ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	VdL - Verband der deutschen Lack- und Druckfarbenindustrie e.V.
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-VDL-20250557-IBN1-EN
Issue date	13.03.2026
Valid to	12.03.2031

Radiation-curing coatings for wood, pigmented

Verband der deutschen Lack- und Druckfarbenindustrie e.V. (VdL)

Institut Bauen und Umwelt e.V.

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1. General Information

Verband der deutschen Lack- und Druckfarbenindustrie e.V. (VdL)

Programme holder

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

Declaration number

EPD-VDL-20250557-IBN1-EN

This declaration is based on the product category rules:

Coatings with organic binders, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

13.03.2026

Valid to

12.03.2031

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

Radiation-curing coatings for wood, pigmented

Owner of the declaration

VdL - Verband der deutschen Lack- und Druckfarbenindustrie e.V.
Mainzer Landstraße 55
60329 Frankfurt a. M.
Germany

Declared product / declared unit

1 kg liquid coating material as supplied

Scope:

This is an association EPD of the Verband der deutschen Lack- und Druckfarbenindustrie e.V. (German Paint and Printing Ink Association, VdL) for a defined group of radiation-curing coatings for wood. For the life cycle assessment (LCA) calculation, a marketable, produced worst-case formulation was used, which has the highest environmental impacts within the specified product range.
The worst-case declaration is based on the product data provided by the members of the VdL sector group for wood coatings. It applies exclusively to the products represented by this formulation from Western European production sites and is valid for a period of five years from the date of issue.
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 evidence.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard is abbreviated 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
☐ internal ☒ external

Dr. Martina Bender,
(Independent verifier)

2. Product

2.1 Product description/Product definition

This environmental product declaration describes radiation-curing coatings for wood produced by manufacturers of wood coatings in Western Europe organised in the German Paint and Printing Ink Association (VdL).
Opaque and staining, radiation-curing coatings, e.g. UV lacquers are used on wood, wooden components, and furniture.
They consist of organic binders, monomers, pigments, mineral fillers such as chalk, smaller quantities of ancillaries (thickeners, defoamers, wetting agents etc.), and photo initiators.
One product group is 100 % radiation-curing coatings without solvents. Another product group is based on water, which must evaporate before hardening. Water-based products may contain in-can preservatives. Both product groups are cured by radical polymerisation initiated by UV light. For the LCA calculation, a real worst-case formulation was selected from a defined range of produced and commercially available radiation-curing coatings. This formulation has the highest environmental impact within the product range analysed and serves as the basis for this declaration. For the use of the product, the respective national regulations apply at the place of use; in Germany, for example, the *building regulations of the federal states* and the technical regulations based on these regulations.

2.2 Application

Radiation-curing coatings are used as (adhesive) primers, undercoats, fillers, blocking coatings, and multi-layer finishes for coating furniture, floors, everyday items and building components for decorative, functional, or protective purposes.

2.3 Technical data

The requirements of the *Decopaint Directive* and the nationally implementing *ChemVOCFarbV* Ordinance apply for:

- Decopaint product group d: Wood paints for building decoration and cladding
- Decopaint product group e: Wood varnishes and stains for building decoration
- Decopaint product group g: Primers
- Decopaint product group i: One-component performance coatings

and pigmented products that do not fall under the scope of the *Decopaint Directive*.

The following technical data is relevant for the declared product.

Technical Data

Name	Value	Unit
Density	900 - 1500	kg/m^3
pH value	5 - 9	-
Viscosity (varnishes)	10 - 20000	mm²/s

Further technical data according to the *PCR: Coatings with organic binders* are not relevant for the product

Performance values of the product in relation to its characteristics according to the relevant technical regulation (no CE marking).

2.4 Delivery status

Liquid or paste-like in plastic or metal containers. Typical container sizes contain 16 - 27 kg of product. For larger applications, drums with a capacity of approx. 200 kg (litres) or IBCs (intermediate bulk containers) with a capacity of up to 1 tonne (m^3) are also used.

