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ENVIRONMENTAL PRODUCT DECLARATION

In accordance with
EN 15804:2012+A2:2019, ISO 14025:2006 and EN 16757:2023
3rd party verified

Glassfibre reinforced concrete elements

Owner:	**Polycon Group a.s.**
Date of issue:	**19.09.2023**
Date of revision:	
Valid until:	**18.09.2028**
Version: 1	

N° VERIFICATION
3013EPD-23-0215

CERTIFIKAČNÍ ORGAN PRO EPD
VÚPS
Certifikační společnost
Výzkumný ústav pozemních staveb

General information

Manufacturer: Polycon Group a.s.
Římovská 973/5, Hloubětín, 198 00 Prague 9, Czech Republic, IČ: 11932660, DIČ: CZ11932660
Production site: provozovna DYJE 74, 669 02 Znojmo 2, Czech Republic

About company: The company Polycon Group a.s. is a leading European manufacturer of glassfibre reinforced concrete (GRC) products. The company was founded in 2000 on the basis of previous long-term experience in the field of development and research of modern building materials. From the very beginning, the company focuses on and specializes in the production and development of glassfibre reinforced concrete composite, which finds its application especially in the field of modern architecture and especially in the design and implementation of building cladding.

Programme used: National Eco-labelling Program, Ministry of the Environment of the Czech Republic, 2007. For more information see www.cenia.cz

EPD declaration number: 3013EPD-23-0215

PCR identification: EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations (Core rules for the product category of construction products)
EN 16757:2023 Sustainability of construction works – Environmnetal product declarations – Product Category Rules for concrete and concrete elements

Product/product family name and manufacturer represented: Glassfibre reinforced concrete elements

Declaration verified/issued: 19.09.2023
Valid until: 18.09.2028

Owner of the declaration: Polycon Group a.s., Římovská 973/5, Hloubětín, 198 00 Prague 9, Czech Republic
EPD prepared by: Lubos Nobilis, Nesuchyně 12, 270 07, Czech Republic, nobilis.lubos@gmail.com

Scope: The LCA is based on 2021 production data for provozovna DYJE 74, 669 02 Znojmo 2, manufacturing site in Czech Republic for Glassfibre reinforced concrete elements.

The declared unit is 1 000 kg of manufactured glassfibre reinforced concrete elements.

CEN standard EN 15804 serves as the core PCR[a]
Independent verification of the declaration, according to EN ISO 14025:2010 ☐ **Internal** ☒ **External**
Third party verifier[b]: **Ing. Pavel Keim** Building Research Institute – Certification Company Ltd. Head od Certification Body for EPD Pražská 16, 102 21 Praha 10 – Hostivař Czech Republic
[a] Product Category Rules **[b] Optional for business-to-business communication; mandatory for business to consumer communication (see EN ISO 14025:2010, 9.4)**

According to EN 15804+A2, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programmes.

Product description

The POLYCON material is a composite material based on concrete, the basic recipe of which contains basic cement mass, fine aggregate, water, dispersed resistant glass fibers and other chemical additives.

Thanks to this combination, the necessary technical properties are achieved, such as hardness, strength, long life, fire resistance of class A1.

In this form, the POLYCON material retains its unique physical and chemical properties, which guarantee the highest quality of elements with regard to their aesthetic and functional requirements.

Glassfibre reinforced concrete POLYCON can be used in the design and implementation of building elements not only in the exterior, but also in interior design. Thanks to the wide possibilities of using imprint structural matrices, it is easy to achieve the entire spectrum of different visual surfaces not only for facing board materials and panels, but also for more complex architectural elements, shaped and spatial parts and design solitaires.

There are almost no dimensional restrictions for products made of POLYCON material, which completely eliminates the problem of cutouts and residual material, which disproportionately burden the economy of buildings beyond the scope of normally calculated costs.

Description of use

The products can be used in the following way:

- Facade cladding - straight elements, shaped and corner elements, cornices, window sills
- Interior design and furniture - seat cushions, furniture, kitchen units, decorations
- Acoustic panels in congress halls, noise barrier
- Benches and urban furniture, planters, reception and bar counters
- Other products based on the interest and design of customers and feasibility with regard to the technical possibilities of the material for the production of a suitable form

For further details of the POLYCON glassfibre reinforced concrete elements properties please see technical data sheet available from https://polycon.info/.

Placing on the market

UN CPC Code: 37550 Prefabricated structural components for building or civil engineering, of cement, concrete or artificial stone

Declared unit

The EPD refers to 1 000 kg of average POLYCON glassfibre reinforced concrete elements.

