PEP ecopassport® PROGRAM

PSR

SPECIFIC RULES FOR
Electrical switchgear and control gear Solutions

PSR-0005-ed3.1-EN-2023 12 08

According to PSR-template-ed2-EN-2021 11 18

Contents

1. Introduction

This reference document complements and explains the Product Environmental Profile (PEP) Drafting Rules defined by the PEP ecopassport® Program (PEP-PCR ed4-EN-2021 09 06), available at www.pep-ecopassport.org).

It sets out the additional requirements applicable to Electrical Switchgear and Controlgear Solutions. Copmliance with these requirements is necessary to:

- Qualify the environmental performance of these solutions on an objective and consistent basis,
- Publish PEPs compliant with the PEP ecopassport® program and international reference standards.[1]

This reference document was drawn up in compliance with the open, transparent rules of PEP Ecopassport® Program with the support of stakeholders and manufacturers of Electrical Switchgear and Controlgear Solutions.

	www.pep-ecopassport.org
PSR reference	PSR-0005-ed3-EN-2023 06 06
Critical review	The third-party critical review was carried out by SOLINNEN. The declaration of conformity published on 03/05/2023 can be found in the Appendices.
Availability	The critical review report is available on request from the PEP Association contact@pep-ecopassport.org
Scope of validity	The critical review report and the declaration of conformity remain valid within 5 years or until the PEP Drafting Rules, or the normative reference texts to which they refer, are modified.

[1] ISO 14025, ISO 14040 and ISO 14044 standards

2. Scope

In accordance with the General Instructions of the PEP ecopassport® program (PEP - General Instructions – ed 4.1-EN-2017 10 17) and in addition to the PCR, Product Category Rules (PEP-PCR ed4-EN-2021 09 06) of the PEP ecopassport® environmental product declaration program, this document sets out the specific rules for systems and products of electrical installation for energy and communication networks and defines the product specifications to be adopted by manufacturers in the development of their PRODUCT ENVIRONMENTAL PROFILES (PEPs), particularly with regard to:

- the technology and its type of application,
- the reference service life time taken into account for the Life Cycle Assessment (LCA) of products,
- the conventional use scenarios to be adopted during the product use stage.

2.1. Description of the product families covered

The product families covered by the PSR are specified from the IEC standards for electrical switchgear and controlgear that describe the functional characteristics of these products.

The standards are categorised by standards group.

For example:

- TC121 = IEC Technical Committee for switchgear and controlgear and their assemblies for low voltage,
- SC23B = IEC Sub-Committee for plugs, socket-outlets and switches for household or similar uses.

These standards are accessible in Appendix 6.3.

If an electrical device is not included in a product family covered by the standards listed in the Appendix, the PEP writer may refer to the content of other standards if they justify their use in the LCA report. In this case, the PEP writer shall describe the functional specifications of their product explicitly in the PEP.

The main functions described in the following sections have been defined from the relevant standards.

2.1.1. Circuit-breakers

The 'Circuit-breakers' product family is defined by:

Product family	Circuit-breakers	
Main function	Protect the installation from overload and short circuits.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	SC23E	Appendix 6.3.1.3

2.1.2. Blocks and differential switches

The 'Blocks and differential switches' product family is defined by:

Product family	Blocks and differential switches	
Main function	Protect people and premises at risk of fire or explosion against insulation defects	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	SC23E	Appendix 6.3.1.3

2.1.3. Differential circuit-breakers

The 'Differential circuit-breakers' product family is defined by:

Product family	Differential circuit-breakers	
Main function	Protect the installation against overloads and short circuits and protect people and premises at risk of fire or explosion against insulation defects.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	SC23E	Appendix 6.3.1.3

2.1.4. Arc fault detection and protection module, with or without opening system (AFDD module)

The 'AFDD Unit' product family is defined by:

Product family	Arc fault detection and protection module, with or without opening system	
Main function	Mitigate risks of fire in a final circuit of a fixed installation for household or similar uses, caused by an electric arc fault	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC23E	Appendix 6.3.1.3

2.1.5. Disconnectors

The 'Disconnectors' product family is defined by:

Product family	Disconnectors	
Main function	Separate installation or part of the installation of any energy source	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	SC23B	Appendix 6.3.1.2

2.1.6. Switches

The 'Switches' product family is defined by:

Product family	Switches	
Main function	Establish and cut off the supply of an electrical circuit.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	SC23B	Appendix 6.3.1.2
	SC23J	Appendix 6.3.1.6

2.1.7. Contactors, remote control switch

The 'Contactors, remote control switch, combinations, starters' product family is defined by:

Product family	Contactors, remote control switch, combinations, starters	
Main function	Establish and cut off the supply of a downstream installation from an electrical and/or mechanical control	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2

2.1.8. Thermostats and programmable thermostats

The 'Thermostats and programmable thermostats' product family is defined by:

Product family	Thermostats and programmable thermostats	
Main function	Control the temperature of a room according to a defined temperature set by the user.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC23B	Appendix 6.3.1.2
	TC72	Appendix 6.3.5

2.1.9. Copper connectors and telecom accessories

The 'Copper connectors and telecom accessories' product family is defined by:

Product family	Copper connectors and telecom accessories	
Main function	Provide a point of connection to a network (energy, telecommunications, ...)	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC23B	Appendix 6.3.1.2
	SC23G	Appendix 6.3.1.4
	SC23H	Appendix 6.3.1.5

2.1.10. Unequipped enclosures and cabinets

The 'Unequipped enclosures and cabinets' product family is defined by:

Product family	Unequipped enclosures and cabinets	
Main function	Protect people against electric shocks by direct contact and the equipment it houses against the penetration of solids and liquids and against mechanical shocks	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121B	Appendix 6.3.4.3
	SC23B	Appendix 6.3.1.2

2.1.11. Surge arresters

The 'Surge arresters' product family is defined by:

Product family	Surge arresters	
Main function	Protect electrical equipment against the direct or indirect effects of lightning or against transient voltage surges	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC37A	Appendix 6.3.3

2.1.12. Terminal Blocks

The 'Terminal Blocks' product family is defined by:

Product family	Terminal Blocks	
Main function	Establish connections between two or more conductors	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	SC121A	Appendix 6.3.4.2
	TC23	Appendix 6.3.1.1

2.1.13. Other equipment

The 'Other equipment' product family is defined by:

Product family	Fuses	
Main function	Protect downstream equipment against effects of overload or short circuit, by interrupting the fault current.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	TC32	Appendix 6.3.2

Product family	Measurement relays and protection equipment	
Main function	Control, monitor and protect power networks.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	TC95	Appendix 6.3.7

Product family	All or nothing relays	
Main function	Establish and interrupt an electric circuit.	
Relevant standards groups and standards	**TC and SC**	**IEC standards**
	TC94	Appendix 6.3.6

2.1.14. Combination of functions

The 'Combination of functions' product category eligible for PSR 0005 is defined as products combining multiple functions as defined in Sections 2.1.1 to 2.1.11. for the same application area.

3. Product Life Cycle Assessment

For each product family, a single reference scenario has been selected regardless of the variety of applications. This requirement helps simplify the LCA, to facilitate comparability of the environmental impacts generated by identical solutions and to meet international LCA standards (ISO 14040s series) to ensure comparability between the PEPs, the reference life and the use scenario proposed in the PSR shall be applied without deviation.

3.1. Common rules for all product families

3.1.1. Functional Unit and reference flow description

For a modular product, it is necessary to integrate in the modelled system to calculate the PEP all the elements that ensure the function.

For example:

- The mechanism (which is clipped on the frame) + the actuating finger (which is clipped on the mechanism) + the frame (which is fixed on the wall) + the plate to cover the frame for switches.
- The mechanism (which is clipped on the frame) + the frame (which is fixed on the wall) + the plate to cover the frame for a socket.
- For thermostats (refer to specific rules for 'Thermostats, programmable thermostats, hygrostats'.

For surface-mounted equipment, all elements must be integrated to ensure electrical protection (e.g. surface-mounted equipment box).

3.1.2. System boundaries

These specific rules are additional to the 'System boundaries' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.1.2.1. Use stage

In the case of breakdown of module B as defined in Section 2.2.6 of the PCR ed.4, the environmental impacts of the use stage must be broken down as follows for all PSR-0005 product families, with the exception of the 'Other equipment' family:

B1: Use or application of the product installed	Not applicable. Module equal to 0.
B2: Maintenance	For example: Replacement battery
B3: Repair	Not applicable. Module equal to 0.
B4: Replacement	Not applicable. Module equal to 0.
B5: Restoration	Not applicable. Module equal to 0.
B6: Energy requirements during the use stage	Electricity consumption of the reference product by applying the use scenario as defined by PSR-0005.
B7: Water requirements during the use stage	Not applicable. Module equal to 0.

In the case of the 'Other equipment' family, the declarant shall justify the breakdown of module B in the LCA report.

3.1.3. Cut-off criteria

These specific rules are additional to the 'Cut-off criteria' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

For product families covered by PSR 0005, the following materials and components shall systematically be included in the reference product modelling.

Materials	Components
Aluminium	Tantalum capacitor
Silver	Arsenic-Gallium capacitor
Copper	Diodes
Gold	Screens and Displays (LED, LCD, OLED, etc.)
Rare earths: Indium, Molybdenum, Neodymium	Micro-processors
Antimony trioxide	Batteries and Accumulators
	Semi-conductors
	Transistors

3.1.4. Rules for allocation between co-products

These specific rules are additional to the 'Rules for allocation between co-products' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

In the event of primary data being shared with other products than those concerned by these specific rules, the impacts may be calculated in proportion to the mass of the devices manufactured. Any other rule must be justified in the LCA report and mentioned in the PEP.

3.1.5. Development of scenarios (default scenarios)

These specific rules are additional to Section '2.5' of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

***Accepted supporting documents to amend default scenarios**

If the declarant wishes to use specific data, the data shall be justified in the report. Such data, forwarded by manufacturers, is not necessarily certified but based on supporting documents on the traceability chain. These supporting documents involve the liability of the declarant or supplier or third party (example of third party: independent certification body). These supporting documents shall be available if requested.

The recycled content of raw materials may for example be justified with supplier data (data sheet or supplier declaration) but may not be justified with generic data (e.g.: system, professional associations, ADEME). The method for calculating the recycled content may be based on that proposed by the EN 45557 standard providing a general method for evaluating the recycled material content of energy-related products.

The scrap rates of raw materials may for example be justified with an internal document from the production factory (e.g.: annual report mentioning the input and output material quantity of the process)

The end-of-life waste treatment may for example be justified with a statement from the contractor tasked with the treatment of waste from the factory.

3.1.5.1. Manufacturing stage

Recycled content

The recycled content of raw materials shall be justified (see Section 3.1.5). In the absence of information, Table 6 of Appendix D of PEP-PCR ed4-EN-2021 09 06 applies.

Packaging of raw material and components

The packaging of raw materials and components as well as their transport to the manufacturing site(s) shall be considered. Supplier data shall be used.

Failing justification, an average packaging content of 5% of the mass of the reference equipment (equipment + packaging) shall be considered, broken down as follows:

- Wood 50%,
- Cardboard 40%,
- Low-density polyethylene 10%.

Packaging reused on-site is not considered.

The end-of-life treatment of packaging is modelled as described below, in the manufacturing waste treatment section of this PSR.

Scrap rate

Specific scrap rates shall be justified*. Declarants whose scrap rates are not available shall consider the default values presented in the first column of Table 1. Columns two and three of Table 1 give an example of how the rates shall be applied.

