



# FEAL

FEAL d.o.o.

## Profiles

# Aluminium profiles for windows, doors and facades



**Basis:**

DIN EN ISO 14025  
EN15804

Company EPD  
Environmental  
Product Declaration

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# Environmental Product Declaration (EPD)



Declaration code EPD-FAP-GB-57.0

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<b>Declaration code</b>	EPD-FAP-GB-57.0		
<b>Designation of declared product</b>	Aluminium profiles for windows, doors and facades		
<b>Scope</b>	Aluminum profiles for use in windows, doors and facades		
<b>Basis</b>	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A2:2019. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (General guideline for preparation of Type III Environmental Product Declarations) applies. The declaration is based on PCR documents EN 17662 „PCR for Steel, Iron and Aluminium structural products for use in construction works“, "PCR Part A" PCR-A-0.3:2018 and "Profiles for Windows, Doors and Facades" PCR-PR-3.0:2023.		
<b>Validity</b>	Publication date: 09.05.2023	Last revision: 09.05.2023	Next revision: 09.05.2028
	This verified Company Environmental Product Declaration (company EPD) applies solely to the specified products and is valid for a period of five years from the date of publication in accordance with DIN EN 15804.		
<b>LCA Basis</b>	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The data collected from production plant of the company FEAL d.o.o. were used as a data basis, as well as generic data from the database "LCA for Experts 10". LCA calculations were carried out for the included "cradle to gate – with options" including all upstream chains (e.g. raw material extraction, etc.).		
<b>Notes</b>	The ift-Guidance Sheet "Conditions and Guidance for the Use of ift Test Documents" applies. The declaration holder assumes full liability for the underlying data, certificates and verifications.		

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## 1 General Product Information

### Product definition

The EPD belongs to the product group profiles and applies to

**1 linear metre Aluminium profiles for windows, doors and facades of company FEAL d.o.o.**

The functional unit is obtained by summing up:

Product group (PG)	Assessed product	Declared unit	Dead weight	Density
PG 1.1	M45-724 (blank)	1 linear metre	3.08 kg/linear metre	2,700 kg/m <sup>3</sup>
PG 1.2	M45-724 (anodized)	1 linear metre	3.08 kg/linear metre	2,700 kg/m <sup>3</sup>
PG 2.1	FT-0264HF (blank)	1 linear metre	5.22 kg/linear metre	726.06 kg/m <sup>3</sup>
PG 2.2	FT-0264HF (anodized)	1 linear metre	5.22 kg/linear metre	726.06 kg/m <sup>3</sup>
PG 3.1	NP-5219 (blank)	1 linear metre	22.09 kg/linear metre	2,700 kg/m <sup>3</sup>
PG 3.2	NP-5219 (anodized)	1 linear metre	6.45 kg/linear metre	2,700 kg/m <sup>3</sup>

**Table 1** Functional unit per reference product

The average unit is declared as follows:

Directly used material flows are determined by means of manufactured masses (kg) and allocated to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since there is no typical functional unit due to the high number of variants. The reference period is the year 2021.

The validity of the EPD is restricted to the following models:

Product group 1	Profile types	
PG 1.1 Aluminium profiles for windows (blank)	Z 40 45 MILL DALMO Z 50 FEAL BLIND TERMO 50 TERMO 60 TERMO 65	TERMO 85 TERMO 85 SK TERMO 85 S Plus TERMO 85 PA TERMO 65 PLUS TERMO 75DA HARMO TERMO 80
	And all client-specific NP profiles for windows up to a weight of 3.08 kg/linear metre.	

**Table 2** Product groups



Product group: profiles

Product group 1	Profile types	
PG 1.2 Aluminium profiles for windows (anodized)	Z 40 45 MILL DALMO Z 50 FEAL BLIND TERMO 50 TERMO 60 TERMO 65	TERMO 85 TERMO 85 SK TERMO 85 S Plus TERMO 85 PA TERMO 65 PLUS TERMO 75DA HARMO TERMO 80
	And all client-specific NP profiles for windows up to a weight of 3.08 kg/linear metre.	
Product group 2	Profile types	
PG 2.1 Aluminium profiles for doors (blank)	Z 40 45 MILL 45 DALMO Z 50 FEAL BLIND TERMO 50 TERMO 60 TERMO 65 TERMO 85 TERMO 85 SK TERMO 85 S Plus TERMO 85 PA	TERMO 65 PLUS TERMO 65 VS TERMO 65 VP TERMO 85 VS TERMO 85 VP TERMO 75DA HARMO TERMO 80 TERMO 120 TERMO 150 INOWA TERMO 200 DA TERMO 80 HD
	And all client-specific NP profiles for doors up to a weight of 5.22 kg/linear metre.	
PG 2.2 Aluminium profiles for doors (anodized)	Z 40 45 MILL 45 DALMO Z 50 FEAL BLIND TERMO 50 TERMO 60 TERMO 65 TERMO 85 TERMO 85 SK TERMO 85 S Plus TERMO 85 PA	TERMO 65 PLUS TERMO 65 VS TERMO 65 VP TERMO 85 VS TERMO 85 VP TERMO 75DA HARMO TERMO 80 TERMO 120 TERMO 150 INOWA TERMO 200 DA TERMO 80 HD
	And all client-specific NP profiles for doors up to a weight of 5.22 kg/linear metre.	

Table 2 Product groups (continued)

Product group 3	Profile types	
PG 3.1 Aluminum profile for facades (blank)	Facade F35 Facade 50FK Facade 60K	Facade 70E Facade Coverings
	And all client-specific NP profiles for facades up to a weight of 22.09 kg/linear metre.	
PG 3.2 Aluminum profile for facades (anodized)	Facade F35 Facade 50FK Facade 60K	Facade 70E Facade Coverings
	And all client-specific NP profiles for facades up to a weight of 6.45 kg/linear metre.	

Table 2 Product groups (continued)

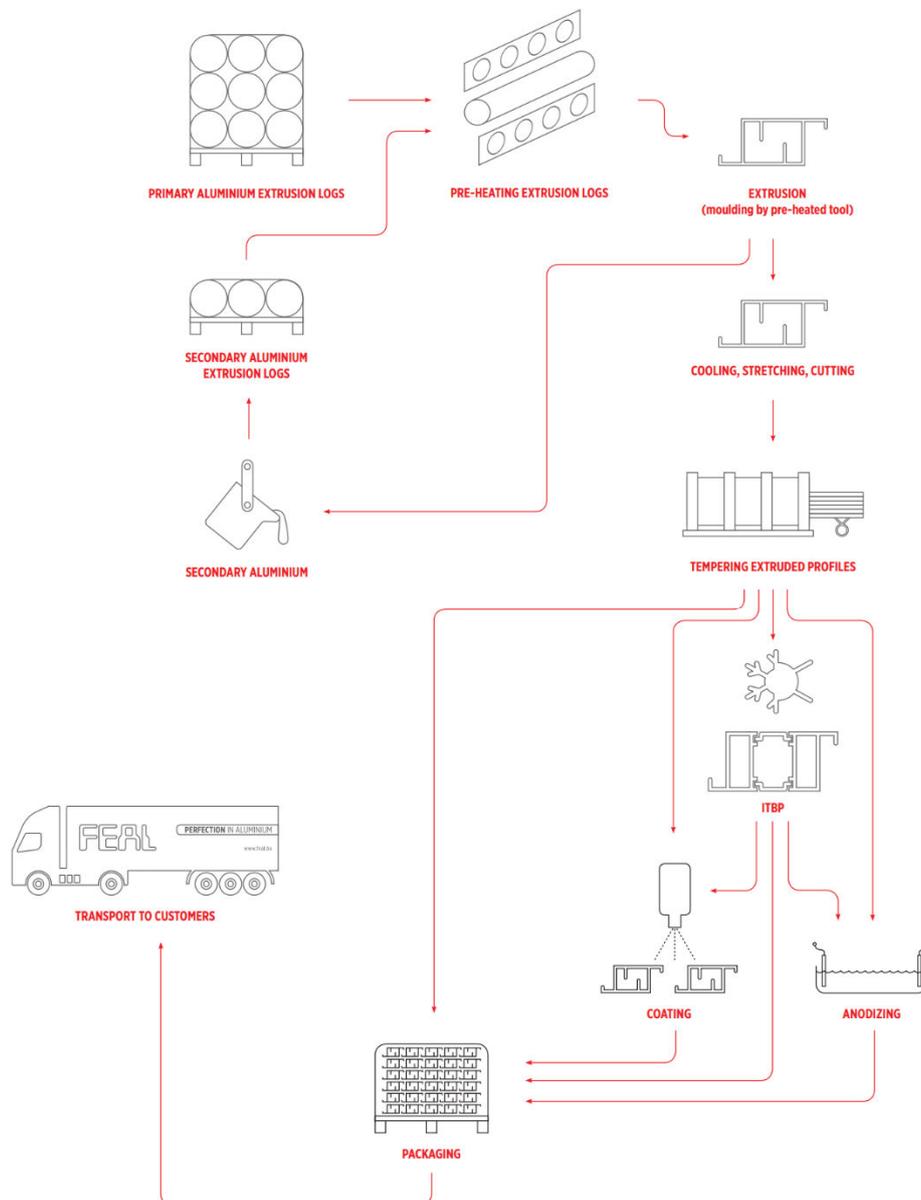
**Powder-coated aluminum profiles are covered by the calculated results of anodized aluminum profiles in the respective product group.**

### Product description

The aluminum profiles manufactured by FEAL d.o.o. are products designed and manufactured for windows, doors and facades. The aluminum profiles and aluminium profiles with thermal break are made of series 6000 aluminum alloys and additional components. All FEAL products are tested and certified, the mechanical properties of the profiles meet the requirements of international standards for quality assurance and environmental protection. The surfaces of the aluminum profiles can be supplied bright rolled, anodized or powder coated according to clients requirements.

For a detailed product description refer to the manufacturer specifications or the product specifications of the respective offer/quotation.

**Product manufacture**



**Application**

The aluminum profiles manufactured by FEAL d.o.o. are used in windows, doors and facades.

**Test evidence / reports**

The following verifications are held:

- Product quality according to QUALANOD
- Product quality according to QUALICOAT SEASIDE
- Product quality according to QUALICOAT QUALIDECO
- Product verification according to EN 1090-1:2009+A1:2011

For information on further and updated verifications (incl. other national approvals) refer to <http://www.feal.ba/>.



## Product group: profiles

### Quality assurance

The following quality assurance system are in place:

- Product verification according to EN ISO 3834-2:2021
- Product quality according to GSB AL 631-5
- Product quality according to ISO/TS 22163:2017
- Product verification according to EN 15085-2
- Product verification according to EN 15088:2005

### Management systems

The following management systems are held:

- Quality management system to DIN EN ISO 9001:2015
- Environmental management system to DIN EN ISO 14001:2015

### Additional information

For additional verifications of applicability or conformity refer to the CE marking and the documents accompanying the product, if applicable.

Aluminum profiles for windows, doors and facades of company FEAL d.o.o. bear the trademark "Der grüne Punkt" (The Green Dot).