2.5 Base materials/auxiliary materials

Pigmented radiation-curing coatings generally consist of at least one binder, possibly dispersed in water, pigments, mineral fillers (e.g. chalk), and photo initiators in varying proportions. To fine-tune the product properties, additives such as monomers, film-forming aids, thickeners, defoamers, wetting and dispersing agents and, if necessary, preservatives are used.

Name	Value	Unit
Binders (solid content)	20 - 90	% by mass
Natural resins, oils	0 - 5	% by mass
Organic solvents	0 - 25	% by mass
Water	0 - 50	% by mass
Pigments	1 - 45	% by mass
Fillers	0 - 30	% by mass
Photo initiators	0 - 10	% by mass
Thickening agents	0 - 1	% by mass
UV stabilisers	0 - 2	% by mass
Wetting agents	0 - 2	% by mass
Ancillary materials	0 - 8	% by mass

The following ancillary materials are used: anti-settling agents, anti-skin agents, biocides < 1 %, defoamers/deaerators, hydrophobing agents, siccatives, stabilisers, levelling agents, waxes, other additives per < 2 %.

More detailed information can be found on the products and ingredients can be found in the respective manufacturer's specifications (e.g. product data sheets).

1) The product contains substances on the *ECHA candidate list* of substances of very high concern (SVHC) for authorisation (date: 25 June 2025) above 0.1 % by mass: no.

2) The product contains other CMR substances of category 1A or 1B that are not on the *candidate list*, above 0.1 % by mass: no.

3) Biocidal products have been added to this construction product or it has been treated with biocidal products (it is therefore a treated product within the meaning of the *Biocidal Products Regulation* (EU) No. 528/2012): yes.

In-can preservatives: bis(3-aminopropyl)(dodecyl)amine (BDA); benzisothiazolinone (BIT); bronopol (BNPD); chloromethylisothiazolinone (CIT); chloromethylisothiazolinone (CIT) / methylisothiazolinone (MIT) 3:1; dibromodicyanobutane (DBDCB); (ethylene dioxy)-dimethanol (EDDM); 3-iodo-2-propynyl butyl carbamate (IPBC); methylisothiazolinone (MIT); sodium pyrithione; silver chloride; tetramethylolacetylene diurea (TMAD); zinc pyrithione.

Film preservatives: diuron (DMCU), isoproturon, terbutryn, dichloroctylisothiazolinone (DCOIT), octylisothiazolinone (OIT), iodopropynylbutylcarbamate (IPBC), zinc pyrithione.

2.6 Manufacture

Radiation-curing coatings are usually mixed discontinuously in batch operation, i.e. in individual batches or series of individual batches from the ingredients, and filled into the delivery containers. The quality of the products and the safe handling of them is ensured by corresponding regulations such as the German Ordinance on Industrial Safety and Health (*BetrSichV*)

and the German Immission Control Act (*BImSchG*).

2.7 Environment and health during manufacturing

The regulations of the *BetrSichV* apply to manufacturing companies. The raw materials are stored in accordance with *TRGS 509* and *TRGS 510*. When storing and handling preservatives, the *Biocidal Products Regulation* and the manufacturer's instructions are observed. In the chemical industry, goggles, gloves, and – if necessary – protective helmets are mandatory.

2.8 Product processing/Installation

Radiation-curing coatings are only applied by professional applicators.
Occupational safety measures (hand and eye protection, ventilation) must be taken in accordance with the information in the safety data sheet and the conditions on site and must be adhered to consistently. Depending on the application and product specification, different application quantities between 3 and 200 g/m² are possible.

2.9 Packaging

The plastic and tin containers are collected by authorised companies and sent for recycling.
Reusable wooden pallets are taken back by the building materials trade (reusable pallets for a refund in the deposit system).

2.10 Condition of use

In the use phase, radiation-curing coatings are hardened and film-formed. They are durable products that protect surfaces as primers and coatings, and contribute to their appearance, functionality, and sustainability.

2.11 Environment and health during use

Option 1 – Products for applications outside habitable rooms

No hazards to water, air and soil are known if the products are used as intended.

