Environmental product declaration (EPD)

Declaration code: EPD-LD-GB-24.0

Lindab A/S

sectional door

LDI steel, LDC steel, LDP

basis:

DIN EN ISO 14025
EN15804

company-EPD
Environmental
Product **D**eclaration

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www.ift-rosenheim.de/
erstellte-epds

ift Rosenheim GmbH
Theodor-Gietl-Str. 7-9
D-83026 Rosenheim

Kontakt
Tel.: +49 8031 261-0
Fax: +49 8031 261-290
www.ift-rosenheim.de

Environmental product declaration (EPD)

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Programme operator	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim		
Practitioner of the LCA	ift Rosenheim GmbH Theodor-Gietl-Straße 7-9 83026 Rosenheim		
Declaration holder	Lindab A/S Finnmarken 1 Jels DK 6630 Roedding		
Declaration code	EPD-LD-GB-24.0		
Designation of declared product	sectional door		
Scope	LDI steel, LDC steel, LDP overhead sectional door are suitable for nearly all building types, regarding function, design and installation.		
Basis	This EPD was prepared on the basis of EN ISO 14025:2011 and EN 15804:2012+A1:2013. In addition, the “Allgemeiner Leitfaden zur Erstellung von Typ III Umweltproduktdeklarationen” (Guidance on preparing Type III Environmental Product Declarations) applies. This declaration is based on the PCR document „Türen und Tore“ – PCR-TT-1.1:2013		
Validity	Publication date: 14.06.2017	Last revision: 14.06.2017	Next revision: 14.06.2022
	This verified Company Environmental Product Declaration applies solely to the specified products and is valid for a period of 5 years from the publication date 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 Lindab A/S production site and the generic data derived from the GaBi ts database. LCA calculations were carried out for the product stage “from cradle to gate with options” including all upstream processes (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.		

Prof. Ulrich Sieberath Institut Manager	Patrick Wortner external verifier

1 General product information

Product definition

The EPD relates to the product group doors and applies to the product:

sectional door **from the company Lindab A**/S

The declared unit refers to 1 m² of sectional doors.

Name	Product	Value	Unit
grammage	LDI steel	20,3	kg/m²
	LDP	19,7	kg/m²
	LDC steel	21,1	kg/m²
Conversion factor to 1 kg.	LDI steel	0,0495	-
	LDP	0,051	-
	LDC steel	0,0475	-

The reference product of LDI steel, LDP, LDC steel was calculated with a size of 16 m². This size represents a conservative assumption in the calculation of the sectional doors. Because environmental impacts of larger sectional doors tend to be lower.

Product description

The Lindab LDI steel / LDP / LDC steel overhead sectional door are suitable for nearly all types of building, regarding operation, design and installation. The various combinations of panel types, design and hardware types, make it possible to install this door solution in almost every building type. When operated, the door leaf slides up under the roof for optimal use of existing room height, leaving the door opening with full clearance. The overhead sectional door has 3 main parts: 1) Door leaf. 2) Hardware set. 3) Electrical operating system or chainhoist. The door leaf is made of roll formed steel or aluminium with a core of 46 mm polystyrene. The doorleaf is designed with finger protection, cold bridge separation, in the center of the panel, which is quite unique and with top- and bottom seals of EPDM. Furthermore the panel is designed with slotted end cassettes for improved insulation. The hardware set including its counterbalance system is made of galvanized steel as standard. The counterbalance system is composed of a shaft fitted with torsion springs, cable drums and cables, which ensures 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 which ensures long term operation. The Lindab LDI / LDP / LDC overhead sectional door has been designed to meet all operational and safety requirements set in the European Directives and standards.

Door type LDI-steel, insulated

LDI door is built of 46 mm thick insulated sections of extruted polystyrene, with steel surface. For the LCA a steel door with 46 mm extruted polystyrene was calculated.

Door type LDP – Panorama

LDP door is made of extruted aluminum profiles and fillings from styrol acryl nitril (SAN).

For the LCA a aluminium frame door with SAN fillings was calculated.

Door type LDC-steel, combined

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.

For the LCA a steel door with 46 mm extruted polystyrene with a combination of an aluminium frame and a SAN filling was calculated.

For a detailed product description refer to the manufacturer specifications at www.lindab.dk or the product descriptions for the desired product.