In addition, they fulfil the following building physics performance characteristics:

- Material properties for EN AW 6060
- Mechanical characteristics as per EN 755-2
- Tolerances on dimensions and form as per EN 12020-2
- Chemical composition and form of products as per EN 573-3
- Design and construction as per EN 1999-1-1 and EN 1999-1-3

For more information, please see <http://www.feal.ba/>.

## 2 Materials used

### Primary materials

The primary materials used are listed in the LCA (see Section 7).

### Declarable substances

Substances according to REACH candidate list are included (declaration of 23.03.2022).

All relevant safety data sheets can be obtained from company FEAL d.o.o.

## 3 Construction process stage

### Processing recommendations, installation

Observe the instructions for assembly/installation, operation, maintenance and disassembly, provided by the manufacturer. For this, see <http://www.feal.ba/>

## 4 Use stage

### Emissions to the environment

No emissions to indoor air, water and soil are known. There may be VOC emissions.

**Reference service life (RSL)**

The RSL information was provided by the manufacturer. The RSL must be established under specified reference conditions of use and relate to the declared technical and functional performance of the product within the building. It must be determined according to all specific rules given in European product standards or, if none are available, according to a c-PCR. It must also take into account ISO 15686-1, -2, -7 and -8. If there is guidance on deriving RSLs from European Product Standards or a c-PCR, then such guidance must take precedence.

If it is not possible to determine the service life as the RSL in accordance with ISO 15686, the BBSR table "Nutzungsdauer von Bauteilen zur Lebenszyklusanalyse nach BNB" (service life of building components for life cycle assessment in accordance with the sustainable construction evaluation system) can be used. For further information and explanations, refer to [www.nachhaltigesbauen.de](http://www.nachhaltigesbauen.de).

For this EPD the following applies:

For an EPD "cradle to factory gate with options", with modules C1-C4 and module D (A1-A3 + C + D and one or more additional modules from A4 to B7), the specification of a reference service life (RSL) is only possible if the reference service life conditions are specified.

The reference service life (RSL) of the aluminum profiles for windows, doors and facades of FEAL d.o.o. is optionally specified as 50 years according to the table of Federal Institute for Research on Building, Urban Affairs and Spatial Development.

The service life is dependent on the characteristics of the product and in-use conditions. The conditions and characteristics described in the EPD are applicable, in particular the characteristics listed below:

- Outdoor environment: Climatic influences may have a negative impact on the service life.
- Indoor environment: No impacts known that have a negative effect on the service life

The service life solely applies to the characteristics specified in this EPD or the corresponding references.

The reference service life (RSL) does not reflect the actual life span, which is usually determined by the service life and the refurbishment of a building. It does not give any information on the useful life, warranty referring to performance characteristics or guarantees.

**5 End-of-life stage****Possible end-of-life stages**

Aluminium profiles for windows, doors and facades are sent to central collection points. There the products are usually shredded and sorted into their constituents. The end-of-life stage depends on the site where the products are used and is therefore subject to the local regulations. Observe the locally applicable regulatory requirements.

In this EPD, the modules of after-use are presented according to the market situation.

Aluminium as well as plastics are recycled to certain parts. Residual fractions are sent to landfill or, in part, thermally recycled.

**Disposal routes**

The LCA includes the average disposal routes.

**All life cycle scenarios are detailed in the Annex.**

## 6 Life Cycle Assessment (LCA)

Environmental product declarations are based on life cycle assessments (LCAs) which use material and energy flows for the calculation and subsequent representation of environmental impacts.

As a basis for this, life cycle assessments were prepared for aluminum profiles for windows, aluminum profiles for doors and aluminum profiles for facades. These LCAs are in conformity with the requirements set out in DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

The LCA is representative of the products presented in the Declaration and the specified reference period.

### 6.1 Definition of goal and scope

**Aim**

The goal of the LCA is to demonstrate the environmental impacts of the products. In accordance with DIN EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the entire product life cycle in the form of basic information. No other additional environmental impacts are specified.

**Data quality, data availability and geographical and time-related system boundaries**

The specific data originate exclusively from the 2021 fiscal year. They were collected on-site at the plant located in Široki Brijeg and originate in parts from company records and partly from values directly obtained by measurement. Validity of the data was checked by the ift Rosenheim.

The generic data originates from the professional database and building materials database software "LCA for Experts 10". The last update of both databases was in 2022. Data from before this date originate also from these databases and are not more than 5 years old. No other generic data were used for the calculation.

Data gaps were either filled with comparable data or conservative assumptions, or the data were cut off in compliance with the 1% rule.

The life cycle was modelled using the sustainability software tool "LCA for Experts" for the development of life cycle assessments.

**Scope / system boundaries**

The system boundaries refer to the supply of raw materials and purchased parts, manufacture/production, use and end-of-life stage of Aluminium profiles for windows, doors and facades. No additional data from pre-suppliers/subcontractors or other sites were taken into consideration.



## Product group: profiles

### Cut-off criteria

All company data collected, i.e. all commodities/input and raw materials used, the thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the product-relevant data. Building sections/parts of facilities that are not relevant to the manufacture of the products, were excluded.

The transport distances of the pre-products used were taken into consideration as a function of 100% of the mass of the products.

The criteria for the exclusion of inputs and outputs as set out in DIN EN 15804 are fulfilled. From the data analysis it can be assumed that the total of negligible processes per life cycle stage does not exceed 1% of the mass/primary energy. This way the total of negligible processes does not exceed 5% of the energy and mass input. The life cycle calculation also includes material and energy flows that account for less than 1%.

## 6.2 Inventory analysis

### Aim

All material and energy flows are described below. The processes covered are presented as input and output parameters and refer to the declared/functional units.

### Life cycle stages

The complete life cycle of Aluminium profiles for windows, doors and facades is shown in the annex. The product stage "A1 – A3", construction process stage "A4 – A5", use stage "B2 – B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" are considered.

### Benefits

The below benefits have been defined as per DIN EN 15804:

- Benefits from recycling
- Benefits (thermal and electrical) from incineration

### Allocation of co-products

No allocations occur during production.

### Allocations for re-use, recycling and recovery

If the products are reused/recycled and recovered during the product stage (rejects), the elements are shredded, if necessary and then sorted into their constituents. This is done by various process plants, e.g. magnetic separators.

The system boundaries were set following their disposal, reaching the end-of-waste status.

### Allocations beyond life cycle boundaries

The use of recycled materials in the manufacturing process was based on the current market-specific situation. In parallel to this, a recycling potential was taken into consideration that reflects the economic value of the product after recycling (recyclate).

Secondary material designated as inputs to Aluminium profiles for windows, doors and facades is calculated as input without loads. No



benefits are assigned to Module D, but consumption to Modules C3 and C4 (worst case consideration).

The system boundary set for the recycled material refers to collection.

**Secondary material**

The use of secondary material by FEAL d.o.o. was not considered in Module A3. Secondary material is used.

**Inputs**

The following manufacturing-related inputs were included in the LCA per 1 linear metre Aluminium profile for windows, doors and facades:

**Energy**

The input material of liquid gas (LPG) is based on "EU-28: liquid gas (LPG)"; the input material of diesel is based on "EU-28: Diesel Mix". The electricity from photovoltaics is based on "SI: Electricity from photovoltaics" and the electricity mix is based on "Electricity mix FEAL d.o.o." (see Table 3).

Electricity disclosure of energy supplier	Shares in %
Hydropower	90.0
Wind energy	10.0

**Table 3** Electricity mix "FEAL d.o.o." (1)

A portion of the process heat is used for space heating. This can, however, not be quantified, hence a "worst case" figure was taken into account for the product.

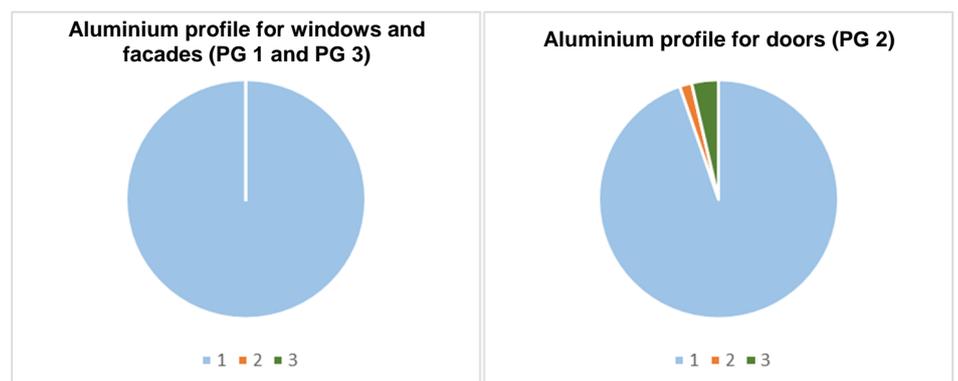
**Water**

In the individual process steps for production, the water consumption per balanced product is 1.49E-06 l per linear metre for PG 1, 2.52E-02 l per linear metre for PG 2, or 1.07E-01 l per linear metre for PG 3.

The consumption of fresh water specified in Section 6.3 originates (among others) from the process chain of the pre-products and the process water for cooling.

**Raw material/Pre-products**

The chart below shows the share of raw materials/pre-products in percent.



**Illustration 1** Percentage of individual materials per declared unit

N°	Material	Mass in %			
		PG 1	PG 2	PG 3.1	PG 3.2
1	Aluminium	100.00	94.75	100.00	100.00
	Primary material	95.45	95.45	95.34	95.34
	Secondary material	4.54	4.60	4.66	4.66
2	Extruded Polystyrene (XPS)	0.00	1.63	0.00	0.00
3	Polyamide (PA)	0.00	3.62	0.00	0.00

**Table 4** Percentage of individual materials per declared unit

### Ancillary materials and consumables

For the respective balanced product, 149.41 g (PG 1), 252.84 g (PG 2) and 1.07 kg (PG 3) of ancillary materials and consumables are incurred per linear meter.

### Product packaging

The amounts used for product packaging are as follows:

N°	Material	Mass in kg per product group (PG)		
		PG 1	PG 2	PG 3
1	PE film	2.75E-02	4.66E-02	0.20
2	Cardboard	2.52E-02	4.27E-02	0.18
3	wood	0.23	0.38	1.61

**Table 5** Weight in kg of packaging per declared unit

### Biogenic carbon content

Only the biogenic carbon content of the associated packaging is reported, as the total mass of biogenic carbon-containing materials is less than 5% of the total mass of the product and associated packaging. According to EN 16449, the following amounts of biogenic carbon are generated for packaging:

N°	part	Content in kg C		
		PG 1	PG 2	PG 3
1	In the corresponding packaging	0.110	0.185	0.785

**Table 6** Biogenic carbon content of the packaging at the factory gate

## Outputs

The following manufacturing-related outputs were included in the LCA per 1 linear metre Aluminium profile for windows, doors and facades:

### Waste

Secondary raw materials were included in the benefits. See Section 6.3 Impact assessment.

### Waste water

During production, 1.49E-02 l (PG 1), 2.52E-02 l (PG 2), or 1.07E-01 l of wastewater per linear meter are generated for each balanced product.

