

AEG EN6x, EN 10x series MCB, 6 & 10 KA, 0.5 TO 63A, B, C & D CURVE, 1 - 4POLES, 1P+N & 3P+N

# Product Environmental Profile

## Environmental Product Declaration



Document in compliance with ISO 14025: 2010 "Environmental labels and declarations. Type III environmental declarations"

|                                       |                |   |      |
|---------------------------------------|----------------|---|------|
| ORGANIZATION                          |                | CONTACT INFORMATION   |      |
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| Approved                              | Public         | ABBG-00475-V01.01-EN  | 1/15 |

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## Purpose & Embedding Sustainability

Committing to continually promoting and embedding sustainability across its operations and value chain, aspiring to become a role model for others to follow. With its Purpose, are focusing on reducing harmful emissions, preserving natural resources and championing ethical and humane behavior.

This study is related to ABB STOTZ-KONTAKT GmbH, Heidelberg plant that produces MCBs in different ranges. The plant already has the following certifications besides product standard certifications:

DIN EN ISO 9001,  
DIN EN ISO 14001,  
DIN ISO 45001,  
DIN EN ISO 50001 and  
ISO/TS 22163

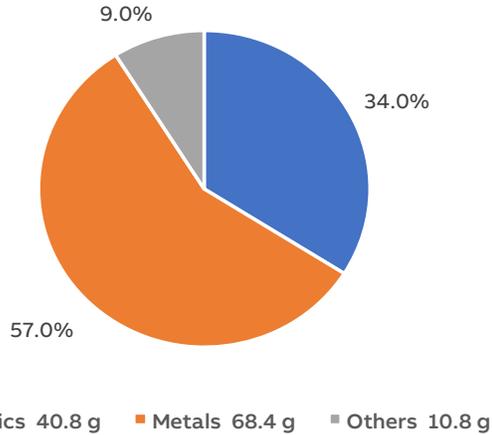


## General Information

|                                   |  |
|-----------------------------------|--|
| <b>Reference product</b>          | EN61C16 - Miniature Circuit Breaker - 1P - C - 16 A  |
| <b>Description of the product</b> | EN61C16 Miniature Circuit Breaker (MCB), 1Pole, 16A, 230/400 V AC, C Curve, 6kA  |
| <b>Functional unit</b>            | Protect the Household/ commercial installation from overloads and short circuits in a circuit with rated voltage 230/400 V AC, rated current 16A with 1 Pole (1P), a rated Breaking capacity 6kA and tripping curve C, according to the appropriate use scenario, and during the reference service life of the product of 20 years   |
| <b>Other products covered</b>     | It is a "Product family declaration" which covers Miniature Circuit Breaker (MCB) EN60 and EN100 of AEG Elfaplus range with Standard Product Characteristics<br>Rated current (In): 0.5, 1, 2, 3, 4, 6, 10, 13, 16, 20, 25, 32, 40, 50 & 63A<br>Rated Voltage (Ue): 230/400 V AC<br>Number of Poles (Np): 1 to 4 Poles, 1Poles+N & 3Pole +N<br>Rated Breaking Capacity(Icn): 6 kA & 10 kA<br>Tripping Curve (Cd): B, C & D |

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# Constituent Materials



|  |        |          |
|--|--------|----------|
| <b>Total weight of Reference product</b> | 119.97 | <b>g</b> |
|--|--------|----------|

Total weight of reference product also included product packaging

| Plastics as % of weight |         | Metals as % of weight |         | Others as % of weight        |         |
|-------------------------|---------|-----------------------|---------|------------------------------|---------|
| Name and CAS number     | Weight% | Name and CAS number   | Weight% | Name and CAS number          | Weight% |
| PA Glass Reinforced     | 31.2    | Steel,                | 50.4    | Carton,                      | 8.9     |
| Miscellaneous Plastics  | 2.1     | Copper, 7440-50-8     | 4.2     | Miscellaneous Other material | 0.1     |
| POM, 9002-81-7          | 0.7     | Aluminum, 7429-90-5   | 2.3     | -                            | -       |
| -                       | -       | Miscellaneous Metals  | 0.1     | -                            | -       |

These products comply with actual requirements of EU Directives 2011/65/EU of 8 June 2011 (ROHS) materials and do not contain or only contain in the authorised proportions lead, mercury, cadmium, hexavalent chromium or flame retardants (polybrominated biphenyls - PBB, polybrominated diphenyl ethers - PBDE) as mentioned in the Directive.

