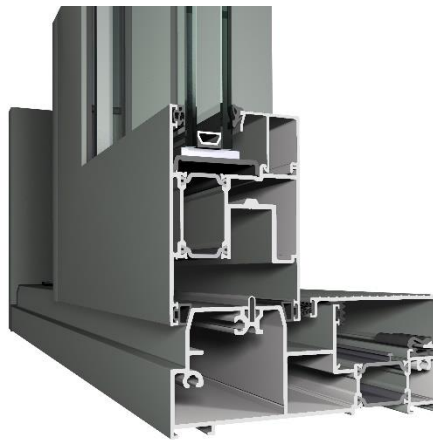


## ENVIRONMENTAL PRODUCT DECLARATION in accordance with ISO 14025 and EN 15804

Product

CP 155/ CP 155- LS Sliding Door



Declaration holder



Publisher and  
programme holder

European Aluminium



EUROPEAN ALUMINIUM

[www.european-aluminium.eu/resource-hub/building-products-epd-programme/](http://www.european-aluminium.eu/resource-hub/building-products-epd-programme/)

Declaration number

EPD EUROPEAN ALUMINIUM 2019 – REYNAERS 13

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Weblink

[www.reynaers.com](http://www.reynaers.com)

## 1. General information

Owner of the declaration	Reynaers Aluminium Oude Liersebaan 266 B- 2570 Duffel, Belgium						
Programme holder	European Aluminium AISBL (previously European Aluminium Association AISBL) Avenue de Tervueren, 168 B - 1150 Brussels Belgium   Dr Gerd Götz, Director General						
PCR used for the verification	EAA Product Category Rules (PCR) for Aluminium Building Products – version of 30 January 2013						
Verification	<table border="1"> <tr> <td colspan="2">EN15804 serves as core PCR completed by EAA PCR</td> </tr> <tr> <td colspan="2">Verification of the EPD by an independent third party in accordance with ISO 14025</td> </tr> <tr> <td><input type="checkbox"/> Internally</td> <td><input checked="" type="checkbox"/> Externally</td> </tr> </table>	EN15804 serves as core PCR completed by EAA PCR		Verification of the EPD by an independent third party in accordance with ISO 14025		<input type="checkbox"/> Internally	<input checked="" type="checkbox"/> Externally
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<input type="checkbox"/> Internally	<input checked="" type="checkbox"/> Externally						
Verifier	  <b>Carl-Otto Nevén</b> NEVÉN Miljökonsult/Environmental Cons.						
Declaration number	EPD EUROPEAN ALUMINIUM 2019 – REYNAERS 13						
Declared Unit	1 m <sup>2</sup> of CP 155/ CP 155-LS sliding door						
Product group covered and applicability	This EPD covers two-vent Cp 155/CP 155-LS sliding aluminium doors. These EPD results have been calculated from a modelling software originally developed by thinkstep and successively updated by Ecoinnovazione s.r.l. via an i-report in GaBi 8.7. Among the product family, two representative products have been selected and corresponding EPD results have been calculated based on specific bill of materials. These two products refer to double glazing sliding doors and triple glazing sliding doors. The results generated by this EPD-data software can be considered as a good proxy to model the doors designed by Reynaers and fabricated by their European distributors.						
Liability	The owner of the declaration is liable for the underlying manufacturing information and evidence; European Aluminium, i.e. the programme holder, is not be liable in this respect.						

## 2. Product

### 2.1. Product description and application

This Environmental Product Declaration (EPD) is for business to business communication. This EPD refers to the CP 155/CP155-LS sliding door. Concept Patio® 155 is a premium insulating slide and lift-slide system, designed to create maximal glass areas, combined with increased comfort. CP 155 is available with various opening

possibilities and allows the creation of glazed doors with extreme dimensions and weights up to 400 kg. It also offers an aesthetical minimalistic middle section. Additionally, CP 155 can comply with burglar resistance class 2, offering a safe and secure solution. The CP 155 can be upgraded to High Insulation (HI) in order to achieve even better insulation values, which makes the system suitable for low energy buildings. A specific variant of CP 155 monorail has achieved the Swiss Minergie® component label.

EPD results have been calculated for the 2 representative sliding doors made of two operable vents, described in Table 1.

Table 1. List of representative products

ID	Size (W x H)	Glazing	Surface area (m <sup>2</sup> )	Opening	Rails
1	3 m x 2.18 m	Double	6.54	XX	2 rails
2	3 m x 2.18 m	Triple	6.54	XX	2 rails

EPD results have been calculated for two representative products: one double glazed sliding door and one triple glazed sliding door. The two representative products are considered representative for the whole product family CP 155/CP 155-LS with mono- and two-rails since they have the highest impacts among all the products included in the product family.

## 2.2. Technical data

The most relevant technical data are reported in Table 2.

Table 2. Most relevant technical data

Category	Description & value	Standards
Thermal Insulation	Uf-value down to 1.07/m <sup>2</sup> K depending on the frame/vent combination.	EN ISO 10077-1; EN ISO 10077-2
Acoustic performance	Sound reduction Index (Rw) up to 42 depending on glazing.	EN ISO 140-3; EN ISO 717-1
Air tightness	Class 4	EN 12207
Water tightness	Class 9A	EN 12208
Wind load resistance	Class C4	EN 12211; EN 12210

For the most up-to-date values of the technical data, please refer to the product specifications available on the Reynaers website (see the specifications for CP 155/CP155-LS sliding door products in the section [www.reynaers.com/consumers/our-products](http://www.reynaers.com/consumers/our-products) ).

