PUERTAS ASTURMEX

LATIN AMERICA EPD®

Environmental Product Declaration

In accordance with ISO 14025 and EN 15804 for:

[Fire and safety steel doors Asturmex] [ASTURMEX]

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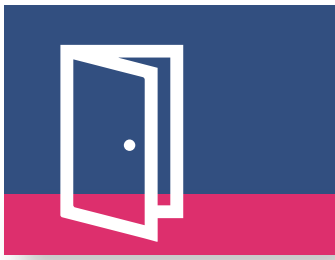
Center for Life Cycle Assessment and Sustainable Design

EPD Content

Environmental Product Declaration of ASTURMEX. 3
1. General information 3
2. Product description 4
2.1. Application 5
2.2. Technical Data 5
2.3. Packaging to delivery status 6
2.4. Product composition 6
2.5. Manufacture 7
2.6. Environment and health during manufacturing 7
2.7. Further information 7
3. LCA: calculation rules 8
3.1. Declared unit 8
3.2. System boundary 8
3.2.1. Estimates and assumptions 9
3.2.2. Cut-off criteria 10
3.2.3. Background data 10
3.2.4. Period under review 10
3.2.5. Data quality 11
3.2.6. Allocation 13
3.2.7. Comparability 14
4. LCA: Scenarios and additional technical information 14
5. LCA Results 14
5.1. Environmental impact: 1 piece – Multipurpose plus door 14
5.2. Environmental impact: 1 piece – Safety fire door 16
5.3. Interpretation of LCA Results 18
6. Evidence requirements 18
7. Contact information 18
8. References 19

This Environmental Product Declaration (EPD) is in accordance with ISO 14025 and EN 15804, it covers five safety doors manufactured by Puertas ASTURMEX in Mexico.



EPD of constructions products may not be comparable if they do not comply with EN 15804 Sustainability of constructions works – Environmental product declarations – Core rules for the product category of construction products.

1. General information

Publisher	International EPD® System,www.environdec.com
EPD registered through the fully aligned regional programme/hub:	EPD Latin America, www.epdlatinamerica.com
Declared product	**Safety Steel Doors: MULTIPURPOSE PLUS door. Safety Fire Door:** this average includes four fire doors: 1) UL Certification fire door 90 and 180 MIN 2) European fire door - EI260 C5, EI290 C5 3) Acoustic fire door - EI260 C5, EI290 C5 4) Ventilated fire door - EI260 C5
Construction product identification	Central Product Classification: CPC 4212 Doors, windows and their frames and thresholds for doors, of iron, steel or aluminium.
Declaration owner	**Puertas ASTURMEX S.A. de C.V.** Norte 45 No 686 Industrial Vallejo. Azcapotzalco, Ciudad México. C.P. 02300. Mexico.
Issued date:	2018-03-21
Period of validity	5 years
Variability for average declaration	Variability between multipurpose plus door and safety fire door is more than 10 % in the results. Variability among four fire doors is less than 10% in the results.
Product composition	Steel, rock wool filling, paint.
Stages omitted	Distribution, use, end of life.
Product Category Rules (PCR)	NPCR 014 rev1 Windows and doors March 2013 The Norwegian EPD Foundation Available on: http://epd-norge.no/pcr-register/npcr-014-windows-and-doors-rev-1-article713-353.html
External verification	In accordance with EN 15804 by Bárbara María Civit.
Verification date:	2018-03-20
Practitioner LCA	Center for Life Cycle Assessment and Sustainable Design (**CADIS**)

Verification

The CEN Standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025 Internally ☐ Externally ☑
Verifier: Dr. Bárbara María Civit Independent verifier appointed by International EPD® System

2. Product description

ASTURMEX safety doors are a complete doors solution, designed to offer many performances: **fire resistance, sound and thermal insulation.**

The main features of the safety doors manufactured by Puertas ASTURMEX is to provide entrances and exits of the living spaces.

Fire doors are manufactured in Mexico and have European or UL Certification depending on the project requirements. These doors are filled with high-density mineral wool which allows a maximum guarantee of fire resistance from 60 to 180 minutes.

Multipurpose steel doors are manufactured in Mexico and with specialized machinery to offer the highest quality in each door that is delivered. These doors contain mineral wool or low-density rock wool filling, which offers acoustic and fire-resistant characteristics.

