

Environmental Product Declaration

A presentation of quantified environmental life cycle product information for the **Think** work chair in North America.

Product Description

The model chosen for analysis is the most popular model **Think** work chair (reference 465THINKS4U).

It is a highly adjustable ergonomic chair equipped as follows:

1. Your Power™ weight activated mechanism
2. Your Profile™ seat and back flexors
3. Your Preference™ control
4. Adjustable seat depth
5. Adjustable seat height
6. Adjustable lumbar support
7. Adjustable armrests
8. Plastic base



Manufacturer

The selected product, the **Think** work chair, is manufactured in Grand Rapids, Michigan by Steelcase.

Steelcase, which was founded in 1912, has been dedicated to creating innovative products and helping people work more effectively for almost a century. Steelcase has quality management systems (ISO 9001), ensuring that our customers are guaranteed the same level of product quality and performance wherever they are in the world.

Steelcase is committed to continually reducing the environmental impacts of its products and activities on a global scale.

The **Think** chair is also manufactured in Sarrebourg, France for the European market and, starting in 2005, in Kuala Lumpur, Malaysia for the Asian market.

For further information visit www.steelcase.com.

Material Declaration

The **Think** work chair consists of the materials listed below. The total weight is 15.1 kg (33.3 lbs.) including packaging.

Metals	kg	%	Plastics	kg	%	Other materials	kg	%
Aluminum	1.583	12.0	PA	5.015	33.2	Cardboard (for packaging)	0.227	1.5
Steel	4.776	31.7	LDPE (for packaging)	0.318	2.1	Rubber	0.024	0.2
			PET	0.380	2.5			
			POM	0.533	3.5			
			PP	0.680	4.5			
			PU	0.330	2.2			

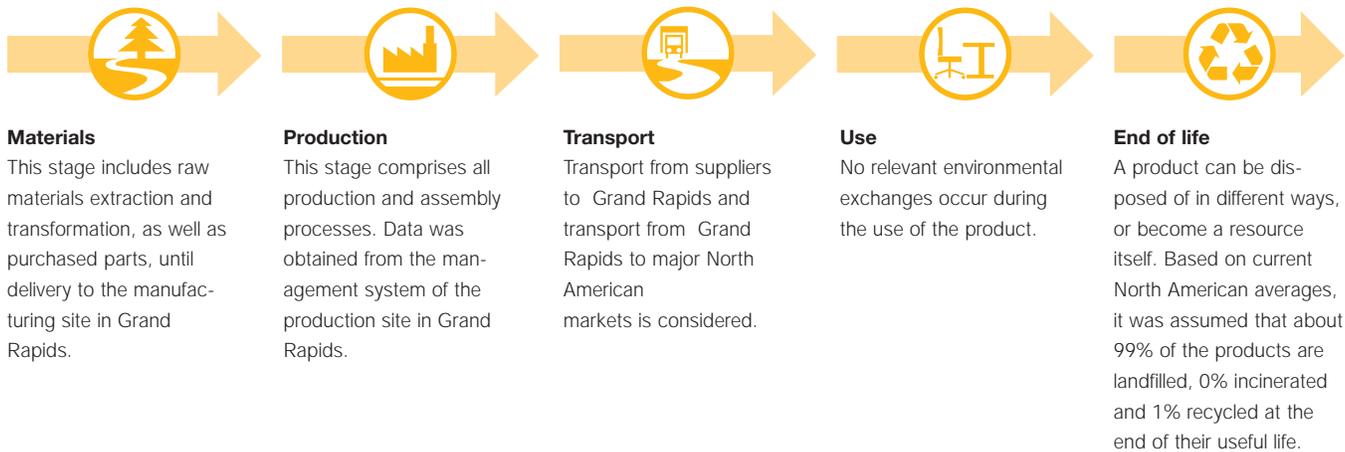
Environmental Product Declaration

The environmental impacts of the **Think** work chair throughout its entire life cycle – including raw materials extraction, production, transport, use, and end of life – were assessed using the Life Cycle Assessment (LCA) process, during the chair's development (early 2004).

The functional unit used in the LCA was chosen as "Provision of comfortable office seating – with the features stated in the product description – for an average person (99 – 243 lbs.) for 8 hours a day, 5 days a week over a period of 15 years."

