

# Raychem RPG (P) Ltd.



## ENVIRONMENTAL PRODUCT DECLARATION

Product Name:

**Composite Insulators**

1. EP6683-000\_CLP-10-CBM20-110-400
2. EP6684-000\_CS-45-CTP-140-450-M


Site Plant:

**Safari Crossing, Near Halol  
GIDC, Village - Kanjari, Taluka -  
Halol, District - Panchmahal,  
Gujarat - 389350, India**

Program Operator	EPDItaly
Publisher	EPDItaly
Declaration Number	RAYCHEM_CFP_EPD-001
EPDItaly Registration Number	EPDITALY0137
Issue Date	2021.04.09
Valid to	2026.04.09

**in compliance with ISO 14025 and EN 50693**



EPD Owner	Raychem RPG (P) Ltd.
Manufacturer name and address	Raychem RPG (P) Ltd. Safari Crossing, Near Halol GIDC, Village - Kanjari, Taluka - Halol, District - Panchmahal, Gujarat - 389350, India
Company Contact	Mr. Kirushnaraj P, Email ID: Kirushnaraj_P@raychemrpg.com
Program operator	EPDIItaly – <a href="mailto:info@epditaly.it">info@epditaly.it</a>
Declared product & Functional unit or declared unit	1. EP6683-000_CLP-10-CBM20-110-400 – with a weight of 3.33 kg 2. EP6684-000_CS-45-CTP-140-450-M – with a weight of 1.14 kg
Description of product application/use	The Raychem RPG polymeric insulator combines mechanical strength with excellent pollution performance. The high tensile strength of glass fiber has been combined with our HV shed profile, to produce this rugged, lightweight tension insulator for overhead line applications.
Independent verification	This declaration has been developed referring to the EPDIItaly, following the "Regolamento di EPDIItaly"; further information and the document itself are available at: <a href="http://www.epditaly.it">www.epditaly.it</a> . EPD document valid within the following geographical area: Italy and other countries worldwide according to sales market conditions  Independent verification of the declaration and data carried out according to ISO 14025: 2010  <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL  Third party verification carried out by: ICMQ SpA, via De Castillia, 1020124 - Milan ( <a href="http://www.icmq.it">www.icmq.it</a> ). Accredited by: Accredia.
Reference PCR and version number	Core PCR: EPDIItaly007 Electronic and Electrical Products and Systems Rev 2, 2020/01/20; CPC: 46 "Electrical machinery and apparatus"  Sub-PCR: EPDIItaly010 Electronic and Electrical Products and Systems – Insulators, Rev. 0, 16/03/2020; CPC: 4621 "Electricity distribution or control apparatus"
Product RSL description (if appl.)	20 years
Markets of applicability	Europe, North America, South America
EPD type	Product-Specific
EPD scope	Cradle-to-Grave
Year of reported primary data	January 2020—December 2020
Technical support	  Sphera Solutions Inc. (India) 707, Meadows, Sahar Plaza, Andheri Kurla Road, Andheri East, Mumbai, India – 400059
LCA software & version number	GaBi (v10.0)
LCI database(s) & version number	GaBi (CUP 2020.2)
LCIA methodology & version number	EN 50693:2019

## LIMITATIONS

**Exclusions:** EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these

impacts and/or set performance thresholds – e.g., Type 1 certifications, health assessments and declarations, environmental impact assessments, etc.

Accuracy of Results: EPDs regularly rely on estimations of impacts; the level of accuracy in estimation of effect differs for any particular product line and reported impact.

Comparability: EPDs published within the same product category, though originating from different programs, may not be comparable. 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”. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared.

## 1. Product Definition and Information

### 1.1. Description of Company/Organization

Raychem RPG (P) Ltd. was incorporated in 1989. It is a 50:50 Joint Venture between TE Connectivity, U.S.A. (formerly Tyco Electronics) and RPG Enterprises, India. TE Connectivity is a US\$ 12 Billion global provider for Solutions in Network, Transportation, Consumers and Industrial for over 50 years. RPG Enterprises, an establishment of over 30 years, is one of India's fastest growing business groups with turnover of over US\$ 3.5 Billion. The group has more than fifteen companies managing diverse business interests in the areas of Automotive Tyres, Infrastructure, IT and Specialty including Pharmaceuticals, Power Ancillaries & Plantations.

