Environmental Product Declaration

Declaration Code: EPD-ASZ-GB-37.0

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clauss markisen Projekt GmbH

Solar shading devices

External solar shading Devices

Basis:

DIN EN ISO 14025
EN15804

Company EPD **E**nvironmental **P**roduct **D**eclaration

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Practitioner of the LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 D-83026 Rosenheim		
Declaration holder	clauss markisen Projekt GmbH Sindelfinger Straße 21 70771 Leinfelden-Echterdingen		
Declaration code	EPD-ASZ-GB-37.0		
Designation of declared product	External solar shading device		
Scope	Solar shading and external venetian blind systems for external application.		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and DIN EN 15804:2012+A1:2013. In addition, the "Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen" (Guidance on preparing Type III Environmental Product Declarations) applies. The Declaration is based on the PCR documents “PCR Part A” PCR-A-0.2:2018 and “Solar shading devices and shutters (including blackout systems)” PCR-SS-2.1:2018		
Validity	Publication date: 15.10.2020	Last revision: 11.11.2020	Next revision: 15.10.2025
	This verified Company Environmental Product Declaration (company EPD) applies solely to the specified products and is valid for a period of 5 years from the date of publication in accordance with DIN EN 15804.		
LCA basis	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The base data includes both the data collected at the production site of clauss markisen Projekt GmbH and the generic data derived from the “GaBi 9” database. LCA calculations were carried out for the included “cradle to gate with options life cycle” (cradle to gate with options) including all upstream chains (e.g. raw material extraction, etc.).		
Notes	The “Conditions and Guidance on the Use of ift Test Documents” apply. The declaration holder assumes full liability for the underlying data, certificates and verifications.		

Florian Stich Deputy Head of Certification and Surveillance Body	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR	Susanne Volz External Verifier

1 General product information

Product definition

The EPD relates to the product group “Solar shading devices” and applies to:

1 m² of External solar shading
made by clauss markisen Projekt GmbH.

The functional unit is obtained by summing up:

Assessed product	Reference product	Weight per unit area
Awning (PG1)	1.23 m x 1.48 m	38.12 kg/m²
Metal curtains and window / façade awnings (PG2)	1.23 m x 1.48 m	12.76 kg/m²
External venetian blind (PG3)	1.23 m x 1.48 m	3.87 kg/m²

The average unit is declared as follows:
Directly used material flows are determined using sizes (1.23 m x 1.48 m) in accordance with the PCR, and assigned to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety because no direct assignment to the sizes is possible. The reference period is the year 2019.

The validity of the EPD is restricted to the following models:
- external shading devices MIKRA and ALTO (curved)
- pleated shading device SWING
- internal shading devices DELTA Type S, Type H, Type HB and INTRA
- internal shading device k_oax (90 / 132 / 180 mm)
- s_onro® and roller shutter AL37/52 front mounted shutter box Type SE20, SE90, Type SR and Type SPT
- s_onro® and built-in roller shutter box Type SAK (95 mm / 120 mm), Type UAK
- s_onro® curtain
- s_onro® and roller shutter AL37 shaft box Type SK
- cassette awning art 01, art 02 and VEGAS
- semi-cassette awning Nova_02
- retractable awning CLASSIC/Maxima
- fan-shaped side awning TERRAZZO
- window awning AKZENT Type S, Type ST, Type F and Type MG
- window awning c_ubus 95 SK/SL and GK/GL
- stainless steel façade awning TECHNO Type ES, Type EV, Type EF and Type EM
- (tubular frame) façade awning VERTICA Type PV and Type PM
- window awning zip_2.0 with box 110 mm / 150 mm
- solar shading curtain s_enn SN 72/1, SN 72/2, SN 72/3 and s_enro SN 72/1, SN 72/2
- external roller blind Solix
- convex venetian blind KR60 and KR80
- economy venetian blind EC7, EC80 and EC100
- compound venetian blind VR70 and VR90 (wind resistant)

- metal compound venetian blind MV90
- balcony curtain Flexus
- external venetian blind 80 mm / 90 mm

