PILKINGTON

NSG GROUP

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025:2006
AND EN 15804:2012+A2:2019/AC:2021 FOR:

Pilkington **Insulight**™ 6/16/6 DOUBLE IGU WITH OFFLINE COATED GLASS

FROM

PILKINGTON GROUP LIMITED
Part of the NSG GROUP

EPD REGISTRATION NUMBER: S-P-02493

PUBLICATION DATE:
2023-11-03
VALID UNTIL 2028-10-31

EPD®

Programme: The International EPD® System
Programme operator: EPD International AB
www.environdec.com

ECO PLATFORM EPD VERIFIED

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

This Environmental Product Declaration has been verified by an independent third party.

PROGRAMME INFORMATION

EPD programme	The International EPD® System
EPD programme operator	EPD International AB - Box 210 60 - SE 100 31 Stockholm - Sweden www.environdec.com - info@environdec.com
EPD based on Product Category Rules	The CEN standard EN 15804 serves as the core PCR
	The International EPD® System's PCR 2019:14 Construction products (EN 15804:A2) (V1.2.5, 2022-11-01) c-PCR009 EN 17074:2019 Glass in building - Environmental product declaration - Product category rules for flat glass products
PCR review conducted by	The Technical Committee of the International EPD® System Chair: Claudia Peña; contact via info@environdec.com
EPD verification	Independent verification of this EPD and data, according to ISO 14025:2006 via: ☐ EPD process certification ■ EPD verification
Third party verifier	Ugo Pretato, Studio Fieschi & soci (Italy) - Recognized Individual Verifier
Approved by	The International EPD® System
Procedure for data follow-up during EPD validity	involves third party Verifier: yes ☐ no ■
Declaration No	S-P-02493
Date of publication	2023-11-03
EPD valid until	2028-10-31
EPD owner	Pilkington Group Limited Hall Lane - Lathom - Lancashire L40 5UF - United Kingdom www.pilkington.com
Product name	Pilkington **Insulight™** 6/16/6 Double IGU with Offline Coated Glass
UN CPC code	371
Declared unit	One square metre (1 m^2)
System boundaries	Cradle to grave with Module D
EPD geographical scope	Europe
LCA conducted by	EuGeos Limited - www.eugeos.co.uk
LCA software	openLCA
Background database	ecoinvent V3.8

This EPD provides environmental performance indicators for Pilkington **Insulight™** Insulating Glass Units (IGUs) manufactured by NSG. This is a cradle-to-grave and module D EPD in accordance with the requirements of EN 15804 and PCR EN 17074:2019.

The EPD is based on a life cycle assessment (LCA) study which used production data for year 2019 from NSG's manufacturing facilities in Europe. Background data were taken from the ecoinvent database (v3.8). 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 and a brief explanation of those results.

The EPD owner has the sole ownership, liability, and responsibility for the EPD.

EPDs within the same product category but registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

Company profile

THE NSG GROUP

(NIPPON SHEET GLASS CO. LTD. AND ITS GROUP COMPANIES)

The NSG Group is the world's leading supplier of glass and glazing systems in the business areas of Architectural, Automotive and Creative Technology. In 2006 it acquired the leading global glass supplier, Pilkington, and today the Group has principal operations around the world and sales in over 100 countries.

Our glazing products are sold under the 'Pilkington' brand name.

Architectural manufactures and supplies architectural glass as well as glass for the solar energy and other sectors.

Automotive serves the original equipment (OE) and aftermarket replacement (AGR) glazing markets.

Creative Technology comprises several discrete businesses, including lenses and light guides for printers and scanners, and speciality glass fiber products such as glass cord for timing belts and glass flake.