Business:

Raychem RPG (P) Ltd is involved in technologies strengthening the infrastructure segments of economy under following Strategic Business Units (SBU).

Energy Products:

- Power Cable Accessories
- Raysulate & Services
- Connectors & Fittings
- Insulation and Protection

Exports:

- Customized Electrical Components
- Cable Management Solutions - Polymeric Moulded Components
- Insulators & Surge Arresters

### 1.2. Product Description

#### 1.2.1 Product Identification

The Raychem RPG (P) Ltd.'s composite insulator provides mechanical support to hold conductor away from tower/ pole as well as it provides Electrical Insulation between conductor and tower.

Table 1 Product Identification and specifications

Information	Description	
Product Features	<ul style="list-style-type: none"> <li>• High tracking and erosion resistance</li> <li>• Excellent performance under polluted conditions</li> <li>• Vandal and break resistant</li> <li>• Aerodynamic design</li> </ul>	
Product Identification	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M
Product Properties (IEC62217 & IEC 61109 & IEC61952)	Maximum System Voltage – 15kV Specified Cantilever load – 10 kN Impulse Withstand Voltage - 110kV Wet power frequency voltage – 40 kV Creepage distance – 400 mm	Maximum System Voltage – 15kV Specified Tensile Load – 45 kN Impulse Withstand Voltage - 110kV Wet power frequency voltage – 40 kV Creepage distance – 400 mm

### 1.2.2 Product Specification

The composite insulator consists of silicone which is a hydrophobic material with a performance of both proven tracking and erosion resistance and UV stability that gives a good balance of technical performance in a wide range of climatic and pollution conditions. The construction consists of compact creepage design insulator profile which has alternating diameter sheds in order to maximize flashover performance in polluted environments over a minimum insulator length. Table 1 above contains description of product specifications.

The production process ensures void free construction and optimal interfacial sealing. This is achieved by bonding the hydrophobic silicone insulating material directly to the FRP core and galvanized steel fittings using a proprietary bonding agent.

### 1.3. Application

The Raychem RPG (P) Ltd.'s composite insulator combines mechanical strength with excellent pollution performance. The high tensile strength of glass fibre has been combined with our HV shed profile, to produce this rugged, lightweight tension insulator for overhead line applications.

### 1.4. Material Composition

The product components are indicated as percentages by mass in the following table:

*Table 2. Content of Materials*

Name/Material of Component	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M
Steel	63%	54%
HTV Rubber	9%	20%
FRP Rod	15%	13%
Packaging (wood and Paper)	12%	12%
Others	Approximately 1%	Approximately 1%

### 1.5. Declaration of Methodological Framework

A full LCA approach was considered with some simplification on data modelling using generic data for most background systems. The EPD analysis uses a cradle-to-grave system boundary. No known flows are deliberately excluded from this EPD. The assessment is carried out as per the guidelines mentioned in PCR EPDIItaly010 - Insulators<sup>1</sup>. Detailed description of functional unit, system boundary and assumptions are mentioned in the following chapters.

<sup>1</sup> PCR EPDIItaly010 – Insulators, Electronic And Electrical Products And Systems – Insulators Rev. 0, Issue date: 16/03/2020

## 2. Life Cycle Assessment Background Information

### 2.1 Functional Unit

Table 3 Functional Unit of two Variants of the insulator products

Nº	Product No.	Rated Voltage [kV]	Product Weight incl. packaging[kg]
1	EP6683-000_CLP-10-CBM20-110-400	Up to 15	3.33
2	EP6684-000_CS-45-CTP-140-450-M	Up to 15	1.14

### 2.2 System Boundary

The specific system boundary considered is a cradle-to-grave life cycle of the two variants of insulator products which includes raw material extraction, part/component manufacturing, transportation and manufacturing/assembly of the Insulator products followed by distribution, installation, and end-of-life of the products as shown in Figure 1.

