



Fiberglass Sliding Patio (5000 Series PD)



SILEX FIBERGLASS WINDOWS & DOORS

ENVIRONMENTAL PRODUCT DECLARATION

ISO 14025:2006 and ISO 21930:2017



ASTM INTERNATIONAL


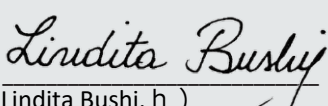
SILEX FIBERGLASS WINDOWS & DOORS is pleased to present this Environmental Product Declaration (EPD) for their Sliding Patio Doors (5000 Series PD). This EPD was developed in compliance with ISO 14025 and ISO 21930 and has been verified by Lindita Bushi, PhD, Athena Sustainable Materials Institute.

The LCA and the EPD were prepared by Vertima Inc. The EPD includes cradle-to-gate life cycle assessment (LCA) results.

For more information about SILEX FIBERGLASS WINDOWS & DOORS, visit www.silexfiberglass.com

For any explanatory material regarding this EPD, please contact the program operator.

1. GENERAL INFORMATION

PCR GENERAL INFORMATION			
Reference PCR	NSF 1102-23 Product Category Rule for Environmental Product Declaration: Fenestration Assemblies NSF International January 1, 2024 to December 31, 2028 (validity period)		
The PCR review was conducted by:	Thomas Gloria, PhD (chair) Industrial Ecology Consultants t.gloria@industrial-ecology.com	Jack Geibig EcoForm jgeibig@ecoform.com	Bill Stough Bill Stough, LLC bill@billstough.net
EPD GENERAL INFORMATION			
Program Operator	ASTM International 100 Barr Harbor Drive, West Conshohocken, PA 19428 USA www.astm.org		
Declared Product	Fiberglass Sliding Patio Doors (5000 Series PD)		
EPD Registration Number 1060	EPD Date of Issue September 8, 2025	EPD Period of Validity 5 Years	
EPD Recipient Organization	SILEX FIBERGLASS WINDOWS & DOORS 1450 Wall Street Winnipeg (Manitoba) R3E 2S3 Canada www.silexfiberglass.com		
EPD Type/Scope and Declared Unit Product-specific cradle-to-gate EPD with declared unit of one square metre (1 m ²)			Year of Reported Manufacturer Primary Data 2023
Geographical Scope North America	LCA Software OpenLCA v.2.1	LCI Databases Ecoinvent 3.9.1 and US LCI	LCIA Methodology TRACI 2.1 and IPCC AR5
This LCA and EPD were prepared by:		Vertima Inc. www.vertima.ca	
This EPD and LCA were independently verified in accordance with ISO 14025:2006, ISO 14040:2026, ISO 14044:2006. ISO 21930:2017 serves as the core PCR and the NSF International PCR “NSF 1102-23 Product Category Rule For Environmental Product Declaration: Fenestration”, which is used as the specific PCR. <input type="checkbox"/> Internal <input checked="" type="checkbox"/> External		 Lindita Bushi, h) Athena Sustainable Materials Institute	

The owner of the declaration shall be liable for the underlying information and evidence; ASTM, or its affiliates, shall not be liable with respect to manufacturer information, life cycle assessment data, and evidence.

LIMITATIONS

“This EPD meets all comparability requirements stated in ISO 14025:2006. [1] However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers or programs, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the construction works level per ISO 21930:2017 guidelines. [2] The results presented in this EPD reflect an average performance by the products and its actual impacts may vary on a case-to-case basis.” [3, p. 15]

Given concerns about variable or nonexistent waste flows in commercially available LCIs, the following statement shall accompany the waste metrics: “Significant data limitations currently exist within the LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values.” [3, p. 31]



Beach Cottage Residential Project – Winnipeg, MB (Photo courtesy of SILEX FIBERGLASS WINDOWS & DOORS)

2. PRODUCT SYSTEM DESCRIPTION

A Canadian window and door industry player, Silex Fiberglass Windows & Doors, a company based in Manitoba (MB) Canada, specializes in pultruded fiberglass windows and doors systems, which are one of the best choices for extreme hot and cold temperatures. Pultruded fiberglass profiles provide better insulation than the traditional materials used for window and doors. Its thermal conductivity ratio is 500x lower than aluminium's. Insulating the frame and sash components reduces the conductivity even further, allowing for the creation of some of the most energy efficient window and door systems. Targeting the North American market, Silex Fiberglass Windows & Doors manufactures many types of doors. This encompasses exterior doors and sliding patio doors, which are available in various series (such as Series 5000 PD), and can be tailored to meet specific customer requirements. The sliding patio doors 5000 Series (Series 5000 PD) studied in this EPD are manufactured at the Silex Fiberglass Windows & Doors plant, which is located at 1450 Wall Street, Winnipeg, Manitoba, R3E 2S3 Canada.

2.1. PRODUCT DESCRIPTION

The Silex Fiberglass Windows & Doors company name was inspired by "silica," the essential element found in both the glazing unit and frame. Silex fiberglass products meet the AAMA/WDMA/CSA 101/I.S.2/A440 standards of high-performance.

Fabricated and factory-assembled Silex fiberglass sliding patio doors have three main product specifications. Firstly, the frame is filled with high-density insulation: pultruded fiberglass with an outward sash. The frame is reinforced with mechanical joints and sealed with silicone. Secondly, the glazing system is offered in double or triple glazing with a Low-E coating. The glazing cavity is edge-drained and vented to the exterior through concealed drainage and vent holes, ensuring proper water management. Thirdly, the weather-stripping consists of the three-seal design which conforms to the rain screen principle: a single foam-filled weather stripping on the sash and a dual foam on the frame.



Figure 1: Silex Fiberglass Windows & Doors Patio Door diagram

Silex Fiberglass Windows & Doors products are designed with customized shapes, sizes and finishes. As in the typical windows and doors manufacturing process, all individual components such as the glazing system, framing, hardware (hinges, locks, handles, gaskets, screws, etc.) are delivered to the manufacturing site.

The manufacturer provides a one-year warranty, from the date of completion, covering material defects. Additionally, the manufacturer provides a 10-year warranty on the glazing and a lifetime warranty on the fiberglass frame. The reference service life (RSL) is not addressed by NSF PCR. [3, p. 17]

Product technical specification

The Product Construction Specification Institute (CSI) MasterFormat code is 08 10 00 for doors. Online product resources for architects and engineers can be found on the Silex website (<https://silexfiberglass.com/resources/>).

