Environmental Product Declaration

Declaration Code: EPD-LD-GB-24.2

Lindab A/S

Sectional doors

LDI steel, LDC steel, LDP

Basis:

DIN EN ISO 14025
EN15804

Company EPD
Environmental
Product **D**eclaration

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Declaration holder	Lindab A/S Finnmarken 1 Jels DK 6630 Roedding		
Declaration code	EPD-LD-GB-24.2		
Designation of declared product	LDI steel, LDC steel, LDP		
Scope	LDI steel, LDC steel and LDP sectional doors are suitable for nearly all building types in terms of function, design and installation.		
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" (Guidance on preparing Type III Environmental Product Declarations) applies. The Declaration is based on the PCR documents “PCR Part A” PCR-A-0.3:2018 and “Doors” PCR-TT-2.3:2018		
Validity	Publication date: 13.05.2022	Last revision: 19.08.2022	Next revision: 13.05.2027
	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 includes both the data collected at the production site of Lindab A/S and the generic data derived from the “GaBi 10” database. LCA calculations were carried out for the "cradle to grave“ life 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.		

Christian Kehrer Head of Certification and Surveillance Body	Dr. Torsten Mielecke Chairman of Expert Committee ift-EPD and PCR	Patrick Wortner External verifier

1 General product information

Product definition

The EPD relates to the product group “Doors” and applies to:

1 m² of LDI steel, LDC steel or LDP made by Lindab A/S.

The functional unit is obtained by summing up:

Assessed product	Declared unit	Weight per unit area
LDI steel	1 m²	20.81 kg/m²
LDP	1 m²	19.57 kg/m²
LDC steel	1 m²	18.11 kg/m²

Table 1: Product groups

The average unit is declared as follows:
Directly used material flows are determined using average sizes (4 m x 4 m) and assigned to the declared unit. All other inputs and outputs in the production were scaled to the declared unit in their entirety since no direct assignment to the average size is possible. The reference period is the year 2021.

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

- LDI steel
- LDP
- LDC steel

LDI aluminium and LDC aluminium have not been taken into consideration.

Product description

The Lindab LDI steel / LDP / LDC steel sectional doors are suitable for nearly all building types in terms of operation, design and installation. Thanks to the various combinations of panel, design and hardware, this door solution can be installed in almost any type of building. When activated, the door leaf slides up under the roof for optimal use of the existing room height, leaving the door opening with full clearance. The overhead sectional door has three main parts: 1) Door leaf. 2) Hardware set. 3) Electrical operating system or pull chain. The door leaf is made of roll formed steel or aluminium with a 46 mm polystyrene core. The door leaf features finger protection, a rather unique thermal bridge separation in the panel centre, and top and bottom EPDM seals. In addition, the panel is equipped with slotted end cassettes for improved insulation. The hardware set including the counter balance system is made of galvanised steel as standard. The balancing system comprises a shaft fitted with torsion springs, cable drums and cable harnesses, ensuring the correct weight balance when the door is operated. The standard operating system comes with energy saving features such as ½ opening height and auto-close programming which reduces energy costs. The software can be updated for future improvements and new features, ensuring long-term operation.

The design of the Lindab LDI / LDP / LDC overhead sectional door meets all operational and safety requirements set out in the European Directives and standards.

LDI door type, steel, insulated

The LDI door is built of insulated 46 mm thick sections of extruded polystyrene, with a steel or aluminium surface. The LCA calculation is based on a steel door with 46 mm extruded polystyrene.

Figure 1: LDI steel door

LDP door type - Panorama

The LDP door is made of aluminium extrusions and styrene acrylonitrile (SAN) fillings. The LCA calculation is based on an aluminium frame door with SAN fillings.

Figure 2: LDP door

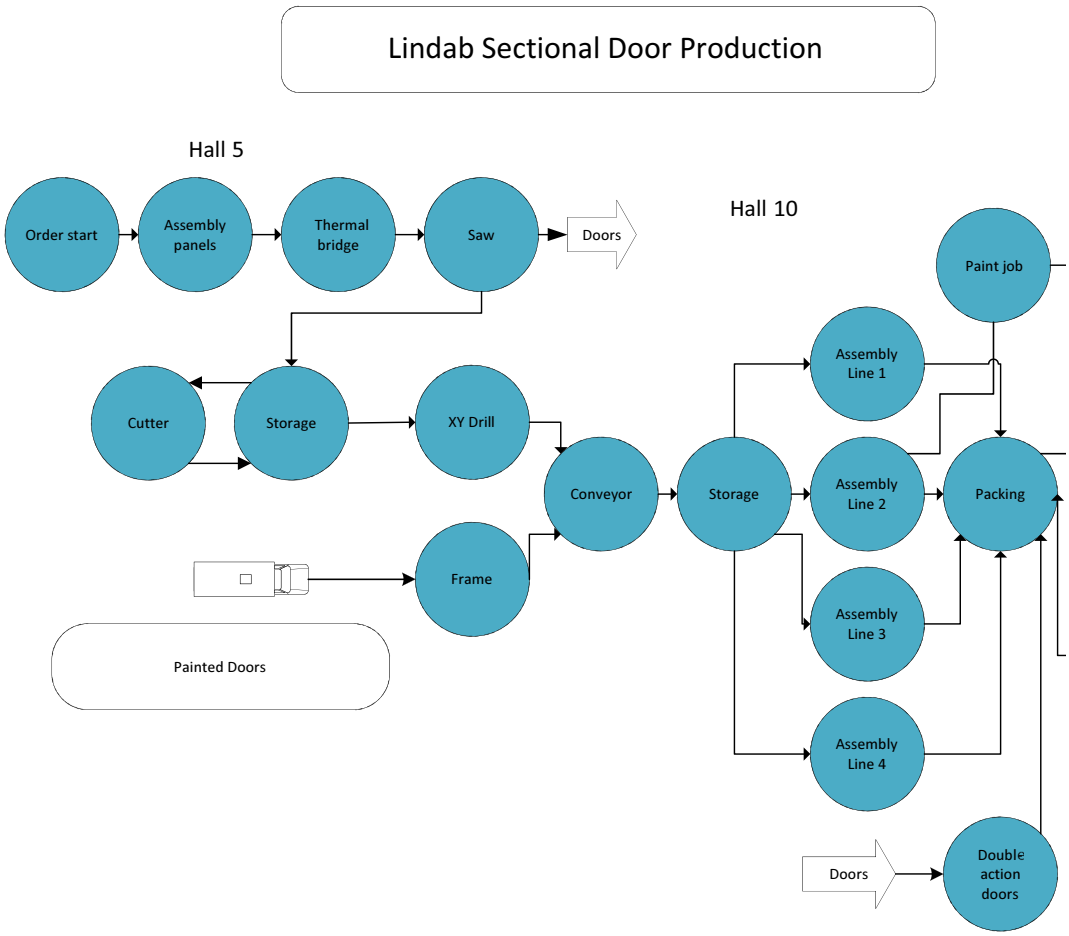
LDC steel door type - combined

The LDC door is a combined solution made of LDI and LDP. It is a combination of extruded polystyrene panels and aluminium frames with SAN fillings. The LCA calculation is based on a steel door with 46 mm extruded polystyrene with a combination of aluminium frame and SAN filling.