Product description

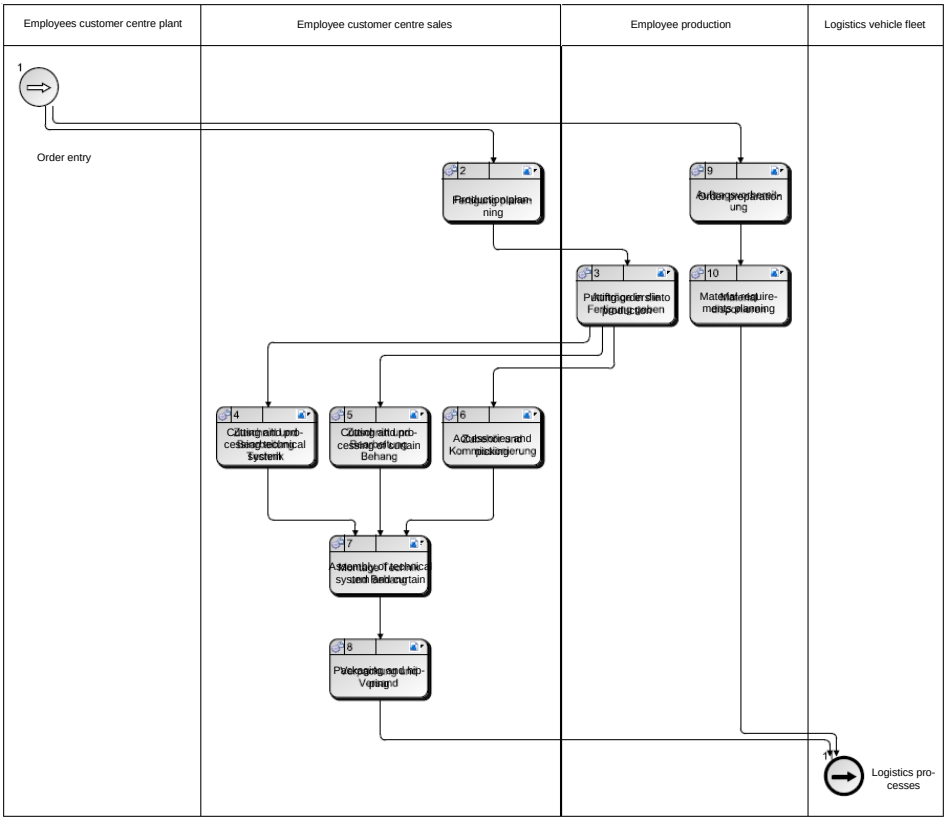
Awnings
Solar shading system in individual sizes and designs, consisting of a tube/rod system and side guides or folding arms with rolled curtain made of a specific fabric.

Metal curtains and window / façade awnings
Solar shading system in individual sizes and designs, consisting of a metal housing and side guides with rolled curtain made of a specific fabric or metal profiles.

External venetian blinds
External venetian blind system in individual sizes and designs, consisting of a head profile and side guide rails and stacked slats in individual designs.

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

Product manufacture



Applications

Awning
Innovative folding arm awning in slim design.

Metal curtains and window / façade awnings
Delicate design, transparency, small installation dimensions, homogeneous, precise surface with a range of optional fabric colours.

External venetian blinds
Movable slats for privacy screening and solar shading for room lighting and ventilation

External solar shading systems are applied in e.g.

- residential and non-residential buildings,
- office and administrative buildings,
- commercial and industrial buildings,
- sports and cultural buildings.

Verifications

The following verifications are held:

- performance requirements including safety to DIN EN 13561 (External blinds and awnings)
- performance requirements including safety to DIN EN 13659 (Shutters and external venetian blinds)

For further and updated verifications (incl. other national approvals) refer to www.mhz.de.

Management systems

The following management systems are in place:

- quality management system to DIN EN ISO 9001:2015 (Niederstetten plant)

Additional information

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

2 Materials used

Primary materials

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

Declarable substances

The zip_2.0 window awning with Type S drop rail in the width dimensions 1,000 - 1,399 mm contains substances from the REACH candidate list (declaration dated August 2020).

All relevant safety data sheets are available from clauss markisen Projekt GmbH .

3 Construction process stage

Processing recommendations, installation

Observe the instructions for assembly/installation, operation, service/maintenance and disassembly. See www.mhz.de

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 refers to the declared technical and functional performance of the product within the building. It shall be established in accordance with specific rules set out in the European product standards and shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards provide guidance on determining RSL, such guidance shall have priority. 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.

For this EPD the following applies:
The reference service life (RSL) can be determined for a "cradle to gate with options" EPD only if all of the Modules A1-A3 and B1-B5 are specified; According to the manufacturer, the external solar shading products manufactured by clauss markisen Projekt GmbH have a service life of 40 years for awnings and 25 years for metal curtains, window and façade awnings as well as for external venetian blinds.

The service life is dependent on the characteristics of the product and in-use conditions. The 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 (e.g., humidity, temperature) known that may 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

The external solar shading device is shipped to central collection points. There the products are usually shredded and sorted into their original 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.

This EPD shows the end-of-life modules according to the market situation. Specific steel, aluminium, stainless steel and electronics parts are recycled. Residual fractions are sent to landfill or partially 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.

Life cycle assessments have been developed as the basis for external solar shading systems. These LCAs are in conformity with 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

Goal

The goal of the LCA is to demonstrate the environmental impacts of external solar shading systems. 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 2019 fiscal year. They were collected on-site at the plants located in 70771 Leinfelden-Echterdingen, 97996 Niederstetten, 79359 Riegel am Kaiserstuhl, 06184 Kabelsketal, 06184 Kabelsketal, 73230 Kirchheim unter Teck and 35801 Kraslice, Czech Republic, and originate in parts from company records and values directly obtained by measurement. Validity of the data was checked by the ift Rosenheim.

