Environmental Product Declaration

Registration number: S-P-00080
Rev. 1 – 20/07/05

F 200 2P

Low voltage circuit breaker

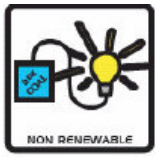
Environmental performance sheet

USE of NON RENEWABLE RESOURCES

Without energy content

Production [kg]
[30mA] 0,422
[300mA] 0,405
Use [kg]
[25A] 0,453
[40A] 1,160
[63A] 2,890

With energy content



Production [MJ]
[30mA] 64,43
[300mA] 63,90
Use [MJ]
[25A] 409
[40A] 1048
[63A] 2598

USE of NON RENEWABLE RESOURCES - Details

Without energy content	*Production [kg]*		*Use [kg]*			*With energy content*	*Production [MJ]*		*Use [MJ]*		
	30 mA	300 mA	[25A]	[40A]	[63A]		30 mA	300 mA	[25A]	[40A]	[63A]
Iron	0,122	0,111	0,049	0,125	0,309	Hard coal	11,43	11,33	87,59	224,2	556,7
Gravel	0,094	0,089	0,244	0,624	1,550	Lignite	3,90	3,83	30,89	79,17	196,2
Copper	0,068	0,070	0	0	0	Methane	14,98	14,97	59,20	152,0	376,0
Limestone	0	0	0,109	0,280	0,695	Oil	17,51	17,34	50,41	129,3	321,4
Sand	0,028	0,029	0,026	0,068	0,168	Uranium	16,61	16,43	180,9	463,5	1147

USE of RENEWABLE RESOURCES

Without energy content

Production [l]
[30mA] 190
[300mA] 189
Use [l]
[25A] 840
[40A] 2150
[63A] 5330

With energy content

Production [MJ]
[30mA] 5,75
[300mA] 5,72
Use [MJ]
[25A] 26,8
[40A] 68,7
[63A] 170,5

ELECTRICITY CONSUMPTION

Production [MJ]
[30mA] 22,81
[300mA] 22,57
Use [MJ]
[25°] 118,3
[40°] 302,7
[63°] 750,1

EMISSION RELATED IMPACTS

[kg CO2 eq.]

Production
[30mA] 3,59
[300mA] 3,56
Use
[25A] 19,3
[40A] 49,5
[63A] 123

[g CFC_{11} eq.]

Production
[30mA] 0,00000530
[300mA] 0,00000529
Use
[25A] 0
[40A] 0
[63A] 0

[kg C_2H_4 eq.]

Production
[30mA] 0,00129
[300mA] 0,00126
Use
[25A] 0,004
[40A] 0,011
[63A] 0,027

[mol H^+ eq.]

Production
[30mA] 1,026
[300mA] 1,025
Use
[25A] 4,27
[40A] 10,94
[63A] 27,14

[kg O_2 eq.]

Production
[30mA] 0,0794
[300mA] 0,0786
Use
[25A] 0,218
[40A] 0,559
[63A] 1,384

WASTE

Production [kg]
[30mA] 5,68
[300mA] 6,00
Use [kg]
[25A] 0,004
[40A] 0,009
[63A] 0,023

Production [kg]
[30mA] 0,001
[300mA] 0,001
Use [kg]
[25A] n.a.
[40A] n.a.
[63A] n.a.

Information about the company and the product

Aim of this document is to supply information on the environmental performances of the F200 2P product life cycle, according to the "General rules for the Swedish Environmental Management Council (SEMC) requirements of Environmental Product Declaration (MSR 1999:2) and to the category "Product Specific Requirements" (PSR 2003:2).
The environmental performance is measured by means of an LCA study carried out in accordance to ISO series 14040 standards.
This document is addressed to suppliers and customers of the product.

Company

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ABB SACE is part of the ABB Group's Automation Technology Products Division. It produces low voltage products and technologies. It offers a complete and integrated range of products for industry, services and domestic customer in the context of constant technological development process.

Since 1997 the Pomezia production site has been certified according to ISO14001. In addition, since April 2000 the Integrated Management System (Quality, Environment and Safety) has been implemented and certified.