Figure 3: LDC steel door

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

Product manufacture



Scope

The Lindab LDI steel / LDP / LDC steel overhead sectional doors are suitable for nearly all building types in terms of function, design and installation. The 46 mm extruded polystyrene panel is very stable and prevents thermal bridges for improved insulation values. Combined with flexibility in installation and the choice of hardware, it is an ideal solution for almost every type of building.

Verifications

The following verifications are held:

- Product quality according to DIN EN 13241-1
- Mechanical durability according to DS/EN 12605:2000

For further and updated verifications (incl. other national approvals) refer to www.lindab.com.

Management systems

The following management systems are in place:

- Quality management system as per DIN EN ISO 9001
- Environmental management system as per DIN EN ISO 14001

Additional information

For additional evidence of fitness for use or certificates of 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 product contains no substances from the REACH candidate list (declaration dated 1 October 2012).

All relevant safety data sheets are available from Lindab A/S .

3 Construction process stage

Processing recommendations, installation

Observe the instructions for assembly/installation, operation, maintenance and disassembly provided by the manufacturer. See www.lindab.com

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 shall be specified under defined reference in-use conditions and shall refer to the declared technical and functional performance of the product within the building. It shall be established in accordance with any specific rules given in European product standards, or, if not available, in a c-PCR. It shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards or a c-PCR provide guidance on deriving the RSL, such guidance shall have priority.
If it is not possible to determine the service life as 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:
For a “cradle to grave” EPD with the Modules C1-C4 and Module D (A1-A3 + C + D and modules A4 to B7), the reference service life (RSL) can only be stated if the reference in-use conditions have been specified.
According to the manufacturer, the sectional doors manufactured by the Lindab A/S have an optional service life of 50 years.

The service life is dependent on the characteristics of the product and in-use conditions. The in-use conditions 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) are known that may 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 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.

A mechanical durability test in accordance with EN 12605 was conducted. The declared service life is 100,000 cycles.

Information in accordance with ISO 15686 is given in the following table:

RSL Data				
General information		sectional doors according to DIN EN 13241-1		
Scope		Data are based on a few years of expert expierence of the company Lindab. Material quantities were assessed for different types of sectional doors.		
Material		LDI steel	LDC steel	LDP
		LDI door is built of insulated sections of extruted polystyrene, with steel surface.	LDC door is a combined solution from the LDI and LDP. It's a combination of extruted polystyrene panels and aluminum frames with SAN fillings.	LDP door is made of extruted aluminum profiles and fillings from styrol acryl nitril (SAN).
Methodology		Inspection of sectional doors and constructed assets (feedback from practice)		
Reference in-use conditions		Factor-factor category	In-use condtion grade	
		A - inherent performance level	3	
		B - design level	3	
		C - work execution level	3	
		D - indoor environment	NA	
		E - outdoor environment	NA	data for two geographical sub-areas "inner city" and "Outer areas" not applicable on product level
		F - usage conditions	3	
		G - maintenance level	2	
Degradation agents		All of the degradation agents that are expected to be of significance are included.		
Critical properties and performance requirements		Critical property	Performance requirement Safety consequence	Refence
		Suspension cables breakage.	2	EN13241 EN12604
		Torsion springs breakage.	4	EN13241 EN12604
		Door rollers clearance, derailment.	2	EN13241 EN12604
		Hinges clearance, breakage.	4	EN13241 EN12604
		Bearings on shafts breakage.	4	EN13241 EN12604
		Safety edge system malfunction.	3	EN13241 EN12453/EN12978
		Photocell malfunction.	3	EN13241 EN12453/EN12978
		Sideseal wear.	6	EN13241 EN12425/EN12426
Reference service life	Factor	Object-specific	Reference in use condition	Factor value Φ
	A	normal	normal	1,0
	B	normal	normal	1,0
	C	normal	normal	1,0
	D	not applicable	not applicable	X
	E	normal (inner city)	low (outer areas)	1,1
	F	normal	normal	1,0
	G	high	high	0,9
	ESL	***20 ±5years***	***with factor***	***19,8***
Data quality		Data are generated on the basis of a systematic procedure but are not critically reviewed by third party		
Reliability of data		Data are provided by non reviewed, research documentation and company documents		
Further information considered				

Table 2: Information in accordance with ISO 15686

5 End-of-life stage

Possible end-of-life stages

The sectional doors are 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 metal or plastic parts are recycled. Residual fractions are thermally recycled or sent to landfill if necessary.

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.

On this basis, LCAs were prepared for the sectional doors. They are in conformity with the requirements set out in DIN EN 15804 and the international standards DIN EN ISO 14040, DIN EN ISO 14044, ISO 21930 and EN ISO 14025.

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

6.1 Definition of goal and scope

Goal

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

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

The specific data originate exclusively from the 2021 fiscal year. They were collected on-site at the plant located in Jels DK 6630 Roedding 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 originate from the “GaBi 10” professional and building materials databases. The last update of both databases was in 2022. Data from before this date originate also from these databases and are not more than ten 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 the sectional doors.
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 used 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 100% of the mass of products.

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

6.2 Inventory analysis

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 Annex shows the entire life cycle of the sectional doors. The product stage "A1 – A3", construction process stage" A4 – A5", use stage "B2 – B7", end-of-life stage "C1 – C4" and the benefits and loads beyond the system boundaries "D" are considered.

Benefits

The below benefits have been defined in accordance with DIN EN 15804:

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

Allocation of co-products

Manufacture does not give rise to any allocations.

Allocations for re-use, recycling and recovery

If the products are reused/recycled and recovered during the product stage (rejects), the components are shredded, if necessary and then sorted into their single constituents. This is done by various process plants, e.g. magnetic separators.
The system boundaries were set following their disposal, reaching the end-of-waste status.

Allocations beyond life cycle boundaries

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 material in Module A3 by Lindab A/S was not considered. Secondary material is not used.

Inputs

The LCA includes the following production-relevant inputs per 1 m² of sectional door:

Energy
The gas input material is based on “Erdgas Mix Dänemark“ (Denmark natural gas mix). The electricity mix is based on “Strom Mix Dänemark” (Denmark electricity mix).

