

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019 for:

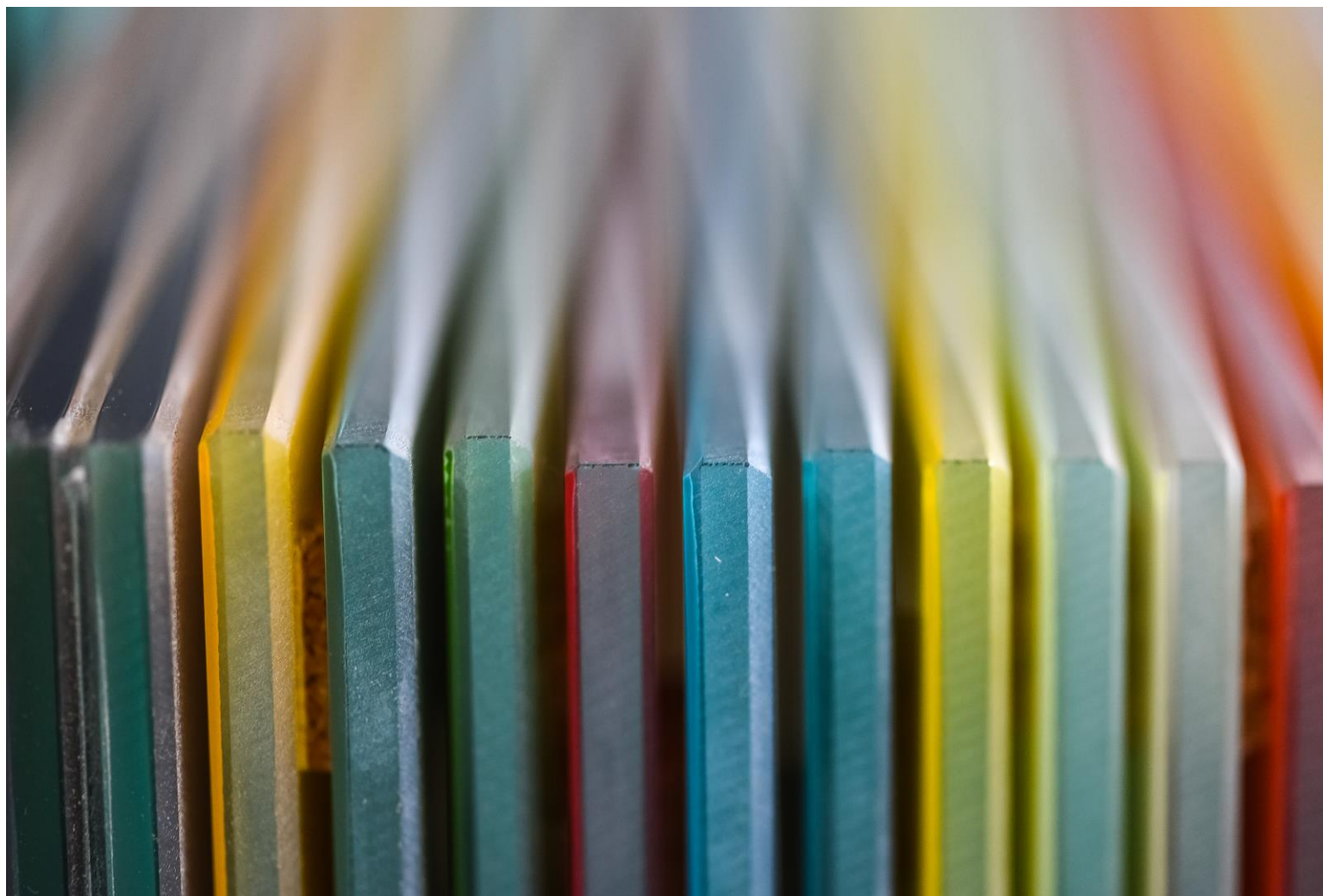
## Enamelled tempered glass

from

**JSC “Stronglasas”**



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
Programme operator:	EPD International AB
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## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
<b>Website:</b>	<a href="http://www.environdec.com">www.environdec.com</a>
<b>E-mail:</b>	<a href="mailto:info@environdec.com">info@environdec.com</a>

