GlobalEPD

A VERIFIED ENVIRONMENTAL DECLARATION

AENOR

Environmental Product Declaration

EN ISO 14025:2010

EN 50693:2019

TSLI(F) 76/132kV (145kV) 1x1600MAl+H70+4MM+4SM

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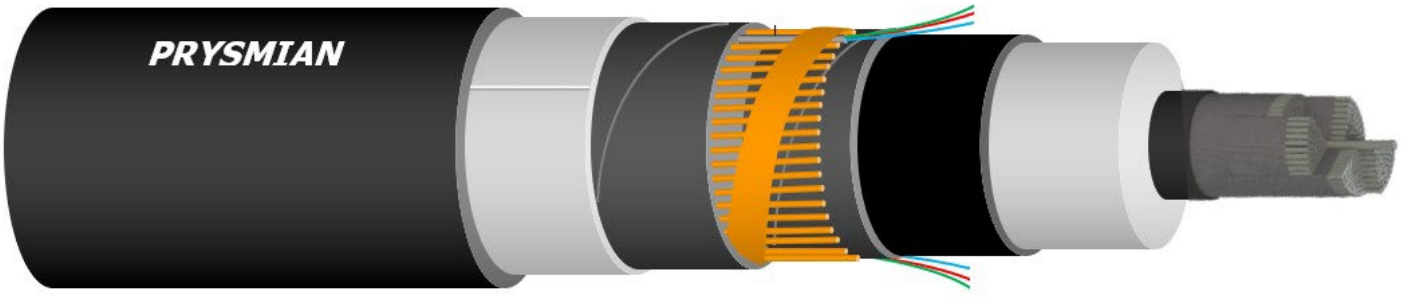
prysmian

Prysmian Cables Spain S.A



The owner of this Declaration is responsible for its content, as well as for keeping the supporting documentation that justifies the data and statements included during the period of validity.

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PCR EDP Italy 007 ‘Electronic and electrical product and systems’ Sub-PCR EPD Italy 016 ‘Electronic And Electrical Products And Systems –Cables And Wires’ The European standard EN 50693:2020 is used as the base for the PCRs
Independent verification of the declaration and data, according to EN ISO 14025:2010 ☐ Interna ☒Externa
Third party verifier: AENOR

1. General information

1.1. The organization

Prysmian Group is a world leader in the manufacture of Low Voltage (LV), Medium Voltage (MV), High Voltage (HV), Specialty Cables and Accessories associated with the energy world; as well as Optical Fibre Cables, Cable systems for data and image transmission, High Voltage lines and installation services for Medium, High Voltage and Submarine cables and accessories.

With more than 140 years of experience, the Group has a long history, always at the forefront in the effort to meet the needs of customers in constant evolution.

1.2. Scope

The product under assessment is a high voltage cable of Prysmian: TSLI(F) 76/132kV (145kV) 1x1600MAl+H70+4MM+4SM. Its main function is energy transmission.

Prysmian Group currently has 4 production centres in Spain specializing in the manufacture of Low Voltage (LV), Medium Voltage (MV) and High Voltage (HV) cables, special cables and accessories associated with the world of energy, as well as Fibre Optic cables, cable systems for data and image transmission in High Voltage lines and turnkey installation services for Medium Voltage, High Voltage and submarine cables and accessories.

1.3. Life cycle and compliance

This EPD has been developed and verified with the following the Standards EN ISO 14025:2010, EN 50693:2020 and following Product Category Rule:

INFORMATION ON CATEGORY RULES PRODUCT	
Descriptive title	Electronic and electrical product and systems & Electronic and Electrical Products and Systems Cables and Wires
Registration code	PCR EPD Italy 007 & Sub PCR EPD Italy 016
Issue date	PCR EPD Italy 007, 13/01/2023 Sub PCR EPD Italy 016, 25/09/2020
Compliance	EN 50693:2019
Programme Manager	AENOR

This Environmental Statement includes the following life cycle stages:

Limits of the system. Information modules considered.

Manufacturing	Raw materials	X
	Raw materials transport	X
	Manufacturing	X
Distribution	Distribution	X
Installation	Installation	X
Use & Maintenance	Use and Maintenance	X
End of life	Deinstallation	NRM
	Waste transport	X
	Waste treatment	X
	Waste Disposal	X
	Beneficts and loads	X

This EPD may not be comparable with those developed in other Programs or according to different reference documents. It may not be comparable with EPDs not developed according to EN 50693:2020.