Product manufacture

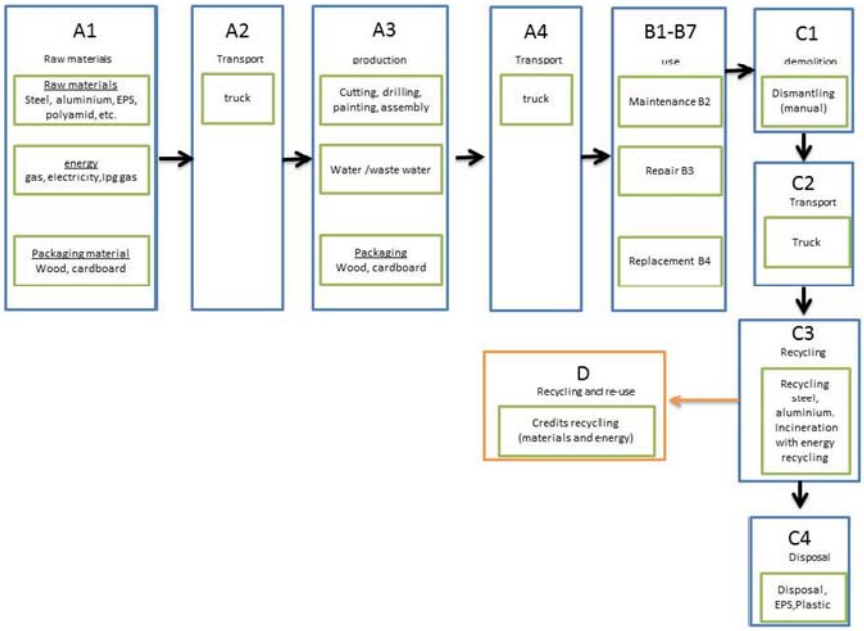

figure 1: product manufacture

Application	The Lindab LDI steel / LDP / LDC steel overhead sectional door are suitable for nearly all building types, regarding function, design and installation. The 46 mm panel of extruded polystyrene, is a panel of great strength and comes without a thermal brigde for better insulations value. This combined with the flexibility for installation, regarding choice of hardware sets, makes this solution ideal for almost every building type.
Verifications (optional)	The following verifications are held: • Product quality according to DIN EN 13241-1
Management systems (optional)	The following management systems are in place: • Quality management system as per DIN EN ISO 9001:2008 • Environmental management system as per DIN EN ISO 14001:2009
Additional information	For detailed building physics characteristics please refer to the CE marking and to the accompanying documents.

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 from 01. Oktober 2012). Lindab carries out a regular review of the list. All relevant safety data sheets are available from Lindab A/S.

3 Construction process stage

Processing recommendations – installation	Observe the manufacturer's instructions for interim storage, processing, assembly/installation and information on compatibility. www.lindab.dk

4 Use stage

Emissions to the environment	Emissions to air and soil can not be quatified.
Reference service life (RSL)	The RSL information was provided by the manufacturer. The RSL shall refer to the declared technical and functional performance of the product within the building. It shall be established in accordance with specific rules set out in the European product standards and shall also take into account ISO 15686-1, -2, -7 and -8. Where European product standards provide guidance on 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 table "Nutzungsdauern von Bauteilen zur Lebenszyklusanalyse nach BNB" ("Service life of building components for life cycle analysis

in accordance with the Sustainable Construction evaluation system" of the German Federal Institute for Research on Building, Urban Affairs and Spatial Development) can be used. For further information and explanations refer to www.nachhaltigesbauen.de

For this EPD the following applies:

> *The reference service life (RSL) can be determined for a "cradle to gate - with options" EPD only if all the modules A1-A3 and B1-B5 are specified;*
>
> According to the manufacturer, the sectional doors manufactured by the company Lindab A/S have an optional service life of 20 years.

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 from the service life and when the building is renovated. It does not provide any indication of durability, nor does it constitute a warranty regarding the product's performance characteristics, nor any kind of guarantee.

5 End-of-life stage

Possible end-of-life stages

The sectional door can be shipped to central collecting points. They are generally shredded and sorted into their original pure components. Residual fractions are thermally recycled or disposed of in landfill.

6 Life Cycle Assessment (LCA)

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

As the basis for this, a Life Cycle Analysis (LCA) was prepared for the sectional doors. The LCA is in conformity with EN 15804 and the requirements set out in the international standards EN ISO 14040, 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 sectional door. In accordance with EN 15804, the environmental impacts covered by this Environmental Product Declaration are presented for the product stage in the form of basic information. Apart from these, no other environmental impacts have been specified.

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

The specific data originate from the fiscal year 2015. They were collected at the the plant at Jels DK 6630 Roedding.
The generic data originate from the GaBi ts professional and construction materials databases. No other generic data were used for the calculation.
Data gaps were filled with comparable data. The system boundaries were adhered to and upstream processes were considered. No additional data were collected; instead, generic data were used.

The life cycle was modelled using the sustainability software tool “GaBi ts” for the development of Life Cycle Assessments.

Data were collected following the 1 percent rule, meaning that all energy and mass shares exceeding 1 percent were included, as were lower energy and mass shares. In this way, the total of all negligible processes does not exceed 5 percent of the energy and mass input.

Scope/system boundaries

The system boundaries refer to the supply of raw materials and purchased parts, and to the manufacture of the sectional door (cradle to gate, with options).
No additional data from pre-suppliers/subcontractors were taken into consideration.

Cut-off criteria

All company data (for module A3) collected, i.e. all commodities/input and raw materials used, thermal energy and electricity consumption, were taken into consideration.

The boundaries cover only the production-relevant data. Building

sections/parts of facilities that are not relevant to the manufacture of the products were excluded.

The average transport distances to the plant at Jels DK 6630 Roedding were determined for the different product groups. The average was obtained by calculation based on the percentages by mass. Since the preproducts are delivered only by hauliers, capacity utilisation is assumed to be high. 85 % was assumed. The basis for 85 % is removed from Gabi database.

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

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 unit.

Life cycle stages

The LCA calculations were carried out for the stage “cradle to gate with options” (i.e. the product stage). The modules considered were those corresponding to the manufacturing process, i.e. A1-A3.

Benefits

The following credits are indicated in accordance with EN 15804:

- Credits from recycling
- Credits (thermal and electrical) from utilisation.

Allocation procedures Allocation of co-products

The manufacture of sectional door does not produce any allocations.

Allocations for re-use, recycling and recovery

If the sectional door are re-used/recycled and recovered during the product stage (rejects), the resulting material is reintroduced into the production process. The system boundaries of the sectional door were set following their disposal, with termination of their waste characteristics.

Secondary material

The use of secondary materials in Module A3 by the company Lindab A/S was considered. Secondary materials are not used.

Inputs

The LCA includes the following production-relevant inputs:

Energy
The electricity mix is based on “Strommix Dänemark” (Danish electricity mix 2015).
Gas is based on “Erdgas Dänemark” (danish natural gas 2015).

Water
The water consumed by the individual process steps for the manufacture of the sectional door was approx. 2 l per m² unit
The consumption of fresh water specified in the results originates from (among other sources) the upstream processes of the pre-products.