### 6.3 Impact assessment

#### Aim

The impact assessment covers both inputs and outputs. The impact categories applied are stated below:

#### Impact categories

The models for impact assessment were applied as described in DIN EN 15804-A2.

The impact categories presented in the EPD are as follows:

- Depletion of abiotic resources - minerals and metals;
- Depletion of abiotic resources - fossil fuels;
- Acidification;
- Ozone depletion;
- Climate change - total;
- Climate change - fossil;
- Climate change - biogenic;
- Climate change - land use and land use change;
- Eutrophication freshwater;
- Eutrophication salt water;
- Eutrophication land;
- Photochemical ozone creation;
- Water use.



#### Resource management

The models for impact assessment were applied as described in DIN EN 15804-A2.

The following resource use indicators are presented in the EPD:

- Renewable primary energy as energy source;
- Renewable primary energy for material use;
- Total use of renewable primary energy;
- Non-renewable primary energy as energy source;
- Renewable primary energy for material use;
- Total use of non-renewable primary energy;
- Use of secondary materials;
- Use of renewable secondary fuels;
- Use of non-renewable secondary fuels;
- Net use of freshwater resources.



**Waste**

The waste generated during the production of 1 linear metre aluminium profile for windows, doors and facades is evaluated and shown separately for the fractions trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

The models for impact assessment were applied as described in DIN EN 15804-A2.

The following waste categories and indicators for output closures are presented in the EPD:

- Disposed hazardous waste;
- Disposed non-hazardous waste;
- Radioactive waste disposed;
- Components for re-use;
- Materials for recycling;
- Materials for energy recovery;
- Exported electrical energy;
- Exported thermal energy.



**Additional environmental impact indicators**

The models for impact assessment were applied as described in DIN EN 15804-A2.

The additional impact categories presented in the EPD are as follows:

- Fine dust emissions;
- Ionizing radiation, human health;
- Ecotoxicity (freshwater);
- Human toxicity, carcinogenic effects;
- Human toxicity, non-carcinogenic effects;
- Impacts associated with land use/soil quality.



Results per 1 linear metre Aluminium profiles for windows PG 1																	
Unit	PG 1.1	PG 1.2															
	A1-A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>Core indicators</b>																	
GWP-t	kg CO <sub>2</sub> -eq.	24.93	24.94	2.46E-02	0.49	ND	1.80E-02	0.00	0.00	0.00	0.00	0.00	0.00	2.52E-02	0.14	2.23E-03	-14.10
GWP-f	kg CO <sub>2</sub> -eq.	25.22	25.23	2.47E-02	9.33E-02	ND	1.66E-02	0.00	0.00	0.00	0.00	0.00	0.00	2.53E-02	0.14	2.30E-03	-14.00
GWP-b	kg CO <sub>2</sub> -eq.	-0.33	-0.33	-3.47E-04	0.39	ND	1.35E-03	0.00	0.00	0.00	0.00	0.00	0.00	-3.52E-04	1.50E-03	-7.63E-05	-3.34E-02
GWP-I	kg CO <sub>2</sub> -eq.	8.02E-03	8.03E-03	2.28E-04	1.71E-06	ND	5.56E-06	0.00	0.00	0.00	0.00	0.00	0.00	2.31E-04	1.49E-05	7.14E-06	-3.73E-03
ODP	kg CFC-11-eq.	2.16E-11	3.84E-11	3.21E-15	4.47E-14	ND	1.01E-13	0.00	0.00	0.00	0.00	0.00	0.00	2.18E-15	2.52E-12	5.85E-15	-1.07E-11
AP	mol H <sup>+</sup> -eq.	0.13	0.13	1.88E-05	7.83E-05	ND	4.21E-05	0.00	0.00	0.00	0.00	0.00	0.00	2.95E-05	2.92E-04	1.63E-05	-6.66E-02
EP-fw	kg P-eq.	2.20E-05	2.21E-05	9.02E-08	1.26E-08	ND	1.46E-06	0.00	0.00	0.00	0.00	0.00	0.00	9.09E-08	5.10E-07	4.63E-09	-6.23E-06
EP-m	kg N-eq.	1.72E-02	1.72E-02	4.42E-06	2.26E-05	ND	1.47E-05	0.00	0.00	0.00	0.00	0.00	0.00	1.03E-05	6.99E-05	4.21E-06	-9.52E-03
EP-t	mol N-eq.	0.19	0.19	5.63E-05	3.33E-04	ND	1.02E-04	0.00	0.00	0.00	0.00	0.00	0.00	1.22E-04	7.30E-04	4.63E-05	-0.10
POCP	kg NMVOC-eq.	5.29E-02	5.29E-02	1.51E-05	6.20E-05	ND	2.76E-05	0.00	0.00	0.00	0.00	0.00	0.00	2.58E-05	1.87E-04	1.27E-05	-2.90E-02
ADPF*2	MJ	331.56	331.56	0.34	0.11	ND	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.34	2.88	3.06E-02	-182.00
ADPE*2	kg Sb equivalent	1.17E-06	1.29E-06	1.62E-09	4.18E-10	ND	9.53E-10	0.00	0.00	0.00	0.00	0.00	0.00	1.61E-09	2.12E-08	1.06E-10	-6.61E-07
WDP*2	m <sup>3</sup> world-eq. deprived	4.22	4.26	2.98E-04	5.26E-02	ND	5.37	0.00	0.00	0.00	0.00	0.00	0.00	2.87E-04	3.05E-02	2.52E-04	-2.10
<b>Resource management</b>																	
PERE	MJ	157.94	167.26	2.45E-02	4.03	ND	6.04E-02	0.00	0.00	0.00	0.00	0.00	0.00	2.40E-02	1.72	4.99E-03	-81.20
PERM	MJ	4.00	4.00	0.00	-4.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	161.94	171.26	2.45E-02	2.82E-02	ND	6.04E-02	0.00	0.00	0.00	0.00	0.00	0.00	2.40E-02	1.72	4.99E-03	-81.20
PENRE	MJ	331.89	331.89	0.34	0.68	ND	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.34	2.88	3.06E-02	-182.00
PENRM	MJ	0.56	0.56	0.00	-0.56	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PENRT	MJ	332.46	332.46	0.34	0.11	ND	0.30	0.00	0.00	0.00	0.00	0.00	0.00	0.34	2.88	3.06E-02	-182.00
SM	kg	0.14	0.14	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m <sup>3</sup>	0.39	0.39	2.68E-05	1.24E-03	ND	0.13	0.00	0.00	0.00	0.00	0.00	0.00	2.64E-05	1.39E-03	7.73E-06	-0.20
<b>Categories of waste</b>																	
HWD	kg	2.33E-08	2.46E-08	1.04E-12	2.66E-12	ND	8.41E-12	0.00	0.00	0.00	0.00	0.00	0.00	1.26E-12	-2.25E-10	6.66E-13	-8.87E-09
NHWD	kg	7.61	7.61	5.14E-05	8.66E-03	ND	3.80E-02	0.00	0.00	0.00	0.00	0.00	0.00	4.90E-05	2.11E-03	0.15	-4.10
RWD	kg	1.69E-02	1.69E-02	6.31E-07	6.41E-06	ND	1.19E-05	0.00	0.00	0.00	0.00	0.00	0.00	4.39E-07	4.58E-04	3.49E-07	-1.06E-02
<b>Output material flows</b>																	
CRU	kg	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.66	0.67	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	2.93	0.00	0.00
MER	kg	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	3.01E-02	3.01E-02	0.00	0.75	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EET	MJ	5.56E-02	5.56E-02	0.00	1.34	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

**Key:**

GWP-t – global warming potential - total    GWP-f – global warming potential fossil fuels    GWP-b – global warming potential - biogenic    GWP-I – global warming potential - land use and land use change    ODP – ozone depletion potential    AP - acidification potential    EP-fw - eutrophication potential - aquatic freshwater    EP-m - eutrophication potential - aquatic marine    EP-t - eutrophication potential - terrestrial    POCP - photochemical ozone formation potential    ADPF\*2 - abiotic depletion potential – fossil resources    ADPE\*2 - abiotic depletion potential – minerals&metals    WDP\*2 – Water (user) deprivation potential    PERE - Use of renewable primary energy    PERM - use of renewable primary energy resources    PERT - total use of renewable primary energy resources    PENRE - use of non-renewable primary energy    PENRM - use of non-renewable primary energy resources    PENRT - total use of non-renewable primary energy resources    SM - use of secondary material    RSF - use of renewable secondary fuels    NRSF - use of non-renewable secondary fuels    FW - net use of fresh water    HWD - hazardous waste disposed    NHWD - non-hazardous waste disposed    RWD - radioactive waste disposed    CRU - components for re-use    MFR - materials for recycling    MER - materials for energy recovery    EEE - exported electrical energy    EET - exported thermal energy

Results per 1 linear metre Aluminium profiles for windows PG 1																	
ift ROSENHEIM	Unit	PG 1.1	PG 1.2														
		A1-A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators																	
PM	Disease incidence	1.45E-06	1.45E-06	1.78E-10	5.06E-10	ND	6.76E-10	0.00	0.00	0.00	0.00	0.00	0.00	1.88E-10	2.46E-09	2.00E-10	-7.45E-07
IRP*1	kBq U235-eq.	3.47	3.47	9.41E-05	1.03E-03	ND	1.82E-03	0.00	0.00	0.00	0.00	0.00	0.00	6.34E-05	7.62E-02	4.03E-05	-2.22
ETP-fw*2	CTUe	123.09	123.09	0.24	5.32E-02	ND	0.61	0.00	0.00	0.00	0.00	0.00	0.00	0.24	1.27	1.67E-02	-62.70
HTP-c*2	CTUh	1.54E-08	1.57E-08	4.88E-12	4.75E-12	ND	1.16E-11	0.00	0.00	0.00	0.00	0.00	0.00	4.81E-12	4.24E-11	2.57E-12	-8.02E-09
HTP-nc*2	CTUh	3.26E-07	3.27E-07	2.57E-10	2.88E-10	ND	1.09E-09	0.00	0.00	0.00	0.00	0.00	0.00	2.57E-10	1.04E-09	2.83E-10	-1.66E-07
SQP*2	dimensionless	81.49	81.50	0.14	3.45E-02	ND	4.41E-02	0.00	0.00	0.00	0.00	0.00	0.00	0.14	1.13	7.43E-03	-7.25

**Key:**  
**PM** – particulate matter emissions potential    **IRP\*1** – ionizing radiation potential – human health    **ETP-fw\*2** - Eco-toxicity potential – freshwater    **HTP-c\*2** - Human toxicity potential – cancer effects    **HTP-nc\*2** - Human toxicity potential – non-cancer effects    **SQP\*2** – soil quality potential

**Disclaimers:**

\*1 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 effects 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 some construction materials is also not measured by this indicator.

\*2 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 experience with the indicator.