**Manufacturing, distribution, installation, use, and end-of-life (EOL) stages are taken into account in the environmental impact analysis of this study.**

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## Additional Environmental Information

|                      |  |
|----------------------|--|
| <b>Manufacturing</b> | Includes the environmental impacts associated with extraction and processing of the raw materials used to produce the product and its packaging, transport to the manufacturing site and assembly.                           |
| <b>Distribution</b>  | Is modelled by considering the average distances from manufacturing site to distance at delivery point.  |
| <b>Installation</b>  | Does not required any special process, installation of product is manual. Packaging waste generated as output in installation.   |
| <b>Use</b>           | Energy is calculated by following the PSR. The energy models based on product distribution. No maintenance is necessary. Reference product consumption over 20 years is 2.21 kWh.  |
| <b>End of life</b>   | Includes its transportation from the installation site to the end-of-life treatment site, and end of life treatment processes. A value of 1000 km transport by lorry is used for the transportation as PCR default scenario. |



## Environmental impacts

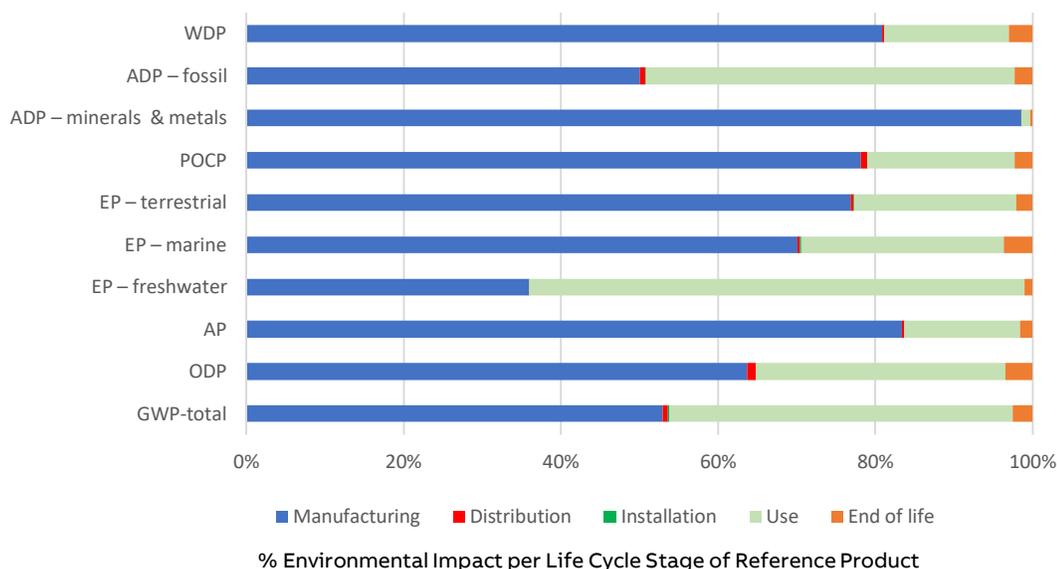
|   |   |
|---|---|
| <b>Reference lifetime</b>                               | 20 Years  |
| <b>Product category</b>                                 | Circuit Breakers  |
| <b>Installation elements</b>                            | End of life of MCB packaging considered in Installation phase.  |
| <b>Use scenario</b>                                     | At loading rate 15% of rated current (In) in continuous operation. And use time rate 30% of reference lifetime (RLT). |
| <b>Geographical representativeness</b>                  | Global  |
| <b>Technological representativeness</b>                 | Technology is specific to ABB MCBs which is common for all ABB manufacturing factories at global level                |
| <b>Software, database and EF Footprint version used</b> | SimaPro 9.5.0.1, Data base Ecoinvent 3.9.1, and EF3.0   |

