

Environmental Product Declaration

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

Aluminium Framed Double Glazed Doors



THE INTERNATIONAL EPD® SYSTEM
EPD INTERNATIONAL AB
EPD REGISTRATION NUMBER S-P-05433
ISSUED ON 2022-02-22
VALID TO 2027-02-21

Lower Embodied Carbon Addendum January 2024

In October 2022 OPL started using aluminium with a much reduced embodied carbon content, which was again reduced in January 2024. The lower forecast kgCO₂e value is set out in an independent report at the end of this EPD, which will be updated in due course.

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



Optima

Introduction

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 OPL's aluminium framed double-glazed doors. 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 1m². The LCA was calculated for a door of 1.23m x 2.18m (standard dimensions specified in EN17213) including a typical set of door hardware (a lock, handles, hinges, and a door closer/spring).

Company Profile

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

The Optima 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 design and production management, and operates a quality management system accredited to ISO 9001: 2015 (bmtrada certificate 2367).

In keeping with Optima's determination to drive good environmental practice in the entire product cycle, OPL operates an environmental management system accredited 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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Aluminium framed double glazed door EPD

EPD programme:	The International EPD® System
EPD programme operator:	EPD International AB - Box 210 60 - SE-100 31 Stockholm - Sweden www.environdec.com
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PCR review conducted by:	The Technical Committee of the International EPD® System Chair: Claudia Peña; contact via: info@environdec.com
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 - www.eugeos.co.uk
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

Edge Series

We offer a range of aluminium framed double glazed door systems including the Edge and Elite series. All doors are single action and may be hinged or set on offset pivots when mounted in an Optima Microflush door frames. The Edge series features two striking aluminium framed double glazed doors, the Edge Symmetry and Edge Affinity (along with a flush frameless double glazed door leaf, the Edge Flush).



EDGE SYMMETRY

The double glazed Edge Symmetry is a hugely popular glass door offering excellent acoustic performance. This elegant door is designed for use within our Microflush door frame and can be hinged or pivoted.

The Edge Symmetry door features a slim 30mm standard width stile at the leading edge; 18mm visible on the corridor side when the door is in a closed position. If a lock is required it can be a dead lock, sash lock or latch. Single or paired doors are available, and the maximum door height is 3000mm. The double glazed Edge Symmetry door uses toughened glass throughout: 6mm inside and 8mm outside.



EDGE AFFINITY

The double glazed Edge Affinity door is an aluminium-framed glass door which offers outstanding acoustic performance.

The door features a 78mm wide stile at the leading edge; 66mm visible on the corridor side when the door is in a closed position. The stile can accommodate a dead lock, sash lock or latch. Single or paired doors are available, and the maximum door height is 3000mm. The double glazed Edge Affinity door uses 6mm toughened glass inside and up to 8.8mm annealed acoustic laminated glass outside.

Elite Series

The Elite series, featuring Elite Symmetry and Elite Affinity, is our striking range of aluminium framed double glazed acoustic doors. These 100mm thick glass doors have been designed exclusively for use within our Revolution 100 double glazed system. The Elite doors are double-rebated and incorporate numerous acoustic seals, including two drop seals, in order to achieve impressive acoustic performance.



ELITE SYMMETRY

Elite Symmetry is available as a single-leaf door only.

The door features a minimal 48mm non-lockable stile with just 18mm visible on the corridor side when the door is in its closed position. Elite Symmetry door is non-latching/locking and may be fitted with only a pair of stainless steel pull handles.



ELITE AFFINITY

Elite Affinity is our highest performing acoustic glass door. The 97mm internal leading stile; 67mm visible on the corridor side when the door is in its closed position, can accommodate a dead lock, sash lock or latch.

This high specification door is the result of extensive product development and testing by Optima and pushes the boundaries of the acoustic performance of glass doors.

The Elite Affinity double glazed door uses 6mm toughened glass inside and up to 8.8mm annealed acoustic laminated glass outside. The Elite Affinity door may incorporate a lock case with either a latch, sash lock or dead lock function and will have stainless steel lever handles or pull handles.