The doors are designed to be easily installed on an existing rough opening and they are fully armed: frame, hinges, plates, lock and handles.

The scope of this EPD is "cradle to gate", in accordance with Product Category Rules (PCR) NPCR 014 Windows and doors, March 2013, rev1, in section 6.2.3. Declared unit (cradle to gate).

PUERTAS ASTURMEX

2.1. Application

ASTURMEX safety doors are designed for a wide variety of buildings of different uses such as corporate, residential, hospitals, cinemas, schools, industrial buildings, laboratories, leisure and entertainment centres, shopping centres, electrical substations, production plants, warehouses, oil platforms, among others.

2.2. Technical Data

Properties of safety steel doors:

MULTIPURPOSE PLUS Door

- Ideal for all types of spaces (offices, hospitals, schools, businesses, industry, etc.) with high quality of materials.
- Wide range of standard sizes in two different heights to provide the best quality and low price.
- Special sizes to adapt it to any need.
- Robustness and resistance.
- Superior torsional rigidity of the blade compared to traditional assembly.
- Sheet and paint with high resistance to corrosion.
- Greater thermal and acoustic insulation.
- Easy installation.
- Excellent standard equipment.
- Wide variety of extra accessories available

SAFETY FIRE Door

The different fire doors manufactured by Puertas ASTURMEX that are included in this EPD are the following:

1) UL Certification fire door - 90 and 180 MIN
2) European fire door – EI260 C5, EI290 C5
3) Acoustic fire door - EI260 C5, EI290 C5
4) Ventilated fire door - EI260 C5

They have different advantages such as:

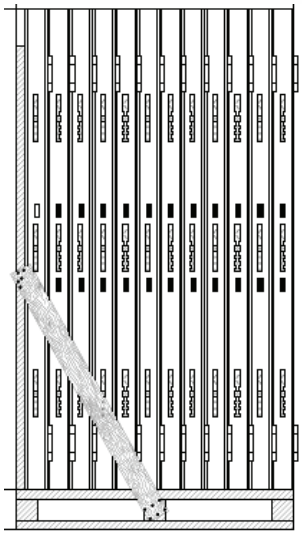
- Wide range of standard sizes in two different heights to provide the best quality and low price.
- Special sizes to adapt it to any need.
- Superior torsional rigidity of the blade compared to traditional assembly.
- Sheet and paint with high resistance to corrosion and durability.
- Easy installation.
- Excellent standard equipment.
- Wide variety of extra accessories available.

The Table below shows the certification features of safety fire door.

DOOR	CERTIFICATION FEATURES
UL Certification fire door 90 and 180 MIN	Fire resistance test according to the regulations: ANSI / UL 10B - 2009 "Fire tests of door assemblies".
European fire door - EI260 C5, EI290 C5	Fire resistance of 60 and 90 minutes according to EN 1634-1: 2000 regulations. C5 Durability Certificate according to the EN 14600: 2005 standard.
Acoustic fire door - EI260 C5, EI290 C5	Acoustic insulation index: According to CTE-DB-HR. Acoustic airborne noise isolation index (R_A): R_A = 29.0 ± 1.0 dBA. Weighted sound reduction index (R_W): R_W (C; Ctr) = 30 (-2; -3) dB. Uncertainty associated to R_W = ± 2 Db. According to UNE-EN ISO 717-1: 1997.
Ventilated fire door - EI260 C5	EI260 E60 according to EN 13501-2:2004.

