

Product Category Rules



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General Information

This Product Category Rules (PCR) is based on ISO 14040 and 14044 standards. This document is planned for making Life Cycle Analysis (LCA) and for making type III Environmental Product Declarations (EPD).

Product life cycle assessment

1. Functional unit and Reference flow description

The product group IED covers product variants from for example relative simple overcurrent relays to more functional control terminals.

- Earth-fault relays
- Overcurrent and earth-fault relays
- Directional earth-fault relays
- Voltage relays
- Feeder protection relays
- Feeder terminals
- Control terminals
- Machine terminals

These product variants all have same basic principle of function, protection and control of medium voltage distribution networks. The application area covers for example

- Different types of networks
- Different kinds of switchgear systems
- Medium-sized three-phase asynchronous motors
- Protection and control of shunt capacitors banks
- Generator and generator-transformer units in small and medium-power diesel, hydroelectric and steam power plants
- Disconnectors
- Switch-disconnectors, switches and other objects in overhead lines and cable networks

Functional unit is defined as an IED.

All the parts which are included in delivery packing of the IED are analyzed in LCA study.

2. System boundary

2.1. Manufacturing phases

- Extraction and production of all raw materials
- Transport of raw materials to manufacture of main parts
- Manufacture of main parts
- Transport of main parts to assembly of products
- Assembly of products

- Packing materials (Including instructions and product labels)
- Transport of final product to warehouse

2.2. Distribution phase

- Transport of final product from warehouse to distributor
- Transport of final product to place its is going to be used

This step is not taken a part of LCA because final products are sent directly to the customer. Transport of final product will be included in Use phases.

2.3. Installation phases

Description and justify of the process, components and energy needed in installation. This step is not taken part of LCA because its impact is so small and this step doesn't have impact to final results.

2.4. Use phases

Use in normal conditions

- Electricity consumption
- Transport of final product to place its is going to be used
- Ancillary material and chemical instructions (according to manufacturer's maintenance instructions). Maintenance is not part of the LCA because there are not any planned maintenances in technical manual.

2.5. End of life phase

- Disposal of the product (landfill or incineration without energy recovery) and transport to these processing sites.
- Valorization of the product (reuse, recycling or incineration with energy recovery) and transport to these processing sites.

3. Cut-off criteria

All the flows which are included in the scope have to be analyzed up to the elementary flows. There are two ways to recover this data:

- Add the data later on to this flow when this data is available
- Or using generic data from other LCA cases

Unavailability of mass of flows can't be more than 5 %. The data that are not collected must be

detailed in LCA report.

Flows that can be ruled out from the LCA because of the difficulty to define them in the flows

- Lighting, heating, sanitary and cleaning of infrastructure
- Employees transportations
- Maintenance of manufacturing and manufacturing equipments when maintenance are not part of a process
- Construction and maintenance of infrastructure
- The flows of management, administrative and R&D departments
- Marketing-related to products
- Catering facilities to staff

Also these processes can be left out from analysis

- Snapping
- Screwing
- Fitting

4. Allocation rules between co-products

If allocation is needed look options from ISO 14044 standard.

5. Transport scenarios

- Kilometers and transportation methods
- All decisions need to be justified and documented in LCA
- All assumptions must be documented and justified

6. Use scenarios of the reference product

Passive product permanent operation	
Product category	Passive products
Use life time	25 years
Rules for calculation of consumption/dissipation of energy in the use phase	<ul style="list-style-type: none"> • Rate of load /nominal current (In):30 % • Percentage of use in time: 100 %

7. Waste treatment scenarios

- Final disposal of the product
- Recycling of the product

8. Units

- Mass (g)
- Energy if possible (MJ) or (kWh) (1kWh = 3,6 MJ)

9. Specific data collected

9.1. Data collected

Input and output data need to be collected

- Materials and energy consumption
- Emissions to air, water and ground
- Wastes from analyzed processes (wastes must be categorized and documented)

Missing information must be marked properly in LCA documentation. Make sure that all the mechanical, electronic and electromechanical parts are taken into the study. Example transformers and some mechanical parts are not part of the PWB BOM.

