# ENVIRONMENTAL PRODUCT DECLARATION

**In accordance with ISO 14025:**

Disconnecting switch

**Zhejiang CHINT Electrics Co., Ltd.**

## Declared product:


Disconnecting switch NH4-125 3P 63A

ENVIRONMENTAL PRODUCT DECLARATION

| | |
|---|---|
| Programme operator: | EPD China |
| Registration number: | EPD-CN-00022 |
| Issued date: | 2025-08-06 |
| Valid until: | 2030-08-05 |

**Programme Information**

| | |
|---|---|
| EPD Owner | Name: Zhejiang CHINT Electrics Co., Ltd.<br>Contact information of EPD owner:<br>No.1 CHINT Road, CHINT Industrial Zone, North Baixiang Town, Yueqing City, Zhejiang Province, China.<br>ldandan@chint.com<br>15088957151 |
| Product Name | Disconnecting switch NH4-125 3P 63A |
| Production Site | No.1 CHINT Road, CHINT Industrial Zone, North Baixiang Town, Yueqing City, Zhejiang Province, China. China |
| Identification of product | UN CPC Code: 46212 – "Electrical apparatus for switching or protecting electrical circuits, for making connections to or in electrical circuits, for a voltage not exceeding 1000 V" |
| Field of Application | The isolating switch is suitable for various power distribution circuits, It is used to isolate the circuit from the power supply and can carry the current under normal circuit conditions and carry the current under abnormal circuit conditions for a certain period of time. It is widely used in industry and mining ,commercial and domestic applications. |
| Programme Operator | EPD China<br>Address: 3rd floor, Lane 320, Tianping Road, Xuhui District, Shanghai<br>Website:www.epdchina.cn<br>Email: info@epdchina.cn \| secretary@epdchina.cn |
| LCA Practitioner | qian.zhao@dekra.com |
| Responsibility | The EPD owner has the sole ownership, liability, and responsibility for the EPD |
| Comparability | EPDs within same category of product in different programme operator are not suggested to be compared. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered. However, variations and deviations are possible even applying the same PCR. |
| Validity | The EPD is published on 2025-08-06 and valid to 2030-08-05 |
| LCA Software (version) | Umberto.11.12.1 |
| LCI Dataset (version) | Ecoinvent-en15804-3.10 (Rev.1,2023/11/28) |
| Year(s) of Primary Data | 01/2023-12/2023 |
| PCR | EPDItaly007 —PCR for Electronic and Electrical Products and Systems, Rev. 3.1 2024/11/12<br>EPDItaly012 -Electronic and electrical products and systems - switches, REV. 1 28/06/2024 |
| Other Reference Document | BS EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems |
| Verification statement according to ISO 14025: | |

Independent verification of the declaration and data according to ISO 14025:2010

☐ internal ☑external Third-party institution verification:

< Weifang Yao, WIT> is an approved certification body accountable for third-part verification.

Approved by: EPD China

Procedure for follow-up of data during EPD validity involves a third-party verifier:

□Yes ☑ No

# 1 General Information

## 1.1 Company information

Founded in 1984, CHINT is a leading global provider of smart energy solutions. It is actively deploying "4+1" industrial sectors including smart electrics, green energy, industrial control and automation, smart home and incubator, forming an integrated whole industry chain of "power generation, storage, transmission, substation, distribution, sales and consumption". And it boasts an extensive business network across over 140 countries and regions as well as more than 30,000 employees and an annual sales revenue of over USD 11.4 billion. CHINT has been ranking among China's Top 500 companies for 18 consecutive years. Its subsidiary, CHINT Electrics is the first company in China with low-voltage electrics as its main business getting listed on the A-share market as one of the Top 50 Asian listed companies.

To comply with the trend of integrated development of modern energy, intelligent manufacturing and digital technology, CHINT has adopted "One Cloud & Two Nets" as the business strategy. CHINT Cloud fulfills digital application and services in both internal and external as the platform of intelligent technology and data application. Based on the Industrial Internet of Things (IIoT), CHINT built an intelligent manufacturing system and realizes intelligent application in electrical industry. Relying on the Energy Internet of Things (EIoT), CHINT built its smart energy system and develops the regional EIoT mode.