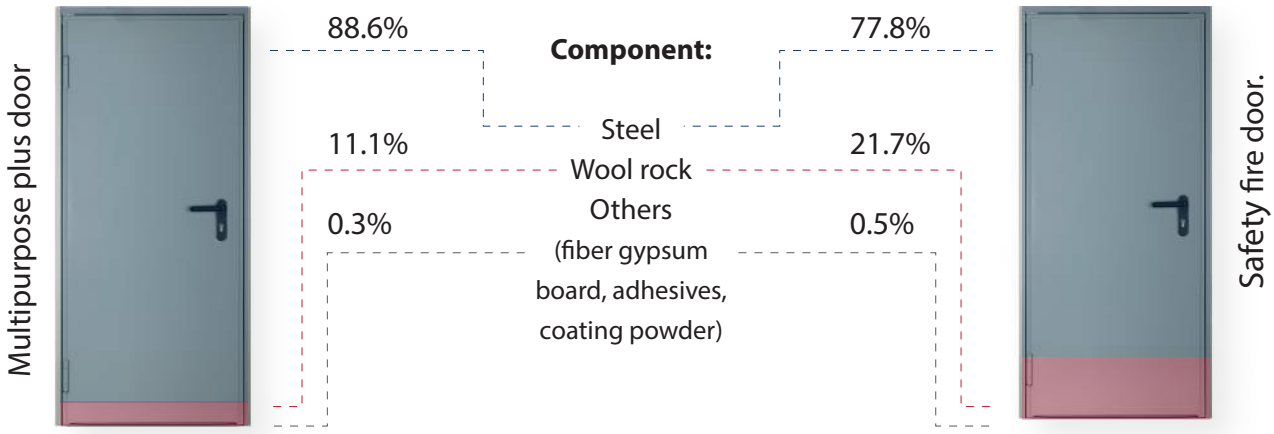
2.3. Packaging to delivery status

When safety steel doors are finished, 12 doors are placed vertically on a wood pallet, separated by polystyrene pieces.



2.4. Product composition

The average composition of safety steel doors is as follows.



The manufacturing process takes place in the factory of Puertas ASTURMEX in Mexico. The address is: Norte 45 No 686. Industrial Vallejo Azcapotzalco. Ciudad de México. C.P. 02300.
The door production process requires the following steps:
- Material revision
- Cutting
- Folding
- Furnished
- Electrostatic powder painting

Production process is certified according to ISO 9001:2008.

2.6. Environment and health during manufacturing

Puertas ASTURMEX is committed to protect human health and the environment; meeting or exceeding legislation, regulations, codes, and guidelines. Painting and welding areas of the manufacturing plant have an extraction-ventilation system to remove dust, VOC and airborne materials. Sound abatement is implemented where possible and Personal Protective Equipment is provided at the manufacture site. Wastewater is pre-treated before to be discharged to the city wastewater treatment system.

Production process is certified according to ISO 9001 & ISO 14001 in their last version.
Environmental operations, GHG, energy, water, waste, VOC, surface treatment and H&S are being routinely monitored. Inspections, audits, and reviews are conducted periodically to ensure that applicable standards are met, and the effectiveness of the environmental management program is evaluated.

ASTURMEX code of conduct covers human rights, labour practices and decent work. ASTURMEX directors are aware of their roles and responsibilities, providing appropriate training, supporting accountability and recognizing outstanding performance.

2.7. Further information

For additional information on ASTURMEX products, please visit the website:
www.puertasasturmex.com

3.1. Declared unit

The declared unit (cradle to gate) is specified in NPCR 014 Windows and doors, March 2013, rev1., is: 1 **produced door measuring 1.23 m x 2.18 m** (reference door based on EN 14351-1) with an essential parameter (multipurpose, UL certification, European certification, fire classification and noise reduction).

Multipurpose plus door weight is 71.2 kg and safety fire door average weight is 81.2 kg. The weight difference among safety fire doors is less than 1 %. Due to weight difference, two conversion factors to kilogram have been considered. These values are showed in Table below.

Declared unit name	Value	Unit
Declared unit	1	Piece of safety steel door
Conversion factor to 1 kg multipurpose plus door	0.04	kg/piece
Conversion factor to 1 kg fire door	0.03	kg/piece
Area	2.64	sqm/pc
Ratio to reference door	0.99	Measuring 1.23 m x 2.18 m = 2.68 sqm/pc (reference door based on EN14351-1)

