 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC-11 eq. | 8,50E-07 | 1,60E-08 | 4,60E-10 | 2,22E-09 | 8,96E-09 | 1,82E-10 | -3,39E-07 |
| Acidification potential, accumulated exceedance (AP) | mol H+ eq. | 2,24E-01 | 2,30E-03 | 1,57E-04 | 4,12E-04 | 2,65E-03 | 3,76E-05 | -1,06E-01 |
| Eutrophication potential - freshwater (EP-freshwater) | kg P eq. | 1,38E-02 | 5,73E-05 | 9,62E-06 | 6,95E-06 | 2,86E-04 | 7,54E-07 | -9,84E-03 |
| Eutrophication potential - marine (EP-marine) | kg N eq. | 3,52E-02 | 7,46E-04 | 5,96E-05 | 1,55E-04 | 8,77E-04 | 1,67E-05 | -1,65E-02 |
| Eutrophication potential - terrestrial (EP-terrestrial) | mol N eq. | 3,38E-01 | 8,11E-03 | 5,37E-04 | 1,69E-03 | 6,36E-03 | 1,63E-04 | -1,42E-01 |
| Photochemical ozone creation potential (POCP) | kg NMVOC eq. | 1,48E-01 | 3,48E-03 | 2,00E-04 | 6,11E-04 | 2,07E-03 | 5,57E-05 | -6,52E-02 |
| Abiotic depletion potential - non-fossil resources (ADPE)* | kg Sb eq. | 2,56E-04 | 2,92E-06 | 2,00E-07 | 3,43E-07 | 5,77E-06 | 1,89E-08 | 2,86E-04 |
| Abiotic depletion potential - fossil resources (ADPF)* | MJ, net calorific value | 6,44E+02 | 1,05E+01 | 4,45E-01 | 1,44E+00 | 8,15E+00 | 1,43E-01 | -3,08E+02 |
| Water (user) deprivation potential (WDP)* | m ³ world eq. deprived | 1,14E+01 | 4,41E-02 | 2,77E-03 | 5,60E-03 | 1,12E-01 | -1,48E-03 | 6,39E-01 |

* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator. The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks."

Additional mandatory and voluntary impact category indicators

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|--|------------------------|---------------------------------|----------|----------|----------|----------|----------|-----------|
| Additional mandatory environmental impact indicators (MANDATORY) | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Global warming potential (GWP-GHG) ¹ | kg CO ₂ eq. | 4,29E+01 | 7,31E-01 | 5,30E-02 | 1,00E-01 | 8,43E-01 | 6,99E-03 | -1,97E+01 |

Resource use indicators

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-------------------------|---------------------------------|----------|----------|----------|----------|-----------|-----------|
| Indicators describing resource use (MANDATORY) | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Use of renewable primary energy as energy carrier (PERE) | MJ, net calorific value | 1,14E+02 | 2,03E-01 | 5,18E-02 | 2,27E-02 | 1,49E+00 | 1,39E-02 | -1,30E+02 |
| Use of renewable primary energy resources used as raw materials (PERM) | MJ, net calorific value | 4,46E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Total use of renewable primary energy (PERT) | MJ, net calorific value | 1,19E+02 | 2,03E-01 | 5,18E-02 | 2,27E-02 | 1,49E+00 | 1,39E-02 | -1,30E+02 |
| Use of non renewable primary energy as energy carrier (PENRE) | MJ, net calorific value | 6,26E+02 | 1,05E+01 | 4,45E-01 | 1,44E+00 | 8,15E+00 | 1,43E-01 | -3,08E+02 |
| Use of non renewable primary energy resources used as raw materials (PENRM) | MJ, net calorific value | 1,79E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Total use of non renewable primary energy resource (PENRT) | MJ, net calorific value | 6,44E+02 | 1,05E+01 | 4,45E-01 | 1,44E+00 | 8,15E+00 | 1,43E-01 | -3,08E+02 |
| Use of secondary material (SM) | kg | 1,34E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Use of renewable secondary fuels (RSF) | MJ, net calorific value | 0,00E+00 | -- | -- | -- | -- | -- | -- |
| Use of non-renewable secondary fuels (NRSF) | MJ, net calorific value | 0,00E+00 | -- | -- | -- | -- | -- | -- |
| Net use of fresh water (FW) | m ³ | 9,17E-01 | 1,46E-03 | 1,56E-04 | 1,80E-04 | 5,08E-03 | -1,79E-03 | -8,68E-01 |

¹ 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 CO₂ is set to zero.

