

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A2

Owner of the Declaration	FEICA, IVK, DBC
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-FEI-20250067-IBP1-EN
Issue date	04.06.2025
Valid to	03.06.2030

Products based on polysulfides

FEICA - Association of the European Adhesive and Sealant Industry

IVK - Industrieverband Klebstoffe e.V.

DBC - Deutsche Bauchemie e.V.

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1. General Information

FEICA - Association of the European Adhesive and Sealant Industry
 IVK - Industrieverband Klebstoffe e.V.
 DBC - Deutsche Bauchemie e.V.

Programme holder

IBU – Institut Bauen und Umwelt e.V.
 Hegelplatz 1
 10117 Berlin
 Germany

Declaration number

EPD-FEI-20250067-IBP1-EN

This declaration is based on the product category rules:

Building sealants, 01.08.2021
 (PCR checked and approved by the SVR)

Issue date

04.06.2025

Valid to

03.06.2030



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Products based on polysulfides

Owner of the declaration

FEICA, Rue Belliard 40, B-1040 Brussels
 IVK, Völklingerstr. 4, D-40219 Düsseldorf
 DBC, Mainzer Landstr. 55, D-60329 Frankfurt a.M.

Declared product / declared unit

1 kg products based on polysulfides; density 1.2 - 2.2 g/cm³

Scope:

This verified EPD entitles the holder to bear the symbol of the Institut Bauen und Umwelt e.V. It exclusively applies for products produced in Europe and for a period of five years from the date of issue. This EPD is a Model EPD where the product displaying the highest environmental impact in a group was selected for calculating the EPD results.

This EPD may be used by members of DBC, FEICA and IVK and their members provided it has been proven that the respective product can be represented by this EPD. For this purpose, a guideline is available at the secretariats of the three associations. The members of the associations are listed on their respective websites.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR		
Independent verification of the declaration and data according to ISO 14025:2011		
☐	internally	☒ externally



Matthias Schulz,
 (Independent verifier)

2. Product

2.1 Product description/Product definition

One- and two-component products based on polysulfides with a Volatile Organic Compound (VOC) content of ≤ 2 % (VOC definition according to *Decopaint Directive*) are manufactured from organic polysulfides, fillers, plasticisers, colour pigments, hardeners and other additives. The formulated products are delivered typically packed in cartridges or containers with 50 ml to 200 l product. They permanently and elastically seal joints planned for the building and for insulating glass. Products based on polysulfides fulfil key functions. Ingress of moisture and chemicals into the structure is prevented by sealants or coatings based on polysulfide. With the use of products based on polysulfides, the fitness for use of the building and the service life are decisively extended. The product displaying the highest environmental impacts was used as a representative product for calculating the Life Cycle Assessment results (worst-case approach).

For the placing on the market in the European Union/European Free Trade Association (EU/EFTA) with the exception of Switzerland, products falling under *Regulation (EU) No 305/2011 (CPR)* need a Declaration of Performance taking into consideration either the relevant harmonised European standard or the European Technical Assessment and the CE marking. For the application and use of the products the respective national provisions apply.

2.2 Application

Module 1: Chemically resistant joint sealants and coatings

Sealants and coatings based on polysulfides are used for cold applied normal, chemical and fuel resistant joint sealants for concrete pavements to be used in roads, bridges, parking decks, fuel stations, airfields and other trafficked areas, joints in facilities for storing, filling and handling dangerous substances, joints in emergency spill containers, joints in storage tanks, chemically resistant sealants (e.g. gas stations, airport sealants, storage tanks for liquids and wastewater treatment)

Module 2: Sealants for insulating glass

Sealants based on polysulfides are used as secondary seal or outer seal in insulating glass units due to their excellent air and moisture resistance, low gas permeability, and good adhesion to glass and metal. They are particularly suitable for applications that require a low-maintenance, long-lasting seal, such as for example residential windows and doors.