The generic data originate from the “GaBi 9” professional and construction materials databases. The last update of both databases was in 2020. Data from before this date originate also from these databases and are not more than 4 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 “GaBi ts” 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 external solar shading products (cradle to gate – with options).

No additional data from pre-suppliers/subcontractors or other sites were taken into consideration.

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 were taken into consideration as a function of > 97% of the mass of external solar shading devices.
The remaining transport distances of the pre-products to the plant in 70771 Leinfelden-Echterdingen were not taken into consideration.

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

Goal

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 entire life cycle of external solar shading products is shown in the Annex. Product stage "A1 – A3", construction process stage" A4 – A5", use stage "B2 – B4, B6, B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" were taken into consideration.

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

The manufacture of external solar shading products does not produce any allocations.

Allocations for re-use, recycling and recovery

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

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

Allocations beyond life cycle boundaries

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

Secondary material

The use of secondary materials by clauss markisen Projekt GmbH was considered in Module A3. Secondary material is not used.

Inputs

The LCA includes the following production-relevant inputs:

Energy

The extra light German “DE Heizöl el“ fuel oil was used as the fuel oil input material. For gas as input material “Erdgas Deutschland” (German natural gas) was used. For wood pellets, “Holzpellets (0% H2O content) Deutschland” (wood pellets Germany) were used. The electricity mix is based on the following electricity mix (see table below):

Electricity disclosure of energy supplier	Shares in %
Renewable energies*	59.1
Coal/natural gas	5.1
Hard / brown coal	0.7
Heavy oil	20.5
Nuclear energy	14.6

Exempt from this is the Niederstetten plant. 72% of its electricity demand is supplied by electricity from photovoltaics and only the remaining 28% by the purchased electricity mix.

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.

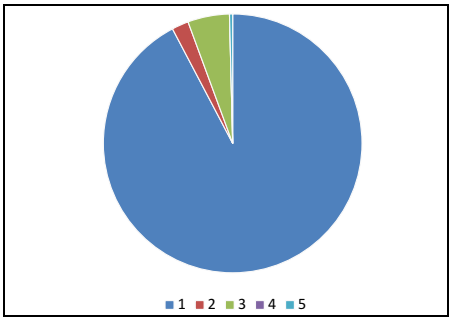
Water

The water consumed by the individual process steps for the manufacture of external solar shading products amounts to 480 l (awnings), 108 l (metal curtains, window and façade awnings) or 313 l (external venetian blinds) water per 1 m² of the element.

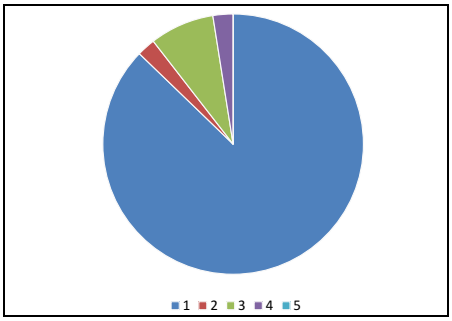
The consumption of fresh water specified in Section 6.3 results (among others) from the process chains of the pre-products.

Raw material / pre-products

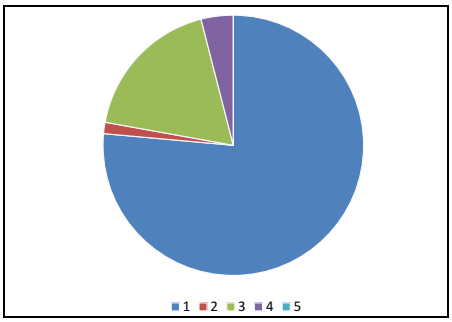
The chart below shows the share of the raw materials/pre-products in the end product in percent.



Awning (PG1)



Metal curtain, window and façade awning (PG2)



External venetian blind (PG3)

No.	Material	Mass in %		
		PG 1	PG 2	PG 3
1	Metals	92.2	87.2	76.5
2	Fabrics	2.1	2.3	1.4
3	Electrical systems	5.2	8.0	18.2
4	Plastics	0.0	2.5	4.0
5	Other	0.4	0.0	0.0

Ancillary materials and consumables
1.60 kg (awnings), 0.36 kg (metal curtains, window and façade awnings) or 1.04 kg (external venetian blinds) of ancillary materials and consumables are required for 1 m² of External solar shading device.

Product packaging
The amounts used for product packaging are as follows:

No.	Material	Mass in kg		
		PG 1	PG 2	PG 3
1	PE film	0.14	0.04	0.04
2	Paper	0.06	0.00	0.00
3	Cardboard	3.04	2.84	0.00

Outputs

The LCA includes the following production-relevant outputs per 1 m² of External solar shading.

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

Waste water
The manufacture of external solar shading products produces 480 l (awnings), 108 l (metal curtains, window and façade awnings) or 313 l (external venetian blinds) waste water per 1 m².

6.3 Impact assessment

Goal

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

Impact categories

The models for impact assessment were applied as described in DIN EN 15804-A1.
The impact categories presented in the EPD are as follows:

- depletion of abiotic resources (fossil fuels);
- depletion of abiotic resources (mineral substances);
- acidification of soil and water;
- ozone depletion;
- global warming;
- eutrophication;
- photochemical ozone creation.