### Energy model used

|                      |  |
|----------------------|--|
| <b>Manufacturing</b> | Electricity Medium Voltage, Global                     |
| <b>Installation</b>  | Electricity Low Voltage, Medium & High Voltage, Global |
| <b>Use</b>           | Electricity Medium Voltage, Europe                     |
| <b>End of life</b>   | Electricity Low Voltage, Medium & High Voltage, Global |

|          |                |                      |      |
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## Common base of mandatory indicators



### Environmental impact indicators

| Indicator   | Unit                   | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|---|------------------------|----------|--------------------|-------------------|-------------------|----------|----------------|
| GWP-total   | kg CO <sub>2</sub> eq. | 2.39E+00 | 1.27E+00           | 1.60E-02          | 4.75E-03          | 1.04E+00 | 6.02E-02       |
| GWP-fossil  | kg CO <sub>2</sub> eq. | 2.28E+00 | 1.26E+00           | 1.60E-02          | 7.52E-04          | 9.52E-01 | 5.56E-02       |
| GWP-biogenic  | kg CO <sub>2</sub> eq. | 1.03E-01 | 4.60E-03           | 1.40E-05          | 4.00E-03          | 9.01E-02 | 4.59E-03       |
| GWP-luluc   | kg CO <sub>2</sub> eq. | 4.23E-03 | 2.22E-03           | 7.65E-06          | 2.68E-07          | 1.93E-03 | 7.22E-05       |
| GWP-fossil = Global Warming Potential fossil fuels<br>GWP-biogenic = Global Warming Potential biogenic<br>GWP-luluc = Global Warming Potential land use and land use change   |                        |          |                    |                   |                   |          |                |
| ODP   | kg CFC-11 eq.          | 3.28E-08 | 2.09E-08           | 3.53E-10          | 1.05E-11          | 1.04E-08 | 1.13E-09       |
| ODP = Depletion potential of the stratospheric ozone layer  |                        |          |                    |                   |                   |          |                |
| AP  | H+ eq.                 | 1.59E-02 | 1.32E-02           | 3.85E-05          | 3.36E-06          | 2.33E-03 | 2.59E-04       |
| AP = Acidification potential, Accumulated Exceedance  |                        |          |                    |                   |                   |          |                |
| EP-freshwater   | kg P eq.               | 1.98E-03 | 7.12E-04           | 1.15E-06          | 8.65E-08          | 1.25E-03 | 2.03E-05       |
| EP-marine   | kg N eq.               | 2.69E-03 | 1.89E-03           | 1.05E-05          | 3.44E-06          | 6.94E-04 | 9.86E-05       |
| EP-terrestrial  | mol N eq.              | 2.58E-02 | 1.98E-02           | 1.08E-04          | 1.28E-05          | 5.31E-03 | 5.42E-04       |
| EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment<br>EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment<br>EP-terrestrial = Eutrophication potential, Accumulated Exceedance |                        |          |                    |                   |                   |          |                |
| POCP  | kg NMVOC eq.           | 8.34E-03 | 6.52E-03           | 6.29E-05          | 5.32E-06          | 1.56E-03 | 1.93E-04       |
| POCP = Formation potential of tropo-spheric ozone   |                        |          |                    |                   |                   |          |                |
| ADP-minerals & metals   | kg Sb eq.              | 1.44E-04 | 1.42E-04           | 4.35E-08          | 2.68E-09          | 1.68E-06 | 4.27E-07       |
| ADP-fossil  | MJ                     | 3.21E+01 | 1.61E+01           | 2.36E-01          | 8.01E-03          | 1.50E+01 | 7.45E-01       |
| ADP-minerals & metals = Abiotic depletion potential for non-fossil resources<br>ADP-fossil = Abiotic depletion for fossil resources potential   |                        |          |                    |                   |                   |          |                |
| WDP   | m <sup>3</sup> e depr. | 5.37E-01 | 4.35E-01           | 1.14E-03          | 9.31E-05          | 8.54E-02 | 1.62E-02       |
| WDP = Water Deprivation potential   |                        |          |                    |                   |                   |          |                |

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## Common base of mandatory indicators