Base materials/ancillary materials

Material	Part (%)	Substances of Very High Concern
Cement	45 – 49.5	No Substance of Very High Concern
Aggregate (sand)	45 – 49.5	
Glassfibre	< 5.5	
Additives (pigments etc.)	< 5.5	
Total	100	


1. měsíc
2. měsíc
3. měsíc
objednávka
zpracování podkladů
objednání materiálů a subdodávek
výroba forem
vkládání, výroba GFRC prvků
odformování, zrání
formátování, zpracování (CNC)
povrchová úprava
kompletace, balení
expedice


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Packaging
Returnable steel cages are used for the packaging and transport of products. Other packaging materials are LDPE foils, PET tapes, non-woven geotextile and steel clasps.

Reference service life
The expected reference life of the concrete products according to EN 16757:2023 is min. 50 years without the need for maintenance. The EPD does not include the use stage.

LCA calculation information

DECLARED UNIT	1 000 kg of non-installed glassfibre reinforced concrete elements
SYSTEM BOUNDARIES	Cradle to Grave with modules C1-C4 and module D: Mandatory stages A1 – A3, C1 – C4 and module D.
ESTIMATES AND ASSUMPTIONS	The electricity production module is country specific – (residual Czech Republic electricity mix 2021). Some additives, which exactly data gaps for a unit process, in total amount of weight max 5 %, were substituted by average chemical in the model.
CUT-OFF RULES	All inputs and outputs to a (unit) process for which data is available are included in the calculation. In case of insufficient input data or data gaps for a unit process, the cut-off criteria is set at 1 % of renewable and non-renewable primary energy usage and 1 % of the total mass input of that unit process.
BACKGROUND DATA	Background data used is of less than 10 years old wherever possible. Data modules are used from the Ecoinvent v 3.8 database.
DATA QUALITY	Specific data has been used for the processes POLYCON has influence over. Generic data has been used for the processes the company cannot influence, where present data modules have been used.
PERIOD UNDER REVIEW	The data are representative of the manufacturing processes of 2021.
ALLOCATIONS	Production data has been calculated on a mass and square basis.
COMPARABILITY	A comparison or an evaluation of EPD data is only possible where EN 15804+A2:2019 has been followed and the same building context and product specific characteristics of performance are

	taken into account and the same stages have been included in the system boundary. According to EN 15804, EPD of construction products may not be comparable if they do not comply with this standard. According to ISO 21930, EPD might not be comparable if they are from different programs.
GEOGRAPHICAL COVERAGE	Scope includes manufacture in Czech Republic.

Life cycle stages

Product stage, A1-A3

Description of the stage:
The product stage of the glassfibre reinforced concrete elements is subdivided into three modules: A1, A2 and A3 respectively "raw material supply", "transport" and "manufacturing".

A1, raw material supply

This includes raw material extraction and processing, processing of secondary material input (e.g. recycling processes) and energy. The main processes in this phase are production of cement, electricity, purchased heat, glassfibre, additives and sand.

A2, transport to the manufacturer

Raw materials are transported to the manufacturing site; this includes modelling of road, boat and or train transport (with average values) for each raw material. The main material inputs (sand and cement) for POLYCON are transported by HGV inside Czech Republic.

A3, manufacturing

The module includes manufacture of product and packaging material. Waste processing up to the end-of –waste state or disposal of final residues during the product stage is also included. Part of the module at this stage is also the production of forms.

Construction process stage, A4-A5

The phases are not declared, due to the variable possibilities of using the products (interior / exterior elements) and the way they are installed (different types of anchoring / without anchoring etc.) and transportation to customers.

Use stage, B1-B7

Phases are not declared, due to variable maintenance options. Glassfibre concrete elements are by default a passive building element and in the phase of use they can only require some coating or its renewal, for which its type or the frequency of renewal is not specified.

End-of-life stage, C1-C4

Description of the stage:
The end-of-life stage includes:

C1, de-construction, demolition: is calculated as machine operation (18.64 kW, high load factor) for 5 minutes per DU.

C2, transport to waste processing: is calculated as 50 km distance,

C3, waste processing for reuse, recovery and/or recycling; is calculated as recycling 70% of construction waste generated (downcycling),

C4, disposal: is calculated as placing 30% of the generated construction waste in a landfill

The ratio of recycling and landfilling of end-of-life products is based on the objectives of the Waste Management Plan of the Czech Republic 2015-2024.