	Default scrap rate	Mass of part after manufacture (kg)	Scrap mass (kg)	Mass to be considered with scraps (kg)
Metal				
Machining	60%	19,20	11,52	30,72
Sheet metal cutting	60%	14,40	8,64	23,04
Coiling	10%	2,00	0,20	2,20
Injection	10%	0,90	0,09	0,99
Moulage	10%	12,60	1,26	13,86
Plastics				
Injection	10%	9,90	0,99	10,89
Packaging	10%	5,00	0,50	5,50
Other processes	30%	24,50	7,35	31,85

Table 1: default scrap rates to be used in the absence of specific data

Manufacturing waste treatment

By sector-based convention, the transport stage of this manufacturing waste shall be considered based on an assumption of 100 km transport by truck.

In the absence of justified* specific data, and for waste treatment in Europe, Table 6 of Appendix D of PEP-PCR ed4-EN-2021 09 06 applies.

For any other case (excluding specific data and excluding European manufacture), the declarant shall apply the following default scenario: 100% incineration with no energy recovery.

3.1.5.2. Installation stage

3.1.5.2.1. Waste from the installation stage

The end of life of packaging, the production of which is included in the manufacturing stage, is included in the installation stage. Packaging waste produced during the installation stage falls within the category of non-hazardous waste and is disposed of, in principle, by the installer once the equipment is installed.

In the absence of supporting documents showing a specific end of life, the treatment scenarios presented in the tables below shall be applied by default. The tables presented below are representative of the year 2019. The latest consolidated Eurostat data, if available, may be accessed using the information available at the address: https://ec.europa.eu/eurostat/databrowser/view/ENV_WASPAC__custom_3801295/default/bar?lang=en.
The reference year of the data used shall be mentioned in the PEP.

For France scope:

	Recycling rate	Incineration with energy recovery	Incineration with no energy recovery	Landfill rate
Metal	83	1	0	16
Steel	88	0	0	12
Aluminium	60	7	0	33
Paper-cardboard	91	5	0	4
Wood	7	31	0	62
Plastic	27	43	0	30

Table 2: Default packaging end-of-life data for France scope

For European scope:

	Recycling rate	Incineration with energy recovery	Incineration with no energy recovery	Landfill rate
Metal	77	2	0	21
Paper-cardboard	82	9	0	9
Wood	31	31	0	38
Plastic	41	37	0	23

Table 3: Default packaging end-of-life data for European scope

In the absence of data in Tables 2 and 3 and for a geographic scope other than France or Europe, waste shall be treated according to the following scenario: **100% incineration with no energy recovery.**

By sector-based convention, the transport stage of this manufacturing waste shall be considered based on an assumption of **100 km transport by truck**.

The strapping, packaging notes and labels present on or in the packaging of the system are considered to be negligible and may be excluded from the life cycle assessment of the packaging waste.

3.1.5.2.2. Installed product scrap

As per PEP-PCR ed4-EN 2021 09 06, product scrap generated during installation (production, transport and end of life) shall be included in the product installation stage (module A5). In the reference flow of this PSR, a specific installed product scrap percentage for each product type is mentioned: production, transport and end of life associated with this installed product scrap, shall be modelled in module A5.

3.1.5.3. Use stage

The energy consumption of the different parts constituting the functional unit shall be determined according to the rules of the in force PCR.

When methods of measurement are described in applicable standards (indicate the considered standards in the PEP), these shall be applied to determine the total energy consumption of the functional unit.

If these methods are not described, the energy consumption shall be determined by order of priority:

- By a measurement report from a laboratory,
- By calculation, using or not measured figures (use the calculation methods described in the applicable standards and indicate them in the PEP),
- By considering figures communicated by the manufacturer to its customers (catalogues, datasheets, etc.).

In any case, considered assumptions and used methods for the calculation shall be indicated in the accompanying report.

For reference products powered by non-rechargeable batteries: the energy (or part of the energy) consumed in use and provided by this kind of batteries shall not be considered. Indeed, the energy provided by the battery during the use stage is taken into account during its own manufacturing.

The batteries or accumulators delivered with the product shall be considered in manufacturing stage. The replacement battery/batteries or accumulator(s) used during the reference service life of the product shall be considered in the use stage.

For batteries conventionally rechargeable, the necessary energy to charge them shall be considered in the use stage during the whole reference service life of the reference product.

3.1.6. Rules applying to joint environmental declarations

The rules defined in the 'Rules applying to joint environmental declarations' section of the PCR (PEP-PCR ed4-EN-2021-09 06) apply.

3.1.7. Environmental data requirements

The rules defined in the 'Primary data requirements' and 'Secondary data requirements' section of the PCR (PEP-PCR ed4-EN-2021 09 06) apply.

Note: The LCI module used to model the raw material or component may contain a default scrap rate.

- If the scrap rate included in the LCI module is modifiable, the default values in the table 1 shall apply.
- If the scrap rate included in the LCI module is non-modifiable:
    - The scrap rate is less than the above default values in the table 1: this scrap rate shall be entered in the LCA report, and insofar as possible, the modelling should be adapted to account for the difference in waste generated (hazardous or non-hazardous).

- The scrap rate is greater than the above default values in the table 1: this scrap rate must be entered in the LCA report.

3.1.8. Environmental impact calculation

3.1.8.1. Environmental impact calculation in respect of the functional unit (FU)

In order to evaluate the environmental impact results at the functional unit level reported in the PEP., the environmental impacts generated by the life cycle of the reference product shall be normalised to the functional unit.

The environmental impacts from the manufacturing, distribution, installation, end-of-life stage and module D are calculated as follows for each life cycle stage:

Environmental impacts of PEP file =Environmental impacts of reference product

The environmental database version shall be mentioned in the PEP and the LCA report, including the EF (Environmental Footprint) version number.

If mentioning the quantity of biogenic carbon stored in kg: for biogenic carbon storage, both 0/0 or -1/+1 assessment methodologies are accepted until the environmental databases are updated. The methodologies used shall be mentioned in the PEP and in the LCA report.

3.2. Specific rules for the 'Circuit-breakers' family

3.2.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.2.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented in the PEP file:

<table>
<tr><td>Family</td><td colspan="2">Circuit-breakers</td></tr>
<tr><td>Sub-family</td><td colspan="2">Not applicable</td></tr>
<tr><td>Functional unit</td><td colspan="2">'Protect the installation from overloads and short circuits in a circuit with rated voltage Ue, rated current In, with Np poles, a rated breaking capacity Icn or Icu, and the tripping curve Cd if applicable, and, if applicable, the specific specifications, in the Household/Commercial or Industrial application area, according to the appropriate use scenario, and during the reference service life of the product of 20 years.'</td></tr>
<tr><td>Application area</td><td>Household / Commercial</td><td>Industrial</td></tr>
<tr><td rowspan="2">Specifications</td><td>Ue = Rated operating voltage (V)
In = Rated current (A)
Np = Number of poles / number of protected poles
Icn: Rated breaking capacity (A)
Cd = Tripping curve (B, C, D or other)</td><td>Ue = Rated operating voltage (V)
In = Rated current (A)
Np = Number of poles / number of protected poles
Icu: Rated breaking capacity (A)</td></tr>
<tr><td colspan="2">If the degrees of protection are considered as specific functions for the product, specify in the FU:
IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529
IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262</td></tr>
<tr><td>Voltage range</td><td colspan="2">Extra-low voltage, low voltage, etc.</td></tr>
<tr><td>Current type</td><td colspan="2">AC or DC current</td></tr>
</table>

E.g.: 'Protect the *Household/Commercial* installation from overload and short circuits in a circuit with rate voltage *230 V*, rated current *16 A*, with *2* poles (1P+N), a rated breaking capacity *3 kA*, and the tripping curve *C*, according to the appropriate use scenario, and during the reference service life of the product of 20 years.'

3.2.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A circuit breaker,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life of this product family is set at 20 years.

3.2.2. Development of scenarios (default scenarios)

3.2.2.1. Use stage

Application area	Household / Commercial	Industrial
Reference service life	20 years	20 years
Use scenario	Load rate = 15% In Use rate = 30% RLT	Load rate = 50 % In Use rate = 30% RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.2.3. Environmental impact calculation

3.2.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.3. Specific rules for the 'Blocks and differential switches' family

3.3.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.3.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Blocks and differential switches	
Sub-family	Not applicable	
Functional unit	'Protect people and premises at risk of fire or explosion against insulation defects in a circuit with rated voltage *Ue*, rated current *In*, with *Np* poles, sensitivity *S*, and the differential protection type *Tp*, *and if applicable the specific specifications*, in the *Household/Commercial or Industrial* application area, according to the appropriate use scenario, and during the 20-year reference service life of the product.'	
Application area	Household / Commercial	Industrial
Specifications	*Ue = Rated operating voltage (V)* *In = Rated current (A)* *Np = Number of protected poles (one pole and the neutral one, three poles, three poles and the neutral one)* *S = Sensitivity (30mA, 300mA,…)* *Tp = Type of differential protection (A, A selective, B, F, AC, AC selective, …)*	
	If the degrees of protection are considered as specific functions for the product, specify in the FU: *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262*	
Voltage range	*Extra-low voltage, low voltage, etc.*	
Current type	*AC or DC current*	

3.3.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A block or differential switches,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.3.2. Development of scenarios (default scenarios)

3.3.2.1. Use stage

Application area	Household / Commercial	Industrial
Reference service life	20 years	20 years
Use scenario	Load rate = 20 % In Use rate = 30% RLT	Load rate = 50 % In Use rate = 30% RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.3.3. Environmental impact calculation

3.3.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.4. Specific rules for the 'Differential circuit-breakers' family

3.4.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.4.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Differential circuit-breakers	
Sub-family	Not applicable	
Functional unit	'Protect the installation against overloads and short circuits and protect people and premises at risk of fire or explosion against insulation defects in a circuit with rated voltage *Ue*, rated current *In*, with *Np* poles, a rated breaking capacity *Icn or Icu*, the tripping curve *Cd*, the sensitivity *S*, and the differential protection type *Tp, and, if applicable, the specific specifications*, in the *Household/Commercial or Industrial* application areas, according to the appropriate use scenario, and during the reference service life of the product of 20 years.'	
Application area	Household / Commercial	Industrial
Specifications	*Ue = Rated operating voltage (V)* *In = Rated current (A)* *Np = Number of poles (1P, 1P+N, 2P, 3P, 3P+N, 4P)* *Rated breaking capacity (A): Icu (industrial type circuit-breaker) or Icn (household type circuit-breaker)* *Cd = Tripping curve (household type circuit-breaker)* *S = Sensitivity (30mA, 300mA,…)* *Tp = Type of differential protection (A, A selective, B, F, AC, AC selective, …)*	
	If the degrees of protection are considered as specific functions for the product, specify in the FU: *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262*	
Voltage range	*Extra-low voltage, low voltage, etc.*	
Current type	*AC or DC current*	

3.4.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A differential circuit breaker,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.4.2. Development of scenarios (default scenarios)

3.4.2.1. Use stage

Application area	Household / Commercial	Industrial
Reference service life	20 years	20 years
Use scenario	Load rate = 15% In Use rate = 30% RLT	Load rate = 50 % In Use rate = 30% RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.4.3. Environmental impact calculation

3.4.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.5. Specific rules for the 'Arc fault detection and protection module, with or without opening system (AFDD module)' family

3.5.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.5.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Arc fault detection and protection module, with or without opening system
Sub-family	Not applicable
Functional unit	'Protect people and premises against risks of fire ignited by a hazardous series or parallel electric arc in a final circuit of rated voltage Un and rated current In, according to the appropriate use scenario, and during the reference service life of the product of 10 years.'
Application area	Household / Commercial
Specifications	*Un = Rated voltage (V)* *In = Rated current (A)* *Np = Number of poles* *Power loss per pole* *Power consumption by measurement/control circuit*
	If the degrees of protection are considered as specific functions for the product, specify in the FU: *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262*
Voltage range	*Extra-low voltage, low voltage, etc.*
Current type	*AC current*

3.5.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- An arc fault detection and protection module, with or without opening system,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 10 years.