### Inventory flows indicator – Resource use indicators

| Indicator | Unit | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|-----------|------|----------|--------------------|-------------------|-------------------|----------|----------------|
| PERE      | MJ   | 5.27E+00 | 1.78E+00           | 3.46E-03          | 2.67E-04          | 3.41E+00 | 7.60E-02       |
| PERM      | MJ   | 1.59E-01 | 1.59E-01           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| PERT      | MJ   | 5.42E+00 | 1.94E+00           | 3.46E-03          | 2.67E-04          | 3.41E+00 | 7.60E-02       |
| PENRE     | MJ   | 3.09E+01 | 1.48E+01           | 2.36E-01          | 8.01E-03          | 1.50E+01 | 7.45E-01       |
| PENRM     | MJ   | 1.23E+00 | 1.23E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| PENRT     | MJ   | 3.21E+01 | 1.61E+01           | 2.36E-01          | 8.01E-03          | 1.50E+01 | 7.45E-01       |

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials  
 PERM = Use of renewable primary energy resources used as raw materials  
 PERT = Total Use of renewable primary energy resources  
 PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials  
 PENRM = Use of non-renewable primary energy resources used as raw materials  
 PENRT = Total Use of non-renewable primary energy re-sources)

### Inventory flows indicator – Indicators describing the use of secondary materials, water, and energy re-sources

| Indicator | Unit           | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|-----------|----------------|----------|--------------------|-------------------|-------------------|----------|----------------|
| SM        | kg             | 0.00E+00 | 0.00E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| RSF       | MJ             | 0.00E+00 | 0.00E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| NRSF      | MJ             | 0.00E+00 | 0.00E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| FW        | m <sup>3</sup> | 2.06E-02 | 1.32E-02           | 3.71E-05          | 3.22E-06          | 6.89E-03 | 5.15E-04       |

SM = Use of secondary material  
 RSF = Use of renewable secondary fuels  
 NRSF = Use of non-renewable secondary fuels  
 FW = Use of net fresh water

### Inventory flows indicator – Waste category indicators

| Indicator                     | Unit | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|-------------------------------|------|----------|--------------------|-------------------|-------------------|----------|----------------|
| Hazardous waste disposed      | kg   | 2.86E-04 | 2.62E-04           | 1.47E-06          | 4.88E-08          | 1.74E-05 | 4.92E-06       |
| Non- hazardous waste disposed | kg   | 3.90E-01 | 2.46E-01           | 2.07E-02          | 1.43E-03          | 5.76E-02 | 6.47E-02       |
| Radioactive waste disposed    | kg   | 1.06E-04 | 2.89E-05           | 7.20E-08          | 6.62E-09          | 7.56E-05 | 1.77E-06       |

|          |                |                      |      |
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## Common base of mandatory indicators

### Inventory flows indicator – Output flow indicators

| Indicator                     | Unit | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|-------------------------------|------|----------|--------------------|-------------------|-------------------|----------|----------------|
| Components for re-use         | kg   | 0.00E+00 | 0.00E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |
| Materials for recycling       | kg   | 1.19E-02 | 3.14E-03           | 0.00E+00          | 8.73E-03          | 0.00E+00 | 0.00E+00       |
| Materials for energy recovery | kg   | 2.33E-03 | 1.37E-03           | 0.00E+00          | 9.58E-04          | 0.00E+00 | 0.00E+00       |
| Exported energy               | MJ   | 0.00E+00 | 0.00E+00           | 0.00E+00          | 0.00E+00          | 0.00E+00 | 0.00E+00       |

### Inventory flow indicator – other indicators

| Indicator   | Unit    | Total    |
|---|---------|----------|
| Biogenic carbon content of the product              | kg of C | 0.00E+00 |
| Biogenic carbon content of the associated packaging | kg of C | 5.32E-03 |

