Chint Electric Co., LTD.

ENVIRONMENTAL PRODUCT DECLARATION

Products:

Transformer SFZ-125000/230(P2403008)

Transformer SFZ-125000/230(P2504041)

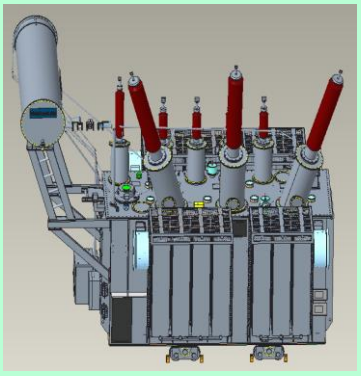
Site:
3555 Sixian Road, Songjiang District, Shanghai,
No. 11, Yubo Avenue, Yangluo Development Zone, Xinzhou District, Wuhan City, Hubei Province

In accordance with ISO 14025 and EN 50693:2019

Program Operator	EPDItaly
Publisher	EPDItaly

Declaration Number	EPDCHINTTRANSFORMER_2025_rev.1.0
Registration Number	EPDITALY1454

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Valid to	15 / 09 /2031





GENERAL INFORMATION

EPD OWNER	
Name of the company	Chint Electric Co., Ltd.
Registered office	3555 Sixian Road, Songjiang District, Shanghai
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PROGRAM OPERATOR	
EPDItaly	Via Gaetano De Castillia n° 10 - 20124 Milano, Italy

INFORMATION ON THE EPD	
Product name (s)	TRANSFORMER SFZ-125000/230 (P2403008) TRANSFORMER SFZ-125000/230 (P2504041)
Site (s)	3555 Sixian Road, Songjiang District, Shanghai Province，China No. 11, Yubo Avenue, Yangluo Development Zone, Xinzhou District, Wuhan City, Hubei Province
Short description and technical information of the product (s)	Within this EPD, Power Transformer SFZ-125000/230 (P2403008) and SFZ-125000/230 (P2504041) are analyzed, there are a static piece of apparatus with two or more windings 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. 125 MVA is a large main transformer capacity (non-distribution small capacity), belonging to high voltage/ultra-high voltage transmission equipment. The core specifications are: three-phase oil immersed, rated capacity of 125 MVA, common voltage combination of 220/110/10 kV or 110/35/10 kV, impedance voltage of 10%~14%, cooling method of ONAN/ONAF/OFAF, insulation level of LI980AC395 (220 kV side) or LI480AC190 (110 kV side), F-class winding temperature rise ≤ 65 K, and compliance with GB/T 6451-2023 and GB 1094 series standards.
Field of application of the product (s)	The 125 MVA transformer is a super large main transformer, mainly used for power plant boosting and grid connection, 220kV/500kV substation main transformer, large industrial base (steel/chemical/electrolytic aluminum) general step-down station, and cross regional transmission nodes, undertaking the core power transmission and voltage conversion tasks of the power grid.
Product (s) reference standards (if any)	IEC 60076-1 (General) IEC 60076-2 (Temperature rise) IEC 60076-3 (Insulation levels and dielectric tests) IEC 60076-5 (Ability to withstand short circuit) IEC 60076-7 (Loading guide for oil-immersed power transformers) IEC 60076-10 (Determination of sound levels)
CPC Code (number) https://unstats.un.org/unsd/classifications/Econ	46121'Electricial transformer'

VERIFICATION INFORMATION	
PCR (title, version, date of publication or update)	EN 50693:2019 – Product category rules for life cycle assessment of electronic and electrical products and systems

	EPDItaly007 – PCR for Electronic and electrical products and systems, Rev. 3.2, 2025/12/20 EPDItaly018 – Electronic and electrical products and systems – Power transformers, Rev. 3.6, 2024/07/01
EPDItaly Regulation (version, date of publication or update)	Regulations of the EPDItaly Programm Rev. 7.1, 2025/09/05
Project Report LCA	Chint Transformer SFZ-125000/230 (P2403008) & Transformer SFZ-125000/230 (P2504041) LCA Report 4.0, 11/08/2026
Independent Verification Statement	Independent verification of the declaration and data, carried out according to ISO 14025: 2010. ☐ Internal ☑ External Third party verification carried out by: ICMQ S.p.A., via Gaetano De Castillia n ° 10 - 20124 Milan, Italy. Accredited by Accredia.
Comparability Statement	Environmental statements published within the same product category, but from different programs, may not be comparable. In particular, EPDs of electronic and electrical products may not be comparable if they do not comply with EN50693:2019
Liability Statement	The EPD Owner releases EPDItaly from any non-compliance with environmental legislation. The holder of the declaration will be responsible for the information and supporting evidence. EPDItaly disclaims any responsibility for the information, data and results provided by the EPD Owner for life cycle assessment.

OTHER INFORMATION	**The reference production year of the product is 2025**

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1. Company information

The Transformer Manufacturing Department of Chint Electric Co., Ltd. was established in 2004 and is located in the Chint Power Transmission and Distribution Equipment Industrial Base Park in Songjiang District, Shanghai. It is a subsidiary of Chint Group and a member of the national transformer industry council. The company has completed the first and second phases of infrastructure construction, building a factory with an area of approximately 300 acres and a construction area of approximately 60000 square meters. It mainly produces 750kV and below power transformers, distribution transformers, special transformers, parallel reactors and other products. In addition, Chint Electric Wuhan Transformer Factory mainly produces 1000kV and below power transformers and various special transformers, with an annual production capacity of over 40000 MVA.