Focusing on energy system of supply, storage, transmission, distribution and consumption, CHINT has core businesses of clean energy, energy distribution, big data and energy value-added services. Furthermore, CHINT pillar businesses include photovoltaic equipment, energy storage, power transmission & distribution, low-voltage apparatuses, intelligent terminals, software development and control automation. With developing into a platform-based enterprise, CHINT provides a package of energy solutions for public institutions, industrial & commercial users and end users, by building a regional smart energy operation network.

**Name and location of production site(s) within the organization**

Table1. Location of the organization and Manufacturing sites

| | |
|---|---|
| Company and Address | Zhejiang CHINT Electrics Co., Ltd.<br>No.1 CHINT Road, CHINT Industrial Zone, North Baixiang Town, Yueqing City, Zhejiang Province, China. (Postal Code 325603) |
| Manufacturing sites | No.1 CHINT Road, CHINT Industrial Zone, North Baixiang Town, Yueqing City, Zhejiang Province, China. (Postal Code 325603) |

## 1.2 Scope and type of EPD

The system boundary considered in this LCA study is from the cradle to the grave. According to the PCR, the life cycle stage must refer to segmentation in the following 5 stages:

Manufacturing stage, distribution stage, installation stage, use & maintenance stage, and End-of-life stage.

**The MANUFACTURING STAGE** contains:

Extraction and processing of raw materials, including plastic, metal and etc., and the transportation of the raw material to the factory, packaging also included in this stage;

Manufacturing of the product, including energy consumption of product parts injection, product assembly,and etc.

Generation of process waste, including its transportation to the disposal site;

**The DISTRIBUTION STAGE** contains the road transport, rail transport, and maritime shipping services for product distribution to various countries.

**The INSTALLATION STAGE** contains disposal of product packaging and transportation of packaging waste.

**The USE & Maintenance STAGE** contains Electricity loss in use stage of product;

**The END-OF-LIFE STAGE** includes:

Transportation of the switch to the collection site;

Disassembly operations;

Distribution and destination of the various material flows to be sent for recycling or disposal or incineration;

Figure 1 below illustrates the system boundaries for the Disconnecting switches, including raw material