End-of-life:

PARAMETER	VALUE/DESCRIPTION
Collection process specified by type	700 kg collected separately for recycling per DU 300 kg collected with mixed construction waste per DU waste is collected and transported by truck for landfill and recycling
Recovery system specified by type	70 % reused as construction material 700 kg for reuse
Disposal specified by type	30 % landfilled, 70 % recycled 300 kg for final deposition
Assumptions for scenario development (e.g. transportation)	Average truck trailer with a 28t payload, diesel consumption 0,0356 kg/tkm, EURO V class 50 km for reuse 50 km for landfilling

Benefits and loads beyond the system boundary, C1-C4

Beyond the boundaries of the system, it is assumed that 70% of the original product will be recycled and substituted the same amount of natural aggregates with relevant benefits declared in phase D.

LCA results – 1 000 kg of POLYCON glassfibre reinforced concrete elements

Description of the system boundary (X = included in the LCA, ND = Not Declared)

PRODUCT STAGE			CONSTRUCTION STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDAR
Raw material supply	Transport	Manufacturing	Transport	Construction-Installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-recovery
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

CORE ENVIRONMENTAL IMPACTS ***per 1 000 kg of POLYCON glassfibre reinforced concrete elements***

Impact category	Unit	A1-A3 Production	*A4-A5 Construction*	*B1-B7 Use*	C1 Deconstruction	C2 Transport	C3 Waste processing	C4 Disposal	D Recycling
Climate change	kg CO2 eq	1.02E+03	*ND*	*ND*	5.29E-01	5.03E+00	2.81E+00	1.59E+00	-6.09E+00
Climate change - Fossil	kg CO2 eq	9.71E+02	*ND*	*ND*	5.29E-01	5.03E+00	2.81E+00	1.59E+00	-6.00E+00
Climate change - Biogenic	kg CO2 eq	5.25E+01	*ND*	*ND*	1.00E-04	2.36E-03	5.37E-04	2.01E-03	-7.80E-02
Climate change - Land use and LU change	kg CO2 eq	6.53E-01	*ND*	*ND*	4.63E-05	1.94E-03	2.48E-04	4.91E-04	-7.94E-03
Ozone depletion	kg CFC11 eq	5.82E-05	*ND*	*ND*	1.13E-07	1.14E-06	6.05E-07	6.51E-07	-5.44E-07
Acidification	mol H+ eq	3.60E+00	*ND*	*ND*	3.29E-03	2.05E-02	2.93E-02	1.50E-02	-3.91E-02
Eutrophication, freshwater	kg P eq	4.47E-01	*ND*	*ND*	1.80E-05	3.60E-04	9.63E-05	1.60E-04	-3.68E-03
Eutrophication, marine	kg N eq	9.29E-01	*ND*	*ND*	1.36E-03	6.15E-03	1.30E-02	5.19E-03	-8.86E-03
Eutrophication, terrestrial	mol N eq	8.66E+00	*ND*	*ND*	1.49E-02	6.71E-02	1.42E-01	5.69E-02	-1.07E-01
Photochemical ozone formation	kg NMVOC eq	2.46E+00	*ND*	*ND*	4.18E-03	2.05E-02	3.90E-02	1.65E-02	-2.71E-02
Resource use, fossils	MJ	9.56E+03	*ND*	*ND*	7.17E+00	7.53E+01	3.84E+01	4.41E+01	-8.74E+01
Resource use, minerals and metals	kg Sb eq	1.51E-02	*ND*	*ND*	8.81E-07	1.23E-04	4.72E-06	1.51E-05	-6.41E-04
Water use	m^3 depriv.	1.66E+02	*ND*	*ND*	1.03E-02	2.29E-01	5.51E-02	1.98E+00	-1.02E+01

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ADDITIONAL CORE ENVIRONMENTAL IMPACTS *per 1 000 kg of POLYCON glassfibre reinforced concrete elements*

Impact category	Unit	A1-A3 Production	*A4-A5 Construction*	*B1-B7 Use*	C1 Deconstruction	C2 Transport	C3 Waste processing	C4 Disposal	D Recycling
Particulate matter	disease inc.	2.65E-05	*ND*	*ND*	5.67E-08	3.51E-07	3.55E-06	2.92E-07	-4.49E-07
Human toxicity, non-cancer	CTUh	1.28E-05	*ND*	*ND*	4.44E-09	6.50E-08	1.98E-08	2.03E-08	-1.26E-07
Human toxicity, cancer	CTUh	4.58E-07	*ND*	*ND*	6.38E-10	1.49E-09	7.01E-10	5.97E-10	-5.33E-09
Ecotoxicity, freshwater	CTUe	4.47E-01	*ND*	*ND*	1.80E-05	3.60E-04	9.63E-05	1.60E-04	-3.68E-03
Land use	Pt	1.38E+04	*ND*	*ND*	1.55E+00	7.46E+01	8.31E+00	9.73E+01	-8.04E+01
Ionising radiation	kBq U-235 eq	1.02E+02	*ND*	*ND*	3.27E-02	3.92E-01	1.75E-01	1.98E-01	-1.34E+00