Water
The water consumed by the individual process steps for the production amounts to a total of 1.54 l per m² of the element.
The consumption of fresh water specified in Section 6.3 originates (among others) from the process chain of the pre-products and the process water.

Raw material / pre-products
The chart below shows the share of raw materials/pre-products in %.

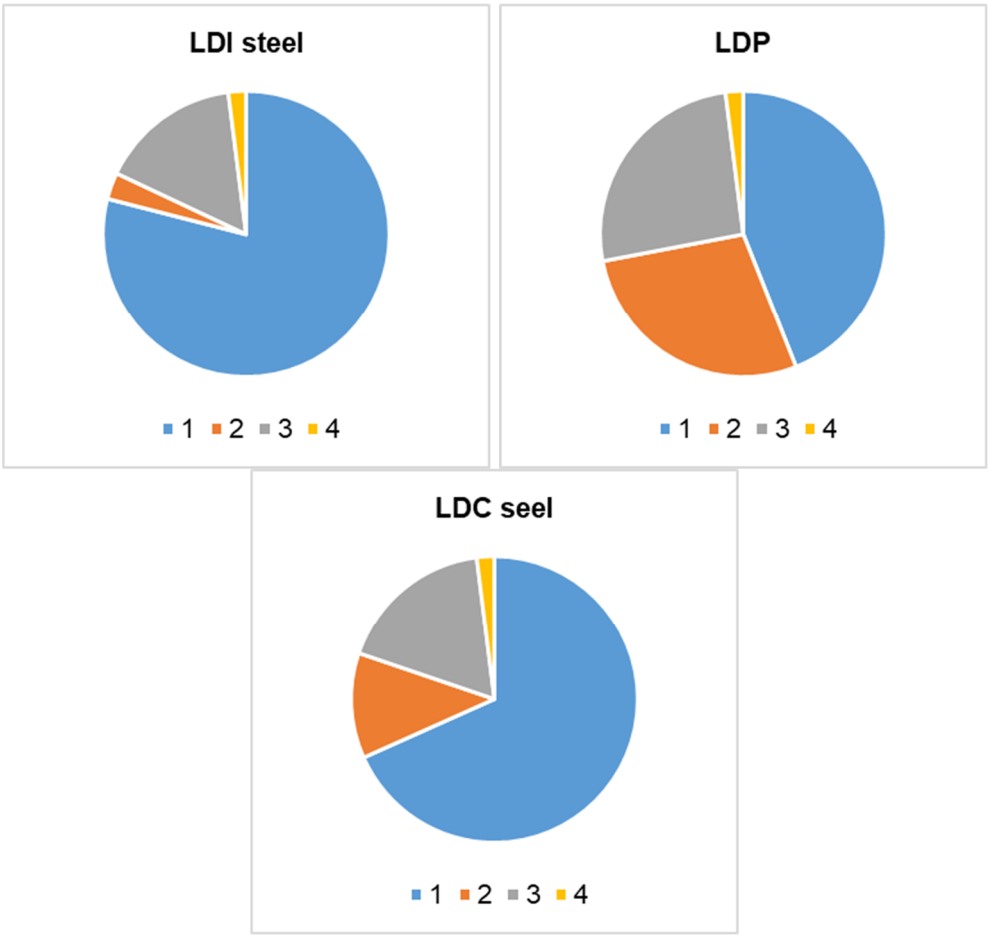


Figure 4: Percentage of individual materials per declared unit

No.	Material	Mass in %		
		LDI steel	LDP	LDC steel
1	Steel	79	44	69
2	Aluminium	3	28	12
3	Plastics	16	26	18
4	Other	2	2	2

Table 3: Percentage of individual materials per declared unit

Ancillary materials and consumables
107 g of ancillary materials and consumables are used.

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

		Mass in kg		
No.	Material	LDI steel	LDP	LDC
1	Wood	2.90	2.25	2.25
2	Cardboard	1.21	0.71	0.71

Table 4: Weight in kg of packaging per declared unit

Biogenic carbon content
Only the biogenic carbon content of the associated packaging is specified, as the total mass of substances containing biogenic carbon is less than 5% of the total mass of the product and associated packaging. According to EN 16449, packaging produces the following amounts of biogenic carbon:

No.	Packaging material	Content in kg C		
		LDI steel	LDP	LDC steel
1	Wood	-1.29	-1.00	-1.00
2	Cardboard	-0.43	-0.25	-0.25

Table 5: Biogenic carbon content of packaging at gate

Outputs

The LCA includes the following production-relevant outputs per 1 m² of sectional door:

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

Waste water
Manufacture produces 1.54 l waste water.

6.3 Impact assessment

Goal

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

Impact categories

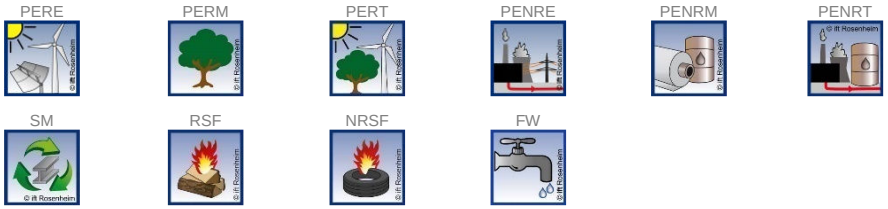
The models for impact assessment were applied as described in DIN EN 15804-A2.
The impact categories presented in the EPD are as follows:

- depletion of abiotic resources – minerals and metals;
- depletion of abiotic resources – fossil fuels;
- acidification;
- ozone depletion;
- climate change - total
- climate change - fossil;
- climate change - biogenic;
- climate change – land use and land use change
- eutrophication aquatic fresh water;
- eutrophication aquatic marine;
- eutrophication terrestrial;
- photochemical ozone creation;
- water use.

Use of resources

The models for impact assessment were applied as described in DIN EN 15804-A2.
The EPD presents the following indicators for the use of resources:

- renewable primary energy as energy resource;
- renewable primary energy for material use;
- total use of renewable primary energy;
- non-renewable primary energy as energy resource;
- renewable primary energy for material use;
- total use of non-renewable primary energy;
- use of secondary materials;
- use of renewable secondary fuels;
- use of non-renewable secondary fuels;
- net use of fresh water resources.

