

Environmental Product Declaration (EPD)



Declaration code EPD-FRA-GB-0.5.2



Hörmann KG Eckelhausen

Doors



Smoke and fire-resistant assemblies



Basis:

DIN EN ISO 14025
EN 15804 + A2

Company EPD
Environmental
Product Declaration

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13.07.2029



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Practitioner of LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim, Germany		
Declaration holder	Hörmann KG Eckelhausen In der Bruchwiese 2 66625 Nohfelden, Germany www.hoermann.de		
Declaration code	EPD-FRA-GB-0.5.2		
Designation of declared product	Smoke and fire-resistant assemblies made of aluminum		
Scope	Fire and smoke control door and shutter assemblies for exterior and interior use, primarily for use in the commercial sector		
Basis	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 the PCR documents EN 17213 "PCR for windows and doors", "PCR Part A" PCR-A-1.0:2023 and "Doors and gates" PCR-TT-3.0:2023."		
Validity	Publication date: 13.07.2024	Last revision: 20.09.2024	Valid until: 13.07.2029
	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.		
LCA Basis	The LCA was prepared in accordance with DIN EN ISO 14040 and DIN EN ISO 14044. The base data include both the data collected at the Hörmann KG Eckelhausen production site and the generic data derived from the database "LCA for Experts 10". LCA calculations were carried out for the "cradle to gate" life cycle with options (cradle to gate with options) including all upstream chains (e.g. raw material extraction, etc.).		
Notes	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.		
	Christoph Seehauser Deputy Head for Sustainability	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 Doors and applies to:

1 m² Smoke and fire-resistant assembly of company Hörmann KG Eckelhausen

The declared unit is obtained by summing up:

Assessed product	Declared unit	Weight per unit area
Product group 1 (PG 1) Smoke control doors and shutters	1 m ²	37.8 kg/m ²
Product group 2 (PG 2) Fire-resistant assemblies T30	1 m ²	54.2 kg/m ²
Product group 3 (PG 3) Fire-resistant assemblies T90	1 m ²	67.8 kg/m ²

Table 1 Product groups

The average unit is declared as follows:

Directly used material flows are determined using average sizes (1.23 m x 2.18 m) and allocated to the declared unit. All other inputs and outputs in the manufacture were scaled to the declared unit as a whole, since no direct assignment to the average size is possible. The reference period is the year 2022.

The validity of the EPD extends to the following series, whereby the national evidence of specified use is explicitly listed here as a representative of identical European evidences of specified use:

Product group 1

Smoke control door and shutter assemblies A/RS x50

- RS-1 door as per DIN 18095 "A/RS 150" P-3545/787/14-MPA BS
- RS-2 door as per DIN 18095 "A/RS 250" P-3545/787/14-MPA BS
- Glazing „A/RS 350“

Smoke control door and shutter assemblies A/RS x00

- RS-1 door as per DIN 18095 "A/RS 100" P-3609/851/14--MPA BS
- RS-2 door as per DIN 18095 "A/RS 200" P-3609/851/14--MPA BS
- Glazing „A/RS 300“

Internal doors

- Internal door ES50-1, ES50-2, glazing ES50-3

Internal/external doors

- OT80-1, OT80-2, glazing OT80-3

Product group 2

Fire-resistant assemblies HE3x1

- T30-1-FSA „HE311“ Z-6.20-1898
- T30-1-RS-FSA „HE311“ Z-6.20-1898
- T30-2-FSA „HE321“ Z-6.20-1898
- T30-2-RS-FSA „HE321“ Z-6.20-1898
- F30 fire resistant glazing „HE331“ Z-19.14-1091
- F30 fire resistant glazing „HE331S“ Z-19.14-1984

Product group 3

Fire-resistant assemblies HE6x1

- | | |
|--------------------------------------|--------------|
| - T60-1-FSA „HE611“ | Z-6.20-1839 |
| - T60-1-RS-FSA „HE611“ | Z-6.20-1839 |
| - T60-2-FSA „HE621“ | Z-6.20-1839 |
| - T60-2-RS-FSA „HE621“ | Z-6.20-1839 |
| - F60 fire resistant glazing „HE631“ | Z-19.14-1667 |

Fire-resistant assemblies HE9x1

- | | |
|------------------------------------|--------------|
| - T90-1-FSA „HE911“ | Z-6.20-1966 |
| - T90-1-RS-FSA „HE911“ | Z-6.20-1966 |
| - T90-2-FSA „HE921“ | Z-6.20-1966 |
| - T90-2-RS-FSA „HE921“ | Z-6.20-1966 |
| - F90 fire resistant glazing HE931 | Z-19.14-1591 |

Automatic sliding doors ASx

- | | |
|------------------------|-------------|
| - T30-1-FSA „ASW 1“ | Z-6.20-1997 |
| - T30-1-RS-FSA „ASV 1“ | Z-6.20-1997 |
| - T30-1-FSA „ASV 1“ | Z-6.20-1997 |
| - T30-1-RS-FSA „ASW 1“ | Z-6.20-1997 |
| - T30-2-FSA „ASV 1“ | Z-6.20-1997 |
| - T30-2-RS-FSA „ASV 2“ | Z-6.20-1997 |
| - T30-2-FSA „ASW 2“ | Z-6.20-1997 |
| - T30-2-RS-FSA „ASW 2“ | Z-6.20-1997 |

Product description

Internal and smoke control doors (A/RS X00, A/RS X50) are designed as single-leaf or double-leaf constructions that can be combined with side panels or top panels as required. They consist of either uninsulated aluminum profiles or aluminium profiles with thermal barrier, which are connected in the corner area using press-fit adhesive joints or screws. The aluminium profiles are either stoving powder-coated or anodized. The sash frame contains either glass or a panel as infill panels. The infill panels can be divided into sections by glazing bars and is held in place by aluminum glazing beads. The glazing bars are fixed with screw connections. The door frame (frame) consists of tubular aluminum frame profiles or is designed as a steel corner or steel frame. The smoke control shutters must be fitted with approved accessories. Approved building products such as construction hinges, closing devices, door coordinating devices, locks and lever handle units are used as accessories.