Module 3: Bonded glazing sealants

Sealants based on polysulfides are used for the bonding of insulating glass units into the window frame.

2.3 Technical Data

The density of the mixed products is between 1.2 and 2.2 g/cm³; other relevant technical data can be found in the manufacturer's technical documentation.

Module 1: Chemically resistant joint sealants and coatings

Depending on the application, the sealants and coatings based on polysulfides must comply with:

EN 14188-2 in combination with *EN 14187-1-9*, *EN 1504-2* and building authority approvals from the DIBt in accordance with 'Spezielle Zulassungs- und Prüfgrundsätze für Fugendichtstoffe zur Verwendung in LAU-Anlagen einschließlich Lager- und Abfüllanlagen von Biogasanlagen und JGS-Anlagen'

Module 2: Sealants for insulating glass

Sealants based on polysulfides must comply with *EN 1279-4*.

Performance characteristics in accordance with the manufacturer's technical documentation/declaration of performance.

Module 3: Bonded glazing sealants

Sealants based on polysulfides must comply with *RAL-GZ 716 part 2* and *ift-Guideline VE-08/4*.

Performance characteristics in accordance with the manufacturer's technical documentation/declaration of performance

Typical data

Due to the variety of formulations and formulation types, it is not possible to give generally valid exact figures for specific technical properties, the following information can only be given as typical values.

Name	Value	Unit
Resistance to deformation: Volume loss (module 1), EN 14188-2	≤ 5	%
Resistance to deformation: Elastic recovery (module 1), EN 14188-2	≥ 70	%
Cohesion (module 1), EN 14188-2	Pass	
Durability of water tightness against liquid chemicals (module 1), EN 14188-2	Pass	
Durability of cohesion against liquid chemicals (module 1), EN 14188-2	Pass	
Gas permeation (Argon) (module 2) EN 1279-4, annex D	≤ 0.3	g/(m ² d)
Water vapor transmission rate (module 2) EN 1279-4, annex D	≤ 10	g/(m ² d)
Volatile (module 2), EN 1279-4, annex H	≤ 2	%
Density (modules 1,3), DIN EN ISO 1183-1	1200 - 2200	kg/m ³
Density (module 2), DIN EN ISO 2811- 1, 23 Grad	1200 - 2200	kg/m ³

valid for all modules: Other performance characteristics in accordance with the manufacturer's technical documentation/declaration of performance

2.4 Delivery status

The products are delivered in pasty or liquid form in containers which contain 1 - 200 l made of plastic, foil or metal, sometimes packed in additional paper boxes. Typical cartridges contain 50 ml to 1000 ml of product. For two-component products based on polysulfides for insulating glass (Module 2), Part A is normally delivered in metal drums which typically contain up to 200 l sealant. Part B can be delivered in metal drums up to 200 l, too, or in metal pails with content up to 21 l. The usage of plastic pails is also possible. Drums and pails are typically packed on wooden pallets. Steel drums and pails as well as pallets can be re-used if not damaged. A combination of HDPE (high-density polyethylene) cartridges, cardboard, steel and wooden pallets was modelled for the LCA.

2.5 Base materials/Ancillary materials

Products based on polysulfides with a Volatile Organic Compound (VOC) content of ≤ 2 % (VOC definition according to *Decopaint Directive*) are manufactured from organic branched polysulfides, fillers, plasticisers, colour pigments, hardeners and

other additives. They are usually two-component systems; typically manganese dioxide is used as hardener, but also one-component products exist.

Typically, the products covered by this EPD contain the following range of base materials and auxiliaries (% by mass):

Organic polysulfide: 15-60

Plasticiser: 10-30

Fillers: 20-70

Pigments: 0-10

Hardeners: 1-7

Additives: <5

VOC according to *Decopaint Directive*: ≤2 % (**mandatory**)

These ranges are average values and the composition of products complying with the EPD can deviate from these concentration levels in individual cases. More detailed information is available in the respective manufacturers' documentation (e.g. product data sheets).