### Accountabilities for PCR, LCA and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (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 was conducted by: The Technical Committee of the International EPD® System Chair: Claudia Peña; contact via [info@environdec.com](mailto:info@environdec.com)

#### Life Cycle Assessment (LCA)

LCA accountability: *Sigita Židonienė, PhD., UAB Vesta Consulting [www.vestaconsulting.lt](http://www.vestaconsulting.lt)*

#### Third-party verification

Independent third-party verification of the declaration and data, according to ISO 14025:2006, via:

EPD verification by individual verifier

Third-party verifier: *Prof. Ing. Vladimír Kočí, PhD., [vladimir.koci@lca.cz](mailto:vladimir.koci@lca.cz)*

Approved by: The International EPD® System

Procedure for follow-up of data during EPD validity involves third party verifier:

Yes  No

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

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. For further information about comparability, see EN 15804 and ISO 14025.

## Company information

### Owner of the EPD:

JSC "Stronglasas"

Naujoji g.136-3, LT-62175 Alytus, Lithuania

www.stronglasas.lt

Email: info@stronglasas.lt

### Description of the organisation:

JSC "Stronglasas" has started its activities on 14 January 2005. It is a modern, reliable, socially responsible manufacturing company. JSC "Stronglasas" is one of the main glass processing companies in the Baltic States, offering various glass processing possibilities. The latest glass cutting line and one of the most modern glass tempering equipment are used for glass processing and tempering. The company's highly skilled personnel work to ensure that the customer receives quality processed glass. In order to care for the needs of the customer, it constantly implements innovations and invests in the automation of manufacturing processes.

Product-related or management system-related certifications Products of enamelled tempered glass are manufactured in compliance with these European standards:

- a) EN 12150 (Parts 1 and 2) Glass in building. Thermally toughened soda lime silicate safety glass.
- b) EN1863 (Parts 1 and 2) Glass in building. Heat strengthened soda lime silicate glass;
- c) EN 14179 (Parts 1 and 2) Glass in building. Heat soaked thermally toughened soda lime silicate safety glass;
- d) EN 1096 (Parts 1, 2, 3 and 4) Glass in building. Coated glass;
- e) EN 572 (Parts 1, 2, 3, 4, 5, 6, 7, 8 and 9) Glass in building. Basic soda lime silicate glass products;
- f) EN 14449 Glass in building. Laminated glass and laminated safety glass;
- g) EN ISO 12543 (Parts 1, 2, 3, 4, 5 and 6) Glass in building. Laminated glass and laminated safety glass;
- h) EN 356 Glass in building. Security glazing. Testing and classification of resistance against manual attack;
- i) EN 1288 Glass in building. Determination of the bending strength of glass;
- j) EN 12600 Glass in building. Pendulum test. Impact test method and classification for flat glass.

Name and location of production site: Alytus, Lithuania

## Product information

Product name: Enamelled tempered glass.

Product description: Enamelled tempered glass is a strong and safe glass that has been coated with ceramic paints on one side for aesthetic purposes. Enamelled glass is manufactured by applying ceramic enamel to the surface of the glass, then drying and undergoing a tempering process. Glass is painted with colours from the RAL and NSC palette. Techniques includes enamel painting, silk printing, perimeter, digital printing. Enamelled tempered glass can be widely used:



For insulated glass units



For shower cabins



For facades



For commercial refrigeration equipment



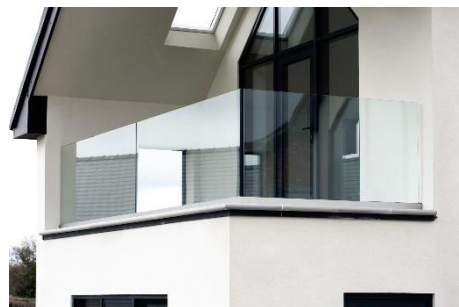
For household refrigerators



For interior



For furniture



For balconies

**Technical characteristics:** Products of enamelled tempered glass are available in various sizes, shapes and lengths. Enamelled glass can be:

- enamelled - painting the entire surface of the glass. We can paint the glass in the desired colour according to RAL or NCS pallets;
- silk-screen painting - painted patterns on glass through silkscreen frames;
- perimeter painting - glass edge painting with strip.