3.5.2. Development of scenarios (default scenarios)

3.5.2.1. Use stage

Application area	Household / Commercial
Reference service life	10 years
Use scenario	Load rate = 15% In* Use rate = 30% RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit

*AFDDs associated or to be associated (module without opening system) with a circuit-breaker, differential circuit-breaker or differential switch are to be considered as a combination of functions: Section 3.16

In this case, the circuit-breaker, differential circuit-breaker or differential switch associated with the AFDD defines the use scenario

3.5.3. Environmental impact calculation

3.5.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.6. Specific rules for the 'Disconnectors' family

3.6.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.6.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Disconnectors	
Sub-family	Earthing	Low voltage
Functional unit	'Turn off all or part of an installation by separating the installation or part of the installation of all electrical energy or earth, for safety reasons with a rated voltage *U*, and rated current *In* ensuring isolation characterised by a rated voltage *Ui*, *and if applicable the specific specifications*, according to the appropriate use scenario, and during the reference service life of the product of *20* or *30* years.'	
Application area	All application areas	
Specifications	*U = Rated voltage (V)* *In = Rated current in continuous operation (A)* *In = Rated isolation voltage (A)*	
	If the degrees of protection are considered as specific functions for the product, specify in the FU: *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262*	
Voltage range	*Extra-low voltage, low voltage, etc.*	
Current type	*AC or DC current*	

3.6.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A disconnector,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life of this product family is set at:

- 30 years for earthing disconnectors,

- 20 years for low voltage disconnectors.

3.6.2. Development of scenarios (default scenarios)

3.6.2.1. Use stage

Sub-family	Earthing	Low voltage
Reference service life	30 years	20 years
Use scenario	Load rate = 0% Use rate (closed device) = 90% RLT	Load rate = 50 % In Use rate (closed device) = 30 % RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.6.3. Environmental impact calculation

3.6.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.7. Specific rules for the 'Switches' family

3.7.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.7.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

<table>
<tr><td>Family</td><td colspan="3">Switches</td></tr>
<tr><td>Sub-family</td><td>Wall-mounted</td><td colspan="2">Enclosure / cabinet</td></tr>
<tr><td>Functional unit</td><td>'Establish, support and interrupt the rated current I and rated voltage U, and, if applicable, the specific specifications, for a wall-mounted or enclosure / cabinet installation, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'</td><td colspan="2">'Establish, support and interrupt the rated current I and rated voltage U, and if applicable the specific specifications, for a wall-mounted or enclosure / cabinet installation, in the Household/Commercial or Industrial application areas, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'</td></tr>
<tr><td>Application area</td><td>All application areas</td><td>Household / Commercial</td><td>Industrial</td></tr>
<tr><td rowspan="3">Specifications</td><td>I = Rated current
U = Rated voltage</td><td colspan="2">I = Rated operating current (A)
U = Rated operating voltage (V)</td></tr>
<tr><td></td><td colspan="2">And if applicable, specify in the FU:
Category of use (e.g. AC-22A, etc.)
Icw = Rated short time withstand current
Icm = Rated making capacity
Ith = Rated current in continuous operation (A)</td></tr>
<tr><td colspan="3">If the degrees of protection are considered as specific functions for the product, specify in the FU:
IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529
IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262</td></tr>
<tr><td>Voltage range</td><td colspan="3">Extra-low voltage, low voltage, etc.</td></tr>
<tr><td>Current type</td><td colspan="3">AC or DC current</td></tr>
</table>

3.7.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A switch,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.7.2. Development of scenarios (default scenarios)

3.7.2.1. Use stage

Sub-family	Wall-mounted	For panel	
Application area	All application areas	Household / Commercial	Industrial
Reference service life	20 years	20 years	
Use scenario	Load rate = 10% I Use rate = 30% RLT	Load rate = 20 % I Use rate = 30% RLT	Load rate = 50 % I Use rate = 30% RLT

3.7.3. Environmental impact calculation

3.7.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.8. Specific rules for the 'Contactors, remote control switch' family

3.8.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.8.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

<table>
<tr><td>Family</td><td colspan="3">Contactors, remote control switch</td></tr>
<tr><td>Sub-family</td><td colspan="2">Contactors</td><td>Remote control switch</td></tr>
<tr><td>Functional unit</td><td colspan="3">'Establish and cut off the supply of a downstream installation from an electrical and/or mechanical control characterised by the composition of the poles or type of contacts X, a rated voltage of Ue, a rated current Ie, a control circuit voltage Uc, with Np poles, and if applicable the specific specifications, in the Household/Commercial or Industrial application areas, according to the appropriate use scenario, and during the reference service life of the product of 20 years.'</td></tr>
<tr><td>Application area</td><td>Household / Commercial</td><td>Industrial</td><td>All application areas</td></tr>
<tr><td rowspan="2">Specifications</td><td colspan="2">X = Composition of poles or contact type (1C, 1C + 1O, 3C, etc.)
Ue = Rated operating voltage (V)
Ie = Rated operating current (A)
Np = Number of poles or number of contacts
Uc = control circuit voltage (V) (12 V, 24 V, 230 V, etc.)
Category of use (AC1, etc.)</td><td>Ue = Rated operating voltage (V)
Ie = Rated operating current (A)
Np = Number of poles or number of contacts
Uc = control circuit voltage (V) (12 V, 24 V, 230 V, etc.)</td></tr>
<tr><td colspan="3">If the degrees of protection are considered as specific functions for the product, specify in the FU:
IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529
IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262</td></tr>
<tr><td>Voltage range</td><td colspan="3">Extra-low voltage, low voltage, etc.</td></tr>
<tr><td>Current type</td><td colspan="3">AC or DC current</td></tr>
</table>

3.8.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A contactor, remote control switch, combination or starter,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.8.2. Development of scenarios (default scenarios)

3.8.2.1. Use stage

Application area	Household / Commercial	Industrial	All application areas
Reference service life	20 years		20 years
Use scenario	Load rate = 30% Ie Use rate = 30% RLT	Load rate = 50 % Ie Use rate = 50 % RLT	Load rate = 20 % Ie Use rate = 30% RLT
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit		- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.8.3. Environmental impact calculation

3.8.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.9. Specific rules for the 'Thermostats, programmable thermostats, hygrostats' family

3.9.1. Functional unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.9.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the tables below shall be presented:

Family	Thermostats, programmable thermostats, hygrostats	
Sub-family	Non-programmable thermostats	Programmable thermostats
Functional unit	'Measure and control the ambient temperature(s) set by the user in a range of X in N zones, with a temperature step of Y and characterised by a closed contact current IL, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'	'Measure and control by time programming the ambient temperature(s) set by the user in a range of X with a temperature step of Y, in N zones according to and characterised by a closed contact current IL, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'
Application area	Household / Commercial	Household / Commercial
Specifications	X = 'Ambient temperature between 0° and 35°C'; any other temperature value shall be specified Y = '0.5°C', any other temperature value shall be specified IL = Maximum allowed current when the contact is closed (A) N = number of zones	X = 'Ambient temperature between 0° and 35°C'; any other temperature value shall be specified Y = '0.5°C', any other temperature value shall be specified N = Number of zones IL = Maximum allowed current when the contact is closed (A) N = number of zones
Voltage range	Extra-low voltage, low voltage, etc.	
Current type	Mains or battery	

Family	Thermostats, programmable thermostats, hygrostats
Sub-family	Hygrostats
Functional unit	'Measure and control the ambient humidity of a zone according to a set-point humidity set by the user in a range of X, with a humidity step of Y, and characterised by a closed contact current IL, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'
Application area	Household / Commercial
Specifications	X = 'humidity level between 20% and 80%'; any other humidity value shall be specified Y = '1%'; any other humidity value shall be specified IL = Maximum allowed current when the contact is closed (A)
Voltage range	Extra-low voltage, low voltage, etc.
Current type	Mains or battery

Family	Thermostats, programmable thermostats, hygrostats	
Sub-family	Thermostatic valves	Programmable thermostatic valves
Functional unit	'Measure and control the temperature set by the user in a range of X in N zones, with a temperature step of Y and mechanically actuate the position of a valve, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'	'Measure and control by time programming the temperature set by the user in a range of X in N zones, with a temperature step of Y and mechanically actuate the position of a valve, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'
Application area	Household / Commercial	Household / Commercial
Specifications	X = 'Ambient temperature between 0° and 35°C'; any other temperature value shall be specified Y = '0.5°C', any other temperature value shall be specified	X = 'Ambient temperature between 0° and 35°C'; any other temperature value shall be specified Y = '0.5°C', any other temperature value shall be specified
Voltage range	Extra-low voltage, low voltage, etc.	
Current type	Mains or battery	

Family	Thermostats, programmable thermostats, hygrostats
Sub-family	Combination of functions
Functional unit	In the case of a combination of functions, add the standardised specifications of all the functions. E.g.: programmable hygrotherm 'Measure and control the ambient temperature and humidity level in a range of XT (temperature), with a temperature step of YT (temperature), a set-point humidity set by the use in a range of XH (humidity), with a humidity step of YH (humidity) in N zones and characterised by a current ILT and a current ILH of the closed contacts, for a given zone, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'
Application area	Household / Commercial
Specifications	XT (temperature) = 'Ambient temperature between 0° and 35°C'; any other temperature value shall be specified YT (temperature) = '0.5°C', any other temperature value shall be specified XH (humidity level) = 'humidity level between 20% and 80%'; any other humidity value shall be specified YH (humidity level) = '1%'; any other humidity value shall be specified N = Number of zones ILT: Max allowed current when the contact is closed for the thermostat (A) ILH: Max allowed current when the contact is closed for the hygrostat (A)
Voltage range	Extra-low voltage, low voltage, etc.
Current type	Mains or battery

Note: In the case of a combination of products to carry out the thermostat / programmable thermostat function, the relevant functional unit shall include all of the elements required, e.g.: actuators, temperature probes, displays, offset relays, etc.

3.9.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A thermostat, programmable thermostat, hygrostat, thermostatic valve, programmable thermostatic valve, combination of functions,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years. However, **when electronic functions are introduced, the reference lifetime to be considered is 10 years.**

3.9.2. Development of scenarios (default scenarios)

3.9.2.1. Use stage

Family	**Mechanical** thermostats, programmable thermostats, hygrostats	**Electronic** thermostats, programmable thermostats, hygrostats**or with LED displays**
Application area	Household / Commercial	Household / Commercial
Reference service life	20 years	10 years
Use scenario	Load rate of the closed contact: 30% of IL during 14% of the RLT	Load rate contact closed: 30% of IL during 14% of the RLT Load rate contact opened: 86% of standby power RLT

3.9.3. Environmental impact calculation

3.9.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.10. Specific rules for the 'Sockets' family

3.10.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.10.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

<table>
<tr><td>Family</td><td colspan="3">Socket</td></tr>
<tr><td>Sub-family</td><td colspan="2">Power socket</td><td>USB charging socket</td></tr>
<tr><td>Functional unit</td><td colspan="2">'Connect/disconnect the plug of a load consuming In A maximum under a voltage of U while protecting the user from direct contact with live parts, and, if applicable, the specific specifications, in the Household/Commercial or Industrial application areas, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'</td><td>'Provide one or more USB connection type charging point(s) X, according to the appropriate use scenario, and for the reference service life of the product of 10 years.'</td></tr>
<tr><td>Application area</td><td>Household / Commercial</td><td>Industrial</td><td>All application areas</td></tr>
<tr><td rowspan="2">Specifications</td><td colspan="2">In = rated current (A).
U = Rated voltage (V)</td><td>X = All USB standard specifications (e.g. USB power delivery, maximum allowed power, efficiency, etc.)</td></tr>
<tr><td colspan="2">If the degrees of protection are considered as specific functions for the product, specify in the functional unit:
IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529
IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262
If necessary, indicate the type and/or socket standard: e.g. 2P+E French/Belgian standard, 2P+E Schuko, etc.</td><td></td></tr>
<tr><td>Voltage range</td><td colspan="3">Extra-low voltage, low voltage, etc.</td></tr>
<tr><td>Current type</td><td colspan="3">AC or DC current</td></tr>
</table>

3.10.1.2. Reference product and reference flow description

The function of the socket is to allow users to connect and disconnect the plug of an electrical load or the source of a signal from a network:

- Electric power: power socket,
- Communication (low currents): RJ45 socket, TV socket, Phone socket,
- Electronic: loudspeaker socket, USB socket.

