

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804+A1

Owner of the Declaration	Deutsche Bauchemie e.V.
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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Methacrylate resins as binding agents for methacrylate resin products

Deutsche Bauchemie e.V.



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**DEUTSCHE
BAUCHEMIE**



1. General Information

Deutsche Bauchemie e.V.

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number

EPD-DBC-20180119-IAE1-EN

This declaration is based on the product category rules:

Reaction resin products, 07.2014
(PCR checked and approved by the SVR)

Issue date

25.03.2020

Valid to

24.03.2025



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



Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.)

Methacrylate resins as binding agents for methacrylic resin products

Owner of the declaration

Deutsche Bauchemie e.V.
Mainzer Landstraße 55
60329 Frankfurt

Declared product / declared unit

1kg/1kg; Density: 900 kg/m³ to 1,700 kg/m³

Scope:

This declaration applies exclusively to the specified product group (methacrylate resins as a binding agent for methacrylate resin products) for plants in Germany and Belgium for five years as from the date of issue. This is a model EPD based on model declaration EPD-DBC-20130102-IBE1-DE in which the product which exhibits the highest environmental impact in a particular group was selected from the group to calculate the LCA. The members of the association are listed on the association website.

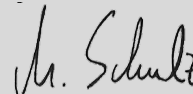
The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of *EN 15804+A1*. 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 14025:2010*

internally externally



Matthias Schulz
(Independent verifier appointed by SVR)

2. Product

2.1 Product description/Product definition

Methacrylate resins as binding agents are mixed together from their ingredients.

They fulfil a wide variety of often specialised tasks in the construction, furnishing, renovation and waterproofing of buildings. Using methyl acrylate resins as binding agents can decisively improve the serviceability of structures and significantly extend their service life.

This product is not subject to EU harmonisation legislation.

This is methacrylate resin used as a binding agent; the requirements regarding labelling do not therefore apply.

The respective national regulations apply to use at the location of use; in Germany, for example, the building

codes of the federal states and the technical building rules based on these regulations apply.

Further information is given in the specific EPDs.

2.2 Application

Methacrylate resins as binding agents are deployed on building sites for the following applications:

- Reaction resins to protect and repair concrete building components
- Reaction resins for liquid-applied bridge deck waterproofing kits
- Reaction resins for watertight covering kits
- Reaction resins for screed material and floor screeds
- Reaction resins for liquid-applied roof waterproofing kits

- Liquid applied products for water proofing of buildings
- Reaction resins for liquid applied waterproofing for joint seals
- Reaction resins for waterproofing concrete components or masonry and for pre-treating mineral substrates such as screed or concrete floors or for visual design

Applications in accordance with the manufacturer's technical documentation and in compliance with the corresponding usage rules.

2.3 Technical Data

Information on the performance of the construction product in relation to its technical properties is contained in the declaration of performance in accordance with EU Directive No. 305/2011 (Construction Products Regulation).

Methyl acrylate resin products must fulfil the following requirements as a minimum:

Constructional data

Name	Value	Unit
Viscosity according /ISO 3219/	< 100	Pa·s
Shore hardness A according /ISO 7619-1/	> 15	-
Shore hardness D according /ISO 7619-1/	> 10	-
Density according /ISO 2811-1/	0,9 - 1,7	kg/dm ³

Note: Specification of tensile shear strength and tensile adhesive strength in accordance with /EN 14239/ are not typical properties of MMA resins.

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

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

2.4 Delivery status

2.4.1 Reaction resins: Liquid or paste-like in containers made of tin plate

Typical container sizes contain from 30 to 200 kg of material.

IBCs (Intermediate Bulk Containers) with up to 1 tonne are used for larger applications.

A tin container was modelled for the LCA.

2.5 Base materials/Ancillary materials

In most cases, methacrylate resins contain methyl methacrylate as the main reactive ingredient and also further co-monomers from the methacrylate or acrylate group. Hardening takes place in an installed state on-site using the hardening component. Radical-forming initiators which are added as a powdery hardener are used for hardening.

The components may contain dissolved polymers also contain further auxiliary materials such as accelerators, wetting agents and foam and viscosity regulators to produce the required application properties.

The mixing ratio for resin and hardener is set according to the specifications depending on the temperature. Product hardening begins directly after the components have been mixed.

On average, products covered by this EPD contain the basic and auxiliary materials listed within the following margins:

Acrylate: > 95%

Others: < 5%

The margins specified are average values and the composition of products which comply with the EPD can deviate from the specified concentration margins in individual cases.

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

1) Does the product contain substances from the ECHA list of substances which are especially problematic for approval: substances of very high concern (SVHC) (Date 16/01/2020) above 0.1 percentage by mass: yes

This is dicyclohexyl phthalate (DHCP). A number of products which are covered by this model EPD still contain DHCP in concentrations above 0.1%. It is to be anticipated that DHCP will be completely substituted by the beginning of 2021 and no longer used in the products.