## 2.3. Relevant Standards for market Applications

Most relevant standards for applications of aluminium window or door products in buildings are EN 14351-1 (performances) & EN 12519 (terminology).

## 2.4. Delivery status and packaging

The sliding doors are supplied with appropriate protection and transport equipment, e.g. racks. Occasionally, the aluminium profiles can be protected with a thin adhesive plastic film. This packing is not considered in this EPD study.

## 2.5. Sliding door fabrication (foreground processes)

The sliding door fabrication consists mainly of the following operations:

1. Aluminium profile preparation mainly via sawing, milling and gluing. Those aluminium profiles are powder coated and thermally broken profiles.
2. Frame production by assembling the various profiles via corner connections and fixing via gluing and/or crimping. Connectors used by Reynaers are composed of aluminium die cast.
3. Positioning and fixing the various gaskets.
4. The fittings integration
5. The fixing of the glazing unit via the glazing bead.

The contribution of the fabrication process to the overall production impact of the window or door is below the cut-off rule of 5%. Hence, no specific LCA modelling has been done on that process step, except a scrap rate of 3% for the aluminium profile and the electricity consumption which has been considered.

## 2.6. Main background processes

The main production processes are reported in Figure 1.

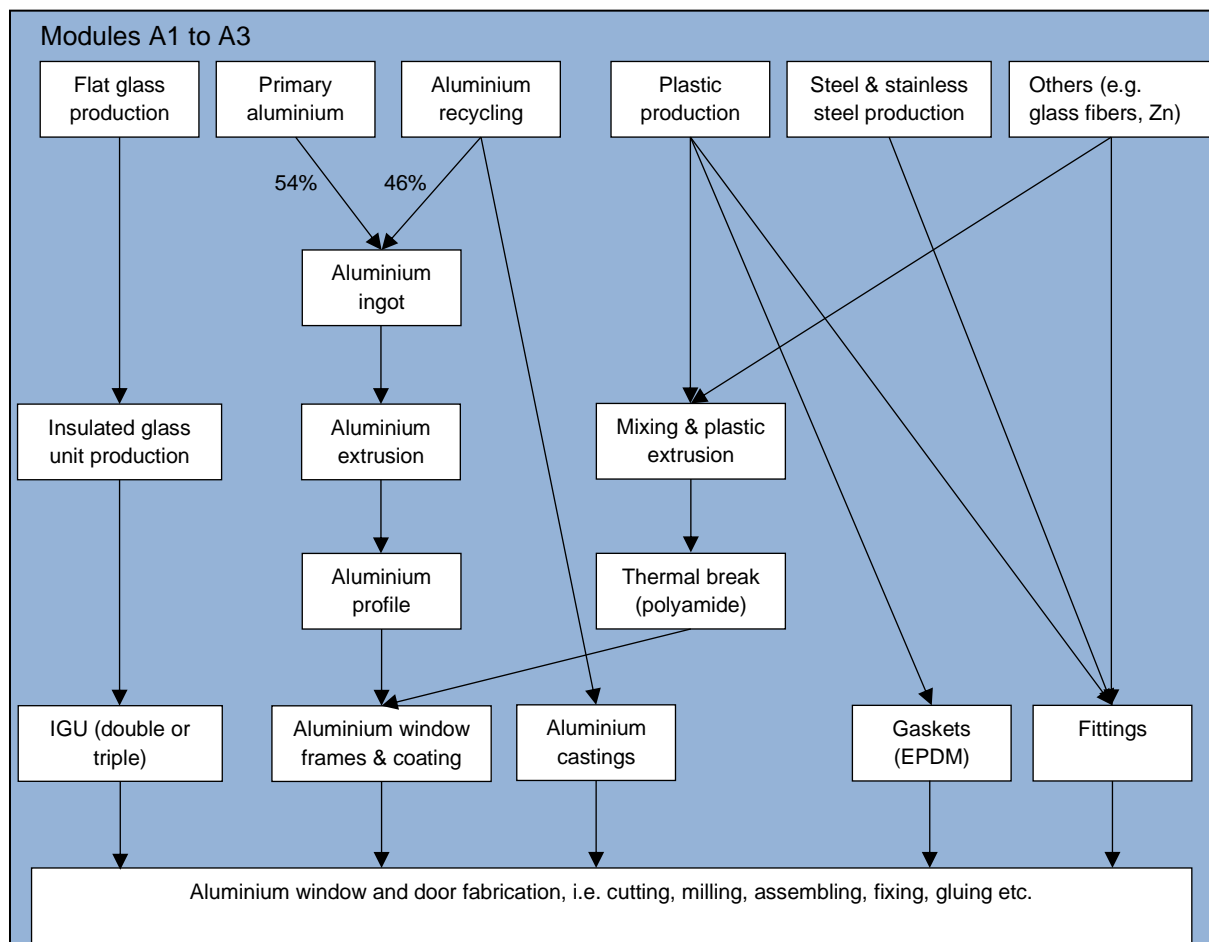


Figure 1. Main production processes and components of aluminium doors and windows

The aluminium profile production has been modelled using European Aluminium LCI datasets (year 2015) for the primary aluminium production, extrusion, recycling and remelting as described in the Environmental profile report developed by European Aluminium. The aluminium ingot (i.e. the billet) production has assumed that

aluminium originated for 54% from primary aluminium and 46% from recycling which corresponds to the average recycling input rate of aluminium produced in Europe.