In Europe, besides others, the following companies are subsidiaries of Pilkington Group Ltd. They manufacture and/or sell glass for the Architectural sector:

- Pilkington Austria GmbH
- Pilkington Danmark A/S
- Pilkington Deutschland AG
- Pilkington Floatglas AB
- Pilkington Glass Service SAS
- Pilkington Glasveredelung GmbH
- Pilkington IGP Sp. z o.o.
- Pilkington Italia SpA
- Pilkington Lahden Lasitehdas Oy
- Pilkington Nederland BV
- Pilkington Norge AS
- Pilkington Polska Sp. z o.o.
- Pilkington Sverige AB
- Pilkington United Kingdom Limited

CONTACT

Sharon Williams, NSG Group Sustainability Technical Manager
NSG European Technical Centre
Hall Lane
Lathom
Lancashire L40 5UF
United Kingdom

Email: sharon.williams@nsg.com

Web: www.pilkington.com

Product information

PILKINGTON INSULIGHT™ 6/16/6 DOUBLE IGU

WITH OFFLINE COATED GLASS

Double IGUs (defined in EN 1279-1) are sealed units that comprise two sheets of glass separated by a spacer and sealed around the edge with polymeric sealant; a desiccant is contained within the unit to prevent condensation on the inside surfaces.

IGUs are available in a wide range of dimensions and configurations. Different variants provide different technical performance characteristics.

Performance characteristics such as light transmittance, thermal transmittance (U value) and acoustic properties can be calculated for any of our products via Pilkington Spectrum: https://spectrum.pilkington.com/.

This EPD applies to Pilkington **Insulight™** double insulating glass unit comprising one pane of 6 mm offline coated glass, 16 mm argon gas-filled cavity and one pane of 6 mm clear float glass. This product is representative for double IGUs of this configuration with aluminium, steel and polymer spacer bars, and a with 12-20 mm gap between the panes and filled with air or argon.

Offline coated glass may come from the following ranges:

- Pilkington **Suncool™** range
- Pilkington **Optitherm™** range
- Pilkington **K Glass™** S range
- Pilkington **Mirropane™** Chrome range
- Pilkington Spandrel Glass Coated range

and uncoated float glass from:

- Pilkington **Optifloat™** Clear and Tinted

Pilkington offline coated glass products are covered by EPD S-P-08819 and Pilkington uncoated float glass products by EPD S-P-08816.

Detailed product information and datasheets can be found on our website: www.pilkington.com.

IGUs are classified CPC371 under the UN CPC classification system v2.1.

MANUFACTURING

All glassmaking begins with the raw materials being melted in a furnace. In the float process, raw materials, along with glass cullet, are loaded into a furnace where they are melted and transformed into molten glass. This is fed onto the surface of an enclosed bath of molten tin. The molten glass floats on top of the tin, cooling and forming a ribbon of uniform, controllable thickness as it flows along the tin surface. The glass is then annealed to relieve stresses, and cut to sizes at the end of the process.

To produce double IGUs two cut sheets of the required size are placed in a jig with the spacer to hold them apart at the required distance. The void between the sheets is evacuated and/or flushed with gas, then polymeric sealants are applied to the circumference. A desiccant is included to prevent condensation.

Pilkington **Insulight™** IGUs are manufactured by NSG Group within the Architectural Glass Europe business unit at facilities in Poland, the Netherlands, Germany, Austria, Sweden and Norway. The production facilities in Poland, Sweden and the Netherlands are ISO 14001-certified; their certificates can be found at: https://www.pilkington.com/en-gb/uk/architects/standards-and-regs/iso-certificates

PACKAGING & TRANSPORTATION

Glass products are normally transported on or in vehicles equipped with specialised racking, to which they are mechanically restrained by straps.

Some glass is transported in other ways, for example in standard shipping containers; in these situations timber cases or frames are commonly used as packaging.

Other packaging materials such as foam pads or cardboard spacers used in small quantities were omitted from the LCA.

INSTALLATION

IGUs are delivered in the final configuration ready for installation. Following EN 17074, in this EPD it is assumed that no waste other than packaging waste is generated at installation.

PRODUCT USE AND MAINTENANCE

Pilkington IGUs consume no energy in use. Once installed, they require only cleaning and no other maintenance during the 30-year reference service life.

END-OF-LIFE

As waste, IGUs fall under European Waste Catalogue (EWC) code 17-02-02. Pilkington recommend that glass be segregated for separate collection and recycling.