Insofar as products contain other REACH candidate list substances (list in accordance with Article 59 Paragraph 1 of the REACH regulation) these are listed as from a concentration of 0.1% together with other ingredients which must be declared in Section 3 of the safety data sheet for the respective product.

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 percentage by mass in at least one partial product: no.

None of the input substances were classified as category 1A or 1B CMR substances at the time this model EPD was issued. Substances classified as Category 1A/1B CMR substances at a concentration of 0.1% or above may be listed along with other ingredients to be declared in Section 3 of the safety data sheet of the respective product.

3) Were biocidal products added to this construction product or was it treated with biocidal products (is this therefore a treated article in terms of EU Biocide Product Regulation No. 528/2012): no.

2.6 Manufacture

The formulated product components are generally mixed together from the ingredients in a batch process and packed into the supply container. Quality standards in accordance with /ISO 9001/ and the provisions of relevant regulations such as the Industrial Safety Directive and the Federal Emissions Control Act are complied with.

2.7 Environment and health during manufacturing

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

2.8 Product processing/Installation

Methacrylate resin products are applied by trowelling/knife-coating or rolling, pouring or spray application.

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. Methacrylate resins as binding agents for methacrylate resin products are generally assigned to the RMA 10 or RMA 20 GISCODE/GISBAU product code due to their composition.

Methacrylate resin products react after mixing resin and hardener under heat development (exothermicity). The mixed components should therefore be processed rapidly within the specified pot life. Larger quantities of the mixture remaining in the container can lead to intense heating and decomposition.

2.9 Packaging

Completely empty containers and clean cardboard boxes with PE foils 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.

2.10 Condition of use

In the use phase, methacrylate resin products are hardened and consist mainly of an inert three-dimensional network.

They are long-life products which protect buildings as a primer, sealant, coating or waterproofing and make a large contribution to their functionality and value retention.

2.11 Environment and health during use

During the use phase, methacrylate resin products have lost their reactivity and behave inertly. No hazards for water, the air/atmosphere and soil are known of if they are used appropriately.

2.12 Reference service life

Methacrylate resin products fulfil a wide variety of frequently specialised functions in the construction or restoration of buildings. The usability of buildings can be improved accordingly and their original service life significantly extended by their use. The anticipated reference service life 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 loads.

2.13 Extraordinary effects

Fire

Even without special fire protection equipment, methacrylate resin products fulfil the requirements of

/EN 13501-1/ for fire classes E and Efl as a minimum. Cross-linked methacrylate resins do not melt and drip down so that the resins do not contribute in any way to the spread of a fire.

In addition to the normal main products of carbon monoxide and carbon dioxide the combustion gases can contain traces of methyl methacrylate, esters, alcohols and hydrocarbons.

In addition, due to the quantities in which they are used, they have only a minor influence on the fire properties of the buildings in which they are installed.

Water

Methacrylate resin products are chemically inert and insoluble in water. They are often used to protect buildings against damaging water ingress.

Mechanical destruction

The mechanical destruction of methacrylate-based reaction resins does not produce decomposition products which are hazardous to the environment or health.

2.14 Re-use phase

According to the current state of knowledge, no environmentally harmful effects (for example on placing in landfill) are to be expected from dismantling and recycling components to which hardened methyl methacrylate-based products still adhere.

Due to their energy content, thermal recycling is a viable recycling variant if methyl methacrylate systems can be removed from the building components without appreciable time and effort.

The small amounts which still adhere are not significant for disposal. They do not disrupt the disposal or recycling of the remaining components/building materials.

2.15 Disposal

Individual components which can no longer be recycled must be mixed together at the prescribed ratio and hardened.

Hardened product residues are not hazardous waste. Non-hardened product residues are hazardous waste.

Completely empty, dried containers (free of drops and scraped-clean) are recycled. Residual quantities are to be disposed of in accordance with the local regulations.

The following /EWC waste codes/ may be appropriate:

Non-hardened product residues:

- 070208 Reaction and distillation residues
- 080111 Waste from the manufacture, formulation, sale, use (MFSU) and removal of paints and varnishes – paint and varnish residues which contain organic solvents or other hazardous substances.

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.

Valuable technical information is also available from the association's website (www.deutsche-bauchemie.de).

3. LCA: Calculation rules

3.1 Declared Unit

This model EPD is based on the declared unit of 1 kg of methacrylate resin as a binding agent for methacrylate resin products in accordance with /PCR Part B/ for reaction resins.

The product which has the highest environmental impact within the product group has been declared.

Specification of the declared unit

Name	Value	Unit
Declared unit	1	kg
Conversion factor to 1 kg	1	-
Density	900 - 1.700	kg/m ³

Consumption per unit of area of the products which are applied to flat surfaces can lie between a few hundred grams and more than 1 kg per m². The density ranges from 900 to 1,700 kg/m³.