The company's third and fourth phase infrastructure plans will build new production workshops and testing halls according to the standard of double million (voltage of one million volts, capacity of one million kilovolt amperes), with an annual production capacity of 50,000MVA by then. We have advanced production, manufacturing, and testing equipment at the international or domestic level, such as imported Belgian Soren silicon steel sheet cutting line, 300kW kerosene gas-phase drying tank, CNC insulation machining center, etc.

The coils and assembly plant of power transformers have achieved full enclosure, full air conditioning, constant temperature and humidity. In the manufacturing process, advanced technologies such as iron core step overlap structure and iron core non overlapping yoke are adopted, and the production conditions and industrial foundation have reached the leading level of domestic enterprises of the same type. We have a sound quality assurance system and have obtained certifications for ISO9001 quality management system, ISO14001 environmental management system, and OHSAS18001 occupational health and safety management system. Transformer products are widely used in State Grid, Southern Power Grid, and multiple key industries and iconic projects, and are exported to mutiple countries and regions such as Italy and Yemen.

2. Product Information

Product Name: Power Transformer
Product Model: SFZ-125000/230 (P2403008)
RATED FREQUENCY：50 Hz
RATED POWER：125/125/31.5 MVA
VOLTAGE COMBINATION：230±13×1.0%/ 68±2X3%/10.5 kV
RATED CURRENT：313.8/1061.3/1732.1 A
COOLING TYPE：ONAN/ONAF1/ONAF2 (80/100/125MVA)

Table 2.1: Material composition of the Transformer SFZ-125000/230 (P2403008) (in accordance with EN IEC 62474)

Product Identification Code	TRANSFORMER SFZ-125000/230 (P2403008)		
Rated power (kVA)	125000/125000/31500		
Country of installation	Spain		
Total product mass, without packaging and transformer oil (kg)	133850.00		
Material content	ID	kg	%
Stainless steel	M-100	519	0.39%
Other ferrous alloys, non-stainless steels	M-119	108026	80.71%
Aluminium and its alloys	M-120	303	0.23%
Copper and its alloys	M-121	101	0.08%
Ceramics	M-160	2220	1.66%
Polyamide (unfilled)	M-208	0	0.00%
Other unfilled thermoplastics	M-249	114	0.09%
NBR	M-320	39	0.03%
Paper	M-341	3500	2.61%
Oils and greases	M-410	0	0.00%
Other material （cable，BVR，etc）		19028	14.22%

Product Name: Power Transformer
Product Model: Transformer SFZ-125000/230 (P2504041)
RATED FREQUENCY：50 Hz
RATED POWER：125/125/31.5 MVA
VOLTAGE COMBINATION：230±13X1.0%/66±2X3.0% (50±2X3.96%)
RATED CURRENT：313.8/1093.5-1443.4/1732.1 A
COOLING TYPE：ONAN/ONAF1/ONAF2

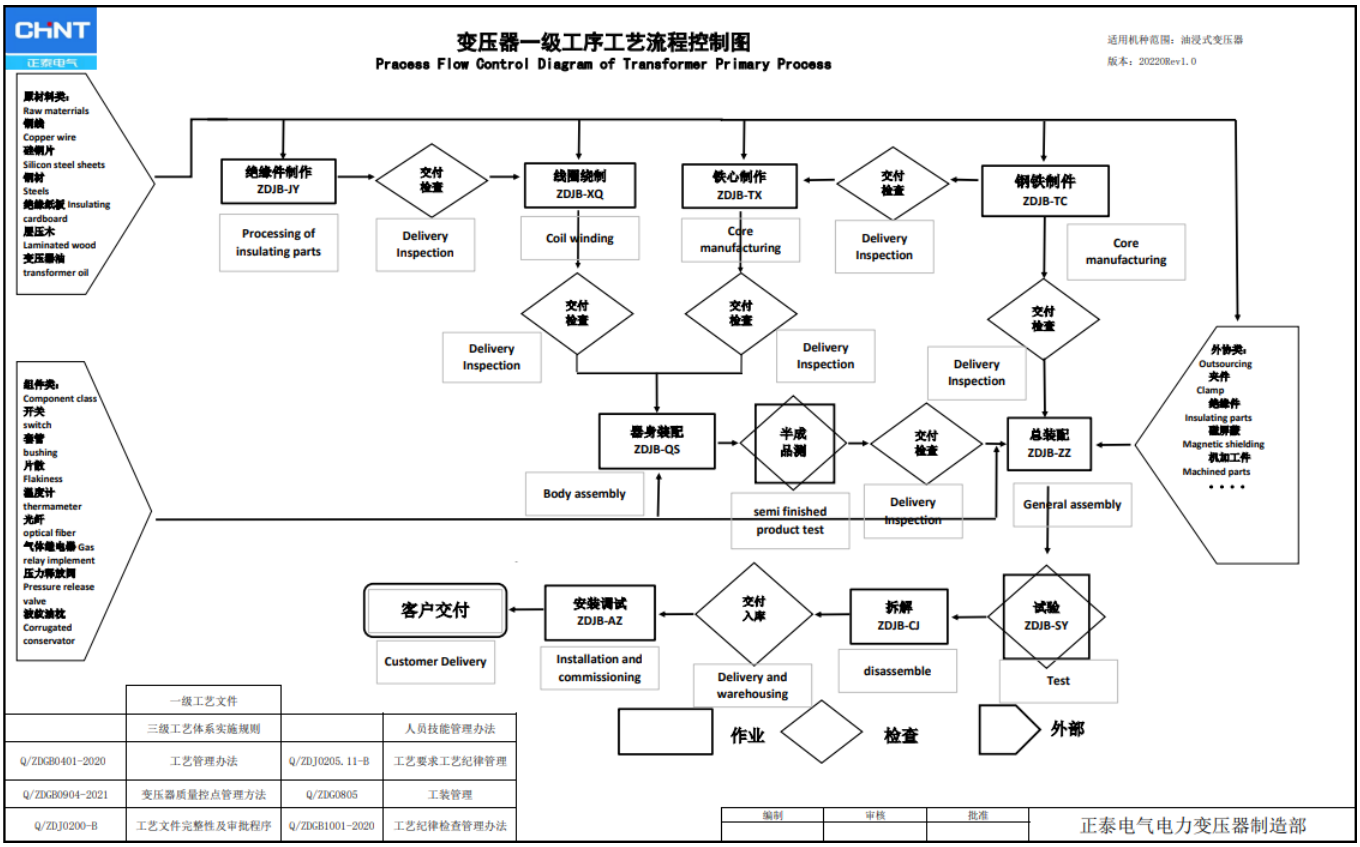
Table 2.2: Material composition of the Transformer SFZ-125000/230 (P2504041) (in accordance with EN IEC 62474)