3.2. System boundary

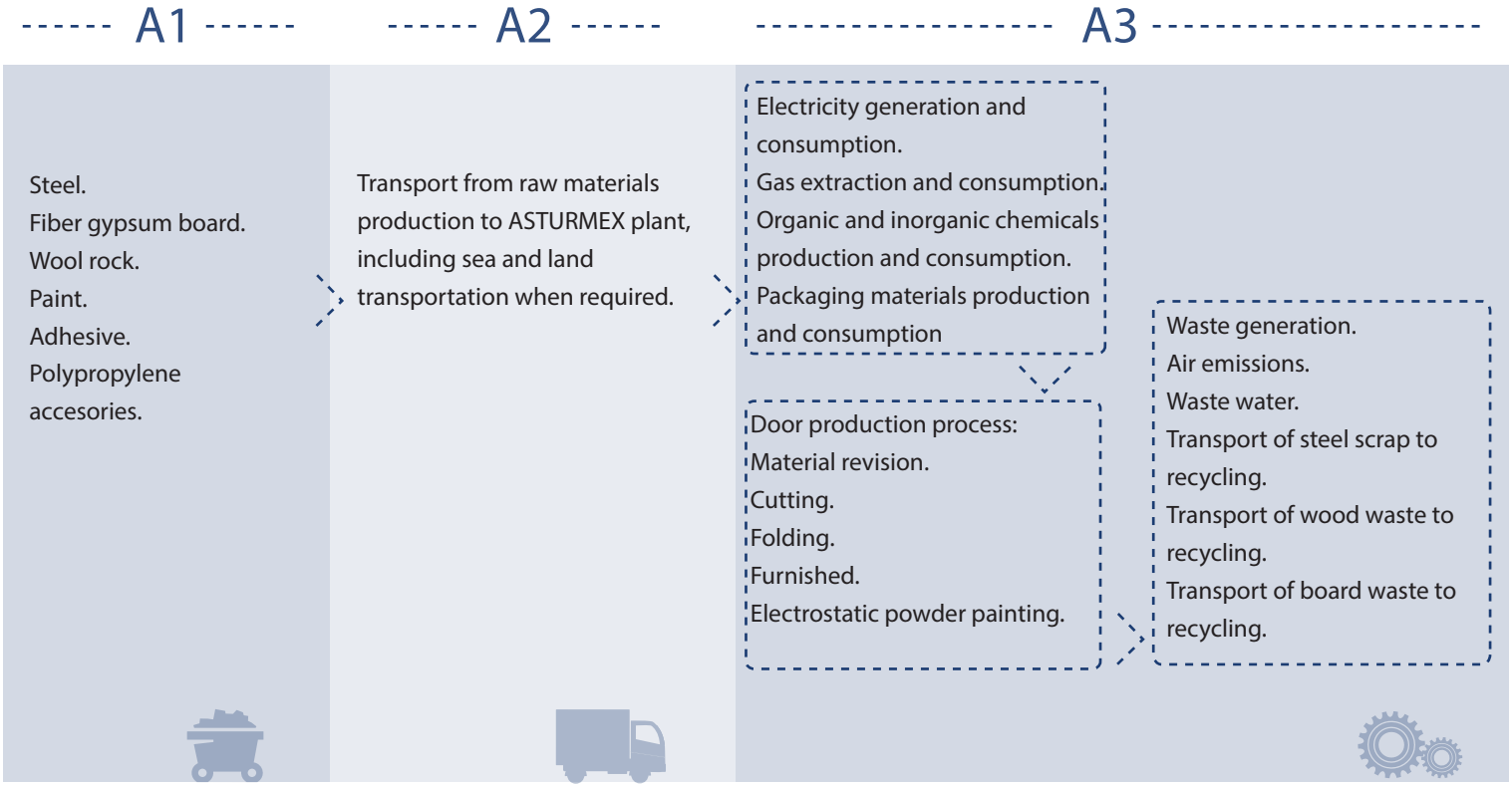
This EPD is a "cradle-to gate EPD". The following life cycle stages were considered:

A1 – Raw material supply.
A2 – Transport.
A3 – Manufacturing.

Description of the system boundary (X = included in LCA; MND = Module Not Declared)

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARYS
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse- Recovery- Recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

A flow diagram of the product system is showed below.



3.2.1. Estimates and assumptions

Due to weight difference between fire doors is less than 1%, an average weight value of 81.2 kg was considered for declared unit.

3.2.2. Cut-off criteria

No cut-off criteria were applied to the elemental components of the doors, thus, 100% of the collected data was included.

Raw materials data and their origin were obtained from the technical and cost sheets of each door.

Data were obtained from the company through the characterization reports (air and water emissions), and invoices generated from the total production process of the doors (water consumption, electricity gas and chemical products).

To obtain the data for each door, these values were assigned considering the production rates in physical units (number of doors each type). The amount produced of each door was considered, so no cutting principles were applied.

In the corresponding LCA, no processes, materials, or emissions that make a significant contribution to the environmental impact of the doors, have been omitted. Taking this into account, there is no evidence to suggest that inputs or outputs contributing more than 1% to the overall mass or energy of the system, or that are environmentally significant, have been omitted either.