Product Information

All Optima doors can be supplied with either powder coated or anodised finish to the aluminium framework.

In this EPD, indicators are declared for 1m² of door based on an Edge Symmetry double glazed door using 6mm toughened and 8.8mm laminated glass, fitted with handles, a lock, hinges and floor spring. This is representative of all Optima double glazed doors with 6mm and 8.8mm laminated glass.

Technical data

The technical characteristics of Optima Products' aluminium framed double glazed doors are summarised below.

Name	Value	Unit
Mass for a unit area	44-47	kg/m ²
Acoustic Testing (EN ISO 10140-1 & 2)		
EDGE Symmetry	41 (up to)	dB(R _w)
EDGE Affinity	42 (up to)	dB(R _w)
ELITE Symmetry	43	dB(R _w)
ELITE Affinity	45	dB(R _w)
Durability Testing (EN 1191 and EN 12400)		
All OPL doors (normal use)	5	Class

All aluminium framed glazed doors produced by OPL are classified CPC 4212 under the UN CPC classification system V2.1.

Manufacturing

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

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

Packaging

Doors are packed onto wooden pallets for transport to the project site, or in wooden crates if exported. Door-frame profiles are packed in cardboard boxes.

OPL uses only FSC certified wood products for deliveries to customers. All pallets are set aside at their destination and returned for re-use.

Product Information

Product use and maintenance

All OPL doors are designed and tested to satisfy the requirements for Class 5 (Normal use) Pedestrian doors according to EN 12400: 2002. Doors should be subjected to regular inspection and maintenance in accordance with the published OPL operation and maintenance schedule - see www.optimasystems.com for further details.

End-of-life

It is recommended that doors 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

EWC 17 04 01 Copper, bronze, brass

EWC 17 04 05 Iron and steel

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.

Content declaration

The material composition of the single-glazed door (including door hardware) 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 - %
Aluminium	6.9	75	0
Glass	35	n/a	0
Steel	1.0	25	0
PVC	0.1	0	0
Other polymers	0.8	0	0
Other metals	0.4	n/a	0
Other materials	0.1	n/a	0
Total:	44		

Packaging materials	Weight - kg	Weight - % (vs product)
Wood	4	8
Total	4	8

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's double glazed doors 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

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
<p style="text-align: center;">Modules declared X included in LCA - ND: module not declared - NR: module not relevant</p>																
X	X	X	X	X	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
<p style="text-align: center;">Geography</p>																
GLO	GLO	GB	GB	GB	-	-	-	-	-	-	-	GB	GB	GB	GB	GLO
<p style="text-align: center;">Specific data used</p>																
85	>90	>90	>90	>90	-	-	-	-	-	-	-	-	-	-	-	-
<p style="text-align: center;">Variation - products</p>																
<10 %	<5 %	<5 %	<5 %	<5 %	-	-	-	-	-	-	-	-	-	-	-	-
<p style="text-align: center;">Variation - sites</p>																
n/a	n/a	n/a	n/a	n/a	-	-	-	-	-	-	-	-	-	-	-	-

Environmental Performance-Related Information

Declared unit

The declared unit is one square metre. The LCA is calculated on the basis of a 1.23m x 2.18m door that includes a typical set of door hardware: a lock, handles, hinges, and a door closer/spring.

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".