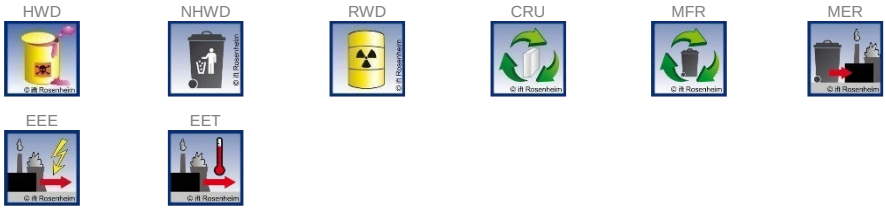


Waste

The waste generated during the production of 1 m² of sectional 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:

- hazardous waste disposed;
- non-hazardous waste disposed;
- radioactive waste
- components for further use;
- materials for recycling;
- materials for energy recovery;
- exported electrical energy;
- exported thermal energy.



Additional environmental impact indicators

The models for impact assessment were applied as described in DIN EN 15804-A2.
The additional impact categories presented in the EPD are as follows:

- particulate matter emissions
- ionising radiation, human health
- ecotoxicity (fresh water)
- human toxicity - carcinogenic effect
- human toxicity - non-carcinogenic effect
- land use related impacts / soil quality

ts per 1 m² of LDI steel

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Core indicators																
GWP-t	kg CO_2 eq	53.60	0.15	9.27	0	0.24	20.70	0	0	6.38	0	0.00	4.93E-02	5.87	3.38E-02	-38.20
GWP-f	kg CO_2 eq	59.85	0.15	2.39	0	0.24	16.90	0	0	6.32	0	0.00	4.93E-02	5.86	3.48E-02	-38.20
GWP-b	kg CO_2 eq	-6.59	-1.48E-03	6.87	0	2.42E-03	2.76E-02	0	0	5.70E-02	0	0.00	-1.94E-04	9.54E-03	-1.03E-03	-5.31E-02
GWP-l	kg CO_2 eq	2.04E-02	1.02E-03	8.87E-04	0	1.51E-05	2.85E-03	0	0	1.34E-03	0	0.00	1.89E-04	2.39E-04	6.42E-05	-9.12E-03
ODP	kg CFC -11 eq.	5.52E-09	1.49E-14	2.14E-12	0	2.59E-13	4.17E-08	0	0	9.26E-11	0	0.00	1.01E-14	1.55E-11	8.17E-14	-4.57E-10
AP	mol H^+ eq.	0.17	1.62E-04	7.00E-03	0	7.39E-04	5.89E-02	0	0	1.39E-02	0	0.00	5.66E-05	3.65E-03	2.47E-04	-9.90E-02
EP-fw	kg P eq.	1.38E-04	5.42E-07	1.98E-06	0	2.06E-06	1.44E-05	0	0	1.85E-05	0	0.00	9.80E-08	3.14E-06	5.89E-08	-4.23E-05
EP-m	kg N eq.	3.62E-02	5.06E-05	1.75E-03	0	1.21E-04	9.49E-03	0	0	3.12E-03	0	0.00	2.08E-05	9.39E-04	6.30E-05	-2.09E-02
EP-t	mol N eq.	0.39	6.09E-04	2.01E-02	0	1.29E-03	0.10	0	0	3.27E-02	0	0.00	2.42E-04	1.20E-02	6.93E-04	-0.23
POCP	kg NMVOC eq.	0.17	1.38E-04	5.47E-03	0	5.65E-04	4.55E-02	0	0	8.42E-03	0	0.00	5.07E-05	2.50E-03	1.92E-04	-8.48E-02
ADPF*²	MJ	773.44	1.99	22.20	0	11.00	265.00	0	0	115.00	0	0.00	0.65	19.60	0.46	-455.00
ADPE*²	kg Sb eq	3.80E-04	1.53E-08	1.43E-07	0	3.63E-08	2.02E-04	0	0	1.72E-06	0	0.00	4.92E-09	2.93E-07	3.56E-09	-1.99E-04
WDP*²	m^3 world eq. deprived	4.79	1.69E-03	0.72	0	5.38	0.78	0	0	1.44	0	0.00	2.10E-04	0.73	3.80E-03	-1.73
Use of resources																
PERE	MJ	126.66	0.14	67.24	0	0.18	23.80	0	0	63.70	0	0.00	4.29E-02	10.50	6.84E-02	-58.60
PERM	MJ	65.76	0.00	-65.73	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
PERT	MJ	192.42	0.14	1.51	0	0.18	23.80	0	0	63.70	0	0.00	4.29E-02	10.50	6.84E-02	-58.60
PENRE	MJ	708.55	2.00	22.40	0	11.00	275.00	0	0	115.00	0	0.00	0.65	85.04	3.90	-457.00
PENRM	MJ	68.88	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	-65.44	-3.44	0.00
PENRT	MJ	777.43	2.00	22.40	0	11.00	275.00	0	0	115.00	0	0.00	0.65	19.60	0.46	-457.00
SM	kg	7.13E-03	0.00	0.00	0	0.00	8.70E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
RSF	MJ	1.09E-04	0.00	0.00	0	0.00	1.33E-03	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	9.52E-04	0.00	0.00	0	0.00	1.16E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.24	1.59E-04	1.90E-02	0	0.13	5.35E-02	0	0	6.07E-02	0	0.00	3.32E-05	2.14E-02	1.16E-04	-0.11
Waste categories																
HWD	kg	1.08E-04	1.06E-11	4.75E-10	0	1.59E-10	1.31E-03	0	0	9.93E-09	0	0.00	2.85E-12	1.72E-09	2.34E-11	-2.45E-08
NHWD	kg	5.04	3.26E-04	0.12	0	3.67E-02	12.30	0	0	8.65E-02	0	0.00	1.06E-04	0.12	2.33	-1.43
RWD	kg	1.14E-02	3.71E-06	2.09E-04	0	4.93E-05	5.21E-03	0	0	1.83E-02	0	0.00	8.19E-07	2.97E-03	5.08E-06	-1.11E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.16	0.00	0.00	0	0.00	5.05	0	0	0.00	0	0.00	0.00	17.10	0.00	0.00
MER	kg	0.00	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.46	0.00	10.20	0	0.00	2.32	0	0	0.00	0	0.00	0.00	8.13	0.00	0.00
EET	MJ	1.98	0.00	18.30	0	0.00	4.15	0	0	0.00	0	0.00	0.00	18.60	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

