

# ENVIRONMENTAL PRODUCT DECLARATION

in accordance with /ISO 14025/ and /EN 15804+A1/

Owner of the declaration	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-KEI-20200169-IBG1-EN
Issue date	11 <sup>th</sup> July 2019
Valid to	10 <sup>th</sup> July 2024


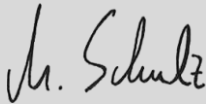

**Silicate interior paints,  
wet abrasion resistance class 2**

**KEIMFARBEN GMBH**

[www.ibu-epd.com](http://www.ibu-epd.com) | <https://epd-online.com>



## 1. General Information

<p>KEIMFARBEN GMBH</p>	<p>Silicate interior paints, wet abrasion resistance class 2</p>						
<p><b>Programme holder</b> IBU – Institut Bauen und Umwelt e.V. Panoramastrasse 1 10178 Berlin Germany</p>	<p><b>Owner of the declaration</b> KEIMFARBEN GMBH Keimstrasse 16 86420 Diedorf</p>						
<p><b>Declaration number</b> EPD-VDL-KEI-20200169-IBG1-EN</p>	<p><b>Declared product/declared unit</b> 1 kg emulsion-based interior paints, wet abrasion resistance class 2: Density 1,000 – 1,700 kg/m<sup>3</sup></p>						
<p><b>This declaration is based on the following product category rules:</b> Coatings with organic binding agents, 07/2014 (PCR tested and approved by the independent advisory board (SVR))</p>	<p><b>Scope:</b> This is an individualised model EPD based on the <b>Verband der deutschen Lack- und Druckfarbenindustrie e.V.</b> association's model declaration EPD-VDL-20190085-IBG1-DE for which the product which represents the worst case with the highest environmental impact from within a range of products has been chosen to calculate the LCA.  This worst-case declaration is based on the specifications of the members of the architectural coatings specialist group within the association. It applies exclusively for products represented by the worst case composition for the plants in Germany for five years as from the date of issue.</p>						
<p><b>Issue date</b> 11<sup>th</sup> July 2019</p>	<p>The owner of the declaration is liable for the basic information and supporting evidence; any liability of the IBU in relation to manufacturer's information, LCA data and supporting evidence is excluded.  This EPD was compiled in accordance with the requirements of <i>EN 15804+A1</i>. This standard is described in simplified form as <i>EN 15804</i> in the following.</p>						
<p><b>Valid to</b> 10<sup>th</sup> July 2024</p>	<p><b>Verification</b></p> <table border="1" data-bbox="831 1384 1370 1576"> <tr> <td colspan="2">European standard <i>EN 15804</i> serves as the core PCR</td> </tr> <tr> <td colspan="2">Independent verification of the declaration and statements by an independent body in accordance with <i>ISO 14025:2010</i></td> </tr> <tr> <td><input type="checkbox"/> internal</td> <td><input checked="" type="checkbox"/> external</td> </tr> </table>	European standard <i>EN 15804</i> serves as the core PCR		Independent verification of the declaration and statements by an independent body in accordance with <i>ISO 14025:2010</i>		<input type="checkbox"/> internal	<input checked="" type="checkbox"/> external
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<input type="checkbox"/> internal	<input checked="" type="checkbox"/> external						
<p> Dipl. Ing. Hans Peters (President of Institut Bauen und Umwelt e.V.)</p>	<p> Matthias Schulz, Independent verifier appointed by SVR</p>						
<p> Dr. Alexander Röder (Executive Director Institut Bauen und Umwelt e.V.)</p>							

## 2. Product

### 2.1 Product description/Product definition

Emulsion-based interior paints comply with *EN 13300*. They consist of artificial, potassium water glass and/or silicone resin-based organic and inorganic binding agents but are also based on natural resins from regenerative sources, inorganic and organic pigments which serve to colour and adjust coverage, mineral-based fillers such as chalk, water and smaller

quantities of additives (thickeners, defoaming and wetting agents, preservatives, etc.).

They dry physically by evaporation of their water content.

The usability of buildings can also be improved and their service life extended through the use of emulsion-based interior wall paints.



The product with the greatest environmental impact was selected as a representative product to calculate the LCA results.