Waste indicators

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-----------|---------------------------------|----------|----------|----------|----------|----------|-----------|
| Environmental information describing waste categories (MANDATORY) | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Hazardous waste disposed (HWD) | kg | 2,05E-02 | 2,49E-06 | 8,32E-08 | 3,44E-07 | 1,35E-06 | 3,58E-08 | 8,90E-04 |
| Non-hazardous waste disposed (NHWD) | kg | 2,05E+00 | 1,91E-02 | 3,72E-04 | 2,42E-03 | 9,97E-03 | 2,58E+00 | -3,75E-02 |
| Radioactive waste disposed (RWD) | kg | 1,32E-03 | 1,41E-07 | 4,75E-08 | 1,48E-08 | 1,35E-06 | 7,27E-09 | -5,18E-05 |

Output flow indicators

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-------------------------|---------------------------------|----------|----------|----------|----------|----------|----------|
| Environmental information describing output flows (MANDATORY) | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Components for re-use (CRU) | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Materials for recycling (MFR) | kg | 7,22E-02 | 0,00E+00 | 3,72E-01 | 0,00E+00 | 8,88E+01 | 0,00E+00 | 0,00E+00 |
| Materials for energy recovery (MER) | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported electrical energy (EEE) | MJ, net calorific value | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| Exported thermal energy (EET) | MJ, net calorific value | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

Additional LCA results (other environmental performance results) of the product

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|--|-------------------|---------------------------------|----------|----------|----------|----------|----------|-----------|
| | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Additional voluntary environmental impact indicators (OPTIONAL)* | | | | | | | | |
| Particulate matter emissions (PM) | Disease incidence | 2,45E-06 | 5,49E-08 | 2,52E-09 | 8,32E-09 | 2,51E-08 | 8,16E-10 | -1,47E-06 |
| Ionizing radiation, human health (IRP)*** | kBq U235 eq. | 5,06E+00 | 1,63E-02 | 5,31E-03 | 1,72E-03 | 1,51E-01 | 9,27E-04 | -5,59E+00 |
| Eco-toxicity - freshwater (ETP-fw) ** | CTUe | 9,97E+01 | 1,64E+00 | 1,39E-01 | 1,91E-01 | 2,91E+00 | 2,68E+01 | -1,27E+01 |
| Human toxicity, cancer effect (HTP-c) ** | CTUh | 5,14E-08 | 1,30E-10 | 1,15E-11 | 1,73E-11 | 2,59E-10 | 2,55E-12 | -4,08E-08 |
| Human toxicity, non-cancer effects (HTP-nc) ** | CTUh | 4,53E-07 | 6,49E-09 | 3,92E-10 | 8,99E-10 | 8,97E-09 | 3,14E-10 | 1,06E-08 |
| Land use related impacts/Soil quality (SQP) | dimensionless | 9,83E+01 | 6,72E+00 | 1,30E-01 | 8,53E-01 | 6,51E+00 | 2,49E-01 | 1,24E+00 |

* 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.

**The results of the impact categories 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.

***This impact category deals mainly with the eventual impact of low dose ionising radiation on human health of the nuclear fuel cycle, It does not consider effects due to possible nuclear accidents, occupational exposure, or due to radioactive waste disposal in underground facilities. This indicator also does not measure potential ionising radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Alternative End-of-Life Scenarios – Summary Comparison (as per PCR 2019:14, Section 4.8.4)