Product Identification Code	TRANSFORMER P2504041		
Rated power (kVA)	125000/125000/31500		
Country of installation	Spain		
Total product mass, without packaging and transformer oil (kg)	149805		
Material content	**ID**	**kg**	**%**
Stainless steel	M-100	1097	0.73%
Other ferrous alloys, non-stainless steels	M-119	118916	79.38%
Aluminium and its alloys	M-120	276	0.18%
Copper and its alloys	M-121	117	0.08%
Ceramics	M-160	2089	1.39%
Polyamide (unfilled)	M-208	0	0.00%
Other unfilled thermoplastics	M-249	59	0.04%
NBR	M-320	80	0.05%
Paper	M-341	3700	2.47%
Oils and greases	M-410	0	0.00%
Other material （cable，BVR，etc）		23470	15.67%

Note 1: According to section 1.4 of PCR EPDItaly 018 the transformer with model SFZ-125000/230 (P2403008) and the transformer with model SFZ-125000/230 (P2504041) are both power transformers.

Note 2: The two transformers mentioned above in this report were independently produced at their respective factories. Power Transformer SFZ-125000/230 (P2403008) is manufactured in the factory of Chint Electric Co., Ltd. in Shanghai (during its whole manufacturing stage) and Power Transformer SFZ-125000/230 (P2504041) is manufactured in the factory of CHINT High Voltage Electrical Equipment (Wuhan) in Wuhan (during its whole manufacturing stage). Both transformers have the same manufacturing process; one transformer is manufactured in Shanghai and the other in Wuhan. There is no interweaving or mutual influence in the production process of the two transformers, and there is no situation where one transformer has a sub process in Shanghai and another sub process in Wuhan in its production process. Vice versa.

The product manufacturing process is as follows.



No substance in the product greater than 0.10% by weight is present on the "List of Potentially Hazardous Substances" (SVHC in English) candidates for authorization under the REACH legislation.

The production process of transformers primarily encompasses several key steps: the processing of insulating components, coil winding, core manufacturing of steel components, as well as general assembly, semi-finished product testing, body assembly and final assembly, testing, disassembly, installation and commissioning.

The core process involves longitudinal cutting of silicon steel sheets, shear testing of silicon steel sheets, core alloying, and assembly. The insulation process involves the manufacturing of fiber containers, which are produced using a cardboard edge sanding machine with an edge sanding length ≤3000mm, a width ≤150mm, and a maximum edge turning thickness of 8mm.

After the active partial fixation, the wooden parts and conduits are secured after unloading. The entire core is fastened with a special cylinder shaving device to ensure uniform fixation of the core.

The site is equipped with dry air generators. Dry air with dew point ≤-70℃ is generated to reduce the degree of moisture absorption when the active part is exposed to the air. For the drag of active part, two 160t travelling cranes and a 300t lifting beam meet the requirements of lifting weight and height of the active part, and 250t gantry cranes are equipped in the freight yard.

3. Life Cycle Assessment Information

A Life Cycle Assessment (LCA) is a methodology for assessing the environmental impacts associated with the entire life cycle of a particular product or process. LCA consists of 4 stages (Goal and Scope, Inventory Analysis, Impact Assessment, and review/presentation) which must follow similar procedures to a PCR (Product Category Rules) and helps to evaluate the carbon footprint and natural resources of a product or process. In this EPD, LCA is conducted separately to obtain environmental impact information.

3.1. Declared unit

According to PCR EPDItaly018, the transformer is defined as an assembly of electric and electronic devices adjusting and regulating voltage and current intensity components of electric power, during a reference service life of 35 years.

The declared unit is therefore defined as a single piece of transformer operating for 35 years. Reference flow is one single piece of transformer.

Chint's declaration: This EPD report is a specific product EPD

3.2. System, temporal, and geographical boundaries

The system boundary includes the whole life cycle of the analyzed product, according to a "from cradle to grave" application, covering the following life cycle stages:

PHASES	MANUFACTURING STAGE	DISTRIBUTION STAGE	INSTALLATION STAGE	USE & Maintenance STAGE	END-OF-LIFE STAGE De-installation	BENEFITS & LOADS BEYOND THE SYSTEM BOUNDARIES*
	IN ACCORDANCE TO EN 50693					
Phases declared	X	X	X	X	X	Opt.
Data quality indicator[11]	%	-				

Table 3.2.1 - Life cycle modules

The manufacturing stage covers 61.22% of the emissions factors assessed for data quality.