Results per 1 m² of LDI steel																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Additional environmental impact indicators																
PM	Disease incidence	2.58E-06	1.14E-09	8.20E-08	0	4.63E-09	3.89E-07	0	0	1.15E-07	0	0.00	3.6E-10	2.62E-08	3.03E-09	-1.17E-06
IRP*[1]	kBq U235 eq.	1.88	5.60E-04	2.58E-02	0	7.97E-03	0.31	0	0	3.11	0	0.00	8.33E-05	0.50	5.64E-04	-1.87
ETP-fw*[2]	CTUe	271.56	1.41	5.22	0	7.47	86.50	0	0	50.30	0	0.00	0.50	8.51	0.26	-131.00
HTP-c*[2]	CTUh	5.93E-08	2.91E-11	2.92E-09	0	1.48E-10	1.41E-08	0	0	1.44E-09	0	0.00	1E-11	2.81E-10	3.89E-11	-3.75E-08
HTP-nc*[2]	CTUh	7.49E-07	1.57E-09	2.67E-08	0	6.75E-09	1.75E-07	0	0	5.28E-08	0	0.00	5.09E-10	1.16E-08	4.31E-09	-4.25E-07
SQP*[2]	Dimensionless	1175.35	0.84	1.84	0	0.12	9.20	0	0	41.40	0	0.00	0.20	6.97	9.48E-02	-36.20

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionising 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

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure 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 of LDP																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 eq	85.89	0.14	7.38	0	0.24	26.50	0	0	6.38	0	0.00	4.64E-02	8.33	3.42E-02	-54.20
GWP-f	kg CO_2 eq	90.14	0.14	2.36	0	0.24	22.70	0	0	6.32	0	0.00	4.64E-02	8.32	3.52E-02	-54.20
GWP-b	kg CO_2 eq	-4.66	-1.34E-03	5.01	0	2.42E-03	3.79E-02	0	0	5.70E-02	0	0.00	-1.82E-04	9.22E-03	-1.04E-03	-5.93E-02
GWP-l	kg CO_2 eq	7.86E-02	9.24E-04	8.81E-04	0	1.51E-05	3.01E-03	0	0	1.34E-03	0	0.00	1.78E-04	2.39E-04	6.50E-05	-2.24E-02
ODP	kg CFC -11 eq.	1.54E-08	1.35E-14	1.97E-12	0	2.59E-13	4.17E-08	0	0	9.26E-11	0	0.00	9.47E-15	1.50E-11	8.27E-14	-2.26E-09
AP	mol H^+ eq.	0.34	1.46E-04	6.64E-03	0	7.39E-04	6.32E-02	0	0	1.39E-02	0	0.00	5.33E-05	4.25E-03	2.50E-04	-0.19
EP-fw	kg P eq.	1.37E-04	4.90E-07	1.94E-06	0	2.06E-06	1.75E-05	0	0	1.85E-05	0	0.00	9.22E-08	3.06E-06	5.97E-08	-5.01E-05
EP-m	kg N eq.	5.73E-02	4.57E-05	1.62E-03	0	1.21E-04	1.06E-02	0	0	3.12E-03	0	0.00	1.96E-05	1.14E-03	6.38E-05	-3.15E-02
EP-t	mol N eq.	0.61	5.51E-04	1.84E-02	0	1.29E-03	0.11	0	0	3.27E-02	0	0.00	2.27E-04	1.52E-02	7.01E-04	-0.34
POCP	kg NMVOC eq.	0.19	1.25E-04	5.14E-03	0	5.65E-04	7.39E-02	0	0	8.42E-03	0	0.00	4.76E-05	3.01E-03	1.94E-04	-0.11
ADPF*²	MJ	1319.34	1.80	21.70	0	11.00	346.00	0	0	115.00	0	0.00	0.61	19.10	0.46	-724.00
ADPE*²	kg Sb eq	2.88E-04	1.38E-08	1.38E-07	0	3.63E-08	2.02E-04	0	0	1.72E-06	0	0.00	4.63E-09	2.85E-07	3.61E-09	-1.42E-04
WDP*²	m^3 world eq. deprived	10.45	1.53E-03	0.51	0	5.38	1.53	0	0	1.44	0	0.00	1.98E-04	0.97	3.85E-03	-5.32
Use of resources																
PERE	MJ	365.06	0.13	48.76	0	0.18	25.80	0	0	63.70	0	0.00	4.03E-02	10.10	6.92E-02	-198.00
PERM	MJ	47.36	0.00	-47.36	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
PERT	MJ	412.42	0.13	1.40	0	0.18	25.80	0	0	63.70	0	0.00	4.03E-02	10.10	6.92E-02	-198.00
PENRE	MJ	1214.57	1.81	21.90	0	11.00	357.00	0	0	115.00	0	0.00	0.61	118.62	5.70	-726.00
PENRM	MJ	104.76	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	-99.52	-5.24	0.00
PENRT	MJ	1319.33	1.81	21.90	0	11.00	357.00	0	0	115.00	0	0.00	0.61	19.10	0.46	-726.00
SM	kg	8.55E-03	0.00	0.00	0	0.00	8.70E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
RSF	MJ	1.31E-04	0.00	0.00	0	0.00	1.33E-03	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	1.14E-03	0.00	0.00	0	0.00	1.16E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.82	1.44E-04	1.41E-02	0	0.13	7.20E-02	0	0	6.07E-02	0	0.00	3.12E-05	2.68E-02	1.17E-04	-0.44
Waste categories																
HWD	kg	2.07E-04	9.56E-12	4.3E-10	0	1.59E-10	1.31E-03	0	0	9.93E-09	0	0.00	2.68E-12	1.69E-09	2.37E-11	-1.51E-05
NHWD	kg	17.03	2.94E-04	8.71E-02	0	3.67E-02	12.40	0	0	8.65E-02	0	0.00	9.98E-05	0.17	2.36	-7.84
RWD	kg	4.66E-02	3.35E-06	1.83E-04	0	4.93E-05	5.75E-03	0	0	1.83E-02	0	0.00	7.71E-07	2.82E-03	5.14E-06	-3.19E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	0	0.00	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.00	0.00	0.00	0	0.00	5.05	0	0	0.00	0	0.00	0.00	14.70	0.00	0.00
MER	kg	0.00	0.00	0.00	0	0.00	0	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.46	0.00	7.41	0	0.00	8.02	0	0	0.00	0	0.00	0.00	12.30	0.00	0.00
EET	MJ	1.98	0.00	13.30	0	0.00	14.30	0	0	0.00	0	0.00	0.00	28.30	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

