

# Environmental Product Declaration

In accordance with  
ISO 14025 and EN 15804:  
2012+A2:2019 for:

**Revolution 100  
Aluminium Framed  
Single Glazed  
Partition Systems**



THE INTERNATIONAL EPD® SYSTEM  
EPD INTERNATIONAL AB  
EPD REGISTRATION NUMBER S-P-05762  
ISSUED ON 2022-04-06  
VALID TO 2027-04-05

An EPD should provide current information  
and may be updated if conditions change.  
The stated validity is therefore subject to the  
continued registration and publication at  
[www.environdec.com](http://www.environdec.com)



# Optima

# Introduction

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Optima Products Limited (OPL) is a UK-based manufacturer of aluminium framed, glazed partition systems and doors. Based in Radstock, Bath, OPL has been designing and producing innovative and performance-driven aluminium and glass-based partition and door systems since the 1980s.

This EPD provides environmental performance indicators for the Revolution 100 single glazed partition systems. It is a cradle-to-gate with options EPD in accordance with the requirements of EN 15804, covering modules A1-A5, C1-C4 and D defined in that standard.

The EPD is based on a life cycle assessment (LCA) study which used production data for the 12-month period 1st January to 31st December 2019 from OPL's manufacturing facility in Radstock, UK.

The EPD presents details of the LCA, a description of the product life cycle it covers, values for the environmental indicators specified by EN 15804:2012 + A2:2019 with a brief explanation of those results; indicators required by EN 15804:2012 + A1:2013 are also included to ensure acceptance by the widest possible base of users.

The declared unit is one square metre of Revolution 100 single glazed partition system.

## Company Profile

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OPL designs and produces aluminium framed glass partition systems and doors from its manufacturing base in Radstock. The factory uses the latest design techniques to ensure high quality products which are rigorously tested both in-house and externally before going to market.

The OPL product range is sold and installed through the Optima Contracting divisions in the UK, Dubai and Kuala Lumpur and through a worldwide network of selected contracting partners.

OPL puts quality at the heart of the design and production management and operates an accredited quality management system to ISO 9001: 2015 (bmtrada certificate 2367).

In keeping with OPL's determination to drive good environmental practice in the entire product cycle, OPL operates an accredited environmental management system to ISO 14001: 2015 (bmtrada certificate 1827). In addition, it is a requirement on all our principal supply chain partners that they also operate similar systems.

OPL believes in openness and transparency in the supply chain and manufacturing process and has published Health Product Declarations in accordance with HPD Standard version 1.0.

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## Revolution 100 single glazed EPD

EPD programme:	The International EPD® System
EPD programme operator:	EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden <a href="http://www.environdec.com">www.environdec.com</a>
EPD owner:	Optima Products Limited, Mill Road, Radstock, Bath BA3 5TX, UK <a href="http://www.optimasystems.com">www.optimasystems.com</a>
EPD registration No:	S-P-05762
Date of publication:	2022-04-07
EPD valid until:	2027-04-05
Procedure for data follow-up during EPD validity:	Involves third party Verifier: Yes <input type="checkbox"/> No <input checked="" type="checkbox"/>
EPD geographical scope:	Worldwide
EPD based on Product Category Rules (PCR):	The CEN standard EN 15804 serves as the core PCR The International EPD® System's PCR 2019:14 Construction products, Version 1.11, 2021-02-05
PCR review conducted by:	The Technical Committee of the International EPD® System Chair: Claudia Peña; contact via: <a href="mailto:info@environdec.com">info@environdec.com</a>
Independent verification of this EPD and data, according to ISO 14025/2006:	EPD process certification <input type="checkbox"/> external EPD verification <input checked="" type="checkbox"/>
Third party verifier:	Ugo Pretato - Recognised Individual Verifier
Accredited or approved by:	The International EPD® System
LCA conducted by:	EuGeos Limited - UK - <a href="http://www.eugeos.co.uk">www.eugeos.co.uk</a>
LCA software:	openLCA
Background database:	ecoinvent v3.6
System boundaries:	Cradle to gate with options (modules A4 & A5, C & D)
Time representativeness:	1st January to 31st December 2019

EPDs within the same product category but from different programmes may not be comparable.  
EPDs of construction products may not be comparable if they do not comply with EN 15804.

# Product Information

## REVOLUTION 100 ALUMINIUM FRAMED SINGLE GLAZED PARTITION SYSTEMS



Revolution 100 is a stunning dry-jointed system which maintains the same visual appearance across a workspace, whilst addressing varying acoustic requirements.

This versatile system can incorporate a number of extruded aluminium deflection heads. Both inner and outer deflection heads are available, to suit your design intent, and can accommodate up to +/-25mm or +/-40mm deflection. If there is no deflection, a simple 25mm or 50mm extruded aluminium head channel is all that is required. The aluminium base channel can either be 25mm or 50mm deep, depending upon your desired aesthetic.

Revolution 100 is also available in double-glazed form.

Another version, Revolution 100 Shoreditch Edition, features a slimline aluminium framework. Bonded to the glass it retains the structural stability and acoustic performance of the glass partition, whilst giving the appearance of cutting through the glass.

The aluminium framework of all Optima Products' partition systems can be supplied in either powder coated or anodised finish.

Partitions are customisable, and indeed normally customised, to suit the context in which they are installed. This EPD applies to Revolution 100 Single-Glazed Partition Systems with 16.8mm acoustic laminated clear glass. The LCA underpinning it also considered partitions using 10mm & 12mm toughened glass, 12.8mm & 14.8mm laminated glass. The effect of changing the glass thickness on the environmental indicators obtained is discussed in the Interpretation section of this EPD.

Aluminium/m <sup>2</sup>		
1.9 - 2.3 kg (Category I)	2.7 - 3.2 kg (Category II)	3.3 - 3.7 kg (Category III)
with 100x25mm profiles; no deflection head*	with 100x25mm profiles; +/-25mm internal deflection head*	with 100x50mm profiles; no deflection head*
	with 100x25mm profiles; +/-25mm external deflection head	with 100x25mm profiles; +/-40mm internal deflection head
	with 100x25mm profiles; +/-40mm external deflection head	

\* in the LCA, this model represents the whole category

All partition systems produced by OPL are classified CPC 4212 under the UN CPC classification system V2.1.