Note: For companies to declare their products within the scope of this EPD it is not sufficient to simply comply with the product composition shown above. The application of this EPD is possible only for member companies of DBC, FEICA, and IVK member associations and only for specific formulations with a total score below the declared maximum score for a product group according to the associated guidance document.

1. Substances from the 'Candidate List of Substances of Very High Concern for Authorisation (SVHC)

If the product based on polysulfides contains SVHC exceeding 0.1 percentage by mass, the respective SVHC, its CAS number, information on the concentration and/or concentration range together with information on their hazardous properties are listed in the safety data sheet of the respective product.

2. CMR substances in categories 1A and 1B

If the product based on polysulfides contains carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B exceeding 0.1 percentage by mass, the respective CMR substances, information on the concentration and/or concentration range together with information on their hazardous properties are listed in the safety data sheet of the respective product.

3. Biocide products added to the construction product

If the product based on polysulfides contains biocide products, the active substances, information on the concentration and/or concentration range, the product type together with information on their hazardous properties are listed in the safety data sheet of the respective product.

2.6 Manufacture

Products based on polysulfides are generally manufactured by mixing the ingredients and then filling them into the delivery containers.

2.7 Environment and health during manufacturing

As a general rule, no other environmental or health protection measures other than those specified by law are necessary.

2.8 Product processing/Installation

The one- and two-component products based on polysulfides can be applied with a (tandem-) cartridge gun. Usually, for two-component products based on polysulfides, Part A and B are pumped out of drums and pails (typically with 17 to 200 l content) by using pump systems with (heated) follower plates and attached mixing and dosing machines. The application of the mixed sealant can be done automatically by a robot or manually by using a hand-applicator. One- and two-component products based on polysulfides coatings are typically applied by

brush, roller or spray-machine.

Health and safety measures (gloves and goggles, ventilation) are to be taken and consistently adhered to in accordance with the information on the safety data sheet and conditions on site.

2.9 Packaging

A detailed description of packaging is provided in section 2.4. Empty containers, clean foils as well as pallets can be recycled.

2.10 Condition of use

During the use phase, products based on polysulfides are chemically stable. They are durable products which protect buildings, secure the functionality of insulated glass units and significantly contribute towards their function and long-term value.

2.11 Environment and health during use

Option 1 – Products for applications outside indoor areas where people stay permanently

During use, products based on polysulfides are inert. No risks are known for water, air and soil if the products are used as designated.

Option 2 – Products for applications inside indoor areas where people stay permanently

When used in indoor areas with permanent stays by people, evidence of the emission performance of construction products in contact with indoor air must be submitted according to national requirements. No further influences on the environment and health by emanating substances are known.

2.12 Reference service life

Sealants and coatings fulfil key functions in buildings. They decisively improve the usability of building structures and constructions in general and significantly extend the lifetime. Information supplied by the manufacturer on maintenance and care must be observed. The anticipated reference service life depends on the specific installation situation and the exposure associated with the product. It can be influenced by weathering as well as by mechanical or chemical loads.

2.13 Extraordinary effects

Fire

Even without any special fire safety features, sealants based on polysulfide comply with at least the requirements of *EN 13501-1* for fire class E.

In terms of volumes used, sealants generally have no or only a minor influence on the fire characteristics (e.g. smoke gas development) of the building in which they are applied.

Water

Cured products based on polysulfides are chemically inert and insoluble in water. They are especially used to secure the functionality of insulated glass units against moisture impact.

Mechanical destruction

The mechanical destruction of products based on polysulfides does not lead to any decomposition of products which are harmful to the environment or health.

2.14 Re-use phase

Products based on polysulfides cannot be recycled. According to present knowledge, no environmentally hazardous effects in terms of landfilling are to be generally anticipated through dismantling and recycling of components to which sealants

based on polysulfides adhere. Thermal recovery is a practical recycling variant for cured polysulfide-based products on account of their energy content.