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

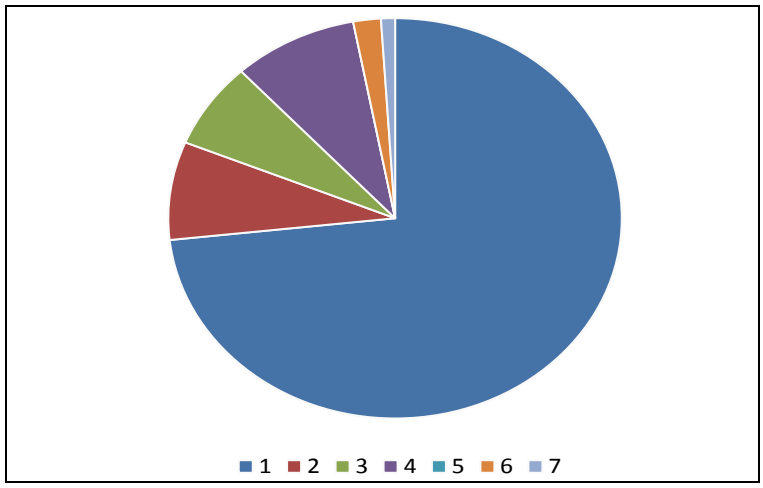

figure 2: material LDI steel door

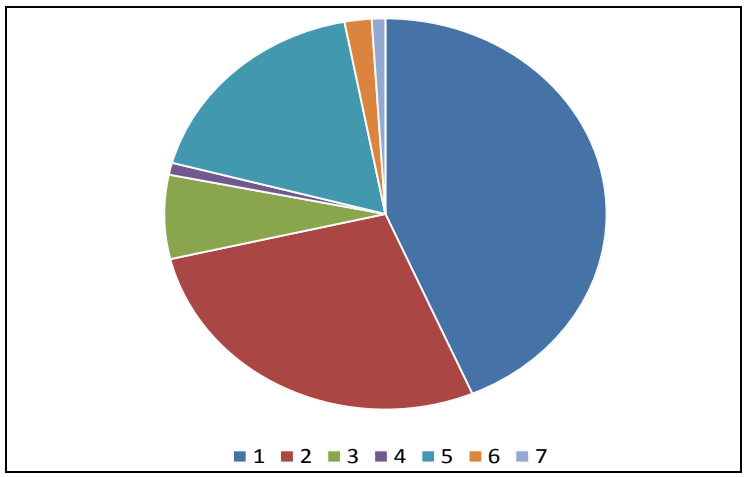

figure 3: material LDP door

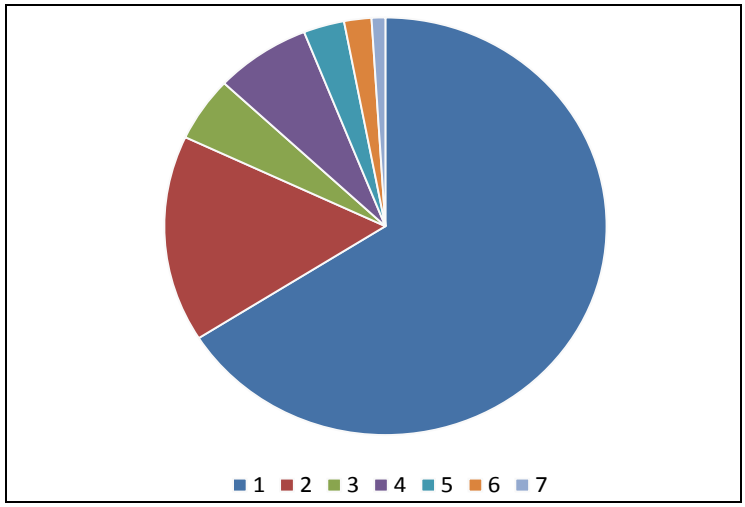

figure 4 material LDC steel door

No.	Material	Mass in %		
	Series and material	**LDI steel**	**LDP**	**LDC steel**
1	Steel	74%	44%	66%
2	Aluminum	8%	28%	16%
3	Plastics (TPU/PE)	7%	7%	5%
4	Polystyrene	9%	1%	7%
5	SAN	0%	18%	3%
6	Paint	2%	2%	2%
7	Drive mechanism	1%	1%	1%

Ancillary materials and consumables
Around 0,107g of ancillary materials and consumables are used per m² sectional door

Outputs

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

Waste
Secondary raw materials were included in the benefits.
See results (Impact assessment).

Waste water
The manufacture of the sectional door produces 2 l of waste water per m².

6.3 Impact assessment

Goal

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

Impact categories

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

- Depletion of abiotic resources (fossil fuels);
- Depletion of abiotic resources (elements);
- Acidification of soil and water;
- Ozone depletion;
- Global warming;
- Eutrophication;
- Photochemical ozone creation.

Waste

The waste generated during the production of 1 m² of sectional door evaluated and shown separately for each of the three main fractions, namely trade wastes, special wastes and radioactive wastes. Since waste handling is modelled within the system boundaries, the amounts shown refer to the deposited wastes. A portion of the waste indicated is generated during the manufacture of the pre-products.