CONTENT INFORMATION

The material composition calculated for the representative IGU covered by this EPD is shown below:

Product components	Weight (kg)	Post-consumer material (weight - %)	Biogenic material (weight - % and kg C/kg)
Glass	30	assumed 0	0
Polymer sealants	0.4	assumed 0	assumed 0
Aluminium	0.1	assumed 0	0
Desiccant	<0.1	0	0
Argon	<0.1	0	0
TOTAL	**31**	**assumed 0**	**assumed 0**

Packaging materials	Weight (kg)	Weight (% vs product)	Weight biogenic carbon (kg C/kg)
Wood	0.1	<5	0.5
TOTAL	**0.1**	**<5**	**0.5**

At the time of data collection, no substance included in the Candidate List of Substances of Very High Concern for authorization under the REACH Regulations is present in the products covered by this EPD either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

RESIDUAL RISKS AND EMERGENCIES

There are no residual risks associated with the normal day-to-day use of the glass covered by this EPD in applications for which it is intended. Care must be taken to select materials in accordance with their declared properties and any other associated regulations governing their usage.

LCA information

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

The LCA was carried out by EuGeos using openLCA software and production data for calendar year 2019 from NSG manufacturing facilities; background data were taken from the ecoinvent database (v3.8).

Declared unit

The declared unit is one square metre (1 m^2)

Reference service life

A reference service life of 30 years is used for this EPD, as prescribed in EN 17074:2019.

Geographical scope

Modules A1 - A3 represent production at all Pilkington architectural glass manufacture and processing facilities in Europe; module A4 and A5 also represent delivery and installation in Europe.

LCA scope

This EPD covers the whole life cycle from cradle-to-grave and beyond. Following EN 17074, since the 30-year reference service life is applied, there are no burdens associated with modules B1, B3, B4, B5, B6 and B7. These modules are included with indicator values of zero in the EPD. As permitted by EN 15804, modules A1-A3 are declared in aggregated form.

Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
Raw material supply	Transport	Manufacturing	Transport to the site	Assembly/ Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste treatment	Disposal	Reuse- recovery- recycling- potential
A 1	A 2	A 3	A 4	A 5	B 1	B 2	B 3	B 4	B 5	B 6	B 7	C 1	C 2	C 3	C 4	D
Modules declared X included in LCA - ND: module not declared																
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
Geography																
GLO	Europe				Europe							Europe				Europe
Specific data used																
>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - products																
+/-<10%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation - sites																
+/- 5%			-	-	-		-	-	-	-	-	-	-	-	-	-