Fire resistant doors (HE3X1 (T30), HE6X1 (T60), or HE9X1 (T90)) are designed as single-leaf or double-leaf constructions that can be combined with side panels and/or top panels as required. Fire resistant doors can be part of fire-resistant glazing and thus form a single unit. Fire resistant doors mainly consist of a door leaf, a frame and accessories. Door leaves and fire resistant glazing or upper and side panels are always glazed with fire resistant glasses; alternatively, the use of fire boards is permitted. The door leaf, door frame and frame profiles of the fire resistant glazing are made of aluminium profiles with thermal barrier fitted with fire protection material. Building products regulated by the building authorities (accessory components) such as construction hinges, locks, closing devices, door coordinating devices, handles and/or mechatronic systems (e.g. drive units) are used as accessory components for fire resistant doors. In the case of non-regulated construction products (accessory components), their use must be



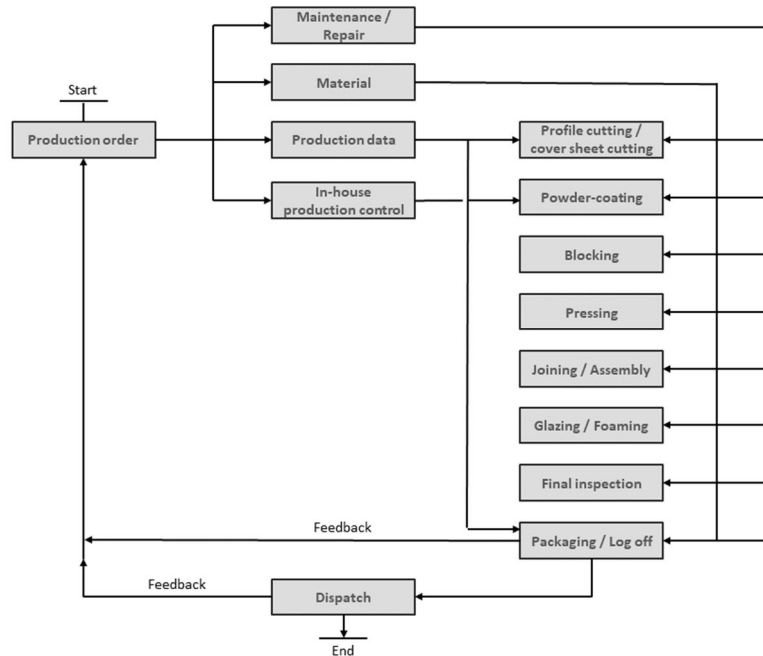
verified by an evidence of specified use prescribed by the building authorities. Fire doors and shutters can also be designed to be smoke-tight and, depending on the series, also meet additional requirements for external pedestrian doorsets.

Fire doors and shutters from the automatic sliding door (ASX) series are sliding leaves that can be designed with either side panels or top panels. The automatic sliding door can be designed as either a single-leaf or double-leaf sliding door. In addition to the sliding panels, the automatic sliding door consists of a track construction and accessory components. The automatic sliding door is made of aluminum and steel profiles. Sliding leaf or sliding leaves as well as side panels and top panels are glazed with fire resistant glasses. The main accessory components are the drive unit and hold-open device. The automatic sliding door can also be designed as a smoke control shutters.

Detailed information on the product and performance specification can be found in the national technical approvals, national technical test certificates and other manufacturer information.

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

Product manufacture



Application

Hörmann fire and smoke control door and shutter assemblies comply with building authority requirements and are used in accordance with building regulations in commercial and private buildings for protection in the event of fire.

Test evidence / reports

In addition to the basic national evidence of specified use in the area of smoke and fire protection (see chapter 1 Product definition), certificates according to DIN EN 16034, DIN EN 1627 and DIN EN 14351-1 are available.

For information on further and updated verifications (including other national refer to www.hoermann.de.

Management systems

The following management systems are held:

- Environmental management system as per DIN EN ISO 14001:2015
- Occupational health and safety management system as per ISO 45001:2015
- Quality management system as per DIN EN ISO 9001:2015
- Energy management system as per DIN EN ISO 50001:2018

Additional information

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

2 Materials used

Primary materials	The raw materials used can be found in Section 6.2 Inventory analysis (Inputs).
Declarable substances	<p>The product contains no substances from the REACH candidate list (declaration dated 03.06.2024).</p> <p>All relevant safety data sheets can be obtained from Hörmann KG Eckelhausen.</p>

3 Construction process stage

Processing recommendations, installation	Observe the instructions for assembly/installation, operation, maintenance and disassembly, provided by the manufacturer. For this, see www.hoermann.de
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4 Use stage

Emissions to the environment	<p>Emissions to indoor air (VOC emissions) are known. The products of product groups 1, 2 and 3 are classified as class A+ (AgBB scheme & VOC and KMR regulation) according to test reports. (certificate 247-7026140-1-5 dated 12.11.2023).</p>
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Furthermore, no emissions to indoor air, water or soil are known.

Reference service life (RSL)	<p>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.</p> <p>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.</p>
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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 service life of the fire and smoke control door and shutter assemblies from Hörmann KG Eckelhausen is optionally specified as 50 years according to the BBSR table.

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 conditions: Weather conditions can have a negative effect on the service life.
- Indoor environment: No impacts (e.g. humidity, temperature) known that have a negative effect on the reference service life.

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

The RSL does not reflect the actual life time, which is usually determined by the service life and the redevelopment 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 Smoke and fire-resistant assemblies 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.

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, a life cycle assessment was created for Smoke and fire-resistant assemblies. The 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 and EN ISO 14025 as well as based on ISO 21930.

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 fiscal year 2022. They were collected on-site at the plant located in 66625 Nohfelden 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 2024. Data from before this date originate also from these databases and are not more than five years old. No other generic data were used for the calculation.

Generic data are selected as accurately as possible in terms of geographic reference. If no country-specific data sets are available or if the regional reference cannot be determined, European or globally valid data sets are used.

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.

The data quality complies with the requirements of prEN 15941:2022.

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 the Smoke and fire-resistant assemblies.

Additional data from pre-suppliers/subcontractors 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. Gebäude- bzw. Anlagenteile, die nicht für die Produktherstellung relevant sind, wurden ausgeschlossen.

The transport distances of the pre-products used were taken into consideration as a function of 100% of the mass of the products. A truck-trailer (34-40 t total weight, 27 t payload) was used. A Euro 0-6 mix is used for the means of transportation. As the pre-products are delivered exclusively by forwarding agents, a very high capacity utilization can be assumed. 85% is assumed. The Euro standard mix and capacities used are representative of the usual supply chain situations and can therefore be applied.

In addition to the transport distances for pre-products, transport distances for waste were also taken into account. The transportation of waste generated in A3 was mapped using the following standard scenario:

Transport to collection point using 40 t truck (Euro 0-6 Mix), Diesel, 27 t payload, 50% capacity used, distance according to manufacturer's specifications. (1)

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. In der Summe werden für die vernachlässigten Prozesse 5 % des Energie- und Masseeinsatzes eingehalten. 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 units.

Life cycle stages

The complete life cycle of Smoke and fire-resistant assemblies is shown in the annex. The product stage "A1 – A3", construction process stage "A4 – A5", use stage "B2, B3, B5 – B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" are considered.