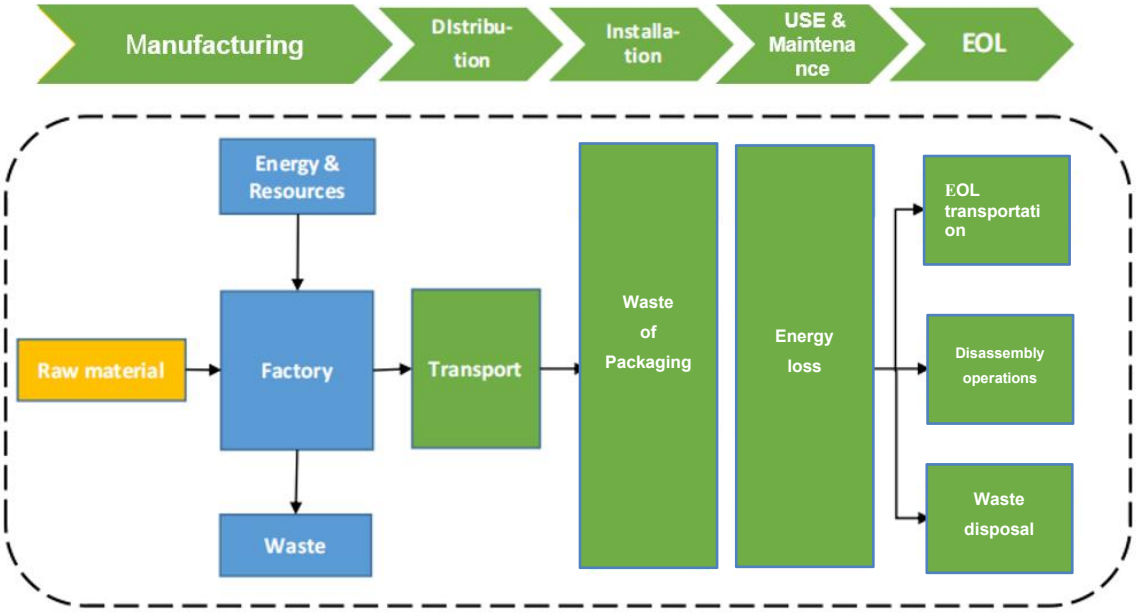


Figure 1 System boundary of target products

Detailed information on the segmentation for the upstream, core, and downstream modules are presented in the following.

Table 2. Division and declarations of life cycle stages according to the PCR

| PHASES | MANUFACTURING STAGE | DISTRIBUTION STAGE | INSTALLATION STAGE | USE & Maintenance STAGE | END-OF-LIFE STAGE De-installation | BENEFITS & LOADS* |
|---|---|---|---|---|---|---|
| | IN ACCORDANCE TO EN 50693 | | | | | |
| Phases declared | X | X | X | X | X | ND |
| Data Quality indicator | 4.04% | | | | | |

Note: X=Declared Module, ND=Module not Declared in this LCA study

## 2 Detailed Product Description

***Description of the product***

Within this EPD, Disconnecting switch NH4-125 3P 63A are analyzed, there are a static piece of apparatus with two or more winding which, by electromagnetic induction,transforms a system of alternating voltage and current into another system of voltage and current usually of different values and at the same frequency for the purpose of transmitting electrical power.

Table 3. Information of target product

| | |
|---|---|
| Product name | Disconnecting switch |
| Specification | NH4-125 3P 63A |
| Nominal voltage | 415V |
| Nominal current intensity | 63A |
| Number of poles | 3P |
| Nominal short-circuit breaking capacity | / |
| Functional unit | 1 PCS |
| Production period | 01/01/2023 to 31/12/2023 |
| Production process | Injection molding, assembly |
| Product standard weight | 0.247 kg |

Note: 0.247kg is the standard mass of the product. Since the components' mass used for calculation and modeling are based on actual weighing of randomly selected product samples, the total mass of the product BOM may deviate slightly from the standard mass. However, this deviation does not exceed 2% of the product's standard mass.

***Description of the production processes***

A flowchart depicting the production process stages of target product is shown in Figure 2 below.