Silex Fiberglass certifies that its products comply with superior quality standards. This is evidenced by third-party test performance, certifications and labeling programs to ensure that all products meet or exceed North American building codes and regulations, including the following standards:

- AAMA/WDMA/CSA 101/I.S.2/A440-08, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- AAMA/WDMA/CSA 101/I.S.2/A440-11, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- AAMA/WDMA/CSA 101/I.S.2/A440-17, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- AAMA/WDMA/CSA 101/I.S.2/A440-22, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- CSA A440S1-09, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- CSA A440S1-17, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- CSA A440S1-19, Canadian Supplement to AAMA/WDMA/CSA 101/I.S.2/A440, NAFS—North American Fenestration Standard/Specification for windows, doors and skylights
- CSA A440.2-14/A440.3-14, Fenestration Energy Performance/User's Guide to CSA A440.2-14, Fenestration Energy Performance
- NFRC 100-2023, Procedure for Determining Fenestration Product U-factors
- NFRC 200-2023, Procedure for Determining Fenestration Product Solar Heat Gain Coefficient and Visible Light Transmittance
- NFRC 500-2017, Procedure for Determining Fenestration Product Condensation Resistance Values

Other standards applicable to windows and doors as defined in the Canadian National Building Code, including:

- AAMA 450-20, ASTM E283/E283M19, ASTM E330/E330M-14(2021), ASTM E547-00(2016), ASTM F588-17
- ASTM E2190, ASTM F476, CGSB 12.1, CGSB 12.2, CGSB 12.3, CGSB 12.4, CGSB 12.8, CGSB 12.10, CGSB 12.11, CGSB 12.20, NAFS and the Canadian Supplement for NAFS, A440S1, A440.2/.3. A440.4. and A440.6

Further details on test performance and standards can be provided by the manufacturer. Silex fiberglass products contribute to the Passive House Canada certification (Victoria, British Columbia).

2.2. PRODUCT COVERED BY THE EPD

One specific sliding door series is involved: sliding patio doors 5000 Series.

2.3. MATERIAL COMPOSITION

The Silex Fiberglass Windows & Doors sliding patio doors 5000 Series (also known as the “Series 5000 PD” or “Series 5000”) is available in various sizes and configurations. This is the one specific product covered by the EPD. Table 1 shows the mass average composition of the sliding patio doors studied, which has been normalized to one square metre (1m²).

Table 1: Average composition for one square metre (1 m²) of Silex fiberglass sliding patio doors from 2023

Materials /Inputs	Series 5000 PD
Sash	7.9%
Frame	6.5%
PVC Adapter	1.2%
SS Roller	0.8%
Gasket	0.0%
Corner Keys	0.3%
Foam	0.0%
Hardware (for 5000 PD)	1.1%
Glass	75.3%
Aert Block	6.8%
TOTAL	100.0%

2.4. MANUFACTURING

Typical Silex Fiberglass Windows & Doors manufacturing processes include the production of pultruded fiberglass, cutting extruded profiles, shaping of profiles, assembly of profiles and infill and building hardware into a complete finished window or door product. Different components are used such as insulated glazing unit blocks, sealants, drain hole covers, gaskets, screws, corner keys and aert blocks. Processing includes chemicals such as glass cleaner and lubricating oil. No electrical motors or devices for opening/closing of windows or doors are covered by the manufacturing processes considered in this LCA’s study. Figure 2 shows the flow diagram for the life cycle stages (A1-A3) of Silex Fiberglass Windows & Doors products.

With regard to the other window and door products manufactured in the same plant, as far as possible, the Silex Fiberglass Windows & Doors manufacturing process is divided into different sub-process which can be allocated to the other products by collecting input and output data related to the product under study. Water consumption was not related to the manufacturing of products under study.

According to information provided by the manufacturer, the production of sliding patio doors does not generate significant waste. The main waste collected is metals and cardboard packaging, which are sent to recycling centres. Office waste and contaminated cardboard from the Silex Fiberglass Windows & Doors plant are sent to landfill.

The sliding doors manufactured and under study are packaged with packaging materials detailed in the section below.

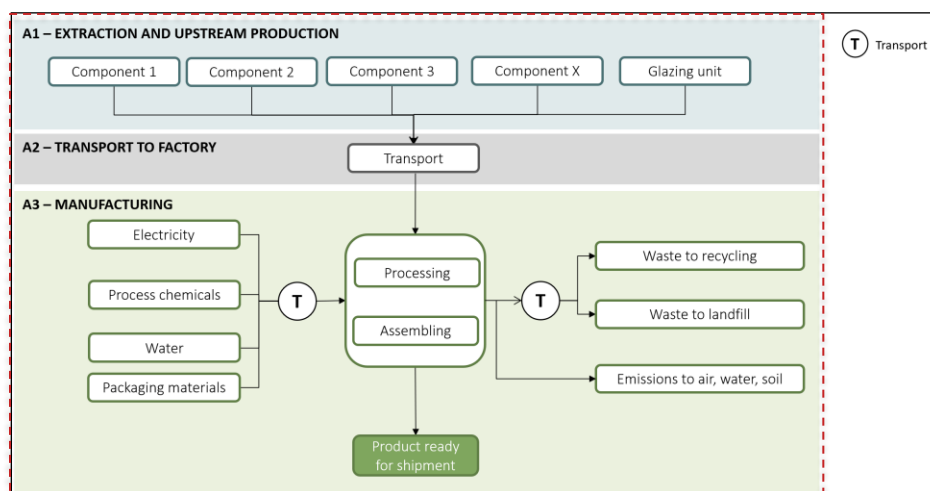


Figure 2: Cradle-to-gate flow diagram of the Silex Fiberglass Windows & Doors products

2.5. PACKAGING

Silex Fiberglass Windows & Doors products are packaged in various materials, including corrugated wrap, shrink wrap and 2"x4" wooden pallet blocks for transport to the point of sale. Secondary packaging, which is not relevant, shall be an exception of inputs in LCA models.

2.6. DISPOSAL

According to the NSF PCR [3] assumptions, as this PCR does not address Module A5 and Modules C1-C4 (End-of-Life), the disposal of the fenestration assemblies is not included in the LCA framework.