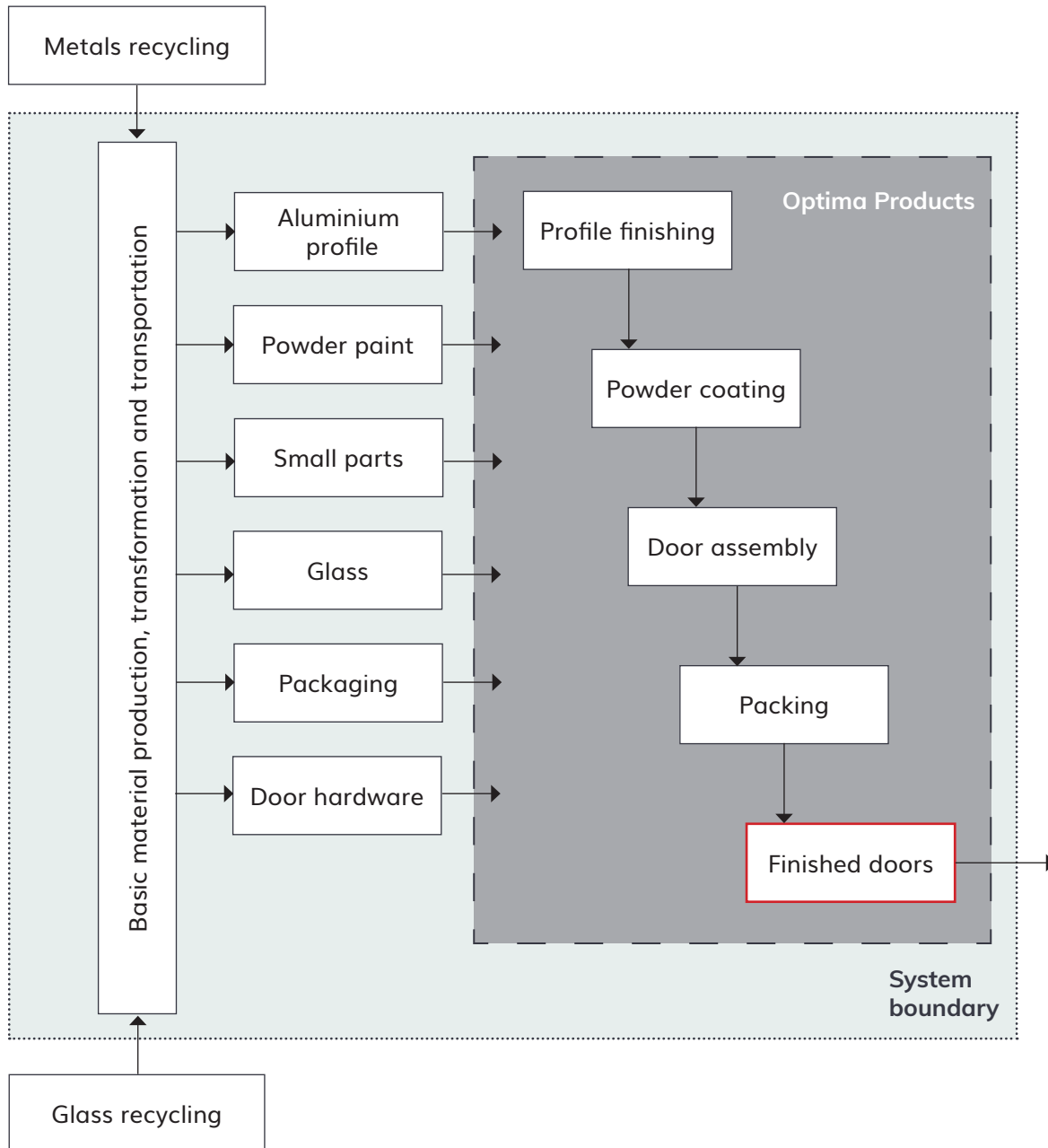
Module C1 - C4 cover the end-of-life stage.

Module D provides an estimate of the potential benefits that would accrue to a different product system were the door 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 MANUFACTURING FACILITY-PRODUCED GLAZED DOOR LCA

Environmental Performance-Related Information

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 <0.1% 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 OPL. 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.