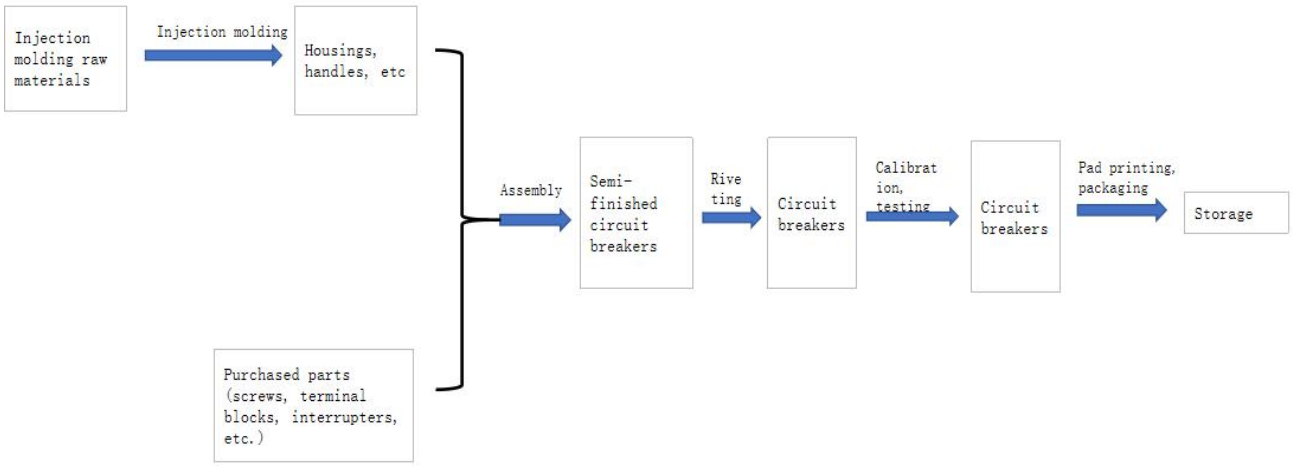


*Figure 2 production processes of Disconnecting switch of CHINT*

Table 4. NH4-125 3P 63A_Main product components and packaging materials per functional unit.

| Product components | Weight, kg | Weight-% |
|---|---|---|
| Raw materials | | |
| metal | 0.11892 | 40.91% |
| plastics | 0.135324 | 46.56% |
| Packaging materials | | |
| corrugated board box | 0.020563333 | 7.07% |
| packaging film | 0.000027125 | 0.01% |
| paper | 0.014901667 | 5.13% |
| Silica | 0.0009225 | 0.32% |

Included products do not contain the substances included in the "Candidate List of SVHC" document issued by the European Chemicals Agency (http://echa.europa.eu/candidate-list-table).

***Functional unit and Reference service life (RSL)***

The functional unit is the product category unit to be referred to when determining environmental impacts. To assess the environmental impacts of different products, the functional units of these products must be equivalent to interpret the results.

The functional unit is specified in terms of 1 pcs, which is in 1 pcs of disconnecting switch. The functional unit is per pcs of disconnecting switch with a RSL of 20 years.

## 3 LCA results

### 3.1 Environmental Impact descriptive parameters

The results of the underlying LCA are provided in this section as environmental impacts, resource use, output flows.

Table 5. NH4-125 3P 63A_ Environmental impact descriptive parameters

| RESULTS OF THE LCA –Environmental impacts per functional unit for Disconnecting switch NH4-125 3P 63A | | | | | | | |
|---|---|---|---|---|---|---|---|
| Core indicator | Unit | Total | MANUFACTURING STAGE | DISTRIBUTION STAGE | INSTALLATION STAGE | USE & Maintenance STAGE | END-OF-LIFE STAGE De-installation |
| Global warming potential - Total (GWP-total) | kg $CO_2$-Eq | 2.45E+02 | 2.67E+00 | 8.16E-02 | 3.03E-02 | 2.42E+02 | 3.05E-01 |
| Global warming potential - biogenic (GWP-biogenic) | kg $CO_2$-Eq | 3.03E-01 | -2.11E-02 | 9.13E-06 | 2.11E-02 | 2.96E-01 | -2.01E-05 |
| Global warming potential - land use and land use change (GWP-luluc) | kg $CO_2$-Eq | 3.31E-01 | 2.45E-03 | 1.08E-04 | 7.56E-07 | 3.28E-01 | 2.74E-05 |
| Global warming potential - fossil fuels (GWP-fossil) | kg $CO_2$-Eq | 2.45E+02 | 2.69E+00 | 8.15E-02 | 2.29E-03 | 2.42E+02 | 3.05E-01 |
| Depletion potential of the stratospheric ozone layer (ODP) | kg CFC-11-Eq | 1.66E-06 | 1.72E-08 | 1.22E-09 | 4.13E-11 | 1.64E-06 | 4.47E-10 |
| Photochemical ozone creation potential (POCP) | kg NMVOC-Eq | 7.35E-01 | 1.65E-02 | 1.43E-03 | 1.57E-05 | 7.17E-01 | 2.19E-04 |
| Eutrophication potential - freshwater (EP-freshwater) | kg P-Eq | 1.14E-01 | 4.01E-03 | 3.78E-06 | 1.88E-07 | 1.10E-01 | 9.94E-06 |
| Eutrophication potential - marine (EP-marine) | kg N-Eq | 2.43E-01 | 5.00E-03 | 4.65E-04 | 4.99E-06 | 2.38E-01 | 8.06E-05 |
| Eutrophication potential - | mol N-Eq | 2.47E+00 | 5.83E-02 | 5.15E-03 | 4.88E-05 | 2.41E+00 | 7.39E-04 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| terrestrial (EP-terrestrial) | | | | | | | |
| Acidifcation potential, accumulated Exceedance (AP) | mol H+-Eq | 1.29E+00 | 4.39E-02 | 1.81E-03 | 1.15E-05 | 1.25E+00 | 2.00E-04 |
| Abiotic depletion potential - fossil resources (ADPF) | MJ | 3.16E+03 | 3.45E+01 | 1.04E+00 | 2.80E-02 | 3.13E+03 | 4.23E-01 |
| Abiotic depletion potential - non-fossil resources (ADPE) | kg Sb-Eq | 2.60E-03 | 1.25E-03 | 1.32E-07 | 6.85E-09 | 1.35E-03 | 1.77E-07 |
| Water (user) deprivation potential (WDP) | $m^3$ world-Eq deprived | 5.51E+01 | 1.22E+00 | 3.60E-03 | 1.42E-03 | 5.39E+01 | 1.23E-02 |