## Optional indicators

### Environmental indicators

| Indicator   | Unit                  | Total    | Manu-<br>facturing | Distri-<br>bution | Instal-<br>lation | Use      | End<br>of life |
|---|-----------------------|----------|--------------------|-------------------|-------------------|----------|----------------|
| Total use of primary energy during the life cycle | MJ                    | 3.75E+01 | 1.80E+01           | 2.40E-01          | 8.28E-03          | 1.85E+01 | 8.21E-01       |
| Emissions of fine particles                       | incidence of diseases | 8.75E-08 | 6.99E-08           | 1.54E-09          | 6.97E-11          | 1.04E-08 | 5.60E-09       |
| Ionizing radiation, human health                  | kBq U235 eq.          | 3.87E-01 | 1.11E-01           | 2.98E-04          | 2.62E-05          | 2.69E-01 | 7.05E-03       |
| Ecotoxicity (fresh water)                         | CTUe                  | 1.64E+01 | 1.47E+01           | 1.24E-01          | 1.02E-02          | 1.30E+00 | 2.78E-01       |
| Human toxicity, carcinogenic effects              | CTUh                  | 4.12E-09 | 2.99E-09           | 6.92E-12          | 5.49E-13          | 2.30E-10 | 8.95E-10       |
| Human toxicity, non-carcinogenic effects          | CTUh                  | 1.31E-07 | 1.07E-07           | 2.13E-10          | 1.57E-11          | 7.70E-09 | 1.57E-08       |
| Impact related to land use/soil quality           | kg                    | 1.96E+00 | 1.44E+00           | 4.48E-02          | 1.19E-03          | 3.76E-01 | 1.01E-01       |

### Extrapolation of Coefficients

Extrapolation rules are established according to EN 50693. Results of LCA performed for a reference product extrapolated to other products, these products are belonged to a same homogeneous product family as the reference product. The group of products have the following same characteristics:

- Same main function, Same product standards,
  - Similar manufacturing technology: same type of materials and manufacturing processes
- Coefficients factors have been extrapolated with division of environment indicators value of homogeneous product by reference product environment indicator value.

For other products than the Reference product covered by this PEP, the environmental impacts for each phase of the lifecycle are obtained by multiplying the values of the Reference product by the following coefficients:

**Note:** If the coefficient is "1", the impacts of the phase of the life cycle are assimilated to the Reference product, meaning that the impacts are unchanged in comparison to the Reference product.

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**Manufacturing phase:** To calculate environmental impact of covered product nominal value of reference product environment category to be multiplied with corresponding rating Impact category's coefficient, then value to be multiplied by the number of poles.

i.e.  $y=a*x*n$

Where a= Coefficient of corresponding rating impact category

y= Homogeneous product environmental category

x=Nominal value of reference product environmental category

n=Number of poles including neutral poles

| Impact category  | Manufacturing Phase Coefficient |          |           |                       |          | Rated Current |  |  |  |  |
|--|---------------------------------|----------|-----------|-----------------------|----------|---------------|--|--|--|--|
|  | 0.5A, 1A, 2A,<br>3A & 4A        | 6A & 10A | 13A & 16A | 20A, 25A,<br>32A, 40A | 50A, 63A |               |  |  |  |  |
| GWP-total  | 1.081                           | 1.040    | 1.000     | 1.104                 | 1.528    |               |  |  |  |  |
| GWP-fossil   | 1.080                           | 1.039    | 1.000     | 1.102                 | 1.522    |               |  |  |  |  |
| GWP-biogenic   | 1.445                           | 1.270    | 1.000     | 1.811                 | 3.028    |               |  |  |  |  |
| GWP-luluc  | 1.107                           | 1.039    | 1.000     | 1.185                 | 1.573    |               |  |  |  |  |
| ODP  | 1.062                           | 1.035    | 1.000     | 1.082                 | 1.481    |               |  |  |  |  |
| AP   | 1.516                           | 1.207    | 1.000     | 2.118                 | 3.008    |               |  |  |  |  |
| EP-freshwater  | 1.475                           | 1.192    | 1.000     | 2.085                 | 4.118    |               |  |  |  |  |
| EP-marine  | 1.164                           | 1.069    | 1.000     | 1.432                 | 2.323    |               |  |  |  |  |
| EP-terrestrial   | 1.204                           | 1.085    | 1.000     | 1.394                 | 2.450    |               |  |  |  |  |
| POCP   | 1.191                           | 1.082    | 1.000     | 1.343                 | 2.155    |               |  |  |  |  |
| ADP-minerals & metals                                      | 1.666                           | 1.259    | 1.000     | 2.475                 | 7.937    |               |  |  |  |  |
| ADP-fossil   | 1.083                           | 1.040    | 1.000     | 1.180                 | 1.607    |               |  |  |  |  |
| WDP  | 1.246                           | 1.102    | 1.000     | 2.123                 | 2.640    |               |  |  |  |  |
| <b>Inventory flows indicator – Resource use indicators</b> |                                 |          |           |                       |          |               |  |  |  |  |
| PERE   | 1.168                           | 1.073    | 1.000     | 1.333                 | 1.801    |               |  |  |  |  |
| PERM   | 1.000                           | 1.000    | 1.000     | 1.000                 | 1.000    |               |  |  |  |  |
| PERT   | 1.154                           | 1.067    | 1.000     | 1.306                 | 1.735    |               |  |  |  |  |