Waste

The waste generated during the production of 1 m² of External solar shading 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.

	Results per 1 m² of awning														
	Unit	**A1-A3**	**A4**	**A5)**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Central environmental impacts																
GWP	kg CO_2 eq.	301.85	3.10	5.22	-	6.48E-03	79.30	228.03	-	126.05	0.00	0.42	0.50	2.48	4.4E-02	-85.59
ODP	kg CFC -11 eq.	1.43E-06	5.10E-16	1.290E-14	-	2.10E-17	1.62E-06	1.43E-06	-	3.77E-12	0.00	1.25E-14	8.32E-17	1.87E-15	2.39E-16	-2.26E-13
AP	kg SO_2 eq.	1.19	7.64E-03	1.75E-03	-	7.90E-06	0.14	0.94	-	0.26	0.00	8.77E-04	1.50E-03	2.65E-04	2.78E-04	-0.26
EP	kg PO_4^{3-} eq.	9.15E-02	1.86E-03	2.69E-04	-	1.42E-06	2.41E-02	7.50E-02	-	2.93E-02	0.00	9.71E-05	3.66E-04	4.54E-05	3.14E-05	-1.92E-02
POCP	kg ethene eq.	8.21E-02	-2.51E-03	1.21E-04	-	1.75E-06	1.62E-02	5.68E-02	-	1.88E-02	0.00	6.25E-05	-4.04E-04	2.38E-05	2.09E-05	-2.26E-02
ADPE	kg Sb eq.	-9.72E-04	2.58E-07	2.21E-07	-	1.79E-09	5.20E-04	-9.86E-04	-	4.21E-05	0.00	1.40E-07	4.21E-08	3.16E-08	1.67E-08	-1.50E-05
ADPF	MJ	4,330.95	42.28	5.63	-	0.19	1,002.83	3,520.03	-	1.396.85	0.00	4.63	6.90	0.86	0.62	-871.83
Use of resources																
PERE	MJ	3,748.63	2.38	53.08	-	4.33E-03	156.65	3,557.36	-	1,001.54	0.00	3.32	0.39	0.49	8.31E-02	-251.03
PERM	MJ	49.69	0.00	-49.69	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	3,798.32	2.38	3.40	-	4.33E-03	156.65	3,557.36	-	1,001.54	0.00	3.32	0.39	0.49	8.31E-02	-251.03
PENRE	MJ	4,990.48	42.42	11.31	-	0.19	2,039.01	4,087.34	-	2,260.04	0.00	7.49	6.92	1.60	0.65	-973.53
PENRM	MJ	3.13	0.00	-2.79	-	0.00	0.00	-1.18E-16	-	0.00	0.00	0.00	0.00	-0.32	-1.69E-02	0.00
PENRT	MJ	4993.61	42.42	8.52	-	0.19	2,039.01	4,087.34	-	2,260.04	0.00	7.49	6.92	1.28	0.63	-973.53
SM	kg	0.60	0.00	0.00	-	0.00	1.49	0.60	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	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	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	3.92	2.76E-03	1.74E-02	-	5.02E-03	0.19	3.37	-	1.16	0.00	3.84E-03	4.50E-04	5.74E-03	1.60E-04	-0.58
Waste categories																
HWD	kg	2.13E-05	1.97E-06	5.01E-09	-	6.05E-11	4.33E-07	2.30E-05	-	9.35E-07	0.00	3.10E-09	3.22E-07	6.06E-10	9.67E-09	-5.88E-07
NHWD	kg	55.73	6.49E-03	0.14	-	1.56E-03	1.11	48.11	-	1.60	0.00	5.32E-03	1.06E-03	1.03E-02	3.19	-10.99
RWD	kg	0.11	5.25E-05	1.15E-03	-	8.94E-07	2.15E-02	6.92E-02	-	0.34	0.00	1.14E-03	8.57E-06	1.66E-04	7.22E-06	-4.02E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	46.83	0.00	0.00	-	0.00	5.00	80.99	-	0.00	0.00	0.00	0.00	34.16	0.00	0.00
MER	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	94.73	0.00	7.57	-	0.00	26.22	107.47	-	0.00	0.00	0.00	0.00	5.17	0.00	0.00
EET	MJ	201.52	0.00	13.70	-	0.00	46.62	224.41	-	0.00	0.00	0.00	0.00	9.20	0.00	0.00