For the other components and materials production, e.g. thermal break, gaskets, glass unit or fittings, datasets from the GaBi database have been used (version GaBi 8.7, SP39, 2019). The powder coating of aluminium profile has been modelled using GaBi datasets as well.

## 2.7. Health and safety aspects during production and installation

There are no critical health and safety aspects during the production of aluminium doors. The pre-treatments used for the pre-treatment of aluminium profile do not contain chromium nor other substances of very high concern (SVHC substances), and this process is followed by a coating process realised using a powder without VOC.

There are no relevant aspects of occupational health and safety during the further processing and installation of Reynaers sliding doors. Under normal installation, no measurable environmental impacts can be associated with the use of Reynaers aluminium sliding doors. The appropriate safety measures need to be taken at the building site, especially if installation takes place on a high-rise building.

## 2.8. Further processing, use and reference service life

CP 155/CP 155 LS sliding doors are customised building products which are ready to be installed on the building site. This EPD does not cover the downstream process to install the product at the building site.

During use, the indoor air quality, i.e. VOC emission, is not affected by aluminium sliding doors / VOC from aluminium windows/.

Since the use phase is not modelled, no specific information can be given about the Reference Service Life. In normal use, aluminium building products are not altered or corroded over time. A regular cleaning (e.g. once a year) of the product suffices to secure a long service life. However, the use of highly alkaline (pH >10) or highly acidic (pH < 4) cleaning solutions should be avoided.

In practice, a service life of 50 years can be assumed in normal use for such application /DURABILITY/.

In case of fire, aluminium is a non-combustible construction material (European Fire Class A1) in accordance to EN 13501 as well as Directive 96/603/EC, and does not therefore make any contribution to fire.

## 2.9. End of life stage

At the end-of-life stage, aluminium sliding doors should be specifically dismantled and collected in order to be treated since they include several materials which can be efficiently recycled or can be used for energy recovery.

In particular the aluminium profiles are systematically dismantled and sent for recycling. This high collection rate has been confirmed by a study done by Delft University showing that large aluminium pieces like aluminium profiles are systematically collected thanks to their intrinsic economic value /EAA DELFT/. Hence, a collection rate of 99% was used for the profiles.

Gaskets, thermal breaks and hardware are collected together with the aluminium profiles and are then treated through shredding and sorting with the aluminium profile. The glazing unit, however, is not systematically collected at the building renovation or demolition site. Indeed, the glazing unit is still often broken on site and is then sent to landfilling. In some European countries, the glazing unit is specifically collected and sent to recycling,

e.g. in the Netherlands. Hence, two extreme end of life scenarios have been used for flat glass: 100% recycling or 100% landfilling.

From collected aluminium scrap (99%), up to the recycled aluminium ingot (92%), it is assumed as a conservative estimate that 7% of the aluminium metal is lost.

The waste code for aluminium in accordance with the European Waste Catalogue (EWC) is 17 04 02. Figure 2 reports the main processes and parameters used for the end of life stage modelling.