Results for m² of LDI steel sectional door		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Environmental impacts	**Unit**			MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Global warming potential (GWP 100)	kg CO2 equiv.	5,40E+01	1,02E-01	-	-	1.07E-01	9.91E+00	-	-	-	-	-	1,01E-01	6,26E-02	6,19E+00	-2,05E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 equiv.	5,41E-07	4,71E-13	-	-	6.46E-12	1.17E-07	-	-	-	-	-	4,66E-13	4,44E-11	1,29E-11	-4,44E-09
Acidification potential of soil and water (AP)	kg SO2 equiv.	1,47E-01	6,24E-04	-	-	5.53E-04	2.76E-02	-	-	-	-	-	6,18E-04	1,74E-04	5,10E-04	-1,03E-02
Eutrophication potential (EP)	kg PO43- equiv.	1,49E-02	1,56E-04	-	-	2.95E-05	2.82E-03	-	-	-	-	-	1,55E-04	1,56E-05	9,89E-05	3,23E-04
Formation potential of tropospheric ozone (POCP)	kg C2H4 equiv.	6,13E-02	-2,59E-04	-	-	8.62E-05	2.10E-02	-	-	-	-	-	-2,57E-04	1,20E-05	6,16E-05	3,12E-03
Abiotic depletion potential - non-fossil resources (ADP - elements)	kg Sb equiv.	3,38E-04	6,82E-09	-	-	1.33E-08	3.63E-04	-	-	-	-	-	6,75E-09	2,03E-08	3,90E-08	-5,70E-06
Abiotic depletion potential - fossil resources (ADP – fossil fuels)	MJ	7,46E+02	1,41E+00	-	-	5.18E+00	1.83E+02	-	-	-	-	-	1,40E+00	6,78E-01	8,79E-01	-5,11E+01
Use of resources	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy - excluding renewable primary energy resources used as raw materials	MJ	1,18E+02	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (primary energy and renewable primary energy resources used as raw materials) (energy + material use)	MJ	1,18E+02	8,02E-02	-	-	3,74E-02	4,68E-02	-	-	-	-	-	7,94E-02	3,05E-01	1,26E-01	-6,85E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	7,69E+02	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and non-renewable primary energy re-sources used as raw materials) (energy + material use)	MJ	7,69E+02	1,42E+00	-	-	4,19E+00	5,24E+00	-	-	-	-	-	1,40E+00	1,09E+00	1,01E+00	-8,97E+01
Use of secondary material	kg	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Results for m² of LDI steel sectional door (part 2)		A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of resources	**Unit**			MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,13E-01	2,01E-04	-	-	6.39E-05	7.98E-05	-	-	-	-	-	1,99E-04	4,71E-04	1,34E-02	-1,53E-01
Waste categories	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste for landfill	kg	2,52E-06	1,07E-07	-	-	2.85E-09	7.32E-08	-	-	-	-	-	1,06E-07	6,93E-10	6,49E-09	-1,61E-05
Disposed non-hazardous waste	kg	2,04E+00	1,19E-04	-	-	9.55E-05	6.78E-02	-	-	-	-	-	1,18E-04	6,58E-04	1,20E+00	-2,77E+00
Disposed radioactive waste	kg	8,91E-03	2,02E-06	-	-	2.47E-05	2.98E-03	-	-	-	-	-	2,00E-06	1,65E-04	5,27E-05	-1,53E-02
Output material flows	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Materials for recycling	kg	1,37E-01	0	-	-	0	0	-	-	-	-	-	0	1.62E+01	0	0
Materials for energy recovery	kg	0	0	-	-	0	0	-	-	-	-	-	0	1.97E+00	0	0
Exported energy (electricity)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Exported energy (thermal energy)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0

Results for m² of LDP sectional door	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Environmental impacts				MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Global warming potential (GWP 100)	kg CO_2 equiv.	4,48E+01	9,74E-02	-	-	1.07E-01	9.91E+00	-	-	-	-	-	4,82E-02	6,13E-02	1,24E+00	-2,25E+01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 equiv.	2,53E-07	4,48E-13	-	-	6.46E-12	1.17E-07	-	-	-	-	-	2,22E-13	4,35E-11	2,87E-12	-9,14E-09
Acidification potential of soil and water (AP)	kg SO_2 equiv.	1,25E-01	5,93E-04	-	-	5.53E-04	2.76E-02	-	-	-	-	-	2,94E-04	1,71E-04	2,82E-04	-1,13E-01
Eutrophication potential (EP)	kg PO_4^{3-} equiv.	1,39E-02	1,49E-04	-	-	2.95E-05	2.82E-03	-	-	-	-	-	7,35E-05	1,53E-05	4,41E-05	-5,99E-03
Formation potential of tropospheric ozone (POCP)	kg C_2H_4 equiv.	2,55E-02	-2,47E-04	-	-	8.62E-05	2.10E-02	-	-	-	-	-	-1,22E-04	1,18E-05	2,96E-05	-4,55E-03
Abiotic depletion potential - non-fossil resources (ADP - elements)	kg Sb equiv.	3,40E-04	6,48E-09	-	-	1.33E-08	3.63E-04	-	-	-	-	-	3,21E-09	1,98E-08	1,81E-08	-1,45E-05
Abiotic depletion potential - fossil resources (ADP – fossil fuels.)	MJ	7,42E+02	1,34E+00	-	-	5.18E+00	1.83E+02	-	-	-	-	-	6,64E-01	6,64E-01	5,67E-01	-2,61E+02
Use of resources	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy - excluding renewable primary energy resources used as raw materials	MJ	1,12E+02	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (primary energy and renewable primary energy resources used as raw materials) (energy + material use)	MJ	1,12E+02	7,63E-02	-	-	3.74E-02	4.68E-02	-	-	-	-	-	3,77E-02	2,99E-01	7,12E-02	-1,61E+02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	7,72E+02	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0,00E+00	-	-	0,00E+00	0,00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and non-renewable primary energy re-sources used as raw materials) (energy + material use)	MJ	7,72E+02	1,35E+00	-	-	4.19E+00	5.24E+00	-	-	-	-	-	6,67E-01	1,07E+00	6,07E-01	-3,29E+02
Use of secondary material	kg	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Results for m² of LDP sectional door (part 2)	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of resources				MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	1,79E-01	1,91E-04	-	-	6.39E-05	7.98E-05	-	-	-	-	-	9,46E-05	4,62E-04	2,70E-03	-4,05E-01
Waste categories	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste for landfill	kg	4,05E-03	1,02E-07	-	-	2.85E-09	7.32E-08	-	-	-	-	-	5,04E-08	6,78E-10	1,06E-08	-1,01E-05
Disposed non-hazardous waste	kg	1,97E+00	1,13E-04	-	-	9.55E-05	6.78E-02	-	-	-	-	-	5,60E-05	6,45E-04	2,13E+00	-7,91E+00
Disposed radioactive waste	kg	1,16E-02	1,93E-06	-	-	2.47E-05	2.98E-03	-	-	-	-	-	9,53E-07	1,61E-04	1,60E-05	-2,68E-02
Output material flows	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Materials for recycling	kg	1,37E-01	0	-	-	0	0	-	-	-	-	-	0	1,41E+01	0	0
Materials for energy recovery	kg	0	0	-	-	0	0	-	-	-	-	-	0	4,63E+00	0	0
Exported energy (electricity)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Exported energy (thermal energy)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0