Manufacturing facility 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 0.43kgCO₂e/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 OPL. Consumption of 0.15kWh electricity per declared unit is assumed, to account for the use of hand-held power tools. Pallets leaving the system in Module A5 are included in the inventory as components for reuse; the same assumptions are applied for transport as in Module C2. 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, therefore both are assumed to be separated in Module C3. The materials remaining after separation of glass and metals represent <0.5% of the total mass of the installed product. 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 exporting energy from waste management activities, were the 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	1.5	kg
Glass	recovered	limestone aggregate	1	35	kg
Glass	recycled	white packaging glass	1	3.9	kg
Steel	recycled	generic converter steel	1	0.7	kg

Environmental indicators

This EPD contains environmental information about OPL's aluminium framed double glazed doors 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
Potential environmental impacts		
Climate change – GWP fossil	GWP-fossil	kg CO ₂ eq
Climate change – GWP biogenic	GWP-biogenic	kg CO ₂ eq
Climate change – GWP land transformation	GWP-luluc	kg CO ₂ eq
Climate change – GWP total	GWP-total	kg CO ₂ eq
Climate change - GWP fossil & land transformation ¹	GWP-GHG	kg CO ₂ eq
Acidification potential	AP	mol H ⁺ eq
Eutrophication – freshwater	EP-freshwater	kg P eq & kg PO ₄ ³⁻ 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 ²	ADPMM	kg Sb eq
Depletion of abiotic resources – fossil fuels ²	ADPFF	MJ, ncv
Water (user) deprivation potential ²	WDP	m ³ world-eq deprived

Environmental Performance-Related Information

Parameter	Abbreviation	Units
Resource use		
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 ³
Wastes		
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	TRWD	kg
Output flows		
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

ALUMINIUM FRAMED DOUBLE GLAZED DOOR

Environmental indicator results for OPL's double-glazed doors 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 ₂ eq	9.76E+01	2.05E+00	1.73E-02	1.73E-02	1.90E+00	9.55E-01	0.00E+00	-1.40E+01
GWP-biogenic	kg CO ₂ eq	-7.55E+00	-7.80E-04	7.89E+00	-1.79E-05	-7.20E-04	-6.86E-02	0.00E+00	2.72E-01
GWP-luluc	kg CO ₂ eq	3.35E-01	9.00E-04	1.10E-06	1.10E-06	8.30E-04	1.16E-03	0.00E+00	-3.14E-02
GWP-total	kg CO ₂ eq	9.04E+01	2.06E+00	1.73E-02	1.73E-02	1.90E+00	8.88E-01	0.00E+00	-1.38E+01
GWP-GHG	kg CO ₂ eq	9.83E+01	2.05E+00	1.73E-02	1.73E-02	1.90E+00	9.60E-01	0.00E+00	-1.41E+01
AP	mol H ⁺ eq	5.04E-01	4.87E-03	4.20E-05	4.20E-05	4.50E-03	8.23E-03	0.00E+00	-8.84E-02
EP-freshwater	kg P eq	3.93E-03	1.99E-05	5.56E-07	5.56E-07	1.84E-05	7.36E-05	0.00E+00	-4.40E-04
	kg PO ₄ ³⁻ eq	1.20E-02	6.11E-05	1.71E-06	1.71E-06	5.65E-05	2.26E-04	0.00E+00	-1.35E-03
EP-marine	kg N eq	5.49E-02	6.40E-04	8.79E-06	8.79E-06	5.90E-04	6.50E-04	0.00E+00	-1.39E-02
EP-terrestrial	mol N eq	6.99E-01	7.08E-03	9.58E-05	9.58E-05	6.54E-03	8.38E-03	0.00E+00	-1.57E-01
POFP	kg NMVOC eq	2.07E-01	3.40E-03	2.57E-05	2.57E-05	3.14E-03	3.09E-03	0.00E+00	-4.47E-02
ODP	kg CFC-11 eq	1.10E-05	4.55E-07	1.75E-09	1.75E-09	4.21E-07	1.28E-07	0.00E+00	-1.12E-06
ADPMM	kg Sb eq	1.73E-02	7.40E-05	1.34E-08	1.34E-08	6.84E-05	5.75E-05	0.00E+00	-4.66E-03
ADPFF	MJ, ncv	1.33E+03	3.03E+01	3.03E-01	3.03E-01	2.80E+01	1.27E+01	0.00E+00	-1.85E+02
WDP	m ³ world-eq dprv	1.08E+04	3.67E+01	2.44E-01	2.44E-01	3.39E+01	7.79E+01	0.00E+00	-8.96E+02
Resource use									
PERE	MJ	1.58E+02	5.22E-01	1.89E-03	1.89E-03	4.83E-01	2.34E+00	0.00E+00	-1.77E+01
PERM	MJ	5.79E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	2.16E+02	5.22E-01	1.89E-03	1.89E-03	4.83E-01	2.34E+00	0.00E+00	-1.77E+01
PENRE	MJ	1.45E+03	3.11E+01	4.80E-01	4.80E-01	2.87E+01	1.48E+01	0.00E+00	-1.94E+02
PENRM	MJ	2.54E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	1.48E+03	3.11E+01	4.80E-01	4.80E-01	2.87E+01	1.48E+01	0.00E+00	-1.94E+02
SM	kg	6.75E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	1.42E+00	1.89E-02	2.24E-05	2.24E-05	1.74E-02	6.01E-02	0.00E+00	-1.24E-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 ³	1.00E+00	2.62E-03	6.70E-05	6.70E-05	2.42E-03	6.16E-03	0.00E+00	-1.05E-01
Waste									
HWD	kg	8.65E+00	3.62E-02	8.40E-04	8.40E-04	3.34E-02	7.56E-02	0.00E+00	-1.95E+00
NHWD	kg	2.04E+02	2.01E+00	2.39E-02	2.39E-02	1.86E+00	4.54E+00	0.00E+00	-2.01E+01
TRWD	kg	5.21E-03	2.10E-04	3.67E-06	3.67E-06	1.90E-04	7.73E-05	0.00E+00	-4.90E-04
Output flows									
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	2.15E+00	1.23E-02	1.39E-05	1.39E-05	1.14E-02	8.37E+00	0.00E+00	-2.92E+00
MER	kg	1.68E-02	2.10E-04	3.21E-07	3.21E-07	1.90E-04	6.60E-04	0.00E+00	-1.55E-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