## Available sizes

	Available sizes		
	Maximum dimension, mm	Minimum dimension, mm	Glass thickness, mm
Enamelled	2200x5000	200x300	4–19
Silk-screen painting	1500x3600	200x300	4–19
Perimeter painting	2200x3600	200x200	4–19

More information about products could be found [www.stronglasas.it](http://www.stronglasas.it)

This EPD covers average production of enamelled tempered glass.

UN CPC code: 3711

Geographical scope: Europe

## Content information

Product components	Weight, kg	Post-consumer material, weight-%	Renewable material, weight-%
Flat glass	2,45	0	0
Paints	0,05	0	0
<b>TOTAL</b>	<b>2,50</b>	<b>0</b>	<b>0</b>
Packaging materials	Weight, kg	Weight-% (versus the product)	
Wood	0,06	2,4	
Plastic	0,01	0,4	
<b>TOTAL</b>	<b>0,07</b>	<b>2,8</b>	

No dangerous substances from the candidate list of SVHC for Authorisation under the REACH regulations are present in this product either above the threshold for registration with the European Chemicals Agency or above 0.1% (wt/wt).

## LCA information

Declared unit: The declared unit is one square metre (1m<sup>2</sup>) of one millimetre (1mm) thickness tempered glass without coating that weights 2,5 kg.

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

Time representativeness: Primary data was collected internally. The production data refers to the average production for the year 2022.

Database(s) and LCA software used: The Ecoinvent database v.3.6 provides the life cycle inventory data for the raw and process materials obtained from the background system, most of raw material - glass had EPDs and therefore that was used for calculations. The LCA software used - One Click LCA.

Description of system boundaries:

Cradle to gate with options, modules C1–C4 and module D (A1–A3 + C + D and with optional module A4).

Modules declared, geographical scope, share of specific data (in GWP-GHG indicator) and data variation:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x
Geography	EU	EU	LT	EU	-	-	-	-	-	-	-	-	EU	EU	EU	EU	EU
Specific data used	>90%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	Not relevant			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Description of the system boundary (X = Included in LCA; MND = Module Not declared)

Data quality: The foreground data collected internally is based on yearly production amounts and extrapolations of measurements on specific machines and plants. Overall, the data quality can be described as good. The primary data collection has been done thoroughly.

Cut-off criteria: Life cycle inventory data for a minimum of 99% of total material and energy input flows have been included in the life cycle analysis. However, only materials having in summa less than 1% of the weight of the product were not used in calculations.

## System Boundary Description

### Product stage:

A1: This module considers the extraction and processing of raw materials and energy consumption.

A2: The raw materials are transported to the manufacturing plant. In this case, the module includes road transportation of each raw material. The raw glass material reaches factory from various European countries by specialized trucks/loaders. In automated warehouse always is over 200 different types of glass.

A3: This module includes the manufacture of products and packaging. It also considers the energy consumption and waste generated at the production plant.

### **Production process description**

After inspection of jumbo glass sheets, glass is cut to needed shapes. Cutting is performed using special designed production lines/tables using diamond cutting wheels. Then, grinding and polishing processes are designed to trim the edges and give them a finished looking. Diamond wheels are used for grinding, which removes small amount of material from the edge and leave them dull after processing. The

polishing process uses polishing wheels, which helps edge become more lustrous than after the grinding process.

The drilling and milling process 's is performed using special machines called CNC. Diamond drill and mills are used for these types of production. In order to obtain high quality holes, drilling is carried out simultaneously on both surfaces of the glass and called countersinking drilling. Cut-outs, edge cut-outs and notches milling can be made in many different configurations.