The respective national regulations apply to use of the product at the use location, in Germany for example the /building regulations of the federal states/ and the technical regulations based on these regulations.

## 2.2 Application

The declared products are used as interior wall paint in accordance with /EN 13300/.

The technical requirements of the /Decopaint Directive/ for Decopaint Product Groups a and b - Interior paints for walls and ceilings and the Ordinance on the Curbing of Emissions of Volatile Organic Compounds which implements these requirements nationally apply.

## 2.3 Technical data

The following technical data is relevant for the declared product.

### Constructional data

Name	Value	Unit
Density	1.0 - 1.7	g/cm <sup>3</sup>
Solids content	40 - 80	%
pH value	7 - 11	-

Further technical information in accordance with /PCR Part B/: Coatings with organic binding agents/ is not relevant for this product.

Product performance values in relation to its characteristics are in accordance with the relevant technical purpose (no CE labelling).

## 2.4 Delivery status

Liquid or paste-like in plastic or metal containers. Typical container sizes contain 1 to 30 l but mostly 10 to 20 l of the product. Barrels with a capacity of approximately 200 l or IBCs (Intermediate Bulk Containers) containing more than 1,000 l are used for larger applications.

## 2.5 Base materials/ancillary materials

### Base materials

Generally, products covered by this EPD contain the basic and ancillary materials listed in the following quantities:

Name	Value	Unit
Synthetic emulsion (solids content)	3 - 24	Mass %
Potassium water glass (alkali silicates)	0 - 20	Mass %
Hydrophobing	0 - 1	Mass %
Pigments	2 - 30	Mass %
Mineral filling agents	15 - 55	Mass %
Water	20 - 60	Mass %
Auxiliary materials	1 - 6	Mass %

The following additives are used:

Thickening agents	< 2 mass %
Dispersing agents/Emulsifiers	< 2 mass %
Wetting agents	< 1 mass %
Further auxiliary materials	0–2 mass %

The composition of products which comply with the EPD may deviate from the specified concentration ranges in individual cases.

More detailed information is available in the respective manufacturer's documentation (e.g. product data sheets).

Emulsion-based interior wall paints generally consist of at least one artificial resin emulsion, of synthetic resins dispersed in water, inorganic and organic pigments and mineral fillers (for example chalk). Additives such as thickeners, defoaming, wetting and dispersing agents and preservatives are used to fine-tune product properties.

1) Does the product contain substances which are on the candidate list (15/01/2019) at a mass concentration above 0.1 %: no.

2) Does the product contain further Category 1A or 1B CMR materials which are not on the candidate list at a mass concentration of above 0.1% in at least one partial product: no.

3) Were biocidal products added to this building product or was it treated with biocidal products (is this therefore a processed product in terms of EU Biocidal Product Directive no. 528/2012): yes;  
In-can preservatives: Bis(3-aminopropyl)(dodecyl)amine (BDA); benzisothiazolinone (BIT); bronopol (BNPD); methylchloroisothiazolinone (CIT); methylchloroisothiazolinone (CIT) / methylisothiazolinone (MIT) 3:1; dibromdicyanobutane (DBDCB); (ethylendioxy)-dimethanol (EDDM); 3-iodine-2-propinyl-butylcarbamate (IPBC); methylisothiazolinone (MIT); sodium pyrithion; silver chloride; tetramethyl olacetylendi urea (TMAD); zinc pyrithione.

## 2.6 Manufacturing

Emulsion-based interior wall paints are generally discontinuously mixed together from the ingredients in batches, that is in individual batches or series of individual batches and filled into the delivery container. Quality standards in accordance with /ISO 9001/ and the provisions of relevant regulations such as the Industrial Safety Directive and the Emissions Protection Act are complied with.

## 2.7 Environment and health during use

Generally, no further environmental or health protection measures beyond those which are legally prescribed are necessary.

## 2.8 Product processing/installation

Emulsion-based interior wall paints are mainly processed by hand with suitable tools. The paints are applied by spreading with a brush or roller or by spraying. Work safety measures (hand and eye protection and ventilation) are to be taken in accordance with the specifications in the safety data sheet and the conditions on-site and consistently complied with.

Emulsion-based paints are assigned to the GISBAU /GISCODE/ product code for paints and varnishes (BSW 10, 20, 40, 60) depending on their composition. Applied quantities vary between 100 and 500 g/m<sup>2</sup> depending on use and the product specification.