This function is specified by the kind of transferred signal.

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A socket
- Its packaging
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.10.2. Development of scenarios (default scenarios)

3.10.2.1. Use stage

Sub-family	Power socket		USB socket
Application area	Household / Commercial	Industrial	All application areas
Reference service life	20 years		10 years
Use scenario	Load rate = 10% In Use rate = 30% RLT	Load rate = 50 % In Use rate = 50 % RLT	Load rate = 50% max power for 30% RLT Use rate = 30% RLT in charging mode, 70% RLT in Standby mode The loss calculation in active mode is based on the charger efficiency measured at 50% of its max power

3.10.3. Environmental impact calculation

3.10.3.1. Environmental impact calculation in respect of the product (declared unit)

The following precision shall be completed and mentioned in the PEP, to ensure clarity and transparency for the PEP user:

'The PEP has been developed taking into account a socket with respect to the functional unit. The effective impact of the product shall be calculated by the PEP user multiplying impacts by the relevant number of sockets.'

3.11. Specific rules for the 'Copper telecom accessories' family

3.11.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

PSR 0005 only applies to accessories for which PSR 0001 does not apply.

3.11.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Copper telecom accessories
Sub-family	Not applicable
Functional unit	'Protect, link by a connection point for X years (reference service life) with a Y% use rate for an application Z, as defined in the table given in section 3.11.1.2.'
Application area	All application areas
Specifications	A: splice or connector X: Reference service life Y: Use rate Z: Application
Voltage range	*Extra-low voltage, low voltage, etc.*
Current type	*AC or DC current*

According to the functional unit definition, production, distribution, installation and end of life stages shall be considered for the maximum capacity of the reference flow fulfilling the functional unit.

PEP environmental impacts = $\frac{\text{Environmental impacts of the reference product}}{\text{Number of connection points of reference product}}$

3.11.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A copper telecom accessory having a number N of connection points,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at:

APPLICATION AREAS	Applications	Reference service life (years)	Use rate (%)
INFRASTRUCTURES	Energy distribution networks	40	100 %
	Railway networks	30	100 %
	Telecom networks (fixed and mobile phones)	20	100 %
INDUSTRIAL APPLICATIONS	Oil, gas and petrochemicals	30	100 %
	Handling	10	50 %
	Automation	5	100 %
	Nuclear	40	100 %
	Wind turbines	20	30 %
	Photovoltaic power plants	10	50 %
	Airports	20	100 %
ONBOARD SYSTEMS	Civil aeronautics	15	80 %
	Shipbuilding and marine	30	80 %
	Rolling stock	30	50 %
	Automotives (Cars and trucks)	10	10 %
BUILDING	Residential/Tertiary/Industrial excluding LAN	30	70 %
	Data centers	10	100 %
	LAN: Residential	10	17 %
	LAN: Tertiary	10	25 %
	LAN: Industrial (Factories, warehouses)	10	100 %

3.11.2. Development of scenarios (default scenarios)

3.11.2.1. Use stage

The energy losses during the use stage are determined applying the following methods.

3.11.2.1.1. Balanced connectors

Examples of balanced connectors covered by this paragraph are RJ 45 and RJ 11.

The losses ($P_{connector\ loss}$) specified by IEC 60603-7-X shall be used. The calculation of the maximum value of the connector losses is made as follow:

- $$P_{connectorloss} = (P_e\text{-}P_s) \times Nbpair$$
- $$P_s = P_e \times 10^{(\frac{-0.02\sqrt{f}}{10})}$$

- Where,
  - Pe: injected power in mW given by the standards: 14 mW
  - Ps: output power in mW
  - *f*: working frequency in MHz
  - Nbpair: is the used pair number for the considered protocol

- To meet the requirements of these protocols, the connectors are divided into categories. For each category is assigned an attenuation value according to the central frequency of the relevant Protocol. This maximum attenuation by category is defined in the standard IEC 61156 corresponding to the cable category.

- The table below includes all the data to use and taken from reference (the standard IEC 60603-7 and the Ethernet IEEE standard 802.3).

Protocol	Frequency	Category	Power loss
Ethernet 100M BP(*)=100MHz	31.25 MHz	Cat.5 and 5e according to IEC 60603-7-2	0.02* $\sqrt{f}$ at 31.25 MHz injected power / pair = 14 mW leading to **0.712 mW** on 2 used pairs and 1.424 mW on 4 used pairs
1 G Ethernet BP (*) = 250 MHz	83 MHz	Cat 6 According to IEC 60603-7-4	0.02* $\sqrt{f}$ at 83 MHz injected power / pair = 14 mW leading to **2.301 mW** on 4 used pairs
10G Ethernet BP (*) = 500 MHz	400 MHz	Cat. 6a According to IEC 60603-7-41	0.02* $\sqrt{f}$ at 400 MHz injected power / pair = 14 mW leading to **4.927** mW on 4 used pairs
10G Ethernet BP(*)=600 MHz	400 MHz	Cat 7 According to IEC 60603-7-7	0.02* $\sqrt{f}$at 400 MHz injected power / pair = 14 mW leading to **4.927** mW on 4 used pairs
10G Ethernet BP(*)=1000MHz	400 MHz	Cat 7a According to 60603-7-71	0.02* $\sqrt{f}$ at 400 MHz injected power / pair= 14 mW leading to **4.927** mW on 4 used pairs
10G Ethernet BW(*)= 1200 MHz	400 MHz	Cat 7+ according to IEC 60603-7-81	0.02* $\sqrt{f}$ at 400 MHz injected power / pair= 14 mW leading to **4.927** mW on 4 used pairs
40G Ethernet BW(*)= 2000 MHz	1600 MHz	Cat. 8.1 according to IEC 60603-7-81	0.00649* $\sqrt{f}$+0.000605*f at 1600 MHz injected power / pair = 14 mW leading to **13.789** mW on 4 used pairs
40G Ethernet BW(*)= 2000 MHz	1600 MHz	Cat. 8.2 according to IEC 60603-7-82	0.02* $\sqrt{f}$+0.0005*(f-1000) at 1600 MHz injected power / pair = 14 mW leading to **12.530** mW on 4 used pairs

(*) BW: connector bandwidth

Table 4 – Power losses of balanced connectors

The energy lost by the balanced connector, expressed in joule, is then obtained by multiplying the power loss, expressed in watt, by the reference lifetime, expressed in seconds, and the use rate.

for example, for an ethernet 100m balanced-connector, with a reference lifetime of 10 years and a 100% use rate, the total energy lost in use is:

0.712 mW x 10 [years] x 365 [days] x 24 [hours] x 3600 [seconds] = **224.5 kJ**

For illustration, 224.5 kJ is approximately the energy consumption of a bulb of 60 watts during 1 hour (216 KJ).

3.11.2.1.2. Coaxial connectors

Examples of coaxial connectors covered by this paragraph are TV-radio-SAT connectors and RF connectors.

A distinction is made between residential coaxial cables and those for other areas (industrial, infrastructure). In residential use, according to PSR1, 75 Ohm connector losses are disregarded.

In other cases, the power losses (P_{cx}) specified in IEC 61169 series for coaxial connectors shall be used.

It is considered that the power injected into the connector is 30 dBm or 1 W.

The calculation of the maximum losses of the connector is made as follow:

$$P_{connector} = 1 - 10^{-\frac{P_{cx}}{10}}$$

Standard	Power loss Pcx expressed in dBm	Power loss
IEC 61169-54	0.05 $\sqrt{f}$dB with f in GHz	11.5 mW

Table 5 – Power losses of coaxial connectors

The energy lost by the coaxial connector, expressed in Joule, is then obtained by multiplying the power loss, expressed in Watt, by the REFERENCE LIFETIME, expressed in seconds, and the use rate.

For example, for a coaxial connector in an industrial building application, the REFERENCE LIFETIME is 10 years and the use rate is 100%, the total energy lost is use is:

11.5 mW x 10 [years] x 365 [days] x 24 [hours] x 3600 [seconds] = **3.62 MJ**

For illustration, 3.62 MJ is the energy consumption of a bulb of 60 watts during 16 hours.

3.11.3. Environmental impact calculation

3.11.3.1. Environmental impact calculation in respect of the product (declared unit)

The following precision shall be completed and mentioned in the PEP, to ensure clarity and transparency for the PEP user:

'The PEP has been developed taking into account the number of connection points. The effective impact of the product shall be calculated by the PEP user multiplying impacts by the number of product connection points."

Precisions:

- A connection point is available in various ways: fusion splices, mechanical splicing, connectors.
- Storing, Mixing and Deriving are secondary functions of equipment and accessories for copper Telecom connections which are not included in the calculation of environmental impacts. Nevertheless, if necessary, these functions will be specified in the PEP.

3.12. Specific rules for the 'Unequipped enclosures and cabinets' family

3.12.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.12.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Unequipped enclosures and cabinets[2]	
Sub-family	Unequipped enclosures	Unequipped cabinets
Functional unit	'Protect people from direct contact with live active parts and ensure the grouping of control, command and protection devices in a single enclosure or cabinet having the following dimensions *H x L x D* or an assembly of *X* enclosures or cabinets having the following dimensions H x L x D, with rated current *In*, while protecting them against mechanical impacts (*IK*) and the penetration of solid objects and liquids (*IP*), according to the appropriate use scenario, and for the reference service life of the product of 20 years.'	
Application area	All application areas	
Specifications	*H = Height (mm)* *L = Width (mm)* *P = Depth (mm)* *X = Total number of enclosures or cabinets* *In = Rated current allowed in this enclosure (A)* *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262*	
Voltage range	*Extra-low voltage, low voltage, etc.*	
Current type	*AC or DC current*	

[2] Sold in an enclosure with connection accessories (e.g.: bridging strip, terminal block) but without the rest of the protective devices of the electric, control or communication circuit.

3.12.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- An unequipped enclosure or an unequipped cabinet,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.12.2. Development of scenarios (default scenarios)

3.12.2.1. Use stage

There is no use scenario to be considered.