Option 2 – Products for applications inside habitable rooms

The emission behaviour of building products after processing is a key criterion for end users with regard to a 'healthy' indoor climate. As these products are not harmonised construction products, the national regulations for emission behaviour may have to be complied with indoors.

2.12 Reference service life

Radiation-curing coatings fulfil a wide range of tasks, often of a specialised nature, in the manufacture of furniture, flooring, everyday objects, and components. Their use improves serviceability and extends the original service life.
When used as intended in accordance with the rules of technology, there is no experience of limitations to the service life due to ageing. Typically, radiation-curing coatings are replaced after 4 to 20 years. The manufacturer's instructions on maintenance and care must be observed where applicable. The anticipated reference service life depends on the specific installation situation and the associated exposure of the product. It can be influenced by weathering as well as mechanical or chemical loads.

2.13 Extraordinary effects

Fire

Due to their low application quantities, radiation-curing coatings generally only have a limited influence on the fire properties of the respective building/component.

Water

Radiation-curing coatings are only resistant to water to a limited extent and can lose strength when exposed to water for a longer period of time and, in unfavourable cases, peel off surfaces. The main components of the products are not hazardous to water or only slightly hazardous to water according to the Ordinance on Installations for Handling Substances Hazardous to Water (*AwSV*). If the products are processed properly, no water hazard is to be expected in contact with water according to current knowledge.

Mechanical destruction

Wood coatings adhere firmly to the substrate. Negative impacts on the environment in the event of unforeseen mechanical destruction of wooden components/materials are not to be expected.

2.14 Re-use phase

Dried coatings on wood cannot be reused. According to the current state of knowledge, no environmentally-harmful impacts are known from the dismantling and recycling of wooden components to which cured coatings adhere.

2.15 Disposal

Coated wood-based materials and components are generally thermally utilised, in accordance with the *Waste Wood Ordinance* of waste wood category AIII. Coated wood-based materials and components without harmful substances in waste wood category AII can also be recycled. Hardened coating materials that are mechanically removed from substrates must be disposed of as industrial/building site waste (*waste code* 170904).

2.16 Further information

Further information can be obtained from the manufacturer's product or safety data sheets and is available either on the manufacturer's website or on request.

3. LCA: Calculation rules

3.1 Declared unit

The association EPD refers to the production of 1 kg liquid coating. The consumption of products that are applied over a wide area can be between 3 and 200 g per m^2.
For the life cycle assessment calculation, a marketable, produced worst-case formulation was used, which has the highest environmental impacts.

Declared unit

Name	Value	Unit
Declared unit	1	kg
Gross density	900 - 1500	kg/m^3

3.2 System boundary

The Declaration type corresponds to the recorded life cycle stages as specified in Section 5.2 of EN 15804: from the cradle to the factory gate with options, modules C1-C4 and module D (A1-A3 + C + D) and additional modules A4 and A5.

- A1 – Production of primary products
- A2 – Transport to the plant (EURO 6, 27 tonnes total load, 61 % capacity utilisation)
- A3 – Production incl. energy supply, production of packaging, ancillary and operating materials, and waste treatment. The following processes are included in detail:

- Supply processes for primary products and energy
- Manufacturing processes of the products
- Incineration of production waste (solid waste) without credits and wastewater treatment
- Production of packaging.

- A4 – Transport to the warehouse and building site (EURO 6, 27 tonnes total load, 61 % capacity utilisation)
- A5 – Installation (disposal of packaging and product residues as well as emissions during installation) Module A5 also considers the treatment of waste from product packaging. Thermal utilisation of the plastic bucket and recycling of the metal handle are considered here. The energy and material recovery generated during disposal (recycling of the steel handle of the bucket) is awarded as a credit in module D.
- C1 – Dismantling or demolition is carried out manually and free of loads.
- C2 – Transport (C2) to the plant covers a distance of 50 km with a diesel truck (EURO 6, 27 tonnes total load, 61 % capacity utilisation).
- C3 – Disposal of the product
- C4 – No expenses
- D – Credits from the incineration of packaging materials and the recycling of the steel components in the packaging. As a conservative scenario, no credits, i.e. energy credits from the combustion of wood and wood varnish, are awarded.