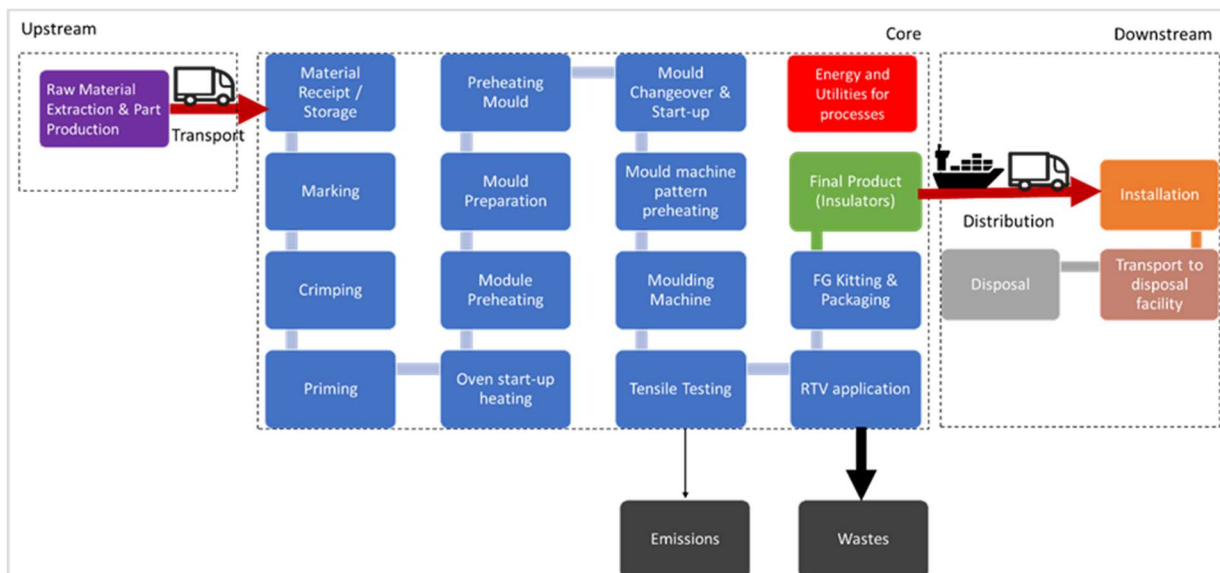


Figure 1 System Boundary for LCA of Insulator Products

Table 4. Life Cycle Modules

Manufacturing Stage		Distribution Stage	Installation Stage	Use & Maintenance Stage	End-Of-Life Stage
<b>Upstream Module</b>	<b>Core Module</b>	<b>Downstream Module</b>			
extraction of raw materials, including waste recycling processes and the production of semi-finished and ancillary products, as well as their packaging	manufacturing of the product constituents, including all the stages	In accordance with EN 50693			
transportation of raw materials to the manufacturing company	product assembly				

Manufacturing Stage		Distribution Stage	Installation Stage	Use & Maintenance Stage	End-Of-Life Stage
<b>Upstream Module</b>	<b>Core Module</b>	<b>Downstream Module</b>			
	packaging				
	waste recycling processes				

**Upstream Module:** This module involves extraction of raw materials and the production of semi-finished and ancillary products, as well as their packaging along with transportation of raw materials to the Raychem RPG (P) Ltd.'s manufacturing facility.

**Core Module:** Production of insulator products at the Halol facility begins with the receipt of raw material and ends with the inspection of the final product followed by packaging. Details of the production processes undertaken in manufacturing facility is listed in Table 3.