Product group Doors

Benefits	<p>The below benefits have been defined as per DIN EN 15804:</p> <ul style="list-style-type: none"> • 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	<p>If the products are re-used/recycled and recovered during the product stage (rejects), the components are shredded/broken, if necessary and then sorted into their single constituents. This is done by various process plants, e.g. magnetic separators.</p> <p>The system boundaries were set following their disposal, reaching the end-of-waste status.</p>
Allocations beyond life cycle boundaries	<p>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).</p> <p>The system boundary set for the recycled material refers to collection.</p>
Secondary material	The use of secondary material by Hörmann KG Eckelhausen was considered in Module A3. Secondary material is not used.
Inputs	<p>The LCA includes the following production-relevant inputs per 1 m² Smoke or fire-resistant assembly:</p> <p>Energy</p> <p>"Thermal energy from natural gas (DE)" was assumed for the input material gas. For the electricity mix, the "Electricity Mix Germany" was assumed.</p> <p>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.</p> <p>Water</p> <p>The water consumed by the individual process steps for the manufacture amounts to a total of 9.3E-03 l/m².</p> <p>The consumption of fresh water specified in Section www.hoermann.de arises also from the upstream processes of the pre-products.</p> <p>Raw material/Pre-products</p> <p>The charts below show the share of raw materials/pre-products in percent.</p>

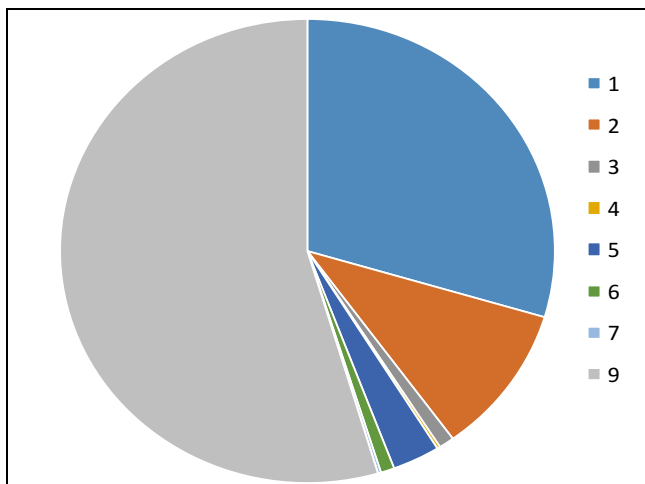


Illustration 1 Percentage of individual materials per declared unit in product group 1 (smoke protection)

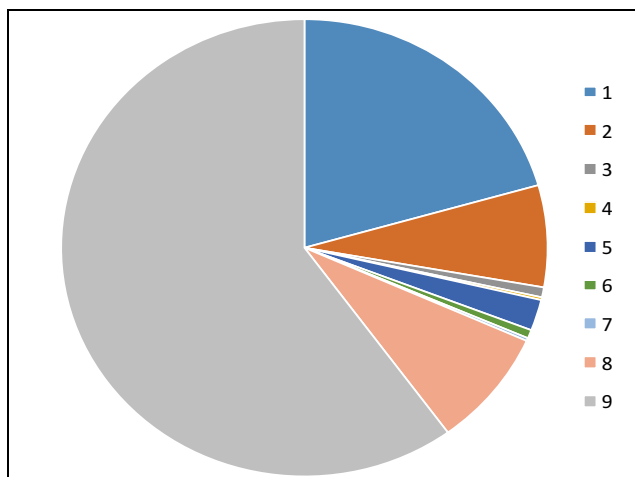


Illustration 2 Percentage of individual materials per declared unit in product group 2 (fire resistance T30)

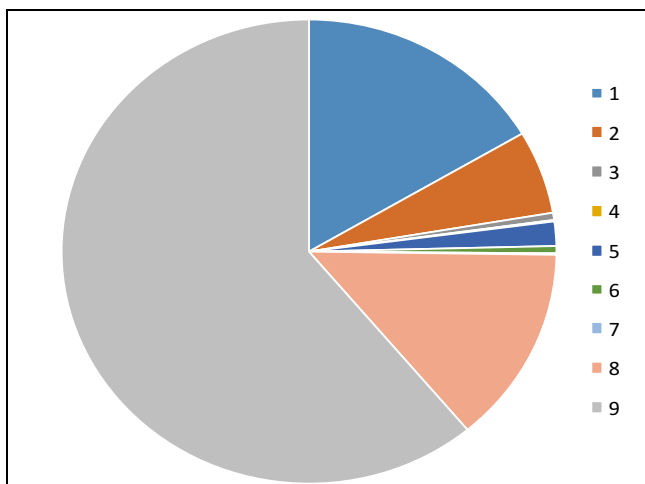


Illustration 3 Percentage of individual materials per declared unit in product group 3 (fire resistance T90)

No.	Material	Mass in %		
		PG 1	PG 2	PG 3
1	Aluminium	29.6	20.6	16.5
2	Steel	10.4	7.2	5.8
3	EPDM	1.0	<1	<1
4	Cables	<1	<1	<1
5	Polyamide	3.1	2.2	1.7
6	Powder coatings	<1	<1	<1
7	PU foam	<1	<1	<1
8	Fire protection material	-	8.3	13.7
9	Glass	54.6	60.1	61.0

Table 2 Percentage of individual materials per declared unit

Ancillary materials and consumables

There are 0.20 kg of ancillary materials and consumables each.

Product packaging

The amounts used for product packaging are as follows (PG1 - PG3):

No.	Material	Mass in kg
1	Cardboard	0.15

Table 3 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, packaging of all product groups produces the following amounts of biogenic carbon :

No.	Part	Content in kg C per m ²		
		PG 1	PG 2	PG 3
1	In the corresponding packaging	0.20	0.20	0.20

Table 4 Biogenic carbon content in product and packaging at the factory gate

Outputs

The LCA includes the following production-relevant outputs per 1 m² Smoke or fire-resistant assembly:

Waste

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

Waste water

Manufacture produces 2.6E-03 /m² waste water.

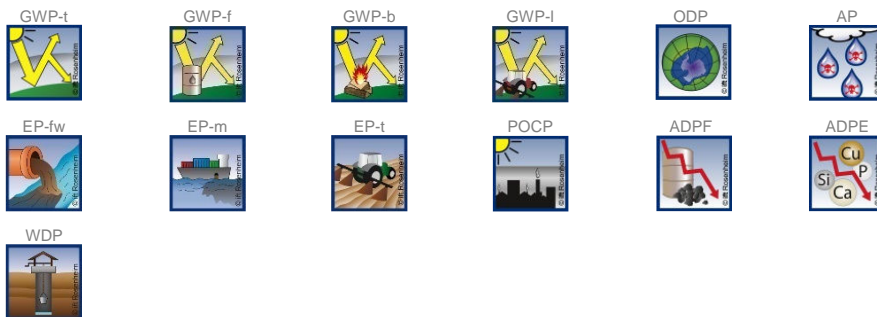
6.3 Impact assessment

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

Core indicators The models for impact assessment were applied as described in DIN EN 15804+A2.