2.7. PRODUCT APPLICATION

Silex Fiberglass Windows & Doors manufactures a wide range of high-performance windows and doors used in residential and commercial construction. They provide a durable and aesthetically pleasing finish to architecturally exposed areas of buildings such as hospitals, schools, cafeterias, shopping centres, condominiums, cottages and countless other structures.

Should you require further details, please visit: <https://silexfiberglass.com/projects/>

3. LCA CALCULATION RULES

3.1. DECLARED UNIT

According to the PCR [3], the declaration unit (DU) selected for this study is **one (1) square metre** (1 m^2) of fenestration assemblies. This includes the frame and glazing meeting the relevant ANSI/NFRC 100 performance standards as per the sliding patio door identified. The declared unit refers to the finished product and its packaging. The EPD results shall be disclosed separately for the frame and glazing. In addition, the reference unit is in kilograms (kg) per 1 m^2 .

Glazing beads and stops, sealants, gaskets, and other parts that retain or support the glazing are considered as part of the framing assembly and not the glazing assembly.

Table 2: Declared unit (DU) and reference flows for Silex Fiberglass Series 5000 PD

Materials /Inputs	Unit	Series 5000 PD
Declared Unit	m^2	1
Mass - Average	kg	4.98E+01
Product density – Average	kg/m^3	3.43E+02
Product thickness – Average	cm	14.5

Note: Product means a finished product including the frame and glazing.

3.2. PRODUCTION AVERAGE

This EPD for Silex Fiberglass Windows & Doors covers the sliding patio doors 5000 Series, where all configurations are functionally equivalent and comply with the $\pm 10\%$ difference requirement on environmental indicators for an average composition.

3.3. REFERENCE PERIOD

The reference period is the 2023 calendar year (from January 1, 2023 to December 31, 2023).

3.4. SYSTEM BOUNDARIES

The system boundaries are **cradle-to-gate**, i.e., only cover the production life cycle stage as illustrated in Table 3. Within this life cycle stage, three (3) modules are considered, namely A-1) Extraction and Upstream Production, A-2) Transport to Factory and A-3) Manufacturing. Thus, the other life cycle stages (Construction (A-4; A-5), Use (B-1 to B-7) and End-of-life (C-1 to C-4)) are not included in this study.

Table 3: Description of the system boundary life cycle stages and related information modules

PRODUCTION STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END-OF-LIFE STAGE			
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
Extraction and Upstream Production	Transport to Factory	Manufacturing	Transport to site	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport to Waste Processing or Disposal	Waste Processing	Disposal of Waste
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Key: X = included; MND = module not declared (excluded)

Production (modules A1 to A3)

Extraction and upstream production (module A1): This module includes all components used in the process. These components include the parts of the frame, the glazing unit and their respective packaging.

Transport to factory (module A2): This module includes the transportation of raw materials from suppliers to the Silex Fiberglass Windows & Doors manufacturing plant in Winnipeg, Manitoba, Canada.

Manufacturing (module A3): This module includes energy consumption (electricity) for the manufacturing processes. Natural gas consumption relating to building heating is also taken into consideration. Chemicals needed in the manufacturing process have been considered here, as well as their transport to the plant. Since the manufacturer has committed to recycling certain packaging materials, the transportation of these materials to the recycling centre is considered in module A3. No green power certificates are used in this LCA report as Silex Fiberglass Windows & Doors does not purchase biogas or CO₂ certificates or any other renewable energy certificates (RECs).

3.5. CUT-OFF CRITERIA

According to ISO 21930:2017 Section 7.1.8 [2] and the NSF PCR [3], if a mass flow or energy flow represents less than 1% of the cumulative mass or energy flow of the system, it may be excluded from system boundaries. However, these flows should not have a relevant environmental impact. In addition, at least 95% of the energy usage, mass and environmental impact input flows shall be included. The cumulative mass or environmental impacts of the excluded flows shall not exceed 5% of the total mass and energy flows or potential environmental impacts.

In this study, no known primary data (input material, energy consumption) was deliberately excluded from the system boundaries. Using the principle of the cut-off approach in accordance with ISO 21930:2017, no environmental benefits associated with materials sent for recycling (cardboard, metals) were accounted for.

For the materials characterized as hazardous by the TRI, 10 cut-off rules shall not be applied, and such substances shall be included in the inventory regardless of the percent of total mass.

Water consumption was assumed to be 100% dedicated to the employees and not to manufacturing processes of the product studied. In addition, primary data on the construction, maintenance or dismantling of the company's capital assets, daily transport of the employees, office work, business trips and other activity from Silex employees

was not included in the model. The model only takes into account the flows associated to infrastructure amortization, which are already included in the ecoinvent unit processes.

3.6. ALLOCATION

The ISO 14044 [4] allocation procedure states that, whenever possible, allocation should be avoided by collecting data related to the process under study or by expanding the product system. According to ISO 14044, the next rule consists of partitioning the inputs and outputs between the different products in a way that reflects the physical relationship between them.

According to the NSF PCR [3, pp. 24-25], in this study, the mass allocation approach is used as the primary basis for the co-products of the Silex manufacturing process. The mass of yearly plant production of each product under study was required. The ecoinvent data allocation approach, “Allocation, cut-off by classification,” attributes the impacts of secondary materials entering the system to those that generated them and excludes the benefits associated with recycling materials. This is in line with the cut-off rule specified in ISO 21930:2017. The allocation and cut-off approach has been used for recycled materials sent to recycling partners only to take into account the environmental impacts of transport. Mass allocation was used to partition the inputs and outputs of the production process.



Beach Cottage Residential Project – Winnipeg, MB (Photo courtesy of SILEX FIBERGLASS WINDOWS & DOORS)

3.7. DATA SOURCES AND QUALITY REQUIREMENTS

Data Quality Parameter	Data Quality Discussion
Source of manufacturing data: Description sources of data	Manufacturing data was collected from the Silex Fiberglass Windows & Doors manufacturing plant located in Winnipeg, MB, Canada for the 2023 production year. This data included: total annual mass of products produced at the manufacturing plant; specific product composition; raw materials and fuels entering the product production process; transport distance of materials and fuels, electricity consumption, water consumption, emissions to the environment at the manufacturing plant, and packaging.
Source of secondary data: Description sources of raw materials, fuels and electricity data	In priority, background data was taken from ecoinvent 3.9.1 “cut-off” datasets representative of Canada, the United States or North America. When appropriate, the grid mix was changed for the grid mix of the province or country where production takes place. Otherwise, ecoinvent data representative of the global market or the “rest-of-the-world” was selected as proxies. Transport data were taken from the US LCI Database, which is specific to a North American context.
Geographical representativeness	The Silex Fiberglass Windows & Doors manufacturing facility is based in the province of Manitoba; hence, electricity consumption is based on the Manitoba grid mix and natural gas consumption from the same area supplier. Geographical correlation of the material supply and the selected datasets are largely representative of the same area. When this was not possible, datasets representing a larger geographical area were used.
Temporal representativeness	Primary data was collected so as to be representative of the full 2023 year, while this is not always the case for ecoinvent and US LCI datasets. Nevertheless, ecoinvent and US LCI remain the reference LCI databases used in this study.
Technological representativeness	Primary data, obtained from the manufacturer, is representative of the current technologies and materials used by this company.
Completeness	All relevant process steps were considered and modelled to satisfy the goal and scope. Cut-off criteria were respected. No known mass or energy flows were excluded.