# Product Information

## Technical data

The technical characteristics of OPL's Revolution 100 single glazed partition systems are summarised below.

Name	Value	Unit
<b>Mass for a unit area*</b>		
Category I	44	kg/m <sup>2</sup>
Category II	45	kg/m <sup>2</sup>
Category III	45	kg/m <sup>2</sup>
<b>Acoustic Testing (EN ISO 10140-1 &amp; 2) - Laboratory measurement of sound insulation of building materials</b>		
All Revolution 100 single glazed models	40	Rw dB

\*Mass is provided for guidance only and is not part of the product specification

Fire resistance (BS 476-22: 1987) - Fire tests on building materials and structures.

Method for determination of the fire resistance of non-loadbearing elements of construction.

EN 13501-1:2007 + A1:2009 - Fire classification of construction products and building elements.

Classification using test data from reaction to fire test.

## Manufacturing

OPL's Radstock manufacturing facility carries out the following manufacturing activities:

- Storage of raw materials, components and packaging
- Aluminium profile finishing and coating
- Preparation of partition components
- Packing of finished products

## Packaging

Partition components are packed in cardboard boxes for delivery to site. The glass element is normally delivered directly to the construction site from, and packed by, the glass supplier.

OPL uses only FSC-certified wood products in its palletisation of material deliveries. All pallets are set aside at their destination and returned for re-use.

## Product use and maintenance

All OPL partition systems are designed and manufactured to satisfy the strength and robustness criteria of BS 5234, where they can be reasonably applied, for Medium Duty.

Systems should be regularly inspected and maintained in accordance with the published Optima operation and maintenance schedule – see [www.optimasystems.com](http://www.optimasystems.com) for further details.

## End-of-life

It is recommended that partition systems being permanently removed from site, and with no planned re-use, be separated from the general waste disposal regime and the glass and aluminium stripped out for potential recycling using a regulated recycling scheme.

The European Waste Catalogue (EWC) codes below apply to the product or parts of it when removed from the building:

EWC 17 02 02 Glass

EWC 17 04 02 Aluminium

EWC 17 02 03 Plastic

All OPL systems are designed to be re-usable and re-locatable if properly configured.

We endeavour to ensure that appropriate after-use planning is implemented to make sure the correct OPL system configuration is specified.

# Product Information

## Content declaration

The material composition of OPL's Revolution 100 single glazed partition systems characterised in this EPD is shown below. The masses quoted are indicative; total mass is not part of the product specification.

Product components	Mass in declared unit, - kg			Post-consumer material, weight - %	Renewable material, weight - %
	Cat I	Cat II	Cat III	All partition systems	
Glass	40	40	40	n/a	0
Aluminium	1.9 - 2.3	2.7 - 3.2	3.3 - 3.7	75	0
PVC	0.1	0.1	0.1	0	0
Other polymers	1.6	1.6	1.6	0	0
Total:	44	45	45		

Packaging materials	Weight - kg			Weight - % (vs product)		
	Cat I	Cat II	Cat III	Cat I	Cat II	Cat III
Cardboard	1.3	1.4	1.3	2.9	3.1	2.8
Total:	1.3	1.4	1.3			

No substance on the "Candidate List of Substances of Very High Concern for authorisation" derived under REACH is present either above the limits for registration with the European Chemicals Agency or in excess of 0.1 weight-% of the product.

## Residual risks and emergencies

There are no residual risks associated with the normal day to day use of OPL partition systems in the context for which they are designed and specified.

## Further product information

Detailed product information and datasheets can be found on our website: [www.optimasystems.com](http://www.optimasystems.com)

# Environmental Performance-Related Information

## LCA Information

This section of the EPD records key features of the LCA on which it is based.

## Scope

This cradle-to-gate with options EPD covers the production stage (modules A1 - A3), the construction stage (modules A4 & A5), the end-of-life stage (modules C1-C4) and module D - see below; as permitted by EN 15804 modules A1-A3 are declared in aggregated form.

Product stage			Construction process stage		Use stage							End of life stage				Benefits & loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste disposal	Disposal	Reuse- recovery- recycling- potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared X included in LCA - ND: module not declared - NR: module not relevant																
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography																
GLO	GLO	GB	GB	GB	-	-	-	-	-	-	-	GB	GB	GB	GB	GLO
Specific data used																
85	>90	>90	>90	>90	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products																
10 %	10 %	5%	10%	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites																
n/a	n/a	n/a	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	-

# Environmental Performance-Related Information

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## Declared unit

The declared unit is one square metre. The LCA is calculated on the basis of a screen of width 5.0m and height 2.90m, using 16.8mm laminated glass, including head and base track and wall abutments. The effect of changing the glass thickness on the environmental indicators obtained is discussed in the Interpretation section of this EPD.

Refer to the content declaration for the mass of the declared unit; the stated masses are for guidance and are not part of the product specification.

## System boundaries

This EPD covers the product stage, delivery to site, installation, and 'end-of-life' management. It therefore includes the following information modules:

- A1 - raw material extraction and processing, and the processing of secondary material input
- A2 - transport of raw materials and secondary material inputs to the manufacturer
- A3 - manufacturing of the construction product and packaging
- A4 - delivery of construction products to the building site
- A5 - assembly
- C1 - removal from the building
- C2 - transport to waste treatment facility
- C3 - waste treatment
- C4 - final disposal
- D - benefits associated with recycling in a different product system

Modules A1, A2 and A3 comprise the product stage and are declared as one aggregated module A1 – A3. This stage includes the extraction and manufacture of raw materials, intermediate products and energy, as well as waste processing up to the end-of-waste state (i.e. no longer considered a waste material) or disposal of final residues arising during the product stage.

Modules A4 & A5 are part of the "Construction Process stage".

Module C1 - C4 cover the end-of-life stage.