Results for m² of LDC steel sectional door	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Environmental impacts				MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Global warming potential (GWP 100)	kg CO_2 equiv.	5,40E+01	1,02E-01	-	-	1.07E-01	9.91E+00	-	-	-	-	-	1,01E-01	6,20E-02	6,74E+00	-2,36E+00
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 equiv.	5,41E-07	4,71E-13	-	-	6.46E-12	1.17E-07	-	-	-	-	-	4,66E-13	4,40E-11	1,41E-11	-4,51E-09
Acidification potential of soil and water (AP)	kg SO_2 equiv.	1,47E-01	6,24E-04	-	-	5.53E-04	2.76E-02	-	-	-	-	-	6,18E-04	1,73E-04	5,45E-04	-1,07E-02
Eutrophication potential (EP)	kg PO_4^{3-} equiv.	1,49E-02	1,56E-04	-	-	2.95E-05	2.82E-03	-	-	-	-	-	1,55E-04	1,54E-05	1,06E-04	2,68E-04
Formation potential of tropospheric ozone (POCP)	kg C_2H_4-equiv.	6,13E-02	-2,59E-04	-	-	8.62E-05	2.10E-02	-	-	-	-	-	-2,57E-04	1,19E-05	6,61E-05	3,04E-03
Abiotic depletion potential - non-fossil resources (ADP - elements)	kg Sb equiv.	3,38E-04	6,82E-09	-	-	1.33E-08	3.63E-04	-	-	-	-	-	6,75E-09	2,01E-08	4,19E-08	-5,70E-06
Abiotic depletion potential - fossil resources (ADP – fossil fuels.)	MJ	7,46E+02	1,41E+00	-	-	5.18E+00	1.83E+02	-	-	-	-	-	1,40E+00	6,71E-01	9,34E-01	-5,50E+01
Use of resources	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Use of renewable primary energy - excluding renewable primary energy resources used as raw materials	MJ	1,18E+02	0.00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of renewable primary energy resources (primary energy and renewable primary energy resources used as raw materials) (energy + material use)	MJ	1,18E+02	8,02E-02	-	-	3.74E-02	4.68E-02	-	-	-	-	-	7,94E-02	3,02E-01	1,35E-01	-6,86E+01
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	7,69E+02	0.00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable primary energy resources used as raw materials (material use)	MJ	0,00E+00	0.00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Total use of non-renewable primary energy resources (primary energy and non-renewable primary energy re-sources used as raw materials) (energy + material use)	MJ	7,69E+02	1,42E+00	-	-	4.19E+00	5.24E+00	-	-	-	-	-	1,40E+00	1,08E+00	1,08E+00	-9,42E+01
Use of secondary material	kg	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00

Results for m² of LDC steel sectional door (part 2)	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Use of resources				MNA	MNA			MNA	MNA	MNA	MNA	MNA				
Use of renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of non-renewable secondary fuels	MJ	0,00E+00	0,00E+00	-	-	0.00E+00	0.00E+00	-	-	-	-	-	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,13E-01	2,01E-04	-	-	6.39E-05	7.98E-05	-	-	-	-	-	1,99E-04	4,67E-04	1,46E-02	-1,52E-01
Waste categories	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Hazardous waste for landfill	kg	2,52E-06	1,07E-07	-	-	2,85E-09	7,32E-08	-	-	-	-	-	1,06E-07	6,86E-10	6,49E-09	-1,59E-05
Disposed non-hazardous waste	kg	2,04E+00	1,19E-04	-	-	9,55E-05	6,78E-02	-	-	-	-	-	1,18E-04	6,52E-04	1,19E+00	-2,74E+00
Disposed radioactive waste	kg	8,91E-03	2,02E-06	-	-	2,47E-05	2,98E-03	-	-	-	-	-	2,00E-06	1,63E-04	5,71E-05	-1,55E-02
Output material flows	**Unit**	**A1-A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Components for re-use	kg	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Materials for recycling	kg	1,37E-01	0	-	-	0	0	-	-	-	-	-	0	1,60E+01	0	0
Materials for energy recovery	kg	0	0	-	-	0	0	-	-	-	-	-	0	1,95E+00	0	0
Exported energy (electricity)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0
Exported energy (thermal energy)	MJ	0	0	-	-	0	0	-	-	-	-	-	0	0	0	0

6.4 Interpretation, LCA presentation and critical review

Evaluation

Interpretation LDI steel-sectional doors:
The production phase (modules A1-A3) contributes app. 30 % of the overall results for all the environmental impact assessment categories, which are bilanzed. The main impact in this phase related to the extraction of raw materials (A1) for the production of steel.

Module A4 shows the transport to the distribution/construction site. Since the distance is relatively short, the environmental impact of the factor “Transport” is of only secondary importance.