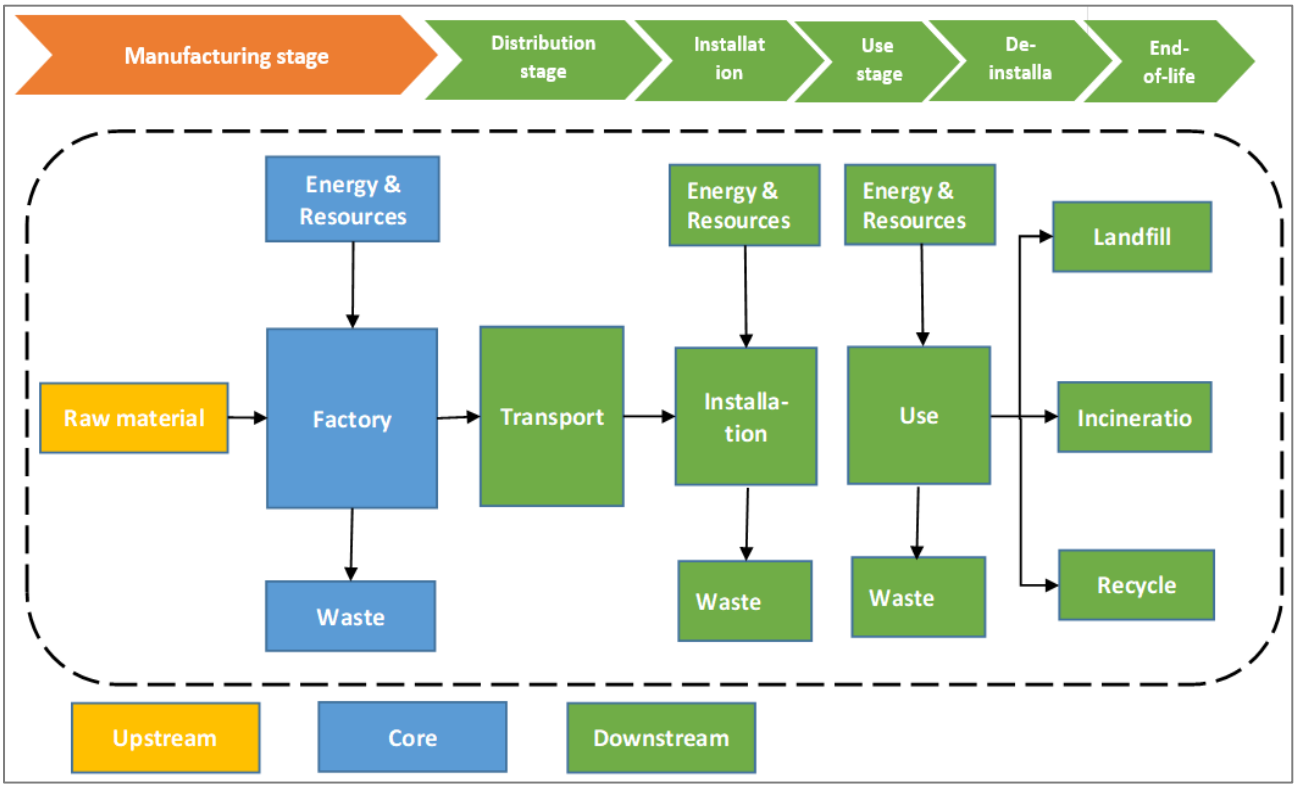


Figure 3.2.1: Phases and processes included

Manufacturing stage. This phase includes the upstream and core modules described earlier (raw material conversion, raw material transportation, generation of process waste, including its transportation to disposal sites, as well as energy and material consumption related to plant operations); the upstream module primarily involves the procurement of primary and auxiliary materials, as well as the acquisition and transportation of electronic components and control equipment. The core module mainly covers the processing of grain-oriented and non-grain-oriented silicon steel sheets and mineral oil, along with the transportation and treatment of waste. It also involves the consumption of electricity, natural gas, and diesel during the processing stage. The data for transportation distance of purchased raw materials is summarized in the tables in LCA report. Steel waste and mineral oil residue will be collected and transported to waste disposal sites. Steel waste will be recycled and oil residue will be incinerated for energy conversion.

Distribution stage. This module covers energy consumption during product transportation. Mainly includes the transportation of transformers from the Chint's factory in Shanghai and Wuhan to Shanghai Port, from Shanghai Port to Spanish ports, and from Spanish ports to local factories in Spain. For transformer SFZ-125000/230 (P2403008) 71017267.44 kwh will be consumed during the 35 years usage and for transformer SFZ-125000/230 (P2403008) 69074711.16 kwh will be consumed during the 35 years usage.

Installation stage. This module includes the end of packaging life, energy consumption related to installation and setup, waste and debris generated during the installation phase; It mainly involves the energy consumption generated in the lifting and hoisting of transformers and the purification of mineral oil.

Use & Maintenance Stage. This module includes the energy consumed by the transformer throughout its entire reference service life, regular maintenance, and special maintenance periods. The function of the transformer is to convert high voltage electricity into low voltage electricity, and the service life of these two units is 35 years. The disposal method for waste wooden pallets and paper generated during installation is incineration.

The total energy consumed shall be expressed in kWh and it can be computed via the following formula:

$$E_d[kWh] = [P_{load} * k_{load}^2 + P_{noload}] * t_{year} * RSL + P_{aux} * f_{aux} * t_{year} * RSL$$

End of Life Stage. This module includes the transportation of the transformer to the collection site, disassembly operations, distribution and destination of the various material flows to be sent for recycling or disposal.