Key:
GWP – global warming potential **ODP** – ozone depletion potential **AP** - acidification potential **EP** - eutrophication potential **POCP** - photochemical ozone formation potential **ADPE** - abiotic depletion potential – non-fossil resources **ADPF** - abiotic depletion potential – fossil resources **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 m² of metal curtain and window / façade awning																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Central environmental impacts																
GWP	kg CO_2 eq.	116.77	1.17	4.55	-	6.48E-03	17.27	81.18	-	126.05	0.00	0.14	0.17	1.86	1.61E-02	-43.49
ODP	kg CFC -11 eq.	9.88E-07	1.93E-16	1.28E-14	-	2.10E-17	6.58E-07	9.88E-07	-	3.77E-12	0.00	4.18E-15	2.78E-17	1.81E-15	8.87E-17	-1.00E-13
AP	kg SO_2 eq.	0.49	2.89E-03	1.65E-03	-	7.90E-06	0.04	0.33	-	0.26	0.00	2.94E-04	5.01E-04	2.27E-04	1.03E-04	-0.17
EP	kg PO_4^{3-} eq.	3.58E-02	7.02E-04	2.51E-04	-	1.42E-06	6.55E-03	2.66E-02	-	2.93E-02	0.00	3.25E-05	1.23E-04	3.71E-05	1.16E-05	-1.03E-02
POCP	kg ethene eq.	3.06E-02	-9.49E-04	1.14E-04	-	1.75E-06	4.39E-03	1.89E-02	-	1.88E-02	0.00	2.09E-05	-1.35E-04	1.99E-05	7.77E-06	-1.08E-02
ADPE	kg Sb eq.	-1.40E-04	9.75E-08	2.12E-07	-	1.79E-09	1.99E-04	-1.56E-04	-	4.21E-05	0.00	4.67E-08	1.41E-08	2.82E-08	6.21E-09	-1.56E-05
ADPF	MJ	1541.18	15.99	5.49	-	0.19	202.57	1,102.78	-	1,396.85	0.00	1.55	2.31	0.79	0.23	-464.76
Use of resources																
PERE	MJ	1,077.60	0.90	48.83	-	4.33E-03	25.78	932.94	-	1,001.54	0.00	1.11	0.13	0.48	3.08E-02	-196.15
PERM	MJ	45.46	0.00	-45.46	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	1,123.06	0.90	3.37	-	4.33E-03	25.78	932.94	-	1001.54	0.00	1.11	0.13	0.48	3.08E-02	-196.15
PENRE	MJ	1,888.86	16.04	9.20	-	0.19	610.40	1,389.95	-	2,260.04	0.00	2.51	2.32	7.42	0.56	-536.96
PENRM	MJ	7.38	0.00	-0.84	-	0.00	0.00	2.22E-16	-	0.00	0.00	0.00	0.00	-6.22	-0.33	0.00
PENRT	MJ	1,896.24	16.04	8.37	-	0.19	610.40	1,389.95	-	2,260.04	0.00	2.51	2.32	1.20	0.24	-536.96
SM	kg	0.30	0.00	0.00	-	0.00	0.61	0.30	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	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	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	1.55	1.04E-03	1.57E-02	-	5.02E-03	0.03	1.09	-	1.16	0.00	1.28E-03	1.51E-04	4.41E-03	5.94E-05	-0.48
Waste categories																
HWD	kg	5.48E-06	7.46E-07	4.81E-09	-	6.05E-11	6.36E-08	6.04E-06	-	9.35E-07	0.00	1.04E-09	1.08E-07	5.56E-10	3.59E-09	-3.06E-07
NHWD	kg	25.67	2.45E-03	0.13	-	1.56E-03	0.16	17.49	-	1.60	0.00	1.78E-03	3.54E-04	7.85E-03	1.18	-9.50
RWD	kg	6.13E-02	1.98E-05	1.14E-03	-	8.94E-07	3.15E-03	3.45E-02	-	0.34	0.00	3.81E-04	2.87E-06	1.62E-04	2.68E-06	-2.85E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	10.50	0.00	0.00	-	0.00	2.03	21.49	-	0.00	0.00	0.00	0.00	11.00	0.00	0.00
MER	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	21.24	0.00	6.37	-	0.00	3.85	31.46	-	0.00	0.00	0.00	0.00	3.86	0.00	0.00
EET	MJ	45.18	0.00	11.54	-	0.00	6.84	63.57	-	0.00	0.00	0.00	0.00	6.85	0.00	0.00

