

Environmental Product Declaration

DC machine type DMA+



ABB Automation



Organizational framework

Manufacturer

ABB Industrie AG
Electrical Machines
CH-5442 Birr
Switzerland

ABB Industry AG/Electrical Machines, Birr is part of the Motors & Machines Business Area, comprising 10 manufacturing locations around the world. The business area belongs to the Automation Technology Products Division of ABB.

Environmental management

The ISO 14001 international environmental management standard has been implemented and the Birr factory has been certified since 1999. Lifecycle assessment is applied continuously to all product development.

The Birr factory was awarded the ISO 9001 quality certificate in 1993 in recognition of its commitment to maintaining the high quality of its DC Machines.

Product description

DMA+ machines have shaft heights ranging from 280 mm to 500 mm. The range of rated output is 150–1400 kW, and voltage ranges from 420 V to 810 V. DMA+ type DC machines are used for variable-speed and variable-load applications, such as cranes, skilifts, testrigs and in the process industry for mills, coilers, extruders and mixers. This document applies to the DMA+ 280 model, a 440 kW product.

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

Type of material	kg/product	kg/kW
Electrical steel	150	0.34
Other steel	699	1.59
Cast iron	223	0.51
Brass	6	0.01
Copper	244	0.56
Insulation material	8.8	0.02
Wooden packing material	132	0.30
Impregnation resin	9.4	0.02
Paint	3.5	0.01
Other chemicals	4.3	0.01

Environmental performance

The data and calculations are in accordance with the Product-Specific Requirements (PSR) for Rotating Electrical Machines dated April 2000, which specify 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 lifecycle assessment covers all environmental aspects for extraction and production of raw materials, manufacturing of main parts, assembly of the machine, transportation and use of the product, dismantling, fragmentation, disposal and recycling of scrap at the end of the product's life. It includes consumption of material and energy resources as well as emissions and waste generation.

Calculations are based upon an estimated lifetime of 25 years when operating 6500 hours per year. A European mix of energy has been used to calculate energy consumption during manufacturing and a European mix of energy to calculate 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 the rated output power of the product in relation to the total annual production volume of the factory.

Resource utilisation (including energy content)	Manufacturing phase unit/kW	Usage phase unit/kW	Disposal phase unit/kW
Use of non-renewable resources			
Coal kg	5.15	2657.00	-0.28
Copper (Cu) kg	0.15	0.00	0.00
Iron (Fe) kg	2.57	0.61	-0.38
Aluminium (Al) kg	0.11	0.00	0.00
Natural Gas kg	0.42	184.00	0.06
Uranium (U) kg	0.00	0.10	-0.00
Oil kg	0.77	279.00	-0.26
Use of renewable resources			
Hydro Power MJ	0.01	0.01	0.00

Energy losses		kWh/product			kWh/kW		
Energy form		Manufacturing phase	Usage phase	Disposal phase	Manufacturing phase	Usage phase	Disposal phase
Electrical energy		2950	4 257 580	–	7	9698	–
Heat energy		2150	–	–	5	–	–

Average European electrical energy is defined as being 10 % gas, 15 % hydro, 36 % nuclear, 10 % oil, 19 % stone coal and 10 % lignite coal. The resultant resource utilisation is shown in the table above.

Waste	kg/kW
Hazardous waste after usage phase	
Various	0.02
Regular waste (to landfill)	
During manufacturing phase	0.065
At disposal phase	0.337

The classification data for emissions are as below:

Environmental effect	Equivalent unit	Manufacturing phase	Usage phase	Disposal phase
Global warming potential GWP	kg CO ₂ /kW	15.06	4935.57	-0.57
Acidification potential AP	kg SO ₂ /kW	0.08	30.83	0.00
Eutrophication	kg O ₂ /kW	0.00	0.00	0.00
Ozone depletion potential ODP	kg CFC-11/kW	0.00	0.10	0.00
Photochemical oxidants POCP	kg ethylene/kW	0.00	1.33	0.00

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 must be noted that the environmental impact during the usage phase is the most important. As an example, the GWP of the usage phase is approximately 300 times greater than the GWP of the manufacturing phase.

Category of impact	Usage in % of total
Global warming GWP	96.30 %
Acidification AP	96.00 %
Eutrophication	92.60 %
Ozone depletion ODP	–
Photochemical oxidants POCP	98.30 %

References

- PSR 2000:2 for Rotating Electrical Machines
- 3BHT 490070 R0001, Installation and Maintenance Manual
- 3BHS119946 ZAB D21, Recycling and Disposal
- MSR 1999:1 Requirements for Environmental Product Declarations, EPD from the Swedish Environmental Management Council

The above-mentioned documents are available upon request.

GLOSSARY

Acidification, AP: Chemical alteration of the environment, resulting in hydrogen ions being produced more rapidly than they are dispersed or neutralised. Occurs mainly through fallout of sulphur and nitrogen compounds from combustion processes. Acidification can be harmful to terrestrial and aquatic life.

Eutrophication: Enrichment of bodies of water by nitrates and phosphates from organic material or surface runoff. This increases the growth of aquatic plants and can produce algal blooms that deoxygenate water and smother other aquatic life.

Global warming potential, GWP: The index used to translate the level of emissions of various gases into a common measure to compare their contributions to the absorption by the atmosphere of infrared radiation. GWPs are calculated as the absorption that would result from the emission of 1 kg of a gas to that of the emission of 1 kg of carbon dioxide over 100 years.

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

Ozone depletion potential, ODP: The index used to translate the level of emissions of various substances into a common measure to compare their contributions to the breakdown of the ozone layer. ODPs are calculated as the change that would result from the emission of 1 kg of a substance to that of the emission of 1 kg of CFC-11 (a freon).

Photochemical ozone creation, POCP: The index to translate the level of emissions of various gases into a common measure to compare their contributions to the change of ground-level ozone concentration. POCPs are calculated as the change that would result from the emission of 1 kg of a gas to that of the emission of 1 kg of ethylene.



ABB Industrie AG

P.O.Box
CH-5442 Birr
Switzerland
Tel: +41 56 466 64 45
Fax: +41 56 466 69 01
Internet: www.abb.com
E-Mail: industriag@chind.mail.abb.com