However, the following elements were not considered:

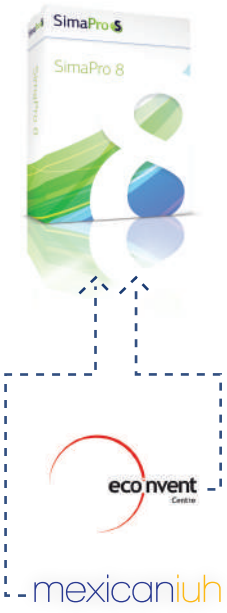
- Infrastructure in manufacturing, such as: machinery equipment and building.
- Materials for maintenance in manufacturing such as oils, tissue.
- Personal protection equipment.

3.2.3. Background data

SimaPro 8.4 software was used to model cradle to gate stages of the products. Datasets that already exist in Mexicaniuh and Ecoinvent 3.3 databases were considered to create the models.

Mexicaniuh is the regional database of life cycle inventories for Mexico and Latin America, developed by CADIS, which contains inventories of different sectors, such as, energy, construction, petrochemical, steel, of waste treatments, leather and footwear, among other.

In the case of steel (main component of the door) the production process in Mexico was used considering 25% of recycled material, according to the supplier's information.



Ecoinvent is an international life cycle inventories database, created in 2003, with high transparency standards. Ecoinvent contains more than 12 800 of datasets from many areas, such as, energy supply, agriculture, transport, biofuel and biomaterials, chemical products, construction materials, wood and waste treatments.

Many components of the doors come from Europe thus Ecoinvent 3.3 database was used.

3.2.4. Period under review

The period under review is 2016 (12-month average).

3.2.5. Data quality

The following Tables describe data included in each module (A1, A2, and A3) as well as their quality and source.

Data information included in module A1 – Raw materials supply					
Data	**Time related coverage**	**Geographic coverage**	**Technological coverage**	**Data source**	**Measured or estimated**
Steel consumption	2016	Mexico	Modern	Company technical sheets	M
Steel production	2016	Mexico	Modern	Ecoinvent 3.3. adapted to Mexico	M
Steel accessories consumption	2016	Mexico	Modern	Company technical sheets	M
Steel accessories production	2016	Mexico	Modern	Ecoinvent 3.3	M
Fiber gypsum board consumption	2016	Mexico	Modern	Ecoinvent 3.3	M
Fiber gypsum board production	2016	Mexico	Modern	Ecoinvent 3.3	M
Wool rock consumption	2016	Mexico	Modern	Mexicaniuh	M
Wool rock production	2015	Mexico	Modern	Mexicaniuh	M
Paint consumption	2016	Mexico	Modern	Company technical sheets	M
Paint production	2001-2016	United States	Modern	Ecoinvent 3.3	M
Adhesive consumption	2016	Mexico	Modern	Company technical sheets	M
Adhesive production	2001-2016	Global	World average based on Europe	Ecoinvent 3.3	M
Polypropylene accessories consumption	2016	Mexico	Modern	Company technical sheets	M
Polypropylene accessories production	2001-2016	Europe	Modern	Industry data 2.0	M

M = Measured; E = Estimated

Data information included in module A2 – Transport

Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Transport from raw materials production to ASTURMEX plant, including sea and land transportation	2016	Mexico	Modern	Company technical sheets and Ecoinvent 3.3.	M

M = Measured; E = Estimated

Data information included in module A3 – Manufacturing

Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Electricity consumption	2016	Mexico	Modern	Electricity consumption bill and machinery power verification	M
Electricity generation	2016	Mexico	Modern	Mexicaniuh	M
Gas consumption	2016	Mexico	Modern	Gas consumption bill and furnace verification	M
Gas extraction	2016	Mexico	Modern	Mexicaniuh	M
Organic and inorganic chemicals products consumption	2016	Mexico	Modern	Company technical sheets	M
Organic and inorganic chemicals products production	2001 - 2016	Global	World average based on Europe	Ecoinvent 3.3	E
Waste generation	2016	Mexico	Modern	Company's technical sheets and reports	M
Transport of steel scrap to recycling	2001 - 2016	Global	World average based on Europe	Ecoinvent 3.3	M
Transport of wood waste to recycling	2001 - 2016	Global	World average based on Europe	Ecoinvent 3.3	M
Transport of board waste to recycling	2001 - 2016	Global	World average based on Europe	Ecoinvent 3.3	M
Air emissions	2016	Mexico	Modern	Company's emissions report	M
Waste water	2016	Mexico	Modern	Company's emissions report	M
Packaging materials consumption	2016	Mexico	Modern	Company's technical sheets and reports	M
Packaging materials production	2001 - 2016	Global	World average based on Europe	Ecoinvent 3.3 adapted to Mexico	M