Table 4.6.1 – EoI treatment inventory SFZ-125000/230 (P2403008)

Stage	Material	Material	Waste Amount (kg)	Weight of materail to be recycled (kg)	Weight of materail to be landfilled (kg)	Weight of materail to be incinerated (kg)	Waste treatment methode
End of Life Stage	Treated as single material	Steel (Main Material+Auxiallary Material)	61443	61443	0	0	100% recovered, 100% recycled
		copper (Main Material)	11	10	1	0	95% recovered, 95% recycled
		wires ((Main Material))	18826	9413	7530	1883	60% recovered, 50% recycled, rest incinerated
		Oil tank+Dismantling steel	35681	35681	0	0	100% recoverd, 100% recycled
		carboard	3500	0	0	3500	100% recovered, 100% incinerated
	Separation before treatment	Aluminum（parts and components）	223	178	45	0	90% recovered, 80% recylced, rest landfilled
		Copper (parts and components)	81	65	16	0	85% recovered, 80% recylced, rest landfilled
		Steel（parts and components）	11190	11190	0	0	100% recovered, 100% recycled
		Plastics（parts and components）	114	0	0	114	90% recovered, 80% recylced, rest incinerated
		Rubber（parts and components）	9	0	0	9	90% recovered, 0% recycled, all incinerated
		Ceramics（parts and components）	2220	0	2220	0	100% recovered, 0% recycled, all landfilled
		Paper（parts and components）	0	0	0	0	90% recovery, 0% recycled, all incinerated
		Glass（parts and components）	2	0	2	0	100% recovered, 0% recycled, all landfilled
		Zinc（parts and components）	0	0	0	0	100% recovered, 0% recycled, all landfilled
	Special treatment	Rubber (Auxiliary Material)	30	0	0	30	90% recovered, 0% recycled, all incinerated

		Power cord (wires form auxialary Material+air-cooled control cabinet)	320	320	0	0	100% recovered, 25% recycled, rest incinerated
		Rest of Electronic wastes	200	100	80	20	100% recovered, 50% recycled, rest landfilled
		Waste oil (Main Material)	41300	0	0	41300	100% recovered, 0% recycled, all incinerated

Table 4.6.2 – EoI treatment inventory SFZ-125000/230 (P2504041)

Stage	Material	Material	Waste Amount (kg)	Weight of materail to be recycled (kg)	Weight of materail to be landfilled (kg)	Weight of materail to be incinerated (kg)	Waste treatment methode
End of Life Stage	Treated as single material	Steel (Main Material+Auxiallary Material)	73553	73553	0	0	100% recovered, 100% recycled
		copper (Main Material)	8	8	0	0	95% recovered, 95% recycled
		wires ((Main Material))	23248	11624	9299	2325	60% recovered, 50% recycled, rest incinerated
		Oil tank+Dismantling steel	31630	31630	0	0	100% recoverd, 100% recycled
		carboard	3700	0	0	3700	100% recovered, 100% incinerated
	Separation before treatment	Aluminum (parts and components)	136	109	27	0	90% recovered, 80% recylced, rest landfilled
		Copper (parts and components)	92	73	18	0	85% recovered, 80% recylced, rest landfilled
		Steel (parts and components)	14447	14447	0	0	100% recovered, 100% recycled
		Plastics (parts and components)	59	0	0	59	90% recovered, 80% recylced, rest incinerated
		Rubber (parts and components)	0	0	0	0	90% recovered, 0% recycled, all incinerated
		Ceramics (parts and components)	2089	0	2089	0	100% recovered, 0% recycled, all landfilled

		Paper（parts and components）	0	0	0	0	90% recovery, 0% recycled, all incinerated
		Glass（parts and components）	2	0	2	0	100% recovered, 0% recycled, all landfilled
		Zinc（parts and components）	0	0	0	0	100% recovered, 0% recycled, all landfilled
		Rubber (Auxiliary Material)	80	0	0	80	90% recovered, 0% recycled, all incinerated
	Special treatment	Power cord (wires from auxialary Material+air-cooled control cabinet)	200	50	0	150	100% recovered, 25% recycled, rest incinerated
		Oil	52000	0	0	52000	100% recovered, 0% recycled, all incinerated

It should be noted that the construction, maintenance, and decommissioning of infrastructure, i.e. buildings and machinery, as well as the occupation of industrial land have not been considered, as their contribution to the environmental impact of the declared unit is considered negligible.

For the study, reference was made to the data deriving from the BOMs of specific products, whose production began in 2024 (reference year). For plant consumption, reference was made to the data related to the Chint production plant and referred to the year 2024 (January – December), considered representative (at the time of conducting the study, this is the last complete calendar year for which the data are available).

The suppliers of raw materials and semifinished products are located in China. Where possible, the specific origin of the raw material has been investigated and characterized accordingly. For the downstream phases, and Spain scenario was considered, knowing the exact position of where the transformers will be installed.

3.3. Impact categories

The methodology chosen to evaluate the potential environmental impacts of the product subject of this study includes all the impact categories required by the Standard EN 50693:2019. The models used are those shown in EN 15804 + A2: 2019, as implemented in the SimaPro software. The categories analyzed are therefore:

Indicator name and abbrevation (EN)	Unit (EN)
Global Warming Potential - total (GWP-total)	kg CO2 eq.
Global Warming Potential - fossil fuels (GWP-fossil)	kg CO2 eq.
Global Warming Potential - biogenic (GWP-biogenic)	kg CO2 eq.
Global Warming Potential - land use and land use change (GWP-luluc)	kg CO2 eq.

Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq.
Acidifcation potential, Accumulated Exceedance (AP)	mol H+ eq.
Eutrophication potential - freshwater (EP-freshwater)	kg P eq.
Eutrophication potential - marine (EP-marine)	kg N eq.
Eutrophication potential - terrestrial (EP-terrestrial)	mol N eq.
Formation potential of tropospheric ozone (POCP)	kg NMVOC eq.
Abiotic Depletion for non-fossil resources potential - (ADP-minerals&metals)	kg Sb eq.
Abiotic Depletion for non-fossil resources potential (ADP-fossil)	MJ, net calorific value
Water deprivation potentail, deprivation-weighted water consumption (WDP)	m3 eq.