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Results per 1 m² of LDP																
Additional environmental impact indicators																
PM	Disease incidence	3.99E-06	1.03E-09	8.01E-08	0	4.63E-09	4.18E-07	0	0	1.15E-07	0	0.00	3.38E-10	2.91E-08	3.07E-09	-2.01E-06
IRP*[1]	kBq U235 eq.	8.98	5.06E-04	2.15E-02	0	7.97E-03	0.40	0	0	3.11	0	0.00	7.83E-05	0.47	5.71E-04	-6.07
ETP-fw*[2]	CTUe	490.49	1.28	5.01	0	7.47	132.00	0	0	50.30	0	0.00	0.47	8.27	0.26	-234.00
HTP-c*[2]	CTUh	7.12E-08	2.63E-11	2.91E-09	0	1.48E-10	1.50E-08	0	0	1.44E-09	0	0.00	9.41E-12	2.93E-10	3.94E-11	-4.01E-08
HTP-nc*[2]	CTUh	1.17E-06	1.42E-09	2.62E-08	0	6.75E-09	2.14E-07	0	0	5.28E-08	0	0.00	4.79E-10	1.28E-08	4.37E-09	-6.19E-07
SQP*[2]	Dimensionless	915.31	0.76	1.71	0	0.12	10.60	0	0	41.40	0	0.00	0.18	6.75	9.59E-02	-60.00

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionising 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

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure 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 of LDC steel																
	Unit	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Core indicators																
GWP-t	kg CO_2 eq	58.49	0.13	7.38	0	0.24	26.50	0	0	6.38	0	0.00	4.29E-02	5.51	3.19E-02	-40.50
GWP-f	kg CO_2 eq	62.83	0.13	2.36	0	0.24	22.70	0	0	6.32	0	0.00	4.29E-02	5.50	3.28E-02	-40.40
GWP-b	kg CO_2 eq	-4.66	-1.25E-03	5.01	0	2.42E-03	3.79E-02	0	0	5.70E-02	0	0.00	-1.68E-04	8.34E-03	-9.71E-04	-5.28E-02
GWP-l	kg CO_2 eq	2.85E-02	8.64E-04	8.81E-04	0	1.51E-05	3.01E-03	0	0	1.34E-03	0	0.00	1.65E-04	2.10E-04	6.05E-05	-1.11E-02
ODP	kg CFC -11 eq.	6.53E-09	1.26E-14	1.97E-12	0	2.59E-13	4.17E-08	0	0	9.26E-11	0	0.00	8.76E-15	1.36E-11	7.70E-14	-5.31E-10
AP	mol H^+ eq.	0.20	1.37E-04	6.64E-03	0	7.39E-04	6.32E-02	0	0	1.39E-02	0	0.00	4.93E-05	3.29E-03	2.32E-04	-0.12
EP-fw	kg P eq.	9.13E-05	4.58E-07	1.94E-06	0	2.06E-06	1.75E-05	0	0	1.85E-05	0	0.00	8.53E-08	2.75E-06	5.55E-08	-3.65E-05
EP-m	kg N eq.	3.80E-02	4.27E-05	1.62E-03	0	1.21E-04	1.06E-02	0	0	3.12E-03	0	0.00	1.81E-05	8.53E-04	5.94E-05	-2.25E-02
EP-t	mol N eq.	0.41	5.15E-04	1.84E-02	0	1.29E-03	0.11	0	0	3.27E-02	0	0.00	2.11E-04	1.10E-02	6.53E-04	-0.24
POCP	kg NMVOC eq.	0.16	1.17E-04	5.14E-03	0	5.65E-04	7.39E-02	0	0	8.42E-03	0	0.00	4.41E-05	2.27E-03	1.80E-04	-8.74E-02
ADPF*²	MJ	849.22	1.68	21.70	0	11.00	346.00	0	0	115.00	0	0.00	0.57	17.10	0.43	-508.00
ADPE*²	kg Sb eq	2.86E-04	1.29E-08	1.38E-07	0	3.63E-08	2.02E-04	0	0	1.72E-06	0	0.00	4.29E-09	2.56E-07	3.36E-09	-1.40E-04
WDP*²	m^3 world eq. deprived	4.89	1.43E-03	0.51	0	5.38	1.53	0	0	1.44	0	0.00	1.83E-04	0.67	3.58E-03	-2.49
Use of resources																
PERE	MJ	184.05	0.12	48.76	0	0.18	25.80	0	0	63.70	0	0.00	3.73E-02	9.19	6.44E-02	-98.30
PERM	MJ	47.36	0.00	-47.36	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
PERT	MJ	231.41	0.12	1.40	0	0.18	25.80	0	0	63.70	0	0.00	3.73E-02	9.19	6.44E-02	-98.30
PENRE	MJ	787.61	1.69	21.90	0	11.00	357.00	0	0	115.00	0	0.00	0.57	79.42	3.71	-509.00
PENRM	MJ	65.60	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	-62.32	-3.28	0.00
PENRT	MJ	853.21	1.69	21.90	0	11.00	357.00	0	0	115.00	0	0.00	0.57	17.10	0.43	-509.00
SM	kg	8.55E-03	0.00	0.00	0	0.00	8.70E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
RSF	MJ	1.31E-04	0.00	0.00	0	0.00	1.33E-03	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
NRSF	MJ	1.14E-03	0.00	0.00	0	0.00	1.16E-02	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
FW	m^3	0.37	1.35E-04	1.41E-02	0	0.13	7.20E-02	0	0	6.07E-02	0	0.00	2.89E-05	1.96E-02	1.09E-04	-0.20
Waste categories																
HWD	kg	1.43E-04	8.94E-12	4.3E-10	0	1.59E-10	1.31E-03	0	0	9.93E-09	0	0.00	2.48E-12	1.51E-09	2.21E-11	-2.78E-06
NHWD	kg	8.61	2.75E-04	8.71E-02	0	3.67E-02	12.40	0	0	8.65E-02	0	0.00	9.24E-05	0.11	2.20	-3.26
RWD	kg	2.11E-02	3.14E-06	1.83E-04	0	4.93E-05	5.75E-03	0	0	1.83E-02	0	0.00	7.13E-07	2.59E-03	4.78E-06	-1.72E-02
Output material flows																
CRU	kg	0.00	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
MFR	kg	0.16	0.00	0.00	0	0.00	5.05	0	0	0.00	0	0.00	0.00	14.60	0.00	0.00
MER	kg	0.00	0.00	0.00	0	0.00	0.00	0	0	0.00	0	0.00	0.00	0.00	0.00	0.00
EEE	MJ	0.46	0.00	7.41	0	0.00	8.02	0	0	0.00	0	0.00	0.00	7.74	0.00	0.00
EET	MJ	1.98	0.00	13.30	0	0.00	14.30	0	0	0.00	0	0.00	0.00	17.80	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