The electricity mix consists of the German residual electricity mix (0.879 kg CO_2 equiv./kWh).

3.3 Estimates and assumptions

If no specific Sphera MLC processes are available, the individual components of the formulations are estimated according to the manufacturer or literature references.

3.4 Cut-off criteria

Transport for basic materials and product dispatch is included. Water consistency adjustment on the building site and packaging such as film, paper, and wooden pallets were neglected due to their low relevance.
Some chemicals were modelled as proxies. As these substances do not dominate the product composition, only the rough synthesis process is shown. Only the production and disposal of the 18-litre plastic containers were taken into account. The sum of the neglected processes contributes less than 5 % to the impact categories considered. The manufacture of the machinery, equipment, and other infrastructure required to produce the products analysed was not taken into account in the LCAs.

3.5 Background data

The Sphera Life Cycle Assessment for Experts (LCA FE) software system developed by Sphera GmbH is used to model the life cycle of the declared product. The background database is the Sphera Managed Lifecycle Content (MLC) modelling database.

3.6 Data quality

The data quality can be described as good. The primary data was collected in full, taking into account all relevant flows. The background data was taken from the Sphera MLC databases. The databases were last updated in 2025.

3.7 Period under review

The formulation data corresponds to the practical mass data that was drawn up with the members of the VdL sector group for wood coatings in autumn 2024. The production data refers to the year 2023.

3.8 Geographic representativeness

Country or region in which the declared product system is manufactured, used or handled at the end of the product's life span: Western Europe

3.9 Allocation

Primary data:
No allocations are used for production. When incinerating the packaging, a multi-input allocation with a credit for electricity and thermal energy is used according to the simple credit method. The credits from packaging disposal are recognised in module D.
Background data:
The data sets used are listed in the background report. The allocation methods used in background data (materials and energy) are documented online at https://sphera.com/.

3.10 Comparability

Basically, a comparison or an evaluation of EPD data is only possible if all data sets to be compared were created according to *EN 15804* and the building context and product-specific performance characteristics are taken into account. The Sphera LCA For Experts (formerly GaBi Software System) software version 10.9 in combination with the associated databases Managed LCA Content (MLC CUP) was used. The background data comes from the Sphera MLC database CUP 2025.1.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon

Information on describing the biogenic carbon content at the factory gate

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

Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The following technical information is the basis for the declared modules or can be used for the development of specific scenarios in the context of a building assessment if modules are not declared (MND).

Transport to the building site (A4)

Transport to the building site is divided into two routes: from the factory to an interim storage facility or to a distribution centre (route 1) and from the interim storage facility to the building site (route 2). Delivery to the building site is made at short notice on call, for which a capacity utilisation of 3 % is assumed.

Name	Value	Unit
Transport distance - route 1	250	km
Capacity utilisation (including empty runs) - route 1	61	%
Transport distance - route 2	50	km
Capacity utilisation (including empty runs) - route 2	3	%

Installation into building (A5)

Name	Value	Unit
Material loss (water vapour)	0.06	kg
Output substances following waste treatment on site (product residues during installation)	0.01	kg
Dust in the air	-	kg
VOC in the air	0.17	kg
Plastic (packaging)	0,045	kg
Steel (packaging)	0,005	kg

Reference lifetime

Name	Value	Unit
Reference service life	4 - 20	a

End of life path (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	0.76	kg
For incineration	0,76	kg

Reuse, recovery, and recycling potential (D), relevant scenario information

Module D contains the credits from the incineration processes and recycling from A5 (packaging waste).
An R1 value of > 0.6 is assumed for the waste incineration plant.

5. LCA: Results

The following is a presentation of the environmental impacts in accordance with *EN 15804+A2* (EF 3.1) for 1 kg of liquid coating material as supplied. The following tables show the results of the impact assessment indicators, resource use, waste, and other output flows in relation to the declared unit.

