Product pictured is not the exact style of the product studied in this document.

SILQ™

The **SILQ** chair (pronounced silk) is a breakthrough in seating design. Its innovative materiality is both mechanism and artistry, and delivers a personal experience by responding to the unique movements of your body.

The model chosen for analysis from the SILQ range is reference # 418A000. Standard features for SILQ include:

- Plastic Base
- Fixed Arms
- “Atlantic” Fabric

Date of critical review: 01/2019

EPD Overview

Final Assembly Location

Final assembly of SILQ is in Sarrebourg, France by Steelcase for the Europe, Middle East, and Africa market.

Goal and Scope

The potential environmental impacts of SILQ (incl. packaging) throughout its entire life cycle – including raw materials extraction, production, transport, use, and end of life – were assessed using Life Cycle Assessment (LCA – ISO 14040 / 14044) in 01/2019.

Life Cycle Inventory

- list of materials
- inventory of resources
- inventory of emissions

Life Cycle Impact Assessment

- environmental impacts

Verification Process And References

Contact

Goal and Scope

The measurements found during the life cycle assessment help to guide best practice decisions and are the starting point for continuous improvement.

Both method and product may be subject to modifications, and the figures are subject to change without notice.

At Steelcase, our goal is to continuously improve the environmental performance of our products, and to consider each phase of the life cycle. Our findings in one product life cycle assessment may also lead to better decisions or best practices for other product lines.

The potential environmental impacts of SILQ (incl. packaging) throughout its entire life cycle – including raw materials extraction, production, transport, use, and end of life – were assessed using Life Cycle Assessment (LCA – ISO 14040 / 14044) in 01/2019.

Materials

This phase includes materials extraction and processing into useable materials. Benefits of recycled materials are considered here.

Production

This phase consists of all manufacturing and assembly taking place at Steelcase or their suppliers and sub-suppliers.

Transport

Upstream and downstream transports are considered, from materials extraction until handling for end of life.

Use

The use phase is when the finished product is in its intended function – no significant environmental impacts occur.

End of life

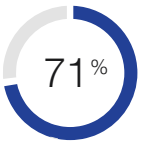
End-of-life product recyclability and local waste management infrastructure are considered. Benefits from recycling are not considered in this phase to avoid double counting.

The functional unit – i.e. the quantified performance of the product for use as a reference unit – used in the Life Cycle Assessment was chosen as provision of comfortable seating – with the features stated in the product description – for 8 hours a day, 5 days a week over 15 years.

Environmental declarations may not be effectively comparable if evaluated against other products, or if the LCA methods were completed by different practitioners using different models.

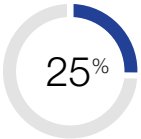
Life Cycle Inventory

SILQ materials composition is listed below.*



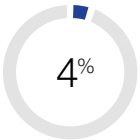
PLASTICS

	kg	%
Polypropylene (PP)	3.1	26.3
Glass-filled nylon (PA-GF)	2.8	24.1
Recycled glass-filled nylon 6 (PA6-GF)	2.0	16.8
Synthetic rubber	0.3	2.9
Acrylonitrile butadiene styrene (ABS)	0.1	0.9
Polyoxymethylene (POM)	<0.1	0.1
Low density polyethylene (LDPE)	<0.1	<0.1
Nylon 6 (PA6)	<0.1	<0.1
Nylon 66 (PA66)	<0.1	<0.1
Polyethylene (PE)	<0.1	<0.1



METALS

	kg	%
Steel	1.7	14.3
Aluminum (cast)	1.2	10.1



OTHER MATERIALS

	kg	%
Polyurethane foam	0.4	3.6
Polyester fabric	<0.1	0.6

PACKAGING

	kg	%
Cardboard	4.6	97.9
Low density polyethylene (LDPE)	<0.1	1.7
Polypropylene (PP)	<0.1	0.4

TOTAL WEIGHT – incl. packaging **16.5**

*The list of materials does not contain all materials used in the product. (e.g. adhesives, coatings, residuals, etc.).

RESOURCES

This table inventories the most important emissions to air, soil and water throughout the entire life cycle of SILQ.

RENEWABLE ENERGY

	MJ
Biomass	52.2
Hydropower	29.5
Wind	5.66

NON-RENEWABLE ENERGY

	MJ
Gas	499
Oil	465
Coal	229
Uranium	208

WATER

	m^3
Water withdrawal	0.132

EMISSIONS

This table inventories the most important emissions to air, soil and water throughout the entire life cycle of SILQ.