Life Cycle Inventory Analysis

The Life Cycle Inventory Analysis covers entire life cycle stages as shown below.



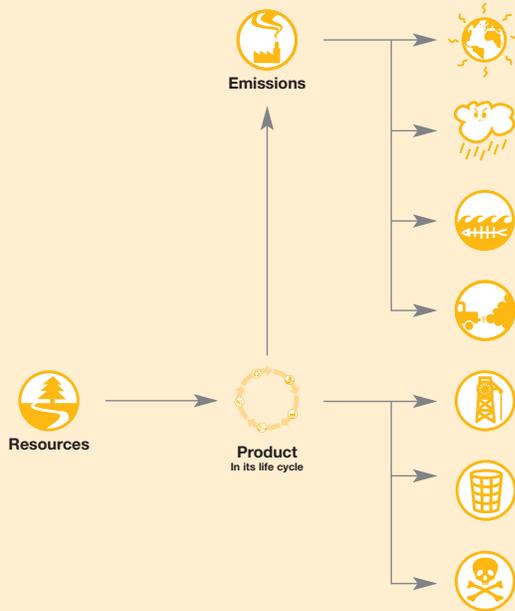
Distribution of the environmental impacts for the relevant life cycle stages

Category	Unit	Total	Materials	Production	Transport	End of Life
	[g CO ₂ -eq.]	102 610.0	67 800.0	27 700.0	3 720.0	3 390.0
	[g SO ₂ -eq.]	836.6	535.0	266.0	35.3	0.3
	[g NO ₃ -eq.]	712.2	471.0	179.0	59.2	3.0
	[g C ₂ H ₄ -eq.]	24.2	18.0	0.8	4.6	0.7

No relevant environmental exchanges occur during the use stage of the product.

Life Cycle Assessment

Environmental impact categories



Global warming

is the rising of the global temperature due to emissions of greenhouse gases.

Acidification

is the damage to trees and life in lakes and rivers, as well as accelerated degradation of materials such as metals, limestone and concrete, both due to emissions of acids.

Eutrophication

is the loss of plants and animals in aquatic ecosystem due to oxygen depletion following blooms of algae, stimulated by high nutrient concentrations.

Photochemical smog

is a type of air pollution harmful to environment and human health caused by emissions of nitrogen oxides and volatile organic components.

Abiotic resource depletion

is the depletion of non-renewable resources such as oil, coal and metals due to their extraction and consumption.

Waste

is the bulk waste and hazardous waste created during the whole life cycle of the product.

Toxic substances

are substances which cause harm to the natural environment or human health.

Environmental aspects of Think work chair

The contributions of inventory parameters to different impact categories throughout the entire life cycle of the **Think** work chair are listed below. Life cycle inventory parameters are considered only if they contribute more than 1% of the total impact in that impact category.

Category	Parameter	Inventory value	Unit	Characterized impact value	Unit
 Global warming	CO ₂	carbon dioxide	85477	g	102 610.0 g CO ₂ -eq.
	N ₂ O	nitrous oxide	276	g	83.3 %
	CH ₄	methane	21	g	6.7 %
	HCs	hydrocarbons	10	g	6.5 %
 Acidification	SO _x	sulphur oxides	504	g	836.6 g SO ₂ -eq.
	NO _x	nitrogen oxides	466	g	60.0 %
 Eutrophication	NO _x	nitrogen oxides	466	g	712.2 g NO ₃ -eq.
	N ₂ O	nitrous oxide	21	g	87.7 %
	NH ₄ ⁺	ammonium	4	g	8.2 %
 Photochemical smog	C ₅ H ₁₂	n-pentane	25	g	24.2 g C ₂ H ₄ -eq.
	CO	carbon monoxide	216	g	41.1 %
	NMVOCS *	(from diesel engines)	7	g	26.8 %
	CH ₄	methane	276	g	17.2 %
	C _x H _y	aromatic hydrocarbons	1	g	8.0 %
	VOCs *	(from diesel engines)	1	g	1.9 %
 Abiotic resource depletion	Brown coal (lignite)		1.3	kg	- -
	Coal		14.0	kg	- -
	Crude oil		13.8	kg	- -
	Iron (in ore)		3.5	kg	- -
	Natural gas		10.3	kg	- -
	Zinc (in ore)		2.1	kg	- -
 Waste	Bulk waste		6788	g	- -
	Hazardous waste		382	g	- -
 Toxic substances	Toxic substances		262	g	- -