The impact categories presented as core indicators in the EPD are as follows:

- Climate change - total (GWP-t)
- Climate change - fossil (GWP-f)
- Climate change - biogenic (GWP-b)
- Climate change - land use & land use change (GWP-l)
- Ozone depletion (ODP)
- Acidification (AP)
- Eutrophication freshwater (EP-fw)
- Eutrophication salt water (EP-m)
- Eutrophication land (EP-t)
- Photochemical ozone creation (POCP)
- Depletion of abiotic resources - fossil fuels (ADPF)
- Depletion of abiotic resources - minerals and metals (ADPE)
- Water use (WDP)

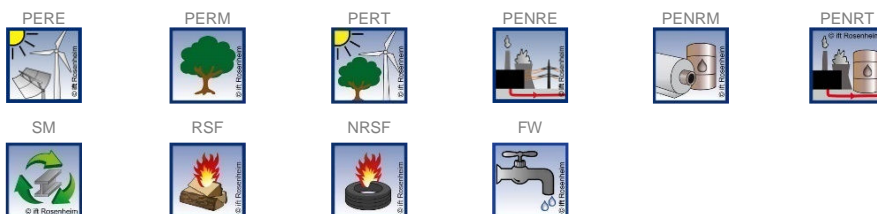


Resource management

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 (PERE)
- Renewable primary energy for material use (PERM)
- Total use of renewable primary energy (PERT)
- Non-renewable primary energy as energy source (PENRE)
- Renewable primary energy for material use (PENRM)
- Total use of non-renewable primary energy (PENRT)
- Use of secondary materials (SM)
- Use of renewable secondary fuels (RSF)
- Use of non-renewable secondary fuels (NRSF)
- Net use of freshwater resources (FW)



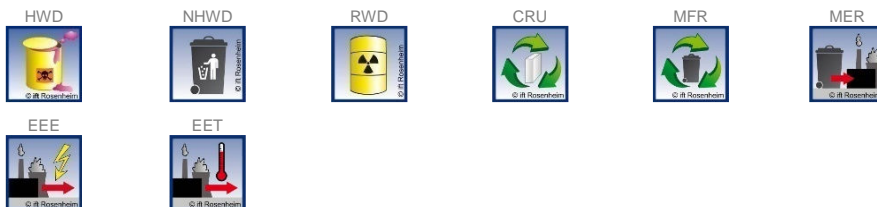
Waste

The waste generated during the production of 1 m² Smoke and fire-resistant assemblies door 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 waste categories and indicators for output material flows presented in the EPD are as follows:

- Disposed hazardous waste (HWD)
- Non-hazardous waste disposed (NHWD)
- Radioactive waste disposed (RWD)
- Components for re-use (CRU)
- Materials for recycling (MFR)
- Materials for energy recovery (MER)
- Exported electrical energy (EEE)
- Exported thermal energy (EET)



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:

- Particulate matter emissions (PM)
- Ionizing radiation, human health (IRP)
- Ecotoxicity – freshwater (ETP-fw)
- Human toxicity, carcinogenic effects (HTP-c)
- Human toxicity, non-carcinogenic effects (HTP-nc)
- Impacts associated with land use/soil quality (SQP)

Product Manager



IRP



ETP-fw



HTP-c



HTP-nc



SQP





Results per 1 m² smoke control shutters (PG 1)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Core indicators																
GWP-t	kg CO ₂ equivalent	168.25	3.81	0.22	ND	0.23	0.00	ND	0.00	0.00	0.00	0.21	6.05	0.24	-92.44	
GWP-f	kg CO ₂ equivalent	168.85	3.84	5.24E-03	ND	0.23	0.00	ND	0.00	0.00	0.00	0.21	6.03	0.24	-92.14	
GWP-b	kg CO ₂ equivalent	-0.35	-9.12E-02	0.21	ND	8.44E-04	0.00	ND	0.00	0.00	0.00	-4.92E-03	1.08E-02	-1.41E-03	-0.26	
GWP-l	kg CO ₂ equivalent	5.80E-02	6.14E-02	3.38E-06	ND	4.84E-05	0.00	ND	0.00	0.00	0.00	3.31E-03	2.15E-04	1.37E-03	-1.70E-02	
ODP	kg CFC-11-eq.	6.29E-04	5.38E-13	2.98E-14	ND	4.32E-13	0.00	ND	0.00	0.00	0.00	2.90E-14	2.15E-11	6.18E-13	-5.78E-10	
AP	mol H ⁺ -eq.	0.68	4.93E-03	6.08E-05	ND	2.26E-04	0.00	ND	0.00	0.00	0.00	2.64E-04	2.30E-03	1.63E-03	-0.35	
EP-fw	kg P-eq.	3.94E-04	1.56E-05	8.49E-09	ND	3.50E-07	1.56E-06	ND	0.00	0.00	0.00	8.41E-07	4.02E-06	5.21E-07	-1.16E-04	
EP-m	kg N-eq.	0.14	1.84E-03	2.23E-05	ND	6.40E-05	0.00	ND	0.00	0.00	0.00	9.82E-05	5.83E-04	4.19E-04	-8.30E-02	
EP-t	mol N-eq.	1.54	2.13E-02	2.78E-04	ND	6.98E-04	0.00	ND	0.00	0.00	0.00	1.14E-03	7.08E-03	4.61E-03	-0.91	
POCP	kg NMVOC-eq.	0.42	5.00E-03	5.93E-05	ND	2.78E-04	0.00	ND	0.00	0.00	0.00	2.68E-04	1.57E-03	1.28E-03	-0.23	
ADPF*2	MJ	2120.80	48.10	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	2.60	20.40	3.02	-1098.40	
ADPE*2	kg Sb equivalent	1.25E-04	3.16E-07	3.05E-10	ND	1.05E-08	0.00	ND	0.00	0.00	0.00	1.70E-08	1.72E-07	1.46E-08	-7.62E-06	
WDP*2	m ³ world-eq. deprived	50.05	5.66E-02	2.71E-02	ND	0.44	0.00	ND	0.00	0.00	0.00	3.05E-03	0.69	2.62E-02	-13.53	
Resource management																
PERE	MJ	1184.82	4.15	2.48	ND	0.22	0.00	ND	0.00	0.00	0.00	0.22	14.40	0.53	-603.75	
PERM	MJ	2.46	0.00	-2.46	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
PERT	MJ	1187.28	4.15	1.83E-02	ND	0.22	0.00	ND	0.00	0.00	0.00	0.22	14.40	0.53	-603.75	
PENRE	MJ	1365.48	48.10	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	2.60	481.72	317.03	-1098.40	
PENRM	MJ	775.32	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	-461.32	-314.01	0.00	
PENRT	MJ	2140.80	48.10	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	2.60	20.40	3.02	-1098.40	
SM	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FW	m ³	2.05	4.62E-03	6.37E-04	ND	1.08E-02	0.00	ND	0.00	0.00	0.00	2.49E-04	2.11E-02	8.00E-04	-0.42	
Categories of waste																
HWD	kg	1.18E-04	1.84E-09	3.83E-11	ND	5.58E-10	0.00	ND	0.00	0.00	0.00	9.94E-11	2.88E-08	7.52E-10	-6.70E-07	
NHWD	kg	48.60	7.86E-03	6.86E-03	ND	5.80E-03	0.00	ND	0.00	0.00	0.00	4.24E-04	0.17	15.30	-35.63	
RWD	kg	0.10	8.77E-05	3.38E-06	ND	2.32E-05	0.00	ND	0.00	0.00	0.00	4.73E-06	3.17E-03	3.17E-05	-6.35E-02	
Output material flows																
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MFR	kg	4.75	0.00	0.00	ND	3.74E-02	0.00	ND	0.00	0.00	0.00	0.00	20.50	0.00	0.00	
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EEE	MJ	2.60	0.00	0.33	ND	6.00E-02	0.00	ND	0.00	0.00	0.00	0.00	7.88	0.00	0.00	
EET	MJ	5.82	0.00	0.60	ND	0.11	0.00	ND	0.00	0.00	0.00	0.00	14.10	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 **ND** - not considered