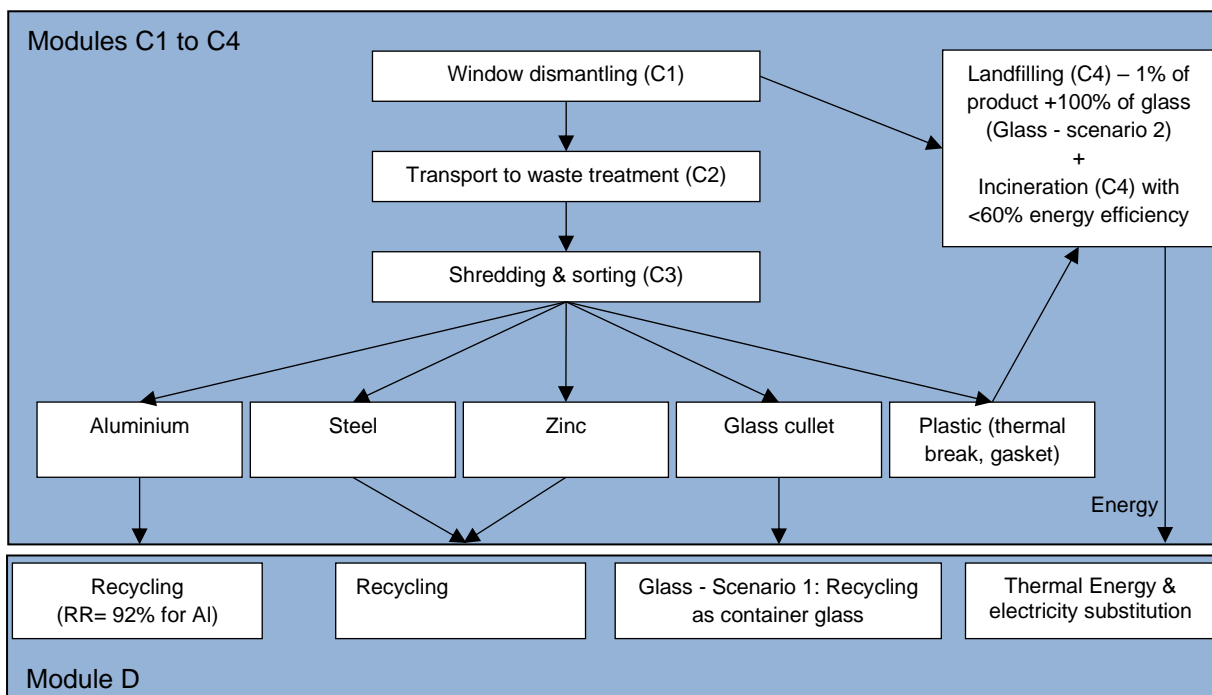


Figure 2. Main processes and parameters for the end of life stage modelling

### 3. LCA: Calculation rules

#### 3.1. Product size, Bill of Materials and declared unit

EPD calculations have been done for the two sliding doors described under point 2.1. The Bill of Materials of the two representative products are reported in Table 4. The declared unit corresponds to 1 m<sup>2</sup> of sliding door.

The EPD results are reported for the two representative products in the 2 annexes of this EPD.

Reference	1	2
Type	CP 155 XX – 2 rails - Double glazed	CP 155 XX – 2 rails - Triple-glazed
Glass	15.47	23.21
Aluminium	12.99	12.81
Thermal break	0.70	0.70
Gasket	0.26	0.26
Fitting	0.91	0.91
Others - in plastics	1.13	1.13
Others - other materials	0.09	0.09

Total	31.56	39.12
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Table 4. Bill of Materials (kg) of the declared unit for the 2 representative products

### 3.2. System boundaries

Type of EPD: Cradle to gate – with options

The production stage (modules A1-A3) includes processes that provide materials and energy input for the system, manufacturing and transport processes up to the factory gate, as well as waste processing.

For the end of life, a collection rate of 99% is assumed and directed to recycling (module D). The 1% lost product is modelled through landfilling (module C4). Considering the few losses along the recycling chain, it is assumed that 92% of the Al material is effectively recycled as new ingot. Hence, an end of life recycling rate of 92% is used within module D to reflect the benefits of recycling through the substitution principle.

### 3.3. Estimates and assumptions

It has been assumed that the aluminium profiles were composed of a mix of 54% primary aluminium and 46% recycled aluminium. Such mix represents the typical sourcing of aluminium in Europe, all markets included. Alloying elements were not considered and a pure aluminium profile has been assumed as a proxy. Alloy used by Reynaers is composed of at least 98% of Aluminium. Hence, such assumption appears adequate.

### 3.4. Cut-off criteria

No specific data were collected and used to model the fabrication stage, which has a limited impact on the full life cycle profile of windows, doors or curtain walls. The impact of fabrication operations is below the cut-off rules of 5%. Nevertheless, a scrap rate of 3% at the fabrication stage and the electricity consumption have been considered into the LCA model.

### 3.5. Background data

GaBi 8.7 2019 – the software system for comprehensive analysis developed initially by thinkstep (previously PE International) and recently updated by Ecoinnovazione s.r.l. – was used for modelling the life cycle for the production of the aluminium sliding doors. Generic GaBi 8.7 data sets have been used for energy, transport and consumables. For the aluminium primary production, recycling and sheet production, the datasets described in the environmental profile report 2018 of European Aluminium have been used.

### 3.6. Foreground data and EPD-data tool

The modelling efforts were focussed on the identification of representative products and the proper calculation and consideration of the BoM of the representative products within the LCA model.

No specific process data have been collected considering that their impact on the whole product life cycle is limited. In most cases, the sliding door fabrication is not performed by Reynaers but by their distributors disseminated in Europe which sell and install Reynaers systems on the European market. Hence, collecting data on this process step is also very challenging. In any case, energy and consumables used at the fabrication stage are below the cut-off rule of 5% and were not considered. A scrap rate of 3% at fabrication stage and the electricity consumption were anyway considered in the model.

### 3.7. Data quality

The data quality can be considered as good. The LCA models have been checked and most relevant flows are considered. Technological, geographical and temporal representativeness is appropriate. The use of collective data can be considered as a reasonable proxy for the Reynaers aluminium systems.

### 3.8. Allocation

Any aluminium scrap produced along the fabrication chain is sent back to recycling. This recycling loop has been modelled in the GaBi model so that the aluminium sliding door is the only product exiting the gate. Hence, the production process does not deliver any co-products.

At the end-of-life stage, the aluminium sliding door is sent to an EoL treatment which is modelled according to the scenario reported in section 2.9. The environmental burdens and benefits of recycling and energy recovery are calculated in module D accordingly.

### 3.9. Comparability

As a general rule, a comparison or evaluation of EPD data is only possible when all of the data to be compared has been drawn up in accordance with EN 15804 and the building context or product-specific characteristics are taken into consideration.