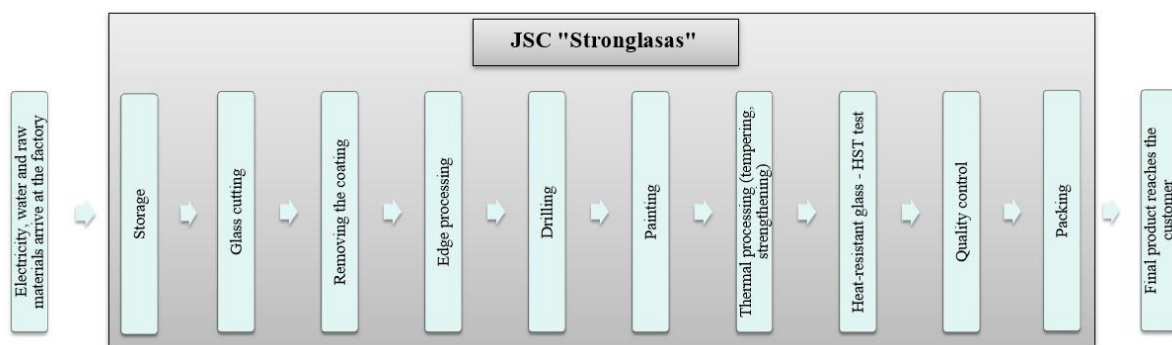
Glass tempering and heat strengthening processes are performed in one of four oscillating horizontal furnaces. Glass is heated close to its melting point to the appropriate temperature and viscosity. After heating section, the glass moved to the quenching chamber where it is rapidly cooled with cold air. Heat strengthened glass is obtained by thermal treatment too. It aims to increase the mechanical and thermal strength of the glass. Differences between heat strengthened and toughened glass lie mainly in the different fracture pattern and lower mechanical strength of the HS glass in relation to the toughened glass.

Stronglasas is using 4 methods of applying ceramic painting - roller coating, edge screen printing, silk-screen printing and digital printing. These processes are used to assess the visual quality of glass partially or completely covered with ceramic enamel. In each method, ceramic paints are used, which is fired after application by means of tempering or heat strengthening the glass.

After these processes, the glasses for shipment to the customer are packed into metal or wooden racks. The glasses in the racks can be separated with dividers, paper, or plastic, paper strips. There are options to pack the glasses individually in cardboard or bubble wrap, wooden package.

The packed glasses are loaded onto trucks using electric or gas-powered forklifts.

The products' manufacturing process is described in the picture below.



Construction process stage:

A4: This module includes transport from the production gate to the construction site where the product shall be installed. The transportation doesn't cause losses as products are packaged properly. Transportation is calculated based on data form manufacturer: 76% of production are taken by clients from production plant gates and 24% are delivered to the clients. The latter transportation scenario parameters are described in the following table.

Parameter	Value/Description
Vehicle type used for transport	EURO 5 truck with a trailer with an average load of >32t;
Distance	24 % of production: Truck – 795 km.
Capacity utilization	56 % of the capacity in volume (truck)

A5: module is not declared.

Use stage: Modules B1-B7 was out of the scope of this EPD, however the company suggest some useful tips how to maintain the best quality of its products during the use stage. Follow the manufacturer's instructions for assembly/installation, use, maintenance and disassembly. Please visit [www.stronglasas.lt](http://www.stronglasas.lt) for information.

End of Life stage:

As waste, glass falls under European Waste Catalogue (EWC) code 17-02-02. JSC Stronglasas recommend that at the end of the product's useful life glass would be segregated for separate collection and recycling. Glass waste can be processed into new glass forms from flat glass to glass fibre.

C1: This module includes product deconstruction, dismantling, and demolition. Since this is a manual process, the environmental impacts are negligible.

C2: Transport of the discarded product to the processing site. It is estimated that there is no mass loss during the use of the product, therefore, the end-of-life product is assumed that it has the same weight as the declared product. All the end-of-life product is assumed to be sent to the closest facilities, such as sorting and recycling. Transportation distance to the closest disposal area is estimated as 100 km and the transportation method is lorry which is the most common.

C3: The Waste Framework Directive 2008/98/EC aims to have 70% of Construction and Demolition waste recycled. According to the Glass for Europe organization (Glass for Europe, 2020), in 2018 the majority of construction glass waste were sent to landfill, and in new glass production the share of cullet use was only 26 %. However, following circular economy principles and the overall EU target for the recycling ratio of construction and demolition waste, this EPD assumes that after the product RSL of 30 years, conservatively 50% of the product will be recycled and 50% will be sent to the landfill.