3.12.3. Environmental impact calculation

3.12.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.13. Specific rules for the 'Surge arresters' family

3.13.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.13.1.1. Functional unit

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

Family	Surge arresters	
Sub-family	Type 1, 2 or 3 devices connected to low voltage power systems	Surge protective devices connected to telecommunications and signalling networks
Functional unit	'Protect, against direct and indirect effects of lightning or against transient overvoltages, electronic equipment connected to networks with a rated operational voltage of up to 1000 V AC or 1500 V DC, via a surge arrester of type *T*, with *Np* poles, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'	'Protect, against direct or indirect effects of lightning or against transient overvoltages, electronic equipment connected to connected to telecommunications and signalling networks with a rated operational voltage up to 1000 V AC (rms) or 1500 V DC, according to the appropriate use scenario, and for the reference service life of the product of 20 years.'
Application area	All application areas	
Specifications	*T = Surge protective device type according to the standard IEC 61643-11. T= T1 or T2 or T3* *Np = Number of poles (XP +N)* *Uc = Maximum continuous operating voltage (kV)* *In = Rated discharge current for class 2 test (current waveshape 8/20µs) (kA)* *Iimp = Impulse discharge current for class 1 test (current waveshape 10/350s) (kA)* *Uoc = open circuit voltage of the combination wave generator for surge protective devices type 3 (kV)* *Up = Voltage protection level (kV)* *Ic = current drawn by the surge protective device and his related functions (A)* *Note: 'Ic current drawn includes all potential currents drawn during the lifetime of the surge protective device: leakage current between phase and*	*Uc = Maximum continuous operating voltage (kV)* *In = Rated current for test (A) according to the product category* *Iimp = Impulse discharge current for surge protective devices category D1 (waveshape 10/350s) or D2 (waveshape 10/250s) (kA)* *C = Product category (A1, A2, B1, B2, B3, C1, C2, C3, D1, D2) according to the standard IEC 61643-21* *Up = voltage protection level (kV)* *Ic = current drawn by the surge protective device and his related functions (A)*

	neutral, earth-leakage current, current drawn by electronic components like indicators, etc.' *F = Frequency range of the low voltage system (d.c. or a.c. from xx Hz to xx Hz)*	
	If the degrees of protection are considered as specific functions for the product, specify in the FU: *IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529* *IK = Degree of protection against external mechanical impacts in accordance with the IEC 62262 standard*	
Voltage range	*Extra-low voltage, low voltage, etc.*	
Current type	*AC or DC current*	

3.13.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A surge arrester,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

3.13.2. Development of scenarios (default scenarios)

3.13.2.1. Use stage

Sub-family	Type 1, 2 or 3 devices connected to low voltage power systems	Surge protective devices connected to telecommunications and signalling networks
Application area	All application areas	
Reference service life	20 years	20 years
Use scenario	Load rate = 100% Ic Use rate = 100 % RLT	Load rate = 100% Ic Use rate = 100 % RLT

3.13.3. Environmental impact calculation

3.13.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.14. Specific rules for the 'Terminal Blocks'

3.14.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.14.1.1. Functional unit

These rules apply to the terminal blocks which refer to the standard IEC 60947-7. For all other connection devices you shall refer to the PCR in effect or to the PSR0001 – Wires, cables and accessories.

According to the use (sub-family, voltage range, application area), the functional unit and the technical specifications of the table below shall be presented:

<table>
<tr><td>Family</td><td colspan="3">Terminal Blocks</td></tr>
<tr><td>Sub-family</td><td>Terminal blocks for copper conductors and disconnect terminal blocks
(60947-7-1 standard)</td><td>Fuse terminal blocks
(60947-7-3 standard)</td><td>Protective conductor terminal block
(60947-7-2) standard (see note 1)</td></tr>
<tr><td>Functional unit</td><td colspan="3">'Connect N clamping units between 2 or more wires for a rated cross-section Sn, with rated voltage U, rated current In, and a voltage drop DU, according to the appropriate use scenario, and for the reference service life of the product of 20 years'</td></tr>
<tr><td>Application area</td><td colspan="3">All application areas</td></tr>
<tr><td rowspan="2">Specifications</td><td colspan="3">N = number of clamping units
Sn = Rated cross-section (mm²)
U = Rated voltage (V)
DU = Voltage drop (mV)
In = Rated current (A)
Icw = Short time withstand current (A)</td></tr>
<tr><td colspan="3">If the degrees of protection are considered as specific functions for the product, specify in the FU:
IP = Degree of protection against ingress of solid foreign objects and water with harmful effects in accordance with the standard IEC 60529
IK = Degree of protection against external mechanical impacts in accordance with the standard IEC 62262</td></tr>
<tr><td>Voltage range</td><td colspan="3">Extra-low voltage, low voltage, etc.</td></tr>
<tr><td>Current type</td><td colspan="3">AC or DC current</td></tr>
</table>

For terminal blocks with additional functions (for example indicator), see chapter 3.16.

3.14.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- A terminal block,
- Its primary packaging,
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years.

Note 1: A protective terminal block is designed to discharge a short circuit current. It is used to form the electrical and mechanical connection between copper conductors and the fixing support. The standard IEC 60947-7-2 specifies that the protective conductor terminal block shall be capable of withstanding 3 applications of 1 second duration each of the short-time withstand current Icw which corresponds to 120 A/mm2 of its rated cross-section. In the PEP boundaries, we consider that the protective conductor terminal block is passed through 100% of the short-time withstand current when it discharges this current. The rest of the time, no electric current passes through this terminal block; there are no energy losses by Joule effect. The standard specifies that this terminal block shall be capable of withstanding 3 applications of 1 second duration each. For the PEP, we consider that the terminal block dissipates energy 3 times during 1 second each time for its total lifetime, so the use time is 3 seconds.

3.14.2. Development of scenarios (default scenarios)

3.14.2.1. Use stage

Sub-family	Terminal blocks for copper conductors and disconnect terminal blocks (60947-7-1 standard)	Fuse terminal blocks (60947-7-3 standard)	Protective conductor terminal block (60947-7-2) standard (see note 1)
Application area	Not applicable		
Reference service life	20 years	20 years	20 years
Use scenario	Load rate = 30 % In Use rate = 90 % RLT	Load rate = 30 % In Use rate = 90 % RLT	Load rate = 100% Icw Use time = 3 seconds
Specifications to take into account for measurements	- Power loss per pole - Power consumption by measurement/control circuit	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations	- Power loss per pole - Power consumption by measurement/control circuit - Any maintenance operations

3.14.3. Environmental impact calculation

3.14.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.15. Specific rules for the 'Other Equipment' family

3.15.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.15.1.1. Functional unit

Other switchgear and controlgear solutions mentioned in the scope (e.g. fuses TC32, all-or-nothing relays TC94, Measuring relays and protection equipment TC95), apply the general rules of PCR and mention in the accompanying report the functional unit, the reference product characteristics, the reference lifetime and the use scenario which are applied consistently with the relevant IEC technical standards.

3.15.1.2. Reference product and reference flow description

The reference flow associated with the Life Cycle Assessment analysis consists of:

- The product
- Its primary packaging
- Any products or elements required for its installation.

The manufacturer selects the reference product within its range to be analysed. The PSR sets no requirements.

The reference service life is set at 20 years for passive products and 10 years for active products.

3.15.2. Development of scenarios (default scenarios)

3.15.2.1. Use stage

In the absence of specific rules applicable to the product, for some of the parameters, it is recommended to rely on the active or passive nature of the equipment to characterise the products in terms of reference service life and use scenario.

	Passive products	Active products
Definition	Passive products are thrown by the main current and do not require energy for their main function. They perform the contact, opening or conduction functions in the installation	Active products need to consume energy for their main function.
Reference service life	20 years	10 years
Use scenario	Energy dissipation by Joule effect See category 1 scenario examples below	Energy consumption See category 2 scenario examples below

The use scenario examples are mentioned below:

<u>Category 1: passive product</u>

Examples: electric lines, bridging strip, etc.

- **"Passive product - non-continuous operation" scenario:** products through which the main current passes during non-continuous operation
    - Load rate / rated current (In): 30% In
    - Use time rate: 30 %
- **'Passive product - continuous operation' scenario:** products through which the main current passes during continuous operation
    - Load rate / rated current (In): 30% In
    - Use time rate: 100 %

Category 2: active product

Examples: shunt trips, remote controls, protective relays, communication gateways, sensors, etc.
The following information must be given, according to the mode(s) of operation of the reference product:

- The consumed power for each operating mode identified (OFF, standby, ON, etc.)
    - The duration of the operating modes expressed as a percentage of the full cycle time.

Where they exist, the energy consumption calculation scenarios established in the context of the regulatory devices applicable to the product categories concerned (European regulation based on directive ErP, Thermal regulations, Energy-saving Certificates, Ecolabel, etc.) must be taken into account.
They must be described in the PEP and justified in the accompanying report.

For complex operating modes corresponding to variable power levels, average power levels can be established by justifying and specifying the calculation assumptions.

3.15.3. Environmental impact calculation

3.15.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.16. Specific rules for 'Combinations of functions'

3.16.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.16.1.1. Functional unit

When a product covered by this PSR includes additional functions, the functional unit defined in the PSR shall be used and shall be completed in order to take into account these additional functions

Examples of products relevant for combination of functions:

- circuit breaker with controller (electronic controller, motor drive, …)
- Switch or disconnector with controller (electronic controller, motor drive, …)
- Source inverter (combination of switch, protection, mechanical interlocking, etc.),
- Starter (combination of control, protection, etc.),
- AFDD module associated with a differential circuit-breaker.

E.g.:

For a circuit-breaker with motor drive:

Protect the installation from overload and short circuits in a circuit with rated voltage *Ue*, rated current *In*, with *Np* poles, a rated breaking capacity *Icn or Icu*, and the tripping curve *Cd* if applicable, *and if applicable the specific specifications*, in the *Household/Commercial or Industrial* application area, according to the appropriate use scenario, and during the reference service life of the product of 20 years, while opening and closing the circuit-breaker remotely via a motor drive (Active product – Other equipment).

3.16.1.2. Reference product and reference flow description

When functions are combined, the reference service life of the functional unit is equal to the longest reference service life between those of all the combined functional units.

If one or more elements in the combination of functions has(have) a reference lifetime shorter than the reference lifetime specified in the functional unit, maintenance and/or replacement of this element shall be included in the product life cycle assessment .

When electronic functions are introduced, the reference lifetime to be considered for these functions is 10 years. When the product reference lifetime is over 10 years, the replacement of electronic functions shall be taken into account.

The use scenario shall be selected between the use scenarii of the assembled products in the combination. This choice shall be justified in the LCA report and described in the PEP.

Use, maintenance and replacement scenarii shall be notified in the PEP.

3.16.2. Development of scenarios (default scenarios)

3.16.2.1. Use stage

The use scenario shall be selected from the use scenarios of the product families mentioned in this PSR and used in the combination of functions.

This scenario shall, in accordance with the product standards, be justified in the LCA report and described in the PEP.

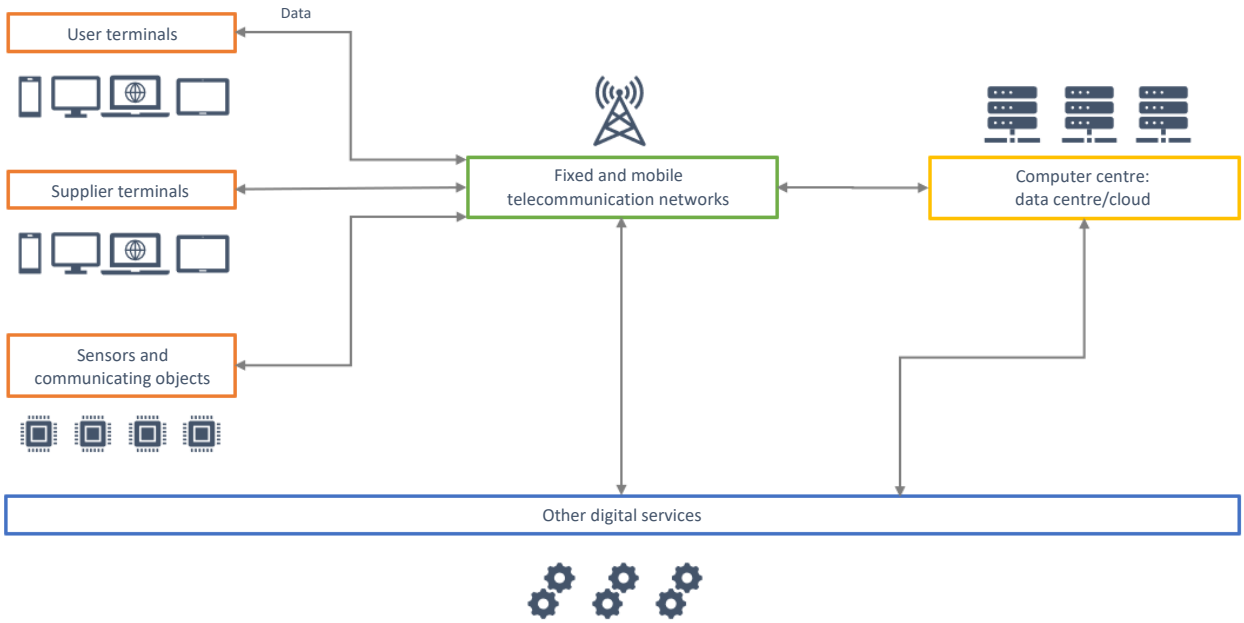
3.16.3. Environmental impact calculation

3.16.3.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.17. Specific rules for 'Connected equipment'

The connected equipment covered by this PSR consists of products belonging to one of the 13 families defined by the PSR (see Sections 3.2 to 3.16) and involving a set of equipment, infrastructures and other digital services to capture, circulate, process, analyse, restore and store data. The connected equipment covered forms one of the components of a digital service characterised in 3 tiers[3]: terminals, telecommunication networks and computer centres. A set of software is used at different levels to 'orchestrate' the physical equipment and deliver the expected service.