2.15 Disposal

Empty containers are directed to the recycling process. Uncured polysulfide components should not be disposed of with domestic refuse or into the sewer, while cured polysulfide sealants can be deposited with household garbage after solidification following consultation with the operator of the waste disposal facility and the pertinent authorities and under the adherence of the necessary technical regulations. Disposal must be made according to official regulations. Residual product mechanically removed from substrates must be disposed of as commercial/site waste. The following waste

codes according to the European List of Waste (EWC) (2000/532/EC) can apply:

Waste generated during application

Product residue: EWC 08 04 09

EWC 08 04 10 with the exception of waste covered by EWC 08 04 09

Waste generated during cleaning

Product residue: EWC 08 04 11

2.16 Further information

More information is available on the manufacturer's product or safety data sheets and is available on the manufacturer's websites or on request. Valuable technical information is also available on the associations' websites.

3. LCA: Calculation rules

3.1 Declared Unit

This EPD refers to the declared unit of 1 kg of products based on polysulfides; applied into the building with a density of 1.2 - 2.2 g/cm³ in accordance with the *IBU PCR part B* for building sealant.

The results of the Life Cycle Assessment provided in this declaration have been selected from the product with the highest environmental impact (worst-case scenario).

Depending on the application, a corresponding conversion factor such as the density to convert volumetric use to mass must be taken into consideration.

The Declaration type is according to *EN 15804*: Cradle to gate with options, modules C1–C4, and module D (A1–A3, C, D) and additional modules (A4–A5).

Declared unit

Name	Value	Unit
Declared unit	1	kg
Gross density	1.2 - 2.2	g/cm ³

3.2 System boundary

Modules A1, A2 and A3 are taken into consideration in the LCA:

- A1 Production of preliminary products
- A2 Transport to the plant
- A3 Production incl. provision of energy, production of packaging as well as auxiliaries, waste treatment and emissions to air
- A4 Transport to site
- A5 Installation, product applied into the building during A5 phase operations and packaging disposal. The emissions of VOC (Volatile Organic Compounds) and electricity consumption are also considered in this module. The end of life for the packaging material considered is described below:
 - incineration, for materials like plastic, cardboard and wood.
 - landfill, for inert materials like metals
 In this module is also considered the incineration of product residue (1%) and the extra production of this amount.
- C1-C2-C3-C4-D: the building deconstruction (demolition process) takes place in the C1 module which considers energy production and consumption in terms of diesel and all the emissions connected with the fuel-burning process to run the machines. After the demolition, the

product is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered. For the precautionary principle and as a worst-case scenario, thermal treatment is the only end-of-life scenario considered. This is modelled by the incineration process (module C3) where the product ends its life cycle. Module C4 is not relevant for the EoL of this product. Module D accounts for potential benefits that are beyond the defined system boundaries. Credits are generated during the incineration of wastes and related energy produced that are occurring in the A5 and C3 modules.

3.3 Estimates and assumptions

For this EPD formulation and production data defined and collected by the associations were considered. Production waste was assumed to be disposed of by incineration as a worst-case.

An average of steel and plastic containers, cardboard and wooden pallets was considered in the LCA.

3.4 Cut-off criteria

All raw materials submitted for the formulations and production data were taken into consideration.

The manufacture of machinery, plant and other infrastructure required for the production of the products under review was not taken into consideration in the LCA.

Transport of packaging materials is excluded.

3.5 Background data

Data from the *Managed LCA Content database SP40* (2020) was used as background data.

3.6 Data quality

Representative products were evaluated for this EPD and the product displaying the highest environmental impact was selected for calculating the LCA results. The background data sets used are less than 8 years old.

Production data and packaging are based on details provided by the manufacturer. The formulation used for evaluation refers to a specific product.

The data quality of the background data is considered to be good.

3.7 Period under review

Representative formulations are valid for 2024.