Results per 1 linear metre Aluminium profiles for doors PG 2																	
Unit	PG 2.1	PG 2.2															
	A1-A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>Core indicators</b>																	
GWP-t	kg CO <sub>2</sub> -eq.	43.89	43.91	4.38E-02	0.83	ND	3.60E-04	4.22E-02	0.00	0.00	0.00	0.00	0.00	4.49E-02	0.75	3.82E-03	-24.90
GWP-f	kg CO <sub>2</sub> -eq.	44.38	44.39	4.40E-02	0.16	ND	3.32E-04	4.20E-02	0.00	0.00	0.00	0.00	0.00	4.52E-02	0.75	3.94E-03	-24.90
GWP-b	kg CO <sub>2</sub> -eq.	-0.55	-0.55	-6.16E-04	0.67	ND	2.70E-05	1.50E-04	0.00	0.00	0.00	0.00	-6.29E-04	2.64E-03	-1.31E-04	-6.25E-02	
GWP-I	kg CO <sub>2</sub> -eq.	1.39E-02	1.39E-02	4.06E-04	2.89E-06	ND	1.11E-07	2.70E-06	0.00	0.00	0.00	0.00	4.12E-04	2.66E-05	1.22E-05	-6.41E-03	
ODP	kg CFC-11-eq.	3.91E-11	6.76E-11	5.71E-15	7.57E-14	ND	2.02E-15	1.10E-11	0.00	0.00	0.00	0.00	3.90E-15	5.89E-10	1.00E-14	-2.35E-11	
AP	mol H <sup>+</sup> -eq.	0.21	0.21	3.34E-05	1.33E-04	ND	8.42E-07	5.68E-05	0.00	0.00	0.00	0.00	5.28E-05	1.38E-03	2.79E-05	-0.11	
EP-fw	kg P-eq.	3.95E-05	3.96E-05	1.60E-07	2.13E-08	ND	2.92E-08	4.62E-08	0.00	0.00	0.00	0.00	1.62E-07	9.19E-07	7.93E-09	-1.24E-05	
EP-m	kg N-eq.	3.00E-02	3.00E-02	7.86E-06	3.82E-05	ND	2.94E-07	2.14E-05	0.00	0.00	0.00	0.00	1.85E-05	5.52E-04	7.22E-06	-1.66E-02	
EP-t	mol N-eq.	0.33	0.33	1.00E-04	5.64E-04	ND	2.04E-06	2.28E-04	0.00	0.00	0.00	0.00	2.17E-04	6.07E-03	7.94E-05	-0.18	
POCP	kg NMVOC-eq.	9.33E-02	9.33E-02	2.69E-05	1.05E-04	ND	5.52E-07	8.28E-05	0.00	0.00	0.00	0.00	4.61E-05	1.42E-03	2.18E-05	-5.10E-02	
ADPF*2	MJ	598.06	598.16	0.60	0.19	ND	5.94E-03	0.73	0.00	0.00	0.00	0.00	0.61	5.41	5.24E-02	-331.00	
ADPE*2	kg Sb equivalent	2.03E-06	2.23E-06	2.89E-09	7.08E-10	ND	1.91E-11	1.26E-09	0.00	0.00	0.00	0.00	2.87E-09	3.79E-08	1.82E-10	-1.18E-06	
WDP*2	m <sup>3</sup> world-eq. deprived	7.20	7.27	5.30E-04	8.90E-02	ND	0.11	2.08E-03	0.00	0.00	0.00	0.00	5.13E-04	0.10	4.32E-04	-3.63	
<b>Resource management</b>																	
PERE	MJ	273.19	288.92	4,35E-02	3.44	ND	1.21E-03	2.82E-02	0.00	0.00	0.00	0.00	4.28E-02	3.08	8.55E-03	-141.00	
PERM	MJ	3.39	3.39	0.00	-3.39	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PERT	MJ	276.58	292.31	4,35E-02	4.78E-02	ND	1.21E-03	2.82E-02	0.00	0.00	0.00	0.00	4.28E-02	3.08	8.55E-03	-141.00	
PENRE	MJ	592.98	593.08	0.60	1.16	ND	5.94E-03	0.73	0.00	0.00	0.00	0.00	0.61	11.29	0.11	-332.00	
PENRM	MJ	6.89	6.89	0.00	-0.96	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	-5.87	-5.92E-02	0.00	
PENRT	MJ	599.87	599.97	0.60	0.19	ND	5.94E-03	0.73	0.00	0.00	0.00	0.00	0.61	5.42	5.25E-02	-332.00	
SM	kg	0.24	0.24	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RSF	MJ	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
NRSF	MJ	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FW	m <sup>3</sup>	0.66	0.66	4.76E-05	2.09E-03	ND	2.50E-03	1.18E-04	0.00	0.00	0.00	0.00	4.72E-05	3.59E-03	1.32E-05	-0.35	
<b>Categories of waste</b>																	
HWD	kg	4.21E-08	4.42E-08	1.86E-12	4.51E-12	ND	1.68E-13	5.18E-11	0.00	0.00	0.00	0.00	2.25E-12	-4.02E-10	1.14E-12	-1.62E-08	
NHWD	kg	12.93	12.93	9,15E-05	1.47E-02	ND	7.60E-04	2.78E-04	0.00	0.00	0.00	0.00	8.75E-05	3.77E-03	0.26	-6.95	
RWD	kg	2.88E-02	2.88E-02	1.12E-06	1.09E-05	ND	2.38E-07	5.82E-06	0.00	0.00	0.00	0.00	7.85E-07	8.27E-04	5.98E-07	-1.89E-02	
<b>Output material flows</b>																	
CRU	kg	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MFR	kg	1.12	1.14	0.00	0.00	ND	0.00	1.97E-03	0.00	0.00	0.00	0.00	0.00	5.06	0.00	0.00	
MER	kg	0.00	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EEE	MJ	5.08E-02	5.08E-02	0.00	1.27	ND	0.00	3.78E-02	0.00	0.00	0.00	0.00	0.00	0.78	0.00	0.00	
EET	MJ	9.38E-02	9.38E-02	0.00	2.27	ND	0.00	1.27E-02	0.00	0.00	0.00	0.00	0.00	2.23	0.00	0.00	

**Key:**

GWP-t – global warming potential - total    GWP-f – global warming potential fossil fuels    GWP-b – global warming potential - biogenic    GWP-I – global warming potential - land use and land use change    ODP – ozone depletion potential    AP - acidification potential    EP-fw - eutrophication potential - aquatic freshwater    EP-m - eutrophication potential - aquatic marine    EP-t - eutrophication potential - terrestrial    POCP - photochemical ozone formation potential    ADPF\*2 - abiotic depletion potential – fossil resources    ADPE\*2 - abiotic depletion potential – minerals&metals    WDP\*2 – Water (user) deprivation potential    PERE - Use of renewable primary energy    PERM - use of renewable primary energy resources    PERT - total use of renewable primary energy resources    PENRE - use of non-renewable primary energy    PENRM - use of non-renewable primary energy resources    PENRT - total use of non-renewable primary energy resources    SM - use of secondary material    RSF - use of renewable secondary fuels    NRSF - use of non-renewable secondary fuels    FW - net use of fresh water    HWD - hazardous waste disposed    NHWD - non-hazardous waste disposed    RWD - radioactive waste disposed    CRU - components for re-use    MFR - materials for recycling    MER - materials for energy recovery    EEE - exported electrical energy    EET - exported thermal energy

Results per 1 linear metre Aluminium profiles for doors PG 2																	
ift ROSENHEIM	Unit	PG 2.1	PG 2.2														
		A1-A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators																	
PM	Disease incidence	2.46E-06	2.46E-06	3.17E-10	8.57E-10	ND	1.35E-11	3.14E-10	0.00	0.00	0.00	0.00	0.00	3.36E-10	6.60E-09	3.43E-10	-1.27E-06
IRP*1	kBq U235-eq.	5.93	5.93	1.67E-04	1.74E-03	ND	3.64E-05	8.50E-04	0.00	0.00	0.00	0.00	0.00	1.13E-04	0.14	6.91E-05	-3.90
ETP-fw*2	CTUe	224.91	224.91	0.42	9.01E-02	ND	1.22E-02	0.35	0.00	0.00	0.00	0.00	0.00	0.42	2.31	2.86E-02	-115.00
HTP-c*2	CTUh	2.67E-08	2.71E-08	8.68E-12	8.04E-12	ND	2.32E-13	9.30E-12	0.00	0.00	0.00	0.00	0.00	8.60E-12	7.86E-11	4.40E-12	-1.39E-08
HTP-nc*2	CTUh	5.71E-07	5.72E-07	4.57E-10	4.87E-10	ND	2.18E-11	3.82E-10	0.00	0.00	0.00	0.00	0.00	4.60E-10	1.95E-09	4.84E-10	-2.91E-07
SQP*2	dimensionless	138.63	139.66	0.25	5.84E-02	ND	8.82E-04	1.99E-02	0.00	0.00	0.00	0.00	0.00	0.25	2.02	1.27E-02	-14.70

**Key:**  
**PM** – particulate matter emissions potential    **IRP\*1** – ionizing radiation potential – human health    **ETP-fw\*2** - Eco-toxicity potential – freshwater    **HTP-c\*2** - Human toxicity potential – cancer effects    **HTP-nc\*2** - Human toxicity potential – non-cancer effects    **SQP\*2** – soil quality potential

**Disclaimers:**

\*1 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 effects 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 some construction materials is also not measured by this indicator.

\*2 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 experience with the indicator.