Example of functional diagram of a digital service illustrating the 3 tiers[4]

Examples of sensors and communicating objects covered by this PSR:

- Connected thermostat,
- Connected socket,
- Connected switch.

Within the framework of a PEP on a sensor or communicating object, the declarant may carry out the Life Cycle Assessment by incorporating the 3 tiers of the digital service in accordance with the following requirements.

[3] Three-tier architecture, also known as three-level architecture or three-layer architecture, is the application of the more general multi-tier model. The logical architecture is divided into three tiers or layers - presentation layer (operated by terminals); application layer (operated by data centres); data access layer (operated by telecommunication networks). [Wikipedia]

[4] Methodological guidance for the environmental assessment of digital services – ADEME, July 2021

If the Life Cycle Assessment does not incorporate the 3 tiers of the digital service, the declarant shall specify, below the environmental impacts table, that *'digital service-related impacts of the product are not assessed (terminals, telecommunication networks and computer centres)'*. They may then be completed by the user. The declarant may provide additional information on the nature of the digital service.

3.17.1. Functional Unit and reference flow description

These specific rules are additional to the 'Functional unit and reference flow description' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

3.17.1.1. Functional unit

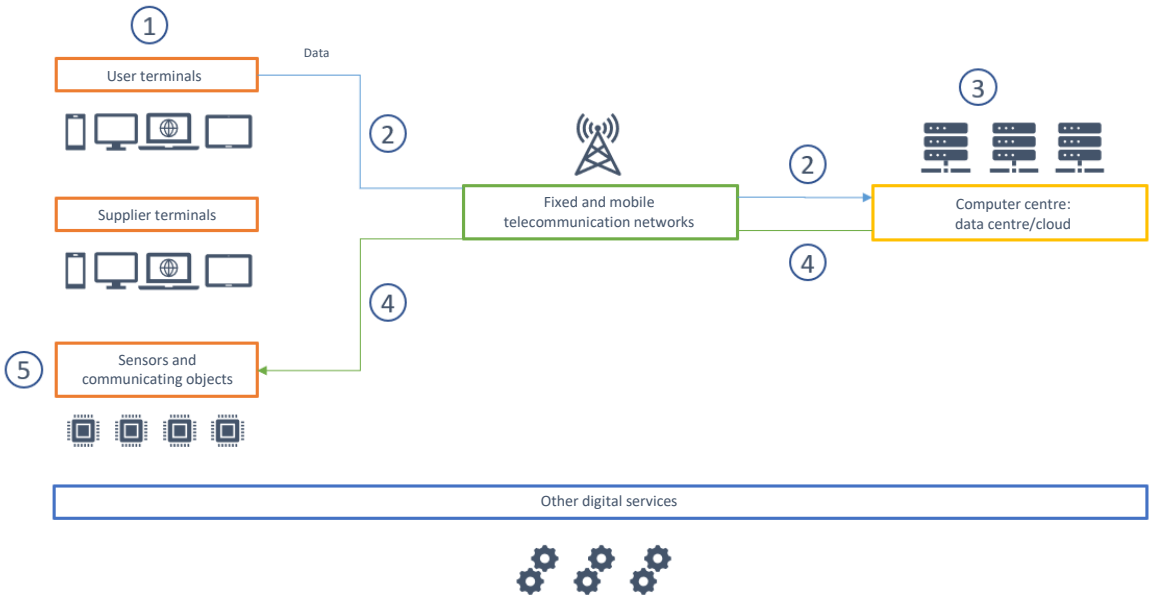
When a product covered by this PSR includes digital service-related functions, the functional unit defined in the PSR shall be used and shall be completed in order to take into account these additional functions.

Examples of functional units for sensors and communicating objects covered by the PSR:

- Connected socket: Connect/disconnect the plug of a load consuming In A maximum under a voltage of U while protecting the user from direct contact with live parts, and with an IP and IK rating, according to the appropriate use scenario, and for the reference service life of the product of 20 years. This product includes a digital remote measurement and control service in respect of the load of the electrical device connected to this socket via a smartphone app.
- Connected switch: Establish, support and interrupt rated currents in normal conditions of circuit characterised by the current Ith, including any conditions specified for overload in operation characterized by the current Ie, for the operating voltage Ue and a current for short-circuit Icw, according to the appropriate use scenario, and for the reference service life of the product of 20 years. This product includes a digital remote measurement and control service in respect of lighting, roller blinds and electrical devices via a smartphone app.
- Connected thermostat: Control the ambient temperature of a zone according to a set-point temperature set by the user in a range of X, with a temperature step of Y, and characterised by a rated current In and a current IL of the closed contact, according to the appropriate use scenario, and for the reference service life of the product of 10 years. This product includes a digital remote measurement and control service in respect of the temperature set-point via a smartphone app.

3.17.1.2. Reference product and reference flow description

To describe the analysed reference product, a functional diagram shall be described in the LCA report. This functional diagram shall be supplemented by a data flow diagram representing the 'user pathway' and the different stages of the digital service.



1. Launch of mobile app linked with the thermostat
2. Sending of required temperature via fixed/mobile network
3. Processing of request in manufacturer's data centre
4. Sending of request to thermostat via fixed network
5. Processing of request by thermostat

* Non-representative example of all connected thermostat technologies. The exchanged data flow may vary according to the thermostat functions, use scenario and communication technologies (fibre, mobile, Wi-Fi, Bluetooth, RFID networks, etc.)

Example of data flow diagram (thermostat temperature control)

3.17.2. System boundary

All aspects associated with production, transport, installation, use and end of life, up to the final elimination of the required flows to feed the digital service shall be taken into account. This covers service user and provider terminals, telecommunication networks and computer centres. In the specific case of computer centres, cooling activities shall be included.

In accordance with PCR-ed4, the following steps are excluded from the environmental assessment of the digital service:

- Lighting, heating, sanitary facilities and cleaning of infrastructures,
- Employee transport, except for transport for product maintenance purposes,
- Production installation and machinery manufacture and maintenance if they are not proportional to the reference flow,
- Infrastructure construction and maintenance if they are not proportional to the reference flow,
- Transport systems and infrastructures if they are not proportional to the reference flow,
- Administrative, management and R&D department flows,
- Product-related marketing activities,
- Catering installations intended for staff.

In accordance with PCR-ed4, accounting for benefits and loads beyond the system boundaries associated with digital services is optional.

3.17.3. Rules for allocation between co-products

The allocations of the manufacturing, distribution, installation and end of life stages of the elements of the digital service shall define, in order of priority and non-exhaustively:

- On a physical criterion: data usage volume over total data volume - 'GB used / Total GB during service life time', 'CPU usage (GHz used / Total GHz during service life time)', 'GPU usage (GHz used / Total GHz during service life time)'.
- On time criteria: time of use/duration of use of equipment throughout its life time
- On another criterion, in accordance with the ISO 14044 standard (e.g. the economic criterion)

Physical allocation shall be prioritised, unless it is not possible. Economic allocations shall only be used if it is not possible to use a physical allocation.

3.17.4. Development of scenarios (default scenarios)

3.17.4.1. Use stage

The use scenario associated with the digital service shall be justified in the LCA report and described in the PEP. The use scenario shall describe at least:

- The use time of service user and provider terminals,
- The quantity of data exchanged on telecommunication networks and stored in computer centres,
- The geographic zone and the electricity mix associated with computer centres.

E.g.:

- Control a connected switch using a Smartphone app 5 minutes per day for the reference service life,
- Equivalent to the exchange of 500 KB of data exchanged on a mobile network (4G), and the storage of 200 KB of data in a data centre,
- Hosted in France, using a 100% renewable electricity mix.

3.17.5. Environmental impact calculation

3.17.5.1. Environmental impact calculation in respect of the product (declared unit)

The environmental impact results generated by the life cycle of the reference product with respect to the functional unit are equivalent to the environmental impacts with respect to the declared unit.

3.17.6. Environmental data requirements

Wherever possible, the environmental impacts of the digital service shall be assessed on the basis of primary data.

When the primary data is not available, secondary data may be used for the processes included in the system boundaries. The secondary data shall be identified and be consistent with the scope of the study in terms to time-related, geographic and technological coverage.

The Life Cycle Inventory database used for modelling the digital service shall be justified in the LCA report and described in the PEP.

3.17.7. Environmental impact calculation

The environmental impacts of the digital service shall be described in the PEP ecopassport® file in the form of an additional column in the results tables.

E.g.:

	[A1-A3]	[A4]	[A5]	[B1-B7]	[C1-C4]	**Total [A1-C4]**	[D]	Digital service
Indicator 1								

4. Drawing up the Product Environmental Profile

4.1. General information

These rules are additional to the 'Drawing up the Product Environmental Profile' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06).

In addition to the information required by the PCR, the PEP shall include:

- The technical specifications used in the definition of the functional units

4.2. Constituent materials

The rules specified in the 'Constituent materials' section of the PCR in force (PEP-PCR ed4-EN-2021 09 06) apply.

4.3. Additional environmental information

These specific rules are additional to the 'Additional environmental information' section of the PCR (PEP- PCR-ed4-EN-2021-09 06).

Within the scope of Life Cycle Assessments in respect of a building, the environmental impacts of the equipment shall be considered in respect to the product and impacts associated with energy consumption in the use stage shall be extracted. In this way, to facilitate the use of the PEP for conducting the building LCA, the PEP may include:

- The table of environmental impacts of the reference product expressed in respect of the declared unit in addition to the table in respect of the functional unit. The values shall then be indicated in numerical values, expressed in the appropriate units with three significant digits (and, optionally, as a percentage) for each stage of the life cycle, and the total for each indicator of the complete life cycle analysis. The following precisions shall be indicated in the PEP, to ensure clarity and transparency for the PEP user:
    - For environmental impacts expressed per functional unit, the following phrase will be included: per FU'.
    - For environmental impacts expressed per declared unit, the following phrase will be included: 'per product'.

      The declared unit is then equivalent to: '1 system operating according to the Reference use scenario for a time equal to the reference service life'. The quantity of electricity during the RLT shall be explicitly mentioned in the PEP.
- The environmental impact calculation in respect of the product (declared unit) is performed as follows:

Environmental impacts of PEP file =
Environmental impacts of reference product x (Reference service life / Rated life time)

PEP ecopassport®	Manufacturing stage			Distribution stage	Installation stage	Use stage							End of life cycle stage				Benefits and loads)
EN 15978 / 15804	Production stage			Construction stage		Use stage							End of life cycle stage				Benefits and loads
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Procurement of raw materials	Transport	Manufacture	Transport	Installation processes	Use	Maintenance	Repair	Replacement	Restoration	Energy consumption during building use	Water consumption during building use	Demolition / Deconstruction	Transport	Waste treatment	Disposal	Benefits beyond the system boundaries

Note: When the total for module D is negative, this represents a benefit. When the total for module D is positive, this represents a load.

- Extrapolation rules with respect to the declared product.

4.4. Environmental impacts

In order to meet the requirements of the PCR in force (PEP- PCR-ed4-EN-2021-09 06), the results presented in the environmental impact table relate to the implementation of the functional unit.

5. PEP update rules

The rules defined in Section 5 'PEP update rules' of the PCR in force (PEP-PCR ed4-EN-2021 09 06) apply.