3.8 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product's lifespan: Europe

3.9 Allocation

Mass allocation has been applied when primary data have been used and implemented into the LCA model.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. *Sphera's Managed LCA Content SP 40* (2020) serves as background database for the calculation.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

The packaging material contains biogenic carbon content which is presented below.

Information on describing the biogenic Carbon Content at factory gate

Name	Value	Unit
Biogenic carbon content in product	-	kg C
Biogenic carbon content in accompanying packaging	0.0142	kg C

For the preparation of building life cycle assessments, it must be taken into account that in modules A5 (installation in the building) the biogenic amount of CO₂ (0.0142 kg C * 3.67 = 0.052 kg CO₂-eq.) of the packaging bound in modules A1-A3 is mathematically booked out.

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO₂.

The emission factor associated with the electricity considered for the production phase is: 0.466 kg CO₂-eq. / kWh

Transport to the building site (A4)

Name	Value	Unit
Transport distance	2000	km
Gross weight	34 - 40	t
Payload capacity	27	t

Installation into the building (A5)

Name	Value	Unit
Material loss	0.01	kg
Electricity consumption	0.1	kWh

Material loss regards the amount of product not used during the application phase into the building. This amount is 1 % of the product, impacts related to the production of this part are charged to the A5 module.

This percentage is considered as waste to incineration and impacts of its end of life have been considered in the LCA model and declared in A5.

End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	0.98	kg
Incineration	0.98	kg

The amount of product considered in the end-of-life does not correspond to 1 kg because an amount of VOC corresponding to 0.02 kg is emitted during the installation phase.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of product based on vinyl chloride polymers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO ₂ eq	6.03E+00	1.11E-01	1.76E-01	2.76E-04	4.89E-03	1.24E+00	0	-3.65E-01
GWP-fossil	kg CO ₂ eq	5.92E+00	1.11E-01	1.22E-01	2.75E-04	4.88E-03	1.24E+00	0	-3.64E-01
GWP-biogenic	kg CO ₂ eq	1.02E-01	1.62E-04	5.37E-02	4.08E-07	7.14E-06	1.92E-04	0	-8.48E-04
GWP-luluc	kg CO ₂ eq	6.46E-03	6.35E-06	1.27E-04	1.6E-08	2.8E-07	4.13E-05	0	-2.5E-04
ODP	kg CFC11 eq	6.75E-14	1.77E-17	1.58E-15	4.47E-20	7.82E-19	3.3E-16	0	-3.72E-15
AP	mol H ⁺ eq	1.62E-02	3.15E-04	2.82E-04	3.56E-06	1.39E-05	6.51E-04	0	-5.04E-04
EP-freshwater	kg P eq	3E-05	2.46E-08	4.13E-07	6.19E-11	1.08E-09	1.18E-07	0	-4.6E-07
EP-marine	kg N eq	4.27E-03	1.43E-04	7.23E-05	1.61E-06	6.29E-06	2.52E-04	0	-1.31E-04
EP-terrestrial	mol N eq	4.59E-02	1.57E-03	7.93E-04	1.77E-05	6.91E-05	2.88E-03	0	-1.4E-03
POCP	kg NMVOC eq	1.25E-02	2.87E-04	2.06E-04	4.84E-06	1.27E-05	6.59E-04	0	-3.76E-04
ADPE	kg Sb eq	5.01E-06	4.21E-09	6.22E-08	1.06E-11	1.85E-10	5.11E-09	0	-5.89E-08
ADPF	MJ	1.1E+02	1.49E+00	1.89E+00	3.76E-03	6.58E-02	5.89E-01	0	-6.16E+00
WDP	m ³ world eq deprived	5.81E-02	2.96E-04	1.94E-02	7.45E-07	1.3E-05	1.55E-01	0	-3.7E-02

