ABB general machinery drives

ACS350, 7.5 kW

Environmental product declaration

ABB general machinery drives
ACS350, 7.5 kW

Organisational framework

ABB is a leader in power and automation technologies that enable utility and industry customers to improve their performance while lowering environmental impact. The ABB Group of companies operates in around 100 countries and employs more than 110,000 people.

ABB Oy, Drives forms a part of ABB's Automation Products Division. This division serves customers with energy efficient and reliable products to improve customers' productivity, including drives, motors and generators, low voltage products, instrumentation and analytical and power electronics.

ABB Oy, Drives researches, develops, manufactures and markets low voltage AC drives. These drives are sold globally through ABB sales offices and channel partners.

Environmental management

The ISO 14001 international environmental management standard has been implemented to all operations of ABB Oy, Drives. Life cycle assessment (LCA) is applied continually to all product development.

Product description

ABB Oy, Drives comprises the following product portfolios:

- ABB machinery drives, power range 0.18 to 110 kW
- ABB standard drives, power range 0.75 to 355 kW
- ABB industrial drives, power range 0.55 to 5600 kW

This document applies to the ABB general machinery drive, ACS350-03E-15A6-4 model which is a 400 V, 7.5 kW product with protection class IP21.

Material according to the table below is used for the product:

Type of material	kg / product	kg / kW
Steel	0.46	0.062
Copper	0.22	0.029
Aluminium	0.97	0.13
Plastics	0.84	0.11
Cardboard (package)	0.79	0.11
Other materials	0.33	0.044

Environmental performance

The data and calculations are in accordance with Product Specific Requirements (PSR) for Variable Speed Electric Drives, which specifies the following baselines for the LCA calculation.

Functional unit

The functional unit for the LCA is 1 kW of rated output power.

System boundaries

The life cycle assessment covers all environmental aspects for extraction and production of raw materials, manufacturing of main parts, assembly, transportation and use of the product, dismantling, fragmentation and disposal and recycling of scrap after end of life. It includes consumption of material and energy resources as well as emissions and waste generation.

Calculations are based on an estimated lifetime of 15 years when operating 5,000 hours per year. A USA mix of energy has been used for calculating energy consumption during manufacturing and an EU-25 (European Union, 25 countries) mix of energy for calculating energy consumption during use and disposal.

Allocation unit

The factor for allocation of common environmental aspects during manufacturing (such as manufacturing waste) is calculated as used working hours in relation to the total annual production volume for the manufacturing at ABB Oy, Drives and mass for the manufacturing at the suppliers.

Resource utilization

	Manufacturing phase unit / kW	Usage phase unit / kW	Disposal phase unit / kW
Use of non-renewable resources			
Coal kg	0.99 (+ lignite 0.78)	232 (+ lignite 373)	-0.15 (+ lignite -0.14)
Aluminium (Al) kg	0.58 (bauxite)	0.01 (bauxite)	-0.43 (bauxite)
Copper (Cu) kg	0.03	0.00	-0.02
Iron (Fe) kg	0.11 (ore)	0.44 (ore)	-0.07 (ore)
Natural Gas kg	0.75	112	-0.10
Uranium (U) kg	0.00	0.02	0.00
Oil kg	0.34	46.7	-0.09
Use of renewable resources			
Hydro Power MJ	7.14	1,658	0.04

Energy consumption and losses

	kWh / product			kWh / kW		
Energy form	Manufacturing phase	Usage phase	Disposal phase	Manufacturing phase	Usage phase	Disposal phase
Electrical energy	7.6	20,882	-	1.01	2,784	-
Heat energy	4.2	-	-	0.56	-	-

Electricity mix which was used in the manufacturing phase is defined as being 48.3 percent hard coal, 20.0 percent nuclear power, 17.7 percent natural gas, 6.4 percent hydro power, 2.5 percent heavy fuel oil, 2.4 percent brown coal and 2.7 percent other sources.

The average EU-25 electrical energy is defined as being 32.1 percent nuclear power, 18.9 percent hard coal, 17.3 percent natural gas, 10.7 percent brown coal, 10.3 percent hydro power, 6.0 percent heavy fuel oil, 1.2 percent wind power, 1.0 percent blast furnace gas and 2.6 percent other. The resultant resource utilization is shown in the table above.