Product description

The model surveyed by the study is the two-poles residual current breaker belonging to the new series of low voltage circuit breakers named F200.
F200 is suitable for installation in industrial and civil environments. It is used to prevent injures due to earth leakage. The F200 2P residual current breakers has an external shape type EN 50.022. The width of one module is 17,5 mm nominal. The F200 series has been developed to satisfy the IEC standard EN 61008. The new series of RCCB's (Residual Current Circuit Breaker) has been developed taking into account some significant environmental topics: thermoset plastics and some metal parts have been replaced with thermoplastics ones. Other metals have replaced lead weldings, where it was possible.
The product analysed is a two-poles (2P) pure differential of 25A-40A-63A with sensitivity of 30 mA – 300 mA.

The characteristics of F200 analysed are:

- U_e = 230 – 400 V;
- U_{imp} = 5000 V;
- U_i = according to CEI EN 61008;
- Current type = A;
- I_m = 1 kA;
- $I_{\Delta m}$ = 1 kA;
- I_{nc} = 10 kA;
- I_u = 25 – 40 – 63 A;
- N. poles = 2

Glossary:

U_e = Rated operational voltage
U_{imp} = Impulse withstand voltage
U_i = Rated insulation voltage
I_m = rated making and breaking capacity
$I_{\Delta m}$ = rated residual making and breaking capacity
I_{nc} = rated conditional short circuit current
I_u = rated current

Scope of the declaration

The scope of this document is to give information about the environmental impacts through an LCA analysis. This analysis is carried out on two poles F200 prototype, in accordance to ISO series 14040.

Functional unit

The functional unit, as specified in the Product Specific Requirements PSR 2003:2, is defined as one low voltage circuit breaker in service for 15 years. The reference flow for the LCA study is represented by the single circuit breaker.

System boundaries

The system includes the production phases of any materials that constitute the circuit breaker. In particular the system includes: the extraction and production of raw materials for the main parts and components; the refining of materials, the transportation of main parts and components to manufacturer, manufacture of main parts and components, assembly and packing of the product.
The system doesn't include the packaging of single components of the circuit breaker and the production of cardboard box.

Production

The system includes the production of any material of the components of F200 with sensitivity of 30 mA and 300 mA according to the quantity given in declaration of contents. All the components production processes have been included. Prototypes have been produced in Vittuone (MI) site, therefore assembling process data are related to that ABB's production site. Data related to processes controlled by ABB SACE are site specific as well as data about production processes required to suppliers. Where suppliers didn't reply to the request of information, generic data from database specified by PSR 2003:2 paragraph 9.2 has been used. Where processes data needed for analyses were not present in PSR, different sources have been used. The transportation throughout all the production phase has been considered.
The distribution of finished product to the customer has not been considered because the product is distributed through all over the world. The main distribution of the product is in Italy, by road.

Declaration of content

	F200 2P 30 mA		F200 2P 300 mA	
Material	**[kg]**	**%**	**[kg]**	**%**
Steel	0,047409	22,46	0,047409	23,91
Aluminum	0,000839	0,40	0,000839	0,42
Copper	0,028566	13,53	0,029357	14,81
Zinc	0,00993	4,70	0,00993	5,01
Nichel	0,001468	0,70	0,001468	0,74
Iron	0,013753	6,52	0,003683	1,86
Tin	0,000033	0,02	0,000033	0,02
Silver	0,000341	0,16	0,000341	0,17
Ceramic	0,00019	0,09	0,00019	0,10
Silicate	0,002635	1,25	0,000511	0,26
Silicon	0,00008	0,04	0,00008	0,04
PC	0,00182	0,86	0,00182	0,92
PA 66 20% GF	0,06378	30,22	0,06378	32,17
PBT 50% GF	0,020243	9,59	0,020243	10,21
PC; 12% PTFE; 20% GF;	0,00162	0,77	0,00162	0,82
PPS; 10% PTFE; 40% GF;	0,0018	0,85	0,0018	0,91
PEI; 30% GF;	0,00083	0,39	0,00083	0,42
PA 66; 25% GF;	0,00043	0,20	0,00043	0,22
Graphite	0,000005	0,00	0,000005	0,00
PA 6.6	0,00018	0,09	0,00018	0,09
PA 66; 35% GF;	0,012635	5,99	0,012636	6,37
POM	0,000011	0,01	0,000011	0,01
Polyamide	0,00005	0,02	0,00005	0,03
Residual metals	0,00241	1,14	0,001022	0,52
Total	**0,211058**	**100**	**0,198268**	**100**