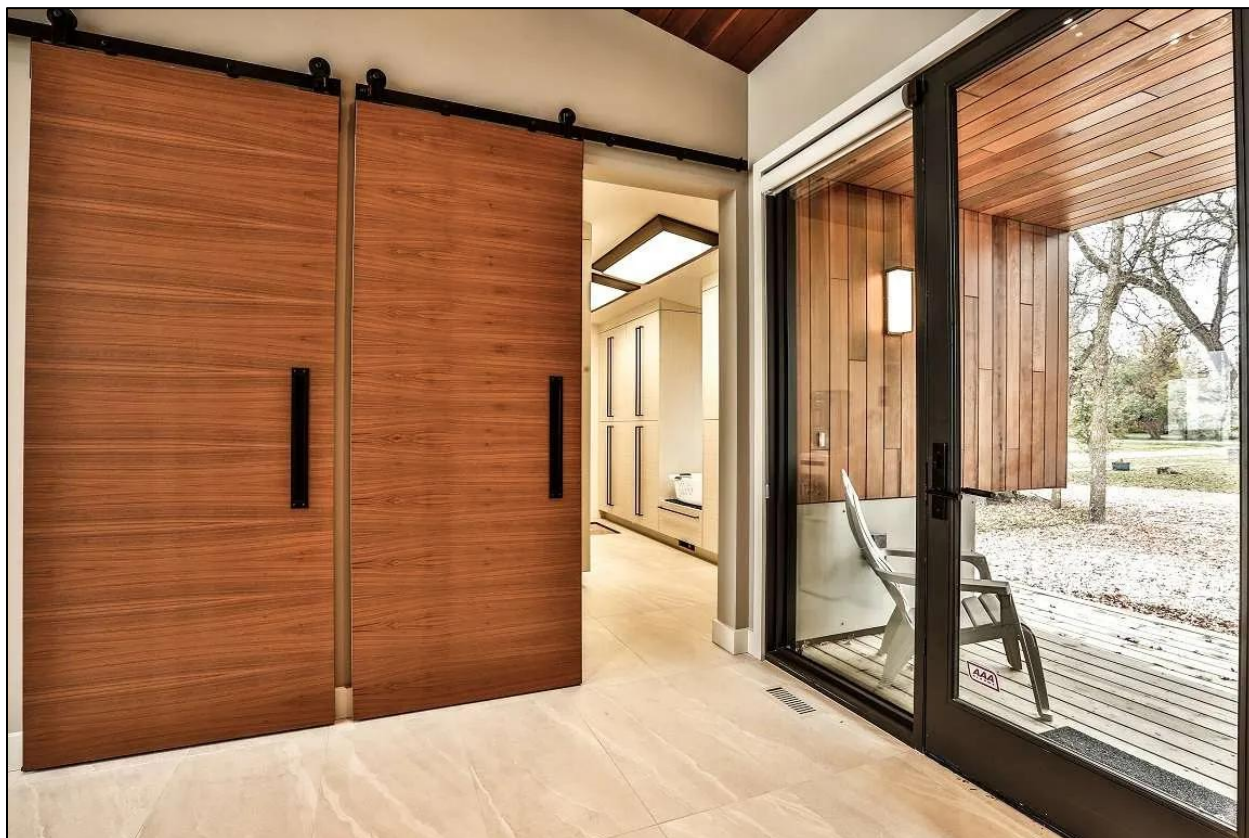
4. LIFE CYCLE ASSESSMENT RESULTS

It should be noted that Life Cycle Impact Assessment (LCIA) results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

The results are reported for the declared unit (DU), i.e. **“one (1) square metre (1 m²) of fenestration assemblies including the frame and glazing meeting the relevant ANSI/NFRC 100 performance standards per the identified sliding patio doors.”** The results are presented for the total finished product and packaging (frame + glazing) and for the frame and the glazing separately.

4.1. ENVIRONMENTAL LIFE CYCLE IMPACTS

Table 4 and Table 5 present the LCIA results according to the PCR NSF 1102-23 and ISO 21930:2017, as the minimum pre-set indicators to report impact categories. This set includes the TRACI 2.1 impact categories for the three life cycle modules (A1, A2 and A3). The term “potential” means that the impact scores do not represent the actual impacts measured but are the results of theoretical modelling using an impact assessment method such as TRACI 2.1.



Beach Cottage Residential Project – Winnipeg, MB (Photo courtesy of SILEX FIBERGLASS WINDOWS & DOORS)

Table 4: Life cycle impact assessment (LCIA) results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame + Glazing)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame + Glazing)			
		A1	A2	A3	A1 - A3
TRACI 2.1					
GWP ₁₀₀ -AR5 ⁽¹⁾	kg CO ₂ eq.	9.67E+01	8.18E+00	1.05E+01	1.15E+02
GWP ₁₀₀ -AR4 ⁽²⁾	kg CO ₂ eq.	9.52E+01	8.16E+00	1.03E+01	1.14E+02
AP	kg SO ₂ eq.	5.11E-01	6.47E-02	9.36E-03	5.85E-01
EP	kg N eq.	2.18E-01	4.63E-03	5.78E-03	2.29E-01
ODP	kg CFC-11 eq.	3.90E-06	1.77E-08	2.30E-07	4.14E-06
SFP	kg O ₃ eq.	6.66E+00	1.79E+00	1.94E-01	8.65E+00
ADP _{Fossil} ⁽³⁾	MJ, LHV	6.69E+02	6.97E+01	1.05E+01	7.50E+02
ADP _{Element} ⁽³⁾	kg Sb eq.	1.10E-04	3.84E-09	2.66E-06	1.13E-04
GWP: Global Warming Potential; AP: Acidification Potential; EP: Eutrophication Potential; ODP: Ozone Layer Depletion Potential; SFP: Smog Formation Potential; ADP_{Fossil}: Abiotic Resource Depletion Potential of Non-Renewable (Fossil) Energy Resources; ADP_{Element}: Abiotic Resource Depletion Potential of Non-Renewable (Non-Fossil) Mineral Resources.					