Results per 1 linear metre Aluminium profiles for facade PG 3.1

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>Core indicators</b>																
<b>GWP-t</b>	kg CO <sub>2</sub> -eq.	178.30	0.18	3.49	ND	7.18E-06	0.00	0.00	0.00	0.00	0.00	0.18	1.00	1.60E-02	-101.00	
<b>GWP-f</b>	kg CO <sub>2</sub> -eq.	180.20	0.18	0.67	ND	6.64E-06	0.00	0.00	0.00	0.00	0.00	0.18	0.99	1.65E-02	-100.00	
<b>GWP-b</b>	kg CO <sub>2</sub> -eq.	-2.38	-2.48E-03	2.83	ND	5.38E-07	0.00	0.00	0.00	0.00	0.00	-2.52E-03	1.07E-02	-5.47E-04	-0.24	
<b>GWP-l</b>	kg CO <sub>2</sub> -eq.	5.75E-02	1.64E-03	1.22E-05	ND	2.22E-09	0.00	0.00	0.00	0.00	0.00	1.65E-03	1.07E-04	5.11E-05	-2.67E-02	
<b>ODP</b>	kg CFC-11-eq.	1.55E-10	2.30E-14	3.20E-13	ND	4.04E-17	0.00	0.00	0.00	0.00	0.00	1.56E-14	1.81E-11	4.19E-14	-7.64E-11	
<b>AP</b>	mol H <sup>+</sup> -eq.	0.89	1.35E-04	5.61E-04	ND	1.68E-08	0.00	0.00	0.00	0.00	0.00	2.12E-04	2.09E-03	1.17E-04	-0.48	
<b>EP-fw</b>	kg P-eq.	1.58E-04	6.46E-07	9.02E-08	ND	5.86E-10	0.00	0.00	0.00	0.00	0.00	6.51E-07	3.66E-06	3.32E-08	-4.46E-05	
<b>EP-m</b>	kg N-eq.	0.12	3.17E-05	1.62E-04	ND	5.90E-09	0.00	0.00	0.00	0.00	0.00	7.40E-05	5.01E-04	3.02E-05	-6.82E-02	
<b>EP-t</b>	mol N-eq.	1.34	4.03E-04	2.39E-03	ND	4.08E-08	0.00	0.00	0.00	0.00	0.00	8.70E-04	5.23E-03	3.32E-04	-0.74	
<b>POCP</b>	kg NMVOC-eq.	0.38	1.08E-04	4.45E-04	ND	1.10E-08	0.00	0.00	0.00	0.00	0.00	1.85E-04	1.34E-03	9.10E-05	-0.21	
<b>ADPF*2</b>	MJ	2379.99	2.41	0.81	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	2.43	20.60	0.22	-1300.00	
<b>ADPE*2</b>	kg Sb equivalent	8.37E-06	1.16E-08	3.00E-09	ND	3.82E-13	0.00	0.00	0.00	0.00	0.00	1.15E-08	1.52E-07	7.59E-10	-4.73E-06	
<b>WDP*2</b>	m <sup>3</sup> world-eq. deprived	30.24	2.14E-03	0.38	ND	2.14E-03	0.00	0.00	0.00	0.00	0.00	2.06E-03	0.22	1.81E-03	-15.00	
<b>Resource management</b>																
<b>PERE</b>	MJ	1153.90	0.18	8.59	ND	2.42E-05	0.00	0.00	0.00	0.00	0.00	0.17	12.30	3.57E-02	-582.00	
<b>PERM</b>	MJ	8.38	0.00	-8.38	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>PERT</b>	MJ	1162.28	0.18	0.20	ND	2.42E-05	0.00	0.00	0.00	0.00	0.00	0.17	12.30	3.57E-02	-582.00	
<b>PENRE</b>	MJ	2378.82	2.42	1.99	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	2.43	20.60	0.22	-1310.00	
<b>PENRM</b>	MJ	1.18	0.00	-1.18	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>PENRT</b>	MJ	2380.00	2.42	0.81	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	2.43	20.60	0.22	-1310.00	
<b>SM</b>	kg	1.03	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>RSF</b>	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>NRSF</b>	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>FW</b>	m <sup>3</sup>	2.77	1.92E-04	8.86E-03	ND	5.00E-05	0.00	0.00	0.00	0.00	0.00	1.89E-04	9.95E-03	5.54E-05	-1.46	
<b>Categories of waste</b>																
<b>HWD</b>	kg	1.68E-07	7.48E-12	1.91E-11	ND	3.36E-15	0.00	0.00	0.00	0.00	0.00	9.01E-12	-1.61E-09	4.77E-12	-6.35E-08	
<b>NHWD</b>	kg	54.46	3.68E-04	6.21E-02	ND	1.52E-05	0.00	0.00	0.00	0.00	0.00	3.51E-04	1.51E-02	1.10	-29.40	
<b>RWD</b>	kg	0.12	4.52E-06	4.59E-05	ND	4.76E-09	0.00	0.00	0.00	0.00	0.00	3.15E-06	3.28E-03	2.50E-06	-7.61E-02	
<b>Output material flows</b>																
<b>CRU</b>	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>MFR</b>	kg	4.75	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	21.00	0.00	0.00	
<b>MER</b>	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>EEE</b>	MJ	0.22	0.00	5.35	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>EET</b>	MJ	0.40	0.00	9.62	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

**Key:**

**GWP-t** – global warming potential - total    **GWP-f** – global warming potential fossil fuels    **GWP-b** – global warming potential - biogenic    **GWP-l** – global warming potential - land use and land use change    **ODP** – ozone depletion potential    **AP** - acidification potential    **EP-fw** - eutrophication potential - aquatic freshwater    **EP-m** - eutrophication potential - aquatic marine    **EP-t** - eutrophication potential - terrestrial    **POCP** - photochemical ozone formation potential    **ADPF\*2** - abiotic depletion potential – fossil resources    **ADPE\*2** - abiotic depletion potential – minerals&metals    **WDP\*2** – Water (user) deprivation potential    **PERE** - Use of renewable primary energy    **PERM** - use of renewable primary energy resources    **PERT** - total use of renewable primary energy resources    **PENRE** - use of non-renewable primary energy    **PENRM** - use of non-renewable primary energy resources    **PENRT** - total use of non-renewable primary energy resources    **SM** - use of secondary material    **RSF** - use of renewable secondary fuels    **NRSF** - use of non-renewable secondary fuels    **FW** - net use of fresh water    **HWD** - hazardous waste disposed    **NHWD** - non-hazardous waste disposed    **RWD** - radioactive waste disposed    **CRU** - components for re-use    **MFR** - materials for recycling    **MER** - materials for energy recovery    **EEE** - exported electrical energy    **EET** - exported thermal energy

 <b>Results per 1 linear metre Aluminium profiles for facade PG 3.1</b>																
Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>Additional environmental impact indicators</b>																
<b>PM</b>	Disease incidence	1.04E-05	1.28E-09	3.63E-09	ND	2.70E-13	0.00	0.00	0.00	0.00	0.00	1.35E-09	1.76E-08	1.44E-09	-5.34E-06	
<b>IRP*1</b>	kBq U235-eq.	24.87	6.74E-04	7.35E-03	ND	7.28E-07	0.00	0.00	0.00	0.00	0.00	4.54E-04	0.55	2.89E-04	-15.90	
<b>ETP-fw*2</b>	CTUe	878.68	1.71	0.38	ND	2.44E-04	0.00	0.00	0.00	0.00	0.00	1.69	9.09	0.12	-449.00	
<b>HTP-c*2</b>	CTUh	1.11E-07	3.50E-11	3.40E-11	ND	4.64E-15	0.00	0.00	0.00	0.00	0.00	3.45E-11	3.03E-10	1.84E-11	-5.74E-08	
<b>HTP-nc*2</b>	CTUh	2.34E-06	1.84E-09	2.06E-09	ND	4.34E-13	0.00	0.00	0.00	0.00	0.00	1.84E-09	7.46E-09	2.03E-09	-1.19E-06	
<b>SQP*2</b>	dimensionless	584.36	1.01	0.25	ND	1.76E-05	0.00	0.00	0.00	0.00	0.00	1.01	8.09	5.32E-02	-51.90	

**Key:**  
**PM** – particulate matter emissions potential    **IRP\*1** – ionizing radiation potential – human health    **ETP-fw\*2** - Eco-toxicity potential – freshwater    **HTP-c\*2** - Human toxicity potential – cancer effects    **HTP-nc\*2** - Human toxicity potential – non-cancer effects    **SQP\*2** – soil quality potential

**Disclaimers:**  
 \*1 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 effects 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 some construction materials is also not measured by this indicator.  
 \*2 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 experience with the indicator.



Results per 1 linear metre Aluminium profiles for facades PG 3.2

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
<b>Core indicators</b>																
<b>GWP-t</b>	kg CO <sub>2</sub> -eq.	52.08	5.15E-02	1.02	ND	7.18E-06	0.00	0.00	0.00	0.00	0.00	5.26E-02	0.29	4.66E-03	-29.40	
<b>GWP-f</b>	kg CO <sub>2</sub> -eq.	52.76	5.17E-02	0.20	ND	6.64E-06	0.00	0.00	0.00	0.00	0.00	5.29E-02	0.29	4.80E-03	-29.30	
<b>GWP-b</b>	kg CO <sub>2</sub> -eq.	-0.69	-7.25E-04	0.83	ND	5.38E-07	0.00	0.00	0.00	0.00	0.00	-7.37E-04	3.14E-03	-1.59E-04	-6.97E-02	
<b>GWP-l</b>	kg CO <sub>2</sub> -eq.	1.68E-02	4.78E-04	3.57E-06	ND	2.22E-09	0.00	0.00	0.00	0.00	0.00	4.83E-04	3.11E-05	1.49E-05	-7.81E-03	
<b>ODP</b>	kg CFC-11-eq.	8.04E-11	6.71E-15	9.35E-14	ND	4.04E-17	0.00	0.00	0.00	0.00	0.00	4.56E-15	5.28E-12	1.22E-14	-2.23E-11	
<b>AP</b>	mol H <sup>+</sup> -eq.	0.26	3.93E-05	1.64E-04	ND	1.68E-08	0.00	0.00	0.00	0.00	0.00	6.18E-05	6.11E-04	3.40E-05	-0.14	
<b>EP-fw</b>	kg P-eq.	4.61E-05	1.89E-07	2.63E-08	ND	5.86E-10	0.00	0.00	0.00	0.00	0.00	1.90E-07	1.07E-06	9.66E-09	-1.30E-05	
<b>EP-m</b>	kg N-eq.	3.60E-02	9.25E-06	4.73E-05	ND	5.90E-09	0.00	0.00	0.00	0.00	0.00	2.16E-05	1.46E-04	8.80E-06	-1.99E-02	
<b>EP-t</b>	mol N-eq.	0.39	1.18E-04	6.97E-04	ND	4.08E-08	0.00	0.00	0.00	0.00	0.00	2.54E-04	1.53E-03	9.68E-05	-0.22	
<b>POCP</b>	kg NMVOC-eq.	0.11	3.16E-05	1.30E-04	ND	1.10E-08	0.00	0.00	0.00	0.00	0.00	5.40E-05	3.90E-04	2.65E-05	-6.06E-02	
<b>ADPF*2</b>	MJ	694.17	0.70	0.24	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	0.71	6.02	6.39E-02	-380.00	
<b>ADPE*2</b>	kg Sb equivalent	2.69E-06	3.40E-09	8.75E-10	ND	3.82E-13	0.00	0.00	0.00	0.00	0.00	3.36E-09	4.44E-08	2.21E-10	-1.38E-06	
<b>WDP*2</b>	m <sup>3</sup> world-eq. deprived	8.90	6.23E-04	0.11	ND	2.14E-03	0.00	0.00	0.00	0.00	0.00	6.01E-04	6.38E-02	5.27E-04	-4.39	
<b>Resource management</b>																
<b>PERE</b>	MJ	350.60	5.12E-02	8.44	ND	2.42E-05	0.00	0.00	0.00	0.00	0.00	5.02E-02	3.60	1.04E-02	-170.00	
<b>PERM</b>	MJ	8.38	0.00	-8.38	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>PERT</b>	MJ	358.98	5.12E-02	5.91E-02	ND	2.42E-05	0.00	0.00	0.00	0.00	0.00	5.02E-02	3.60	1.04E-02	-170.00	
<b>PENRE</b>	MJ	694.99	0.71	1.42	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	0.71	6.02	6.40E-02	-381.00	
<b>PENRM</b>	MJ	1.18	0.00	-1.18	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>PENRT</b>	MJ	696.17	0.71	0.24	ND	1.19E-04	0.00	0.00	0.00	0.00	0.00	0.71	6.02	6.40E-02	-381.00	
<b>SM</b>	kg	0.30	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>RSF</b>	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>NRSF</b>	MJ	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>FW</b>	m <sup>3</sup>	0.81	5.60E-05	2.59E-03	ND	5.00E-05	0.00	0.00	0.00	0.00	0.00	5.53E-05	2.91E-03	1.61E-05	-0.43	
<b>Categories of waste</b>																
<b>HWD</b>	kg	5.15E-08	2.18E-12	5.57E-12	ND	3.36E-15	0.00	0.00	0.00	0.00	0.00	2.63E-12	-4.71E-10	1.39E-12	-1.86E-08	
<b>NHWD</b>	kg	15.87	1.08E-04	1.81E-02	ND	1.52E-05	0.00	0.00	0.00	0.00	0.00	1.02E-04	4.41E-03	0.32	-8.57	
<b>RWD</b>	kg	3.53E-02	1.32E-06	1.34E-05	ND	4.76E-09	0.00	0.00	0.00	0.00	0.00	9.19E-07	9.57E-04	7.29E-07	-2.22E-02	
<b>Output material flows</b>																
<b>CRU</b>	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>MFR</b>	kg	1.41	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	6.13	0.00	0.00	
<b>MER</b>	kg	0.00	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>EEE</b>	MJ	6.29E-02	0.00	1.56	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
<b>EET</b>	MJ	0.12	0.00	2.81	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	

