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
- “Connect” Fabric

This EPD – Environmental Product Declaration – is valid for the above reference.
Date of critical review: 01/2019

Published on 03/2019

Steelcase

EPD Overview

Final Assembly Location

Final assembly of SILQ is in Kentwood, Michigan by Steelcase for the Americas 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) and BIFMA PCR for Seating: UNCPC 3811 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 the 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) and BIFMA PCR for Seating: UNCPC 3811 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

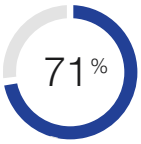
End-of-life product recyclability and local waste management infrastructure are considered. Benefits from recycling are not considered in this phase to avoid double counting.

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 “provide one unit of seating to seat one individual, maintained for a 10 year period.”

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.

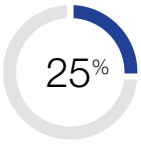
Life Cycle Inventory

SILQ materials composition is listed below.*



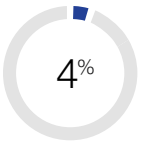
PLASTICS

	kg	lb	%
Polypropylene (PP)	3.1	6.8	26.1
Glass-filled nylon (PA-GF)	2.8	6.2	23.9
Recycled glass-filled nylon 6 (PA6-GF)	2.0	4.4	16.7
Synthetic rubber	0.3	0.7	2.9
Acrylonitrile butadiene styrene (ABS)	0.1	0.2	0.9
Polyoxymethylene (POM)	<0.1	<0.1	0.7
Nylon 6 (PA6)	<0.1	<0.1	<0.1
Nylon 66 (PA66)	<0.1	<0.1	<0.1
Polyethylene (PE)	<0.1	<0.1	<0.1



METALS

	kg	lb	%
Steel	1.7	3.7	14.4
Aluminum (cast)	1.2	2.6	10.1



OTHER MATERIALS

	kg	lb	%
Polyurethane foam	0.4	0.9	3.6
Polyester fabric	<0.1	<0.1	0.6

PACKAGING

	kg	lb	%
Blanket wrap	0.3	0.7	98.8
Low density polyethylene (LDPE)	<0.1	<0.1	1.2

TOTAL WEIGHT – incl. packaging	**12.1**	**26.7**

*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 energy and water consumption throughout the entire life cycle of SILQ.

RENEWABLE ENERGY

	MJ
Biomass	25.1
Hydropower	29.7
Wind	5.51
Geothermal	0.909
Solar	0.230

NON-RENEWABLE ENERGY

	MJ
Gas	440
Oil	523
Coal	209
Uranium	128

WATER

	m^3
Water withdrawal	0.283

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)	70.4
CO_2 – Carbon dioxide (biogenic)	4.33
CO – Carbon monoxide (fossil)	0.178
CH_4 – Methane (fossil)	0.282
CH_4 – Methane (biogenic)	0.205
SO_2 – Sulfur dioxide	0.190
NO_x – Nitrogen oxides	0.200

EMISSIONS TO SOIL

	kg
Cl^- – Chloride	0.004
Oils	0.018
Na – Sodium	0.002
Ca – Calcium	0.001
Fe – Iron	0.001
C – Carbon	0.001

EMISSIONS TO WATER

	kg
Cl^- – Chloride	0.903
SO_4^{2-} – Sulfate	2.15
Si – Silicon	0.671
COD – Chemical Oxygen Demand	0.962
TOC – Total Organic Carbon	0.793
Ca^{2+} – Calcium, ion	0.778
DOC, Dissolved Organic Carbon	0.798

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 BIFMA Product Category Rules)

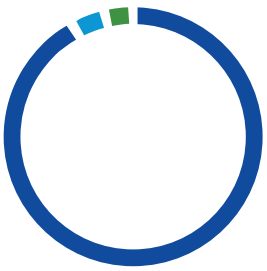
- **Global warming** [kg CO_2-eq.]
  Is due to emissions of greenhouse gases, causing the rise of the global temperature.
- **Acidification** [kg SO_2-eq.]
  Measures the emissions which increase the acidity of the environment due to various chemical reactions and/or biological activity, or by natural circumstances.
- **Photochemical ozone creation** [kg O_3-eq.]
  Is created by various chemical reactions, which occur between nitrogen oxides (NOx) and volatile organic compounds (VOCs) in sunlight.
- **Eutrophication** [kg N -eq.]
  Is the enrichment of an aquatic ecosystem with nutrients (nitrates, phosphates) that accelerate biological productivity and an undesirable accumulation of algal biomass.
- **Ozone depletion** [kg CFC-11 eq]
  Reduction of the stratospheric ozone layer due to anthropogenic emissions of ozone depleting substances.
- **Carcinogenics** [CTUh*]
  Represents the chronic toxicological carcinogenic effects on human health. Provides estimates of the comparative toxicological impact potential associated with a specified mass of a chemical emitted into the environment.
  *Comparative Toxic Units for human
- **Non-Carcinogenics** [CTUh*]
  Represents the chronic toxicological non-carcinogenic effects on human health. Provides estimates of the comparative toxicological impact potential associated with a specified mass of a chemical emitted into the environment.
  *Comparative Toxic Units for human

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.]	8.8E+01	4.4E+01	2.4E+01	1.3E+01	No significant environmental impacts occur.	6.4E+00
Acidification	[kg SO_2-eq.]	3.6E-01	1.9E-01	9.9E-02	6.9E-02		3.3E-03
Photochemical ozone creation	[kg O_3 -eq.]	5.0E+00	2.4E+00	8.8E-01	1.7E+00		6.8E-02
Eutrophication	[kg N -eq.]	2.9E-01	9.7E-02	1.2E-01	1.3E-02		6.6E-02
Ozone depletion	[kg CFC-11- eq.]	1.2E-05	7.0E-06	2.4E-06	2.9E-06		1.4E-07
Carcinogenics	[CTUh]	8.4E-06	5.6E-06	2.2E-06	3.1E-07		3.3E-07
Non-Carcinogenics	[CTUh]	4.1E-05	1.3E-05	9.9E-06	1.9E-06		1.6E-05

Recycled Materials and Recyclability



SILQ

	kg	lb	%
Pre-consumer recycled content	0.5	1.1	4.2
Post-consumer recycled content	0.8	1.8	6.8
Total recycled content	**1.3**	**2.9**	**11.0**

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

87.8%

According to the available waste management infrastructures, we estimate that 87.8% 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.

An environmental declaration according to the objectives of ISO 14025 and BIFMA PCR for Seating: UNCPC 3811.

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:

- Product Category Rule for Environmental Product Declarations, BIFMA PCR for Seating: UNCPC 3811, NSF International, Valid through September 30, 2019.
- 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.
- Bare, J., TRACI 2.1: The Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts 2.1 **http://www.epa.gov/nrmrl/std/sab/traci/**
- Eco-Invent v3.5 LCI database: Swiss Centre for Life Cycle Inventories, Duebendorf, CH - **www.ecoinvent.ch**

End-of-life scenario:

- Mainly based on EPA data for the American market **http://www.epa.gov/osw/nonhaz/municipal/pubs/msw_2010_rev_factsheet.pdf**

Contact

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