(1): GWP 100, excludes biogenic CO₂ removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO₂ removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

(3): Calculated according to CML-baseline, v.4.8, August 2016.

Table 5: Life cycle impact assessment (LCIA) results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame and Glazing separately)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame and Glazing separately)						
		A1		A2		A3		A1 - A3
		FRAME	GLAZING	FRAME	GLAZING	FRAME	GLAZING	TOTAL SYSTEM
TRACI 2.1								
GWP ₁₀₀ -AR5 ⁽¹⁾	kg CO ₂ eq.	4.34E+01	5.33E+01	8.14E+00	3.65E-02	1.05E+01	1.75E-02	1.15E+02
GWP ₁₀₀ -AR4 ⁽²⁾	kg CO ₂ eq.	4.27E+01	5.25E+01	8.12E+00	3.63E-02	1.03E+01	1.74E-02	1.14E+02
AP	kg SO ₂ eq.	1.67E-01	3.44E-01	6.44E-02	3.00E-04	9.24E-03	1.20E-04	5.85E-01
EP	kg N eq.	1.03E-01	1.15E-01	4.61E-03	2.29E-05	5.76E-03	1.53E-05	2.29E-01
ODP	kg CFC-11 eq.	7.68E-07	3.13E-06	1.76E-08	1.31E-10	2.29E-07	2.37E-10	4.14E-06
SFP	kg O ₃ eq.	2.27E+00	4.39E+00	1.78E+00	8.20E-03	1.89E-01	5.03E-03	8.65E+00
ADP _{Fossil} ⁽³⁾	MJ, LHV	3.05E+02	3.64E+02	6.92E+01	5.15E-01	1.04E+01	1.42E-01	7.50E+02
ADP _{Element} ⁽³⁾	kg Sb eq.	2.93E-05	8.07E-05	3.82E-09	2.81E-11	2.65E-06	8.34E-09	1.13E-04
GWP: Global Warming Potential; AP: Acidification Potential; EP: Eutrophication Potential; ODP: Ozone Layer Depletion Potential; SFP: Smog Formation Potential; ADP_{Fossil}: Abiotic Resource Depletion Potential of Non-Renewable (Fossil) Energy Resources; ADP_{Element}: Abiotic Resource Depletion Potential of Non-Renewable (Non-Fossil) Mineral Resources.								

(1): GWP 100, excludes biogenic CO₂ removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

(2): GWP 100, excludes biogenic CO₂ removals and emissions associated with biobased products and packaging; 100-year time horizon GWP factors are provided by the IPCC 2007 Fourth Assessment Report (AR4).

(3): Calculated according to CML-baseline, v.4.8, August 2016.

4.2. LIFE CYCLE INVENTORY CATEGORIES

According to the PCR NSF 1102-23 and ISO 21930:2017, the life cycle inventory (LCI) categories shall be presented for resources used and output flows, waste categories and biogenic carbon dioxide emissions and removals. [3, pp. 26-28] The environmental parameters used for the inventory analysis describe the use of renewable and non-renewable material resources, renewable and non-renewable primary energy, and water.

Inventory categories regarding biogenic carbon, carbonation, and CO₂ emissions from waste combustion are not included because the results are either zero (biogenic carbon in the product, carbonation, waste combustion) or below the cut-off criteria (biogenic carbon in packaging).

In addition, “The LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations currently have significant limitations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values”. [3, p. 27]

Table 6 to Table 9 present the life cycle inventory categories for resource use as well as output flows and waste categories.



Beach Cottage Residential Project – Winnipeg, MB (Photo courtesy of SILEX FIBERGLASS WINDOWS & DOORS)

Table 6: Resource use LCI results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame + Glazing)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame + Glazing)			
		A1	A2	A3	A1 - A3
Resource Use					
RPR _E ⁽¹⁾	MJ, LHV	8.27E+01	1.34E-01	2.45E+01	1.07E+02
RPR _M ⁽²⁾	MJ, LHV	9.24E-01	0.00E+00	7.03E+00	7.95E+00
RPR _T	MJ, LHV	8.36E+01	1.34E-01	3.15E+01	1.15E+02
NRPR _E ⁽³⁾	MJ, LHV	7.76E+02	6.94E+01	1.01E+01	8.55E+02
NRPR _M ⁽⁴⁾	MJ, LHV	0.00E+00	0.00E+00	1.89E+00	1.89E+00
NRPR _T	MJ, LHV	7.76E+02	6.94E+01	1.19E+01	8.57E+02
SM	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE ⁽⁵⁾	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW ⁽⁶⁾	m ³	1.11E+00	8.60E-04	1.43E-01	1.25E+00
RPRE: Renewable Primary Resources Used as Energy Carrier (Fuel); RPRM: Renewable Primary Resources with Energy Content Used as Material; RPRT: Renewable Primary Resources Total; NRPRE: Non-Renewable Primary Resources Used as Energy Carrier (Fuel); NRPRM: Non-Renewable Primary Resources with Energy Content Used as Material; NRPRT: Non-Renewable Primary Resources Total; SM: Secondary Materials; RSF: Renewable Secondary Fuels; NRSF: Non-Renewable Secondary Fuels; RE: Recovered Energy; FW: Use of Net Fresh Water Resources.					

(1): RPRE = RPRT - RPRM, where RPRT is equal to the value for renewable energy obtained using the CED methodology (LHV).

(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPRM.

(3): NRPRE = NRPRT - NRPRM, where NRPRT is equal to the value for non-renewable energy obtained using the CED methodology (LHV).

(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, NRPRM.

(5): Category meeting the requirements of ISO 21930:2017. Silex Fiberglass Windows & Doors products are not recovered for energy purposes, so this category is zero.

(6): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption.