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 Radiation-curing coatings for wood, pigmented

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq	3.98E+00	7.96E-02	1.47E-01	0	3.05E-03	1.76E+00	0	-8.62E-02
GWP-fossil	kg CO_2 eq	3.94E+00	7.63E-02	1.43E-01	0	2.93E-03	1.76E+00	0	-8.57E-02
GWP-biogenic	kg CO_2 eq	5.11E-04	1.32E-03	4.81E-03	0	5.07E-05	1.04E-04	0	-4.89E-04
GWP-luluc	kg CO_2 eq	3.46E-02	1.99E-03	1.39E-06	0	7.66E-05	4.49E-05	0	-3.47E-05
ODP	kg CFC11 eq	1.4E-11	2.16E-14	1.43E-14	0	8.33E-16	2.89E-13	0	-9.29E-13
AP	mol H^+ eq	9.24E-03	1.16E-04	2.66E-05	0	4.02E-06	5.2E-04	0	-1.03E-04
EP-freshwater	kg P eq	1.05E-05	1.47E-07	2.28E-09	0	5.65E-09	4.69E-08	0	-1.04E-07
EP-marine	kg N eq	2.32E-03	4.53E-05	5.49E-06	0	1.53E-06	1.61E-04	0	-3.38E-05
EP-terrestrial	mol N eq	2.79E-02	5.08E-04	1.25E-04	0	1.71E-05	2.48E-03	0	-3.72E-04
POCP	kg NMVOC eq	8.9E-03	1.08E-04	1.67E-01	0	3.76E-06	4.19E-04	0	-8.92E-05
ADPE	kg Sb eq	6.89E-06	1.04E-08	1.37E-10	0	3.99E-10	2.83E-09	0	-8.12E-09
ADPF	MJ	7.82E+01	1E+00	2.63E-02	0	3.86E-02	4.66E-01	0	-1.2E+00
WDP	m^3 world eq deprived	5.81E-01	2.95E-04	1.42E-02	0	1.14E-05	1.79E-01	0	-9.59E-04

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 Radiation-curing coatings for wood, pigmented

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PERE	MJ	7.49E+00	8.66E-02	7.3E-03	0	3.33E-03	1.31E-01	0	-3.98E-01
PERM	MJ	0	0	0	0	0	0	0	0
PERT	MJ	7.49E+00	8.66E-02	7.3E-03	0	3.33E-03	1.31E-01	0	-3.98E-01
PENRE	MJ	6.02E+01	1E+00	2.1E+00	0	3.86E-02	1.64E+01	0	-1.2E+00
PENRM	MJ	1.8E+01	0	-2.07E+00	0	0	-1.59E+01	0	0
PENRT	MJ	7.82E+01	1E+00	2.63E-02	0	3.86E-02	4.66E-01	0	-1.2E+00
SM	kg	0	0	0	0	0	0	0	5E-03
RSF	MJ	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0
FW	m^3	2.08E-02	6.16E-05	3.34E-04	0	2.37E-06	4.22E-03	0	-1.52E-04

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 Radiation-curing coatings for wood, pigmented

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
HWD	kg	1.23E-04	5.23E-11	1.6E-11	0	2.01E-12	2.85E-10	0	-8.66E-10
NHWD	kg	2.12E+00	1.49E-04	1.15E-03	0	5.74E-06	3.75E-02	0	-4.9E-04
RWD	kg	1.05E-03	1.45E-06	7.32E-07	0	5.59E-08	1.31E-05	0	-3.98E-05
CRU	kg	0	0	0	0	0	0	0	0
MFR	kg	0	0	5E-03	0	0	0	0	0

MER	kg	0	0	0	0	0	0	0	0
EEE	MJ	0	0	2.63E-01	0	0	2.94E+00	0	0
EET	MJ	0	0	6.06E-01	0	0	6.75E+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 Radiation-curing coatings for wood, pigmented