Results per 1 m² of LDC steel

	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Additional environmental impact indicators																
PM	Disease incidence	2.70E-06	9.65E-10	8.01E-08	0	4.63E-09	4.18E-07	0	0	1.15E-07	0	0.00	3.13E-10	2.34E-08	2.86E-09	-1.33E-06
IRP*[1]	kBq U235 eq.	3.82	4.74E-04	2.15E-02	0	7.97E-03	0.40	0	0	3.11	0	0.00	7.25E-05	0.44	5.31E-04	-3.10
ETP-fw*[2]	CTUe	307.41	1.19	5.01	0	7.47	132.00	0	0	50.30	0	0.00	0.43	7.44	0.24	-154.00
HTP-c*[2]	CTUh	5.63E-08	2.46E-11	2.91E-09	0	1.48E-10	1.50E-08	0	0	1.44E-09	0	0.00	8.71E-12	2.49E-10	3.67E-11	-3.53E-08
HTP-nc*[2]	CTUh	7.87E-07	1.33E-09	2.62E-08	0	6.75E-09	2.14E-07	0	0	5.28E-08	0	0.00	4.43E-10	1.04E-08	4.06E-09	-4.49E-07
SQP*[2]	Dimensionless	881.26	0.71	1.71	0	0.12	10.60	0	0	41.40	0	0.00	0.17	6.09	8.93E-02	-41.50

Key:
PM – particulate matter emissions potential **IRP*[1]** – ionising 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

Disclaimers

*1 This impact category deals mainly with the eventual impact of low-dose ionising radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure 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

Calculation of the scenarios was based on a service life of 50 years. Furthermore, the scenarios of the research project "EPDs für transparente Bauelemente“ (EPDs for transparent building components) were used (1).
The standard scenarios selected are presented in bold type.

The environmental impacts of

- LDI steel
- LDP
- LDC steel

sometimes differ greatly. The differences result mainly from the amount of the different pre-products and raw materials used. This was to be expected due to the use of varying amounts of steel and aluminium. The highest environmental impacts occur in the LDP sectional door, mainly due to the higher amount of aluminium.

The environmental impacts during the manufacture of the LDI steel sectional doors are mainly due to the use of steel or its upstream chains. Aluminium, PVC and EPS and their upstream chains are of secondary importance.
The environmental impacts of the LDP and LDC steel sectional doors are mainly due to the use of steel and aluminium and their upstream chains. The use of EPS and its upstream chains for the LDP sectional door, or the use of EPS and SAN including upstream chains for the LDC steel sectional door are of secondary importance.
Notable environmental impacts for all sectional doors during the 50-year use stage arise from the replacement of steel and electronic parts in Module B3 and electricity consumption in Module B6.

For scenario C4 only marginal consumptions arising from the physical pre-treatment and management of the disposal site are expected.
When recycling the products, for aluminium an average of about 3% (LDI steel sectional door), 15% (LDP sectional door) and 8% (LDC steel sectional door) of the environmental impacts arising during the life cycle can be assigned as benefits to scenario D. For steel the average values are about 14% (LDI steel sectional door), 5% (LDP sectional door) and 10% (LDC steel sectional door). In addition, benefits can be assigned to copper in Module D, with average values of about 4% (LDI steel) and 3% (LDP and LDC steel).

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

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

Charts

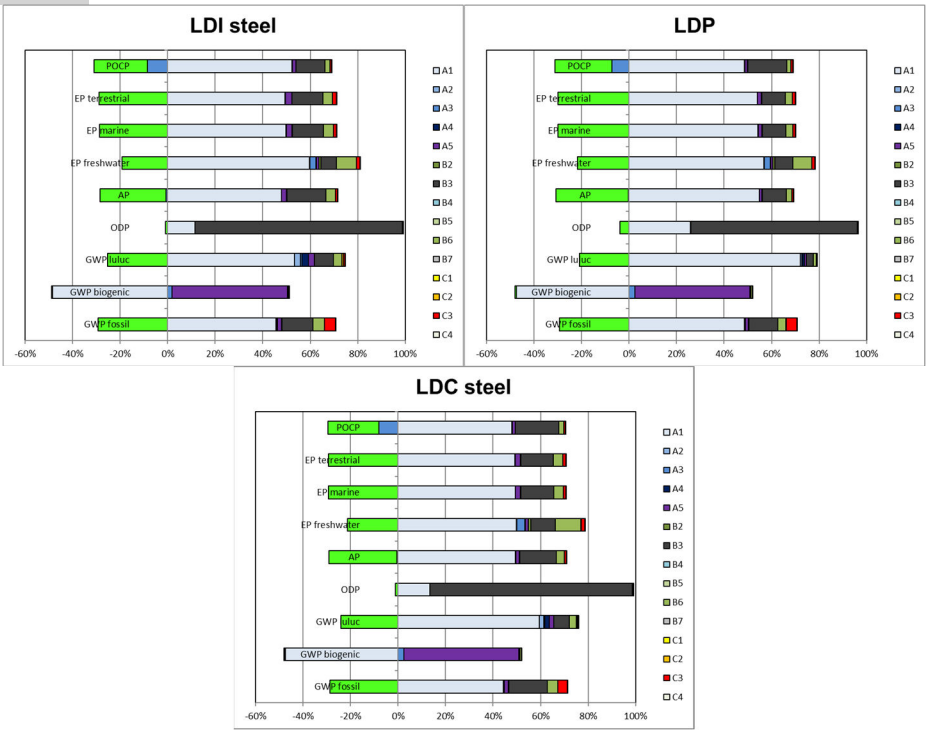


Figure 5: Percentage of the modules in selected environmental impact categories

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 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 of the report took place in the course of verification of the EPD and was carried out by Patrick Wortner, MBA and Eng., Dipl.-Ing. (FH), 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.

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. 3 -0.2:2018 and “Doors” PCR-TT-2. 3 -1.1:2018

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)] Patrick Wortner
[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	13.05.2022	External Verification	Hilz	Wortner
2	19.08.2022	Revision	Hilz	Wortner
3				

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9 Annex

Description of life cycle scenarios for LDI steel, LDC steel, LDP

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 process	Use	Maintenance	Repair	Replacement	Modification/refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	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) as well as EN 17213 (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	Lindab Transport	28-32 t truck (Euro 0-6 mix), diesel, 22 t payload, 85% capacity used, distance 102 km and empty return

A4 Transport to the construction site	Transport weight [kg/m²]
LDI steel	24.92
LDP	22.53
LDC steel	21.07

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

A5 Construction/Installation

No.	Scenario	Description
A5	Lindab installation, manual	According to the manufacturer, the products are installed without using additional lifting and auxiliary devices Installation material: 0.375 kg Lubricant: 0.006 kg Transport of installation material: 53 km

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.