RESOURCE USE ***per 1 000 kg of POLYCON glassfibre reinforced concrete elements***

Indicator	Unit	A1-A3 Production	*A4-A5 Construction*	*B1-B7 Use*	C1 Deconstruction	C2 Transport	C3 Waste processing	C4 Disposal	D Recycling
Use of renewable primary energy excluding renewable primary energy resources used as raw materials - *MJ/FU*	MJ/DU	1.14E+03	*ND*	*ND*	4.04E-02	1.13E+00	2.16E-01	3.78E-01	-7.82E+00
Use of renewable primary energy used as raw materials *MJ/FU*	MJ/DU	0.00E+00	*ND*	*ND*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources (primary energy and primary energy resources used as raw materials) *MJ/FU*	MJ/DU	1.14E+03	*ND*	*ND*	4.04E-02	1.13E+00	2.16E-01	3.78E-01	-7.82E+00
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials - *MJ/FU*	MJ/DU	1.03E+04	*ND*	*ND*	7.61E+00	8.00E+01	4.08E+01	4.69E+01	-9.29E+01
Use of non-renewable primary energy used as raw materials *MJ/FU*	MJ/DU	0.00E+00	*ND*	*ND*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources (primary energy and primary energy resources used as raw materials) - MJ/FU	MJ/DU	1.03E+04	*ND*	*ND*	7.61E+00	8.00E+01	4.08E+01	4.69E+01	-9.29E+01
Use of secondary material - *kg/FU*	*kg/DU*	0.00E+00	*ND*	*ND*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of renewable secondary fuels – MJ/FU	MJ/DU	0.00E+00	*ND*	*ND*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of non-renewable secondary fuels – MJ/FU	MJ/DU	0.00E+00	*ND*	*ND*	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water m^3/FU	*m^3/DU*	9.22E+00	*ND*	*ND*	4.07E-04	8.71E-03	2.18E-03	4.74E-02	-2.63E-01

WASTE CATEGORIES ***per 1 000 kg of POLYCON glassfibre reinforced concrete elements***

Indicator	Unit	A1-A3 Production	*A4-A5 Construction*	*B1-B7 Use*	C1 Deconstruction	C2 Transport	C3 Waste processing	C4 Disposal	D Recycling
Hazardous waste	kg	1.73E-02	*ND*	*ND*	1.94E-05	1.94E-04	1.04E-04	6.54E-05	-1.80E-04
Non-hazardous waste disposed	kg	1.79E+02	*ND*	*ND*	9.18E-03	3.62E+00	4.92E-02	3.00E+02	-1.41E+00
Radioactive waste disposed/stored	kg	3.68E-02	*ND*	*ND*	4.99E-05	5.15E-04	2.68E-04	2.90E-04	-4.43E-04