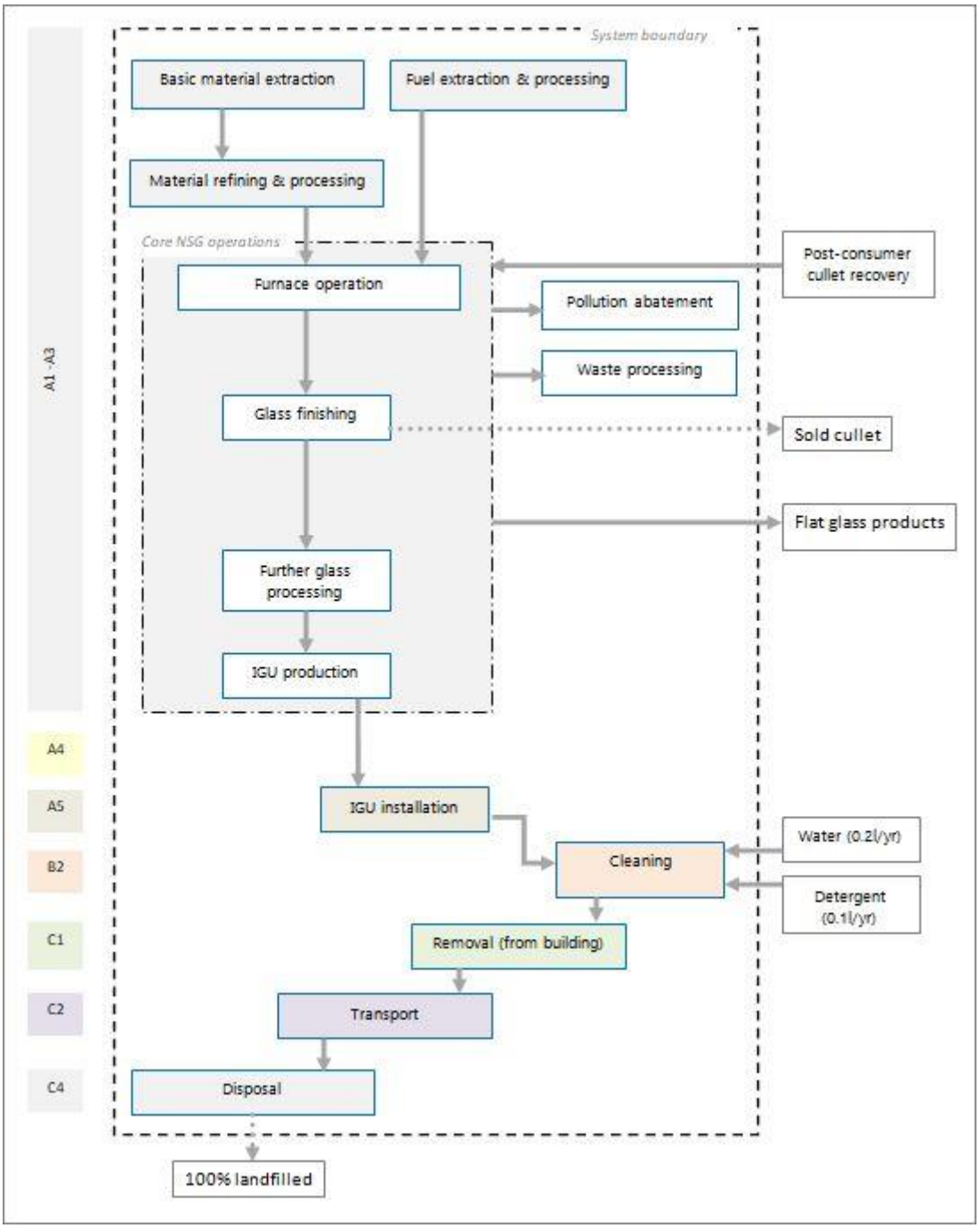
SYSTEM BOUNDARIES

The system boundary of the EPD is defined using the modular approach set out in EN 15804.

As well as the core processes which cover manufacture of glass and IGUs at NSG sites in Europe, the system includes production of all raw materials and components from basic resources; transport of those materials at all stages up to users' sites, subsequent installation and end-of-life management; the production of fuels and energy carriers and their delivery to manufacturing sites; the treatment of all wastes.

The processing of recycled material inputs prior to them passing the end-of-waste state is outside the system boundary.

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



Data sources and data quality

Data characterising NSG's core processes (see above figure) were collected for a continuous 12-month period between 2019/01/01 and 2019/12/31. The collected data cover all float glass and >95% of IGUs production by NSG in Europe.

These data were checked to ensure that sufficient materials and water are included within the inputs to account for all products, wastes and emissions.

Background data

Background (generic) data were taken from the ecoinvent database (v3.8); this fulfils the EN 15804 requirement that generic data used in the LCA have been updated within the last 10 years. The quality of generic data has been reviewed and specific datasets used where necessary to better reflect actual operations in NSG's supply chain.

Cut-off criteria

The collected data encompassed all raw materials, packaging materials and process aids, as well as associated transport to the manufacturing site. Process energy and water use, emissions to air or water and direct production waste are included within the data.

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 or 1% of the total energy content of fuels and energy carriers; some ancillary materials used in small quantities within the process and amounting, in combination, to <0.1% of total input materials were omitted from the LCA underpinning this EPD.

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.

Assumptions and estimates

Inputs to and outputs from the system are accounted for over a 100-year time period; long-term emissions are therefore omitted from the impact assessment part of the LCA, except for biogenic carbon-containing flows, which are accounted for on an indefinite timeframe.

Pre-consumer and internal cullet used in glassmaking may be internal process scrap, scrap from secondary processing on the same site or at other sites of the same business, or waste from independent secondary processors. In the LCA, no burdens were allocated to either produced internal cullet or to used pre-consumer cullet; mass balance showed that net cullet consumption across glass producing sites is small, therefore this approach has minimal influence on indicator values.

The "primary renewable energy used as material" indicator (PERM) is calculated applying a characterisation factor of 16MJ/kg for wood used as packaging. Surfactant consumed in module B2 is omitted as a simplification, so that both PENRM and PERM are zero for this module. "Primary energy as fuel" indicators (PENRE, PERE) are calculated as the total primary energy demand minus primary energy used as material. Module D calculations exclude any third-party recycling of packaging or process wastes arising in Modules A1-A5.

In Module A5, following EN 17074, it is assumed that no waste other than packaging waste is generated at installation.