**Key:**

**GWP-t** – global warming potential - total    **GWP-f** – global warming potential fossil fuels    **GWP-b** – global warming potential - biogenic    **GWP-l** – global warming potential - land use and land use change    **ODP** – ozone depletion potential    **AP** - acidification potential    **EP-fw** - eutrophication potential - aquatic freshwater    **EP-m** - eutrophication potential - aquatic marine    **EP-t** - eutrophication potential - terrestrial    **POCP** - photochemical ozone formation potential    **ADPF\*2** - abiotic depletion potential – fossil resources    **ADPE\*2** - abiotic depletion potential – minerals&metals    **WDP\*2** – Water (user) deprivation potential    **PERE** - Use of renewable primary energy    **PERM** - use of renewable primary energy resources    **PERT** - total use of renewable primary energy resources    **PENRE** - use of non-renewable primary energy    **PENRM** - use of non-renewable primary energy resources    **PENRT** - total use of non-renewable primary energy resources    **SM** - use of secondary material    **RSF** - use of renewable secondary fuels    **NRSF** - use of non-renewable secondary fuels    **FW** - net use of fresh water    **HWD** - hazardous waste disposed    **NHWD** - non-hazardous waste disposed    **RWD** - radioactive waste disposed    **CRU** - components for re-use    **MFR** - materials for recycling    **MER** - materials for energy recovery    **EEE** - exported electrical energy    **EET** - exported thermal energy

 <b>Results per 1 linear metre Aluminium profiles for facades PG 3.2</b>																
Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Additional environmental impact indicators																
<b>PM</b>	Disease incidence	3.03E-06	3.73E-10	1.06E-09	ND	2.70E-13	0.00	0.00	0.00	0.00	0.00	3.94E-10	5.14E-09	4.19E-10	-1.56E-06	
<b>IRP*1</b>	kBq U235-eq.	7.27	1.97E-04	2.15E-03	ND	7.28E-07	0.00	0.00	0.00	0.00	0.00	1.33E-04	0.16	8.43E-05	-4.64	
<b>ETP-fw*2</b>	CTUe	257.11	0.50	0.11	ND	2.44E-04	0.00	0.00	0.00	0.00	0.00	0.50	2.66	3.49E-02	-131.00	
<b>HTP-c*2</b>	CTUh	3.29E-08	1.02E-11	9.93E-12	ND	4.64E-15	0.00	0.00	0.00	0.00	0.00	1.01E-11	8.86E-11	5.37E-12	-1.68E-08	
<b>HTP-nc*2</b>	CTUh	6.84E-07	5.38E-10	6.02E-10	ND	4.34E-13	0.00	0.00	0.00	0.00	0.00	5.38E-10	2.18E-09	5.90E-10	-3.46E-07	
<b>SQP*2</b>	dimensionless	170.82	0.29	7.21E-02	ND	1.76E-05	0.00	0.00	0.00	0.00	0.00	0.30	2.36	1.55E-02	-15.20	

**Key:**  
**PM** – particulate matter emissions potential    **IRP\*1** – ionizing radiation potential – human health    **ETP-fw\*2** - Eco-toxicity potential – freshwater    **HTP-c\*2** - Human toxicity potential – cancer effects    **HTP-nc\*2** - Human toxicity potential – non-cancer effects    **SQP\*2** – soil quality potential

**Disclaimers:**  
\*1 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 effects 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 some construction materials is also not measured by this indicator.  
\*2 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 experience with the indicator.

## Product group profiles

## 6.4 Interpretation, LCA presentation and critical review

## Evaluation

The environmental impacts of

- Aluminium profiles for windows blank (PG 1.1) and anodized (PG 1.2)
- Aluminium profiles for doors blank (PG 2.1) and anodized (PG 2.2)
- Aluminium profiles for facades blank (PG 3.1) and anodized (PG 3.2)

differ considerably from each other. The differences lie in the varying masses per linear metre. In particular, the balanced product for PG 3 has a multiple of the masses of the balanced products for PG 1 and PG 2 and thus shows by far the highest environmental impacts. Furthermore, it should be emphasized for the balanced product in PG 2 that, in contrast to the balanced products for PG 1 and PG 3, it is not a pure aluminum profile, but additionally contains plastic components made of polyamide (PA) and extruded polystyrene (XPS). Therefore, there are also differences in the environmental impacts for values broken down to 1 kg. In the respective subgrouping into blank and anodized aluminum profiles, anodized aluminum profiles show higher environmental impacts in all product groups, which can be attributed to the additional consumption of electricity as well as sodium hydroxide of the anodizing process. The exception here is PG 3, since the balanced linear metre weight varies for PG 3.1 and PG 3.2, which is not the case for the subgrouping of PG 1 and PG 2.

In the area of production, the environmental impact of all three product groups mainly results from the use of primary aluminum. The utilisation phase of all product groups is insignificantly affected by the modeled cleaning.

In scenario C4, only marginal expenditures for the physical pretreatment and the landfill operation are to be expected. Allocation to individual products is almost impossible for site disposal.

When recycling the products, the following listed shares of the environmental impacts occurring in the life cycle can be credited in scenario D for aluminum and plastic components.

PG	1.1	1.2	2.1	2.2	3.1	3.2
Aluminium	39.60 %	38.51 %	34.82 %	34.52 %	37.97 %	38.66 %
XPS	-	-	0.09 %	0.09 %	-	-
PA	-	-	0.44 %	0.44 %	-	-

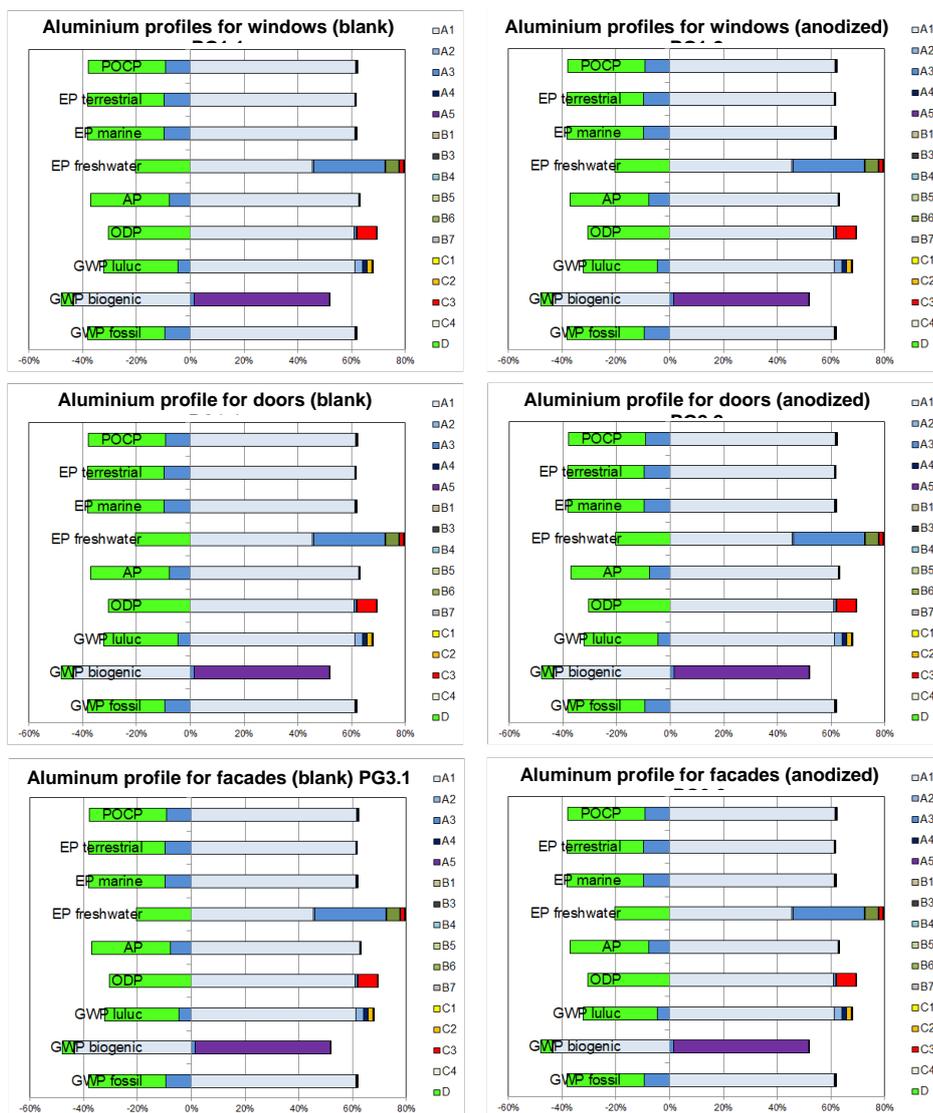
**Table 7** Shares of calculated environmental impacts in percent that can be credited through recycling in module D

The charts below show the allocation of the main environmental impacts.

The values obtained from the LCA calculation are suitable for the certification of buildings.

**Diagrams**

The diagrams below show the B modules with reference to the specified RSL.



**Illustration 2** Percentage of the modules in selected environmental impact indicators

**Report**

The LCA report underlying this EPD was developed according to the requirements of DIN EN ISO 14040 and DIN EN ISO 14044 as well as DIN EN 15804 and DIN EN ISO 14025. It is deposited with ift Rosenheim. The results and conclusions reported to the target group are complete, correct, without bias and transparent. The results of the study are not designed to be used for comparative statements intended for publication.



Product group profiles

**Critical review**

The critical review of the LCA and of the report took place in the course of verification of the EPD and was carried out by the external auditor Patrick Wortner, MBA and Eng., Dipl.-Ing.

**7 General information regarding the EPD**

**Comparability**

This EPD was prepared in accordance with DIN EN 15804 and is therefore only comparable to those EPDs that also comply with the requirements set out in DIN EN 15804. Any comparison must refer to the building context and the same boundary conditions of the various life cycle stages. For comparing EPDs of construction products, the rules set out in DIN EN 15804, Clause 5.3, apply.

The detailed individual results of the products were summarised on the basis of conservative assumptions and differ from the average results. Identification of the product groups and the resulting variations are documented in the background report.