Similarly, these EDP may not be comparable if the origin of the data is different (e.g. databases), not all relevant information modules are included or they are not based on the same scenarios.

The comparison of products must be made on the same function, applying the same functional unit and at the level of the building (or architectural or engineering work), i.e. including the behavior of the product throughout its life cycle, as well as the specifications of section 6.7.2 of EN ISO 14025

1.4. Differences from previous versions of this DAP.

This DAP is an update to the version published on 2023-12-15

2. Product

2.1. Product identification

This Environmental Product Declaration covers the High Voltage cable TSLI(F) 76/132kV (145kV) 1x1600MAl+H70+4MM+4SM (code 20363009). This type of cable is mainly used for energy distribution.

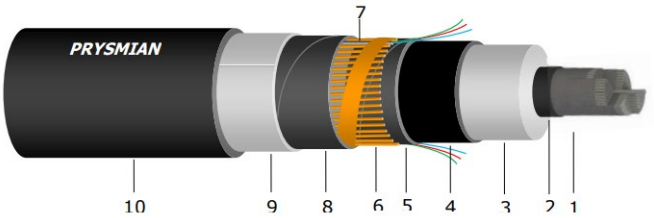
2.2. Product performance

The manufacturer declares the following information on the technical specifications of the product:

HV4 features

Characteristic	HV4
Rated voltage, Uo/U(Um) [kV]	76/132(145)
Section of conductor [mm²]	1600
Approximate weight [kg/m]	12.4
Electrical resistance of conductor at 20ºC c.c. [Ω/km]	0.0186

HV4 diagram



1. Conductor
2. Conductor screen
3. Insulation
4. Insulation screen
5. Longitudinal waterblocking
6. Metallic screen
7. Optical fibres
8. Spacer: Waterblocking
9. Radial water blocking
10. Oversheath

3. Information about LCA

3.1. Life Cycle Analysis

The goal of this Environmental Product Declaration is analyzing the potential environmental impacts of the high voltage cable TSLI(F) 76/132kV (145kV) 1x1600MAl+H70+4MM+4SM, manufactured by Prysmian Cables Spain S.A. at 'Cavinova Energía' plant, based in Vilanova I la Geltrú.(Barcelona, Spain).

Information of this EPD is based on the report "ACV DE LOS PRODUCTOS TSLI(F) 76/132kV (145kV) 1600Al+H70, TSLI(F) 76/132kV (145kV) 1x400 Al2 H70, RHZ1-RA+2OL(S) 132KV 1X1200MAL+H120 Y TSLI(F) 76/132kV (145kV) 1x1600MAl+H70+4MM+4SM FABRICADOS POR PRYSMIAN GROUP". The LCA study, as well as the present EPD, has been performed by Anthesis Lavola in 2023, using SimaPro software 9.5.0.1 and Ecoinvent database version 3.9.1.

3.2. Declared unit

The functional unit used is:

To transmit energy expressed for 1A over a distance of 1km during 40 years and a 100% use rate.

3.3. Reference Service Life (RSL)

A Reference Service Life (RSL) of 40 years has been declared.

3.4. Allocation criteria

A mass allocation has been performed for the calculation of the following impacts:

- Resources used in the manufacturing process.
- Emissions and waste generated during the manufacturing process.

3.5. Representativity, quality and selection of data

For the development of this study, the data quality requirements established by the EN 50693: 2019 standard have been considered.

All processes relevant to the different products and representing the specific situation of each product have been used.

Primary inventory data has been provided by Prysmian Group, corresponding to year 2022. Prysmian Group has given data related to the raw material consumption and suppliers of each material, manufacturing process of the cable (all the resources needed and waste generated), packaging and distribution of the cables.

Secondary data has been collected from generic database Ecoinvent version 3.9.1.

To ensure consistency, data at the same level of detail and developed under the same methodological considerations have been used. The methods and data used have been described in such a way that they can be reproduced by an independent professional.