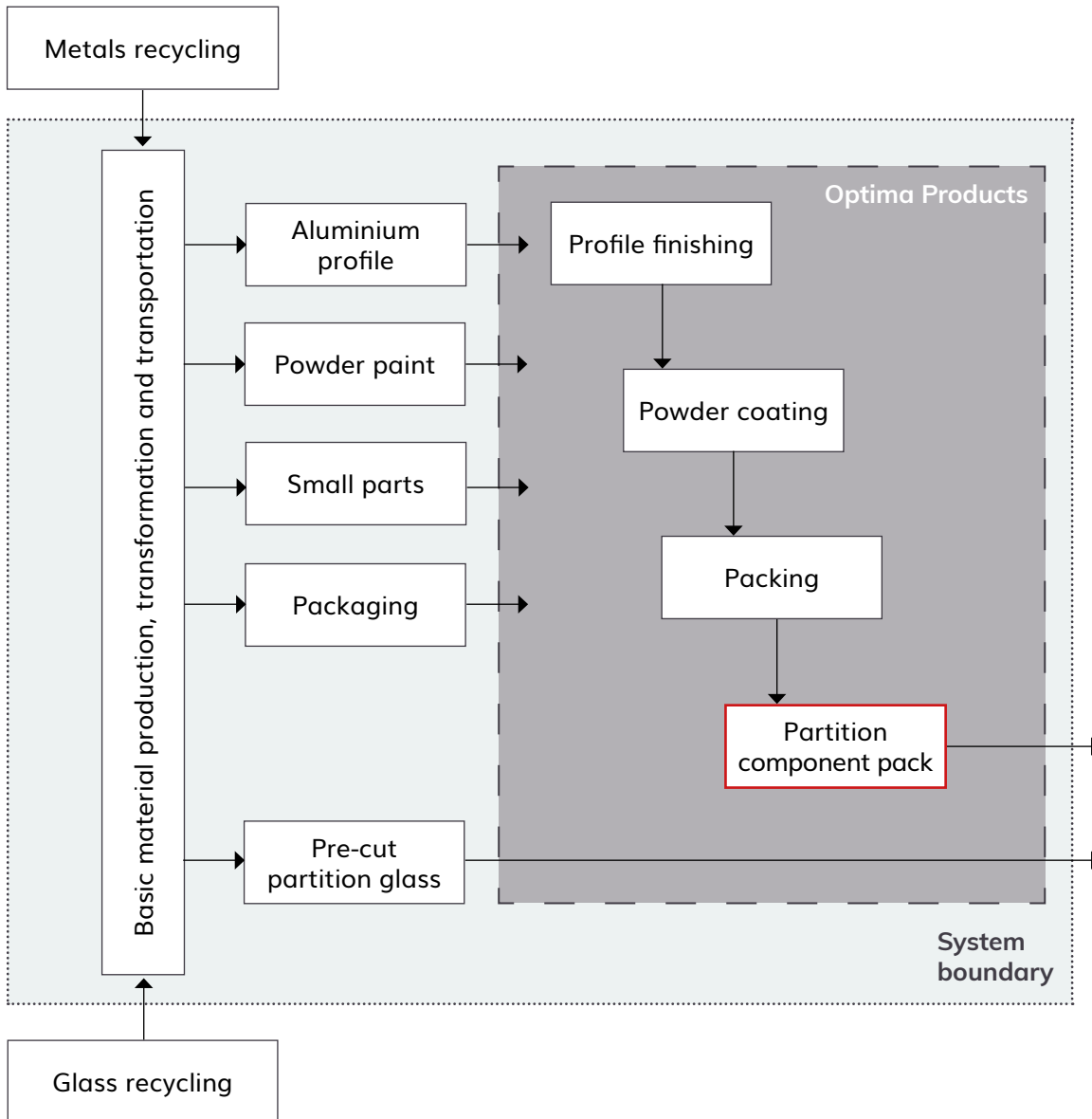
Module D provides an estimate of the potential benefits that would accrue to a different product system were the partition constituents and recycled wastes identified in data for other life cycle modules actually recycled or recovered at current rates and using current technologies.



# Environmental Performance-Related Information

All upstream resource extraction and manufacturing processes are included in the system. All energy used in factories and offices at OPL'S Radstock site is included; energy used in OPL's offices at locations other than Radstock is excluded. Maintenance of equipment is also excluded.

The product life cycle covered by this EPD is illustrated below.



SYSTEM BOUNDARIES (A1-A3) FOR PARTITION SYSTEM LCA

# Environmental Performance-Related Information

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## **Cut-off criteria**

According to EN 15804 and the PCR, flows can be omitted (cut-off) from a core process in the LCA up to a maximum of 1% of the total mass of material inputs. The total of input flows omitted in this way for any single module must not exceed 5% of the total energy usage and mass inputs for that module. The following must be included in all cases, regardless of the proportion of mass or energy they represent:

- Inputs giving rise to significant environmental effects or energy use in their extraction, use or disposal
- Inputs or outputs classified as hazardous waste

The data collected from OPL encompassed all raw materials, packaging materials and process aids, as well as associated transport to the manufacturing site. Process energy and water use, and direct production waste are included within the data. There are no emissions to air or water apart from un-monitored combustion gases and trade effluent; these are quantified by virtue of mass balance (trade effluent) or by their inclusion in generic processes characterising inputs (gas combustion). Non-hazardous material inputs amounting, in combination, to <0.5% of all inputs during the data period were omitted from the LCA.

## **Data sources and data quality**

Data used for this EPD were collected following guidance in ISO 14044:2006; the most current available data were used in accordance with EN 15804.

The manufacturer-specific data used in LCA calculations cover a period of 1 year from 1 January 2019 to 31 December 2019. They are therefore based on 1 year averaged data and have been updated within the 5 years prior to publication of the EPD. These data were checked to ensure that sufficient materials and water were included within the inputs to account for all outputs, including products and wastes. Their technological coverage reflects physical reality for the declared product.

Other (generic) data sets used for calculations have been updated within the last 10 years.