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of product based on vinyl chloride polymers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	1.72E+01	7.52E-03	1.02E+00	1.9E-05	3.31E-04	1.01E-01	0	-1.32E+00
PERM	MJ	5.24E-01	0	-5.24E-01	0	0	0	0	0
PERT	MJ	1.78E+01	7.52E-03	4.99E-01	1.9E-05	3.31E-04	1.01E-01	0	-1.32E+00
PENRE	MJ	8.58E+01	1.5E+00	2.3E+00	3.78E-03	6.6E-02	2.37E+01	0	-6.16E+00
PENRM	MJ	2.43E+01	0	-4.09E-01	0	0	-2.32E+01	0	0
PENRT	MJ	1.1E+02	1.5E+00	1.9E+00	3.78E-03	6.6E-02	5.89E-01	0	-6.16E+00
SM	kg	0	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m ³	3.41E-02	1.23E-05	9.42E-04	3.1E-08	5.42E-07	3.66E-03	0	-1.53E-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; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA - WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of product based on vinyl chloride polymers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	9.72E-08	3.94E-10	1.52E-09	9.94E-13	1.74E-11	2.17E-09	0	-2.46E-09
NHWD	kg	7.11E-01	1.62E-04	7.89E-02	4.08E-07	7.14E-06	1.69E-01	0	-2.82E-03
RWD	kg	2.76E-03	2.46E-06	1.37E-04	6.21E-09	1.09E-07	2.58E-05	0	-4.51E-04
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	1.34E-01	0	0	1.38E+00	0	0
EET	MJ	0	0	2.46E-01	0	0	2.58E+00	0	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of product based on vinyl chloride polymers

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Potential Human exposure efficiency relative to U235, Disclaimer 1 – This impact category deals mainly with the eventual impact of low-dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and (from) some construction materials is also not measured by this indicator.

ADP minerals & metals, ADP fossil, WDP, ETF-fw, HTP-c, HTP-nc, SQP, Disclaimer 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

Additional environmental impact indicators shall be used with care as the uncertainties on these results are high and as there is limited experience with the indicator (see ILCD classification in EN 15804, table 5). For this reason, results based on these indicators are not considered suitable for a decision-making process.

6. LCA: Interpretation

The majority of impacts are associated with the production phase modules (A1-A3). The most significant contribution to the production phase impacts is the upstream production of raw materials as the main driver. A small contribution to the impact of the production phase is also given by the transport of raw materials and manufacturing.

Emissions associated with the manufacturing of raw materials also have some influence on the formation potential of tropospheric ozone (POCP) in the production phase. CO₂ is the most important contributor to the Global Warming Potential (GWP). For the Acidification Potential (AP) NO_x and SO₂ contribute to the largest share.

The majority of energy consumption takes place during the production phase (A1-A3). Significant contributions to Primary Energy Demand – Non-renewable (PENRT), come from the energy resources used in the production of raw materials. The

largest contributor to Primary Energy Demand – Renewable (PERT) impacts comes from the consumption of renewable energy resources required for the generation and supply of electricity and the energy resources used for raw materials production as well as the energy resources used for packaging. It should be noted that PERT generally represents a small percentage of the production phase primary energy demand with the bulk of the demand coming from non-renewable energy resources.

Transportation to the construction site (A4) and the installation process (A5) make a low contribution to the overall impact, not as significant and relevant as the other phases.

Instead, another relevant module is waste processing (C3). The End-of-Life phase influences Climate Change indicators due to the impact related to the thermal treatment process of resin occurring in the C3 module.

7. Requisite evidence

VOC

Special tests have not been carried out within the framework of drawing up this Model EPD. Some member states require special documentation on VOC emissions into indoor air for specific areas of application. This documentation, as well as documentation for voluntary VOC labelling, must be provided separately and is specific to the product in question. Evidence pertaining to VOC emissions shall show -either an attestation of compliance with, -or documentation of test data that is required in any of the existing regulations or in any of the existing voluntary labelling programs for low-emitting products, as far as these