The requirements for coverage and representativeness are the following:

- Temporal coverage: the life cycle analysis has been based on 2022 relative data of the different cable components collected through questionnaires to Prysmian Group.
- Geographic coverage: wherever possible, generic data representative of the country or larger territories (Europe) have been used.
- Technological coverage: to model the components not manufactured by Prysmian Group, the Ecoinvent v3.9.1 database has been used.

3.6. Other calculation rules and assumptions

The impact of the production of auxiliary materials for cable manufacturing has not been considered. This accounts for less than 0.5% of the impact.

In the installation phase, only packaging material waste generated during installation is considered while energy consumption has been excluded due to the wide variety of installation processes that exist for electrical cables (according to EN 50693 for electronic products, PSR-001 for cables).

In the End-of-Life stage, it has been considered that there is no relevant electricity consumption in the disassembly or dismantling operation, therefore this process is outside the scope of the study as a not relevant module (NRM).

4. System boundaries, scenarios, and additional technical information.

The life cycle stages considered in the assessment are described below, according the definition included in EN 50693, the generic PCR for electronic and electrical product and systems (PCR EPD Italy007) and the Sub-PCR for Electronic And Electrical Products And Systems –Cables And Wires (PCR EPD Italy 016)

4.1. Manufacturing

Raw materials: considers the extraction and production of raw materials for semi-finished products received from external suppliers and used to produce and assemble the cable components. The datasets representing this stage consider material transformation operations, energy, waste treatments and emissions derived from these procedures, which are included in the background SimaPro processes.

Some of the materials incorporated in the cable are semi-processed. Based on the data provided by Prysmian Group, the quantities of each material required to manufacture the corresponding quantity of semi-finished products have been included.

Raw materials transport: considers the transport of raw materials from the supplier to the manufacturing plant. Prysmian Group has provided the specific information for each supplier of the materials and the specific type of transport (road or sea transport).

For this module all transports to and from the different production sites have considered the following truck: > 32 tonnes and EURO 5 emissions.

Manufacturing: covers the manufacture of the final product, including drawing and cabling operations, product assembly and packaging. This stage considers the production of semi-finished products and packaging materials. Water and electricity consumption is considered, as well as the generation of waste and wastewater.

For this module all transports to and from the different production sites have considered the following truck: < 16 tonnes and EURO 5 emissions.

The general manufacturing process includes the drawing of copper and aluminium for conductor and screen, the extrusion of polymers and their cross-linking for insulation and sheathing, and the packaging process for distribution.

The basic packaging of the cable is wooden or steel drums: the weight of the drums depends on the considered load capacity. In addition, drums are protected with hardboard and polypropylene film.

According to information provided by Prysmian Group, during year 2022, 40% of the drums used are returned to the production site to be reused.

For the modelling of the energy consumption related to the cable manufacturing process, the Ecoinvent energy mix process has been modified to the 100% renewable energy mix (wind) used by Prysmian Group.

4.2. Distribution, Installation, Use & Maintenance and End-of-life & Deinstallation

For these modules all transports to and from the different production sites have considered the following truck: > 32 tonnes and EURO 5 emissions. Except for the End-of-Life stage, where the waste transport considers trucks > 7.5 -16 tonnes and EURO 5 emissions.

Distribution: The distribution of the product has been calculated considering the distance from the manufacturing plant to the installation site.

Installation: Only packaging material waste generated during installation is considered in this phase.

The following table gathers the end-of-life considerations for the packaging of the product under study:

Packagjng	Recycling	Landfill	Incineration
Metal, Coil	85%	8%	7%
Wood, Coil	30%	38%	32%
Stave	30%	38%	32%
Pallet	30%	38%	32%

Use: This module shall consider the impacts arising from the use phase of the cable. The impact related to electricity losses during the use phase of the cable is related to the Joule effect and is calculated considering the following formula described in PSR-001 for cables:

$E = R \times I2 \times \Delta t.$

The electrical resistance is a characteristic of the cable, described in the data sheets.

Indirect electrical resistance to 20 °C	0.0186
Service life (RSL)	40
Usage rate	100
Usage time (y)	40
Energy consumption during use phase (J*km-1)	0.744

Deinstallation: this end-of-life stage includes the processes for disassembly specified by the manufacturer or the regulatory standards in force, as well as the management of the waste generated at the disassembly centre (collection and treatment until the final treatment of the waste).

