



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

FrameFour

FrameFour makes transitions practically seamless, providing a consistent ecosystem of spaces that support resident, nomadic, meeting workstyles throughout the work environment. This new family of products sharing a common leg design encompasses 4-leg desks in various heights, a 4-leg bench, a series of 4-leg meeting tables in different sizes and a storage leg.

The model chosen for analysis from the FrameFour range is reference # N411012700. Standard features for FrameFour include:

- 1600 x 800 mm top size
- 740 mm height

This EPD – Environmental Product Declaration – is valid for the above reference.
Date of critical review: 03/2019

EPD Overview

Final Assembly Location

Final assembly of FrameFour is in Rosenheim, Germany by Steelcase for the Europe, Middle East, and Africa market.

Goal and Scope >

The potential environmental impacts of FrameFour (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 03/2019.

Life Cycle Inventory >

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

Life Cycle Impact Assessment >

- environmental impacts

Verification Process And References >

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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 FrameFour (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 03/2019.

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

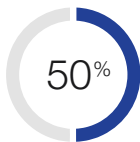
End-of-life product recyclability and local waste management infrastructure are considered. Benefits from recycling are not considered in this phase to avoid double counting.

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 an office desk – with the features stated in the product description – for 8 hours a day, 5 days a week, over 15 years.

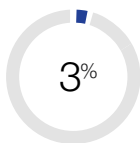
Environmental declarations may not be effectively comparable if evaluated against other products, or if the LCA methods were completed by different practitioners using different models.

Life Cycle Inventory

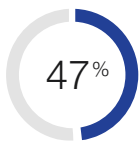
FrameFour materials composition is listed below.*



METALS		
	kg	%
Steel	21.1	50.3



PLASTICS		
	kg	%
Glass-filled nylon 6 (PA6-GF)	0.6	1.5
Polypropylene (PP)	0.3	0.8
Polyoxymethylene (POM)	<0.1	0.2
Acrylonitrile butadiene styrene (ABS)	<0.1	<0.1
Nylon 6 (PA6)	<0.1	<0.1
Nylon 66 (PA66)	<0.1	<0.1



WOOD BASED MATERIALS		
	kg	%
Particle board	19.6	46.7
Melamine	0.2	0.45



PACKAGING		
	kg	%
Cardboard	3.0	93.1
Expanded polyethylene (EPE)	0.1	4.4
Low density polyethylene (LDPE)	<0.1	2.5

TOTAL WEIGHT – incl. packaging 45.2

*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 FrameFour.

RENEWABLE ENERGY

	MJ
Biomass	404
Hydropower	66.6
Wind	23.7

NON-RENEWABLE ENERGY

	MJ
Gas	532
Oil	536
Coal	482
Uranium	211

WATER

	m ³
Water withdrawal	0.233

EMISSIONS

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

EMISSIONS TO AIR

	kg
CO ₂ – Carbon dioxide (fossil)	117.3
CO ₂ – Carbon dioxide (biogenic)	36.03
CO – Carbon monoxide (fossil)	0.69
CH ₄ – Methane (fossil)	0.366
CH ₄ – Methane (biogenic)	0.372
SO ₂ – Sulfur dioxide	0.258
NO _x – Nitrogen oxides	0.285

EMISSIONS TO SOIL

	kg
Cl ⁻ – Chloride	0.030
Oils	0.033
Na – Sodium	0.020
Ca – Calcium	0.009
Fe – Iron	0.005
C – Carbon	0.006

EMISSIONS TO WATER

	kg
Cl ⁻ – Chloride	1.170
SO ₄ ²⁻ – Sulfate	6.5
Si – Silicon	2.36
COD – Chemical Oxygen Demand	2.5
TOC – Total Organic Carbon	2.11
Ca ²⁺ – Calcium, ion	1.98
DOC – Dissolved Organic Carbon	2.110

Life Cycle Impact Assessment

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

Impact categories (selected by Steelcase)

- **Global warming** [kg CO₂-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 C₂H₃Cl-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.]	1.3E+02	5.2E+01	5.2E+01	1.9E+01	No significant environmental impacts occur.	3.5E+00
Respiratory inorganics	[kg PM2.5-eq.]	1.6E-01	9.1E-02	4.9E-02	1.8E-02		1.0E-03
Carcinogens	[kg C ₂ H ₃ Cl-eq.]	5.4E+00	4.7E+00	5.8E-01	1.2E-01		3.6E-02
Terrestrial ecotoxicity	[kg TEG soil]	5.6E+03	2.7E+03	1.6E+03	1.3E+03		3.6E+01
Non-renewable energy	[MJ primary]	1.9E+03	8.0E+02	8.2E+02	3.1E+02		1.3E+01

Recycled Materials and Recyclability

FRAMEFOUR		
	kg	%
Total recycled content	23.4	51.9



98.6%
According to the available waste management infrastructures, we estimate that 98.6% is recyclable.

Verification Process and References

The LCA study of FrameFour (reference: N411012700) 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

Contact

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