**Downstream Module:** The products are then distributed to various retailers for installation. The distribution stage involves transportation via land and sea routes to do delivery of the products to the point of sale. Since, the insulator's installation does not require any relevant inputs in terms of materials and energy, a cut-off on the impacts included in the module is made. However, the packaging material associated with the products are separated during installation stage; its treatment is accounted under installation stage and subsequent credits are accounted. It is assumed that the transportation of used insulators to a collection site is within 100 km radius from the point of installation as a conservative approach. It is assumed that the insulator products are disposed of in landfill sites. The credits of energy recovery from packaging materials are considered.

## 2.3 Cut-off Criteria

1. Mass: A total of all flows contributing to less than 1% of the cumulative mass of the model is excluded, providing its environmental relevance is not a concern.
2. Energy: None of the energy process has been cut-off in this assessment.
3. Environmental relevance – Material flows which leave the system (by emissions) and whose environmental impact is greater than 1% of the whole impact of an impact category that has been documented in the assessment are covered.
4. In case of human labour, social issues are outside the scope of this assessment. The exclusions also consist of accessories and auxiliaries which are not process wastes such as personal protective equipment (PPEs), cotton wads etc.

## 2.4 Data sources

### 2.4.1 Background data

All background data used is taken from the GaBi databases (CUP 2020.2) and are documented in the URL: [www.gabi-software.com/databases](http://www.gabi-software.com/databases) .

## 2.4.2 Data Quality

The i background data used from GaBi databases are all latest (2020) and the data quality and representativity of primary as well as background data is high.

## 2.4.3 Period under review

The data used refers to the production processes of calendar year 2020 at the Raychem RPG Private Limited manufacturing plant located at Halol, India. The Life Cycle Assessment is modelled for Indian Geography.

## 2.4.4 Allocation

For all the inventories, data was available at the lowest granular level of the production steps and no allocation was used.

The waste generated during the processes are packaging waste (supply components and parts). These wastes are disposed in a landfill site. For accounting the GWP impact, system expansion approach is applied taking the actual waste treatment disposal scenario.

Paper/corrugated board is used as packaging material for the insulator products. It includes a mix of recycled and virgin fibres. When modelling the production of paper, the scrap paper that is used in this process has been assumed to be burden free. The recycled paper content in the used dataset is 47.26%. The wastepaper at the end of its life is assumed to go for incineration followed by energy recovery. Subsequent credits are only considered from the virgin content of the paper. The uptake and release of carbon is adjusted while considering the credits from wastepaper. For the waste incineration plant, R1-value of >0.6 is assumed.

## 2.4.5 Comparability and Benchmarking

No comparisons or benchmarking are included in this EPD. LCA results across EPDs can be calculated with different background databases, modelling assumptions, geographic scope and time periods, all of which are valid and acceptable according to the Product Category Rules (PCR) and ISO standards. The user of the EPD should take care when comparing EPDs from different companies. Assumptions, data sources, and assessment tools may all impact the uncertainty of the final results and make comparisons misleading.

## 3. LCA: Scenarios and additional technical information

### Characteristic product properties Information on biogenic Carbon

The mass of packaging is declared and associated biogenic carbon content is listed in the table below. There is no biogenic carbon content in the product.

*Table 5 Information on describing the biogenic Carbon Content at factory gate*

Name	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M	Unit
Biogenic Carbon Content in product	0	0	kg C
Biogenic Carbon Content in packaging	2.48E-01	8.65E-02	kg C

The following technical information is the basis for the declared modules.

### Transport from gate to the site

Table 6 Transport from the gate to the site

Name	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M	Unit
Transport distance (Ship)	20000	20000	km
Transport distance (Truck)	300	300	km

### Installation

The following packaging materials are considered on construction site:

Table 7 Packaging Material at Installation Site

Name	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M	Unit
Wooden pallet for packaging	0.2	0.049	Kg/m <sup>2</sup>
Cardboard boxes	0.231	0.095	Kg/m <sup>2</sup>

### End of Life of Product

Installation of the product is done manually. Hence, no additional energy or material is required. The packaging wooden pallet and cardboard boxes go into incineration after installation of the product. The impacts of incineration and subsequent credits of energy recovery from packaging wastes are considered.