Table 7: Resource use LCI results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame and Glazing separately)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame and Glazing separately)						
		A1		A2		A3		A1 - A3
		FRAME	GLAZING	FRAME	GLAZING	FRAME	GLAZING	TOTAL SYSTEM
Resource Use								
RPR _E ⁽¹⁾	MJ, LHV	3.68E+01	4.59E+01	1.33E-01	9.80E-04	2.45E+01	2.97E-03	1.07E+02
RPR _M ⁽²⁾	MJ, LHV	9.24E-01	0.00E+00	0.00E+00	0.00E+00	7.03E+00	0.00E+00	7.95E+00
RPR _T	MJ, LHV	3.77E+01	4.59E+01	1.33E-01	9.80E-04	3.15E+01	2.97E-03	1.15E+02
NRPRE ⁽³⁾	MJ, LHV	3.69E+02	4.06E+02	6.88E+01	5.13E-01	9.91E+00	1.42E-01	8.55E+02
NRPR _M ⁽⁴⁾	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.89E+00	0.00E+00	1.89E+00
NRPR _T	MJ, LHV	3.69E+02	4.06E+02	6.88E+01	5.13E-01	1.18E+01	1.42E-01	8.57E+02
SM	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE ⁽⁵⁾	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW ⁽⁶⁾	m ³	7.55E-01	3.51E-01	8.54E-04	6.28E-06	1.43E-01	3.23E-05	1.25E+00
RPRE: Renewable Primary Resources Used as Energy Carrier (Fuel); RPRM: Renewable Primary Resources with Energy Content Used as Material; RPRT: Renewable Primary Resources Total; NRPRE: Non-Renewable Primary Resources Used as Energy Carrier (Fuel); NRPRM: Non-Renewable Primary Resources with Energy Content Used as Material; NRPRT: Non-Renewable Primary Resources Total; SM: Secondary Materials; RSF: Renewable Secondary Fuels; NRSF: Non-Renewable Secondary Fuels; RE: Recovered Energy; FW: Use of Net Fresh Water Resources.								

(1): RPRE = RPRT - RPRM, where RPRT is equal to the value for renewable energy obtained using the CED methodology (LHV).

(2): Calculated as per ACLCA ISO 21930 Guidance, 6.2 Renewable primary resources with energy content used as a material, RPRM.

(3): NRPRE = NRPRT - NRPRM, where NRPRT is equal to the value for non-renewable energy obtained using the CED methodology (LHV).

(4): Calculated as per ACLCA ISO 21930 Guidance, 6.4 Non-renewable primary resources with energy content used as a material, NRPRM.

(5): Category meeting the requirements of ISO 21930:2017. Silex Fiberglass Windows & Doors products are not recovered for energy purposes, so this category is zero.

(6): Represents the use of net fresh water calculated from life cycle inventory results, i.e., water consumption.

Table 8: Output flows and waste LCI results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame + Glazing)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame + Glazing)			
		A1	A2	A3	A1 - A3
Output flows and waste categories					
HWD ^(1,5)	kg	8.00E+01	4.50E-02	1.02E+00	8.10E+01
NHWD ^(2,5)	kg	8.66E+00	6.72E-02	1.64E-01	8.89E+00
HLRW ^(3,5)	m ³	4.68E-08	5.18E-12	5.96E-10	4.74E-08
ILLRW ^(4,5)	m ³	2.61E-07	3.07E-11	3.42E-09	2.65E-07
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.65E-01	0.00E+00	1.66E-01	3.31E-01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD: Hazardous Waste Disposed; NHWD: Non-Hazardous Waste Disposed; RWD: Radioactive Waste Disposed; HLRW: High-Level Radioactive Waste, Conditioned, to Final Repository; ILLRW: Intermediate and Low-Level Radioactive Waste, Conditioned, to Final Repository; CRU: Components for Re-Use; MFR: Materials for Recycling; MER: Materials for Energy Recovery; EE: Exported Energy.					

(1): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste.

(2): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive" and EPD values.

(3): Calculated from life cycle inventory results, based on ecoinvent waste flow "high-level radioactive waste for final repository." The manufacturer does not generate radioactive waste.

(4): Calculated from life cycle inventory results, based on ecoinvent waste flow "low-level radioactive waste for final repository." The manufacturer does not generate radioactive waste.

(5): "The LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations currently have significant limitations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values."

Table 9: Output flows and waste LCI results for one square metre (1 m²) of Silex Fiberglass Series 5000 PD (Frame and Glazing separately)

Environmental Indicator	Unit	Results for 1 m ² DU of Series 5000 PD (Frame and Glazing separately)						
		A1		A2		A3		A1 - A3
		FRAME	GLAZING	FRAME	GLAZING	FRAME	GLAZING	TOTAL SYSTEM
Output flows and waste categories								
HWD ^(1,5)	kg	2.64E+01	5.36E+01	4.47E-02	3.30E-04	1.02E+00	1.66E-03	8.10E+01
NHWD ^(2,5)	kg	2.70E+00	5.97E+00	6.67E-02	5.00E-04	1.64E-01	1.60E-04	8.89E+00
HLRW ^(3,5)	m ³	1.74E-08	2.94E-08	5.15E-12	3.81E-14	5.95E-10	8.51E-13	4.74E-08
ILLRW ^(4,5)	m ³	1.02E-07	1.59E-07	3.05E-11	2.26E-13	3.42E-09	4.60E-12	2.65E-07
CRU	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	1.65E-01	0.00E+00	0.00E+00	0.00E+00	1.66E-01	0.00E+00	3.31E-01
MER	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE	MJ, LHV	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
HWD: Hazardous Waste Disposed; NHWD: Non-Hazardous Waste Disposed; RWD: Radioactive Waste Disposed; HLRW: High-Level Radioactive Waste, Conditioned, to Final Repository; ILLRW: Intermediate and Low-Level Radioactive Waste, Conditioned, to Final Repository; CRU: Components for Re-Use; MFR: Materials for Recycling; MER: Materials for Energy Recovery; EE: Exported Energy.								

(1): Calculated from life cycle inventory results, based on datasets classified under "treatment and disposal of hazardous waste." The manufacturer does not generate hazardous waste.

(2): Calculated from life cycle inventory results, based on waste that is neither "hazardous" nor "radioactive" and EPD values.

(3): Calculated from life cycle inventory results, based onecoinvent waste flow "high-level radioactive waste for final repository." The manufacturer does not generate radioactive waste.