Key:
GWP – global warming potential **ODP** – ozone depletion potential **AP** - acidification potential **EP** - eutrophication potential **POCP** - photochemical ozone formation potential **ADPE** - abiotic depletion potential – non-fossil resources **ADPF** - abiotic depletion potential – fossil resources **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 m² of external venetian blind																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Central environmental impacts																
GWP	kg CO_2 eq.	127.60	0.30	0.50	-	6.48E-03	10.19	115.39	-	120.63	0.00	4.33E-02	5.22E-02	0.68	5.54E-03	-13.80
ODP	kg CFC -11 eq.	7.47E-07	4.91E-17	1.18E-14	-	2.10E-17	1.39E-06	7.47E-07	-	3.61E-12	0.00	1.30E-15	8.62E-18	1.70E-15	3.05E-17	-2.29E-14
AP	kg SO_2 eq.	0.56	7.36E-04	8.35E-04	-	7.90E-06	3.47E-02	0.51	-	0.25	0.00	9.09E-05	1.55E-04	1.54E-04	3.55E-05	-5.28E-02
EP	kg PO_4^{3-} eq.	4.12E-02	1.79E-04	9.32E-05	-	1.42E-06	5.15E-03	3.83E-02	-	2.80E-02	0.00	1.01E-05	3.79E-05	2.12E-05	4.00E-06	-3.29E-03
POCP	kg ethene eq.	3.38E-02	-2.42E-04	5.97E-05	-	1.75E-06	2.44E-03	3.00E-02	-	1.80E-02	0.00	6.47E-06	-4.19E-05	1.23E-05	2.67E-06	-3.58E-03
ADPE	kg Sb eq.	-1.80E-04	2.49E-08	1.32E-07	-	1.79E-09	1.20E-03	-1.83E-04	-	4.03E-05	0.00	1.45E-08	4.36E-09	2.18E-08	2.14E-09	-3.73E-06
ADPF	MJ	2,133.87	4.07	4.39	-	0.19	123.72	2,000.83	-	1,336.77	0.00	0.48	0.71	0.67	7.86E-02	-143.45
Use of resources																
PERE	MJ	2,291.22	0.23	3.14	-	4.33E-03	0.00	2,236.60	-	958.46	0.00	0.34	4.03E-02	0.45	1.06E-02	-58.83
PERM	MJ	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	2,291.22	0.23	3.14	-	4.33E-03	0.00	2,236.60	-	958.46	0.00	0.34	4.03E-02	0.45	1.06E-02	-58.83
PENRE	MJ	2,254.53	4.09	7.80	-	0.19	141.03	2,108.39	-	2,162.84	0.00	0.78	0.72	4.10	0.24	-163.87
PENRM	MJ	3.92	0.00	-0.71	-	0.00	0.00	2.50E-16	-	0.00	0.00	0.00	0.00	-3.05	-0.16	0.00
PENRT	MJ	2,258.45	4.09	7.09	-	0.19	141.03	2,108.39	-	2,162.84	0.00	0.78	0.72	1.06	0.08	-163.87
SM	kg	0.00	0.00	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	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	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m^3	2.15	2.66E-04	3.86E-03	-	5.02E-03	0.00	2.01	-	1.11	0.00	3.98E-04	4.66E-05	1.86E-03	2.04E-05	-0.15
Waste categories																
HWD	kg	1.30E-05	1.90E-07	2.94E-09	-	6.05E-11	0.00	1.32E-05	-	8.95E-07	0.00	3.21E-10	3.34E-08	4.59E-10	1.23E-09	-9.59E-08
NHWD	kg	28.43	6.25E-04	5.46E-03	-	1.56E-03	0.00	25.89	-	1.53	0.00	5.51E-04	1.10E-04	3.19E-03	0.41	-2.96
RWD	kg	4.54E-02	5.06E-06	1.07E-03	-	8.94E-07	0.00	3.87E-02	-	0.33	0.00	1.18E-04	8.88E-07	1.54E-04	9.21E-07	-8.06E-03
Output material flows																
CRU	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	30.48	0.00	0.00	-	0.00	1.43	33.82	-	0.00	0.00	0.00	0.00	3.34	0.00	0.00
MER	kg	0.00	0.00	0.00	-	0.00	0.00	0.00	-	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	61.64	0.00	0.23	-	0.00	0.00	63.22	-	0.00	0.00	0.00	0.00	1.34	0.00	0.00
EET	MJ	131.14	0.00	0.42	-	0.00	0.00	133.94	-	0.00	0.00	0.00	0.00	2.39	0.00	0.00

Key:
GWP – global warming potential **ODP** – ozone depletion potential **AP** - acidification potential **EP** - eutrophication potential **POCP** - photochemical ozone formation potential **ADPE** - abiotic depletion potential – non-fossil resources **ADPF** - abiotic depletion potential – fossil resources **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

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of

- awnings
- metal curtains and window / façade awnings
- external venetian blinds

differ considerably from each other. The differences are due mainly to the amounts of pre-products and raw materials used. This was to be expected mainly for the metals used.