9.2. Multi-site data aggregation

- If it is possible collect data from multiple-sites and then aggregate them
- Document all the decision rules that you have made about data sources
- Missing data must be clearly identified and missing data processing rules must be clearly documented

10. Selection of LCA modules

Choose modules whose technological, geographic and temporal representation and identification information are available.

Rules adapted to LCA data modules must be explained and documented in LCA study

Modules that are chosen in to the LCA study must be justified and documented in LCA study

More information to modules can be found in the ISO 14040 and 14044 standards.

Modules should be chosen based on one of the following criteria:

- Modules whose method of development is the subject of an independent verification attesting their conformity to the ISO 14040 standard or any other framework that refers to the ISO 14040 standard application
- Module without any verification proof. The LCA report will then justify the choice of this module

11. Calculation of the environmental impact

11.1. Common base of mandatory indicators

Parameters and units for environmental impact indicators:

- Global warming (kg CO₂)
- Ozone layer depletion (kg R-11)
- Water eutrophication (kg PO₄³)
- Creation of photochemical ozone (kg C₂H₄)
- Acidification (kg SO₂)

Parameters and units for elementary flows:

- Total energy consumption of the product during its life cycle (MJ)
- Water consumption (l or dm³)

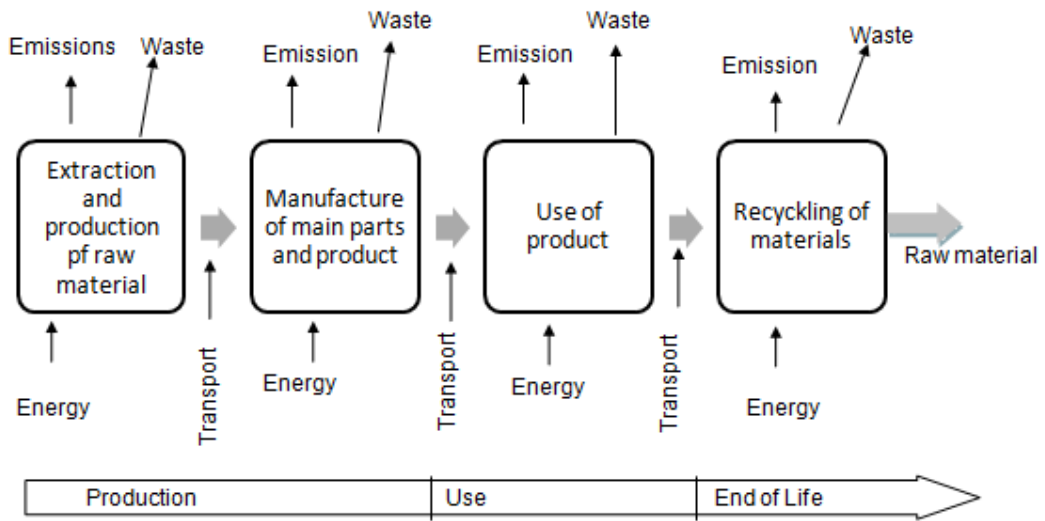
11.2. Optional indicators

- Raw material consumption per year
- Air pollutions (m³)
- Water pollutions (m³)
- Hazardous waste (kg)

12. LCA Report

LCA have to cover certain thing (listed below) so it can be verified

- All the elements and assumptions during the LCA
- Results and justifications for the choices made during the LCA
- Documented inventory analysis
Documented results of laboratory measurements



References

0. Association P.E.P. PCR Product Category Rules of the PEP ecopassport PROGRAM. Reference made 6.3.2012. <http://www.pepecopassport.org/docs/PEP-PCR%20ed2-EN-2011%2012%2009.pdf>

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