It has been considered that there is no relevant electricity consumption in the disassembly or dismantling operation, therefore this process is outside the scope of the study as a not relevant module (NRM).

Waste transport: includes the transport of cables from the point of waste generation to the treatment platform. In the case of recovery and recycling processes, which take place outside the boundaries of the product system, only impacts related to the transport of the waste to the treatment platform are considered.

Waste treatment: includes the collection of waste fractions from decommissioning and the treatment of material streams for reuse, recycling, and energy recovery. Downstream operations from recycled material are outside the scope of the system.

Cable Waste disposal: this module considers the disposal of a material or a set of materials in landfill or incineration when these cannot be recovered as secondary materials.

The following table shows the end of life considered for the different materials that make up the product:

Type of waste	Recycling	Landfill	Incineration
Aluminium	85%	8%	7%
Steel	85%	8%	7%
Copper	95%	3%	2%
Plastic	0%	54%	46%
Others	0%	54%	46%

Benefits and loads: this module considers the net benefits of the system, i.e. the difference between output and input benefits, taking into account the avoided impacts of secondary materials and input and output energy.

The amount of material recycled has been calculated considering the percentages included in table above.

5. LCA and ILCA environmental parameter statements.

Environmental impact

The estimated impact results are relative and do not indicate the final value of the impact categories, nor do they refer to threshold values, safety margins or risks.

Parameter	Units	Manufacturing stage			Distribution stage	Installation stage	Use & maintenance stage	End-of-life stage	Benefits and loads
		Raw materials	Raw materials transport	Manufacturing					
GWP-total	kg CO2 eq	7,47E+04	1,31E+03	4,94E+03	3,79E+03	1,04E+03	3,42E+00	7,62E+03	-3,07E+04
GWP-fossil	kg CO2 eq	7,34E+04	1,31E+03	4,84E+03	3,79E+03	9,77E+02	3,42E+00	7,05E+03	-2,99E+04
GWP-biogenic	kg CO2 eq	3,43E+02	9,36E-02	1,01E+02	2,72E-01	6,62E+01	1,72E-03	5,71E+02	-1,52E+02
GWP-luluc	kg CO2 eq	1,02E+03	2,47E-02	6,82E+00	7,15E-02	6,01E-03	3,44E-04	1,25E+00	-7,18E+02
ODP	kg CFC11 eq	8,86E-03	2,72E-05	8,78E-05	7,88E-05	2,15E-06	7,52E-08	1,51E-05	-8,23E-04
AP	mol H+ eq	1,06E+03	3,29E+00	2,04E+01	9,30E+00	4,81E-01	9,51E-03	5,05E+00	-6,75E+02
EP-freshwater	kg Peq	4,96E+00	9,88E-04	2,12E-01	2,87E-03	2,82E-04	1,31E-04	3,49E-02	-2,86E+00
EP-marine	kg N eq	6,89E+01	1,27E+00	4,27E+00	3,62E+00	2,43E-01	1,95E-03	2,82E+00	-3,45E+01
EP-terrestrial	mol N eq	8,43E+02	1,34E+01	4,50E+01	3,82E+01	2,29E+00	2,23E-02	1,59E+01	-4,43E+02
POCP	Kg NMVOC eq	3,31E+02	5,24E+00	1,84E+01	1,51E+01	7,31E-01	6,77E-03	4,88E+00	-1,67E+02
ADP-minerals& metals [2]	kg Sb eq	1,01E+01	4,32E-05	6,67E-02	1,25E-04	1,07E-05	9,73E-08	1,10E-04	-7,16E+00
ADP-fossil [2]	MJ	1,34E+06	1,67E+04	5,75E+04	4,85E+04	1,26E+03	6,44E+01	1,21E+04	-4,50E+05
WDP [2]	m^3	6,04E+04	1,54E+01	1,36E+03	4,46E+01	-9,72E+00	2,34E-01	3,71E+02	-3,68E+03