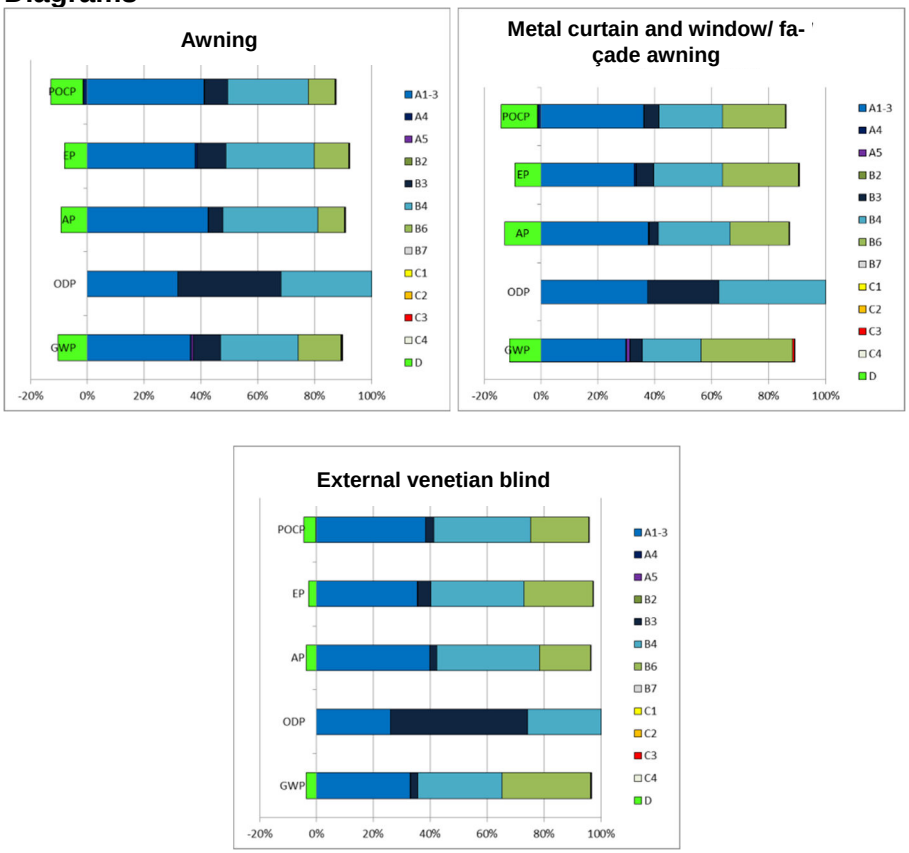
The environmental impacts from the manufacture result mainly from the use of aluminium / its upstream chains. The environmental impacts resulting from electricity consumption and the associated upstream chains are also of importance.
Further essential parameters result from one replacement of the entire product systems and the electricity consumed in the use stage over a 50-year period. The repair of wearing parts, in particular of the drive mechanism, and the cleaning processes using water and aluminium cleaner, play a secondary role in terms of environmental impacts during the 50-year use stage.

For scenario C4 only marginal consumptions arising from the physical pre-treatment and management of the disposal site are expected. Allocation to individual products is almost impossible for site disposal.
As regards the recycling of the products, between 2 and 10% (aluminium) and 1 and 3% (steel) of the environmental impacts during manufacture can be assigned as benefits to scenario D.

The chart below shows the allocation of the main environmental impacts.

The values obtained from the LCA calculation are suitable for building certification if required.

Diagrams



Report

The LCA 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 not addressed to third parties for reasons of confidentiality. It is deposited with the 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.

Critical review

The critical review of the LCA and the report took place in the course of verification of the EPD and was carried out by Susanne Volz, M.Sc. Environmental Science, an external verifier.

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.

The Declaration is based on the PCR documents "PCR Part A" PCR-A-0.2:2018 and "Solar shading devices and shutters (including blackout systems)" PCR-SS-2.1:2018.

The European standard EN 15804 serves as the core PCR [a)]
Independent verification of the Declaration and statement according to EN ISO 14025:2010 ☐ internal ☒ external
Independent third party verifier: [b)] Susanne Volz
[a)] Product category rules [b)] Optional for business-to-business communication Mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

Revisions of this document

No.	Date	Note:	Practitioner of the LCA	Verifier
1	15.10.2020	External Verification	Zwick	Volz

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9 Annex

Description of life cycle scenarios for External solar shading devices

Product stage			Con-struction stage		Use stage							End-of-life stage				Benefits and loads from beyond the system boundaries
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material supply	Transport	Manufacture	Transport	Construction/Installation	Use	Inspection, maintenance, clean-ing	Repair	Exchange / Replacement	Improvement / Modernisation	Operational energy use	Operational water use	Deconstruction	Transport	Waste management	Disposal	Re-use Recovery Recycling potential
✓	✓	✓	✓	✓	—	✓	✓	✓	—	✓	✓	✓	✓	✓	✓	✓

Calculation of the scenarios was based on a building service life of 50 years (in accordance with RSL of Section 4 Use stage).

The scenarios were based on information provided by the manufacturer. The scenarios were furthermore based on the research project “EPDs for transparent building components” (1).

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

A4 Transport to the construction site

No.	Scenario	Description
A4	Direct shipment to construction site/branch	7.5 t truck (Euro 0-6 Mix), 2.7 t payload, 85 percent capacity used, approx. 350 km 3.5 t utility vehicle / Sprinter (Euro 4), 1.5 t payload, 85 percent capacity used, approx. 50 km

Since only one scenario is used, the results are shown in the relevant summary table.

A5 Construction/Installation

No.	Scenario	Description
A5	Small lifting trolley / lifting platform	Small lifting platform/lifting trolley is required for the installation of the elements 1 kWh/m² (1)

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.

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

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. Transport to the recycling plants is not taken into account.
Benefits from A5 are specified in Module D. Benefits from waste incineration: electricity replaces (EU 28) electricity mix; thermal energy replaces thermal energy from (EU 28) natural gas.