### 3.2 Resource consumption descriptive parameters

Table 6. NH4-125 3P 63A_ Resource consumption descriptive parameters

| RESULTS OF THE LCA –Resource consumption per functional unit for Disconnecting switch NH4-125 3P 63A | | | | | | | |
|---|---|---|---|---|---|---|---|
| Core indicator | Unit | Total | MANUFACTURING STAGE | DISTRIBUTION STAGE | INSTALLATION STAGE | USE & Maintenance STAGE | END-OF-LIFE STAGE De-installation |
| Total use of non renewable primary energy (PENRT) | MJ | 3.16E+03 | 3.45E+01 | 1.04E+00 | 2.80E-02 | 3.13E+03 | 4.23E-01 |
| Use of non renewable primary energy as energy carrier (PENRE) | MJ | 3.16E+03 | 3.28E+01 | 1.04E+00 | 2.80E-02 | 3.13E+03 | 4.23E-01 |
| Use of non renewable primary energy resources used as raw materials (PENRM) | MJ | 1.73E+00 | 1.73E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Total use of renewable primary energy (PERT) | MJ | 4.43E+02 | 3.47E+00 | 1.03E-02 | 5.79E-04 | 4.39E+02 | 2.66E-02 |
| Use of renewable primary energy as energy carrier (PERE) | MJ | 4.42E+02 | 2.90E+00 | 1.03E-02 | 5.79E-04 | 4.39E+02 | 2.66E-02 |
| Use of renewable primary energy resources used as raw materials (PERM) | MJ | 5.67E-01 | 5.67E-01 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Use of secondary materials (SM) | Kg | 5.06E-01 | 6.25E-02 | 4.92E-04 | 1.77E-05 | 4.43E-01 | 1.85E-04 |
| Use of renewable secondary fuels (RSF) | MJ | 7.14E-03 | 4.32E-03 | 2.63E-06 | 2.42E-07 | 2.80E-03 | 1.03E-05 |
| Net use of fresh water (FW) | $m^3$ | 1.58E+00 | 3.24E-02 | 9.73E-05 | 2.42E-05 | 1.55E+00 | 2.64E-04 |
| Use of non-renewable secondary fuels (NRSF) | MJ | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |

### 3.3 Waste production descriptive parameters

Table 7. NH4-125 3P 63A_ Waste production descriptive parameters

| RESULTS OF THE LCA –Waste production per functional unit for Disconnecting switch NH4-125 3P 63A | | | | | | | |
|---|---|---|---|---|---|---|---|
| Core indicator | Unit | Total | MANUFACTURING STAGE | DISTRIBUTION STAGE | INSTALLATION STAGE | USE & Maintenance STAGE | END-OF-LIFE STAGE De-installation |
| Hazardous waste disposed (HWD) | kg | 1.35E-03 | 1.35E-03 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Non-hazardous waste disposed (NHWD) | kg | 1.20E-01 | 0.00E+00 | 0.00E+00 | 1.77E-02 | 0.00E+00 | 1.02E-01 |
| Radioactive waste disposed (RWD) - Total | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for energy recovery (MER) | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Materials for recycling (MFR) | kg | 1.70E-01 | 0.00E+00 | 0.00E+00 | 1.77E-02 | 0.00E+00 | 1.52E-01 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Components for reuse (CRU) | kg | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 | 0.00E+00 |
| Exported energy, thermal (EET) | MJ | 2.87E-01 | 0.00E+00 | 0.00E+00 | 7.10E-02 | 0.00E+00 | 2.16E-01 |
| Exported energy, electric (EEE) | MJ | 1.15E-01 | 0.00E+00 | 0.00E+00 | 2.84E-02 | 0.00E+00 | 8.66E-02 |

## 4 Supplementary information

### 4.1 Calculation rules

***functional unit:***

The functional unit is specified in terms of pcs. The functional unit is in 1 pcs of disconnecting switch. The functional unit is per pcs of disconnecting switch with a RSL of 20 years.

***Assumptions:***

1. As for the transportation for the unspecified distance such as the transport of end of life stage, there is an assumption of 300 km of the transport in Europe according to PCR.

2. For EOL stage, products are disposed of locally, the materials' disposal rate and recycling rate of each material are followed the specific data from EN 50693: 2019.

***Cut off rules***

1. Environmental impacts relating to personnel, infrastructure, and production equipment not directly consumed in the process are excluded from the system boundary.

2. Some materials (material unknown, or no applicable emission factor available) whose mass less than 0.1% of the product are ignored. The total exclusion shall not exceed 1% of the total weight of the product.

3. Some of the general solid waste in the manufacturing stage is not included in the calculation because it is recycled in its disposal stage, Incineration models are used for solid waste that cannot be recycled, but the environmental impact of its transshipment to the recycling company is included in the assessment.

4. The exhaust gas from the production is excluded because the emissions are very small, and the amount of the exhaust gas during the reference period are calculated to be less than 1% of the total waste generated during the production stage.

5. Since there is almost no energy consumption or material usage during the product installation phase, only packaging waste was considered for this stage.

6. The product virtually requires no maintenance, and the environmental emissions from maintenance are excluded.

***Data quality***

In this EPD, both primary and secondary data are used. Site specific foreground data have been provided by Zhejiang CHINT Electrics Co., Ltd.. Main data sources are the bill of materials available on the enterprise resource planning. For all processes for which primary are not available, generic data originating from the ecoinvent v3.10 database, allocation cut-off by classification, are used. The ecoinvent database is available in the Umberto.11.12.1 software used for the calculations. The ecoinvent v 3.10 by cut-off classification system processes are used to model the background system of the processes. The raw material inputs are modelled with data from ecoinvent representing a global market (GLO) or rest-of-world (ROW) coverage. These datasets are assumed to be representative.

***Allocation of input and output flows***

As for the electricity consumed during the manufacturing plant, we assessed the consumption from 2 parts, injection molding and welding (isolation switch does not involve welding process) of parts and final assembly of products.

For injection molding, due to the difficulty of data collection, the total output value of the injection molding and welding workshops and the output value of the parts used on the product are finally used to allocate the electricity consumption of the product parts manufacturing. As shown in the following formula:

$$Eparts = \frac{Electricity\ consumption\ for\ parts\ making}{Total\ (Output\ value\ of\ parts\ making)} \times Output\ value\ of\ parts\ on\ target\ product \quad (1)$$

For the assembly process, the electricity used for product assembly is allocated by working hours：

$$Eassembly = \frac{Electricity\ consumption\ for\ assembly}{Total\ (Working\ hours\ of\ all\ products)} \times Working\ hous\ of\ Target\ Product \quad (2)$$

***Allocation by reuse, recycling and recovery process***

Final waste treatment processes (all modeled as incineration), where waste production is linked to the product life cycle, has been included in the study.