GWP-total: Global Warming Potential total; **GWP-fossil:** Global Warming Potential fossil; **GWP-biogenic:** Global Warming Potential biogenic; **GWP-luluc**: Global Warming Potential land use and land use change; **ODP:** Depletion potential of the stratospheric ozone layer; **AP**: Acidification potential; **EP-freshwater:** Eutrophication; **EP-marine:** Eutrophication, marine; **EP-terrestrial:** Eutrophication, terrestrial; **POCP:** Formation potential of tropospheric ozone; **ADP-minerals & metals:** Abiotic Depletion for non-fossil resources potential; **ADP-fossil:** Abiotic Depletion for fossil resources potential; **WDP:** Water deprivation potential.
[2]The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

Additional environmental impacts

Parameter	Units	Manufacturing stage			Distribution stage	Installation stage	Use & maintenance stage	End-of-life stage	Benefits and loads
		Raw materials	Raw materials transport	Manufacturing					
PM	Disease inc.	5,05E-03	1,05E-04	3,20E-04	3,05E-04	8,15E-06	2,87E-08	5,02E-05	-2,86E-03
IRP [1]	kBq U235 eq	5,32E+03	2,66E+00	1,15E+02	7,72E+00	2,69E-01	4,63E-01	3,36E+01	-2,70E+03
ETP-fw [2]	CTUe	6,39E+05	8,42E+03	1,63E+04	2,44E+04	8,46E+02	3,83E+00	1,84E+04	-2,25E+05
HTP-c [2]	CTUh	2,53E-04	9,02E-08	1,32E-05	2,61E-07	9,43E-08	3,04E-10	7,33E-07	-1,85E-04
HTP-nc [2]	CTUh	1,28E-02	1,40E-05	9,32E-05	4,06E-05	3,85E-06	2,12E-08	4,35E-05	-1,01E-02
SQP [2]	-	2,74E+05	3,18E+01	3,08E+05	9,22E+01	1,77E+02	1,11E+01	1,65E+03	-1,40E+05

IRP: Ionising radiation, human health; **PM:** Particulate matter; **SQP:** Land use; **HTP-nc:** Human toxicity, non-cancer**; HTP-c:** Human toxicity, cancer; **ETP-fw:** Ecotoxicity, freshwater.
[1]This impact category deals mainly with the eventual impacts of low doses of ionising radiation on human health from the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents or occupational exposure due to disposal of radioactive waste in underground facilities. The ionising radiation potential of soil, due to radon or some building materials is also not measured with this parameter.
[2]The results of this environmental impact indicator shall be used with care as the uncertainties of the results are high and as there is limited experience with the indicator.

Resource use

Parameter	Units	Manufacturing stage			Distribution stage	Installation stage	Use & maintenance stage	End-of-life stage	Benefits and loads
		Raw materials	Raw materials transport	Manufacturing					
PERE	MJ	3,20E+05	4,39E+01	9,38E+04	1,28E+02	6,35E+00	3,39E+00	-1,93E+05	-1,93E+05
PERM	MJ	2,49E+03	0,00E+00	4,87E+04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	3,22E+05	4,39E+01	1,42E+05	1,28E+02	6,35E+00	3,39E+00	-1,93E+05	-1,93E+05
PENRE	MJ	1,43E+06	1,78E+04	6,17E+04	5,16E+04	1,34E+03	6,78E+01	-4,77E+05	-4,77E+05
PENRM	MJ	2,82E+05	0,00E+00	7,91E+02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,71E+06	1,78E+04	6,25E+04	5,16E+04	1,34E+03	6,78E+01	-4,77E+05	-4,77E+05
SM	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	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	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m^3	6,02E+03	6,99E-01	3,70E+01	2,03E+00	-1,21E-01	2,99E-02	-1,33E+03	-1,33E+03

PERE : Use of renewable primary energy excluding renewable primary energy resources used as raw materials; **PERM**: Use of renewable primary energy resources used as raw materials; **PERT**: Total use of renewable primary energy resources; **PENRE**: Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; **PENRM**: Use of non-renewable primary energy resources used as raw materials; **PENRT**: Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials); **SM**: Use of secondary materials; **RFS**: Use of renewable secondary fuels; **NRSF**: Use of non-renewable secondary fuels; **FW**: Net use of fresh water.