No characterised impacts were calculated for Abiotic resource depletion, Solid waste and Toxic substances, due to lack of credible, internationally agreed characterization factors.
 * VOCs = volatile organic compounds, NMVOCS = non-methane VOCs

Additional environmental information

Certifications

By the end of 2004 **Think** will officially comply with the French environmental certification NF – Environnement, awarded by the CTBA (Centre Technique du Bois et de l'Ameublement).

Think carries the Scientific certification Systems Indoor Advantage™ Gold certification for indoor air quality in North America.

LEED

The **Think** chair helps companies work toward LEED (the U.S. Green Building Council's Leadership in Energy and Environmental Design) certification in many ways. The **Think** chair can contribute toward LEED credits because it contains a high percentage of recycled material and it is a low emitting product. Additionally, its ergonomic qualities, production processes and ease of disassembly may contribute towards LEED credits for employee health and for innovation. Because each project is unique, Steelcase will work with customers individually towards LEED application.

McDonough Braungart Design Chemistry

In addition to conducting a Life Cycle Assessment of **Think**, Steelcase consulted with McDonough Braungart Design Chemistry (MBDC) on the safety of materials before they went into the **Think** chair. MBDC analyzed key materials according to their strict protocols, endorsing only those deemed safe to the environment.

Materials

Reduce overall material usage, **Think** weighs only 15 kg (32 lbs). Made from up to 44% recycled materials it contains no hazardous materials (no PVC, chrome, mercury or lead). The water based foam does not contain CFC or HCFC. Suppliers send materials in reusable totes to reduce packaging waste. Majority of chairs are shipped blanket wrapped, and when used, cardboard boxes are recyclable.

Production

Think was designed to be produced with minimal waste, energy consumption and environmental impact. Powder-coat paint is VOC-free and free of heavy metals. No gluing processes are used in assembly, and all urethane foam is water based.

End of Life

Think can be easily disassembled for recycling in about five minutes, using common hand tools. **Think** is up to 99% recyclable by weight. Parts weighing more than 50g are clearly labelled for recycling.

Use

To maximize the **Think** chair's working life, seat and back cushions, arms, headrest, and lumbar support can easily be added or replaced. Maintenance information is available on www.steelcase.com or from Steelcase dealers.

Transport

To reduce shipping, chairs are manufactured close to customers in North America and Europe, and starting 2005 in Asia. The **Think** chair is lightweight and can ship ready-to-assemble which uses less packaging and allows more chairs per shipment, requiring less energy and materials for shipping.



Compilation and Verification Process

- The LCA and the EPD of the Think work chair (reference 465THINKS4U) were conducted with:
- Institute for Product Development – Denmark (Institutet for Produktudvikling, IPU)
- Institute for Engineering Design, Vienna University of Technology - Austria (Institut für Konstruktionslehre, Ecodesign, Technische Universität Wien, TUW)
- The LCA was verified through a critical review by Institute of Chambéry - France (Ecole Nationale Supérieure des Arts et Métiers, ENSAM)

References

- ISO/TR 14025: Environmental labels and declarations – Type III environmental declarations, 15-03-2000
- Lee, K.M., Park, P.: "Application of Life-Cycle Assessment to Type III Environmental Declarations", Environmental Management, Vol. 28, No. 4, 2001, pp. 533-546

LCA method and characterization factors

- EDIP method: Wenzel, Hauschild, Alting: "Environmental Assessment of Products" Volume 1 (Methodology, tools and case studies in product development), Chapman and Hall, 1997, ISBN 0 412 80800 5
- Intergovernmental Panel on Climate Change (IPCC), Status report, 1994
- World Meteorological Organization (WMO), Status report on global ozone research and monitoring project, 1992/1995
- Nordic LCA guideline, 1995
- UNECE report, 1990/1992

Contact

For further information please call 1.800.333.9939.