Removal from the building is assumed to involve no mechanical processes, therefore no environmental burdens or benefits are associated with module C1.

Glass that is sent for landfill disposal requires and receives no treatment, therefore there are no activities in module C3 and the environmental indicator values are reported as zero.

Final disposal (module C4) is modelled as disposal of the entire declared unit in landfill.

Because 100% landfill of the product after removal from the building is assumed, there are no benefits or loads beyond the system boundary (Module D). All indicators for Module D are therefore reported as zero.

Transport to waste processing, waste treatment and final disposal are modelled using scenarios; the relevant parameters for the transport scenarios are shown in the table on the following page.

Transport scenario	Transport	
	to site (A4)	to waste treatment (C2)
Parameters	**Quantity & unit**	
Vehicle type	lorry	lorry
Vehicle load capacity	16 t	10 t
Fuel type and consumption	diesel, 0.3 l/km	diesel, 0.1 l/km
Volume capacity utilisation factor	1	1
Capacity utilisation (including empty returns)	38%	33%
Distance to site	200 km	50 km
Bulk density of transported products	2500 kg/m^3	2500 kg/m^3

INTERPRETATION OF THE LCA RESULTS

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

Indicator values obtained for resource depletion (ADPMM, ADPFF), stratospheric ozone depletion (ODP), eutrophication (EP) freshwater and water deprivation (WDP) potential should be used with caution; all are subject to uncertainties in data or method which limit the scope for their use as the basis for comparisons.

GWP-biogenic is not relevant to the product; the values for this indicator are of limited significance in terms of GWP-total and should be regarded as highly uncertain.

In this study, the FW indicator is strongly driven by generic data characterising upstream processes which may not represent well the actual activities in NSG's particular supply chain.

No untreated wastes leave the modelled system, which includes waste treatment activities as required by EN 15804. The waste indicators HWD, NHWD and TRWD presented in this EPD therefore represent waste flows *within* the modelled system.

The secondary materials (SM) indicator includes all secondary materials used in the modelled system and does not represent the recycled material content of the product.

The MER and MFR indicators also include flows leaving the background system.

The contribution to the overall indicators for the production stage of the life cycle (Modules A1-A3) from spacer materials and argon is relatively small: <10% for carbon footprint (GWPtotal).

Use of thicker glass in the IGU leads to higher environmental performance indicator values for 1 m^2 of IGU, the increase being almost entirely associated with additional production and transport of glass. For each of uncoated float and offline coated glass the GWPtotal indicator increases by approximately 3.5 kgCO_2e per mm additional thickness.

ENVIRONMENTAL INDICATORS

This EPD contains environmental information 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	Unit
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
Eutrophication – marine	EP-marine	kg N eq
Eutrophication – terrestrial	EP-terrestrial	mol N eq
Photochemical ozone formation	POCP	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
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
Waste production		
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

ENVIRONMENTAL INDICATOR RESULTS (PER DECLARED UNIT)

Environmental indicator results for all declared modules are shown in the following tables for the declared unit of one square metre (1 m^2) of Pilkington **Insulight™** 6/16/6 Double IGU with Offline Coated Glass.
The A1 - A3 modules are shown on an aggregated basis; the results of modules A1-A3 should not be used without considering the results of module C.

PILKINGTON INSULIGHT™ 6/16/6 DOUBLE IGU WITH OFFLINE COATED GLASS

ENVIRONMENTAL IMPACTS (EN 15804 + A2)