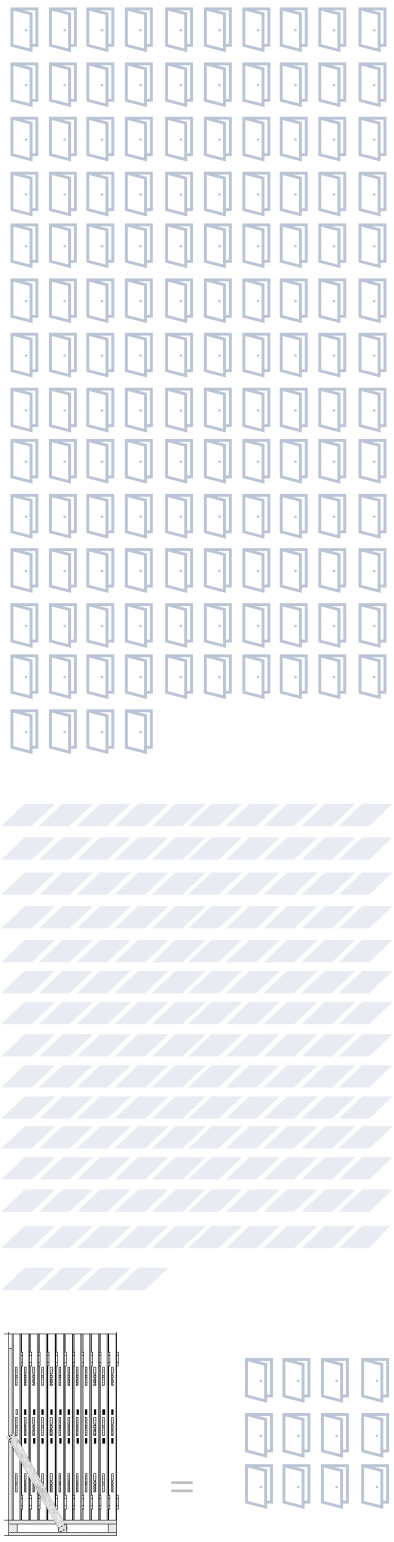
M = Measured; E = Estimated

During 2016, 536 is the difference between doors manufactured and steel sheets used, this difference corresponds to the manufacture of double doors.

The reference flow according to the declared unit is a one-sheet door. Factory's consumptions are calculated according to steel sheets production. The number of steel sheets manufactured in a year is considered for the allocation of electricity, gas, water and chemical products. The annual consumptions were divided by the number of steel sheets. This is how the consumption per sheet is obtained.

Cardboard, wood and steel waste, were reported by the company and were allocated by type of door. These wastes are recycled, thus the distance from the company to recycling site was calculated.

In the case of packaging, the number of neoprene plugs and films to pack each door was obtained from the company's data sheet. In the case of pallets, the use of 1 pallet for every 12 doors was taken as a reference, each door uses two polystyrene pieces for its protection.



3.2.7. Comparability

EPD of doors may not be comparable if they do not comply with EN 15804

4. LCA: Scenarios and additional technical information

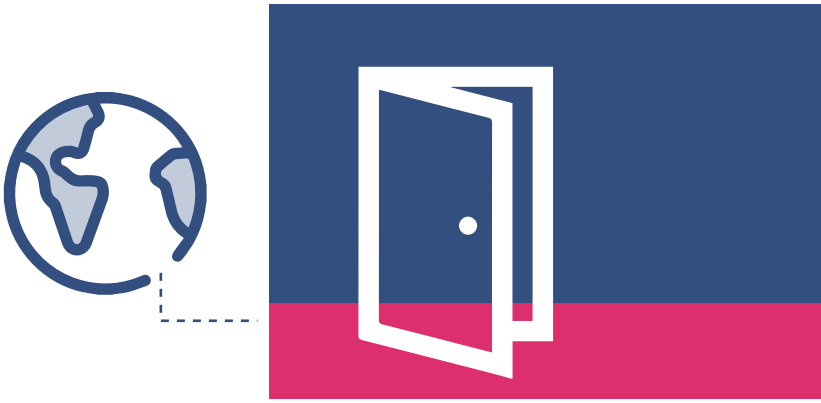
Not apply in this study. The EPD's scope is from cradle to gate. The modules declared are A1 to A3, which are showed in Section 3.2.