(4): Calculated from life cycle inventory results, based onecoinvent waste flow "low-level radioactive waste for final repository." The manufacturer does not generate radioactive waste.

(5): "The LCI data used to generate waste metrics for Life Cycle Assessments and Environmental Product Declarations currently have significant limitations. The waste metrics were calculated in a way conformant with the requirements of ISO 21930:2017, but these values represent rough estimates and are for informational purposes only. As such, no decisions regarding actual cradle-gate waste performance between products should be derived from these reported values."

4.3. CONTRIBUTION ANALYSIS

This section provides details on the contribution to the potential environmental impacts and resource use of the different life cycle stage modules of the Silex Fiberglass Windows & Doors product studied. The contribution was carried out for the extraction and upstream production (A1), transport (A2) and manufacturing (A3) modules. Figure 3 to Figure 5 present the contribution analyses in relative values of the impacts. As specified in section 7.1.3 of the PCR [3], results must be presented for the frame and glazing:

1. The **frame** includes the low profile, glazing beads and stops, metal steel components, sealants, gaskets, hardware and other parts that retain or support the glazing and the packaging materials.
2. **Glazing** includes the Insulated Glass Unit (IGU) and packaging materials.

As shown in Figure 3 to Figure 5, raw materials extraction and upstream production (A1) is the main contributor to all potential impact categories, as well as renewable and non-renewable resource consumption. Depending on the impact categories, transport (A2) or manufacturing (A3) are the second or third main contributor. For the total product, in terms of global warming potential (GWP), the two main processes contributing to the production stage (A1) are the acquisition of the fiberglass (modelled by nylon 6-6) and the Insulated Glass Unit (IGU), respectively, in “A1 – FRAME” and “A1 – GLAZING.” At the manufacturing stage (A3), for energy consumption at the Silex plant, electricity consumption from the Manitoba power grid is the main contributor to GWP.

Based on this EPD, for one square metre (1 m²) of Silex Fiberglass Windows & Doors, the sliding patio doors impact is 1.15E+02 kg CO₂ eq. (module A1-A3), including the frame and glazing. The global warming potential (GWP) is calculated based on IPCC’s 5th assessment report.

GWP: Global Warming Potential; **AP:** Acidification Potential; **EP:** Eutrophication Potential; **ODP:** Ozone Layer Depletion Potential; **SFP:** Smog Formation Potential; **ADP_{Fossil}:** Abiotic Resource Depletion Potential of Non-Renewable (Fossil) Energy Resources; **ADP_{Element}:** Abiotic Resource Depletion Potential of Non-Renewable (Non-Fossil) Mineral Resources; **RPRT:** Renewable Primary Resources Total; **NRPRT:** Non-Renewable Primary Resources Total.

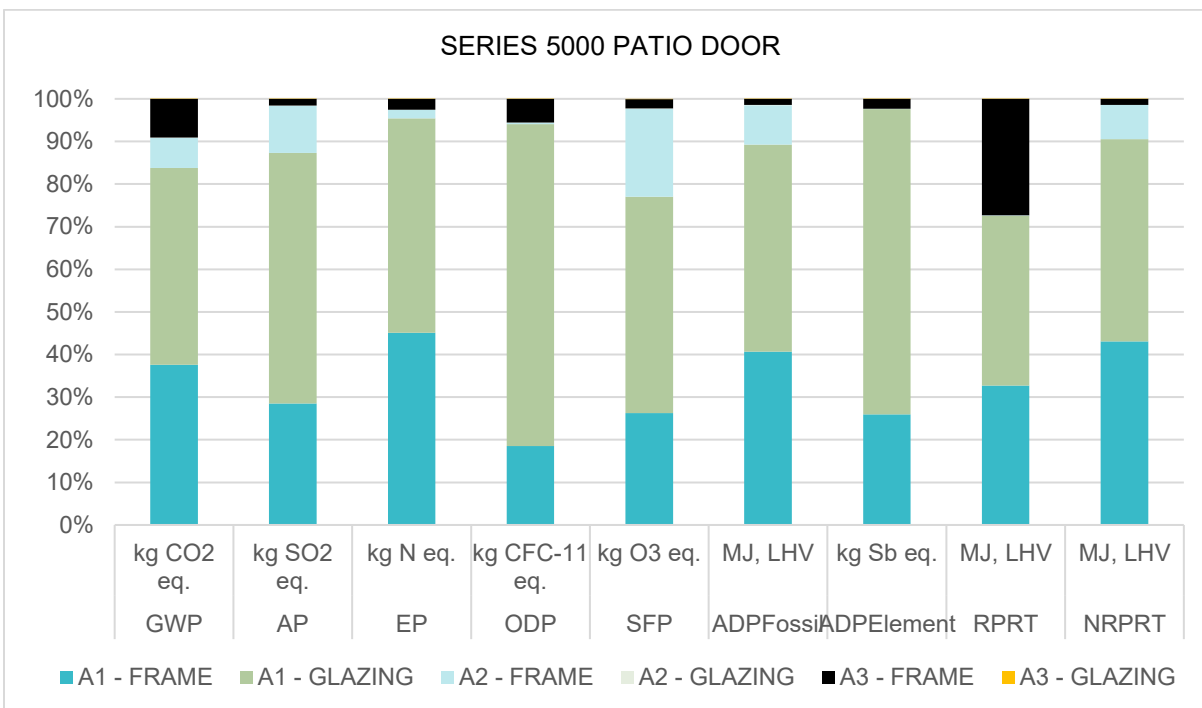


Figure 3: Contribution of life cycle stages (A1-A3) to the environmental impacts for one square metre (1 m²) of Silex Fiberglass Series 5000 Patio Door - TRACI & CML, and CED indicators