## 2.9 Packaging

Completely empty containers can be recycled. Reusable wooden pallets are taken back by the building materials trade (reusable pallets against reimbursement within the deposit system) returned by them to building product manufacturers and returned to the production process.

Interior wall paints are normally packaged in 5 litre or 12.5 litre polypropylene buckets.

## 2.10 Condition of use

In the use phase, emulsion-based paints are hardened and consist mainly of an inert three-dimensional network.

These are long-life products which form a protective coating for buildings and contribute to their functionality and value retention.

## 2.11 Environment and health during use

Being thin-layer products, interior paints generally only discharge volatile compounds into the room air for a short time during the drying phase. Their emission behaviour during the use phase can be tested according to /EN 16402/.

## 2.12 Reference period of use

There is no knowledge of limitations of the service life through ageing if used appropriately in accordance with the rules of technology. A service life of more than 100 years could realistically be achieved.

The manufacturer's instructions on care and maintenance must be followed. Maintenance work or requirements for optical redesign mainly lead to a renewal of the paintwork.

The reference period of use to be expected depends on the specific installation situation and the associated exposure of the product. It can be influenced by the weather and also mechanical or chemical impacts.

## 2.13 Extraordinary influences

### Fire

Due to the thinness of the coating and its composition, interior wall paints have no or only a subordinate influence on the fire properties of the component which has been coated with them.

### Water

Emulsion-based products are only water-resistant to a certain extent and can become less stable under prolonged exposure to water, even flaking off surfaces in extreme cases. The main ingredients of the products are either not hazardous at all or only slightly hazardous to water in accordance with the Ordinance on Installations for the Handling of Substances Hazardous to Water (/AwSV/).

Since emulsion-based products are only used in low quantities on buildings overall, extraordinary exposure to water is not expected to make any relevant contribution to environmental damage.

### Mechanical destruction

The mechanical destruction of hardened emulsion-based interior wall paints does not produce degradation products which are hazardous to the environment or health.

## 2.14 End-of-life phase

According to the current state of knowledge, no environmentally harmful effects are to be expected from dismantling and recycling components which are coated with hardened emulsion-based interior wall paints.

## 2.15 Disposal

Only a small proportion of interior wall paint accrues when components on which they were used are disposed of.

The small amounts adhering to components are not a problem when normal components/building components are recycled. The respective substrate/component waste code remains unaffected. Hardened product remains which are removed mechanically from substrates are to be disposed of as mixed building site waste (/waste code/ 170904).

## 2.16 Further information

Further information can be found in the manufacturer's product or safety data sheets and is also available from the manufacturer's website or on enquiry.

# 3. LCA: Calculation rules

## 3.1 Declared unit

This federation EPD is based on the declared unit of 1 kg of emulsion-based interior wall paint. Consumption of the products which are applied to surfaces can be between 100 and 500 g/m<sup>2</sup>.

The product with the greatest environmental impact was selected as a representative product to calculate the LCA results.

### Specification of the declared unit

Name	Value	Unit
Declared unit	1	kg
Bulk density	1000 - 1700	kg/m <sup>3</sup>

- A1: Manufacture of pre-products
- A2: Transport to works
- A3: Production including energy provision, manufacture of packaging and also auxiliary and operating materials and waste treatment
- A4: Transport to the building site
- A5: Installation (disposal of packaging and product residues and also emissions during installation)
- D: Credits from burning the packaging materials and recycling the steel parts in the packaging.

## 3.2 System boundary

Modules A1/A2/A3, A4, A5 and D are included in the LCA:

This is therefore a cradle to factory gate with options declaration.



### 3.3 Estimations and assumptions

If no specific /GaBi/ processes were available, the individual component ingredients of the formulations were estimated based on manufacturer specifications or literature.

### 3.4 Cut-off rules

No cut-off rules were applied in calculating the LCA. All raw materials which were sent by the association for the formulations were included.

The manufacture of machines, systems and other infrastructure required to produce the products under consideration was not included in the LCA.

### 3.5 Background data

Data from the /GaBi 8B/ database was used as background data. This was supplemented by information from the manufacturer and research in the relevant literature if background data was not available.