5. LCA Results

5.1. Environmental impact: 1 piece – Multipurpose plus door

Parameters describing environmental impacts were calculated using CML-IA version 3.01, methodology developed by the Center of Environmental Science (CML) of Leiden University in The Netherlands (Guinee et al, 2001; Huijbregts, 1995; Wegener, 2008).

The Table below shows the LCA results for the declared unit, 1 piece of Multipurpose plus door.



PARAMETERS DESCRIBING ENVIRONMENTAL IMPACTS - 1 PIECE OF MULTIPURPOSE PLUS

Impact Category	Unit	A1	A2	A3	(A4 – D)	Total
Global Warming	kg CO_2 equiv	183	5.29	31.7	MND	220
Ozone Depletion	kg CFC-11 equiv	1.7E-05	9.3E-07	1.4E-06	MND	1.9E-05
Acidification for soil and water	kg SO_2 equiv	1.08	0.05	0.11	MND	1.24
Eutrophication	kg $(PO_4)^{3-}$ equiv	0.51	0.01	0.01	MND	0.52
Photochemical ozone creation	kg Ethene equiv	0.17	1.9E-03	0.01	MND	0.19
Depletion of abiotic resources-elements	kg Sb equiv	0.03	1E-05	1E-05	MND	0.03
Depletion of abiotic resources-fossil fuels	MJ, net calorific value	2 101	81.4	171	MND	2 353

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.08 (Frischknecht R. et al., 2003) except for the use of water that was evaluated with Recipe version 1.10 (Huijbregts M.A.J. et al., 2016). The Table below shows the results for the declared unit, 1 piece of Multipurpose plus door.

PARAMETERS DESCRIBING RESOURCE USE – 1 PIECE OF MULTIPURPOSE PLUS DOOR

Parameter	Unit	A1	A2	A3	(A4 – D)	Total
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	198	1.31	83.2	MND	282
Use of renewable primary energy resources used as raw materials	[MJ]	0	0	0	MND	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	198	1.31	83.2	MND	282
Use of non renewable primary energy excluding non renewable primary resources used as raw materials	[MJ]	2 202	83.5	184	MND	2 469
Use of non renewable primary energy resources used as raw materials	[MJ]	0	0	0	MND	0
Total use of non renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	2 202	83.5	184	MND	2 469
Use of secondary material	[MJ]	0	0	0	MND	0
Use of renewable secondary fuels	[MJ]	0	0	0	MND	0
Use of non renewable secondary fuels	[MJ]	0	0	0	MND	0
Use of net fresh water	[m^3]	1.85	0.02	0.04	MND	1.90

The Table below shows the parameters describing hazardous, non hazardous and radioactive waste were calculated using EDIP 2003 version 1.04 (Hauschild and Potting, 2003) and output flows derived from LCI. The results are declared per unit, 1 piece of Multipurpose plus door.

PARAMETERS DESCRIBING WASTE CATEGORIES AND OUTPUT FLOWS – 1 PIECE OF MULTIPURPOSE PLUS DOOR						
Parameter	**Unit**	**A1**	**A2**	**A3**	**(A4 – D)**	**Total**
Hazardous waste disposed	[kg]	0.02	4.6E-05	1.5E-04	MND	0.02
Non hazardous waste disposed	[kg]	46.9	2.44	0.34	MND	49.7
Radioactive waste disposed	[kg]	3.7E-03	5.3E-04	2.8E-04	MND	4.5E-04
Components for re-use	[kg]	0	0	1 975	MND	1 975
Materials for recycling	[kg]	0	0	4.15	MND	4.15
Materials for energy recovery	[kg]	0	0	0	MND	0
Exported energy	[MJ]	0	0	0	MND	0

5.2. Environmental impact: 1 piece – Safety fire door

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.08 (Frischknecht R. et al., 2003) except for the use of water that was evaluated with Recipe version 1.10. The Table below shows the results for the declared unit, 1 piece of Safety fire door.