Waste

	kg / kW
Hazardous waste	
During manufacturing	0.22
At disposal phase	0.00
Regular waste (to landfill)	
During manufacturing phase	0.01
At disposal phase	0.10

Classification data for emissions

Environmental effect	Equivalent unit	Manufacturing phase	Usage phase
Global warming potential GWP	kg CO_2 / kW	7.16	1,601
Acidification potential AP	kmol H+ / kW	0.0012	0.31
Eutrophication	kg O_2 / kW	0.086	17.5
Ozone depletion potential ODP	kg CFC-11 / kW	6.8E-07	0.00038
Photochemical oxidants POCP	kg ethylene / kW	0.0031	0.56

Additional qualifying factors

Recycling and disposal

The main parts of the product can be recycled - some parts need to be fragmented to separate different types of material. A list of parts and components that can be fragmented and recycled can be obtained from the manufacturer. See references.

Usage phase in relation to the total

It should be observed that the environmental impact during the usage phase is the most important. As an example, GWP for the usage phase is approximately 220 times larger than GWP for the manufacturing phase.

Category of impact	Usage as % of total
Global warming GWP	99.53%
Acidification AP	99.62%
Eutrophication	99.1%
Ozone depletion ODP	-
Photochemical oxidants POCP	99.44%

References

- LCA report, 3AFE68989981
- PSR 2000:7 for Variable Speed Electric Drives
- User's manual for ACS350 drives, 3AFE68462401
- ACS350/150 product family, Environmental Information, Recycling Instructions, 3AFE68614180
- MSR 1999:2 Requirements for Environmental Product Declarations, EPD from the Swedish Environmental Management Council

Glossary

Acidification, AP.
Acidification originates from the emissions of sulphur dioxide and oxides of nitrogen. In the atmosphere, these oxides react with water vapour and form acids which subsequently fall down to the earth in the form of rain or snow, or as dry depositions. Acidification potential translates the quantity of emission of substances into a common measure to compare their contributions to the capacity to release hydrogen ions.

Eutrophication.
Nutrients (mainly nitrogen and phosphorus) from sewage outfalls and fertilised farmland accelerate the growth of algae and other vegetation in water. The degradation of organic material consumes oxygen resulting in oxygen deficiency and fish kill. Nutrification potential translates the quantity of emission of substances into a common measure expressed as the oxygen required for the degradation of dead biomass.

Global warming potential, GWP.
Some of the gases in the earth's atmosphere (in particular water vapour and carbon dioxide) have an ability to absorb infrared radiation. They do not prevent sunlight reaching the earth's surface, but they do trap some of the infrared radiation emitted back into space causing an increase in the surface temperature. Global Warming Potential, GWP100, translates the quantity of emission of gases into a common measure to compare their contributions - relative to carbon dioxide - to the absorption of infrared radiation in 100 years perspective.

Life cycle assessment, LCA.
A management tool for appraising and quantifying the total environment impact of products or activities over their entire life cycle of particular materials, processes, products, technologies, services or activities. Life cycle assessment comprises three complementary components - inventory analysis, impact analysis and improvement analysis.

Ozone depletion potential, ODP.
Ozone forms a layer in the stratosphere protecting plants and animals from much of the sun's harmful UV-radiation. The ozone levels have declined as a consequence of CFCs and halons released into the atmosphere. A depletion of the ozone layer will increase the UV-radiation at ground level. Ozone depletion potential, ODP, translates the quantity of emission of gases into a common measure to compare their contributions - relative to CFC-11 (a freon) - to the breakdown of the ozone layer.

Photochemical ozone creation, POCP.
Photochemical ozone or ground level ozone is formed by the reaction of volatile organic compounds and nitrogen oxides in the presence of heat and sunlight. Ground-level ozone forms readily in the atmosphere, usually during hot summer weather. Photochemical ozone creation potential translates the quantity of emission of gases into a common measure to compare their contributions - relative to ethylene - to the formation of photochemical oxidants.

ABB Oy
Drives
P. O. Box 184
FI - 00381 Helsinki
Finland
Telephone +358 10 22 11
Telefax +358 10 222 2764
Internet www.abb.com/drives

Ad agency Piirtek Oy #13508

441 024
Printed matter
HANSAPRINT/SAL06_00000/2008