Parameter	Unit	A1-A3	A4	A5	C1	C2	C3	C4	D
PM	Disease incidence	1.8E-07	1.02E-09	1.72E-10	0	3.65E-11	2.88E-09	0	-8.99E-10
IR	kBq U235 eq	2.14E-01	1.43E-04	7.36E-05	0	5.52E-06	1.31E-03	0	-3.99E-03
ETP-fw	CTUe	5.02E+01	1.11E+00	1.45E+00	0	4.27E-02	1.72E-01	0	-1.46E-01
HTP-c	CTUh	8.9E-10	1.59E-11	1.09E-12	0	6.12E-13	1.78E-11	0	-2.42E-11
HTP-nc	CTUh	2.66E-08	6.15E-10	1.04E-08	0	2.37E-11	8.02E-10	0	-2.39E-10
SQP	SQP	6.07E+00	5.26E-01	7.5E-03	0	2.02E-02	1.3E-01	0	-2.55E-01

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 (carcinogenic); HTP-nc = Potential comparative toxic unit for humans (not carcinogenic); SQP = Potential soil quality index

Disclaimer 1 – applies to the indicator 'Potential effect of human exposure to U235'.
This impact category mainly deals with the possible effect of low-dose ionising radiation on human health in the nuclear fuel cycle. It does not take into account impacts attributable to possible nuclear accidents and occupational exposure, or to the disposal of radioactive waste in underground facilities. Nor is the potential ionising radiation emitted by soil, radon and some building materials measured by this indicator.

Disclaimer 2 – applies to the indicators: 'Abiotic depletion potential – non-fossil resources', 'Abiotic depletion potential – fossil fuels', 'Water depletion potential (users), 'Potential toxicity comparison unit for ecosystems', 'Potential toxicity comparison unit for humans – carcinogenic effect', 'Potential toxicity comparison unit for humans – non-carcinogenic effect', 'Potential soil quality index'.

The results of these environmental impact indicators must be used with caution, as the uncertainties in these results are high or because there is only limited experience with the indicators.

6. LCA: Interpretation

Due to the different units, the results of the impact indicators are given as a percentage.

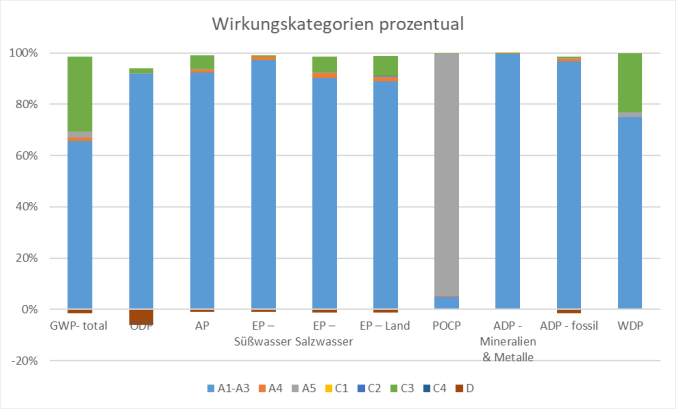

Figure 1:

Wirkungskategorien prozentual	Impact categories as a percentage
GWP-total	GWP total
ODP	ODP
AP	AP
EP - Süßwasser	EP - fresh water
EP - Salzwasser	EP - marine
EP - Land	EP - terrestrial
POCP	POCP
ADP - Mineralien & Metalle	ADPE (minerals & metals)
ADP - fossil	ADPF (fossil resources)
WDP	WDP

Production (A1-A3)
As shown in the figure, the majority of the environmental impacts for all impact categories comes from the production phase (exception: WDP and POCP). Modules A1-A3 have a total impact of 3.86 kg CO_2 equiv., i.e. 67 % of the total GWP total impact.

Transport to the building site (A4)
The transport of products to the building site is of low relevance in most impact categories with values between 0.1 % - 3.0 % in relation to the entire life cycle.

Installation (A5)
Module A5 takes into account the emissions of the solvents contained in the product as well as the treatment of the packaging and the product residue remaining in the bucket. The environmental impacts in this module play a rather subordinate role in the LCA results. The exception is the POCP category (formation potential for tropospheric ozone). The VOC emissions were calculated for module A5 under the assumptions stated in 'Technical Data', i.e. 0.167 kg of VOC emissions per kg of product. The contribution to the other impact categories is negligible.