	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-fossil	kg CO_2 eq	4.76E+01	5.57E-01	9.60E-04	0.00E+00	9.34E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-01	0.00E+00	3.36E-01	0.00E+00
GWP-biogenic	kg CO_2 eq	-4.99E-02	5.68E-04	5.35E-02	0.00E+00	-4.47E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.29E-04	0.00E+00	-3.42E-02	0.00E+00
GWP-luluc	kg CO_2 eq	1.62E-01	1.98E-04	6.15E-07	0.00E+00	3.01E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.85E-05	0.00E+00	2.60E-04	0.00E+00
GWP-total	kg CO_2 eq	4.77E+01	5.58E-01	5.45E-02	0.00E+00	7.87E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.55E-01	0.00E+00	3.02E-01	0.00E+00
GWP-GHG	kg CO_2 eq	4.78E+01	5.57E-01	4.45E-03	0.00E+00	1.23E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.54E-01	0.00E+00	3.38E-01	0.00E+00
ODP	kg CFC-11 eq	5.09E-06	1.33E-07	1.68E-10	0.00E+00	4.05E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.88E-08	0.00E+00	9.64E-08	0.00E+00
AP	mol H^+ eq	2.61E-01	2.33E-03	9.27E-06	0.00E+00	5.90E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.03E-03	0.00E+00	2.57E-03	0.00E+00
EP-freshwater	kg P eq	8.18E-03	3.47E-05	3.25E-07	0.00E+00	2.83E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.64E-05	0.00E+00	2.98E-05	0.00E+00
EP-marine	kg N eq	5.51E-02	7.10E-04	1.84E-05	0.00E+00	4.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.11E-04	0.00E+00	1.70E-03	0.00E+00
EP-terrestrial	mol N eq	6.90E-01	7.68E-03	4.18E-05	0.00E+00	1.70E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.37E-03	0.00E+00	9.90E-03	0.00E+00
POCP	kg NMVOC eq	1.66E-01	2.50E-03	1.18E-05	0.00E+00	5.30E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.04E-03	0.00E+00	2.86E-03	0.00E+00
ADPMM	kg Sb eq	4.60E-04	1.27E-06	2.70E-09	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.81E-07	0.00E+00	9.24E-07	0.00E+00
ADPFF	MJ, ncv	6.29E+02	8.89E+00	1.57E-02	0.00E+00	1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	0.00E+00	7.32E+00	0.00E+00
WDP	m^3 world-eq deprived	3.18E+01	4.21E-02	1.60E-04	0.00E+00	4.99E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.74E-02	0.00E+00	3.30E-01	0.00E+00

PILKINGTON INSULIGHT™ 6/16/6 DOUBLE IGU WITH OFFLINE COATED GLASS

RESOURCE USE	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	4.82E+01	1.11E-01	3.00E-04	0.00E+00	1.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.42E-02	0.00E+00	8.47E-02	0.00E+00
PERM	MJ	2.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERT	MJ	5.02E+01	1.11E-01	3.00E-04	0.00E+00	1.13E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.42E-02	0.00E+00	8.47E-02	0.00E+00
PENRE	MJ	6.28E+02	8.89E+00	1.57E-02	0.00E+00	1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	0.00E+00	7.32E+00	0.00E+00
PENRM	MJ	1.05E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT	MJ	6.29E+02	8.89E+00	1.57E-02	0.00E+00	1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	0.00E+00	7.32E+00	0.00E+00
SM	kg	9.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	3.94E-01	2.15E-03	0.00E+00	0.00E+00	1.05E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.16E-03	0.00E+00	8.00E-04	0.00E+00
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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m^3	5.86E-01	1.06E-03	4.35E-06	0.00E+00	1.37E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.38E-04	0.00E+00	7.97E-03	0.00E+00
WASTE	**Unit**	**A1 - A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
HWD	kg	4.14E+01	1.76E-01	7.50E-04	0.00E+00	1.34E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.51E-02	0.00E+00	1.54E-01	0.00E+00
NHWD	kg	5.00E+00	8.10E-01	7.53E-02	0.00E+00	8.88E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.96E-01	0.00E+00	3.06E+01	0.00E+00
TRWD	kg	1.43E-02	1.63E-04	2.64E-07	0.00E+00	6.09E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	7.65E-05	0.00E+00	9.84E-05	0.00E+00
OUTPUT FLOWS	**Unit**	**A1 - A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	7.40E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER	kg	5.73E-02	0.00E+00	1.23E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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	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	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

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 one square metre (1 m^2) of Pilkington **Insulight™** 6/16/6 Double IGU with Offline Coated Glass; modules A1 - A3 are shown on an aggregated basis.