Acronyms

PA = Polyamide; PC = Polycarbonate;
PTFE = polytetrafluoroethylene;
FV = Glass Fibres
PPS = Polyphenylene sulphide
PBT = polybutylene terephthalate
PEI = Polyetherimide
POM = Polyoxymethylene Acetal Polymer

Use

The product usage phase brings along potential impacts, energy consumption and waste due to the production and supply of dissipated energy as a result of the Joule effect.
The usage phase has been assessed according to PSR 2003:2 paragraph 5.2. The reference energy mix used in the usage phase is the European one (ETH 1998).
The energy losses in the usage phase due to the resistance of the main circuit (measured phase resistance equal to 0,0016 ohm) are shown in the following tables.

	I_n 25 [A]	I_n 40 [A]	I_n 40 [A]
E [MJ]	118,3	302,7	750,9

Additional information

RoHS product compliance

2002/95/EC on Restriction of Hazardous Substances (RoHS) Directive does not apply to this product, as it is not falling in any of the categories listed in Appendix 1A of the WEEE Directive 2002/96/EC (consumer products). Notwithstanding, ABB Automation Products is committed to make its products RoHS-compliant, in harmony with ABB Group's sustainability policy and to meet the needs of its customers, since these products may become parts of an equipment within the scope of the Directive. For this reason, the product has been analyzed to identify the uses of the substances subject to restriction according to the RoHS directive and specific projects are running, aimed to find, test and validate alternative RoHS-compliant solutions.

The full RoHS compliance of this product has been planned by ABB SACE SpA by July 2006.

Recycling declaration

Tests carried out on the F200 lead to a recycling rate of about 99%.

Results of this testing are shown below:

F200 30 mA	Recycle [kg]	Recovery* [kg]
Steel - iron	0,06116	
Non-iron metals	0,04359	
Plastics	0,10339	
Dust waste		0,00291

F200 300 mA	Recycle [kg]	Recovery* [kg]
Steel iron	0,05109	
Non-iron metals	0,04299	
Plastics	0,10340	
Dust waste		0,000786

* by the term recovery, the incineration process with energy recovery is intended.

Identification of plastics

Where technologically possible, the plastic parts of the circuit breaker are marked in accordance with the ISO 11469 and ISO 10431/2/3/4 standards to facilitate their identification and recovery at the end of their life.

See example shown below related to Polyamide (PA).

Reference documentation

- MSR 1999:2: Guidelines for the Environmental Product Declaration (EPD);
- The reference LCA study
- PSR 02:2003 “Low voltage circuit-breakers”
- ISO 14020 (2000) "Environmental labels and declarations - Principles and guidelines"
- ISO/TR 14025 (2000) "Environmental labels and declarations - Type III environmental declarations"
- ISO 11469 “Plastics – Generic identification and marking of plastics products”
- ISO 1043-1 “Plastics – Symbols and abbreviated terms - Part 1: Basic polymers and their special characteristics”
- ISO 1043-2 “Plastics – Symbols - Part 2: Fillers and reinforcing materials”
- ISO 1043-3 “Plastics – Symbols and abbreviated terms - Part 3: Plasticizers”
- ISO 1043-4 “Plastics – Symbols and abbreviated terms - Part 4: Flame retardants”

Validation

This EPD and the relative Life Cycle Assessment study have been approved by RINA S.p.A.

Further information regarding the aims of the Environmental Product Declaration, the validation course, the standard references and documents mentioned above, as well as the list of the EPDs validated in the various countries, are available on the following site: www.environdec.com.

Registration number: S-P-00080

Validity time: 29/07/2007

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