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| Impact category   | 0.5A, 1A, 2A,<br>3A & 4A | 6A & 10A | 13A & 16A | 20A, 25A,<br>32A, 40A | 50A, 63A |
|---|--------------------------|----------|-----------|-----------------------|----------|
| PENRE   | 1.090                    | 1.043    | 1.000     | 1.197                 | 1.657    |
| PENRM   | 1.000                    | 1.000    | 1.000     | 0.975                 | 0.999    |
| PENRT   | 1.083                    | 1.040    | 1.000     | 1.180                 | 1.607    |
| <b>Inventory flows indicator – Indicators describing the use of secondary materials, water, and energy re-sources</b> |                          |          |           |                       |          |
| FW  | 1.202                    | 1.085    | 1.000     | 1.882                 | 2.372    |
| <b>Inventory flows indicator – Waste category indicators</b>  |                          |          |           |                       |          |
| Hazardous waste disposed  | 1.523                    | 1.208    | 1.000     | 1.795                 | 3.291    |
| Non- hazardous waste disposed   | 1.168                    | 1.073    | 1.000     | 1.266                 | 1.561    |
| Radioactive waste disposed  | 1.135                    | 1.063    | 1.000     | 1.232                 | 1.777    |
| <b>Inventory flows indicator – Output flow indicators</b>   |                          |          |           |                       |          |
| Materials for recycling & Material for energy recovery  | 1.000                    | 1.000    | 1.000     | 1.000                 | 1.000    |
| <b>Inventory flows indicator – Other indicators</b>   |                          |          |           |                       |          |
| Biogenic carbon content of the associated packaging   | 1.000                    | 1.000    | 1.000     | 1.000                 | 1.000    |

**Note:**

In above table coefficients are excluded when impact indicators value is zero for reference products. And for Optional Environmental indicators.

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**Distribution, Installation & EOL Phase:** To calculate the environmental impact of covered product nominal value of reference product environment category is to be multiplied with corresponding rating's coefficient, and then value to be multiplied by the number of poles. i.e.  $y=a*x*n$

Where a= Coefficient of corresponding rating

y= Homogeneous product environmental category

x=Nominal value of reference product environmental category,

n=Number of poles including neutral poles

#### Coefficient of Distribution, Installation & EOL Phase

| Rated Current      | 0.5A, 1A,2A, 3A & 4A | 6A & 10A | 13A & 16A | 20A, 25A, 32A, 40A | 50A, 63A |
|--------------------|----------------------|----------|-----------|--------------------|----------|
| Distribution Phase | 1.071                | 1.031    | 1.000     | 1.056              | 1.116    |
| Installation Phase | 1.000                | 1.000    | 1.000     | 1.000              | 1.000    |
| EOL Phase          | 1.077                | 1.034    | 1.000     | 1.061              | 1.127    |

**Use phase:** To calculate the environmental impact of covered product nominal value of reference product environment category to be multiplied with corresponding rating w.r.t tripping curve's coefficient, and then value to be multiplied by the number of poles. i.e.  $y=a*x*n$

Where a= Coefficient of corresponding rating w.r.t tripping curve

y= Homogeneous product environmental category

x=Nominal value of reference product environmental category.