ALUMINIUM FRAMED DOUBLE GLAZED DOOR ENVIRONMENTAL IMPACTS (EN 15804+A1:2013)

For information, indicator values calculated using the methods prescribed in the earlier version of EN 15804 (EN 15804+A1:2013) are provided in the table below for the declared unit of 1m²; 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 ₂ eq	9.61E+01	2.04E+00	1.71E-02	1.71E-02	1.88E+00	9.40E-01	0.00E+00	-1.36E+01
Depletion potential of the stratospheric ozone layer	ODP	kg CFC-11 eq	9.40E-06	3.63E-07	1.98E-09	1.98E-09	3.35E-07	1.10E-07	0.00E+00	-9.64E-07
Acidification potential of land and water	AP	kg SO ₂ eq	4.48E-01	4.22E-03	3.56E-05	3.56E-05	3.90E-03	7.40E-03	0.00E+00	-7.73E-02
Eutrophication potential	EP	kg PO ₄ ³⁻ eq	3.61E-02	4.10E-04	4.79E-06	4.79E-06	3.80E-04	5.10E-04	0.00E+00	-6.47E-03
Formation potential of tropospheric ozone photochemical oxidants	POCP	kg ethene eq	3.21E-02	2.50E-04	1.62E-06	1.62E-06	2.30E-04	3.60E-04	0.00E+00	-4.64E-03
Abiotic depletion potential for non-fossil resources	ADPE	kg Sb eq	1.73E-02	7.40E-05	1.34E-08	1.34E-08	6.84E-05	5.75E-05	0.00E+00	-4.66E-03
Abiotic depletion potential for fossil resources	ADPF	MJ	1.33E+03	3.03E+01	3.03E-01	3.03E-01	2.80E+01	1.27E+01	0.00E+00	-1.85E+02

Biogenic carbon

Carbon dioxide (CO₂) 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 in the wood contained in the declared unit in this EPD is shown below.