Results per 1 m² smoke control shutters (PG 1)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators															
PM	Disease incidence	4.02E-04	4.81E-08	3.34E-10	ND	2.40E-09	0.00	ND	0.00	0.00	0.00	2.59E-09	1.98E-08	2.04E-08	-6.38E-06
IRP*1	kBq U235-eq.	11.22	1.27E-02	5.32E-04	ND	2.62E-03	0.00	ND	0.00	0.00	0.00	6.86E-04	0.52	3.67E-03	-6.75
ETP-fw*2	CTUe	901.76	35.40	3.28E-02	ND	1.76	0.00	ND	0.00	0.00	0.00	1.91	9.41	1.75	-556.31
HTP-c*2	CTUh	1.65E-07	7.22E-10	1.74E-12	ND	7.44E-11	0.00	ND	0.00	0.00	0.00	3.89E-11	3.49E-10	4.11E-11	-6.47E-08
HTP-nc*2	CTUh	1.48E-06	3.86E-08	6.24E-11	ND	2.66E-09	0.00	ND	0.00	0.00	0.00	2.08E-09	8.32E-09	2.71E-09	-8.85E-07
SQP*2	dimensionless	353.89	23.70	2.05E-02	ND	0.17	0.00	ND	0.00	0.00	0.00	1.28	8.52	0.83	-196.41

Key:

PM – particulate matter emissions potential **IRP*1** – ionizing radiation potential – human health **ETP-fw*2** - Ecotoxicity potential – freshwater **HTP-c*2** - Human toxicity potential – cancer effects **HTP-nc*2** - Human toxicity potential – non-cancer effects **SQP*2** – soil quality potential **ND** - not considered

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 ionising radiation from the soil, from radon and from some building 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 m² fire-resistant assembly T30 (PG 2)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Core indicators															
GWP-t	kg CO ₂ equivalent	228.35	5.45	0.22	ND	0.23	0.00	ND	0.00	0.00	0.00	0.28	6.38	0.43	-94.14
GWP-f	kg CO ₂ equivalent	226.95	5.49	5.24E-03	ND	0.23	0.00	ND	0.00	0.00	0.00	0.28	6.36	0.43	-93.94
GWP-b	kg CO ₂ equivalent	1.23	-0.13	0.21	ND	8.44E-04	0.00	ND	0.00	0.00	0.00	-6.62E-03	1.45E-02	-2.58E-03	-0.26
GWP-l	kg CO ₂ equivalent	0.10	8.78E-02	3.38E-06	ND	4.84E-05	0.00	ND	0.00	0.00	0.00	4.46E-03	2.64E-04	2.52E-03	-1.74E-02
ODP	kg CFC-11-eq.	7.29E-04	7.70E-13	2.98E-14	ND	4.32E-13	0.00	ND	0.00	0.00	0.00	3.91E-14	2.89E-11	1.13E-12	-5.82E-10
AP	mol H ⁺ -eq.	0.91	7.05E-03	6.08E-05	ND	2.26E-04	0.00	ND	0.00	0.00	0.00	3.56E-04	2.93E-03	2.99E-03	-0.36
EP-fw	kg P-eq.	4.75E-04	2.23E-05	8.49E-09	ND	3.50E-07	0.00	ND	0.00	0.00	0.00	1.13E-06	5.36E-06	9.56E-07	-1.17E-04
EP-m	kg N-eq.	0.20	2.63E-03	2.23E-05	ND	6.40E-05	0.00	ND	0.00	0.00	0.00	1.32E-04	7.39E-04	7.69E-04	-8.63E-02
EP-t	mol N-eq.	2.22	3.05E-02	2.78E-04	ND	6.98E-04	0.00	ND	0.00	0.00	0.00	1.54E-03	8.72E-03	8.46E-03	-0.94
POCP	kg NMVOC-eq.	0.57	7.16E-03	5.93E-05	ND	2.78E-04	0.00	ND	0.00	0.00	0.00	3.61E-04	1.98E-03	2.35E-03	-0.24
ADPF*2	MJ	3012.50	68.90	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	3.50	27.20	5.55	-1128.40
ADPE*2	kg Sb equivalent	1.31E-04	4.52E-07	3.05E-10	ND	1.05E-08	0.00	ND	0.00	0.00	0.00	2.30E-08	2.30E-07	2.68E-08	-7.68E-06
WDP*2	m ³ world-eq. deprived	42.55	8.09E-02	2.71E-02	ND	0.44	0.00	ND	0.00	0.00	0.00	4.11E-03	0.78	4.81E-02	-13.63
Resource management															
PERE	MJ	1429.90	5.93	2.48	ND	0.22	0.00	ND	0.00	0.00	0.00	0.30	19.30	0.97	-606.75
PERM	MJ	2.46	0.00	-2.46	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	1432.36	5.93	1.83E-02	ND	0.22	0.00	ND	0.00	0.00	0.00	0.30	19.30	0.97	-606.75
PENRE	MJ	1932.45	68.90	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	3.50	648.83	493.97	-1128.40
PENRM	MJ	1110.05	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	-621.63	-488.42	0.00
PENRT	MJ	3042.50	68.90	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	3.50	27.20	5.55	-1128.40
SM	kg	3.31	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
FW	m ³	2.05	6.61E-03	6.37E-04	ND	1.08E-02	0.00	ND	0.00	0.00	0.00	3.35E-04	2.48E-02	1.47E-03	-0.42
Categories of waste															
HWD	kg	2.19E-02	2.64E-09	3.83E-11	ND	5.58E-10	0.00	ND	0.00	0.00	0.00	1.34E-10	3.86E-08	1.38E-09	-6.76E-07
NHWD	kg	54.90	1.12E-02	6.86E-03	ND	5.80E-03	0.00	ND	0.00	0.00	0.00	5.71E-04	0.17	28.10	-36.03
RWD	kg	0.16	1.25E-04	3.38E-06	ND	2.32E-05	0.00	ND	0.00	0.00	0.00	6.37E-06	4.26E-03	5.82E-05	-6.41E-02
Output material flows															
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
MFR	kg	5.30	0.00	0.00	ND	3.74E-02	0.00	ND	0.00	0.00	0.00	0.00	24.10	0.00	0.00
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00
EEE	MJ	2.60	0.00	0.33	ND	6.00E-02	0.00	ND	0.00	0.00	0.00	0.00	7.88	0.00	0.00
EET	MJ	5.81	0.00	0.60	ND	0.11	0.00	ND	0.00	0.00	0.00	0.00	14.10	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 **ND** - not considered