Inputs to and outputs from the system are accounted for over a 100-year time period; long-term emissions are therefore omitted from the LCA.

## **Background data**

Background (generic) data for raw material inputs and fuels were taken from the ecoinvent v3.6 database, augmented where necessary to ensure the data used are as representative as possible of the materials actually used by Optima. This fulfils the EN 15804 requirement that generic data used in the LCA have been updated within the last 10 years. Data quality has been reviewed for all processes that contribute significantly to the overall LCA.

## **Allocation**

In the background data, the ecoinvent default allocation is applied to all processes except those in which secondary materials are used, where the "cut-off" allocation is applied. This ensures that secondary materials are free of upstream burdens that arise prior to their reaching the "end of waste" state, in accordance with Section 6.3.4.2 of EN 15804.

Factory data for OPL's Radstock facility have been sub-divided where possible to avoid allocation. Remaining inputs and outputs are allocated on the basis of physical relationships.

# Environmental Performance-Related Information

## Assumptions and estimates

Electricity supplied to OPL is modelled as the residual mix for 2018 as declared by the Association of Issuing Bodies. The GWP total associated with this is 0.43kgCO<sub>2</sub>e/kWh.

The “primary energy used as material (PERM; PENRM)” indicators are calculated using – as characterisation factors – published values for constituent materials which can yield energy on combustion, where available, and from published calorific values where PERM or PENRM values are not available.

In this EPD, the following values are used:

- Renewable primary energy as material: wood - 16MJ/kg; cardboard - 14MJ/kg
- Non-renewable primary energy as material: 27 MJ/kg for all polymer content

“Primary energy as fuel” indicators (PENRE, PERE) are calculated as the total primary energy demand minus primary energy used as material.

Delivery of the product to users’ sites, installation and transport to waste processing and final disposal are modelled using scenarios. The relevant parameters for the transport scenarios are shown in the table below.

Scenario parameters - transport		
Parameter	A4 transport to site	C2 transport to waste treatment
	Quantity and unit	
Vehicle type	lorry	
Vehicle load capacity	10t; n/a	
Fuel type and consumption	diesel, 0.1 l/km	
Volume capacity utilisation factor	1	
Capacity utilisation (including empty returns)	38%	33%
Distance to site	200 km	50 km
Bulk density of transported products	n/a (mixed materials, packed)	n/a (mixed materials)

Installation (Module A5) is modelled on the basis of information from Optima Installations. Consumption of 0.08kWh electricity per declared unit is assumed, to account for the use of hand-held power tools. Cardboard packaging is assumed to be recycled; the same assumptions are applied for its transport as in Module C2. Other items used to transport partition components to site are returned for re-use. Removal from the building (Module C1) is assumed to use the same energy as installation.

In the end-of-life modules, aluminium is assumed recycled and glass recovered for use as aggregate, therefore these are assumed to be separated in Module C3. As a simplification, treatment of these materials as wastes is omitted so that Module C4 is empty.

# Environmental Performance-Related Information

Module D quantifies the benefits and loads associated with recycling materials and the exported energy from waste management activities, were those recycled materials and recovered energy to be used in another product system. Net output quantities of materials used in the Module D calculation are shown in the table below, with the associated “quality factors” and the virgin materials assumed to be displaced.

Scenario parameters - Module D					
Output to recycling/ recovery	Assumed fate	Displaced input flow	Quality factor	Net output	
				Quantity	Units
Aluminium	90% recycled	primary aluminium ingot	1	0.5/0.6/0.7	kg
Glass	recovered	limestone aggregate	1	40	kg
Glass	recycled	white packaging glass	1	4.4	kg
Carboard (A1-A5)	recycled	core board	1	1.3/1.4/1.3	kg

## Environmental indicators

This EPD contains environmental information about OPL’s partition systems in the form of quantitative indicator values for a number of parameters, which encompass calculated environmental impact potentials, resource and energy use, waste generation and material and energy outputs from the product system that may be reused, recycled or recovered into other, unspecified product life cycles. These parameters are listed below along with the abbreviations used for them in the tables of indicator values that follow.

Parameter	Abbreviation	Units
<b>Potential environmental impacts</b>		
Climate change – GWP fossil	GWP-fossil	kg CO <sub>2</sub> eq
Climate change – GWP biogenic	GWP-biogenic	kg CO <sub>2</sub> eq
Climate change – GWP land transformation	GWP-luluc	kg CO <sub>2</sub> eq
Climate change – GWP total	GWP-total	kg CO <sub>2</sub> eq
Climate change - GWP fossil & land transformation <sup>1</sup>	GWP-GHG	kg CO <sub>2</sub> eq
Acidification potential	AP	mol H <sup>+</sup> eq
Eutrophication – freshwater	EP-freshwater	kg P eq & kg PO <sub>4</sub> <sup>3-</sup> eq
Eutrophication – marine	EP-marine	kg N eq
Eutrophication – terrestrial	EP-terrestrial	mol N eq
Photochemical ozone formation	POFP	kg NMVOC eq
Ozone depletion	ODP	kg CFC-11 eq
Depletion of abiotic resources – minerals & metals <sup>2</sup>	ADPMM	kg Sb eq
Depletion of abiotic resources – fossil fuels <sup>2</sup>	ADPFF	MJ, ncv
Water (user) deprivation potential <sup>2</sup>	WDP	m <sup>3</sup> world-eq deprived

# Environmental Performance-Related Information

Parameter	Abbreviation	Units
<b>Resource use</b>		
Renewable primary energy as energy carrier	PERE	MJ
Renewable primary energy resources as material utilisation	PERM	MJ
Total renewable primary energy use (sum of the two parameters above)	PERT	MJ
Non-renewable primary energy as energy carrier	PENRE	MJ
Non-renewable primary energy resources as material utilisation	PENRM	MJ
Total non-renewable primary energy use (sum of the two parameters above)	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Net use of fresh water	FW	m <sup>3</sup>
<b>Wastes</b>		
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	TRWD	kg
<b>Output flows</b>		
Components for re-use	CRU	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy - electrical	EEE	MJ
Exported energy - thermal	EET	MJ