**Communication**

The communications format of this EPD meets the requirements of EN 15942:2012 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to DIN EN 15804.

**Verification**

Verification of the Environmental Product Declaration is documented in accordance with the ift "Richtlinie zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) in accordance with the requirements set out in DIN EN ISO 14025.

This declaration is based on PCR documents EN 17662 „PCR for Steel, Iron and Aluminium structural products for use in construction works“, "PCR Part A" PCR-A-0.3:2018 and "Profiles for Windows, Doors and Facades" PCR-PR-3.0:2023.

The European standard EN 15804 serves as the core PCR <sup>a)</sup>
Independent verification of the Declaration and statement according to EN ISO 14025:2010 <input type="checkbox"/> internal <input checked="" type="checkbox"/> external
Independent third party verifier: <sup>b)</sup> Patrick Wortner
<sup>a)</sup> Product category rules <sup>b)</sup> Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4).

**Revisions of this document**

N°	Date	Note	Person in charge	Testing personnel
1	09.05.2023	External verification	Pscherer	Wortner

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Product group profiles

9 Annex

Description of life cycle scenarios for Aluminium profiles for windows, doors and facades

Product stage			Con- struction process stage		Use stage*							End-of-life stage				Benefits and loads beyond system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	production	Transport	Construction/installation process	Use	maintenance	Repair	replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse Recovery Recycling potential
✓	✓	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓

\* For declared B-modules, the calculation of the results is performed taking into account the specified RSL related to one year

**Table 8** Overview of applied life cycle stages

The scenarios were calculated taking into account the defined RSL (see 4 Use stage).

The scenarios were furthermore based on the research project “EPDs for transparent building components” (2) and on EN 17662 (3).

**Note:** The standard scenarios selected are presented in bold type. They were also used for calculating the indicators in the summary table.

- ✓ Included in the LCA
- Not included in the LCA

## Product group profiles

<b>A4 Transport to construction site</b>		
No.	Scenario	Description
A4	Transport	<b>40 t truck (Euro 0-6 Mix), diesel, 27 t payload, 85 % capacity used, 150 km to construction site and back empty.</b>
A4 Transport to construction site		Transport weight [kg/linear metre]
		Density [kg/m <sup>3</sup> ]
PG1		3.362
PG2		5.979
PG3.1		24.081
PG3.2		7.031
<p>Since this is a single scenario, the results are shown in the relevant summary table.</p>		
<b>A5 Construction/Installation</b>		
No.	Scenario	Description
A5	Manual	<b>According to the manufacturer, the products are installed without additional lifting and auxiliary devices</b>
<p>In case of deviating consumption during installation/assembly of the products which forms part of the site management, they are covered at the building level.</p> <p>Ancillary materials, consumables, use of energy and water, other resource use, material losses, direct emissions as well as waste during construction / installation are negligible.</p> <p>It is assumed that the packaging material in the Module construction / installation is sent to waste handling. Waste is only thermally recycled in line with the conservative approach. Benefits from A5 are specified in module D. Benefits from waste incineration: Benefits from waste incineration: electricity replaces electricity mix (EU-28); thermal energy replaces thermal energy from natural gas (EU-28). Transport to the recycling plants is not taken into account.</p> <p>Since this is a single scenario, the results are shown in the relevant summary table.</p>		
<b>B1 Use - not included</b>		
Refer to Section 4 Use stage - Emissions to the environment. Emissions cannot be quantified.		
<b>B2 Inspection, maintenance, cleaning</b>		
<b>B2.1 Cleaning</b>		
No.	Scenario	Description
B2.1	Rarely, manual	<b>Manual using suitable cleaning agents: 2.5 l of water per linear metre per year (2).</b>
<p>Ancillary materials, consumables, use of energy and water, material losses and waste as well as transport distances during cleaning are negligible.</p> <p>Since this is a single scenario, the results are shown in the relevant summary table.</p>		



Product group profiles

<b>B2.2 Maintenance</b>			
<b>No.</b>	<b>Scenario</b>	<b>Description</b>	
<b>B2.2</b>	<b>Normal use</b>	<b>Annual functional test, visual inspection, as specified by the manufacturer</b>	
Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during maintenance are negligible.			
Since this is a single scenario, the results are shown in the relevant summary table.			
<b>B3 Repair</b>			
<b>No.</b>	<b>Scenario</b>	<b>Description</b>	
<b>B3.1</b>	<b>Normal use and heavy use</b>	<b>According to the manufacturer: No exchange* of components for PG 1 and PG 3.</b>	
<b>B3.2</b>	<b>Normal use and heavy use</b>	<b>One-time replacement* of plastic components for PG 2:</b> <ul style="list-style-type: none"> <li><b>Extruded polystyrene (XPS) 0.09 kg/linear metre,</b></li> <li><b>Polyamide (PA) 0.20 kg/linear metre.</b></li> </ul>	
* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of performance.			
For updated information refer to the relevant instructions for assembly/installation, operation and maintenance issued by company FEAL d.o.o..			
The service life of the aluminum profiles for windows, doors and facades of company FEAL d.o.o. is given as 50 years. For scenario B3, the respective components of the building elements whose useful life is less than the specified RSL are accounted for. The results were based on one year, taking into account the RSL.			
It is assumed that the replaced components in the repair module will be sent for recycling. Plastics are partly recycled, rest in incineration plants. Benefits from B3 are specified in module D. Benefits from waste incineration: Benefits from waste incineration: electricity replaces electricity mix (EU-28); thermal energy replaces thermal energy from natural gas (EU-28). Transport to the recycling plants is not taken into account.			
Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances during repair are negligible.			
<b>B3 Repair</b>	<b>Unit</b>	<b>B3.1</b>	<b>B3.2</b>
<b>Core indicators</b>			
<b>GWP-t</b>	kg CO <sub>2</sub> equivalent	<b>0.00</b>	4.22E-02
<b>GWP-f</b>	kg CO <sub>2</sub> equivalent	<b>0.00</b>	4.20E-02
<b>GWP-b</b>	kg CO <sub>2</sub> equivalent	<b>0.00</b>	1.50E-04
<b>GWP-l</b>	kg CO <sub>2</sub> equivalent	<b>0.00</b>	2.70E-06
<b>ODP</b>	kg CFC-11-eq.	<b>0.00</b>	1.10E-11
<b>AP</b>	mol H <sup>+</sup> -eq.	<b>0.00</b>	5.68E-05
<b>EP-fw</b>	kg P-eq.	<b>0.00</b>	4.62E-08
<b>EP-m</b>	kg N-eq.	<b>0.00</b>	2.14E-05
<b>EP-t</b>	mol N-eq.	<b>0.00</b>	2.28E-04

## Product group profiles

POCP	kg NMVOC-eq.	0.00	8.28E-05
ADPF	MJ	0.00	0.73
ADPE	kg Sb equivalent	0.00	1.26E-09
WDP	m <sup>3</sup> world-eq. deprived	0.00	2.08E-03
<b>Resource management</b>			
PERE	MJ	0.00	2.82E-02
PERM	MJ	0.00	0.00
PERT	MJ	0.00	2.82E-02
PENRE	MJ	0.00	0.73
PENRM	MJ	0.00	0.00
PENRT	MJ	0.00	0.73
SM	kg	0.00	0.00
RSF	MJ	0.00	0.00
NRSF	MJ	0.00	0.00
FW	m <sup>3</sup>	0.00	1.18E-04
<b>Categories of waste</b>			
HWD	kg	0.00	5.18E-11
NHWD	kg	0.00	2.78E-04
RWD	kg	0.00	5.82E-06
<b>Output material flows</b>			
CRU	kg	0.00	0.00
MFR	kg	0.00	1.97E-03
MER	kg	0.00	0.00
EEE	MJ	0.00	3.78E-02
EET	MJ	0.00	1.27E-02
<b>Additional environmental impact indicators</b>			
PM	Disease incidence	0.00	3.14E-10
IRP	kBq U235-eq.	0.00	8.50E-04
ETP <sub>fw</sub>	CTU <sub>e</sub>	0.00	0.35
HTP <sub>c</sub>	CTU <sub>h</sub>	0.00	9.30E-12
HTP <sub>nc</sub>	CTU <sub>h</sub>	0.00	3.82E-10
SQP	dimensionless	0.00	1.99E-02

**B4 Exchange/replacement**

No.	Scenario	Description
B4.1	No replacement	<b>According to manufacturer, a replacement is not planned. Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances are negligible.</b>
B4.2	Normal use, heavy use and exceptional use	One-time replacement after 50 years (RSL)*: The environmental impacts of the selected scenario originate from the product, construction and disposal phases. Ancillary materials, consumables, use of energy and water, waste, material losses and transport distances are taken into account.

\* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of performance.

The statements made in this EPD are only informative to allow evaluation at the building level.

It is assumed that no replacement will be necessary during the 50-year reference service life according to the BBSR Table and the 50-year building service life. The results were based on one year, taking into account the RSL.

## Product group profiles

For updated information refer to the relevant manufacturer instructions for assembly/installation, operation and maintenance

Aluminium profile for windows PG 1				
B4 Exchange/replacement	Unit	PG 1.1 and PG 1.2	PG 1.1	PG 1.2
		B4.1	B4.2	B4.2
<b>Core indicators</b>				
GWP-t	kg CO <sub>2</sub> equivalent	0.00	0.23	0.23
GWP-f	kg CO <sub>2</sub> equivalent	0.00	0.23	0.23
GWP-b	kg CO <sub>2</sub> equivalent	0.00	6.15E-04	6.15E-04
GWP-l	kg CO <sub>2</sub> equivalent	0.00	9.55E-05	9.57E-05
ODP	kg CFC-11-eq.	0.00	2.69E-13	6.06E-13
AP	mol H <sup>+</sup> -eq.	0.00	1.18E-03	1.18E-03
EP-fw	kg P-eq.	0.00	3.29E-07	3.31E-07
EP-m	kg N-eq.	0.00	1.56E-04	1.56E-04
EP-t	mol N-eq.	0.00	1.68E-03	1.70E-03
POCP	kg NMVOC-eq.	0.00	4.84E-04	4.84E-04
ADPF	MJ	0.00	3.07	3.07
ADPE	kg Sb equivalent	0.00	1.07E-08	1.30E-08
WDP	m <sup>3</sup> world-eq. deprived	0.00	4.41E-02	4.49E-02
<b>Resource management</b>				
PERE	MJ	0.00	1.65	1.84
PERM	MJ	0.00	0.00	0.00
PERT	MJ	0.00	1.65	1.84
PENRE	MJ	0.00	3.08	3.08
PENRM	MJ	0.00	0.00	0.00
PENRT	MJ	0.00	3.08	3.08
SM	kg	0.00	2.88E-03	2.88E-03
RSF	MJ	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00
FW	m <sup>3</sup>	0.00	3.74E-03	3.75E-03
<b>Categories of waste</b>				
HWD	kg	0.00	2.84E-10	3.09E-10
NHWD	kg	0.00	7.35E-02	7.35E-02
RWD	kg	0.00	1.35E-04	1.35E-04
<b>Output material flows</b>				
CRU	kg	0.00	0.00	0.00
MFR	kg	0.00	7.19E-02	7.21E-02
MER	kg	0.00	0.00	0.00
EEE	MJ	0.00	1.55E-02	1.55E-02
EET	MJ	0.00	2.79E-02	2.79E-02
<b>Additional environmental impact indicators</b>				
PM	Disease incidence	0.00	1.41E-08	1.41E-08
IRP	kBq U235-eq.	0.00	2.66E-02	2.66E-02
ETPfw	CTUe	0.00	1.24	1.24
HTPc	CTUh	0.00	1.50E-10	1.54E-10
HTPnc	CTUh	0.00	3.25E-09	3.26E-09
SQP	dimensionless	0.00	1.51	1.51