For recovery and recycling processes, which take place outside the boundaries of the product system, only impacts related to the transportation of the waste to the treatment platform has been taken into account.

### 4.2 Scenarios and additional technical information

***Description of the processes included in raw materials extraction, raw materials transport and product assembly.***

**Raw materials extraction and production:** This stage mainly includes the mining, transportation and production of raw materials, using the factors of the database to calculate, the production of raw materials such as steel products, copper products, aluminum products, steel plate rolling and copper wire drawing processes energy consumption are also included.

**Raw materials transport**: Concerning raw material transportation, all the raw materials are sourced from domestic suppliers and are transported by truck, unspecified lorry is used for modeling in this study. The study applies an aggregated approach to raw materials transportation summarizing all the transport data by multiplying the weight and the transportation distance.

**Manufacturing**:

The energy involved in the production stage of the product is electricity, allocation method see chapter 4.1 specifically.The data details are shown in table 7, 8, 9, 10 (data period is 01/01/2023 to 31/12/2023):

Table 8. Energy consumption and output value of injection molding workshops

| Item | Amount | Unit |
|---|---|---|
| Electricity consumption- injection molding | 10552366.23 | kWh |
| Output value - injection molding (constant price) | 194996600 | Yuan |

Table 9. Allocation results for target product-injection molding

| Item | Amount | Unit |
|---|---|---|
| Unit electricity consumption per output value - injection molding | 0.053098192 | kWh/yuan |
| Output value of parts on NH4-125 3P 63A (constant price) - injection molding | 0.12947 | Yuan |
| NH4-125 3P 63A parts production electricity consumption - injection molding | 0.007006352 | kWh |

Table 10. Energy consumption and working hours of assembly workshop

| Item | Amount | Unit |
|---|---|---|
| Study scope assembly energy consumption | 1985927.611 | kWh |
| Study scope working hours | 19583605.1 | h |

Note: Since the electricity consumption during product assembly has the strongest correlation with working hours, working hours are selected for allocation.

Table 11. Allocation results for target product-assembly workshop

| Item | Amount | Unit |
|---|---|---|
| Working hours for NH4-125 3P 63A | 124.16 | s |
| Assembly electricity consumption for NH4-125 3P 63A | 0.003497438 | kWh/pcs |

**Distribution stage**:

The products are transported to global for application. The scope covers over a dozen countries and regions across Asia, Europe, etc., with transportation modes including maritime shipping and land transport.

***Description of the processes for others***

**Installation**:

At this stage, only the packaging materials are discarded. The quality and disposal rate during the packaging waste stage are shown in the table below:

Table 12. NH4-125 3P 63A_Waste treatment scenario for packaging

| Material-Packaging | Waste weight (kg) | Disposal rate | Disposal weight (kg) |
|---|---|---|---|
| Other Plastic | 0.000027125 | 50% | 1.36E-05 |
| Paperboard | 0.035465 | 50% | 1.77E-02 |
| Mineral | 0.0009225 | 100% | 9.23E-04 |

The transportation distance of packaging disposal is set at 300 km based on EPDItaly012 - Electronic and electrical products and systems - switches, Rev. 1.

**Uses and maintenance**:

As for use phase:

The $P_{use}$ is base on Maximum power consumption from Product Test Report.

As for the electricity consumption, according to the calculation formula in PCR, and RSL=20, α (coefficient describing the amount of time in which the switch is requested to operate its function ) =30%, the Euse of each product is calculated as follows：

Table 13. $E_{use}$ calculated of target product

| Product | Specification | Maximum power consumption (w) | $E_{use}$ (kWh) |
|---|---|---|---|
| NH4-125 | 3P 63A | 6.22 | 326.9232 |

Because the product has almost no maintenance phase, this phase is negligible.