*Please also note that the EN 15804+A2 method is based on the EF 3.11 version for this study.

3.4. Cut-off

According to EPD Italy Regulations and PCR EPDItaly007, the following flows and operations are cut-offed:

- Production, use and disposal of the packaging of components and the packaging of semi-finished intermediates.
- Materials making up the transformer itself whose total mass does not exceed 1% of the total weight of the device.
- Material and energy flows related to dismantling phase which is performed by adopting manual tools (e.g. screwdrivers, hammers, etc.).
- Manufacture of equipment used in production, buildings or any other capital goods;
- The transportation of personnel to the plant.
- Transportation of personnel within the plant.
- Research and development activities.
- Long-term emissions.

  During the production process, auxiliary materials such as alcohol (used for cleaning agents), machine oil are utilized. However, due to their minimal consumption and the resulting waste generation being far less than 1% of the weight of the raw materials per unit of product produced, they have negligible impact on the overall results of the life cycle assessment (LCA) and are therefore cut-offed in accordance with cut-off principle from the calculation.

  As far as possible, the entire calculation is based primarily on primary data, and secondary data is obtained based on life-cycle databases or literature, among them, energy consumption is mainly geographical, that is, refer to local data.

3.5. Allocation Principles

Firstly, the principle of "modularity" is followed. The life cycle phases of transformer P2403008 and transformer P2504041 according to EN 50693:2019 are divided to five modules: Manufacturing, Distribution, Installation, Use and maintenance, End of life. Secondly, the energy and resources usage per functional unit in the production stage of the product is calculated by dividing the annual energy or resource consumption by the total output of the company's product, In detail, the allocation of energy resources for plant processing use is converted using the proportion of rated power of transformer P2403008 and transformer P2504041 to the total rated power of transformers produced in the plant in 2025.that is, the physical allocation method is used for allocation.

In addition, the default distribution rule for the environmental impacts and benefits of reuse, recovery and/or recycling is based on the polluter pays principle (PPP), which means that the recovery or reuse beneficiary bears the environmental impacts and benefits associated with the recovery or reuse treatment, and the original product manufacturer does not have to bear this part of the impact burden. It also does not participate in the sharing of benefits (environmental impact of the production of the same product avoided by recycling and reuse).

3.6. Limitation and Assumption

The results are only valid for the situation defined by the assumptions described in the present report, and they are subject to change if these manufacturing conditions change. The following assumptions are used in this assessment:

Table 3.6.1 – Assumptions for each stage of the life cycle

Life cycle module	Life cycle stage	Assumption
MANUFACTURING STAGE	Upstream Module	• Raw material information is provided by Chint according to product's bill of material, losses for metal cutting, wood and transformer oil are considered while others were excluded.

		• The density of wood package is assumed to be 740 kg/m3 as glued solid timber is used.
	Core Module	• China consumption electricity mix from East Centre China Grid was used in the core module. For 1kWh electricity used, upstream CO2e emission is 0.78 kgCO2e. • Assume same amount of energy and resource consumption were used to produce each unit of rated power of transformers in the manufacturing phase. • Assume same amount of waste was produced to produce each unit of transformer in the manufacturing phase. • The distance from the Chint plant to the downstream waste disposal site is assumed to be 2.4 km (according to transportation starting point and transportation destination).
DISTRIBUTION STAGE	Downstream Module	• The product is to be used in Spain. Downstream distribution distances are estimated from the GAODE map and SEARATE website for shipment distances, inland transport is by truck freight and sea transport is by ship. • The distance from Chint Electric.Co.,Ltd. to Shanghai port is assumed to be 100 km. • The distance from CHINT High Voltage Electrical Equipment（Wuhan）Co.,Ltd. to Shanghai port is assumed to be 856 km. • The distance from Port of Spain to the client is assumed to be 500 km.
INSTALLATION STAGE		• Energy and resources needed during installation are provided by Chint, it is assumed the same amount were used to install each unit of transformer. • The distance from the user installation site to the downstream waste disposal site is also assumed to be 200 km • In this stage, package of the transformer and oil tank were disposed, and 100% of waste wood and cardboard package are assumed to be incinerated.
USE & Maintenance STAGE		• Energy used during the product service life is provided by Chint in accordance with PCR EPDItaly018, it is assumed the same amount were used to install each unit of transformers. Dataset for electricity modelled in this stage is Electricity, high voltage {ES}| electricity, high voltage, production mix | Cut-off, S • According to expert judgement and from various users provided by Chint, inspection and maintenance do not require replacement parts during the service life, and transformer oil changes are not necessary or foreseen, therefore are not considered in the study.
END-OF-LIFE STAGE De-installation		• In the end of life disposal stage, materials of transformer components can be categorized into several categories - Major components (steel and copper) that can be easily recycled as a single material, components that need to be disassembled and then processed as separate materials, components that are processed as a whole, materials that need to be treated as hazardous waste, and components that need special treatment such as power cords and paper based insulation parts. Global waste material treatment data were used to calculate the impact of the potential environment at the disposal stage. Recycling rate of each material is assumed in accordance with IEC TR 62635:2012.

4. Inventory analysis

In this EPD, where available, reference was made to primary data. Where access to this type of data was not possible, datasets from the Ecoinvent v3.11 database were used as reference.

Data collection was carried out by preparing a sheet that collected input and output data, in terms of mass, energy consumption were obtained within production site. The data collection sheet was verified and checked by mass balances and reporting any inconsistencies that were clarified and resolved.

In the study, SimaPro 10.2.0.0 software was used to establish the model for the life cycle of products and calculate LCA results.