Results per 1 m² fire-resistant assembly T30 (PG 2)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators															
PM	Disease incidence	3.66E-04	6.87E-08	3.34E-10	ND	2.40E-09	0.00	ND	0.00	0.00	0.00	3.48E-09	2.50E-08	3.75E-08	-6.45E-06
IRP*1	kBq U235-eq.	11.11	1.82E-02	5.32E-04	ND	2.62E-03	0.00	ND	0.00	0.00	0.00	9.24E-04	0.70	6.74E-03	-6.84
ETP-fw*2	CTUe	901.60	50.60	3.28E-02	ND	1.76	0.00	ND	0.00	0.00	0.00	2.57	12.50	3.22	-589.31
HTP-c*2	CTUh	1.65E-07	1.03E-09	1.74E-12	ND	7.44E-11	0.00	ND	0.00	0.00	0.00	5.24E-11	4.59E-10	7.55E-11	-6.49E-08
HTP-nc*2	CTUh	1.48E-06	5.52E-08	6.24E-11	ND	2.66E-09	0.00	ND	0.00	0.00	0.00	2.80E-09	1.09E-08	4.98E-09	-9.02E-07
SQP*2	dimensionless	417.35	33.90	2.05E-02	ND	0.17	0.00	ND	0.00	0.00	0.00	1.72	11.40	1.53	-198.41

Key:

PM – particulate matter emissions potential **IRP*1** – ionizing radiation potential – human health **ETP-fw*2** - Ecotoxicity potential – freshwater **HTP-c*2** - Human toxicity potential – cancer effects **HTP-nc*2** - Human toxicity potential – non-cancer effects **SQP*2** – soil quality potential **ND** - not considered

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 ionising radiation from the soil, from radon and from some building 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 m² fire-resistant assembly T90 (PG 3)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	
Core indicators																
GWP-t	kg CO ₂ equivalent	234.46	6.81	0.22	ND	0.23	0.00	ND	0.00	0.00	0.00	0.00	0.34	6.69	0.60	-95.54
GWP-f	kg CO ₂ equivalent	234.05	6.87	5.24E-03	ND	0.23	0.00	ND	0.00	0.00	0.00	0.00	0.35	6.67	0.60	-95.24
GWP-b	kg CO ₂ equivalent	0.90	-0.16	0.21	ND	8.44E-04	0.00	ND	0.00	0.00	0.00	-8.20E-03	1.79E-02	-3.59E-03	-0.26	
GWP-l	kg CO ₂ equivalent	0.11	0.11	3.38E-06	ND	4.84E-05	0.00	ND	0.00	0.00	0.00	5.52E-03	3.10E-04	3.51E-03	-1.77E-02	
ODP	kg CFC-11-eq.	1.36E-05	9.63E-13	2.98E-14	ND	4.32E-13	0.00	ND	0.00	0.00	0.00	4.84E-14	3.57E-11	1.58E-12	-5.85E-10	
AP	mol H ⁺ -eq.	0.93	8.82E-03	6.08E-05	ND	2.26E-04	0.00	ND	0.00	0.00	0.00	4.41E-04	3.51E-03	4.15E-03	-0.37	
EP-fw	kg P-eq.	5.44E-04	2.79E-05	8.49E-09	ND	3.50E-07	0.00	ND	0.00	0.00	0.00	1.40E-06	6.61E-06	1.33E-06	-1.18E-04	
EP-m	kg N-eq.	0.20	3.28E-03	2.23E-05	ND	6.40E-05	0.00	ND	0.00	0.00	0.00	1.64E-04	8.84E-04	1.07E-03	-8.88E-02	
EP-t	mol N-eq.	2.29	3.82E-02	2.78E-04	ND	6.98E-04	0.00	ND	0.00	0.00	0.00	1.90E-03	1.02E-02	1.18E-02	-0.97	
POCP	kg NMVOC-eq.	0.59	8.95E-03	5.93E-05	ND	2.78E-04	0.00	ND	0.00	0.00	0.00	4.48E-04	2.37E-03	3.27E-03	-0.24	
ADPF*2	MJ	3083.80	86.20	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	4.33	33.50	7.72	-1148.40	
ADPE*2	kg Sb equivalent	1.37E-04	5.66E-07	3.05E-10	ND	1.05E-08	0.00	ND	0.00	0.00	0.00	2.84E-08	2.84E-07	3.73E-08	-7.73E-06	
WDP*2	m³ world-eq. deprived	41.85	0.10	2.71E-02	ND	0.44	0.00	ND	0.00	0.00	0.00	5.09E-03	0.87	6.70E-02	-13.73	
Resource management																
PERE	MJ	1440.04	7.42	2.48	ND	0.22	0.00	ND	0.00	0.00	0.00	0.00	0.37	23.80	1.35	-608.75
PERM	MJ	2.46	0.00	-2.46	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
PERT	MJ	1442.50	7.42	1.83E-02	ND	0.22	0.00	ND	0.00	0.00	0.00	0.00	0.37	23.80	1.35	-608.75
PENRE	MJ	1724.10	86.20	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	4.33	802.01	628.92	-1148.40	
PENRM	MJ	1389.70	0.00	-8.74E-13	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	-768.51	-621.20	0.00	
PENRT	MJ	3113.80	86.20	6.72E-02	ND	3.82	0.00	ND	0.00	0.00	0.00	4.33	33.50	7.72	-1148.40	
SM	kg	3.42	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
RSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
NRSF	MJ	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
FW	m³	2.05	8.27E-03	6.37E-04	ND	1.08E-02	0.00	ND	0.00	0.00	0.00	4.15E-04	2.83E-02	2.05E-03	-0.43	
Categories of waste																
HWD	kg	2.27E-02	3.30E-09	3.83E-11	ND	5.58E-10	0.00	ND	0.00	0.00	0.00	1.66E-10	4.77E-08	1.92E-09	-6.80E-07	
NHWD	kg	55.40	1.41E-02	6.86E-03	ND	5.80E-03	0.00	ND	0.00	0.00	0.00	7.07E-04	0.18	39.10	-36.43	
RWD	kg	0.16	1.57E-04	3.38E-06	ND	2.32E-05	0.00	ND	0.00	0.00	0.00	7.89E-06	5.27E-03	8.10E-05	-6.46E-02	
Output material flows																
CRU	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
MFR	kg	5.32	0.00	0.00	ND	3.74E-02	0.00	ND	0.00	0.00	0.00	0.00	0.00	26.70	0.00	
MER	kg	0.00	0.00	0.00	ND	0.00	0.00	ND	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
EEE	MJ	2.60	0.00	0.33	ND	6.00E-02	0.00	ND	0.00	0.00	0.00	0.00	0.00	7.88	0.00	
EET	MJ	5.82	0.00	0.60	ND	0.11	0.00	ND	0.00	0.00	0.00	0.00	0.00	14.10	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 **ND** - not considered