**EOL stage：**

For the end-of-life stage, the transportation of waste materials adopts the model distance of 300 km in PCR., the factors of disassembly are used in the calculation of waste processing stage. The materials' disposal rate and recycling rate of each material are followed the specific data from EN 50693 2019. Here is the table of the summary disposal material amount of target product during end-of-life:

Table 14. NH4-125 3P 63A_Waste treatment scenario

| Material-BOM | Waste weight (kg) | Disposal rate | Disposal weight (kg) |
|---|---|---|---|
| Steel | 0.0636 | 20% | 0.01272 |
| Aluminium | 0.00228 | 30% | 0.000684 |
| Copper | 0.0516 | 40% | 0.02064 |
| Other non-ferrous mentals | 0.00144 | 40% | 0.000576 |
| PP | 0.000084 | 40% | 0.0000336 |
| Other Plastic | 0.13524 | 50% | 0.06762 |

## 4.3 Other optional additional environmental information

In this study, it is important to note that different electricity grid mixes are used for different stages of the life cycle. Specifically, manufacturing stage of the product took place in Shanghai, China, Electricity mix for Eastern Power Grid of China was used for modelling. As for use & maintenance stage, European market average electricity mix is used. The detailed information can be found in Table 15.

Table 15. Electricity profiles applied

| Consumption type | Electricity process type | GWP Value | Sources |
|---|---|---|---|

| | | | |
|---|---|---|---|
| Electricity use in manufacturing stage-grid power | Electricity, low voltage {CN-ECGC}\| market group for \| Cut-off, U | 0.884 kg CO2-Eq/kWh | Ecoinvent data set Version 3.10 |
| Electricity use in the use & maintenance stage | Market group for electricity low voltage - Global (GLO) | 0.741 kg CO2-Eq/kWh | |

**Special Note:**

According to the requirements of EPDItaly007 — PCR for Electronic and Electrical Products and Systems, Rev. 3.1, in any case, all electricity generation in all EPDs without GO shall be calculated with residual mix.

However, the Chinese regional grid factors do not include a "residual mix" category. Therefore, we conducted a sensitivity analysis:

Based on the grid structure of Zhejiang Province, we selected the GWP factors for electricity production-hard coal and electricity production-nuclear in Zhejiang Province to simulate and construct a residual mix for sensitivity analysis. The GWP value of simulated emission is 0.997 kg CO2-eq/kWh, with a 13% deviation of selected electricity emission factor. Since the environmental impact of the electricity consumption of manufacture stage itself is extremely minor—taking the GWP-Total indicator as an example, the electricity emissions in the manufacture stage account for less than 0.03% of the total indicator value—the overall impact of using this factor is negligible, less than 0.01% to total GWP among all life stages. Therefore, the use of the data "Electricity, low voltage {CN-ECGC}| market group for | Cut-off, U" has an insignificant effect on the final EPD results. In this study, we retained this factor for accounting purposes.

**References**

[1] EPD China General Programme Instructions V 3.0

[2] EN 50693:2019, Product category rules for life cycle assessments of electronic and electrical products and systems.

[3] Ecoinvent-en15804-3.10 (Rev.1,2023/11/28), Swiss Centre for Life Cycle Assessment, (www.ecoinvent.ch).

[4] EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declaration - Core rules for the product category of construction products.

[5] ISO 14025:2006, Environmental labels and declarations-Type III environmental declarations-Principles and procedures.

[6] ISO 14040: 2006/Amd 1:2020 Environmental management - Life cycle assessment - Principles and framework Amendment 1 (ISO 2020).

[7] ISO 14044: 2006/Amd 2:2020 Environmental management - Life cycle assessment - Requirements and guidelines Amendment 2 (ISO 2020).

[8] EPDItaly007 —PCR for Electronic and Electrical Products and Systems, Rev. 3.1, 2024/11/12

[9] EPDItaly012 -Electronic and electrical products and systems - switches, Rev. 1, 28/06/2024

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# ENVIRONMENTAL PRODUCT DECLARATION