In module B3 the repair of the doors the impacts are calculated for a service life of 20 years. The abiotic depletion potential elements (ADPE) in this scenario has up to 20 %, as expected it is mainly related with the extraction of raw materials for the production of steel, for the spare parts.

In the end-of-life phase, there are loads and benefits (module D) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process.

Interpretation LDP-sectional doors:
The production phase (modules A1-A3) contributes app. 20 % of the overall results for all the environmental impact assessment categories. The main impact in this phase related to the extraction of raw materials (A1) for the production of aluminium.

Module A4 shows the transport to the distribution/construction site. Since the distance is relatively short, the environmental impact of the factor “Transport” is of only secondary importance.

In module B3 the repair of the doors the impacts are calculated for a service life of 20 years. The abiotic depletion potential elements (ADPE) in this scenario has up to 20 %, as expected it is mainly related with the extraction of raw materials for the production of steel, for the spare parts.

In the end-of-life phase, there are loads and benefits (module D) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process.

Interpretation LDC steel-sectional doors:
The production phase (modules A1-A3) contributes app. 25 %-30 % of the overall results for all the environmental impact assessment categories. The main impact in this phase related to the extraction of raw materials (A1) for the production of steel and aluminium.

Module A4 shows the transport to the distribution/construction site. Since the distance is relatively short, the environmental impact of the factor "Transport" is of only secondary importance.

In module B3 the repair of the doors the impacts are calculated for a service life of 20 years. The abiotic depletion potential elements (ADPE) in this scenario has up to 20 %, as expected it is mainly related with the extraction of raw materials for the production of steel, for the spare parts.

In the end-of-life phase, there are loads and benefits (module D) considered. The benefits are considered beyond the system boundaries and are declared for the recycling potential of the metals and for the credits from the incineration process.

For all the doors the following statement is relevant:

In the modules A4 and C2 (all transport modules) , values for POCP are negative due to emission profile modelled for the selected transportation process and of the characterisation method used in /CML 2001/ for the calculation of the POCP. Transportation processes are
responsible for the emission of NOx in the ground layer atmosphere.
NO in particular can have an ozone depleting effect that is reflected in /CML 2001/ by
assigning a negative characterisation factor to this substance. However, although these negative values may appear unusual, it should be considered that POCP is only one of the analysed environmental impact categories. All other potential impacts would increase with greater transportation distances, showing that transportation is a process leading to net environmental burdens. Furthermore, even for POCP, transportation processes needed for supply of
materials and product distribution only have limited counterbalance effects on the overall LCA results.

The values calculated from the life cycle assessment can be used for building certification.