## 4. LCA scenarios and additional technical information

Modules A4, A5 and B1-B7 are not taken into consideration in this Declaration. In module A1, a recycled metal content of 46% is assumed. Hence, end of life credits are calculated in Module D based on a net aluminium recycling of 92% at end of life minus 46% at production stage, i.e. a quantity representing 46% of the aluminium content of the door. It is assumed that the inherent properties are conserved through recycling, i.e. quality factor is kept to one.

Table 5. Modules addressed in the EPD study (X: module declared, MND: module not declared)

Production			Installation		Use stage							End-of-Life				Next product system
Raw material supply (extraction, processing, recycled material)	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to EoL	Waste processing for reuse, recovery or recycling	Disposal	Reuse, recovery or recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	X	X	X	X	X

## 5. LCA results

The LCA results are reported in the 2 annexes.

List of abbreviations: GWP: Global warming potential; ODP: Ozone layer depletion potential; AP: Acidification potential of land and water; EP: Eutrophication potential; POCP: Photochemical oxidation potential; ADPE: Abiotic depletion potential (elements); ADPF: Abiotic depletion potential (fossil fuels); PERE: Use of renewable primary energy excluding renewable



primary energy resources used as raw materials; PERM: Use of renewable primary energy resources used as raw materials; PERT: Total use of renewable primary energy resources; PENRE: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM: Use of non-renewable primary energy resources used as raw materials; PENRT: Total use of non-renewable primary energy resources; SM: Use of secondary materials; RSF: Use of renewable secondary fuels; NRSF: Use of non-renewable secondary fuels; FW: Use of net fresh water; HWD: Hazardous waste disposed; NHWD: Non-hazardous waste disposed; RWD: Radioactive waste disposed; CRU: Components for re-use; MFR: Materials for recycling; MER: Materials for energy recovery; EEE: Exported electrical energy; EET: Exported thermal energy.

## 6. LCA interpretation

- Aluminium sliding door production – Module A.

The majority of the environmental impacts come from the aluminium profile and to a lesser extent from the glazing unit. Hence, most indicators are influenced by the mass of aluminium in the declared unit: The higher the aluminium mass, the higher the indicator. Within the aluminium production processes, the primary aluminium production is dominant, especially the alumina production and the electrolysis. The recycled ingot production, which presents a much lower impact than the primary ingot production, is used in Module A1-A3 for the fraction of aluminium coming from recycling (46%). The extrusion process which transforms ingot, i.e. billets, into profile is much less significant. The LCA modelling and the impact of the primary aluminium production is detailed in the environmental profile report 2018.

The impact of the other components, e.g. thermal break, gaskets and fittings, is less significant due to their low contribution to the BoM.

- End of life stage (Module C) and benefits and loads resulting from reusable products, recyclable materials and/or useful energy carriers entering & leaving the product system (module D)

Parameters reported in Table 3 were used to model the end of life stage.

Module C: In all cases, the contribution of module C is very limited compared to modules A1-A3 and module D. (see Annex 3 for graphical representation). However, in case of the glass landfilling scenario, the mass of non-hazardous waste disposed becomes significant, i.e. corresponding at least to the mass of the glazing unit.

Module D: The environmental benefits come not only from the recycling of aluminium and metal fittings but also from glass recycling in case of scenario 1. About 30% to 50% of GWP savings are obtained in Module D compared to the value calculated for module A1-A3 (see Annex 3 for graphical representation). The energy indicators follow the same trends. Additional benefits are also resulting from the energy recovery from EPDM and thermal break.

Since aluminium is one of the major materials used in the product and one of the major contributors to the total environmental impact of the product, the environmental impact of the aluminium used plays a fundamental role in determining the total environmental impact of the product. To show the relevance of this, Tables 6 – 9 report the results of a sensitivity analysis where the effect of having a different global warming potential for the aluminium used in the products on the global warming potential of the products object of this EPD is reported. For the calculation of the sensitivity analysis, 100% primary aluminium is considered and the values of 4 kg CO<sub>2</sub>/kg of primary aluminium and 5.1 kg CO<sub>2</sub>/kg primary aluminium have been used. The results are expressed per declared unit (1 m<sup>2</sup> of sliding door).

The results reported in Annexes 1-3 are calculated considering that the aluminium has a recycled content of 46% and the remaining primary aluminium has been modelled as “Primary Aluminium, European Consumption”, to which corresponds a global warming potential of 8.6 kg CO<sub>2</sub>/kg of primary aluminium.

Table 6 – Results of the sensitivity analysis on global warming potential calculated considering 4 kg CO<sub>2</sub>/ kg primary aluminium for the double glazed representative product.

	Glass landfill	Glass recycling
<b>Impact Indicator</b>	Global warming potential	
<b>Unit</b>	kg CO <sub>2</sub> -eq/m <sup>2</sup>	
<b>A1-A3</b>	108	108
<b>C1</b>	1.02·10 <sup>-1</sup>	1.02·10 <sup>-1</sup>
<b>C2</b>	1.63·10 <sup>-1</sup>	2.37·10 <sup>-1</sup>
<b>C3</b>	4.78·10 <sup>-1</sup>	1.06
<b>C4</b>	4.88	4.65
<b>D</b>	-51.38	-60.87

Table 7 – Results of the sensitivity analysis on global warming potential calculated considering 4 kg CO<sub>2</sub>/ kg primary aluminium for triple glazed representative product.