Table 8 End of life

Name	EP6683-000_CLP-10-CBM20-110-400	EP6684-000_CS-45-CTP-140-450-M	Unit
Collected Separately	2.9	0.986	kg
Disposal (landfill)	2.9	0.986	kg
Transport (To Waste processing Site)	100	100	km

### Reuse, recovery and/or recycling potentials

The potential benefits from packaging material during the installation stage are declared. For waste incineration, combustion in a waste incineration plant (R1 > 0.6) with energy recuperation is considered. Recycling credits after the end-of-life of the product are considered.

## 4. LCA: Results

The following tables depict the results of the indicators with the associated magnitude of impact, use of resources as well as waste and other output flows in relation to 1 unit of respective products.

**Table 9. Environmental impacts of 1 unit of EP6683-000\_CLP-10-CBM20-110-400 with mass 3.33 kg**

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
GWP - total [kg CO <sub>2</sub> eq.]	1.38E+01	9.19E-01	1.27E+00	1.60E+01
GWP - fossil [kg CO <sub>2</sub> eq.]	1.44E+01	5.57E-02	6.71E-01	1.51E+01
GWP - biogenic [kg CO <sub>2</sub> eq.]	-6.06E-01	8.63E-01	5.90E-01	8.47E-01
GWP - luluc [kg CO <sub>2</sub> eq.]	2.37E-02	2.15E-05	5.11E-03	2.89E-02
ODP [kg CFC-11 eq.]	7.81E-12	1.16E-16	-7.22E-16	7.81E-12
AP [Mole of H+ eq.]	8.50E-02	3.21E-04	2.20E-02	1.07E-01
EP - freshwater [kg P eq.]	2.45E-05	6.59E-06	3.62E-07	3.14E-05
EP - marine [kg N eq.]	1.35E-02	1.56E-04	5.91E-03	1.95E-02
EP - terrestrial [Mole of N eq.]	1.44E-01	1.08E-03	6.49E-02	2.10E-01
POCP [kg NMVOC eq.]	4.15E-02	5.35E-04	1.63E-02	5.83E-02
ADPF [MJ]	1.80E+02	7.52E-01	8.47E+00	1.90E+02
ADPE [kg Sb eq.]	4.67E-05	2.97E-09	-1.80E-08	4.67E-05
WDP [m <sup>3</sup> world equiv.]	1.62E+00	2.19E-03	5.88E-02	1.68E+00

**Table 10. Resource consumption of 1 unit of EP6683-000\_CLP-10-CBM20-110-400 with mass 3.33 kg**

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
PERE [MJ]	4.04E+01	4.66E-02	4.91E+00	4.54E+01
PERM [MJ]	6.02E+00	0.00E+00	-6.02E+00	0.00E+00
PERT [MJ]	4.64E+01	4.66E-02	-1.11E+00	4.54E+01
PENRE [MJ]	1.80E+02	7.52E-01	8.24E+00	1.89E+02
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [MJ]	1.80E+02	7.52E-01	8.24E+00	1.89E+02
SM [kg]	5.39E-01	0.00E+00	0.00E+00	5.39E-01
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m3]	5.34E-02	8.44E-05	-3.89E-03	4.95E-02

**Table 11. Output Flows and Waste Category Of 1 Unit of EP6683-000\_CLP-10-CBM20-110-400 With Mass 3.33 Kg**

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
HWD [kg]	6.56E-07	3.93E-10	8.59E-09	6.65E-07
NHWD [kg]	9.68E-01	6.10E-01	2.92E+00	4.50E+00
RWD [kg]	2.64E-03	4.24E-06	-4.64E-05	2.60E-03
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	9.22E-01	9.22E-01
EET [MJ]	0.00E+00	0.00E+00	1.67E+00	1.67E+00