PARAMETERS DESCRIBING ENVIRONMENTAL IMPACTS - 1 PIECE OF SAFETY FIRE DOOR						
Impact Category	**Unit**	**A1**	**A2**	**A3**	**(A4 – D)**	**Total**
Global Warming	kg CO_2 equiv	197	9.25	31.7	MND	238
Ozone Depletion	kg CFC-11 equiv	1.6E-05	1.6E-06	1.4E-06	MND	2E-05
Acidification for soil and water	kg SO_2 equiv	1.11	0.10	0.11	MND	1.32
Eutrophication	kg $(PO_4)^{3-}$ equiv	0.51	0.01	0.01	MND	0.53
Photochemical ozone creation	kg Ethene equiv	0.17	3.5E-03	0.01	MND	0.19
Depletion of abiotic resources-elements	kg Sb equiv	0.02	1.7E-05	1E-05	MND	0.02
Depletion of abiotic resources-fossil fuels	MJ, net calorific value	2 330	142	171	MND	2 643

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.08 (Frischknecht R. et al., 2003) except for the use of water that was evaluated with Recipe version 1.10. The Table below shows the results for the declared unit, 1 piece of safety fire door.

PARAMETERS DESCRIBING RESOURCE USE – 1 PIECE OF SECURITY FIRE DOOR						
Parameter	**Unit**	**A1**	**A2**	**A3**	**(A4 – D)**	**Total**
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	[MJ]	209	2.38	83.2	MND	295
Use of renewable primary energy resources used as raw materials	[MJ]	0	0	0	MND	0
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	209	2.38	83.2	MND	295
Use of non renewable primary energy excluding non renewable primary resources used as raw materials	[MJ]	2 432	146	184	MND	2 761
Use of non renewable primary energy resources used as raw materials	[MJ]	0	0	0	MND	0
Total use of non renewable primary energy resources (primary energy and primary energy resources used as raw materials)	[MJ]	2 432	146	184	MND	2 761
Use of secondary material	[MJ]	0	0	0	MND	0
Use of renewable secondary fuels	[MJ]	0	0	0	MND	0
Use of non renewable secondary fuels	[MJ]	0	0	0	MND	0
Use of net fresh water	[m^3]	1.88	0.03	0.04	MND	1.95

The Table below shows the parameters describing hazardous, non hazardous and radioactive waste were calculated using EDIP 2003 version 1.04 (Hauschild and Potting, 2003) and output flows derived from LCI. The results are declared per unit, 1 piece of Safety fire door.

PARAMETERS DESCRIBING WASTE CATEGORIES AND OUTPUT FLOWS – 1 PIECE OF SAFETY FIRE DOOR						
Parameter	**Unit**	**A1**	**A2**	**A3**	**(A4 – D)**	**Total**
Hazardous waste disposed	[kg]	0.02	8E-05	1.5E-04	MND	0.02
Non hazardous waste disposed	[kg]	48	4	0.34	MND	52.3
Radioactive waste disposed	[kg]	3.7E-03	9.3E-04	2.7E-04	MND	4.9E-03
Components for re-use	[kg]	0	0	1 975	MND	1 975
Materials for recycling	[kg]	0	0	4.15	MND	4.15
Materials for energy recovery	[kg]	0	0	0	MND	0
Exported energy	[MJ]	0	0	0	MND	0

In the case of Safety fire door, the variability among four doors: Certification UL fire door – 90 and 180 MIN, European fire door - EI260 C5, EI290 C5, Acoustic fire door - EI260 C5, EI290 C5 and Ventilated fire door - EI260 C5 is less than 1 %.

5.3. Interpretation of LCA Results

LCA study (cradle to gate) shows that the environmental profiles of multipurpose plus and safety fire doors are similar in raw materials and transport stages. In both cases the impact of manufacture stage is the same.

The raw materials stage, A1, has the greatest impact in all categories with contributions above 52 %, due to steel consumption, for both doors.

The transport stage, A2, has no significant impact on the evaluation of environmental performance.

most significant impacts
due to electricity consumption

The manufacturing stage, A3, has no significant environmental impact.

The most significant impacts in the manufacture stage are related to electricity consumption.

There is a predominance of non-renewable energy consumption, according to LCA results (cradle to gate).

Water consumption in the manufacture stage represents 2 % of the total cradle to gate consumption.

6. Evidence requirements

Not applicable in this EPD.

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