Results per 1 m² fire-resistant assembly T90 (PG 3)

Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators															
PM	Disease incidence	5.22E-04	8.60E-08	3.34E-10	ND	2.40E-09	0.00	ND	0.00	0.00	0.00	4.31E-09	2.99E-08	5.21E-08	-6.51E-06
IRP*1	kBq U235-eq.	11.19	2.28E-02	5.32E-04	ND	2.62E-03	0.00	ND	0.00	0.00	0.00	1.14E-03	0.87	9.38E-03	-6.92
ETP-fw*2	CTUe	902.70	63.30	3.28E-02	ND	1.76	0.00	ND	0.00	0.00	0.00	3.18	15.40	4.48	-614.31
HTP-c*2	CTUh	1.65E-07	1.29E-09	1.74E-12	ND	7.44E-11	0.00	ND	0.00	0.00	0.00	6.49E-11	5.62E-10	1.05E-10	-6.50E-08
HTP-nc*2	CTUh	1.48E-06	6.91E-08	6.24E-11	ND	2.66E-09	0.00	ND	0.00	0.00	0.00	3.47E-09	1.33E-08	6.93E-09	-9.15E-07
SQP*2	dimensionless	371.24	42.40	2.05E-02	ND	0.17	0.00	ND	0.00	0.00	0.00	2.13	14.00	2.13	-199.41

Key:

PM – particulate matter emissions potential **IRP*1** – ionizing radiation potential – human health **ETP-fw*2** - Ecotoxicity potential – freshwater **HTP-c*2** - Human toxicity potential – cancer effects **HTP-nc*2** - Human toxicity potential – non-cancer effects **SQP*2** – soil quality potential **ND** - not considered

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 ionising radiation from the soil, from radon and from some building 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.

6.4 Interpretation, LCA presentation and critical review

Evaluation

The environmental impacts of

- Smoke control shutters (PG 1)
- Fire-resistant assembly T30 (PG 2)
- Fire-resistant assembly T90 (PG 3)

differ moderately from each other. The differences lie in the different pre-products used. The different types of glazing and the use of fire protection materials in the profiles were particularly indicative of this.

In the area of production, the environmental impact of all product groups mainly results from the use of aluminum profiles and glazing or their respective upstream chains. In the case of product groups 2 and 3, the environmental impacts are also caused by the use of firestop boards (calcium silicate boards) and their upstream chains.

Furthermore, the electrical energy used contributes significantly to the environmental impacts identified.

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, around 22% (PG1 approx. 29%) of the environmental impacts of the core indicators (without WDP, as not supported by the software) occurring in the life cycle can be credited for aluminum in scenario D.

Some LCA results differ considerably from the results presented in the EPD prepared five years ago. The reasons for this are a changed normative basis, the use of other data sets, changed background data in "LCA for Experts" and a new data collection by the declaration holder.

The diagram below shows 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 within the building service life of 50 years.

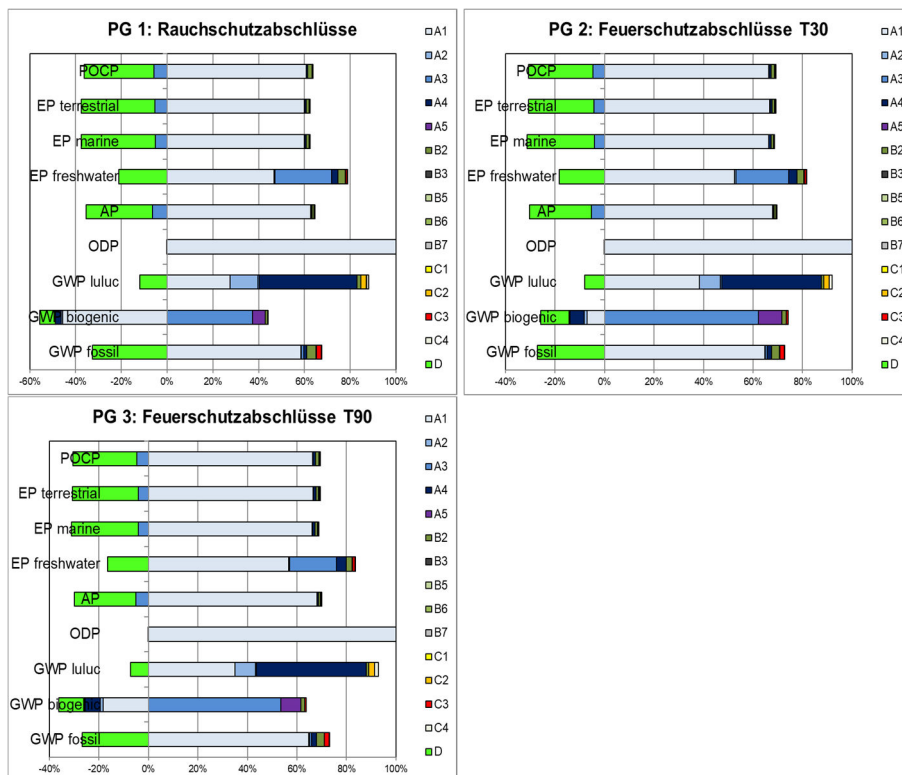


Illustration 4 Percentage of the modules in selected environmental impact indicators

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.