### 3.6 Data quality

Representative products have been used and the product from the group which has the greatest environmental impact has been used to calculate the LCA results for this federation EPD. The primary data

is not more than 7 years old. The data has been taken from /GaBi 8B/ databases and is thus consistent. The foreground data is from 2017 and 2018 and is therefore also current.

### 3.7 Period under review

The period under review relates to the annual output for 2017.

### 3.8 Allocation

No allocations were applied for production. A multi-input allocation with a potential credit for electricity and thermal energy is deployed in accordance with the simple credit method for the burning of the packaging. The credits from disposal of the packaging are credited in Module D.

### 3.9 Comparability

In principle, a comparison or the evaluation of EPD data is only possible if all data to be compared was compiled in accordance with /EN 15804/ and the building context or product-specific performance characteristics have been included.

The /GaBi 8B/ database was used to produce the LCA.

## 4. LCA: Scenarios and further technical information

The following 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 travelled: from the works to an intermediate store or a distribution centre (route 1) and from the intermediate store to the building site (route 2). Delivery to the building site is on demand and at short notice for which capacity utilisation of 3% is assumed.

Name	Value	Unit
Transport distance route 1	250	km
Capacity utilisation (including empty runs) route 1	85	%
Transport distance route 2	50	km
Capacity utilisation (including empty runs) route 2	3	%

### Installation into the building (A5)

Name	Value	Unit
Auxiliary material	0	kg
Water consumption	0	m <sup>3</sup>
Other resources	0	kg
Electricity consumption	0	kWh
Other energy carriers	0	MJ
Material loss	0.01	kg
Output materials as a result of waste treatment on the building site (product residues on installation)	0.01	kg
Dust in the atmosphere	0	kg
NMVOc in the atmosphere	0.0007	kg

## 5. LCA: Results

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

Production stage			Construction process stage		Use stage							End of life stage				Credits and loads beyond the system boundary
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use/application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/demolition	Transport	Waste processing	Disposal	Reuse, recovery or 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	MND	MND	MND	MND	X

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with EN 15804+A1: 1 kg emulsion-based interior wall paint, wet abrasion resistance class 2: Covering capacity class 1

Parameter	Unit	A1-A3	A4	A5	D
Global warming potential	[kg CO <sub>2</sub> eq.]	1.41E+0	2.41E-1	3.02E-2	-1.84E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11 eq.]	6.45E-10	8.21E-17	3.88E-16	-3.31E-16
Acidification potential of land and water	[kg SO <sub>2</sub> eq.]	1.77E-2	4.86E-4	4.98E-6	-2.24E-5
Eutrophication potential	[kg (PO <sub>4</sub> ) <sup>3-</sup> eq.]	4.44E-4	1.20E-4	1.09E-6	-3.37E-6
Formation potential for tropospheric ozone photochemical oxidants	[kg Ethene eq.]	8.21E-4	-1.63E-4	1.06E-4	-2.14E-6
Abiotic depletion potential for non-fossil resources	[kg Sb eq.]	8.97E-6	2.27E-8	2.46E-9	-3.74E-9
Abiotic depletion potential for fossil resources	[MJ]	2.20E+1	3.21E+0	1.90E-2	-2.27E-1

RESULTS OF THE LCA – ENVIRONMENTAL IMPACT in accordance with EN 15804+A1: 1 kg emulsion-based interior wall paint, wet abrasion resistance class 2: Covering capacity class 1

Parameter	Unit	A1-A3	A4	A5	D
Renewable primary energy as energy carrier	[MJ]	3.93E+0	1.96E-1	5.89E-3	-5.52E-2
Renewable primary energy resources as material utilisation	[MJ]	3.00E-2	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	3.96E+0	1.96E-1	5.89E-3	-5.52E-2
Non-renewable primary energy as energy carrier	[MJ]	1.99E+1	3.22E+0	3.85E-1	-2.51E-1
Non-renewable primary energy resources as material utilisation	[MJ]	3.72E+0	0.00E+0	-3.63E-1	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	2.6E+1	3.22E+0	2.17E-2	-2.51E-1
Use of secondary materials	[kg]	0.00E+0	0.00E+0	0.00E+0	1.20E-3
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m <sup>3</sup> ]	6.60E-3	2.25E-4	9.16E-5	-3.26E-5