1 - GWP-GHG includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus almost equal to the GWP indicator originally defined in EN 15804:2012+A1:2013

2 - The results of this environmental impact indicator shall be used with care because either the uncertainties associated with the results are high or there is limited experience with the indicator

# LCA Results

## REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY I

Environmental indicator results are shown in the 4 following tables for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A2)	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq	7.04E+01	1.49E-01	1.08E-01	3.46E-02	1.88E+00	9.44E-01	0.00E+00	-7.67E+00
GWP-biogenic	kg CO <sub>2</sub> eq	-5.84E-03	-5.68E-05	5.91E-01	-3.58E-05	-7.10E-04	-6.78E-02	0.00E+00	3.51E-01
GWP-luluc	kg CO <sub>2</sub> eq	1.13E-01	6.51E-05	5.47E-05	2.20E-06	8.20E-04	1.15E-03	0.00E+00	-1.32E-02
GWP-total	kg CO <sub>2</sub> eq	7.05E+01	1.49E-01	6.99E-01	3.46E-02	1.88E+00	8.77E-01	0.00E+00	-7.34E+00
GWP-GHG	kg CO <sub>2</sub> eq	7.07E+01	1.49E-01	6.24E-01	3.46E-02	1.88E+00	9.48E-01	0.00E+00	-7.73E+00
AP	mol H <sup>+</sup> eq	2.05E-01	3.50E-04	5.80E-04	8.40E-05	4.45E-03	8.13E-03	0.00E+00	-5.68E-02
EP-freshwater	kg P eq	1.59E-03	1.45E-06	1.77E-06	1.11E-06	1.82E-05	7.27E-05	0.00E+00	-2.20E-04
	kg PO <sub>4</sub> <sup>3-</sup> eq	4.87E-03	4.43E-06	5.41E-06	3.41E-06	5.58E-05	2.23E-04	0.00E+00	-6.74E-04
EP-marine	kg N eq	2.75E-02	4.63E-05	2.60E-04	1.76E-05	5.80E-04	6.40E-04	0.00E+00	-8.46E-03
EP-terrestrial	mol N eq	3.90E-01	5.10E-04	1.80E-03	1.90E-04	6.46E-03	8.28E-03	0.00E+00	-9.72E-02
POFP	kg NMVOC eq	1.05E-01	2.50E-04	6.90E-04	5.14E-05	3.10E-03	3.06E-03	0.00E+00	-2.63E-02
ODP	kg CFC-11 eq	8.44E-06	3.30E-08	2.00E-08	3.50E-09	4.15E-07	1.27E-07	0.00E+00	-9.05E-07
ADPMM	kg Sb eq	9.90E-04	5.37E-06	2.12E-06	2.69E-08	6.76E-05	5.68E-05	0.00E+00	-1.52E-03
ADPFF	MJ, ncv	9.36E+02	2.20E+00	1.62E+00	6.07E-01	2.77E+01	1.26E+01	0.00E+00	-1.05E+02
WDP	m <sup>3</sup> world-eq dprv	4.26E+03	2.66E+00	1.39E+00	4.87E-01	3.35E+01	7.70E+01	0.00E+00	-4.08E+02
<b>Resource use</b>									
PERE	MJ	4.09E+01	3.79E-02	3.04E-02	3.78E-03	4.77E-01	2.31E+00	0.00E+00	-1.26E+01
PERM	MJ	1.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.87E+01	3.79E-02	3.04E-02	3.78E-03	4.77E-01	2.31E+00	0.00E+00	-1.26E+01
PENRE	MJ	9.84E+02	2.26E+00	1.83E+00	9.59E-01	2.84E+01	1.46E+01	0.00E+00	-1.13E+02
PENRM	MJ	4.59E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.03E+03	2.26E+00	1.83E+00	9.59E-01	2.84E+01	1.46E+01	0.00E+00	-1.13E+02
SM	kg	2.64E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.17E+00	1.37E-03	7.40E-04	4.49E-05	1.72E-02	5.94E-02	0.00E+00	-1.16E-01
NRSF	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
FW	m <sup>3</sup>	5.87E-01	1.90E-04	1.90E-04	1.30E-04	2.39E-03	6.09E-03	0.00E+00	-5.58E-02
<b>Waste</b>									
HWD	kg	2.97E+00	2.62E-03	3.64E-03	1.68E-03	3.30E-02	7.46E-02	0.00E+00	-6.26E-01
NHWD	kg	6.58E+01	1.46E-01	3.30E-01	4.78E-02	1.83E+00	4.49E+00	0.00E+00	-9.26E+00
TRWD	kg	3.65E-03	1.52E-05	1.21E-05	7.33E-06	1.90E-04	7.63E-05	0.00E+00	-4.10E-04
<b>Output flows</b>									
CRU	kg	0.00E+00	0.00E+00	1.00E+01	1.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.17E+00	8.90E-04	1.27E+00	2.79E-05	1.12E-02	4.21E+01	0.00E+00	-2.81E+00
MER	kg	1.31E-02	1.52E-05	8.29E-06	6.41E-07	1.90E-04	6.50E-04	0.00E+00	-1.89E-03
EEE	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
EET	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

# LCA Results

## Additional Environmental Information

ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY I

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the tables below for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A1)		Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
Global warming potential	GWP	kg CO <sub>2</sub> eq	6.94E+01	1.48E-01	4.58E-01	3.41E-02	1.86E+00	9.29E-01	0.00E+00	-7.52E+00
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11 eq	7.02E-06	2.63E-08	1.66E-08	3.97E-09	3.31E-07	1.09E-07	0.00E+00	-7.57E-07
Acidification potential of land and water	AP	kg SO <sub>2</sub> eq	1.76E-01	3.10E-04	5.50E-04	7.11E-05	3.85E-03	7.31E-03	0.00E+00	-4.90E-02
Eutrophication potential	EP	kg PO <sub>4</sub> <sup>3-</sup> eq	1.86E-02	3.01E-05	1.30E-04	9.58E-06	3.80E-04	5.10E-04	0.00E+00	-3.95E-03
Formation potential of tropospheric ozone photochemical oxidants	POCP	kg ethene eq	1.58E-02	1.84E-05	1.20E-04	3.24E-06	2.30E-04	3.60E-04	0.00E+00	-2.17E-03
Abiotic depletion potential for non-fossil resources	ADPE	kg Sb eq	9.90E-04	5.37E-06	2.12E-06	2.69E-08	6.76E-05	5.68E-05	0.00E+00	-1.52E-03
Abiotic depletion potential for fossil resources	ADPF	MJ	9.36E+02	2.20E+00	1.62E+00	6.07E-01	2.77E+01	1.26E+01	0.00E+00	-1.05E+02