- (1) include limits for the parameters TVOC, TSVOC, carcinogens, formaldehyde, acetaldehyde, LCI limits for individual substances (including but not limited to the European list of harmonized LCIs), and the R-value;
- (2) base their test methods on EN 16516;
- (3) perform testing and apply the limits after 28 days of storage

in a ventilated test chamber, under the conditions specified in EN 16516; some regulations and programs also have limits after 3 days, on top of the 28-day limit;

(4) express the test results as air concentrations in the European Reference Room, as specified in EN 16516. Examples of such regulations are the *Belgian Royal Decree C-2014/24239*, or the *German AgBB/ABG*. Examples of such voluntary labelling programs are *EMICODE*, *Blue Angel* or *Indoor Air Comfort*.

Relevant test results shall be produced either by an ISO 17025 accredited commercial test lab or by a qualified internal test lab of the manufacturer. Examples for the applied limits after 28 days of storage in a ventilated test chamber are:

- TVOC: 1000 µg/m³
- TSVOC: 100 µg/m³
- Each carcinogen: 1 µg/m³
- Formaldehyde: 100 µg/m³
- LCI: different per substance involved

- R-value: 1 (meaning that, in total, 100 % of the combined LCI values must not be exceeded)

Informative Annexes (2 tables):

Table 1 shown below is an overview of the most relevant regulations and specifications as of October 2024, as regards requirements after 3 days of storage in a ventilated test

chamber.

Table 2 provides an overview of the most relevant regulations and specifications as of October 2024, as regards requirements after 28 days of storage in a ventilated test chamber. Some details may be missing in the table due to lack of space. Values given represent maximum values/limits.

	TVOC µg/m³	Sum of carcinogens. C1A,CA2 µg/m³	Formaldehyde µg/m³	Acetaldehyde µg/m³	Sum of Form- and Acetaldehyde
German AgBB/ABG regulation	10 000	10	-/-	-/-	-/-
Belgian regulation	10 000	10	-/-	-/-	-/-
EMICODE EC1	1 000	10	50	50	50 ppb
EMICODE EC1 ^{PLUS}	750	10	50	50	50 ppb

	TVOC µg/m³	TSVOC µg/m³	Each carcinogen C1A,CA2 µg/m³	Formalde- hyde µg/m³	Acetalde- hyde µg/m³	LCI	R value	Specials	Sum of non-LCI & non- identified µg/m³
Belgian regulation	1000	100	1	100	200	Belgian list	1	Toluene 300 µg/m³	-/-
French regulations class A+	1000	-/-	-/-	10	200	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class A	1500	-/-	-/-	60	300	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class B	2000	-/-	-/-	120	400	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class C	>2000	-/-	-/-	>120	>400	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
German DIBt/AgBB regulation	1000	100	1	100	300	German AgBB list	1	-/-	100
EMICODE EC1	100	50	1	(after 3 days)	(after 3 days)	-/-	-/-	-/-	-/-
EMICODE EC1 ^{PLUS}	60	40	1	(after 3 days)	(after 3 days)	German AgBB list	1	-/-	40
Finnish M1, sealants	20	-/-	1	10	300	EU LCI list	-/-	Ammonia, odour	-/-
Finnish M1, adhesives	200 µg/m²h	-/-	5 µg/m²h	50 µg/m²h	300	EU LCI list	-/-	Ammonia, odour	-/-

8. References

EN ISO 1183-1

EN ISO 1183-1:2019 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method

EN 1279-4

EN 1279-4:2018 Glass in building - Insulating glass units - Part 4: Methods of test for the physical attributes of edge seals

EN 1504-2

EN 1504-2:2005-01 Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 2: Surface protection systems for concrete

EN ISO 2811-1

EN ISO 2811-1:2023 Paints and varnishes - Determination of density - Part 1: Pycnometer method

EN 13501-1

EN 13501-1:2018

Fire classification of construction products and building elements – Part 1: Classification using data from reaction to fire tests

ISO 14025

DIN EN ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 14187-1 to 9

EN 14187-1 to 9:2017-07 Cold applied joint sealants - Test methods

EN 14188-2

EN 14188-2:2005-03 Joint fillers and sealants - Part 2: Specifications for cold applied sealants

EN 15804

EN 15804+A2:2019+AC:2021, Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products.