RESULTS OF THE LCA: OUTPUT FLOWS AND WASTE CATEGORIES TO EN 15804+A1:

1 kg emulsion-based interior wall paint, wet abrasion resistance class 2: Covering capacity class 1

Parameter	Unit	A1-A3	A4	A5	D
Hazardous waste disposal	[kg]	2.09E-4	1.84E-7	8.06E-11	-1.44E-10
Non-hazardous waste disposal	[kg]	3.74E-1	2.16E-4	1.43E-3	-1.01E-4
Radioactive waste disposal	[kg]	6.22E-4	3.83E-6	1.07E-6	-9.58E-6
Components for reuse	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	1.20E-3	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	9.17E-3	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	5.23E-2	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	1.21E-1	0.00E+0

Small quantities of pre-products are deployed which contain biogenic carbon, i.e. cellulose fibres and balsam colophony-based triethylene glycol ester. The end-of-life for emulsion-based products is not included due to the small quantities and uncertainty about the release of these biogenic carbons.

## 6. LCA: Interpretation

### Primary energy in the lifecycle

The total primary energy contains a 10% share of renewable primary energy (PERT). Module A1 therefore contains a share of some 90% of the pre-products of the formulation from both renewable and non-renewable primary energy (PENRT).

### Impact categories in the lifecycle

Module A1 (manufacture of the respective pre-products) dominates the impact categories of global warming potential (GWP), acidification potential (AP), eutrophication potential (EP), photochemical ozone creation potential (POCP), abiotic depletion potential for non-fossil resources (ADPE) and abiotic depletion potential for fossil resources (ADPF) with a share of between 75% and 100%.



The extremely low proportion of solvents overall results in overall low POCP values and a share of approximately 10% of this impact category for Module A5.

Transport, especially transport in Module A4 (transport to the building site) represents a further significant share of up to approximately 20% in the LCA due to the assumptions made (250 km with 85% capacity utilisation and 50 km with 3% capacity utilisation).

Module A4 exhibits a negative POCP value. This results from the negative characterisation factor for

carbon monoxide (CAS 10102-43-9) and a carbon monoxide emission through transport (Module A4).

#### Impacts of pre-products

The impact categories considered are dominated by titanium dioxide. Further significant pre-products are poly(vinyl acetate-vinyl chloride-ethylene) emulsion, silicone resin emulsion / silicone resin and precipitated calcium carbonate.

No further pre-products make any significant contribution to the result.

## 7. Requisite evidence

### 7.1 VOC- Requisite evidence

No special tests and verifications have been done or provided as part of compiling this federation EPD.

Verification should be provided by the manufacturer insofar as products are deployed in any application area (e.g. common rooms) in which the verification/detection of VOC emissions in common rooms is demanded.

The following threshold values apply for products which are used in common rooms (maximum values):

#### VOC emissions

Name	Value	Unit
TVOC (C6 - C16) (after 3 / 28 days)	10,000 / 1,000	µg/m <sup>3</sup>
Cat. 1A and 1B carcinogens (after 3 / 28 days)	10 / 1	µg/m <sup>3</sup>
Total SVOC (C16 - C22) (after 28 days)	100	µg/m <sup>3</sup>
R (dimensionless) (after 28 days)	1	-
VOC without NIK (after 28 days)	100	µg/m <sup>3</sup>

Interior wall paints which fulfil the requirements of /VdL-RL 01/ for solvent- and softener-free emulsion paints generally fulfil the requirements of the /AgBB/ schema.

**Measurement procedure:** Method to determine emissions of volatile organic compounds from building products in accordance with /EN 16402/ in a test chamber.

### 7.2 Leaching

This test is not relevant for emulsion-based interior wall paints as the products are only used indoors.

### 7.3 Toxicity of combustion gases

The combustion gases from organic products contain dangerous substances but no especially dangerous emissions. A toxicity test for combustion gases is appropriate above all in the system design of the products and is not performed for individual coatings for this reason as the combustion gases are significantly influenced by the type of substrate.

## 8. References

### Standards

#### EN 15804

/EN 15804:2012-04+A1 2013/, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

#### EN 15804

/EN 15804:2019-04+A2 (in press)/, Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products.