Biogenic carbon content per declared unit	Unit	Quantity
Biogenic carbon content in product	kg C	<0.5
Biogenic carbon content in packaging	kg C	2

Note: 1 kg biogenic carbon is equivalent to 44/12 kg CO₂

Interpretation

Glass accounts for 80% of the GWPTotal indicator (carbon footprint). The door hardware accounts for 12.5% of the indicator total, although the door hardware set accounts for <5% of the total mass of the finished door. GWPTotal obtained for the double-glazed Symmetry door without hardware is 80.3 kg CO₂eq per m².

Door hardware is even more significant for other environmental impact categories. It accounts for > 90% of the ADPMM indicator value, reflecting the relative scarcity of the metals used compared to aluminium and the raw materials for glass.

The Water Deprivation Potential and GWPluluc indicators are strongly influence 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 GWPTotal 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 ADPFF, although reported in the same units, are calculated by different methods. PENRE includes nuclear energy and energy in wood extracted from primary forests, whereas ADPFF does not. The fossil fuel-derived component of PENRE is identical to the ADPFF indicator value.

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 doors (EPD S-P-00480), once the latter are scaled to the 1m² declared unit used here.

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

References

ecoinvent database (v3.6) - www.ecoinvent.ch

BS EN 1191:2012 - Windows and doors. Resistance to repeated opening and closing.

EN 12400:2002 - Windows & Doors - Mechanical durability - requirements and classification.

EN 15804:2012 + A1:2013 and EN 15804:2012 + A2:2019 - Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products.

General Program Instructions, V3.1, 2019-09-18 - The International EPD® System - EPD International AB.

ISO 9001:2015 - Quality management system. Requirements.

ISO 14001:2015 - Environmental management systems - Requirements with guidance for use.

ISO 10140-1:2016 - Acoustics - Laboratory measurement of sound insulation of building elements - Part 1: Application rules for specific products

ISO 10140-2:2010 - Acoustics - Laboratory measurement of sound insulation of building elements - Part 2: Measurement of airborne sound insulation

ISO 14025:2009-11: Environmental labels and declarations - Type III environmental declarations - Principles and procedures.

OPL LCA - Report for OPL - EuGeos Limited (2022).

PCR 2019:14 Construction products Version 1.11, 2021-02-05 - The International EPD® System - EPD International AB.

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)

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.



CARBON CALCULATION REPORT

for

Optima Products Limited

Executive Summary

Optima (OPL) has previously appointed a third-party consultant to produce Environmental Protection Declarations (EPDs) for a range of their products. For the aluminium material used in the products OPL have already begun to use an aluminium with a lower embodied carbon, in kgCO₂e, owing to its 75% recycled content – made up from post-consumer recycled aluminium. Average raw material used in this aluminium are:

- Post-Consumer Scrap: 81%
- Primary Ingot: 11%
- Process Scrap (also denoted pre-consumer scrap): 8%
- Alloying Materials: 0.1%

OPL approached Tunley Engineering to perform forecast calculations to estimate the carbon reductions for a range of products owing to the use of the more environmentally friendly aluminium. Tunley Engineering conducted the calculations to provide OPL with the expected carbon reduction that will result from use of the high recycled content aluminium for their products. These serve as interim forecasts until such time as a full set of updated EPDs are available.

Introduction and Assumptions

The current EPD documents for OPL products containing aluminium provide embodied carbon values for those products. Since the publication of these EPDs, OPL have proactively sought and implemented use of a more environmentally responsible aluminium material that contains a high content of post-consumer recycled aluminium. This reduces the embodied carbon for the aluminium content of each product.

An appropriate emission factor value for the billet of aluminium commonly used in the UK, excluding all further processing, as these factors remain unchanged, is 6.7 kgCO₂e/kg. The aluminium billet made using 75% post-consumer recycled aluminium has a lower carbon emission factor at 1.8 kgCO₂e/kg.

Tunley Engineering assumed that all emission sources other than aluminium (billet or ingot) remain the same. The change is a direct result of exchanging the aluminium and nothing else within the EPD has otherwise changed.

The data provided in this report provides a forecast estimation for the products, to act as an intermediate guide until such time as full EPD updates can be provided.