n=Number of poles including neutral poles

#### Use Phase Coefficient

| Tripping curve | Rated Current |       |       |       |       |       |       |       |       |       |
|----------------|---------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
|                | 0.5A          | 1A    | 2A    | 3A    | 4A    | 6A    | 10A   | 13A   | 16A   | 20A   |
| B, C & D       | 0.690         | 0.690 | 0.690 | 0.690 | 0.690 | 0.476 | 0.762 | 0.914 | 1.000 | 1.143 |
| Tripping curve | 25A           | 32A   | 40A   | 50A   | 63A   |       |       |       |       |       |
| B, C & D       | 1.333         | 1.643 | 2.000 | 2.429 | 3.000 |       |       |       |       |       |

Coefficients listed in Manufacturing phase, Distribution phase, Installation phase, Use phase, and End of Life phase (EOL) applicable for entire " EN60 and EN100 of AEG Elfaplus MCB Series" correspond to ratings.

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| Approved | Public         | ABBG-00475-V01.01-EN | 11/15 |

## Environmental Impact Indicator Glossary

### Impact indicators

| Indicator  | Description   | Unit                                 |
|--|---|--------------------------------------|
| Global warming potential (GWP) - total               | Indicator of potential global warming caused by emissions to air contributing to the greenhouse effect. The total global warming potential (GWP-total) is the sum of three sub-categories of climate change.<br>GWP-total = GWP-fossil + GWP-biogenic + GWP- land use and land use change | kg CO <sub>2</sub> eq.               |
| Ozone depletion (OD)                                 | Emissions to air that contribute to the destruction of the stratospheric ozone layer  | kg CFC-11 eq.                        |
| Acidification of soil and water (A)                  | Acidification of soils and water caused by the release of certain gases to the atmosphere, such as nitrogen oxides and sulphur oxides   | H <sup>+</sup> eq.                   |
| Eutrophication (E)                                   | Indicator of the contribution to eutrophication of water by the enrichment of the aquatic ecosystem with nutritional elements, e.g. industrial or domestic effluents, agriculture, etc. This indicator is divided to three: freshwater, marine and terrestrial.                           | kg P eq.,<br>kg N eq.,<br>mole N eq. |
| Photochemical ozone creation (POCP)                  | Indicator of emissions of gases that affect the creation of photochemical ozone in the lower atmosphere (smog) because of the rays of the sun.  | kg NMVOC eq.                         |
| Depletion of abiotic resources – elements (ADPe)     | Indicator of the depletion of natural non-fossil resources  | kg Sb eq.                            |
| Depletion of abiotic resources – fossil fuels (ADPf) | The use of non-renewable fossil resources in an unsustainable way (e.g. from material to waste)   | MJ (lower heating value)             |
| Water Deprivation potential (WDP)                    | Deprivation-weighted water consumption. Assesses the potential of water deprivation, to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived.  | m <sup>3</sup> e depr.               |

### Resource use indicators

| Indicator                   | Description  | Unit                     |
|-----------------------------|--|--------------------------|
| Total use of primary energy | Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) + Total use of renewable primary energy re-sources (primary energy and primary energy resources used as raw materials) | MJ (lower heating value) |

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| Approved | Public         | ABBG-00475-V01.01-EN | 12/15 |

## Environmental Impact Indicator Glossary

### Inventory flows indicator -Indicators describing the use of secondary materials, water, and

| Indicator                                   | Description   | Unit           |
|---|---|----------------|
| SM = Use of secondary material              | Material recovered from previous use by recycling or from waste which substitutes primary materials and use in product. | kg             |
| RSF = Use of renewable secondary fuels      | Fuel recovered after a first use or retrieved from waste of renewable fuel, that replaces primary fuels.                | MJ             |
| NRSF = Use of non-renewable secondary fuels | Fuel recovered after a first use or retrieved from waste of non-renewable fuel, that replaces primary fuels.            | MJ             |
| FW = Use of net fresh water                 | Freshwater use in absolute values   | m <sup>3</sup> |