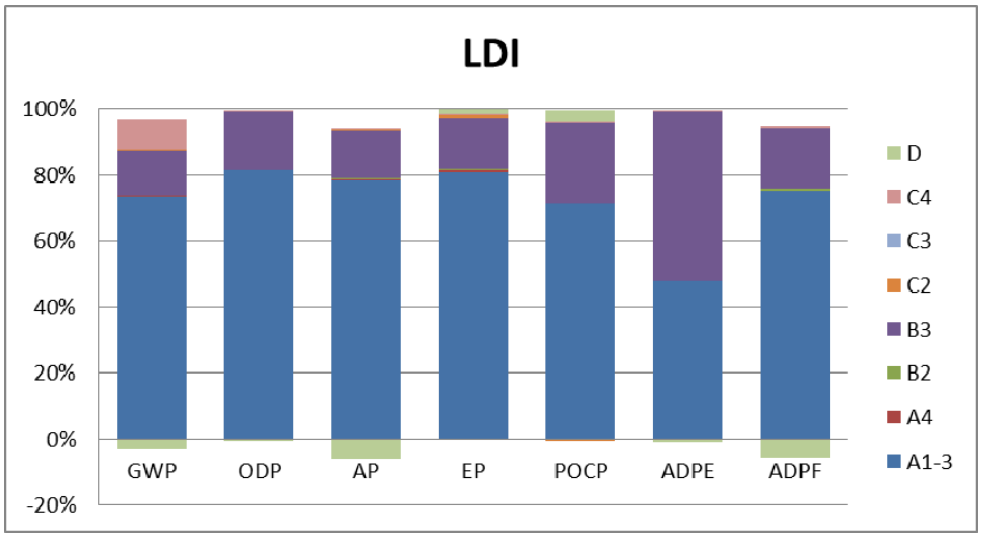

Figure 5: environmental impacts of LDI steel doors

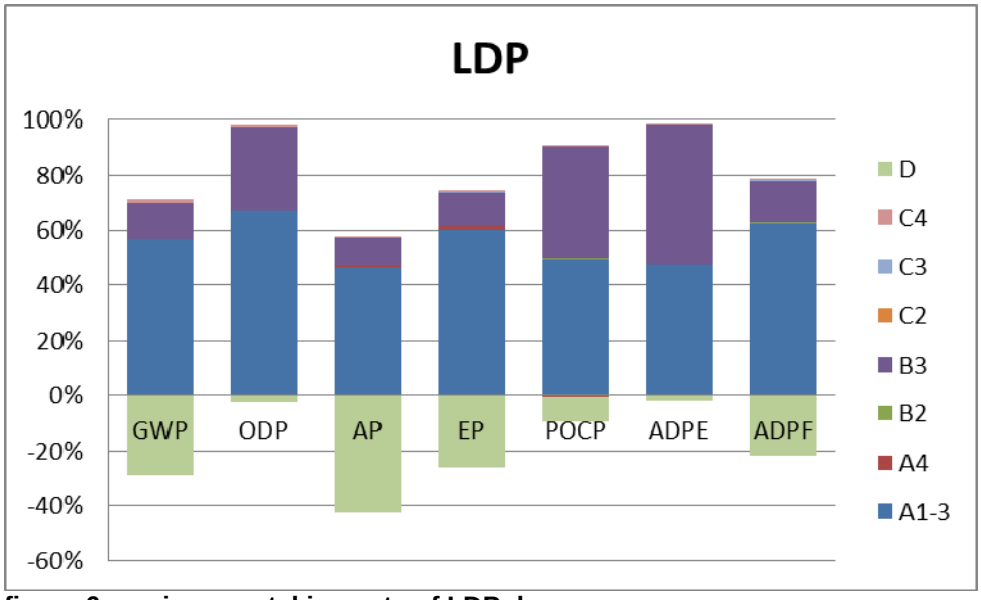

figure 6: environmental impacts of LDP doors

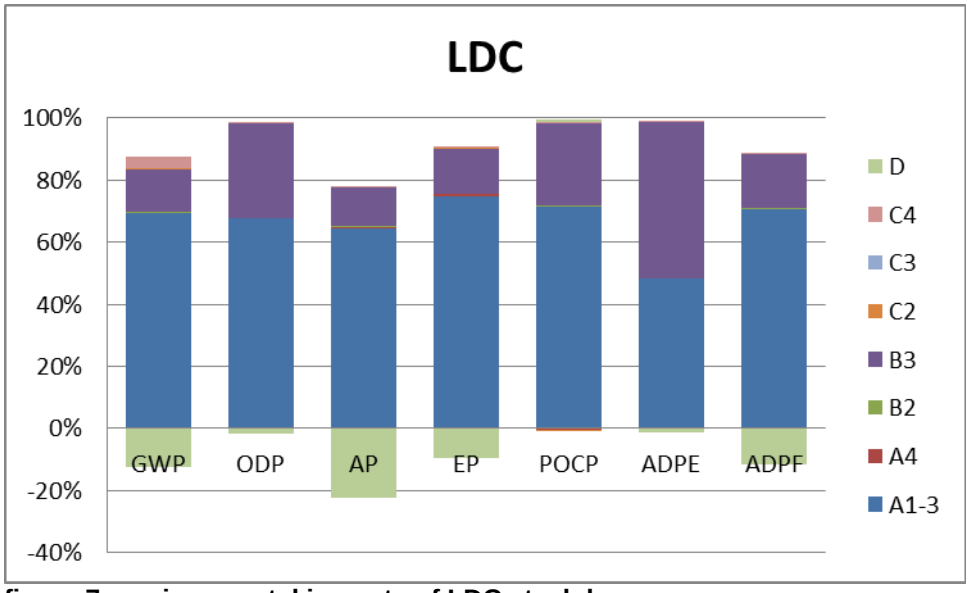

figure 7: environmental impacts of LDC steel doors

Report

The LCA underlying this EPD was developed according to the requirements set out in EN ISO 14040 and EN ISO 14044 as well as EN 15804 and EN ISO 14025. For reasons of confidentiality, it is not addressed to third parties. 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 life cycle assessment was carried out by the independent verifier Patrick Wortner.

7 General information regarding the EPD

Comparability

This EPD was prepared in accordance with EN 15804 and is therefore only comparable with those EPDs that also comply with the requirements set out in 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 EN 15804 (Clause 5.3) apply.

Communication

The communications format of this EPD meets the requirements of EN 15942:2011 and is therefore the basis for B2B communication. Only the nomenclature has been changed according to 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 EN ISO 14025.

This Declaration is based on the ift PCR Document "Türen und Tore: PCR-TT-1.1 : 2013".

The European standard EN 15804 serves as the core PCR [a)]
Independent verification of the declaration and statements 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	14.06.2017	External verification and approval	F.Stöhr	P.Wortner
2				
3				

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8 Annex

Description of life cycle scenarios for sectional door

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

Calculation of the scenarios was based on a building service life of 50 years (as RSL in accordance with Section 4 – Reference Service Life [RSL]).

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

MNA= module not assessed

A1-A3: Product stage

A1- Raw materials

- Extraction and processing of raw materials (e.g. mining processes) and biomass production.
- Generation of electricity, steam and heat from primary energy resources, also including their extraction, refining and transport.
- Extraction of primary aluminium and steel (no secondary material is used)

A2- Transport to the production site

- Transportation up to the factory gate and internal transport.

A3- Manufacturing process

- Manufacturing of products and co-products
- Manufacturing of packaging

The product stage comprises the acquisition of all raw materials, products and energy transport, transport to the production site, packaging and waste processing up to the “end of waste” state or final disposal. The LCA results are declared in aggregated form for the product stage, which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3. Components are manufactured in the EU. Manufacturing of sectional doors LDI steel, LDP, LDC steel on the production site located in Roedding, Denmark.

A4 Transport to site

Nr.	Scenario	Description
A4	Direct shipment to construction site/branch	40 t truck, 80 percent capacity used, approx. 100 km to domestic construction site Weight LDI steel: 20.3 kg/m² Weight LDP: 19.3 kg/m² Weight LDC steel: 21.1 kg/m²

A4 Transport to site				
Environmental impacts	**Unit**	**LDI steel**	**LDP**	**LDC steel**
Global warming potential (GWP 100)	kg CO2 equiv.	1,02E-01	9,74E-02	1,07E-01
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC 11 equiv.	4,71E-13	4,48E-13	4,90E-13
Acidification potential of soil and water (AP)	kg SO2 equiv.	6,24E-04	5,93E-04	6,49E-04
Eutrophication potential (EP)	kg PO43- equiv.	1,56E-04	1,49E-04	1,62E-04
Formation potential of tropospheric ozone (POCP)	kg C2H4 equiv.	-2,59E-04	-2,47E-04	-2,70E-04
Abiotic depletion potential - non-fossil resources (ADP - elements)	kg Sb equiv.	6,82E-09	6,49E-09	7,09E-09
Abiotic depletion potential - fossil resources (ADP – fossil fuels.)	MJ	1,41E+00	1,34E+00	1,47E+00