## Biogenic carbon

Carbon dioxide (CO<sub>2</sub>) is absorbed from the atmosphere by trees, so any wood-based product contains some carbon from this source. This carbon is considered as a negative emission in some carbon accounting systems. The biogenic carbon contained in the wood contained in the declared unit of each Category in this EPD is shown below.

Biogenic carbon content per declared unit	Unit	Quantity
		Category I
Biogenic carbon content in product	kg C	n/a
Biogenic carbon content in packaging	kg C	0.6

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

# LCA Results

## REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY II

Environmental indicator results are shown in the 4 following tables for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A2)	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq	7.46E+01	1.90E-01	1.17E-01	3.46E-02	1.91E+00	9.62E-01	0.00E+00	-8.66E+00
GWP-biogenic	kg CO <sub>2</sub> eq	-4.54E-02	-7.23E-05	6.46E-01	-3.58E-05	-7.30E-04	-6.91E-02	0.00E+00	3.65E-01
GWP-luluc	kg CO <sub>2</sub> eq	1.52E-01	8.29E-05	5.97E-05	2.20E-06	8.30E-04	1.17E-03	0.00E+00	-1.68E-02
GWP-total	kg CO <sub>2</sub> eq	7.47E+01	1.90E-01	7.63E-01	3.46E-02	1.91E+00	8.94E-01	0.00E+00	-8.32E+00
GWP-GHG	kg CO <sub>2</sub> eq	7.49E+01	1.90E-01	6.80E-01	3.46E-02	1.91E+00	9.66E-01	0.00E+00	-8.72E+00
AP	mol H <sup>+</sup> eq	2.31E-01	4.50E-04	6.30E-04	8.40E-05	4.53E-03	8.28E-03	0.00E+00	-6.24E-02
EP-freshwater	kg P eq	1.78E-03	1.84E-06	1.88E-06	1.11E-06	1.85E-05	7.41E-05	0.00E+00	-2.50E-04
	kg PO <sub>4</sub> <sup>3-</sup> eq	5.46E-03	5.64E-06	5.76E-06	3.41E-06	5.68E-05	2.27E-04	0.00E+00	-7.66E-04
EP-marine	kg N eq	3.09E-02	5.90E-05	2.90E-04	1.76E-05	5.90E-04	6.60E-04	0.00E+00	-9.39E-03
EP-terrestrial	mol N eq	4.28E-01	6.50E-04	1.96E-03	1.90E-04	6.58E-03	8.43E-03	0.00E+00	-1.07E-01
POFP	kg NMVOC eq	1.17E-01	3.10E-04	7.50E-04	5.14E-05	3.16E-03	3.11E-03	0.00E+00	-2.91E-02
ODP	kg CFC-11 eq	8.84E-06	4.20E-08	2.17E-08	3.50E-09	4.23E-07	1.29E-07	0.00E+00	-9.50E-07
ADPMM	kg Sb eq	1.04E-03	6.84E-06	2.32E-06	2.69E-08	6.89E-05	5.79E-05	0.00E+00	-2.06E-03
ADPFF	MJ, ncv	9.96E+02	2.80E+00	1.74E+00	6.07E-01	2.82E+01	1.28E+01	0.00E+00	-1.18E+02
WDP	m <sup>3</sup> world-eq dprv	5.42E+03	3.39E+00	1.49E+00	4.87E-01	3.41E+01	7.84E+01	0.00E+00	-4.96E+02
<b>Resource use</b>									
PERE	MJ	5.36E+01	4.83E-02	3.30E-02	3.78E-03	4.86E-01	2.36E+00	0.00E+00	-1.39E+01
PERM	MJ	1.94E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	7.31E+01	4.83E-02	3.30E-02	3.78E-03	4.86E-01	2.36E+00	0.00E+00	-1.39E+01
PENRE	MJ	1.05E+03	2.87E+00	1.96E+00	9.59E-01	2.89E+01	1.49E+01	0.00E+00	-1.26E+02
PENRM	MJ	4.62E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.10E+03	2.87E+00	1.96E+00	9.59E-01	2.89E+01	1.49E+01	0.00E+00	-1.26E+02
SM	kg	3.60E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.22E+00	1.74E-03	8.10E-04	4.49E-05	1.75E-02	6.05E-02	0.00E+00	-1.21E-01
NRSF	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
FW	m <sup>3</sup>	6.60E-01	2.40E-04	2.00E-04	1.30E-04	2.44E-03	6.20E-03	0.00E+00	-6.52E-02
<b>Waste</b>									
HWD	kg	3.67E+00	3.34E-03	3.90E-03	1.68E-03	3.36E-02	7.61E-02	0.00E+00	-8.21E-01
NHWD	kg	7.48E+01	1.85E-01	3.59E-01	4.78E-02	1.87E+00	4.57E+00	0.00E+00	-1.09E+01
TRWD	kg	3.90E-03	1.93E-05	1.29E-05	7.33E-06	1.90E-04	7.78E-05	0.00E+00	-4.30E-04
<b>Output flows</b>									
CRU	kg	0.00E+00	0.00E+00	1.00E+01	1.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.58E+00	1.14E-03	1.39E+00	2.79E-05	1.14E-02	4.30E+01	0.00E+00	-2.86E+00
MER	kg	1.41E-02	1.94E-05	9.02E-06	6.41E-07	1.90E-04	6.60E-04	0.00E+00	-1.98E-03
EEE	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
EET	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