	Glass landfill	Glass recycling
<b>Impact Indicator</b>	Global warming potential	
<b>Unit</b>	kg CO <sub>2</sub> -eq/m <sup>2</sup>	
<b>A1-A3</b>	122.89	122.89
<b>C1</b>	1.07·10 <sup>-1</sup>	1.07·10 <sup>-1</sup>
<b>C2</b>	1.8·10 <sup>-1</sup>	2.91·10 <sup>-1</sup>
<b>C3</b>	4.72·10 <sup>-1</sup>	1.34
<b>C4</b>	5	4.65
<b>D</b>	-50.71	-65

Table 8 – Results of the sensitivity analysis on global warming potential calculated considering 5.1 kg CO<sub>2</sub>/ kg primary aluminium for the double glazed representative product.

	Glass landfill	Glass recycling
<b>Impact Indicator</b>	Global warming potential	

	Glass landfill	Glass recycling
<b>Unit</b>	kg CO <sub>2</sub> -eq/m <sup>2</sup>	
<b>A1-A3</b>	111.18	111.18
<b>C1</b>	1.02·10 <sup>-1</sup>	1.02·10 <sup>-1</sup>
<b>C2</b>	1.63·10 <sup>-1</sup>	2.37·10 <sup>-1</sup>
<b>C3</b>	4.78·10 <sup>-1</sup>	1.06
<b>C4</b>	4.88	4.65
<b>D</b>	-56.27	-65.76

Table 9 – Results of the sensitivity analysis on global warming potential calculated considering 5.1 kg CO<sub>2</sub>/ kg primary aluminium for triple glazed representative product.

	Glass landfill	Glass recycling
<b>Impact Indicator</b>	Global warming potential	
<b>Unit</b>	kg CO <sub>2</sub> -eq/m <sup>2</sup>	
<b>A1-A3</b>	136.69	136.69
<b>C1</b>	1.07·10 <sup>-1</sup>	1.07·10 <sup>-1</sup>
<b>C2</b>	1.8·10 <sup>-1</sup>	2.91·10 <sup>-1</sup>
<b>C3</b>	4.72·10 <sup>-1</sup>	1.34
<b>C4</b>	5	4.65
<b>D</b>	-63.69	-77.98

## 7. References

CEN/TR 15941	Sustainability of construction works - Environmental product declarations - Methodology for selection and use of generic data; CEN/TR 15941:2010
DIRECTIVE 96/603/EC	COMMISSION DECISION of 4 October 1996 establishing the list of products belonging to Classes A ' No contribution to fire '
DURABILITY	<a href="#">Aluminium and Durability - Towards Sustainable Cities</a> , edited by Michael Stacey, Published by Cwningen Press, November 2014 ISBN 978-0-9930162-0-2 (available at <a href="http://www.world-aluminium.org/publications/">http://www.world-aluminium.org/publications/</a> )
EAA DELFT	COLLECTION OF ALUMINIUM FROM BUILDINGS IN EUROPE - A Study by Delft University of Technology – 2004, available at <a href="http://european-aluminium.eu/media/1628/collection-of-aluminium-from-buildings-in-europe.pdf">http://european-aluminium.eu/media/1628/collection-of-aluminium-from-buildings-in-europe.pdf</a>
EAA EPR	Environmental Profile Report for the European Aluminium Industry - 2018- Data for the year 2015, available at <a href="https://www.european-aluminium.eu/resource-hub/environmental-profile-report-2018/">https://www.european-aluminium.eu/resource-hub/environmental-profile-report-2018/</a>
EAA PCR	Product Category Rules (PCR) for Aluminium Building Products – version of 30 Jan 2013, available at <a href="http://european-aluminium.eu/resource-hub/epd-programme-according-to-en15804/">http://european-aluminium.eu/resource-hub/epd-programme-according-to-en15804/</a>
EN 1026	Windows and doors. Air permeability. Test method
EN 1027	Windows and doors. Watertightness. Test method
EN 12207	Windows and doors. Air permeability. Classification
EN 12208	Windows and doors. Watertightness. Classification
EN 12210	Windows and doors. Resistance to wind load. Classification
EN 12211	Windows and doors. Resistance to wind load. Test method
EN 12519	Windows and pedestrian doors — Terminology
EN 12519	Windows and pedestrian doors — Terminology
EN 14351-1	Windows and doors - Product standard, performance characteristics - Part 1: Windows and external pedestrian doorsets without resistance to fire and/or smoke leakage characteristics
EN 15804	Sustainability of construction works –Environmental Product Declarations – Core rules for the product category of construction products
EN 1627	Pedestrian doorsets, windows, curtain walling, grilles and shutters. Burglar resistance. Requirements and classification
EN 1630	Pedestrian doorsets, windows, curtain walling, grilles and shutters - Burglar resistance - Test method for the determination of resistance to manual burglary attempts
EN 573-3	Aluminium and aluminium alloys – Chemical composition and form of wrought products – Part 3: Chemical composition and form of products
EN ISO 10077-1	Thermal performance of windows, doors and shutters -- Calculation of thermal transmittance -- Part 1: General
EN ISO 10077-2	Thermal performance of windows, doors and shutters -- Calculation of thermal transmittance -- Part 2: Numerical method for frames
EN ISO 14025	Environmental labels and declarations - Type III environmental declarations - Principles and procedures
EN ISO 140-3	Acoustics -- Measurement of sound insulation in buildings and of building elements -- Part 3: Laboratory measurements of airborne sound insulation of building elements
EN ISO 14040	Environmental management - Life cycle assessment - Principles and framework
EN ISO 14044	Environmental management - Life cycle assessment - Requirements and guidelines
EN ISO 717-1	Acoustics -- Rating of sound insulation in buildings and of building elements -- Part 1: Airborne sound insulation
GaBi 6	GaBi 6.3 dataset documentation for the software-system and databases, LBP, University of Stuttgart and PE INTERNATIONAL AG, Leinfelden-Echterdingen, 2013 ( <a href="http://documentation.gabi-software.com/">http://documentation.gabi-software.com/</a> )
NEN 6069	Beproeving en klassering van de brandwerendheid van bouwdeelen en bouwproducten (fire resistance testing and classification of building elements and products)
RECYCLING IN EN15804	TACKLING RECYCLING ASPECTS IN EN15804 – paper presented at the « LCA & Construction » conference in Nantes 10-12 July 2012
VOC from Al windows	Evaluation of Volatile Organic Compounds and aldehydes emitted by a “thermolacquered aluminium window posed (White QUALICOAT)” according to ISO 16000, Bureau Veritas Laboratoires, Report N°1200410-1 (E12-002890)

