Environmental Product Declaration

CERTIFIED ENVIRONMENTAL PRODUCT DECLARATION

http://www.environdec.com

Live Tank Circuit Breaker, Type LTB 145D

Product Description

The LTB 145D live tank circuit breaker with the Auto-Puffer™ interrupter is based on proven technology. The energy required for interrupting short-circuit currents is partly taken from the arc itself, significantly reducing the energy required from the operating mechanism. Lower operating energy inherently reduces mechanical stresses and increases circuit breaker reliability.

The LTB 145D circuit breaker is operated by a motor-charged spring operating mechanism type BLK. The design of the operating mechanism is characterized by a minimum number of mechanical components, which ensures the highest degree of total reliability.

LTB 145D circuit breakers are designed for, and installed in, widely shifting conditions, from polar to desert climates throughout the world.

Material Declaration

The weight of a three-pole operated LTB 145D circuit breaker is 1389 kg distributed among the following materials:

Metals		**Polymers**	
Steel	33%	PTFE	0.5%
Aluminum	12%	Epoxy	0.3%
Copper	4.0%	Other polymers	0.3%
Tungsten	0.01%		
Silver	0.006%	**Insulating material**	
Zinc	0.5%	Porcelain	49%
		SF_6 gas	0.3%

System Boundaries

This EPD is based on the results from an LCA (Life Cycle Assessment) of a three-pole operated LTB 145D live tank circuit breaker with a three-column stand and performed in accordance with PSR (Product Specific Requirements) for High Voltage Circuit Breakers 2002:3.

The LCA covers all environmental aspects.

- Manufacturing, including:
  -Production of all materials
  -Transportation
  -Production of main parts
  -Assembly of the product
- Use of the product, including:
  -Transportation to customers
  -Energy consumption for 40 years of continuous operation

- End of life, including:
  -Dismantling
  -Disposal
  -Recycling

Operation

Calculations are based on an estimated lifetime of 40 years when operated continuously. The operational point is 145 kV, 50% of rated current 3150 A. An anti-condensation heater rated at 40 W runs continuously and a thermostat-controlled heater rated at 140 W runs 50% of the time. The actual operational point will vary considerably, and for most of applications, there is no need for thermostat-controlled heating.

A Swedish mix of energy has been used for calculating energy consumption during manufacturing and a European OECD mix of energy for calculating energy consumption during use and disposal.

Resources Utilization				
		Manufacturing	Use	Disposal
Use of non-renewable resources				
Materials in ore	kg/LTB 145D circuit breaker	1166*	666	-847
Materials for energy production	kg/LTB 145D circuit breaker	1458	41354	-692
** Materials for porcelain not included*				
Use of renewable resources				
Hydro energy	kWh/LTB 145D circuit breaker	2300		-80
Wood	kg/LTB 145D circuit breaker	24	1406	-17

Energy Consumption			
		Manufacturing	Use
Electrical energy	kWh/LTB 145D circuit breaker	605	83400
Heat energy	kWh/LTB 145D circuit breaker	320	38500

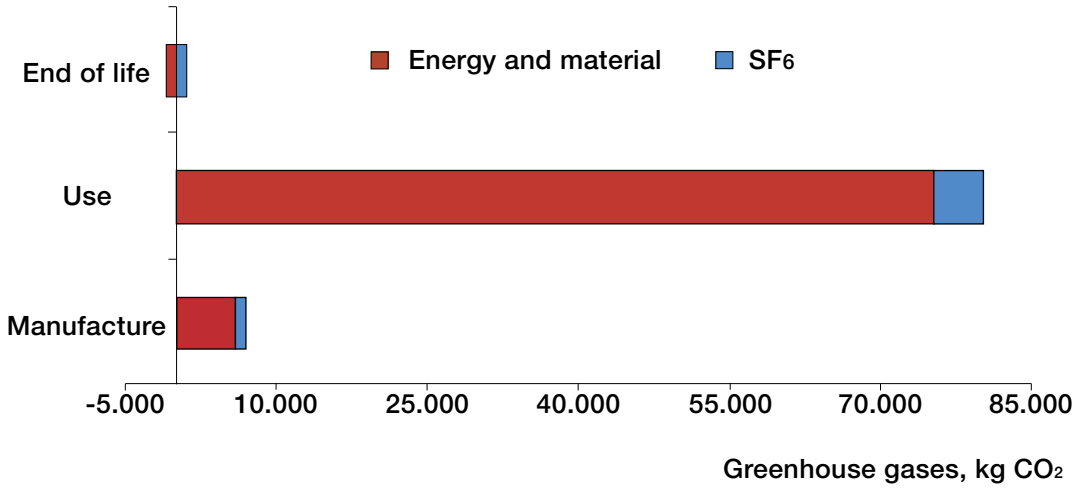
Waste				
		Manufacturing	Use	Disposal
Hazardous waste	kg/LTB 145D circuit breaker	28	negligible	negligible
Regular waste, landfill	kg/LTB 145D circuit breaker	116	negligible	836**
*** Non-recycled materials, including porcelain*				