Data collection	1/1/2025-31/12/2025
Sites used	2 sites owned by Chint Electric Co., Ltd. and Chint High Voltage Electrical Equipment（Wuhan）
Geography	Both Chint Electric Co., Ltd. and CHINT High Voltage Electrical Equipment (Wuhan) have comprehensive production processes and can manufacture transformer products throughout the entire production chain. The two transformers mentioned in this report were independently produced at their respective factories. The transformers are sold to Spain. The EPD is modelled for use and disposal in Spain.
Technology	The transformer is manufactured by processing raw materials like silicon steel sheet, magnetic shielding and mineral oil. Parts and components and electronic control cabinet units will be purchased from provider and assembled together.
Averaging	Production weighted average covering 100% of production by Chint Electric Co., Ltd.and Chint High Voltage Electrical Equipment（Wuhan）
LCI/LCA database	Ecoinvent 3.11
EPD used	Chint EPD Program, EPD for Transformer SFZ-125000/230 (P2403008) and Transformer SFZ-125000/230 (P2504041)
Data Quality Scheme	EN 15804:2012+A2:2019, Annex E, Table E.2
Use of Fair data with more than 30% of a core impact	The use of datasets for the stage of transformer uses stage accounts for more than 97% of the GWP impact in Shanghai fabrik and more than 94 % the GWP impact in Wuhan fabrik. Manufacturing stage accounts for only 3-4% of the GWP impact.
Use of Poor relevant data	Data quality for parts and components in the manufacturing stage and end-of-life stage is both geographically relatively average, because they summaries a big area of data sources. Parts and components account for less than 1% and en-of-life accounts for less than 2% of GWP impact.
Use of very Poor relevant data	No very poor data used.

5. Impact Assessment

Potential Environmental impact of each lifecycle stage is shown below.

Table 5.1.1 – Environmental impact descriptive parameters

TRANSFORMER SFZ-125000/230 (P2403008)

Impact indicator	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
GWP -total	kg CO2 eq	1.41E+07	4.72E+05	4.46E+04	1.58E+04	1.35E+07	1.34E+05
GWP - Fossil	kg CO2 eq	1.38E+07	4.79E+05	4.46E+04	1.23E+03	1.32E+07	1.28E+05
GWP - Biogenic	kg CO2 eq	1.37E+05	-8.02E+03	-7.33E-01	1.46E+04	1.25E+05	5.56E+03
GWP - luluc	kg CO2 eq	1.90E+05	6.48E+02	2.32E+01	2.85E+00	1.89E+05	1.72E+00
Ozone depletion	kg CFC11 eq	2.13E-01	5.84E-03	6.37E-04	1.92E-05	2.06E-01	1.08E-04
Acidification	mol H+ eq	6.27E+04	9.42E+03	9.91E+02	1.14E+01	5.23E+04	2.56E+01
Eutrophication, freshwater	kg P eq	2.19E+03	5.44E+02	2.48E+00	1.57E-01	1.64E+03	8.83E+00
Eutrophication, marine	kg N eq	1.31E+04	6.40E+02	2.47E+02	4.96E+00	1.22E+04	8.35E+00
Eutrophication, terrestrial	mol N eq	1.37E+05	7.54E+03	2.74E+03	5.31E+01	1.27E+05	9.57E+01
Photochemical ozone formation	kg NMVOC eq	5.01E+04	2.76E+03	7.66E+02	1.52E+01	4.66E+04	2.88E+01
Depletion of abiotic resources – minerals and metals	kg Sb eq	1.42E+02	1.25E+02	6.68E-02	5.91E-03	1.67E+01	1.40E-02
Depletion of abiotic resources – fossil fuels	MJ	4.29E+08	7.92E+06	5.77E+05	1.95E+04	4.21E+08	7.05E+04
WDP	m3 depriv.	1.49E+07	5.08E+05	1.82E+03	3.01E+02	1.43E+07	4.42E+03

TRANSFORMER SFZ-125000/230 (P2504041)

Impact Indicator	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
GWP -total	kg CO2 eq	1.39E+07	5.58E+05	6.95E+04	2.22E+04	1.31E+07	1.66E+05
GWP - Fossil	kg CO2 eq	1.36E+07	5.69E+05	6.94E+04	1.75E+03	1.28E+07	1.60E+05
GWP - Biogenic	kg CO2 eq	1.36E+05	-1.10E+04	5.35E+00	2.05E+04	1.21E+05	5.57E+03
GWP - luluc	kg CO2 eq	1.85E+05	7.59E+02	3.52E+01	3.62E+00	1.84E+05	2.06E+00
Ozone depletion	kg CFC11 eq	2.09E-01	7.37E-03	1.00E-03	2.72E-05	2.01E-01	1.26E-04
Acidification	mol H+ eq	6.34E+04	1.13E+04	1.20E+03	1.67E+01	5.08E+04	3.10E+01
Eutrophication, freshwater	kg P eq	2.23E+03	6.25E+02	4.84E+00	2.14E-01	1.59E+03	1.11E+01
Eutrophication, marine	kg N eq	1.29E+04	7.36E+02	2.99E+02	7.30E+00	1.19E+04	1.01E+01
Eutrophication, terrestrial	mol N eq	1.35E+05	8.70E+03	3.32E+03	7.82E+01	1.23E+05	1.17E+02
Photochemical ozone formation	kg NMVOC eq	4.96E+04	8.70E+03	9.61E+02	2.23E+01	4.53E+04	3.47E+01
Depletion of abiotic resources – minerals and metals	kg Sb eq	1.61E+02	1.17E-03	1.28E-01	7.64E-03	1.63E+01	1.70E-02
Depletion of abiotic resources – fossil fuels	MJ	4.20E+08	1.47E-03	9.32E+05	2.72E+04	4.09E+08	8.33E+04
WDP	m3 depriv.	1.46E+07	3.00E-04	3.47E+03	3.93E+02	1.39E+07	5.02E+03

Note: Th negative value of Climate change -Biogenic indicator in manufacturing stage is due to the use of plywood as auxiliary material in upstream that will be used for sea transportation. Plywood will be seen as CO2e absorbed, since they are from biogenic material. Due to the fact that the total biological carbon emissions of the main materials, parts and components and Air-cooled control cabinet and transportation of raw material (positive values) are less than those of the plywood as auxiliary material, the total biological carbon emissions in manufacturing stage is negative.