C4: It is assumed that 50% of the product is collected at the construction site and sent for landfilling.

Benefits and loads beyond the system boundary (D):

It is assumed that all of the recycled waste flat glass is used to produce glass wool.

**Conversions Factors**

The LCA study included in this EPD declares environmental impact of 1 m<sup>2</sup> enamelled tempered glass of 1 mm thickness with a weight of 2,5 kg. To get GWP values for other thicknesses, multiply GWP results by the thickness of glass.



## Results of the environmental performance indicators (per declared unit - 1m<sup>2</sup> of 1mm thickness enamelled tempered glass)

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.

### Environmental Impacts according to EN 15804+A2

Impact category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	D
GWP – total	kg CO <sub>2</sub> e	3,46E0	4,39E-2	MND	0E0	2,27E-2	6,23E-3	1,06E-2	-1,51E0
GWP – fossil	kg CO <sub>2</sub> e	3,43E0	4,43E-2	MND	0E0	2,27E-2	6,14E-3	1,05E-2	-1,58E0
GWP – biogenic	kg CO <sub>2</sub> e	2,29E-2	3,22E-5	MND	0E0	1,65E-5	8,05E-5	1,57E-5	7,33E-2
GWP – LULUC	kg CO <sub>2</sub> e	2,27E-3	1,33E-5	MND	0E0	6,84E-6	6,55E-6	4,21E-6	-8,64E-4
Ozone depletion pot.	kg CFC-11e	3,29E-7	1,04E-8	MND	0E0	5,34E-9	1,27E-9	3,52E-9	-1,6E-7
Acidification potential	mol H <sup>+</sup> e	2,9E-2	1,86E-4	MND	0E0	9,54E-5	4,38E-5	8,77E-5	-1,32E-2
EP-freshwater	kg Pe	5,89E-5	3,6E-7	MND	0E0	1,85E-7	2,81E-7	1,36E-7	-4,12E-5
EP-marine	kg Ne	5,15E-3	5,61E-5	MND	0E0	2,88E-5	1,28E-5	3,06E-5	-1,88E-3
EP-terrestrial	mol Ne	6,25E-2	6,19E-4	MND	0E0	3,18E-4	1,43E-4	3,37E-4	-2,32E-2
POCP (“smog”)	kg NMVOCe	1,5E-2	1,99E-4	MND	0E0	1,02E-4	4,04E-5	9,69E-5	-5,75E-3
ADP-minerals & metals	kg Sbe	2,21E-4	7,56E-7	MND	0E0	3,88E-7	7,52E-8	1,48E-7	-8,81E-5
ADP-fossil resources	MJ	3,57E1	6,89E-1	MND	0E0	3,53E-1	1,22E-1	2,42E-1	-1,84E1
Water use	m <sup>3</sup> e depr.	7,95E-1	2,56E-3	MND	0E0	1,31E-3	3,06E-3	8,82E-3	-4,2E-1
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP – minerals & metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption								

Disclaimer: it is discouraged to use the results of modules A1-A3 without considering the results of module C when module C is declared.

Reading example: 6,42E-1 refers to 0,642.

### Use of natural resources

Impact category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	D
Renew. PER as energy	MJ	1,22E1	8,67E-3	MND	0E0	4,45E-3	9,3E-3	2,58E-3	-2,33E0
Renew. PER as material	MJ	1,31E0	0E0	MND	0E0	0E0	0E0	0E0	0E0
Total use of renew. PER	MJ	1,35E1	8,67E-3	MND	0E0	4,45E-3	9,3E-3	2,58E-3	-2,33E0
Non-re. PER as energy	MJ	4,16E1	6,89E-1	MND	0E0	3,53E-1	1,22E-1	2,42E-1	-1,84E1
Non-re. PER as material	MJ	2,51E-1	0E0	MND	0E0	0E0	-1,26E-1	-1,26E-1	-1,26E-1
Total use of non-re. PER	MJ	4,19E1	6,89E-1	MND	0E0	3,53E-1	-3,50E-3	1,17E-1	-1,85E1
Secondary materials	kg	1,33E-1	0E0	MND	0E0	0E0	0E0	0E0	-5,04E-3
Renew. secondary fuels	MJ	2E-3	0E0	MND	0E0	0E0	0E0	0E0	0E0
Non-ren. secondary fuels	MJ	4,25E-12	0E0	MND	0E0	0E0	0E0	0E0	0E0
Use of net fresh water	m <sup>3</sup>	2,54E-2	1,43E-4	MND	0E0	7,36E-5	7,88E-5	2,14E-4	-1,35E-2