Since only one scenario is used, the results are shown in the relevant summary table.

B1 Use (not included)
Refer to Section 5 Use stage - Emissions to the environment. Emissions cannot be quantified.

B2 Inspection, maintenance, cleaning

B2.1 Cleaning

No.	Scenario	Description
B2.1	Frequently, manually	Manually using moist cloth and suitable cleaning agent, twice a year 0.05 l/m² water per cleaning process (5 l / 50 yr), 3 ml cleaning agent per 5 l water (3.12 g / 50 yr)

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

Since only one scenario is used, the results are shown in the relevant summary table.

B2.2 Maintenance

No.	Scenario	Description
B2.2	Normal use and heavy use	Annual operational check and visual inspection

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

Since only one scenario is used, the results are shown in the relevant summary table.

B3 Repair

No.	Scenario	Description
B3	Normal use and heavy use	**Awning** **Repeated replacement*: fabric and electric drive (2.5 times) and roller cables (10 times)** **Metal curtain and window / façade awning** **Repeated replacement*: fabric and electric drive (twice)** **External venetian blind** **Repeated replacement*: electric drive (twice)**

* Assumptions for the 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 of External solar shading at www.mhz.de .

The external solar shading products manufactured by clauss markisen Projekt GmbH have a specified service life of 40 and 25 years, respectively. Scenario B3 presents the LCA of the components of building elements with a service life of less than the relevant evaluation period.

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

Since only one scenario is used, the results are shown in the summary table.

B4 Exchange / Replacement

No.	Scenario	Description
B4	Normal use and heavy use	One replacement of the entire system in 50 years*

* Assumptions for the 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.

According to the manufacturer, it is assumed that one replacement will be necessary during the 40-year service life of awnings and 25-year service life of metal curtains, window and façade awnings and external venetian blinds, and the 50-year building service life.

For updated information refer to the relevant instructions for assembly/installation, operation and maintenance of External solar shading at www.mhz.de .

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.

Since only one scenario is used, the results are shown in the summary table.

B6 Operational energy use

No.	Scenario	Description
B6	**Power operated, normal use**	**Awnings and metal curtains, window and façade awnings** **Per drive mechanism: 95.79 kWh for 15 years (319.30 kWh / 50 yr) electricity (incl. standby operation)** (2) **External venetian blind** **Per drive mechanism: 91.67 kWh for 15 years (305.57 kWh / 50 yr) electricity (incl. standby operation)** (3)

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

Since only one scenario is used, the results are shown in the relevant summary table.

B7 Operational water use (not relevant)
No water consumption when used as intended. Water consumption for cleaning is specified in Module B2.1.

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

Since only one scenario is used, the results are shown in the relevant summary table.

C1 Deconstruction

No.	Scenario	Description
C1	**Deconstruction**	**95% deconstruction;** **Further deconstruction rates are possible, give adequate reasons.**

Since only one scenario is used, the results are shown in the summary table.

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

C2 Transport

No.	Scenario	Description
C2	Transport	Transport to collection point using 3.5 t utility vehicle / Sprinter (Euro 4), 1.5 t payload, 80% capacity used, 50 km

Since only one scenario is used, the results are shown in the summary table.

C3 Waste management

No.	Scenario	Description
C3	Disposal	**Share for recirculation of materials:** • **steel 98% in melt** (UBA, 2017) • **aluminium 95% in melt** (GDA, 2018) • **remaining metals 97% in melt** (UBA, 2017) • **electric components 87%** (based on end-of-life electric devices 87%; UBA, 2018) • **plastics - thermal recycling in waste incineration plant** • **fabrics - thermal recycling in waste incineration plant** • **remainder to landfill**

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	PG1	PG2	PG3
Collection process, collected separately	kg	36.21	12.12	3.75
Collection process, collected as mixed construction waste	kg	1.91	0.64	0.20
Recovery system, for re-use	kg	0.00	0.00	0.00
Recovery system, for recycling	kg	34.16	11.00	3.34
Recovery system, for energy recovery	kg	0.77	0.58	0.20
Disposal	kg	3.19	1.18	0.41

Since only one scenario is used, the results are shown in the summary table.

C4 Disposal

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

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.
Since only one scenario is used, the results are shown in the summary table.

D Benefits and loads from beyond the system boundaries		
No.	**Scenario**	**Description**
D	**Recycling potential**	**Aluminium recyclate from C3 excluding the recyclate used in A3 replaces 60% of aluminium compound; Steel scrap from C3 excluding the scrap used in A3 replaces 60% of steel; Stainless steel scrap from C3 excluding the scrap used in A3 replaces 60% of stainless steel; Electric scrap from C3 excluding the electric drives used in A3 replaces 60% of steel; Benefits from waste incineration: electricity replaces (EU-28) European electricity mix; thermal energy replaces thermal energy from(EU-28) European natural gas.**

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

Since only one scenario is used, the results are shown in the summary table.

Imprint

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

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