PILKINGTON INSULIGHT™ 6/16/6 DOUBLE IGU WITH OFFLINE COATED GLASS

ENVIRONMENTAL IMPACTS (EN 15804 + A1:2013)

	Unit	A1 - A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP	kg CO_2-eq	4.66E+01	5.53E-01	2.85E-03	0.00E+00	1.19E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.52E-01	0.00E+00	3.16E-01	0.00E+00
ODP	kg CFC11-eq	5.09E-06	1.33E-07	1.68E-10	0.00E+00	4.05E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.88E-08	0.00E+00	9.64E-08	0.00E+00
AP	kg SO_2-eq	2.12E-01	1.82E-03	7.53E-06	0.00E+00	4.50E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.10E-04	0.00E+00	2.04E-03	0.00E+00
EP	kg PO_4^{3-}-eq	4.79E-02	3.90E-04	1.10E-04	0.00E+00	3.00E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.75E-04	0.00E+00	2.61E-03	0.00E+00
POCP	kg ethene-eq	1.16E-02	7.07E-05	7.63E-07	0.00E+00	3.73E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.27E-05	0.00E+00	7.40E-05	0.00E+00
ADPE	kg Sb-eq	4.60E-04	1.27E-06	2.70E-09	0.00E+00	1.18E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.81E-07	0.00E+00	9.24E-07	0.00E+00
ADPF	MJ	6.29E+02	8.89E+00	1.57E-02	0.00E+00	1.97E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.93E+00	0.00E+00	7.32E+00	0.00E+00

GWP = Global warming potential
ODP = Depletion potential of the stratospheric ozone layer
AP= Acidification potential of land and water
EP = Eutrophication potential
POCP = Formation potential of tropospheric ozone photochemical oxidants
ADPE = Abiotic depletion potential for non-fossil resources
ADPF = Abiotic depletion potential for fossil resources

GHG REDUCTION TARGETS

NSG Group's SBTi reduction target is aligned with a well below 2℃ global warming scenario.

By 2030, NSG Group commits to reduce absolute GHG emissions (Scope 1, Scope 2 and Scope 3) by 30% compared to the 2018 baseline level.

Committed to support the mitigation of risks of climate change, NSG Group continues to actively investigate and implement the following measures:

- Converting the energy source in glass manufacturing processes from heavy fuel oil to natural gas and/or other alternative low carbon fuel sources.
- Implementing various measures to reduce CO_2 emissions associated with the glass manufacturing process, including; LED lighting, heating & ventilation, high efficiency motors and inverters and waste heat recovery systems
- Expanding the use of renewable energy
- Developing and supplying glass products which contribute to the reduction of CO_2 emissions in their use from energy saving or energy generation.

  According to "*Glazing Potential*", an independent study commissioned by Glass for Europe, the trade association of European flat glass manufacturers of which NSG Group is an active member, 94 million tonnes of CO_2 could be saved in 2030 if all of Europe's buildings were equipped with high-performance glazing.

CARBON NEUTRALITY

NSG Group announced a commitment to achieve carbon neutrality by 2050. The target covers all scopes of NSG GHG emissions with no exclusions.

The first key milestone towards carbon neutrality has been set for the end of our financial year in 2024 (April 2024).

The second key milestone will be the achievement of the verified SBT in 2030. We expect to publish further SBTi commitments over the coming years, to establish further milestones for absolute emission reductions.

For our latest information please visit: www.nsg.com/en/sustainability

References

c-PCR009 EN 17074:2019 Glass in building - Environmental product declaration - Product category rules for flat glass products - The International EPD® System - EPD International AB

ecoinvent database (v3.8) - www.ecoinvent.ch

EN 1279-1 - Glass in building – Insulating glass units (Part 1: Generalities, dimensional tolerances and rules for the system description) (Comité Européen de Normalisation)

EN 15804:2012 + A1:2013 and EN 15804:2012 + A2:2021 - Sustainability of construction works - Environmental Product Declarations - Core rules for the product category of construction products (Comité Européen de Normalisation)

General Program Instructions, V4.0, 2021-03-29 - The International EPD® System - EPD International AB

Glass LCA & EPD (2023) - Report for NSG Group - EuGeos

Glazing Potential (2019) - Glass for Europe
Report available at:
https://glassforeurope.com/wp-content/uploads/2019/05/Glazing_potential_brochure_2019.pdf

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

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

PCR 2019:14 Construction products EN 15804-A2, V1.2.5, 2022-11-01 - 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 EPDs as well as keeping a library of EPDs 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.

SBTi: The Science Based Targets initiative. A programme to drive ambitious climate action in the private sector by enabling organisations to set science-based emissions reduction targets (https://sciencebasedtargets.org/)