Emissions				
	Equivalent unit/ circuit breaker	Manufacturing	Use	Disposal
Acidifying gases	mol H^+	1560	13430	-860
Green house gases	kg CO_2	6930	81350	-890
Oxygen consumption gases	kg O_2	99	890	-15
Ozone depletion gases	kg CFC	0.037	0.012	-0.00008
Ozone formation gases	kg C_2H_2	1.06	13.0	-0.21

Additional Qualifying Factors

Life Cycle

Energy consumption during the usage phase contributes most to the greenhouse effect. The contribution of SF_6 is less than 10% due to very low leakage, ≤0.1% per year, resulting in emission of only 0.2 kg SF_6 during 40 years of operation.



Noise Levels
Because the noise level is low, <90 dB at 10 m, the LTB 145D circuit breaker is suitable for installation in residential areas.

Porcelain or Polymeric Insulators?
Porcelain mainly affects the global and regional environments with emissions of acidifying and greenhouse gases. The impact from polymer is regional or local due to the formation of ground-level ozone and eco-toxicity effects in water. The conclusion from an LCA study comparing insulators made of porcelain and polymer is that it is impossible to state whether one design is preferred over the other.

Recycling and Disposal
The main parts of the product can easily be recycled. ABB has a worldwide service center network for the handling of SF_6 gas. The centers can provide:

- Gas recovery service
- Supply or leasing of equipment for gas treatment
- Training courses for personnel in charge of recycling the gas

All treatment of SF_6 follows the procedures described by Technical brochure no. 117 of the CIGRE so as to avoid the release of gas into the atmosphere.

Manufacturer:
ABB Power Technologies AB
High Voltage Products

SE-771 80 LUDVIKA, SWEDEN
Phone: +46 (0)240 78 20 00
Fax: +46 (0)240 78 32 20
E-mail: circuit.breakers@se.abb.com
Internet: http://www.abb.com

Accredited Certification Body
This EPD has been reviewed and found to comply with the Product Specific Requirements for High Voltage Circuit Breakers 2002:3 and with the Swedish Environmental Council's requirements for environmental product declarations dated November 25, 1999.

Certification body: BVQI
Period of validity: 11 August 2007

Information
More information on certified EPDs is available on www.environdec.com

References
- LCA LTB circuit breaker SECRC/CS/TR 04-080
- LCA Isolation material SECRC/CS/TR 03-361
- PSR 2002:3 for Live Tank Circuit Breakers
- MSR 1999:2, Requirements for Environmental product Declarations, EPD from the Swedish Environmental Management Council
- CIGRE Technical brochure no. 117, 1997

The above-mentioned publications are available upon request.

Environmental Management:
The manufacturer has been certified in compliance with ISO 14001 since 1998.

Document No. 1HSM9543 23-01 en, Environmental Product Declaration LTB 145 D, Edition 1, 2004-08

ABB Power Technologies
High Voltage Products

SE-771 80 LUDVIKA, SWEDEN
Phone: +46 (0)240 78 20 00
Fax: +46 (0)240 78 36 50
E-mail: circuit.breakers@se.abb.com
Internet: http://www.abb.com