## Annex 1: EPD results for the 2 end of life scenarios of the double glazed representative product

Reference	1
Width of the door [m]	3
Height of the door [m]	2,18
Glazing Unit	Double glazing

Bill of Materials of the declared unit in kg	
Glass	15.47
Aluminium	12.99
Thermal break	0.70
Gasket	0.26
Fitting	0.91
Others - in plastics	1.13
Others - other materials	0.09
Total	31.56

The results are expressed per declared unit (1 m2 of sliding door)												
<b>ENVIRONMENTAL IMPACTS</b>												
		Glass landfill						Glass recycling				
<b>Parameter</b>	<b>Unit</b>	<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
GWP	kg CO2-eq	127	0.102	0.163	0.478	4.88	-47.4	1.02E-01	2.37E-01	1.06E+00	4.65E+00	-5.68E+01
ODP	kg CFC11-eq	1.32E-09	2.34E-15	5.61E-17	2.00E-14	7.26E-15	-6.10E-10	2.34E-15	8.16E-17	1.73E-14	5.92E-15	-6.10E-10
AP	kg SO2-eq	4.67E-01	2.82E-04	6.48E-04	6.47E-04	3.60E-03	-2.29E-01	2.82E-04	9.43E-04	7.41E-04	2.24E-03	-2.75E-01
EP	kg PO43- eq	5.08E-02	3.73E-05	1.62E-04	1.14E-04	6.95E-04	-1.37E-02	3.73E-05	2.36E-04	3.02E-04	5.41E-04	-1.92E-02
POCP	kg ethene eq	3.00E-02	2.17E-05	-2.48E-04	4.88E-05	2.67E-04	-1.28E-02	2.17E-05	-3.60E-04	-4.03E-04	1.61E-04	-1.60E-02
ADPE	kg Sb-eq	1.59E-03	2.63E-08	1.47E-08	1.87E-07	8.95E-08	-1.34E-03	2.63E-08	2.14E-08	1.67E-07	6.66E-08	-1.34E-03
ADPF	MJ	1550	1.15	2.19	4.65	8.67	-505	1.15E+00	3.19E+00	4.23E+00	5.44E+00	-6.05E+02
<b>RESOURCE USE</b>												
		Glass landfill						Glass recycling				
<b>Parameter</b>	<b>Unit</b>	<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
PERE	MJ	0	0.621	0.134	3.3	1.51	-5.39	0.621	0.195	2.38	1.09	-8.48
PERM	MJ	466	0	0	0	0	-255	0	0	0	0	-258
PERT	MJ	466	0.621	0.134	3.3	1.51	-260	0.621	0.195	2.38	1.09	-266
PENRE	MJ	2.48	1.76	2.2	6.11	9.31	-25.7	1.76	3.2	4.61	5.97	-69.6
PENRM	MJ	1750	0	0	0	0	-589	0	0	0	0	-650
PENRT	MJ	1750	1.76	2.2	6.11	9.31	-598	1.76	3.2	4.61	5.97	-702
SM	kg	6.46	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m3	1.08	7.32E-04	1.54E-04	1.78E-03	1.15E-02	-6.58E-01	7.32E-04	2.24E-04	1.99E-03	1.07E-02	-0.684
<b>WASTE</b>												
		Glass landfill						Glass recycling				
<b>Parameter</b>	<b>Unit</b>	<b>A1-A3</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>	<b>C1</b>	<b>C2</b>	<b>C3</b>	<b>C4</b>	<b>D</b>
HWD	kg	4.65E-06	4.84E-07	1.28E-07	4.75E-09	9.33E-08	-3.3E-07	4.84E-07	1.85E-07	3.13E-07	3.64E-08	-4.82E-07
NHWD	kg	22.5	3.51E-02	1.50E-04	6.32E-03	18.1	-13.4	3.51E-02	2.18E-04	2.05E-02	2.62	-14.7
RWD	kg	7.77E-02	7.66E-03	2.66E-06	5.75E-04	2.54E-04	-3.64E-02	7.66E-03	3.85E-06	1.53E-04	2.09E-04	-3.83E-02
<b>OUTPUT FLOWS</b>												
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	17.7	0	0	0	0	32.6
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	6.5	0	0	0	0	0	6.5
EET	MJ	0	0	0	0	11.9	0	0	0	0	0	11.9