# LCA Results

## Additional Environmental Information

ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY II

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the tables below for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A1)		Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
Global warming potential	GWP	kg CO <sub>2</sub> eq	7.34E+01	1.88E-01	4.98E-01	3.41E-02	1.90E+00	9.46E-01	0.00E+00	-8.47E+00
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11 eq	7.40E-06	3.35E-08	1.80E-08	3.97E-09	3.38E-07	1.11E-07	0.00E+00	-7.98E-07
Acidification potential of land and water	AP	kg SO <sub>2</sub> eq	1.99E-01	3.90E-04	5.90E-04	7.11E-05	3.93E-03	7.44E-03	0.00E+00	-5.40E-02
Eutrophication potential	EP	kg PO <sub>4</sub> <sup>3-</sup> eq	2.05E-02	3.83E-05	1.40E-04	9.58E-06	3.90E-04	5.20E-04	0.00E+00	-4.39E-03
Formation potential of tropospheric ozone photochemical oxidants	POCP	kg ethene eq	1.77E-02	2.34E-05	1.30E-04	3.24E-06	2.40E-04	3.70E-04	0.00E+00	-2.48E-03
Abiotic depletion potential for non-fossil resources	ADPE	kg Sb eq	1.04E-03	6.84E-06	2.32E-06	2.69E-08	6.89E-05	5.79E-05	0.00E+00	-2.06E-03
Abiotic depletion potential for fossil resources	ADPF	MJ	9.96E+02	2.80E+00	1.74E+00	6.07E-01	2.82E+01	1.28E+01	0.00E+00	-1.18E+02

## Biogenic carbon

Carbon dioxide (CO<sub>2</sub>) is absorbed from the atmosphere by trees, so any wood-based product contains some carbon from this source. This carbon is considered as a negative emission in some carbon accounting systems. The biogenic carbon contained in the wood contained in the declared unit of each Category in this EPD is shown below.

Biogenic carbon content per declared unit	Unit	Quantity
		Category II
Biogenic carbon content in product	kg C	n/a
Biogenic carbon content in packaging	kg C	0.7

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

# LCA Results

## REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY III

Environmental indicator results are shown in the 4 following tables for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A2)	Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
GWP-fossil	kg CO <sub>2</sub> eq	7.61E+01	2.03E-01	1.08E-01	3.46E-02	1.93E+00	9.71E-01	0.00E+00	-9.18E+00
GWP-biogenic	kg CO <sub>2</sub> eq	-8.70E-02	-7.74E-05	5.91E-01	-3.58E-05	-7.40E-04	-6.97E-02	0.00E+00	3.60E-01
GWP-luluc	kg CO <sub>2</sub> eq	1.73E-01	8.87E-05	5.47E-05	2.20E-06	8.40E-04	1.18E-03	0.00E+00	-1.84E-02
GWP-total	kg CO <sub>2</sub> eq	7.62E+01	2.03E-01	6.99E-01	3.46E-02	1.93E+00	9.02E-01	0.00E+00	-8.84E+00
GWP-GHG	kg CO <sub>2</sub> eq	7.64E+01	2.03E-01	6.24E-01	3.46E-02	1.93E+00	9.75E-01	0.00E+00	-9.24E+00
AP	mol H <sup>+</sup> eq	2.45E-01	4.80E-04	5.80E-04	8.40E-05	4.58E-03	8.36E-03	0.00E+00	-6.53E-02
EP-freshwater	kg P eq	1.87E-03	1.97E-06	1.77E-06	1.11E-06	1.87E-05	7.48E-05	0.00E+00	-2.70E-04
	kg PO <sub>4</sub> <sup>3-</sup> eq	5.73E-03	6.04E-06	5.41E-06	3.41E-06	5.74E-05	2.29E-04	0.00E+00	-8.28E-04
EP-marine	kg N eq	3.25E-02	6.31E-05	2.60E-04	1.76E-05	6.00E-04	6.60E-04	0.00E+00	-9.86E-03
EP-terrestrial	mol N eq	4.45E-01	7.00E-04	1.80E-03	1.90E-04	6.65E-03	8.52E-03	0.00E+00	-1.13E-01
POFP	kg NMVOC eq	1.21E-01	3.40E-04	6.90E-04	5.14E-05	3.19E-03	3.14E-03	0.00E+00	-3.05E-02
ODP	kg CFC-11 eq	8.95E-06	4.50E-08	2.00E-08	3.50E-09	4.27E-07	1.30E-07	0.00E+00	-9.73E-07
ADPMM	kg Sb eq	1.07E-03	7.32E-06	2.12E-06	2.69E-08	6.96E-05	5.84E-05	0.00E+00	-2.35E-03
ADPFF	MJ, ncv	1.02E+03	3.00E+00	1.62E+00	6.07E-01	2.85E+01	1.29E+01	0.00E+00	-1.24E+02
WDP	m <sup>3</sup> world-eq dprv	6.06E+03	3.63E+00	1.39E+00	4.87E-01	3.45E+01	7.92E+01	0.00E+00	-5.42E+02
<b>Resource use</b>									
PERE	MJ	6.31E+01	5.17E-02	3.04E-02	3.78E-03	4.91E-01	2.38E+00	0.00E+00	-1.44E+01
PERM	MJ	1.78E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	8.09E+01	5.17E-02	3.04E-02	3.78E-03	4.91E-01	2.38E+00	0.00E+00	-1.44E+01
PENRE	MJ	1.08E+03	3.07E+00	1.83E+00	9.59E-01	2.92E+01	1.50E+01	0.00E+00	-1.32E+02
PENRM	MJ	4.59E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.12E+03	3.07E+00	1.83E+00	9.59E-01	2.92E+01	1.50E+01	0.00E+00	-1.32E+02
SM	kg	4.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.24E+00	1.86E-03	7.40E-04	4.49E-05	1.77E-02	6.11E-02	0.00E+00	-1.22E-01
NRSF	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
FW	m <sup>3</sup>	6.98E-01	2.60E-04	1.90E-04	1.30E-04	2.46E-03	6.26E-03	0.00E+00	-6.95E-02
<b>Waste</b>									
HWD	kg	4.04E+00	3.58E-03	3.64E-03	1.68E-03	3.40E-02	7.68E-02	0.00E+00	-9.24E-01
NHWD	kg	7.93E+01	1.98E-01	3.30E-01	4.78E-02	1.89E+00	4.62E+00	0.00E+00	-1.17E+01
TRWD	kg	3.98E-03	2.07E-05	1.21E-05	7.33E-06	2.00E-04	7.85E-05	0.00E+00	-4.40E-04
<b>Output flows</b>									
CRU	kg	0.00E+00	0.00E+00	1.00E+01	1.00E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.81E+00	1.22E-03	1.27E+00	2.79E-05	1.16E-02	4.34E+01	0.00E+00	-2.89E+00
MER	kg	1.46E-02	2.07E-05	8.29E-06	6.41E-07	2.00E-04	6.70E-04	0.00E+00	-1.96E-03
EEE	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
EET	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