Waste categories

Parameter	Units	Manufacturing stage			Distribution stage	Installation stage	Use & maintenance stage	End-of-life stage	Benefits and loads
		Raw materials	Raw materials transport	Manufacturing					
HWD	kg	4,75E+01	1,10E-01	2,58E+01	3,20E-01	8,64E-03	1,02E-04	4,00E-02	4,01E+01
NHWD	kg	1,43E+04	8,25E-01	3,09E+03	2,39E+00	9,39E+02	6,55E-02	4,66E+03	-8,50E+03
RWD	kg	4,13E+00	1,43E-03	8,23E-02	4,16E-03	1,54E-04	3,37E-04	2,15E-02	-2,15E+00

HWD: hazardous waste disposed; **NHWD:** non-hazardous waste disposed; **RWD:** radioactive waste disposed.

Other output flows results

Parameter	Units	Manufacturing stage			Distribution stage	Installation stage	Use & maintenance stage	End-of-life stage	Benefits and loads
		Raw materials	Raw materials transport	Manufacturing					
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	1,13E+03	0,00E+00	0,00E+00	0,00E+00	5,08E+03	0,00E+00
MER	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
ETE	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

CRU: components for reuse**; MFR:** material for recycling; **MER:** materials for energy recovery; **EEE:** exported electric energy; **ETE**: exported thermal energy.

References

[1] Reglas Generales del Programa GlobalEPD AENOR: https://www.aenor.com/certificacion/certificacion-de-producto/declaraciones-ambientales-de-producto

https://www.aenor.com/Producto_DAP_pdf/Instrucciones%20Generales%20Programa%20GlobalEPD%202023%20rev%203%20june%202023.pdf

[2] UNE-EN 50693:2020 Reglas de categoría de producto para el análisis del ciclo de vida de productos y sistemas eléctricos y electrónicos.

[3] PCR EPD Italy 007: "Electronic and electrical product and systems" Rev.3, issue date 20/10/2020, valid until 19/01/2025.

[4] Sub-PCR EPD Italy 016: "Electronic And Electrical Products And Systems –Cables And Wires" Rev.2, issue date 25/09/2020, valid until 25/09/2025, CPC 463 family "Insulated wire and cable; optical fibre cables" and sub-sequent clusters

[5] PSR 001 ed3 EN 2015 10 16: PEP Ecopassport® PROGRAM – PSR - SPECIFIC RULES FOR Wires, Cables and Accessories Appendix 1.

[6] UNE-EN ISO 14040:2006 – Gestión Medioambiental – Análisis del ciclo de vida – Principios y marco de referencia

[7] UNE-EN ISO 14044:2006 – Gestión Medioambiental – Análisis del ciclo de vida – Requisitos y directrices

[8] UNE-EN ISO 14025:2006- Etiquetas y declaraciones ambientales. Declaraciones ambientales tipo III. Principios y procedimientos

[9] ISO/TR 14047: 2003 – Gestión Medioambiental – Análisis del ciclo de vida – Ejemplos de aplicación de LCI (Inventario del Ciclo de Vida)

[10] ISO/TS 14048: 2003 – Gestión Medioambiental – Análisis del ciclo de vida – Formatos de datos de Inventario

[11] ISO/TR 14049: 2000 – Gestión Medioambiental – Análisis del ciclo de vida – Ejemplos de aplicación de objetivos y alcance y análisis de inventario

[12] RECOMENDACIÓN (UE) 2021/2279 DE LA COMISIÓN de 15 de diciembre de 2021 sobre el uso de los métodos de la huella ambiental para medir y comunicar el comportamiento ambiental de los productos y las organizaciones a lo largo de su ciclo de vida

[13] ANEXO C DE LA METODOLOGÍA EUROPEA DE HUELLA AMBIENTAL DEL PRODUCTO https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml

Index

1. General information 3
1.1. The organization 3
1.2. Scope 3
1.3. Life cycle and compliance 3
1.4. Differences from previous versions of this DAP. 3
2. Product 4
2.1. Product identification 4
2.2. Product performance 4
3. Information about LCA 5
3.1. Life Cycle Analysis 5
3.2. Declared unit 5
3.3. Reference Service Life (RSL) 5
3.4. Allocation criteria 5
3.5. Representativity, quality and selection of data 5
3.6. Other calculation rules and assumptions 5
4. System boundaries, scenarios, and additional technical information. 6
4.1. Manufacturing 6
4.2. Distribution, Installation, Use & Maintenance and End-of-life & Deinstallation 6
5. LCA and ILCA environmental parameter statements. 8
References 11

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