Parameters describing resource use are shown below.

Table 5.2 – Parameters describing resource use

TRANSFORMER SFZ-125000/230 (P2403008)

Parameter	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	4.27E+08	5.99E+06	5.77E+05	1.95E+04	4.21E+08	7.05E+04
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1.35E+08	1.85E+06	5.31E+03	2.64E+03	1.33E+08	1.79E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1.35E+08	2.05E+06	5.31E+03	2.64E+03	1.33E+08	1.79E+03
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	4.29E+08	7.92E+06	5.77E+05	1.95E+04	4.21E+08	7.05E+04
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	1.95E+05	1.95E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	1.93E+06	1.93E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	m3	2.07E+05	1.46E+04	5.62E+01	6.13E+00	1.92E+05	1.39E+02
Use of secondary raw materials (MS)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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

TRANSFORMER SFZ-125000/230 (P2504041)

Parameter	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw material (PENRE)	MJ, net calorific value	4.17E+08	7.05E+06	9.32E+05	2.72E+04	4.09E+08	8.33E+04
Use of renewable primary energy excluding renewable primary energy resources used as raw material (PERE)	MJ, net calorific value	1.32E+08	2.25E+06	9.66E+03	3.34E+03	1.29E+08	2.14E+03
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PERT)	MJ, net calorific value	1.32E+08	2.50E+06	9.66E+03	3.34E+03	1.29E+08	2.14E+03
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) (PENRT)	MJ, net calorific value	4.20E+08	9.47E+06	9.32E+05	2.72E+04	4.09E+08	8.33E+04
Use of renewable primary energy resources used as raw material (PERM)	MJ, net calorific value	2.55E+05	2.55E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ, net calorific value	2.42E+06	2.42E+06	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Net use of fresh water (FW)	m3	2.05E+05	1.77E+04	7.68E+01	1.05E+02	8.18E+00	1.87E+05
Use of secondary raw materials (MS)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels (RSF)	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
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

Waste production descriptive parameters are shown below.

Table 5.3 – Waste production descriptive parameters

TRANSFORMER SFZ-125000/230 (P2403008)

Parameter	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
Hazardous waste disposed (HWD)	kg	6.40E+03	3.32E+02	9.57E+00	8.22E+01	5.80E+03	1.71E+02
Non-hazardous waste disposed (NHWD)	kg	8.94E+05	1.68E+05	1.51E+04	3.89E+02	7.01E+05	9.38E+03
Radioactive waste disposed (RWD)	kg	3.43E+03	1.27E+01	7.93E-02	5.53E-02	3.42E+03	2.42E-02
Materials for energy recovery (MER)	kg	2.55E+04	0.00E+00	0.00E+00	9.97E+03	0.00E+00	1.55E+04
Material for recycling (MFR)	kg	1.18E+05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.18E+05
Components for reuse (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (ETE)	MJ	1.41E+06	0.00E+00	0.00E+00	4.90E+04	0.00E+00	1.36E+06
Exported electricity energy (EEE)	MJ	1.59E+05	0.00E+00	0.00E+00	2.44E+04	0.00E+00	1.35E+05

TRANSFORMER SFZ-125000/230 (P2504041)

Parameter	Unit	Total	Manufacturing Stage	Distribution Stage	Installation Stage	Use & Maintenance Stage	End of Life Stage
Hazardous waste disposed (HWD)	kg	6.35E+03	3.92E+02	1.90E+01	1.15E+02	5.64E+03	1.81E+02
Non-hazardous waste disposed (NHWD)	kg	9.54E+05	2.20E+05	3.93E+04	5.43E+02	6.82E+05	1.16E+04
Radioactive waste disposed (RWD)	kg	3.34E+03	1.46E+01	1.47E-01	6.99E-02	3.33E+03	2.90E-02
Materials for energy recovery (MER)	kg	6.76E+04	0.00E+00	0.00E+00	1.40E+04	0.00E+00	5.36E+04
Material for recycling (MFR)	kg	1.34E+05	0.00E+00	0.00E+00	3.00E+04	0.00E+00	1.04E+05
Components for reuse (CRU)	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported thermal energy (ETE)	MJ	1.42E+06	0.00E+00	0.00E+00	4.90E+04	0.00E+00	1.37E+06
Exported electricity energy (EEE)	MJ	1.66E+05	0.00E+00	0.00E+00	2.44E+04	0.00E+00	1.42E+05

5. References

- ISO 14040:2006 Environmental management — Life cycle assessment — Requirements and guidelines
- ISO 14044:2006 Environmental management — Life cycle assessment — Principles and framework
- EPDItaly007 – PCR for Electronic and electrical products and systems, Rev. 3.2, 2025/12/20
- EPDItaly018 – Electronic and electrical products and systems – Power transformers, Rev. 3.6, 2024/07/01
- EN 50693:2019 Product category rules for life cycle assessments of electronic and electrical products and systems
- Regulations of the EPDItaly Programm Rev. 7.1, 2025/09/05
- CHINT TRANSFORMER SFZ-125000/230 (P2403008) & TRANSFORMER SFZ-125000/230 (P2504041) LCA Report Date of Report 11.08.2026 version 4.0