EMISSIONS TO AIR

	kg
CO_2 – Carbon dioxide (fossil)	65.9
CO_2 – Carbon dioxide (biogenic)	4.90
CO – Carbon monoxide (fossil)	0.175
CH_4 – Methane (fossil)	0.273
CH_4 – Methane (biogenic)	0.120
SO_2 – Sulfur dioxide	0.176
NO_x – Nitrogen oxides	0.173

EMISSIONS TO SOIL

	kg
Cl^- – Chloride	0.004
Oils	0.015
Na – Sodium	0.002
Ca – Calcium	0.001
Fe – Iron	0.001
C – Carbon	0.001

EMISSIONS TO WATER

	kg
Cl^- – Chloride	0.790
SO_4^{2-} – Sulfate	1.84
Si – Silicon	0.583
COD – Chemical Oxygen Demand	1.16
TOC – Total Organic Carbon	0.965
Ca^{2+} – Calcium, ion	0.616
DOC, Dissolved Organic Carbon	0.970

Life Cycle Impact Assessment

Based on the Life Cycle Inventory, the environmental impacts of SILQ are assessed with the following impact categories:

Impact categories (selected by Steelcase)

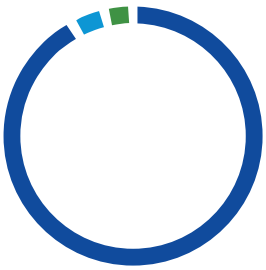
- **Global warming** [kg CO_2-eq.]
  Is due to emissions of greenhouse gases, causing the rise of the global temperature.
- **Respiratory inorganics** [kg PM2.5*-eq.]
  Are due to small particles or dust that causes respiratory problems for humans with asthma or respiratory diseases.
  *Particulate matter smaller than 2.5 micrometres in diameter.
- **Carcinogens** [kg C_2H_3Cl-eq.]
  Describe substances or agents which may contribute to cancer.
- **Terrestrial ecotoxicity** [kg TEG* soil]
  Measures the ecotoxicological factor for terrestrial ecosystems.
  *Triethylene glycol
- **Non-renewable energy** [MJ primary]
  Describes finite resources that will eventually dwindle, becoming too expensive or too environmentally damaging to extract.

Distribution of the environmental impacts for the respective life cycle stages:

The figures in this table are rounded up because the potential uncertainties don't justify the use of more than two significant digits.

Impact category	Unit	Total	Materials	Production	Transport	Use	End of life
Global warming	[kg CO_2-eq.]	7.3E+01	3.8E+01	2.2E+01	9.4E+00	No significant environmental impacts occur.	2.7E+00
Respiratory inorganics	[kg PM2.5-eq.]	3.5E-02	2.4E-02	6.8E-03	4.8E-03		1.6E-04
Carcinogens	[kg C_2H_3Cl-eq.]	3.0E+00	2.6E+00	3.1E-01	5.3E-02		1.0E-02
Terrestrial ecotoxicity	[kg TEG soil]	2.3E+03	1.2E+03	5.0E+02	5.4E+02		1.4E+01
Non-renewable energy	[MJ primary]	1.4E+03	7.8E+02	4.7E+02	1.5E+02		5.2E+00

Recycled Materials and Recyclability



SILQ

	kg	%
Pre-consumer recycled content	0.50	4.3
Post-consumer recycled content	0.80	6.8
Total recycled content	**1.30**	**11.1**

- Pre-consumer - Recycled content
- Post-consumer - Recycled content
- Virgin material

91.4%

According to the available waste management infrastructures, we estimate that 91.4% is recyclable.

Verification Process and References

The LCA study of SILQ (reference: 418A000) was carried out by Steelcase, according to ISO 14040 / 14044 and based on previous collaboration with the Technical University of Denmark (DTU) and Quantis. It was then critically reviewed by Michael Hauschild from the Department of Management Engineering of the DTU.

The independent verification of this EPD was carried out by the Department of Management Engineering of the DTU in accordance with ISO 14025.

Disclaimer: In the absence of a relevant Product Category Rule (PCR), Steelcase developed a set of specific rules, requirements and guidelines to perform life cycle assessments and Type III environmental declarations, according to the objectives of ISO 14025.

References

Related ISO standards:

- ISO 14025 Environmental labels and declarations – Type III environmental declarations
- ISO 14040:2006 Environmental management – Life cycle assessment – Principles and framework
- ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines

LCIA method and LCI database:

- ILCD HANDBOOK, European Commission, Joint Research Centre, Institute for Environment and Sustainability. ILCD Handbook: General Guide for Life Cycle Assessment – Detailed Guidance. European Union, March 2010, 394p.
- IMPACT 2002+ V2.10 method: JOLLIET, O., MARGNI, M., CHARLES, R., HUMBERT, S., PAYET, J., REBITZER, G. et ROSENBAUM, R. (2003). IMPACT 2002+: A New Life Cycle Impact Assessment Methodology. International Journal of Life Cycle Assessment 8(6) p.324-330.
- Eco-Invent v3.5 LCI database: Swiss Centre for Life Cycle Inventories, Duebendorf, CH - **www.ecoinvent.ch**

End-of-life scenario:

- Mainly based on Eurostat data for the European market
  https://ec.europa.eu/eurostat/statistics-explained/index.php/Waste_statistics

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