EN 16516

EN 16516:2017+A1:2020 Construction products - Assessment of release of dangerous substances - Determination of emissions into indoor air

EN ISO 17025

EN ISO 17025: 2018-03 General requirements for the competence of testing and calibration laboratories

2000/532/EC

Commission decision dated 3 May 2000 replacing decision 94/3/EC on a waste directory in accordance with Article 1 a) of Council Directive 75/442/EEC on waste and Council decision 94/904/EC on a directory of hazardous waste in terms of Article 1, paragraph 4 of Directive 91/689/EEC on hazardous waste

Belgian Royal Decree C-2014/24239

Belgisch Staatsblad 8 MEI 2014, p.60603. — Koninklijk besluit tot vaststelling van de drempelniveaus voor de emissies naar het binnenmilieu van bouwproducten voor bepaalde geogode gebruiken

Blue Angel

Environmental label organised by the federal government of Germany www.blauer-engel.de

Candidate list

Candidate List of substances of very high concern for Authorisation, published in accordance with Article 59(10) of the REACH Regulation, ECHA, www.echa.europa.eu/candidate-list-table

CPR

CPR Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and

repealing Council Directive 89/106/EEC

Decopaint Directive

Directive 2004/42/CE of the European Parliament and the Council of 21 April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes and vehicle refinishing products and amending Directive 1999/13/EC

EMICODE

EMICODE, GEV – Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e. V. (pub.) www.emicode.de

EWC waste code

Directive governing introduction of the European Waste Catalogue

Sphera's Life Cycle for Expert (LCA FE) software

Sphera Solutions, 'Life Cycle Assessment for Expert software', Sphera Solutions, Chicago, US, 2024. Retrieved from <https://sphera.com/life-cycle-assessment-lca-software/>

Sphera Managed Lifecycle Content (MLC)

Sphera Solutions, Managed LCA content dataset documentation, Sphera Solutions, Chicago, US. Retrieved from <https://sphera.com/product-sustainability-gabi-data-search/>

German AgBB

Committee for Health-related Evaluation of Building Products: health-related evaluation of emissions of volatile organic compounds (VOC and SVOC) from building products; status: 2024 www.umweltbundesamt.de/produkte/bauprodukte/agbb.htm

IBU 2022

Institut Bauen und Umwelt e.V.: General mInstructions for the EPD programme of Institut Bauen und Umwelt e.V. EPD programme. Version 2.1. Berlin: Institut Bauen und Umwelt e.V., 10-2022 www.ibu-epd.com

Indoor Air Comfort

Product certification by Eurofins, Galten, Denmark www.eurofins.com

ift-Guideline VE-08/4

ift-Guideline VE-08/4:2017, Beurteilungsgrundlage für geklebte Verglasungssysteme

IBU PCR Part A

Institut Bauen und Umwelt e.V., Königswinter (pub.): Product Category Rules for Construction Products from the range of Environmental Product Declarations of Institut Bauen und Umwelt (IBU), Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Background Report. Version 1.4, 04-2024 www.ibu-epd.de

PCR Part B

Product Category Rules for Construction Products, Part B: Building sealants, v.11, 2024-08

RAL-GZ 716

RAL-GZ 716:2019-04 part 2, Kunststoff-Fensterprofilsysteme - Gütesicherung

REACH

Directive (EG) No. 1907/2006 of the European Parliament and of the Council dated 18 December 2006 on the registration, evaluation, approval and restriction of chemical substances (REACH), for establishing a European Agency for chemical

substances, for amending Directive 1999/45/EC and for annulment of Directive (EEC) No. 793/93 of the Council, Directive (EC) No. 1488/94 of the Commission, Guideline 76/769/EEC of the Council and Guidelines 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC of the Commission



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