1. **Scenario 1:** Realistic (90% recycling, 10% landfill) – Page 8 to 11

2. **Scenario 2:** 100% Recycling

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-----------------------------------|---------------------------------|----------|----------|----------|----------|----------|-----------|
| | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Global warming potential - total (GWP-total) | kg CO ₂ eq. | 4,39E+01 | 7,36E-01 | 1,50E-01 | 1,01E-01 | 9,29E-01 | 0,00E+00 | -2,17E+01 |
| Global warming potential - fossil fuels (GWP-fossil) | kg CO ₂ eq. | 4,36E+01 | 7,36E-01 | 5,05E-02 | 1,01E-01 | 8,29E-01 | 0,00E+00 | -2,10E+01 |
| Global warming potential - biogenic (GWP-biogenic) | kg CO ₂ eq. | 5,77E-03 | 3,83E-04 | 9,92E-02 | 6,98E-05 | 9,91E-02 | 0,00E+00 | -9,79E-02 |
| Global warming potential - land use and land use change (GWP-luluc) | kg CO ₂ eq. | 3,52E-01 | 2,71E-04 | 2,85E-05 | 3,37E-05 | 7,98E-04 | 0,00E+00 | -5,56E-01 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC-11 eq. | 8,50E-07 | 1,60E-08 | 4,60E-10 | 2,22E-09 | 9,11E-09 | 0,00E+00 | -3,73E-07 |
| Acidification potential, accumulated exceedance (AP) | mol H ⁺ eq. | 2,24E-01 | 2,30E-03 | 1,57E-04 | 4,12E-04 | 2,70E-03 | 0,00E+00 | -1,16E-01 |
| Eutrophication potential - freshwater (EP-freshwater) | kg P eq. | 1,38E-02 | 5,73E-05 | 9,62E-06 | 6,95E-06 | 2,90E-04 | 0,00E+00 | -1,08E-02 |
| Eutrophication potential - marine (EP-marine) | kg N eq. | 3,52E-02 | 7,46E-04 | 5,96E-05 | 1,55E-04 | 9,06E-04 | 0,00E+00 | -1,81E-02 |
| Eutrophication potential - terrestrial (EP-terrestrial) | mol N eq. | 3,38E-01 | 8,11E-03 | 5,37E-04 | 1,69E-03 | 6,55E-03 | 0,00E+00 | -1,56E-01 |
| Photochemical ozone creation potential (POCP) | kg NMVOC eq. | 1,48E-01 | 3,48E-03 | 2,00E-04 | 6,11E-04 | 2,13E-03 | 0,00E+00 | -7,16E-02 |
| Abiotic depletion potential - non-fossil resources (ADPE)* | kg Sb eq. | 2,56E-04 | 2,92E-06 | 2,00E-07 | 3,43E-07 | 5,95E-06 | 0,00E+00 | 3,15E-04 |
| Abiotic depletion potential - fossil resources (ADPF)* | MJ, net calorific value | 6,44E+02 | 1,05E+01 | 4,45E-01 | 1,44E+00 | 8,27E+00 | 0,00E+00 | -3,38E+02 |
| Water (user) deprivation potential (WDP)* | m ³ world eq. deprived | 1,14E+01 | 4,41E-02 | 2,77E-03 | 5,60E-03 | 1,13E-01 | 0,00E+00 | 7,02E-01 |

3. Scenario 3: 100% Landfill

| Indicator name and abbreviation (EN) | Unit (EN) | Results per declared unit (1 m) | | | | | | |
|---|-----------------------------------|---------------------------------|----------|----------|----------|----------|-----------|----------|
| | | Total A1-A3 | A4 | A5 | C2 | C3 | C4 | D |
| Global warming potential - total (GWP-total) | kg CO ₂ eq. | 4,39E+01 | 7,36E-01 | 1,50E-01 | 1,01E-01 | 0,00E+00 | 8,53E-02 | 0,00E+00 |
| Global warming potential - fossil fuels (GWP-fossil) | kg CO ₂ eq. | 4,36E+01 | 7,36E-01 | 5,05E-02 | 1,01E-01 | 0,00E+00 | 8,27E-02 | 0,00E+00 |
| Global warming potential - biogenic (GWP-biogenic) | kg CO ₂ eq. | 5,77E-03 | 3,83E-04 | 9,92E-02 | 6,98E-05 | 0,00E+00 | 2,63E-03 | 0,00E+00 |
| Global warming potential - land use and land use change (GWP-luluc) | kg CO ₂ eq. | 3,52E-01 | 2,71E-04 | 2,85E-05 | 3,37E-05 | 0,00E+00 | 2,05E-05 | 0,00E+00 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC-11 eq. | 8,50E-07 | 1,60E-08 | 4,60E-10 | 2,22E-09 | 0,00E+00 | 2,17E-09 | 0,00E+00 |
| Acidification potential, accumulated exceedance (AP) | mol H ⁺ eq. | 2,24E-01 | 2,30E-03 | 1,57E-04 | 4,12E-04 | 0,00E+00 | 4,45E-04 | 0,00E+00 |
| Eutrophication potential - freshwater (EP-freshwater) | kg P eq. | 1,38E-02 | 5,73E-05 | 9,62E-06 | 6,95E-06 | 0,00E+00 | 8,60E-06 | 0,00E+00 |
| Eutrophication potential - marine (EP-marine) | kg N eq. | 3,52E-02 | 7,46E-04 | 5,96E-05 | 1,55E-04 | 0,00E+00 | 1,97E-04 | 0,00E+00 |
| Eutrophication potential - terrestrial (EP-terrestrial) | mol N eq. | 3,38E-01 | 8,11E-03 | 5,37E-04 | 1,69E-03 | 0,00E+00 | 1,94E-03 | 0,00E+00 |
| Photochemical ozone creation potential (POCP) | kg NMVOC eq. | 1,48E-01 | 3,48E-03 | 2,00E-04 | 6,11E-04 | 0,00E+00 | 6,67E-04 | 0,00E+00 |
| Abiotic depletion potential - non-fossil resources (ADPE)* | kg Sb eq. | 2,56E-04 | 2,92E-06 | 2,00E-07 | 3,43E-07 | 0,00E+00 | 2,15E-07 | 0,00E+00 |
| Abiotic depletion potential - fossil resources (ADPF)* | MJ, net calorific value | 6,44E+02 | 1,05E+01 | 4,45E-01 | 1,44E+00 | 0,00E+00 | 1,70E+00 | 0,00E+00 |
| Water (user) deprivation potential (WDP)* | m ³ world eq. deprived | 1,14E+01 | 4,41E-02 | 2,77E-03 | 5,60E-03 | 0,00E+00 | -1,61E-02 | 0,00E+00 |