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 the external verifier Susanne Volz, M. Sc. Environmental Sciences.

7 General information regarding the EPD

Comparability

This EPD was prepared according to 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.



Product group Doors

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 "Doors and Gates" PCR TT-3.0:2023, EN 17213:2020 as well as "PCR Part A" PCR-A-1.0:2023.

The European standard EN 15804 serves as the core PCR ^{a)}
Independent verification of the declaration and statement according to EN ISO 14025:2010
Independent third party verifier: ^{b)} Susanne Volz, M. Sc. Environmental Sciences
^{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	Person in charge	Testing personnel
1	13.07.2024	External verification	Brechleiter	Volz
2	29.08.2024	Editorial changes	Brechleiter	-
3	20.09.2024	Editorial changes	Brechleiter	-

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9 Annex

Description of life cycle scenarios for Smoke and fire-resistant assemblies

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 5 Overview of applied life cycle stages

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

The scenarios were furthermore based on the research project “EPDs for transparent building components” (1) and on EN 17213.

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 Doors

A4 Transport

No.	Scenario	Description
A4	Direct delivery to construction site/branch	40 t truck (Euro 0-6 mix), diesel, 27 t payload, 95% capacity utilization ¹ , approx. 530 km to construction site and back with 40% capacity utilization

¹ Capacity used: utilized loading capacity of the truck, manufacturer’s specification

A4 Transport to construction site	Transport weight [kg/m ²]	Density [kg/m ³]	Capacity load factor ²
PG1	38.0	175	<1
PG2	54.3	251	<1
PG3	67.9	314	<1

² Capacity load factor:
 = 1 Product completely fills the packaging (without air inclusion)
 <1 Packaging contains unused volume (e.g.: air, filling material)
 > 1 Product is packed in compressed form

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

A5 Construction/installation process

No.	Scenario	Description
A5	Manual	According to the manufacturer, the products are installed without additional lifting and auxiliary devices

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

Ancillary materials, consumables, use of energy and water, other resource use, material losses, direct emissions as well as waste during construction / installation are negligible.

It is assumed that the packaging material in the Module A5 is sent to waste handling. Waste is only thermally recycled in line with the conservative approach: Films/casings, wood and carton in incineration plants. Benefits from A5 are specified in module D. Benefits from waste incineration: Benefits from waste incineration: electricity replaces electricity mix (RER); thermal energy replaces thermal energy from European natural gas (RER).

Transport to the recycling plants is not taken into account.

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



Product group Doors

B2 Cleaning, maintenance and repair

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

B2.1 Cleaning

No.	Scenario	Description
B2.1	Frequently manual	<p>According to the manufacturer, the following applies to both product groups:</p> <p>Manually with suitable cleaning agents, every 3 months. Water: 2.5 l/m² per cleaning; 500 l/m² within the RSL Glass cleaner: 0.0125 l/m² per cleaning; 10 l/m² within the RSL</p>

B2.2 Maintenance and repair

No.	Scenario	Description
B2.2	Normal use	<p>According to the manufacturer, the following applies to both product groups:</p> <p>Annual functional check, visual inspection, lubrication/greasing and, if necessary, repair. 0.25 kg lubricants per 50 yrs (1)</p> <p>Two replacements*: Hardware 1.87 kg, Sealants 0.742 kg</p>

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

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from Hörmann KG Eckelhausen.

The service life of the smoke and fire-resistant assemblies from Hörmann KG Eckelhausen is specified as 50 years. For scenario B2.2, 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. Metals into the melt (material recycling), plastics to incineration plants. Benefits from B2.2 are specified in Module D. Benefits from waste incineration: Benefits from waste incineration: electricity replaces electricity mix (RER); thermal energy replaces thermal energy from European natural gas (RER).

Transport to the recycling plants is not taken into account.

B3 Repair

No.	Scenario	Description
B3	Normal use and heavy use	According to EN 17213: The repair of accidental damage (e.g. broken windows or damaged building hardware) may only be taken into account if the installation site is known and reasons are given as to why this accidental damage is to be expected (e.g. schools).

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

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

B5 Modification/refurbishment

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

For updated information refer to the respective instructions for assembly/installation, operation and maintenance from Hörmann KG Eckelhausen.

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

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

B6 Operational energy use

No.	Scenario	Description
B6	Manual	No energy consumed when used

There is no energy used during normal use. The products are opened by manual control.

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.



Product group Doors

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 summary table.

C1 Deconstruction, demolition

No.	Scenario	Description
C1	Deconstruction	According to EN 17074 (9.8.4 end-of-life stage (C1 - C4)): <ul style="list-style-type: none"> • Deconstruction of glass 30 % • Deconstruction of glass-free materials 95% • Remainder to landfill

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	Transport to collection point with 40 t truck (Euro 0-6 Mix), diesel, 27 t payload, 50 % capacity used, 100 km. (1)

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

Product group Doors

C3 Waste management

No.	Scenario	Description
C3	Current market situation	<p>Share for the return of materials according to EN 17213:</p> <ul style="list-style-type: none"> • Metals 100% recycled • Plastics 100% thermal recycling in incineration plants • Glass 100% recycled • Remainder to landfill/disposal

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
Collection process, collected separately	kg	22.5	30.3	37.5
Collection process, collected as mixed construction waste	kg	15.3	23.8	30.3
Recovery system, for re-use	kg	0	0	0
Recovery system, for recycling	kg	20.6	24.1	26.8
Recovery system, for energy recovery	kg	1.9	1.9	1.9
Disposal	kg	15.3	28.1	39.1

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

C4 Disposal

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

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 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 ¹
D	Recycling potential	<p>Metal scrap from C3 excluding the scrap used in A3 replaces 70.2% of the respective metal;</p> <p>Glass from C3 excluding the glass shards used in A3 replace 60% of container glass;</p> <p>Benefits from incineration plant: Benefits from waste incineration: electricity replaces electricity mix (GLO); thermal energy replaces thermal energy from natural gas (GLO).</p>

¹ Applied value correction factor of 70.2% according to metal-specific data set, 60% according to standard data set for other materials.

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 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 the Institut für Fenstertechnik e.V., Rosenheim (ift Rosenheim) and specifically on the ift-Richtlinie NA-01/4 Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen. (ift-Guideline NA-01/4 - Guidance on preparing Type III Environmental Product Declarations)
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