### End of life - waste

Impact category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	D
Hazardous waste	kg	2,31E-1	6,7E-4	MND	0E0	3,43E-4	0E0	2,8E-4	-4,95E-2
Non-hazardous waste	kg	2,59E0	7,41E-2	MND	0E0	3,8E-2	0E0	1,25E0	-1,4E0
Radioactive waste	kg	3,5E-4	4,73E-6	MND	0E0	2,43E-6	0E0	1,59E-6	-5,97E-5

### End of life – output flows

Impact category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	D
Components for re-use	kg	3,95E-3	0E0	MND	0E0	0E0	0E0	0E0	0E0
Materials for recycling	kg	5,52E-1	0E0	MND	0E0	0E0	1,25E0	0E0	0E0
Materials for energy rec	kg	0E0	0E0	MND	0E0	0E0	0E0	0E0	0E0
Exported energy	MJ	3,05E-3	0E0	MND	0E0	0E0	0E0	0E0	0E0

### Additional environmental information – GHG-GWP\*

Impact category	Unit	A1-A3	A4	B1-B7	C1	C2	C3	C4	D
GWP-GHG	kg CO <sub>2e</sub>	3,43E0	4,43E-2	MND	0E0	2,27E-2	6,14E-3	1,05E-2	-1,58E0

\* This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product as defined by IPCC AR 5 (IPCC 2013) This indicator is almost equal to the GWP indicator originally defined in EN 15804: 2012+A1: 2013.

## Additional information

### Manufacturing energy scenario documentation

Scenario parameter	Value
Electricity data source and quality	Electricity production, hydro, run-of-river (Reference product: electricity, high voltage). Lithuania. Ecoinvent 3.6.
Electricity (hydro) CO <sub>2e</sub> / kWh	0,004
Electricity data source and quality	Electricity production, wind, >3mw turbine, onshore (Reference product: electricity, high voltage) Lithuania. Ecoinvent 3.6.
Electricity (wind) CO <sub>2e</sub> / kWh	0,021
Electricity data source and quality	Electricity production, photovoltaic, 3kwp slanted-roof installation, multi-si, panel, mounted (Reference product: electricity, low voltage) Lithuania. Ecoinvent 3.6.
Electricity (photovoltaic) CO <sub>2e</sub> / kWh	0,094
Electricity data source and quality	Heat and power co-generation, wood chips, 6667 kw (Reference product: electricity, high voltage) Lithuania. Ecoinvent 3.6.
Electricity (biomass) CO <sub>2e</sub> / kWh	0,064

## References

General Programme Instructions of the International EPD<sup>®</sup> System. Version 4.0. The International EPD<sup>®</sup> System - EPD International AB

ISO 14025:2010 Environmental labels and declarations – Type III environmental declarations Principles and procedures.

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and frameworks.

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines.

EN 15804+A2 Sustainability in construction works – Environmental product declarations – Core rules for the product category of construction products.

PCR 2019:14 Construction products (version 1.2.5). Dated 2022-11-01. The International EPD<sup>®</sup> System - EPD International AB

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

Glass for Europe, 2020. 2050: Flat Glass in Climate-Neutral Europe. Triggering a Virtuous Cycle of Decarbonization. 2020. Glass for Europe.

Laminated glass, enamelled tempered glass, tempered glass with coating and tempered glass without coating by JSC Strogilasas LCA report. Part 1, 2023.

### Differences versus previous versions:

2023-09-09 Version 1

2023-09-18 Version 1.1.

**Editorial change:** updated contact information of the company.