Data

Table 1: Embodied carbon forecasts for OPL products resulting from implementing 75% recycled content Aluminium. All data is reported using declared unit of one m², with the exception of AMRs, which is reported per AMRs of 3 m x 3 m and 3 m x 6 m.

Product		EPD Published GWP-GHG (kgCO ₂ e)	Forecast Emissions (kgCO ₂ e)	Reduction (kgCO ₂ e)	Reduction (%)
Partition	Optima 117+ 12.8mm – Cat I	46.6	43.2	3.1	7%
Partition	Optima 117+ 12.8mm – Cat II	50.4	44.5	5.3	12%
Partition	Optima 117+ 12.8mm – Cat III	51.4	43.6	7.0	15%
Partition	Optima 117+ 16.8mm - Cat I	59.7	55.8	3.5	7%
Partition	Optima 117+ 16.8mm - Cat II	64.7	55.9	7.9	14%
Partition	Revolution 54 (Single Glazed) – Cat I	53.3	46.4	6.2	13%
Partition	Revolution 54 (Single Glazed) – Cat II	57.0	46.7	9.2	18%
Partition	Revolution 54 (Double Glazed) – Cat I	94.0	87.1	6.2	7%
Partition	Revolution 54 (Double Glazed) – Cat II	100.0	89.7	9.2	10%
Partition	Revolution 54 (Double Glazed) – Cat III	115.0	97.4	15.8	15%
Partition	Revolution 100 (Single Glazed) – Cat I	70.7	59.4	10.1	16%
Partition	Revolution 100 (Single Glazed) – Cat II	74.9	59.2	14.1	21%
Partition	Revolution 100 (Single Glazed) – Cat III	76.4	58.3	16.3	24%
Partition	Revolution 100 (Double Glazed) – Cat I	98.0	86.7	10.1	12%
Partition	Revolution 100 (Double Glazed) – Cat II	102.0	86.3	14.1	15%
Partition	Revolution 100 (Double Glazed) – Cat III	104.0	85.9	16.3	17%
Door	Edge Symmetry (Single Glazed)	88.6	54.8	30.4	38%
Door	Edge Symmetry (Double Glazed)	98.3	64.5	30.4	34%
Door	Edge Affinity (Single Glazed)	88.6	54.8	30.4	38%
Door	Edge Affinity (Double Glazed)	98.3	64.5	30.4	34%
Door	Elite Symmetry (Double Glazed)	98.3	64.5	30.4	34%
Door	Elite Affinity (Double Glazed)	98.3	64.5	30.4	34%
Other	Fabric Adaptable Wall	57.1	28.7	25.5	50%
Other	Laminate Adaptable Wall	53.9	25.5	25.5	53%
Other	AMR 3 m x 3 m	4,040.0	2,962.0	968.0	27%
Other	AMR 3 m x 6 m	5,840.0	4,272.0	1,408.0	27%

*The different categories for each product refers to differing aluminium content and product specification as detailed in each EPD.

In all instances, biogenic removals were neglected due to lack of clarity in the end-of-life routes and information on source of such removals. Therefore, these calculations are based on “GWP-GHG” in the EPDs.

Example calculations for potential reduced emissions from using recycled aluminium.

Product: Revolution 100 – Cat III, 3.3-3.7 kg Al/m², 16.8 mm glass, 100x50 mm profiles.

Declared unit: one m².

Data from the current EPD for GWP-GHG A1-A3: 76.4 kgCO₂e

Mass of Al in the declared unit: 3.7 kg

Emissions of the Al content: 3.7 kg x 6.7 kgCO₂e/kg = 24.8 kgCO₂e

New emissions (assuming Circa 75R) of Al: 3.7 kg x 1.8 kgCO₂e/kg = 6.7 kgCO₂e

Reduction = 24.8-6.7 = 18.1 kgCO₂e

New emissions = 76.4-18.1 = 58.3 kgCO₂e.

Percentage reduction = 18.1/76.2 = 24%.



Approval (Internal use only)

Issued by:	Tunley Engineering Ltd.
Approved by:	Gareth Davies PhD MChem
Approved Date:	28 th November 2023
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