# LCA Results

## Additional Environmental Information

ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

REVOLUTION 100 SINGLE GLAZED PARTITION SYSTEMS - CATEGORY III

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the tables below for the declared unit of one square metre; modules A1 - A3 are shown on an aggregated basis.

Environmental Impacts (EN 15804 + A1)		Unit	A1 - A3	A4	A5	C1	C2	C3	C4	D
Global warming potential	GWP	kg CO <sub>2</sub> eq	7.49E+01	2.01E-01	4.58E-01	3.41E-02	1.91E+00	9.56E-01	0.00E+00	-8.96E+00
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11 eq	7.51E-06	3.59E-08	1.66E-08	3.97E-09	3.41E-07	1.12E-07	0.00E+00	-8.19E-07
Acidification potential of land and water	AP	kg SO <sub>2</sub> eq	2.11E-01	4.20E-04	5.50E-04	7.11E-05	3.96E-03	7.52E-03	0.00E+00	-5.66E-02
Eutrophication potential	EP	kg PO <sub>4</sub> <sup>3-</sup> eq	2.14E-02	4.10E-05	1.30E-04	9.58E-06	3.90E-04	5.20E-04	0.00E+00	-4.60E-03
Formation potential of tropospheric ozone photochemical oxidants	POCP	kg ethene eq	1.81E-02	2.50E-05	1.20E-04	3.24E-06	2.40E-04	3.70E-04	0.00E+00	-2.64E-03
Abiotic depletion potential for non-fossil resources	ADPE	kg Sb eq	1.07E-03	7.32E-06	2.12E-06	2.69E-08	6.96E-05	5.84E-05	0.00E+00	-2.35E-03
Abiotic depletion potential for fossil resources	ADPF	MJ	1.02E+03	3.00E+00	1.62E+00	6.07E-01	2.85E+01	1.29E+01	0.00E+00	-1.24E+02

## Biogenic carbon

Carbon dioxide (CO<sub>2</sub>) is absorbed from the atmosphere by trees, so any wood-based product contains some carbon from this source. This carbon is considered as a negative emission in some carbon accounting systems. The biogenic carbon contained in the wood contained in the declared unit of each Category in this EPD is shown below.

Biogenic carbon content per declared unit	Unit	Quantity
		Category III
Biogenic carbon content in product	kg C	n/a
Biogenic carbon content in packaging	kg C	0.6

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO<sub>2</sub>

# Interpretation

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Glass accounts for around 90% of the mass of a partition and approximately 80% of the GWP<sub>total</sub> indicator (carbon footprint). In all environmental categories, aluminium accounts for a higher proportion of indicator totals than the proportion it represents of total door or partition mass. When thinner glass is used, the contribution of the glass to the GWP<sub>total</sub> indicator is less: at its lowest approximately 65% in a partition with 10mm toughened glass.

The Water Deprivation Potential and GWPluluc indicators are strongly influenced by data relating to aluminium production. However, there are weaknesses in the relevant background data, therefore the indicator values obtained are considered unreliable. GWPluluc makes only a small contribution to GWP<sub>total</sub> for these products.

For ODP, releases of Halon 1301, Halon 1211 and CFC-114 in generic inventory data for upstream processes account for almost 95% of the indicator values obtained. Some information sources of these generic data predate Montreal Protocol deadlines for replacement of these substances in all but essential uses. ODP indicator values should therefore be treated with caution.

PENRE and ADPF, although reported in the same units, are calculated by different methods. PENRE includes nuclear energy and energy in wood extracted from primary forests, whereas ADPF does not. The fossil fuel-derived component of PENRE is identical to the ADPF indicator value.

Across all impact categories, changing the glass thickness in a Category I partition by 2mm is associated with a change in environmental impact indicator of between 8% and 16%; for GWP<sub>total</sub> (carbon footprint) the sensitivity is slightly less, ranging from 11% to 14% per 2mm change. For the other categories of partition covered by this EPD, the sensitivity to glass thickness is similar but slightly less, because of the greater, constant aluminium content.

Where the impact assessment methods are comparable, the indicator values reported in this EPD are in line with those reported in the previous EPD for OPL's glazed partitions (EPD S-P-00481), once the latter are scaled to the 1m<sup>2</sup> declared unit used here.

The reporting of Module D shows benefits as negative indicator values.

# References

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## **Glossary**

The International EPD® System: a programme for Type III environmental declarations, maintaining a system to verify and register EPD®s as well as keeping a library of EPD®s and PCRs in accordance with ISO 14025. ([www.environdec.com](http://www.environdec.com))

Life cycle assessment (LCA): LCA studies the environmental aspects and quantifies the potential impacts (positive or negative) of a product (or service) throughout its entire life. ISO standards ISO 14040 and ISO 14044 set out conventions for conducting LCA.

REACH Regulation: REACH is the European Regulation on Registration, Evaluation, Authorisation and Restriction of Chemicals. It entered into force in 2007, replacing the former legislative framework for chemicals in the EU.

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