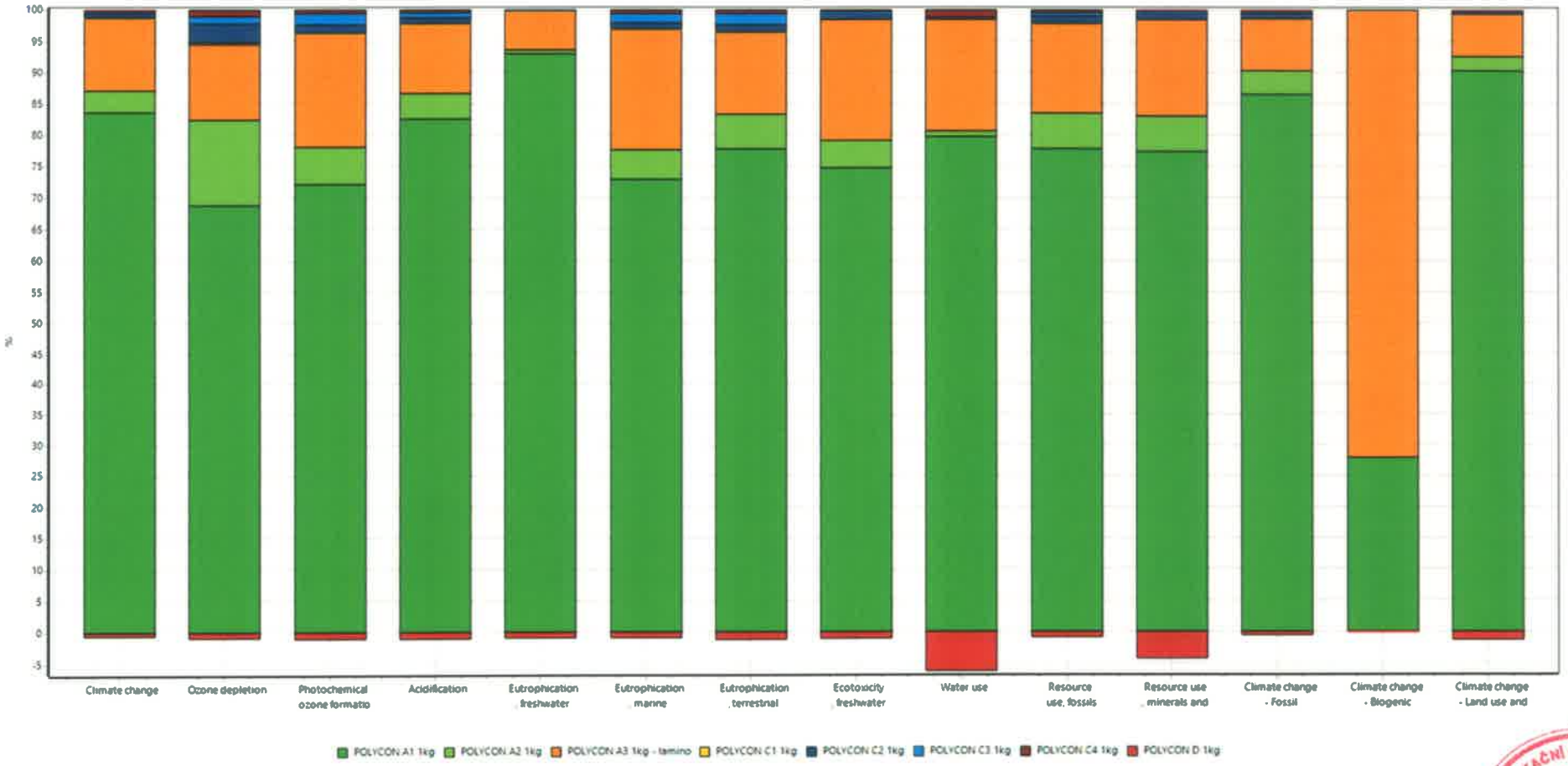
OUTPUT FLOWS ***per 1 000 kg of POLYCON glassfibre reinforced concrete elements***

Indicator	Unit	A1-A3 Production	*A4-A5 Construction*	*B1-B7 Use*	C1 Deconstruction	C2 Transport	C3 Waste processing	C4 Disposal	D Recycling
Components for re-use	kg	0	*ND*	*ND*	0	0	0	0	0
Materials for recycling	kg	0	*ND*	*ND*	0	0	0	0	700
Materials for energy recovery	kg	0	*ND*	*ND*	0	0	0	0	0
Exported energy	MJ per energy carrier	0	ND	ND	0	0	0	0	0

BIOGENIC CARBON CONTENT *per 1 000 kg of POLYCON glassfibre reinforced concrete elements*	
Biogenic carbon content in product	**0**
Biogenic carbon content in accompanying packaging	**0,01 kg (glue-laminated timber for** forms)
NOTE 1 kg biogenic carbon is equivalent 44/12 kg CO_2	

LCA: Interpretation

The following diagram shows the share of each phase in the results in impact categories



Additional information

The plant constantly works on increasing energy efficiency and environmental impact reduction. ISO 9001, ISO 14001 implementation and ENVI Politic helps increase environmental efficiency https://polycon.info/envi-politika-2021/.

References

Rules for National Eco-labelling programme, Ministry of the Environment of Czech Republic, 2007

EN 16757:2023 Sustainability of construction works – Environmental product declarations - Product category Rules for concrete and concrete elements

EN 15804:2012+A2:2019 Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products,

ISO 21930:2017 Sustainability in building construction – Environmental declaration of building products

ISO 14025:2006 Environmental labels and declarations – Type III environmental declarations – Principles and procedures

ISO 14040:2006 Environmental management. Life cycle assessment. Principles and framework

ISO 14044:2006 Environmental management. Life cycle assessment. Requirements and guidelines

European Chemical Agency, Candidate List of substances of very high concern for Authorization. https://echa.europa.eu/candidate-list-table

Ecoinvent LCI database, v3.8, 2021, https://ecoinvent.org/