Use of resources	Unit	LDI steel	LDP	LDC steel
Use of renewable primary energy - excluding renewable primary energy resources used as raw materials	MJ	0	0	0
Use of renewable primary energy resources used as raw materials (material use)	MJ	0	0	0
Total use of renewable primary energy resources (primary energy and renewable primary energy resources used as raw materials) (energy + material use)	MJ	8,02E-02	7,63E-02	8,34E-02
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	0	0	0
Use of non-renewable primary energy resources used as raw materials (material use)	MJ	0	0	0
Total use of non-renewable primary energy resources (primary energy and non-renewable primary energy resources used as raw materials) (energy + material use)	MJ	1,42E+00	1,35E+00	1,47E+00
Use of secondary material	kg	0	0	0
Use of renewable secondary fuels	MJ	4,61E-06	4,38E-06	4,80E-06
Use of non-renewable secondary fuels	MJ	7,02E-05	6,67E-05	7,30E-05
Use of net fresh water	m^3	2,01E-04	1,91E-04	2,09E-04
Waste categories	**Unit**	**LDI steel**	**LDP**	**LDC steel**
Hazardous waste for landfill	kg	1,07E-07	1,02E-07	1,11E-07
Disposed non-hazardous waste	kg	1,19E-04	1,13E-04	1,24E-04
Disposed radioactive waste	kg	2,02E-06	1,93E-06	2,11E-06
Output material flows	**Unit**	**LDI steel**	**LDP**	**LDC steel**
Components for re-use	kg	0	0	0
Materials for recycling	kg	0	0	0
Materials for energy recovery	kg	0	0	0
Exported energy (electricity)	MJ	0	0	0
Exported energy (thermal energy)	MJ	0	0	0

B2 Maintenance (included)

No.	Scenario	Description
B2.2	**Normal use:** **For a service life of 20 years,** **Door cycles per year:** **7500 door cycles/year**	Annual functional check, visual inspection and, if necessary, repair. 0,005 kg/year (0,1 kg in a service life of 20 years) of lubrication grease

Ancillary materials, energy use and waste materials as well as transport distances during maintenance are negligible.

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

B3 Repair (included)

No.	Scenario	Description
B3	**Normal use For a service life of 20 years*, 7500 door cycles/year**	One-time replacement of 0.30 kg control circuit board, 0.19 kg EPDM gaskets, 2.16 kg hardware parts, 0,7kg EPS 0.20 kg polyamide 6.6.

For updated information of sectional door refer to the respective instructions for assembly/installation, operation and maintenance at www.lindab.dk.

* Assumptions for evaluation of possible environmental impacts; statements made do not constitute any guaranty or warranty of the company for a lifetime of 20 years.

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

C1 Deconstruction (included)

No.	Scenario	Description
C1	Deconstruction Removal of the door from the building	Sectional door: 99 % deconstruction The energy consumed (e.g. demolition excavator) for deconstruction is negligible. Any consumption arising is marginal. Cannot be quantified.

There are no relevant inputs or outputs in this scenario.

Expenditures during the construction of a building can´t be estimated, they only can be declared as part of the construction process

C2 Transport (included)

No.	Scenario	Description
C2	Transport	Transport to collecting point using 40 t truck, 80% capacity used, 50 km distance

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

C3 Waste management (included)		
No.	**Scenario**	**Description**
C3	Disposal	Removal of door leaf, recirculation of aluminium (90 %), recirculation of remaining metals (90 %) Residual fraction in waste incineration plant
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 method, collected separately	kg	**20.1**	**19.1**	**20.9**
Collection method, collected as a mixed construction waste	kg	**0**	**0**	**0**
Repatriation method, for reusing	kg	**0**	**0**	**0**
Repatriation method, for recycling	kg	**15,95**	**13.5**	**17.5**
Repatriation method, for energy recycling	kg	**3,25**	**4.9**	**3.1**
Removal	kg	**0.9**	**0.7**	**0.3**
Assumptions for the scenario development, e.g. for the transport	useful units	-	-	-

C4 Disposal (included)		
No.	**Scenario**	**Description**
C4	Disposal	The losses of the re-use/recycling chain (C1 and C3) are modelled as “landfilled”.
Loads, (e.g. emissions) from waste disposal in module C4 are considered part of the product system under study, according to the “polluter pays principle”. If however this process generates energy such as heat and power from waste incineration or landfill the potential benefits from utilisation of such energy in the next product system are assigned to module D and are calculated using current average substitution processes.		

D Benefits and loads beyond the system boundaries (included)		
No.	**Scenario**	**Description**
D	Recycling potential	Aluminium recyclate from C3.1 excluding the recyclate used in A3 replaces 85 % of aluminium compound [33] Steel scrap from C3.1 excluding the scrap used in A3 replaces 85% of steel [32] Benefits from waste incinerator: electricity replaces Denmark electricity mix (The electricity mix is based on “Strommix Dänemark” Danish electricity mix 2015..)

Imprint

LCA preperation by
ift Rosenheim GmbH
Theodor-Gietl-Straße 7-9
83026 Rosenheim

Programme operator
ift Rosenheim GmbH
Theodor-Gietl-Str. 7-9
83026 Rosenheim
Phone: 0 80 31/261-0
fax: 0 80 31/261 290
E-Mail: info@ift-rosenheim.de
www.ift-rosenheim.de

declaration holder
Lindab A/S
Finnmarken 1
Jels DK 6630 Roedding

notes
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Pictures Lindab A/S

ift Rosenheim GmbH
Theodor-Gietl-Str. 7-9
83026 Rosenheim
Telefon: +49 (0) 80 31/261-0
Telefax: +49 (0) 80 31/261-290
E-Mail: info@ift-rosenheim.de
www.ift-rosenheim.de