Energy, use of water, material losses, direct emissions and waste 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: Wood and cardboard in waste incineration plants. Benefits from A5 are specified in Module D. Benefits from waste incineration: electricity replaces electricity mix (EU 28); thermal energy replaces thermal energy from natural gas (EU 28).
Transport to the recycling plants is not taken into account.

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

B1 Use

Refer to Section 4 Use stage - Emissions to the environment. Emissions are unknown and hence declared to be not relevant. The manufacturer is responsible for any evidence.

B2 Inspection, maintenance, cleaning

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

B2.1 Cleaning

No.	Scenario	Description
B2.1	**Rarely manual**	**Manually using water, annually (2.5 l / cleaning; 125 l / 50 yr)**

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

B2.2 Maintenance

No.	Scenario	Description
B2.2	**Lindab maintenance**	**Annual functional check, visual inspection, greasing/lubrication and, if necessary, repair according to manufacturer 0.21 kg lubricant per 50 yr**

Energy, use of water, material losses and waste as well as transport distances during maintenance are negligible.

B3 Repair

No.	Scenario	Description
B3	**Lindab repair**	**Replacement of wearing parts over 50 years according to manufacturer*: Steel parts: 4.34 kg Plastic parts 0.41 kg Seals/gaskets: 0.39 kg Electronics: 0.61 kg Panels: 1.42 kg**

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

For updated information refer to the relevant instructions for assembly/installation, operation and maintenance from Lindab A/S .

According to the manufacturer, the sectional doors manufactured by Lindab A/S have a service life of 50 years. Scenario B3 presents the LCA of the components of building elements with a service life of less than the relevant period of 50 years.

Is is assumed that the replaced components in the Module Repair are recycled. Metals mainly in melt (material recycling), plastics in waste incineration plants. Benefits from B3 are specified in Module D. Benefits from waste incineration: electricity replaces electricity mix (EU 28); thermal energy replaces thermal energy from natural gas (EU 28).
Transport to the recycling plants is not taken into account.

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

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

B4 Exchange / Replacement

No.	Scenario	Description
B4	**Normal use and heavy use**	**No replacement over a 50 year period***

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

According to the manufacturer no replacement will be necessary during the 50-year service life and the estimated 50-year building service life.

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

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

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

B5 Improvement / Modernisation

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

For updated information refer to the relevant instructions for assembly/installation, operation and maintenance from Lindab A/S .

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

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

B6 Operational energy use

No.	Scenario	Description
B6.1	**Power-operated Heavy use (industrial application)**	**7,500 cycles/yr; 17.15 kWh/50 yr**
B6.2	Power-operated Normal use (private sector)	1,100 cycles/yr; 2.51 kWh/50 yr

* Frequencies, times of use, number of users, cycles, etc.

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

B6 Operational energy use	Unit	B6.1	B6.2
Core indicators			
GWP-t	kg CO_2 eq	6.38	0.93
GWP-f	kg CO_2 eq	6.32	0.93
GWP-b	kg CO_2 eq	5.70E-02	8.34E-03
GWP-l	kg CO_2 eq	1.34E-03	1.96E-04
ODP	kg CFC -11 eq.	9.26E-11	1.36E-11

AP	mol H^+ eq.	1.39E-02	2.03E-03
EP-fw	kg P eq.	1.85E-05	2.70E-06
EP-m	kg N eq.	3.12E-03	4.56E-04
EP-t	mol N eq.	3.27E-02	4.78E-03
POCP	kg NMVOC eq.	8.42E-03	1.23E-03
ADPF	MJ	115.00	16.80
ADPE	kg Sb eq	1.72E-06	2.52E-07
WDP	m^3 world eq. deprived	1.44	0.21
Use of resources			
PERE	MJ	63.70	9.32
PERM	MJ	0.00	0.00
PERT	MJ	63.70	9.32
PENRE	MJ	115.00	16.80
PENRM	MJ	0.00	0.00
PENRT	MJ	115.00	16.80
SM	kg	0.00	0.00
RSF	MJ	0.00	0.00
NRSF	MJ	0.00	0.00
FW	m^3	6.07E-02	8.89E-03
Waste categories			
HWD	kg	9.93E-09	1.45E-09
NHWD	kg	8.65E-02	1.27E-02
RWD	kg	1.83E-02	2.69E-03
Output material flows			
CRU	kg	0.00	0.00
MFR	kg	0.00	0.00
MER	kg	0.00	0.00
EEE	MJ	0.00	0.00
EET	MJ	0.00	0.00
Additional environmental impact indicators			
PM	Disease incidence	1.15E-07	1.68E-08
IRP	kBq U235 eq.	3.11	0.46
ETP-fw	CTUe	50.30	7.36
HTP-c	CTUh	1.44E-09	2.11E-10
HTP-nc	CTUh	5.28E-08	7.73E-09
SQP	Dimensionless	41.40	6.06

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 during water use 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	**Based on EN 17213 :** **Dismantling of glass-free materials: 95%** **Further deconstruction rates are possible, give adequate reasons.**

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

Since only one scenario is used, the results are shown in the relevant 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 40 t truck (Euro 0-6 mix), diesel, 27 t payload, 80% capacity used, 50 km**

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

C3 Waste management

No.	Scenario	Description
C3.4	Current market situation	**Share for recirculation of materials:** • **steel 98% in melt** (UBA, 2017) • **aluminium 95% in melt** (GDA, 2018) • **remaining metals 97% in melt** (UBA, 2017) • **plastics 66%, thermal recycling in waste incineration plant** (Zukunft Bauen, 2017) • **plastics 34%, material recycling** (Zukunft Bauen, 2017) • **remainder disposed (landfill)**

Electricity consumed by 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	LDI steel	LDP	LDC steel
Collection process, collected separately	kg	19.77	18.59	17.20
Collection process, collected as mixed construction waste	kg	1.04	0.98	0.91
Recovery system, for re-use	kg	0.00	0.00	0.00
Recovery system, for recycling	kg	17.07	14.71	14.60
Recovery system, for energy recovery	kg	2.11	3.20	2.01
Disposal	kg	1.63	1.66	1.50

The 100% scenarios differ from current average recycling (C3.4). The evaluation of the individual scenarios is presented in the underlying report.

Since only one scenario is used, the results are shown in the relevant 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" (EU-28).**

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 relevant 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; Plastic recyclate from C3 excluding the plastics used in A3 replaces 60% of polyethylene granules; Benefits from waste incineration: electricity replaces electricity mix (EU-28); thermal energy replaces thermal energy from natural gas (EU-28).**

The values in Module "D" result from recycling of the packaging material in the use stage (Module B3) and from deconstruction at the end of service life.

The 100% scenarios differ from the current average recycling (D.1). The evaluation of the individual scenarios is presented in the underlying report.

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

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Notes
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