## Annex 2: EPD results for the 2 end of life scenarios of the triple glazed representative product

Reference	2
Width of the door [m]	3
Height of the door [m]	2,18
Glazing Unit	Triple glazing

Bill of Materials of the declared unit in kg	
Glass	23.21
Aluminium	12.81
Thermal break	0.70
Gasket	0.26
Fitting	0.91
Others - in plastics	1.13
Others - other materials	0.09
Total	39.12

The results are expressed per declared unit (1 m2 of sliding door)

ENVIRONMENTAL IMPACTS												
Parameter	Unit	A1-A3	Glass landfill					Glass recycling				
			C1	C2	C3	C4	D	C1	C2	C3	C4	D
GWP	kg CO2-eq	141	0.107	0.18	0.472	5	-46.8	0.107	0.291	1.34	4.65	-60.8
ODP	kg CFC11-eq	1.31E-09	2.34E-15	6.20E-17	1.98E-14	7.92E-15	-6.02E-10	2.34E-15	1.00E-16	1.58E-14	5.92E-15	-6.02E-10
AP	kg SO2-eq	4.91E-01	2.98E-04	7.17E-04	6.40E-04	4.29E-03	-2.26E-01	2.98E-04	1.16E-03	7.82E-04	2.23E-03	-2.94E-01
EP	kg PO43- eq	6.21E-02	4.11E-05	1.80E-04	1.13E-04	7.73E-04	-1.35E-02	4.11E-05	2.90E-04	3.95E-04	5.40E-04	-2.18E-02
POCP	kg ethene eq	4.38E-02	2.33E-05	-2.74E-04	4.83E-05	3.20E-04	-1.26E-02	2.33E-05	-4.43E-04	-6.30E-04	1.61E-04	-1.75E-02
ADPE	kg Sb-eq	1.60E-03	2.68E-08	1.63E-08	1.85E-07	1.01E-07	-1.34E-03	2.68E-08	2.63E-08	1.55E-07	6.65E-08	-1.34E-03
ADPF	MJ	1720	1.21	2.43	4.6	10.3	-499	1.21	3.92	3.97	5.44	-648
RESOURCE USE												
Parameter	Unit	A1-A3	Glass landfill					Glass recycling				
			C1	C2	C3	C4	D	C1	C2	C3	C4	D
PERE	MJ	0	0.625	0.148	3.26	1.72	-5.39	0.625	0.24	1.88	1.09	-10
PERM	MJ	475	0	0	0	0	-252	0	0	0	0	-256
PERT	MJ	475	0.625	0.148	3.26	1.72	-257	0.625	0.24	1.88	1.09	-266
PENRE	MJ	2.48	1.82	2.44	6.04	11	-25.8	1.82	3.94	3.8	5.97	-91.6
PENRM	MJ	1910	0	0	0	0	-581	0	0	0	0	-672
PENRT	MJ	1910	1.82	2.44	6.04	11	-590	1.82	3.94	3.8	5.97	-747
SM	kg	6.38	0	0	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0
FW	m3	1.11	7.36E-04	1.70E-04	1.76E-03	1.20E-02	-6.50E-01	7.36E-04	2.75E-04	2.08E-03	1.07E-02	-6.88E-01
WASTE												
Parameter	Unit	A1-A3	Glass landfill					Glass recycling				
			C1	C2	C3	C4	D	C1	C2	C3	C4	D
HWD	kg	5.88E-06	1.88E-08	1.39E-07	4.69E-09	1.22E-07	-4.29E-07	1.88E-08	2.24E-07	4.67E-07	3.63E-08	-8.1E-07
NHWD	kg	2.32E+01	1.12E-03	1.63E-04	6.25E-03	2.58E+01	-1.33E+01	1.12E-03	2.64E-04	2.76E-02	2.6	-13.9
RWD	kg	7.79E-02	2.43E-04	2.89E-06	5.69E-04	2.76E-04	-3.60E-02	2.43E-04	4.68E-06	-6.46E-05	2.09E-04	-3.88E-02
OUTPUT FLOWS												
CRU	kg	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	17.4	0	0	0	0	39.9
MER	kg	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	6.49	0	0	0	0	6.49	0
EET	MJ	0	0	0	0	11.9	0	0	0	0	11.9	0

Annex 3. Detailed results for the two representative products and for the two scenarios for glass end of life.