Deconstruction and demolition (C1)
Module C1 has no measurable environmental impact, as the dismantling or demolition of the component coated with the product is carried out manually.

Transport to waste recycling plants (C2)
The contribution of transport to waste recycling plants plays a negligible role for all impact categories.

Waste process (C3)
The product is incinerated of at the end of its service life. The impacts of incineration are of great significance in the impact categories GWP and EP, where they account for 30 % and 23 % of total impact, respectively.

Disposal (C4)
The product is not landfilled, so C4 does not cause any emissions.

Credits (D)
Module D contains the potential credits from the utilisation of the packaging buckets in module A5. This includes the thermal utilisation of plastics and the material recycling of steel.

7. Requisite evidence

VOC evidence
If the products are used in an area of application (e.g. habitable rooms) in which testing/verification of VOC emissions into the habitable room is required, the manufacturers should always provide such verification in the individual EPDs, e.g. *AgBB*. The following limit values (maximum values) apply to products used in habitable rooms:

VOC emissions

Name	Value	Unit
TVOC (C6 - C16) (after 3 / 28 d)	10.000 / 1.000	µg/m^3
Carcinogenic Substances cat. 1A and 1B (after 3 / 28 d)	10 / 1	µg/m^3
Sum SVOC (C16 - C22) (after 28 d)	100	µg/m^3
R (dimensionless) (after 28 d)	1	-
VOC without NIK (after 28 d)	100	µg/m^3

Measuring method: Test method for determining the emission of volatile organic compounds from coating materials according to *EN 16402* in a test chamber.
No testing is currently planned for outdoor products.

Leaching
Wood coatings are not used outdoors in areas in contact with soil and groundwater. There are currently no recognised assessment principles or emission scenarios for sprinklered components with wood coatings at either European or national level. It is therefore not currently possible to provide technical verification along the lines of indoor emission tests.

Fire gas toxicity
The fire gases from organic products contain hazardous substances, but no particularly dangerous emissions. Testing the toxicity of fire gases is particularly useful in the system structure of the products and is not carried out for individual coatings for this reason, as the fire gases are significantly influenced by the type of substrate.

8. References

Standards

EN 15804
DIN EN 15804:2012+A2:2019+AC:2021, Sustainability of construction works – Environmental product declarations – Basic rules for the product category construction products

EN 16402
DIN EN 16402:2019-08, Paints and varnishes – Assessment of emissions of substances from coatings into indoor air – Sampling, conditioning and testing

ISO 9001
DIN EN ISO 9001:2015, Quality management systems – Requirements (ISO 9001:2015)

ISO 14025
EN ISO 14025:2011, Environmental labels and declarations – Type III environmental declarations – Principles and procedures

Further references

Waste code
Ordinance on the European Waste Catalogue (AVV), 10 December 2001

AgBB
Committee for Health Evaluation of Construction Products, June 2021

Waste Wood Ordinance
Ordinance on requirements for the utilisation and disposal of waste wood, August 2002

AwSV
Ordinance on installations for handling substances hazardous to water, April 2017

Building regulations of the federal states
http://www.bauordnungen.de/html/deutschland.html

Construction Products Regulation
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, March 2011

BBSR
'Nutzungsdauer von Bauteilen zur Lebenszyklusanalyse nach BNB' (Service life of building components for life cycle assessment according to BNB), Federal Institute for Research on Building, Urban Affairs and Spatial Development, Division II Sustainable Building (BBSR); available online at https://www.nachhaltigesbauen.de/austausch/nutzungsdauern-von-bauteilen/;last checked on 20 May 2025

BetrSichV
Ordinance on industrial safety and health; Ordinance on Safety and Health Protection in the Provision of Work Equipment and its Use at Work, on Safety in the Operation of Installations Requiring Monitoring, and on the Organisation of Occupational Health and Safety, July 2021

BImSchG
Federal Immission Control Act; Act on protection against harmful environmental impacts from air pollution, noise, vibrations, and similar processes, August 2025