### Inventory flows indicator – Waste category indicators

| Indicator                     | Description   | Unit |
|-------------------------------|---|------|
| Hazardous waste disposed      | A hazardous waste is a special type of waste because it cannot be disposed of by common means like other by-products of our everyday lives. | Kg   |
| Non- hazardous waste disposed | Non-hazardous waste is any waste that does not cause harm to people or the environment.   | Kg   |
| Radioactive waste disposed    | Radioactive waste is a type of hazardous waste that contains radioactive material.  | Kg   |

### Inventory flows indicator – Output flow indicators

| Indicator                     | Description  | Unit |
|-------------------------------|--|------|
| Components for reuse          | Material or components leaving the modelled system boundary which is destined for reuse                          | Kg   |
| Materials for recycling       | Material leaving the modelled system boundary which is destined for recycling                                    | Kg   |
| Materials for energy recovery | Material leaving the modelled system boundary which is destined for use in power stations using secondary fuels. | Kg   |
| Exported energy               | Energy exported from waste incineration and landfill   | MJ   |

### Inventory flow indicator – other indicators

| Indicator   | Description   | Unit    |
|---|---|---------|
| Biogenic carbon content of the product, and Biogenic carbon content of the associated packaging | Biogenic carbon is the carbon that is stored in biological materials, such as plants or soil. | kg of C |

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## Environmental Impact Indicator Glossary

### Inventory flow indicator – other indicators

| Indicator   | Description   | Unit                  |
|---|---|-----------------------|
| Total use of primary energy during the life cycle                 | Sum of the primary renewable and non-renewable energy   | MJ                    |
| Emissions of fine particles                                       | Indicator of the potential incidence of disease due to particulate matter emissions.  | incidence of diseases |
| Ionizing radiation, human health                                  | Damage to human health and ecosystems linked to the emissions of radionuclides.   | kBq U235 eq.          |
| Ecotoxicity (fresh water)   | Impact on freshwater organisms of toxic substances emitted to the environment.  | CTUe                  |
| Human toxicity, carcinogenic effects and non-carcinogenic effects | Impact on humans of toxic substances emitted to the environment. Divided into non-cancer and cancer related toxic substances. | CTUh                  |
| Impact related to land use/soil quality                           | Measure of the changes in soil quality (Biotic production, Erosion resistance, Mechanical filtration).                        | kg                    |

## References

- Product Category Rules for Electrical, Electronic and HVAC-R Products - PEP-PCR-ed4-EN-2021 09 06
- SPECIFIC RULES FOR Electrical switchgear and control gear Solutions - PSR-0005-ed3-EN-2023 06 06
- IEC 60947-1 - Low-voltage switchgear and controlgear - Part 1: General rules
- IEC 60947-2 - Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
- ISO 14067:2018 Greenhouse gases — Carbon footprint of products — requirements and guidelines for quantification
- ISO 14044 Environmental management — Life cycle assessment — Requirements and guidelines
- ISO14040 Environmental management — Life cycle assessment — Principles and framework
- ISO 14025 - Environmental management — Life cycle assessment — Principles and framework
- IEC/TR 62635 Guidelines for end-of-life information provided by manufacturers and recyclers and for recyclability rate calculation of electrical and electronic equipment
- IEC 62474 Material declaration for products of and for the electrotechnical industry
- EN 50693:2019 – Product category rules for life cycle assessments of electronic and electrical products and systems
- Data base Ecoinvent 3.9.1
- Life cycle assessment report - DESB-00475-V01-01-EN

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|--------------------------------|--|----------------------------|
| Registration number:           | Drafting Rules:  | PCR-ed4-EN-2021 09 06      |
| ABBG-00475-V01.01-EN           | Supplemented by:   | PSR-0005-ed3-EN-2023 06 06 |
| Verifier accreditation number: | Information and reference documents:                                 |                            |
| VH50                           | <a href="http://www.pep-ecopassport.org">www.pep-ecopassport.org</a> |                            |
| Date of issue:                 | 10.2023  | Validity period: 5 years   |

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Independent verification of the declaration and data, in compliance with ISO 14025: 2010

Internal  External

The PCR review was conducted by a panel of experts chaired by Julie Orgelet (DDemain)

PEP are compliant with EN 50693:2019  
The components of the present PEP cannot be compared with components from another program

Document in compliance with ISO 14025: 2010 "Environmental labels and declarations. Type III environmental declarations"



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