## Product group profiles

Aluminium profile for doors (PG 2)				
B4 Exchange/replacement	Unit	PG 2.1 and PG 2.2	PG 2.1	PG 2.2
		B4.1	B4.2	B4.2
<b>Core indicators</b>				
GWP-t	kg CO <sub>2</sub> equivalent	0.00	0.23	0.23
GWP-f	kg CO <sub>2</sub> equivalent	0.00	0.23	0.23
GWP-b	kg CO <sub>2</sub> equivalent	0.00	6.15E-04	6.15E-04
GWP-l	kg CO <sub>2</sub> equivalent	0.00	9.55E-05	9.57E-05
ODP	kg CFC-11-eq.	0.00	2.69E-13	6.06E-13
AP	mol H <sup>+</sup> -eq.	0.00	1.18E-03	1.18E-03
EP-fw	kg P-eq.	0.00	3.29E-07	3.31E-07
EP-m	kg N-eq.	0.00	1.56E-04	1.56E-04
EP-t	mol N-eq.	0.00	1.68E-03	1.70E-03
POCP	kg NMVOC-eq.	0.00	4.84E-04	4.84E-04
ADPF	MJ	0.00	3.07	3.07
ADPE	kg Sb equivalent	0.00	1.07E-08	1.30E-08
WDP	m <sup>3</sup> world-eq. deprived	0.00	4.41E-02	4.49E-02
<b>Resource management</b>				
PERE	MJ	0.00	1.65	1.84
PERM	MJ	0.00	0.00	0.00
PERT	MJ	0.00	1.65	1.84
PENRE	MJ	0.00	3.08	3.08
PENRM	MJ	0.00	0.00	0.00
PENRT	MJ	0.00	3.08	3.08
SM	kg	0.00	2.88E-03	2.88E-03
RSF	MJ	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00
FW	m <sup>3</sup>	0.00	3.74E-03	3.75E-03
<b>Categories of waste</b>				
HWD	kg	0.00	2.84E-10	3.09E-10
NHWD	kg	0.00	7.35E-02	7.35E-02
RWD	kg	0.00	1.35E-04	1.35E-04
<b>Output material flows</b>				
CRU	kg	0.00	0.00	0.00
MFR	kg	0.00	7.19E-02	7.21E-02
MER	kg	0.00	0.00	0.00
EEE	MJ	0.00	1.55E-02	1.55E-02
EET	MJ	0.00	2.79E-02	2.79E-02
<b>Additional environmental impact indicators</b>				
PM	Disease incidence	0.00	1.41E-08	1.41E-08
IRP	kBq U235-eq.	0.00	2.66E-02	2.66E-02
ETPfw	CTUe	0.00	1.24	1.24
HTPc	CTUh	0.00	1.50E-10	1.54E-10
HTPnc	CTUh	0.00	3.25E-09	3.26E-09
SQP	dimensionless	0.00	1.51	1.51

## Product group profiles

Aluminum profile for facades (PG 3)				
B4 Exchange/replacement	Unit	PG 3.1 and PG 3.2	PG 3.1	PG 3.2
		B4.1	B4.2	B4.2
<b>Core indicators</b>				
GWP-t	kg CO <sub>2</sub> equivalent	0.00	1.64	0.48
GWP-f	kg CO <sub>2</sub> equivalent	0.00	1.64	0.48
GWP-b	kg CO <sub>2</sub> equivalent	0.00	4.36E-03	1.27E-03
GWP-l	kg CO <sub>2</sub> equivalent	0.00	6,86E-04	2.00E-04
ODP	kg CFC-11-eq.	0.00	1.95E-12	1.27E-12
AP	mol H <sup>+</sup> -eq.	0.00	8.39E-03	2.46E-03
EP-fw	kg P-eq.	0.00	2.37E-06	6.92E-07
EP-m	kg N-eq.	0.00	1.11E-03	3.27E-04
EP-t	mol N-eq.	0.00	1.21E-02	3.55E-03
POCP	kg NMVOC-eq.	0.00	3.47E-03	1.01E-03
ADPF	MJ	0.00	22.13	6.44
ADPE	kg Sb equivalent	0.00	7.64E-08	2.72E-08
WDP	m <sup>3</sup> world-eq. deprived	0.00	0.32	9.38E-02
<b>Resource management</b>				
PERE	MJ	0.00	11.86	3.86
PERM	MJ	0.00	0.00	0.00
PERT	MJ	0.00	11.86	3.86
PENRE	MJ	0.00	21.93	6.46
PENRM	MJ	0.00	0.00	0.00
PENRT	MJ	0.00	21.93	6.46
SM	kg	0.00	2.06E-02	6.00E-03
RSF	MJ	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00
FW	m <sup>3</sup>	0.00	2.67E-02	7.85E-03
<b>Categories of waste</b>				
HWD	kg	0.00	2.05E-09	6.49E-10
NHWD	kg	0.00	0.52	0.15
RWD	kg	0.00	9.55E-04	2.81E-04
<b>Output material flows</b>				
CRU	kg	0.00	0.00	0.00
MFR	kg	0.00	0.52	0.15
MER	kg	0.00	0.00	0.00
EEE	MJ	0.00	0.11	3.25E-02
EET	MJ	0.00	0.20	5.85E-02
<b>Additional environmental impact indicators</b>				
PM	Disease incidence	0.00	1.02E-07	2.95E-08
IRP	kBq U235-eq.	0.00	0.19	5.58E-02
ETPfw	CTUe	0.00	8.85	2.60
HTPc	CTUh	0.00	1.08E-09	3.24E-10
HTPnc	CTUh	0.00	2.33E-08	6.85E-09
SQP	dimensionless	0.00	10.86	3.17

**B5 Improvement/modernisation**

According to the manufacturer, the elements are not included in the improvement / modernisation activities for buildings.

For updated information refer to the relevant instructions for assembly/installation, operation and maintenance issued by company FEAL d.o.o.

Ancillary materials, consumables, use of energy and water, material losses, waste as well as transport distances during replacement are negligible.



Product group profiles

Since this is a single scenario, the results are shown in the relevant summary table.

**B6 Operational energy use**

There is no energy used during normal use.

There is no transport consumption for energy use in buildings. Ancillary materials, consumables and water, waste materials and other scenarios are negligible.

Since this is a single scenario, the results are shown in the relevant summary table.

**B7 Operational water use**

No water consumption when used as intended. Water consumption for cleaning is specified in Module B2.1.

There is no transport consumption for water use in buildings. Ancillary materials, consumables, waste materials and other scenarios are negligible.

Since this is a single scenario, the results are shown in the relevant summary table.

**C1 Deconstruction**

No.	Scenario	Description
C1	Deconstruction	<p><b>Based on EN 16772:</b></p> <ul style="list-style-type: none"> <li>Aluminium 99 % deconstruction,</li> <li>Remainder to landfill/disposal.</li> </ul> <p><b>Further deconstruction rates are possible, give adequate reasons.</b></p>

No relevant inputs or outputs apply to the scenario selected. The energy consumed for deconstruction is negligible. Any arising consumption is marginal.

Since this is a single scenario, the results are shown in the relevant summary table.

In case of deviating consumption the removal of the products forms part of site management and is covered at the building level.

**C2 Transport**

No.	Scenario	Description
C2	Transport	<p><b>Based on EN 17662:</b>  <b>Transport to collection point with 40 t truck (Euro 0-6 Mix), diesel, 27 t payload, 50 % capacity used, 100 km</b></p>

Since this is a single scenario, the results are shown in the relevant summary table.



Product group profiles

**C3 Waste management**

No.	Scenario	Description
C3	Current market situation	<p><b>Share for recirculation of materials: Based on EN 17662:</b></p> <ul style="list-style-type: none"> <li>• Aluminium 96% in melt,</li> <li>• Aluminium 4% in landfill,</li> <li>• Plastics 66 % thermal recycling in incineration plants (Zukunft Bauen, 2017)</li> <li>• Plastics 34 % recycled (Zukunft Bauen, 2017)</li> </ul>

Electricity consumption of recycling plant: 0.5 MJ/kg.

As the products are placed on the European market, the disposal scenario is based on average European data sets.

The below table presents the disposal processes and their percentage by mass/weight. The calculation is based on the above mentioned shares in percent related to the declared unit of the product system.

C3 Disposal	Unit	PG 1	PG 2	PG 3.1	PG 3.2
Collection process, collected separately	kg	3.05	5.45	21.87	6.39
Collection process, collected as mixed construction waste	kg	0.03	0.06	0.22	0.06
Recovery system, for re-use	kg	0.00	0.00	0.00	0.00
Recovery system, for recycling	kg	2.93	5.06	20.99	6.13
Recovery system, for energy recovery	kg	0.00	0.00	0.00	0.00
Disposal	kg	0.15	0.26	1.10	0.32

The 100% scenarios differ from the current average recovery shown here (in background report C3.4). The evaluation of each scenario is described in the background report.

Since this is a single scenario, the results are shown in the summary table.

**C4 Disposal**

No.	Scenario	Description
C4	Disposal	<p><b>The non-recordable amounts and losses within the re-use/recycling chain (C1 and C3) are modelled as “disposed” (EU-28).</b></p>

The 100% scenarios differ from the current average recovery shown here (in background report C4.4). The evaluation of each scenario is described in the background report.

The consumption in scenario C4 results from physical pre-treatment, waste recycling and management of the disposal site. The benefits obtained here from the substitution of primary material production are allocated to Module D, e.g. electricity and heat from waste incineration.



Product group profiles

Since this is a single scenario, the results are shown in the summary table.

**D Benefits and loads from beyond the system boundaries**

No.	Scenario	Description
D	Recycling potential (current market situation)	Aluminium recyclate from C3 excluding the recyclate used in A3 replaces 60% of aluminium; PA recyclate from C3 replaces 60% PA granules; XPS recyclate from C3 replaces 60% XPS granules. Benefits from incineration plant: Benefits from waste incineration: electricity replaces electricity mix (EU-28); thermal energy replaces thermal energy from natural gas (EU-28).

The values in Module D result from recycling of the packaging material in Module A5 and from deconstruction at the end of service life.

The 100% scenarios differ from the current average recovery shown here (in background report D4). The evaluation of each scenario is described in the background report.

Since this is a single scenario, the results are shown in the summary table.

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### **Notes**

This EPD is mainly based on the work and findings of Institut für Fenstertechnik e.V., Rosenheim (ift Rosenheim) and specifically on ift-Guideline NA-01/3 "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations).

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