Biocidal Products Regulation
Regulation (EU) No. 528/2012 of the European Parliament and of the Council of 22 May 2012 concerning the making available on the market and use of biocidal products, May 2012

ChemVOCFarbV
Chemicals Ordinance on the limitation of emissions of volatile organic compounds (VOC) by restricting the placing on the market of solvent-based paints and varnishes (Solvent-based paints and varnishes ordinance, ChemVOCFarbV), December 2004

Decopaint Directive
Directive 2004/42/EC of the European Parliament and of 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, April 2004

ECHA list / Candidate list

European Chemicals Agency (ECHA): List of substances of very high concern for authorisation (https://echa.europa.eu/)

Sphera LCA software and database
Sphera LCA For Experts (formerly GaBi Software System) with the associated databases Managed LCA Content MLC (formerly GaBi databases), Sphera Solutions GmbH. CUP version: 2025.1. University of Stuttgart, Leinfelden Echterdingen, MLC data documentation at https://sphera.com/productsustainabilitygabidatasearch/ (March 2025)

GISCODE
Classifications according to the GISCODE for coating materials (painters and varnishers) of GISBAU as the hazardous substance information system of the German Social Accident Insurance Institution for the construction industry;https://www.bgbau.de/themen/sicherheit-und-gesundheit/gefahrstoffe/gisbau/, July 2025

IBU 2021
Institut Bauen und Umwelt e.V.: General instructions for the EPD programme of Institut Bauen und Umwelt e.V., Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021

PCR, Part A
Product category rules for building-related products and services. Part A: Calculation rules for the Life Cycle Assessment and requirements for the project report, Berlin: Institut Bauen und Umwelt e.V. (pub.), version 1.4, 15 April 2024 (www.ibu-epd.com)

PCR: Coatings with organic binders
Product category rules for building-related products and services. Product category rules for building-related products and services. Product category rules for building-related products and services. PCR, Part B: Requirements for the EPD for coatings with organic binders, version 3 dated 5 July 2023, Institut Bauen und Umwelt e.V., www.bau-umwelt.com

REACH Regulation
Regulation (EC) No. 1907/2006 of the European Parliament and of the Council of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), establishing a European Chemicals Agency, amending Directive 1999/45/EC, and repealing Council Regulation (EEC) No. 793/93, Commission Regulation (EC) No. 1488/94, Council Directive 76/769/EEC, and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, December 2006

TRGS 509
Technical Rules for Hazardous Substances (TRGS), Rule 509: Storage of liquid and solid hazardous substances in stationary containers and filling and emptying points for portable containers, April 2017, Federal Institute for Occupational Safety and Health

TRGS 510
Technical Rules for Hazardous Substances (TRGS), Rule 510: Storage of hazardous substances in transportable containers, January 2013, Federal Institute for Occupational Safety and Health

The following companies from the sector group for wood coatings within the German Paint and Printing Ink Association (VdL) are involved in the preparation of the EPD:

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Berger-Zobel GmbH, production site: Grünstadt / Weinstraße

biopin Naturfarben GmbH & Co. KG, production site: Jever

Herlac Coswig GmbH, production site: Coswig

KNEHO-LACKE GMBH, production site: Horn-Bad Meinberg

Koch & Schulte GmbH & Co. KG, production site: Linden / Westerwald district

Loba GmbH, production site: Ditzingen

MIPA SE, production site: Essenbach, Landshut

Mocopinus GmbH Co.KG, production site: Karlsruhe

Oli Lacke GmbH, production site: Lichtenau

Osmo Holz und Color GmbH & Co. KG, production site: Münster

Remmers GmbH, production site: Löningen, Hiddenhausen

RÜTGERS Organics GmbH, production site: Mannheim

SAICOS COLOUR GmbH, production site: Sassenberg

Teknos Deutschland GmbH, production site: Brüggen

In my capacity as a public translator for the English language, duly registered, commissioned and sworn by the President of the Landgericht (Regional Court) Saarbrücken, I hereby certify the foregoing to be a true and complete translation of the copy which has been submitted to me.
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