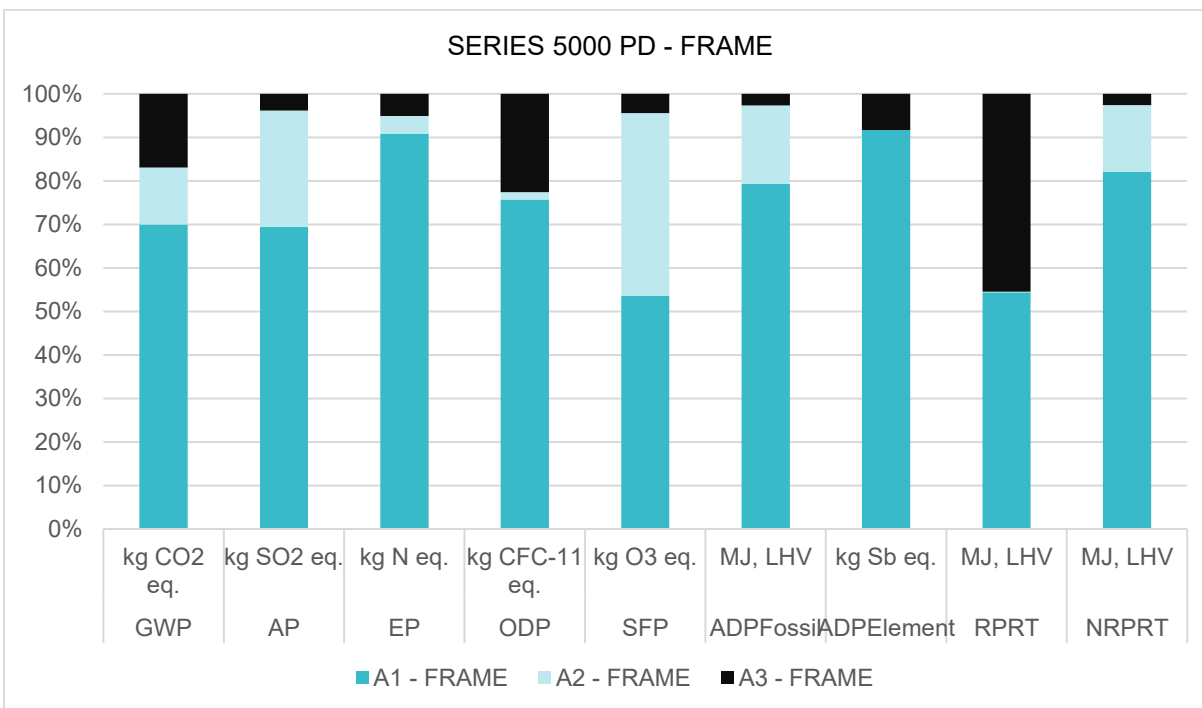


Figure 4: Contribution of life cycle stages (A1-A3) to the environmental impacts for one square metre (1 m²) of Silex Fiberglass Series 5000 Patio Door Frame - TRACI & CML, and CED indicators

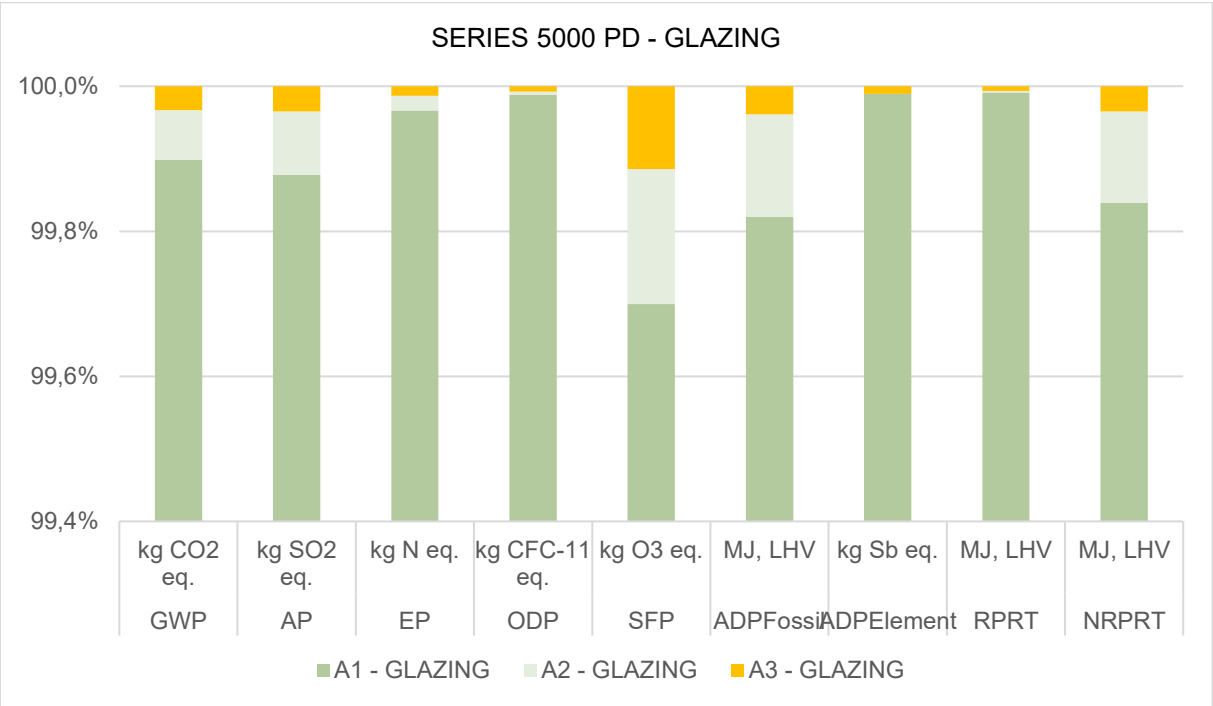


Figure 5: Contribution of life cycle stages (A1-A3) to the environmental impacts for one square metre (1 m²) of Silex Fiberglass Series 5000 Patio Door Glazing - TRACI & CML, and CED indicators



Beach Cottage Residential Project – Winnipeg, MB (Photo courtesy of SILEX FIBERGLASS WINDOWS & DOORS)

5. ADDITIONAL ENVIRONMENTAL INFORMATION

5.1. REGULATED HAZARDOUS SUBSTANCES

Silex Fiberglass Windows & Doors products are not considered to contain regulated hazardous substances based on the manufacturer's declaration.

5.2. RELEASE OF DANGEROUS SUBSTANCES

Silex Fiberglass Windows & Doors products are not known to release dangerous substances.

5.3. FUTHER INFORMATION

Silex Fiberglass Windows & Doors is fully committed to the diligent protection of both the environment and the health and safety of its workers and its customers' workers. Its manufacturing process includes state-of-the-art environmental control equipment and workers are equipped with the highest quality personal protection gear. The Silex Fiberglass Windows & Doors research and development process strives to create architectural products that have a sustainable impact on buildings and their occupants.

To learn more about Silex Fiberglass Windows & Doors and its products, visit: <https://silexfiberglass.com/>

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EPD

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