6. Appendices

6.1. Appendix 1: Glossary

A	Ampere
LCA	Life Cycle Assessment
A^2s	Square Ampere Second
LV	Low Voltage
IEC	International Electrotechnical Commission
°C	Celsius Degrees
RSL	Reference service life
GIMELEC	« Groupement des Industries de l'Equipement Electrique, du Contrôle-Commande et des Services Associés »
HBES	Home and Building Electronic Systems
HV	High Voltage
Hz	Hertz
IEC	International Electrotechnical Commission
IGNES	Industrie du Génie Numérique, Energétique et Sécuritaire
PCR	Product Category Rules
PEP	Product Environmental Profile
PSR	Product Specific Rules
RJ45	**R**egistered **J**ack **45**
SC	IEC technical SubCommitee
TC	IEC Technical Commitee
TV	Television
FU	Functional Unit
USB	Universal Serial Bus
V	Volt
W	Watt

6.2. Appendix 2: Definitions

There are currently no specific definitions for PSR 0005.

6.3. Appendix 3: List of product families and applicable standards

These standards are for reference, the list is not exhaustive.

6.3.1. Electrical accessories (TC23)

Electrical appliances for household and similar purposes, the word similar including locations such as offices, commercial and industrial premises, hospitals, public buildings, etc.

These accessories are intended for fixed installation or for use in or with appliances and other electrical or electronic equipment.

This PSR does not apply to the following products covered by subcommittee SC23A: Cable Management Systems, already addressed in the PSR0003 'Specific Rules for Cable Management solutions'.

Product examples: switches, HBES switches, plug and socket-outlets, circuit breakers, contactors, connecting devices, enclosures for accessories, connectors, thermostats, etc.

6.3.1.1. List of standards applicable to TC23

	Electrical accessories
Applicable standard number	**Applicable standard title**
	Connecting devices for low-voltage circuits for household and similar purposes - Part 1: General requirements
	Connecting devices for low-voltage circuits for household and similar purposes - Part 2-1: Particular requirements for connecting devices as separate entities with screw-type clamping units
	Connecting devices for low-voltage circuits for household and similar purposes - Part 2-2: Particular requirements for connecting devices as separate entities with screwless-type clamping units
	Connecting devices for low-voltage circuits for household and similar purposes - Part 2-3: Particular requirements for connecting devices as separate entities with insulation-piercing clamping units
	Connecting devices for low-voltage circuits for household and similar purposes - Part 2-4: Particular requirements for twist-on connecting devices
	Connecting devices - Flat quick-connect terminations for electrical copper conductors - Safety requirements
	Installation couplers intended for permanent connection in fixed installations
	Connecting devices - Devices for the connection of aluminium conductors in clamping units of any material and copper conductors in aluminium bodied clamping units

6.3.1.2. List of standards applicable to SC23B

	Plugs, socket-outlets and switches
Applicable standard number	**Applicable standard title**
	Plugs and socket-outlets for domestic and similar general use standardized in member countries of IEC
	Switches for household and similar fixed-electrical installations - Part 1: General requirements

	Switches for household and similar fixed electrical installations - Part 2-1: Particular requirements - Electronic control devices
	Switches for household and similar fixed electrical installations - Part 2-2: Particular requirements - Electromagnetic remote-control switches (RCS)
	Switches for household and similar fixed electrical installations - Part 2-3: Particular requirements - Time-delay switches (TDS)
	Switches for household and similar fixed electrical installations - Part 2-4: Particular requirements - Isolating switches
	Switches for household and similar fixed electrical installations - Part 2-5: Particular requirements - Switches and related accessories for use in home and building electronic systems (HBES)
	Switches for household and similar fixed electrical installations - Part 2-6: Particular requirements - Fireman's switches for exterior and interior signs and luminaires
	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations - Part 1: General requirements
	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations - Part 21: Particular requirements for boxes and enclosures with provision for suspension means
	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations - Part 22: Particular requirements for connecting boxes and enclosures
	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations - Part 23: Particular requirements for floor boxes and enclosures
	Boxes and enclosures for electrical accessories for household and similar fixed electrical installations - Part 24: Particular requirements for enclosures for housing protective devices and other power dissipating electrical equipment
	Plugs and socket-outlets for household and similar purposes - Part 1: General requirements
	Plugs and socket-outlets for household and similar purposes - Part 2-1: Particular requirements for fused plugs
	Plugs and socket-outlets for household and similar purposes - Part 2-2: Particular requirements for socket-outlets for appliances
	Plugs and socket-outlets for household and similar purposes - Part 2-3: Particular requirements for switched socket-outlets without interlock for fixed installations
	Plugs and socket-outlets for household and similar purposes - Part 2-4: Particular requirements for plugs and socket-outlets for SELV
	Plugs and socket-outlets for household and similar purposes - Part 2-5: Requirements for adaptors
	Plugs and socket-outlets for household and similar purposes - Part 2-6: Particular requirements for switched socket-outlets with interlock for fixed electrical installations
	Plugs and socket-outlets for household and similar purposes - Part 2-7: Particular requirements for cord extension sets
	Plugs and socket-outlets for household and similar purposes - Part 3-1: Particular requirements for socket-outlets incorporating USB power supply
	IEC system of plugs and socket-outlets for household and similar purposes - Part 1: Plugs and socket-outlets 16 A 250 V a.c.
	IEC system of plugs and socket-outlets for household and similar purposes - Part 2: Plugs and socket-outlets 15 A 125 V a.c. and 20 A 125 V a.c.
	IEC system of plugs and socket-outlets for household and similar purposes - Part 3: SELV plugs and socket-outlets, 16 A 6 V, 12 V, 24 V, 48 V, a.c. and d.c.

6.3.1.3. List of standards applicable to SC23E

	Circuit-breakers and similar equipment for household use
Applicable standard number	**Applicable standard title**
	Electrical accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 1: Circuit-breakers for a.c. operation
	Accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 2: Circuit-breakers for a.c. and d.c. operation
	Accessories - Circuit-breakers for overcurrent protection for household and similar installations - Part 3: Circuit-breakers for DC operation
	Circuit-breakers for equipment (CBE)
	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs) - Part 1: General requirements
	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). Part 2-1: Applicability of the general rules to RCCBs functionally independent of line voltage
	Residual current operated circuit-breakers without integral overcurrent protection for household and similar uses (RCCBs). Part 2-2: Applicability of the general rules to RCCBs functionally dependent on line voltage
	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 1: General requirements
	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 2-1: Applicability of the general rules to RCBOs functionally independent of line voltage
	Residual current operated circuit-breakers with integral overcurrent protection for household and similar uses (RCBOs) - Part 2-2: Applicability of the general rules to RCBOs functionally dependent on line voltage
	Electrical accessories - Portable residual current devices without integral overcurrent protection for household and similar use (PRCDs)
	Residual current-operated protective devices (RCDs) for household and similar use - Electromagnetic compatibility
	Electrical accessories - Circuit-breakers and similar equipment for household use - Auxiliary contact units
	Electrical accessories - Residual current monitors (RCMs) - Part 1: RCMs for household and similar uses
	Circuit breakers - Switched protective earth portable residual current devices for class I and battery powered vehicle applications
	Type F and type B residual current operated circuit-breakers with and without integral overcurrent protection for household and similar uses
	Residual current devices with or without overcurrent protection for socket-outlets for household and similar uses

6.3.1.4. List of standards applicable to SC23G

	Appliance couplers
Applicable standard number	**Applicable standard title**
	Appliance couplers for household and similar general purposes - Part 1: General requirements
	Appliance couplers for household and similar general purposes - Part 2-1: Sewing machine couplers
	Appliance couplers for household and similar general purposes - Part 2-3: Appliance coupler with a degree of protection higher than IPX0
	Appliance couplers for household and similar general purposes - Part 2-4: Couplers dependent on appliance weight for engagement
	Electrical accessories - Cord sets and interconnection cord sets

6.3.1.5. List of standards applicable to SC23H

	Plugs, Socket-outlets and Couplers for industrial and similar applications, and for Electric Vehicles
Applicable standard number	**Applicable standard title**
	Plugs, socket-outlets and couplers for industrial purposes - Part 1: General requirements
	Plugs, socket-outlets and couplers for industrial purposes - Part 2: Dimensional interchangeability requirements for pin and contact-tube accessories
	Plugs, socket-outlets and couplers for industrial purposes - Part 4: Switched socket-outlets and connectors with or without interlock
	Industrial cable reels
	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 1: General requirements
	Plugs, socket-outlets, vehicle connectors and vehicle inlets - Conductive charging of electric vehicles - Part 2: Dimensional compatibility and interchangeability requirements for a.c. pin and contact-tube accessories
	Plugs, socket-outlets and ship couplers for high-voltage shore connection systems (HVSC-Systems) - Part 1: General requirements
	Plugs, socket-outlets and ship couplers for high-voltage shore connection systems (HVSC-SYSTEMS) - Part 2: Dimensional compatibility and interchangeability requirements for accessories to be used by various types of ships

6.3.1.6. List of standards applicable to SC23J

	Switches for appliances
Applicable standard number	**Applicable standard title**

	Electromechanical switches for use in electrical and electronic equipment - Part 1: Generic specification
	Switches for appliances - Part 1: General requirements
	Switches for appliances - Part 2-1: Particular requirements for cord switches
	Switches for appliances - Part 2-4: Particular requirements for independently mounted switches
	Switches for appliances - Part 2-5: Particular requirements for change-over selectors

6.3.2. Fuses (TC32)

6.3.2.1. List of standards applicable to SC32B

	Low-voltage fuses
Applicable standard number	**Applicable standard title**
	Low-voltage fuses - Part 1: General requirements
	Low-voltage fuses - Part 2: Supplementary requirements for fuses for use by authorized persons (fuses mainly for industrial application) - Examples of standardized systems of fuses A to K
	Low-voltage fuses - Part 3: Supplementary requirements for fuse-links for the protection of semiconductor devices
	Low-voltage fuses - Part 4: Supplementary requirements for fuse-links for the protection of semiconductor devices
	Low-voltage fuses - Part 6: Supplementary requirements for fuse-links for the protection of solar photovoltaic energy systems

6.3.2.2. List of standards applicable to SC32C

	Miniature fuses
Applicable standard number	**Applicable standard title**
	Miniature fuses - Part 1: Definitions for miniature fuses and general requirements for miniature fuse-links
	Miniature fuses - Part 2: Cartridge fuse-links
	Miniature fuses - Part 3: Sub-miniature fuse-links
	Miniature fuses - Part 4: Universal modular fuse-links (UMF) - Through-hole and surface mount types
	Miniature fuses - Part 5: Guidelines for quality assessment of miniature fuse-links
	Miniature fuses - Part 6: Fuse-holders for miniature fuse-links

	Miniature fuses - Part 7: Miniature fuse-links for special applications

6.3.3. Surge arresters (TC 37 and SC37A/B)

Surge arresters for protection against indirect or direct effects of lightning and/or against other transient overvoltages. These devices are to be used in power, telecommunications and/or signalling networks with voltages up to 1000 V a.c. and 1500 V d.c.

Product examples: low voltage surge arresters, surge arresters for signalling and telecommunication networks, etc.

6.3.3.1. List of standards applicable to TC37

	Surge arresters
Applicable standard number	**Applicable standard title**
	Surge arresters - Part 7: Glossary of terms and definitions from IEC publications 60099-1, 60099-4, 60099-6, 61643-1, 61643-12, 61643-21, 61643-311, 61643-321, 61643-331 and 61643-341
	Low-voltage surge protective devices - Part 11: Surge protective devices connected to low-voltage power systems - Requirements and test methods
	Low-voltage surge protective devices - Part 21: Surge protective devices connected to telecommunications and signalling networks - Performance requirements and testing methods

6.3.4. Switchgear and controlgear and their assemblies for low voltage (TC121)

Low-voltage switchgear for industrial, commercial and similar use rated below or equal to 1 kV a.c. and 1.5 kV d.c. The scope includes open and enclosed separate items of equipment as well as combinations of items of equipment into complete functional units.