#### ISO 14025

/DIN EN ISO 14025:2011-10/, Environmental labels and declarations – Type III Environmental declarations – Principles and procedures.

### Further literature

#### IBU 2016

Institut Bauen und Umwelt e.V.: General EPD programme instructions from Institut Bauen und

Umwelt e.V. (IBU). Version 1.1, Berlin: Institut Bauen und Umwelt e.V., 2016.

[www.ibu-epd.com](http://www.ibu-epd.com)

#### Software/database title

Software/database title. Addendum to title, version. Location: Publisher, date of publication [access on access date].

#### /Waste code/

European Waste Catalogue regulation, 2001-12.

#### /AgBB/

Committee for Health-related Evaluation of Building Products, 2018-08.

#### /AwSV/

Ordinance on Installations for the Handling of Substances Hazardous to Water, 2017-04.

#### /Building regulations of the federal states/

<http://www.bauordnungen.de/html/deutschland.html>.

#### /Industrial Safety Directive (BetrSichV)/

Industrial safety directive: Directive on safety and health protection in the provision of working materials



and their use at work, on safety when operating plant requiring supervision and on the organisation of occupational health and safety, 2015-02.

**/BlmSchG/**

Federal Immission Control Act; Law to protect against harmful environmental impacts through air pollution, noise, vibration and similar processes, 2013-05.

**/Ordinance on Biocidal Products/**

EU Ordinance No. 528/2012 of the European Parliament and Council of 22<sup>nd</sup> May 2012 on the Provision on the Market and Use of Biocidal Products, 2012-05.

**/Ordinance on the Curbing of Emissions of Volatile Organic Compounds (ChemVOCFarbV)/**

Ordinance on the Curbing of Emissions of Volatile Organic Compounds (VOC) through limiting the putting on the market of solvent-containing paints and varnishes (Ordinance on the Curbing of Emissions of Volatile Organic Compounds), 2004-12.

**/Decopaint Directive/**

Directive 2004/42/EC of the European Parliament and Council of 21<sup>st</sup> April 2004 on the limitation of emissions of volatile organic compounds due to the use of organic solvents in certain paints and varnishes in vehicle repair paint products and also to modify Directive 1999/13/EC, 2004-04.

**/EN 13300/**

DIN EN 13300: 2002-11 Paints and varnishes - Water-borne coating materials and coating systems for interior walls and ceilings - Classification.

**/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).

**/GaBi 8/**

GaBi Version 8.7: Software and database for integrated lifecycle assessment (SP 36), 1992-2018,

thinkstep AG, Leinfelden-Echterdingen, with recognition from the University of Stuttgart Institute for Acoustics and Building Physics (IABP).

**/GaBi 8B/**

GaBi Version 8.7: Documentation of the GaBi 8 database data for integrated lifecycle assessment. University of Stuttgart Institute for Acoustics and Building Physics (IABP) and thinkstep AG, Leinfelden-Echterdingen, 2018 (<http://documentation.gabi-software.com/>).

**/GISCODE/**

GISBAU classifications according to the GISCODE for coating materials (painters and varnishers) as the hazardous substance information system from the construction industry trade association, <https://www.bgbau.de/themen/sicherheit-und-gesundheit/gefahrstoffe/gisbau/>, 2018-10.

**/PCR Part A/**

Product category rules for building-related products and services. Part A: Calculation rules for the LCA and requirements of the project report, version 1.7 Berlin: Institut Bauen und Umwelt e.V., [www.ibu-epd.com](http://www.ibu-epd.com), 2018.

**/PCR: Coatings with organic binding agents/**

Product category rules for building-related products and services. Part B: Requirements of the EPD for coatings with organic binding agents, Berlin: Institut Bauen und Umwelt e.V. (IBU), 2017-11

**/REACH regulations/**

Regulation (EC) No 1907/2006 of the European Parliament and of the Council of 18<sup>th</sup> 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 as well as EC Commission Directive 1488/94, Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, 2006-12.

**/VdL-RL 01/**

Federation directive 01: Directive on declaring varnishes, paints, stains, plastering, smoothing cement, primers and associated products (VdL-RL 01), Verband der deutschen Lack- und Druckfarbenindustrie e.V., 2018-01.



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