**Table 12. Environmental impacts of 1 unit of EP6684-000\_CS-45-CTP-140-450-M with mass 1.14 kg**

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
GWP - total [kg CO <sub>2</sub> eq.]	7.57E+00	3.97E-01	4.44E-01	8.41E+00
GWP - fossil [kg CO <sub>2</sub> eq.]	7.80E+00	2.96E-02	2.26E-01	8.05E+00
GWP - biogenic [kg CO <sub>2</sub> eq.]	-2.39E-01	3.67E-01	2.16E-01	3.44E-01
GWP - luluc [kg CO <sub>2</sub> eq.]	1.53E-02	1.14E-05	1.73E-03	1.71E-02
ODP [kg CFC-11 eq.]	4.46E-12	6.19E-17	-2.67E-16	4.46E-12

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
AP [Mole of H+ eq.]	5.92E-02	1.62E-04	7.53E-03	6.69E-02
EP - freshwater [kg P eq.]	1.40E-05	3.83E-06	1.18E-07	1.80E-05
EP - marine [kg N eq.]	8.23E-03	7.27E-05	2.02E-03	1.03E-02
EP - terrestrial [Mole of N eq.]	8.90E-02	5.28E-04	2.22E-02	1.12E-01
POCP [kg NMVOC eq.]	2.56E-02	2.46E-04	5.56E-03	3.14E-02
ADPF [MJ]	1.02E+02	4.03E-01	2.84E+00	1.05E+02
ADPE [kg Sb eq.]	3.58E-05	1.59E-09	-6.87E-09	3.58E-05
WDP [m <sup>3</sup> world equiv.]	1.12E+00	7.95E-04	2.13E-02	1.14E+00

Table 13. Resource consumption of 1 unit of EP6684-000\_CS-45-CTP-140-450-M with mass 1.14 kg

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
PERE [MJ]	2.67E+01	2.49E-02	1.79E+00	2.85E+01
PERM [MJ]	2.20E+00	0.00E+00	-2.20E+00	0.00E+00
PERT [MJ]	2.89E+01	2.49E-02	-4.07E-01	2.85E+01
PENRE [MJ]	1.02E+02	4.03E-01	2.76E+00	1.05E+02
PENRM [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRT [MJ]	1.02E+02	4.03E-01	2.76E+00	1.05E+02
SM [kg]	2.01E-01	0.00E+00	0.00E+00	2.01E-01
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m3]	3.66E-02	3.63E-05	-1.43E-03	3.52E-02

Table 14. Output Flows and Waste Category of 1 unit of EP6684-000\_CS-45-CTP-140-450-M with mass 1.14 kg

Impact Category [Unit]	Upstream Module	Core	Downstream Module	Total
HWD [kg]	2.71E-06	2.10E-10	2.90E-09	2.71E-06
NHWD [kg]	5.98E-01	3.46E-01	9.94E-01	1.94E+00
RWD [kg]	1.74E-03	2.26E-06	-1.71E-05	1.73E-03
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	3.37E-01	3.37E-01
EET [MJ]	0.00E+00	0.00E+00	6.11E-01	6.11E-01

**Disclaimer** – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP

The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experience with these indicators.

## 5. References

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BACKGROUND REPORT	Background Report - Life Cycle Assessment of Insulator Products- 2 variants, Sphera Solutions Inc., April 2021
EN ISO 14025	EN ISO 14025:2011-10 Environmental labels and declarations - Type III environmental declarations - Principles and procedures
EN ISO 14040	EN ISO 14040:2009-11 Environmental management - Life cycle assessment - Principles and framework
EN ISO 14044	EN ISO 14044:2006-10 Environmental management - Life cycle assessment - Requirements and guidelines
EPDITALY REGULATIONS	Regulations of EPDItaly program, v. 5
GABI TS	GaBi ts dataset documentation for the software-system and databases, LBP, University of Stuttgart and Sphera, Leinfelden-Echterdingen, 2020 ( <a href="http://documentation.gabi-software.com/">http://documentation.gabi-software.com/</a> ), content version 2020.2
PCR EPDITALY 007	Electronic and Electrical Products and Systems, Rev. 2, Dated: 21/10/2020
SUB PCR EPDITALY	Electronic and Electrical Products And Systems – Insulators, Rev. 0, Dated: 16/03/2020