Product examples: circuit breakers, switches, contactors, starters, disconnectors, busbars and any switchgear assemblies, etc.

6.3.4.1. List of standards applicable to TC121 (SC17B)

	Low voltage switchgear and controlgear
Applicable standard number	**Applicable standard title**
	Low-voltage switchgear and controlgear - Part 1: General requirements
	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers

	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters
	Low-voltage switchgear and controlgear - Part 4-2: Contactors and motor-starters - AC semiconductor motor controllers and starters
	Low-voltage switchgear and controlgear - Part 4-3: Contactors and motor-starters - AC semiconductor controllers and contactors for non-motor loads
	Low-voltage switchgear and controlgear - Part 5-1**:** Control circuit devices and switching elements - Electromechanical control circuit devices
	Low-voltage switchgear and controlgear - Part 5-2: Control circuit devices and switching elements - Proximity switches
	Low-voltage switchgear and controlgear - Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDDB)
	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
	Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment
	Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS)
	Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 7-3: Ancillary equipment - Safety requirements for fuse terminal blocks
	Low-voltage switchgear and controlgear - Part 7-4: Ancillary equipment - PCB terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 8: Control units for built-in thermal protection (PTC) for rotating electrical machines
	Electromechanical contactors for household and similar purposes
	Low-voltage switchgear and controlgear assemblies - Part 0: Guidance to specifying assemblies
	Low-voltage switchgear and controlgear assemblies - Part 1: General requirements
	Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies
	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)

	Low-voltage switchgear and controlgear assemblies - Part 4: Particular requirements for assemblies for construction sites (ACS)
	Low-voltage switchgear and controlgear assemblies - Part 5: Assemblies for power distribution in public networks
	Low-voltage switchgear and controlgear assemblies - Part 6: Busbar trunking systems (busways)
	Low-voltage switchgear and controlgear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicles charging stations
	Low-voltage switchgear and controlgear - Overcurrent protective devices - Part 1: Application of short-circuit ratings
	Low-voltage switchgear and controlgear - Device profiles for networked industrial devices - Part 1: General rules for the development of device profiles
	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 1: General requirements
	Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements
	Low-voltage switchgear and controlgear enclosed equipment - Part 1: Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work

6.3.4.2. List of standards applicable to SC121A

	Low voltage switchgear and controlgear
Applicable standard number	**Applicable standard title**
	Dimensions of low-voltage switchgear and controlgear – Standardized mounting on rails for mechanical support of switchgear, controlgear and accessories
	Low-voltage switchgear and controlgear - Part 1: General requirements
	Low-voltage switchgear and controlgear - Part 2: Circuit-breakers
	Low-voltage switchgear and controlgear - Part 3: Switches, disconnectors, switch-disconnectors and fuse-combination units
	Low-voltage switchgear and controlgear - Part 4-1: Contactors and motor-starters - Electromechanical contactors and motor-starters
	Low-voltage switchgear and controlgear - Part 4-2: Contactors and motor-starters - Semiconductor motor controllers, starters and soft-starters
	Low-voltage switchgear and controlgear - Part 5-1: Control circuit devices and switching elements - Electromechanical control circuit devices
	Low-voltage switchgear and controlgear - Part 5-2: Control circuit devices and switching elements - Proximity switches

	Low-voltage switchgear and controlgear - Part 5-3: Control circuit devices and switching elements - Requirements for proximity devices with defined behaviour under fault conditions (PDDB)
	Low-voltage switchgear and controlgear - Part 5-4: Control circuit devices and switching elements - Control circuit devices and switching elements - Method of assessing the performance of low-energy contacts - Special tests
	Low-voltage switchgear and controlgear - Part 5-5: Control circuit devices and switching elements - Electrical emergency stop device with mechanical latching function
	Low-voltage switchgear and controlgear - Part 5-6: Control circuit devices and switching elements - DC interface for proximity sensors and switching amplifiers (NAMUR)
	Low-voltage switchgear and controlgear - Part 5-7: Control circuit devices and switching elements - Requirements for proximity devices with analogue output
	Low-voltage switchgear and controlgear - Part 5-8: Control circuit devices and switching elements - Three-position enabling switches
	Low-voltage switchgear and controlgear - Part 5-9: Control circuit devices and switching elements - Flow rate switches
	Low-voltage switchgear and controlgear - Part 6-1: Multiple function equipment - Transfer switching equipment
	Low-voltage switchgear and controlgear - Part 6-2: Multiple function equipment - Control and protective switching devices (or equipment) (CPS)
	Low-voltage switchgear and controlgear - Part 7-1: Ancillary equipment - Terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 7-2: Ancillary equipment - Protective conductor terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 7-3: Ancillary equipment - Safety requirements for fuse terminal blocks
	Low-voltage switchgear and controlgear - Part 7-4: Ancillary equipment - PCB terminal blocks for copper conductors
	Low-voltage switchgear and controlgear - Part 8: Control units for built-in thermal protection (PTC) for rotating electrical machines
	Low-voltage switchgear and controlgear - Part 9-1: Active arc-fault mitigation systems - Arc quenching devices
	Low-voltage switchgear and controlgear - Part 9-2: Active arc-fault mitigation systems - Optical-based internal arc-detection and mitigation devices
	Connecting devices - Electrical copper conductors - Safety requirements for screw-type and screwless-type clamping units - Part 2: Particular requirements for clamping units for conductors above 35 mm2 up to 300 mm2 (included)
	Electromechanical contactors for household and similar purposes
	Low-voltage switchgear and controlgear - Device profiles for networked industrial devices - Part 1: General rules for the development of device profiles

	Low-voltage switchgear and controlgear - Device profiles for networked industrial devices - Part 2: Root device profiles for starters and similar equipment
	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 1: General requirements
	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 2: Actuator sensor interface (AS-i)
	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 3: DeviceNet
	Low-voltage switchgear and controlgear - Controller-device interfaces (CDIs) - Part 7: CompoNet
	Low-voltage switchgear and controlgear - Controllers for drivers of stationary fire pumps
	Low-voltage switchgear and controlgear enclosed equipment - Part 1: Enclosed switch-disconnectors outside the scope of IEC 60947-3 to provide isolation during repair and maintenance work
	Low-voltage switchgear and controlgear - Product data and properties for information exchange - Part 1: Catalogue data

6.3.4.3. List of standards applicable to SC121B

SC121B	**Low voltage switchgear and controlgear**
Applicable standard number	**Applicable standard title**
	Low-voltage switchgear and controlgear assemblies - Part 1: General requirements
	Low-voltage switchgear and controlgear assemblies - Part 2: Power switchgear and controlgear assemblies
	Low-voltage switchgear and controlgear assemblies - Part 3: Distribution boards intended to be operated by ordinary persons (DBO)
	Low-voltage switchgear and controlgear assemblies - Part 4: Particular requirements for assemblies for construction sites (ACS)
	Low-voltage switchgear and controlgear assemblies - Part 5: Assemblies for power distribution in public networks
	Low-voltage switchgear and controlgear assemblies - Part 6: Busbar trunking systems (busways)
	Low-voltage switchgear and controlgear assemblies - Part 7: Assemblies for specific applications such as marinas, camping sites, market squares, electric vehicle charging stations
	Empty enclosures for low-voltage switchgear and controlgear assemblies - General requirements

6.3.5. Automatic electrical controls (TC72)

To prepare standards related to inherent safety, to the operating characteristics where such are associated with applicational safety, and to the testing of automatic electrical control devices used in appliances and other apparatus, electrical and non-electrical, for household and similar purposes, but also extended to industrial

purposes when no dedicated product standards exist, such as that for central heating, air conditioning, process heating building automation, etc., including the following:

1. Automatic electrical control devices, mechanically, electromechanically, electrically or electronically operated, responsive to or controlling parameters such as temperature, pressure, passage of time, humidity, light, electrostatic effect, flow or liquid level.

2. Automatic electrical control devices serving the starting of small motors that are used principally in appliances and apparatus for household and similar purposes. Such control devices may be built into or be separate from the motor.

3. Non-automatic control devices when such are associated with automatic control devices.

TC72	**Automatic electrical controls**
Applicable standard number	**Applicable standard title**

6.3.6. Electrical relays (TC94)

Electrical relays used in the various fields of Electrical Engineering, normally produced in very large numbers as components of electromechanical or electronic equipment and eventually submitted to Quality Assurance requirements based on sampling techniques.

	Automatic electrical controls
Applicable standard number	**Applicable standard title**

6.3.7. Measuring relays and protection equipment (TC95)

Measuring relays, protection equipment and protection functions embedded in any equipment or systems used in various fields of electrical engineering covered by IEC, including combinations of devices and functions which form schemes for power system protection. TC95 scope includes control, monitoring, and process interface related functions, and equipment used with protection systems (such as automatic reclosing, fault location, teleprotection or process data interfaces, and fault recording); as well as protection and protection related functions of distributed energy resources (DER) or inverter based resources (IBR).

The concepts and definitions described in the standards developed by TC95 are intended for all power system protection engineers, dealing with the various activities related to protection functions and protection relays. These include specification of functional and product design requirements and design qualification type tests. These requirements and type tests can be used with interpretation for FAT (Factory Acceptance Tests), SAT (Site Acceptance Tests), commissioning and maintenance tests.

Excluded from TC 95 scope are the following: all devices covered by standards within the scope of other IEC Technical Committees, for example instrument transformers (TC 38).

	Measuring relays and protection equipment
Applicable standard number	**Applicable standard title**

6.4. Appendix 4: References

6.5. Appendix 5: Declaration of conformity

Solinnen

Solutions innovantes pour l'environnement

PROGRAMME PEP Ecopassport

Attestation de revue-critique des règles spécifiques aux Solutions d'Appareillages Electriques

Document revu : PSR, Règles spécifiques aux Solutions d'Appareillages Electriques

Version et date : PSR-0005-ed3-FR-2023 v3.0 du 3 mai 2023

Établi par : l'Industrie du Génie Numérique, Énergétique et Sécuritaire

L'Industrie du Génie Numérique, Énergétique et Sécuritaire (IGNES) a demandé à Solinnen, en tant que bureau d'études spécialisé en Analyse du Cycle de Vie (ACV), la revue critique des règles spécifiques aux Solutions d'Appareillages Electriques.

Référentiels

L'objectif de la revue critique est de vérifier la conformité de ce document avec les référentiels suivants :

- le Programme PEP ecopassport, il s'agit du document intitulé : « PCR Règles de définition des catégories de produits relatives aux équipements électriques, électroniques et de génie climatique », dont la référence est : « PCR–ed4-FR-2021 09 06 » disponible à l'adresse : https://register.pep-ecopassport.org/documents;
- la norme NF EN ISO 14025:2010;
- les normes NF EN ISO 14040:2006 & NF EN ISO 14044:2006.

Conclusion

Le PSR revu ne comporte pas de non-conformité par rapport aux référentiels. Par conséquent, ce document – PSR, Règles spécifiques aux Solutions d'Appareillages Electriques – est conforme aux exigences des référentiels.

Le 5 mai 2023

Philippe Osset
Président de Solinnen

Solinnen, société par action simplifiée au capital de 79 721,00 Euros
RCS : Paris 523 138 493 – SIREN : 523 138 493 – TVA : FR 14 523 138 493 – APE : 7490B
Siège social : 25, rue des Mathurins- 75008 Paris – Tél : 01 83 64 53 86 – Email : contact@solinnen.com
Déclaration d'activité comme prestataire de formation enregistrée sous le numéro 11 75 47228 75 auprès du préfet de région d'Ile-de-France et référençable dans Datadock. Cet enregistrement ne vaut pas agrément de l'État