Disclaimers for Non-Applicable Scenarios

Incineration: Incineration is not technically applicable to aluminium profiles, as aluminium is a non-combustible metal. Therefore, a 100% incineration scenario is not reported.

Reuse: Direct reuse of product in the same functional application is not considered feasible within the declared system boundaries. Therefore, a 100% reuse scenario is not reported.

ABBREVIATIONS

| Abbreviation | Definition |
|------------------------------|--|
| General Abbreviations | |
| EN | European Norm (Standard) |
| EF | Environmental Footprint |
| GPI | General Programme Instructions |
| ISO | International Organization for Standardization |
| CEN | European Committee for Standardization |
| CLC | Co-location centre |
| CPC | Central product classification |
| GHS | Globally harmonized system of classification and labelling of chemicals |
| GRI | Global Reporting Initiative |
| SVHC | Substances of Very High Concern |
| ND | Not Declared |
| PERE | Use of renewable primary energy excluding renewable primary energy resources used as raw materials |
| PERM | Use of renewable primary energy resources used as raw materials |
| PERT | Total use of renewable primary energy resources |
| PENRE | Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials |
| PENRM | Use of non-renewable primary energy resources used as raw materials |
| PENRT | Total use of non-renewable primary energy re-sources |
| SM | Use of secondary material |
| RSF | Use of renewable secondary fuels |
| NRSF | Use of non-renewable secondary fuels |
| FW | Use of net fresh water |
| GWP-fossil | Global Warming Potential fossil fuels |
| GWP-biogenic | Global Warming Potential biogenic |
| GWP-luluc | Global Warming Potential land use and land use change |
| ODP | Depletion potential of the stratospheric ozone layer |
| AP | Acidification potential, Accumulated Exceedance |
| EP-freshwater | Eutrophication potential, fraction of nutrients reaching freshwater end compartment |
| EP-marine | Eutrophication potential, fraction of nutrients reaching marine end compartment |
| EP-terrestrial | Eutrophication potential, Accumulated Exceedance |
| POCP | Formation potential of tropospheric ozone |
| ADP-minerals&metals | Abiotic depletion potential for non-fossil resources |
| ADP-fossil | Abiotic depletion for fossil resources potential |
| WDP | Water (user) deprivation potential, deprivation-weighted water consumption |

REFERENCES

- a) General Programme Instructions of the International EPD® System. Version 5.0.1
- b) UNI EN 15804:2021 EN 15804 "Sustainability of construction works-Environmental Product Declarations-Core rules for the product category of construction products" del 23/09/2021
- c) PCR 2019:14. Construction product. Version 2.0.1
- d) European Aluminium General Programme Instructions Version 3 - 23rd September 2020
- e) Environmental LCA study " Life Cycle Assessment (LCA) - Production of aluminium railing system for glass parapets DEFENDER DF810LM17" rev 02 of 20/10/2025

VERSION HISTORY

Original Version of the EPD, 2025-11-04