3.2 System boundary

Modules A1 to A3 are included in the LCA:

- 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

This is a cradle to factory gate declaration.

3.3 Estimates and assumptions

If no specific /GaBi 8B/ processes were available, the individual component ingredients of the formulations were estimated based on manufacturer specifications or literature.

3.4 Cut-off criteria

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 model EPD. The primary data is not more than 5 years old.

3.7 Period under review

Representative formulations from Deutsche Bauchemie e.V. from 2018 were compiled for the formulations. The production data relates to a primary data collection from 2017.

3.8 Allocation

No allocations were applied for production. However, production waste was sent to a waste incineration plant for disposal. Potential credits for electrical and thermal energy were calculated after incineration.

3.9 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.

The used background database has to be mentioned. The /GaBi 8B/ database was used for modelling.

4. LCA: Scenarios and additional technical information

In accordance with /PCR Part A/, no scenarios were specified as Modules A1-A3 are declared.

Installation in the building (A5)

Name	Value	Unit
Other resources (released CO ₂)	0.196	kg
Other energy carriers renewable primary energy for material Utilisation, PERM [from packaging])	-1.16	MJ

Module A5 was not declared. Just the values for calculating CO₂ neutrality (biogenic CO₂ emissions from burning pallets and paper) and the renewable primary energy for material use are specified in accordance with the requirements of /PCT Part A/.

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE 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	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	MND

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 kg methacrylate resin as a binding agent for methacrylate resin products

Parameter	Unit	A1-A3
Global warming potential	[kg CO ₂ -Eq.]	4.39E+0
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	2.92E-14
Acidification potential of land and water	[kg SO ₂ -Eq.]	1.04E-2
Eutrophication potential	[kg (PO ₄) ³⁻ -Eq.]	9.65E-4
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.39E-3
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.83E-5
Abiotic depletion potential for fossil resources	[MJ]	1.08E+2

RESULTS OF THE LCA - RESOURCE USE according to EN 15804+A1: 1 kg methacrylate resin as a binding agent for methacrylate resin products

Parameter	Unit	A1-A3
Renewable primary energy as energy carrier	[MJ]	5.11E+0
Renewable primary energy resources as material utilization	[MJ]	1.16E+0
Total use of renewable primary energy resources	[MJ]	6.27E+0
Non-renewable primary energy as energy carrier	[MJ]	8.24E+1
Non-renewable primary energy as material utilization	[MJ]	2.77E+1
Total use of non-renewable primary energy resources	[MJ]	1.10E+2
Use of secondary material	[kg]	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0
Use of net fresh water	[m ³]	2.04E-2

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES according to EN 15804+A1: 1 kg methacrylate resin as a binding agent for methacrylate resin products

Parameter	Unit	A1-A3
Hazardous waste disposed	[kg]	6.37E-8
Non-hazardous waste disposed	[kg]	4.30E-2
Radioactive waste disposed	[kg]	8.94E-4
Components for re-use	[kg]	0.00E+0
Materials for recycling	[kg]	0.00E+0
Materials for energy recovery	[kg]	0.00E+0
Exported electrical energy	[MJ]	0.00E+0
Exported thermal energy	[MJ]	0.00E+0

6. LCA: Interpretation

Overall, the results are dominated by the environmental impacts of the pre-products (Module A1) in all important impact categories. The methyl methacrylate (MMA) used plays a particularly large role here (40-50%). With a share of 25-35%, acrylic copolymer is the second significant pre-product, followed by 2-ethylhexyl acrylate with a share of between 20 and 35%.

Global warming potential (GWP) is dominated by the manufacture of the pre-products at approximately 95%. The influence of each pre-product is approximately reflected by their mass share in the formulation. In

production, which contributes < 5% to global warming potential, the manufacture of the steel container has a particularly large effect.

The photochemical ozone creation potential (POCP) is also dominated by the manufacture of the pre-products: The pre-products contribute approximately 70% of POCP. The influence of the manufacture of the binding agent is around 30% due to emissions. It should be noted that emissions from installation are not included in the result as the installation of the product is not part of this pre-product declaration.

7. Requisite evidence

7.1 VOC evidence

No special tests and verifications have been done or provided as part of compiling this model EPD. Verification should be sought from the manufacturer insofar as products are deployed in any application area (e.g. common room) in which the verification/detection of VOC emissions in the common rooms are demanded.

Measurement procedure: GEV test method to determine emissions of volatile organic compounds from building products in accordance with /ISO 16000-3/, /ISO 16000-6/, /ISO 16000-9/ and /ISO 16000-11/ in a test chamber. Test for CMR substances and also TVOC/TSVOC after 3 and 28 days.

The corresponding test certificate serves as **verification**. The results may be given in the form of an emissions class.

VOC emissions

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

Name	Value	Unit
TVOC (C6 - C16) after 3 / 28 d	10.000 / 1.000	µg/m ³
Sum SVOC (C16 - C22) after 28 d	100	µg/m ³
C1, C2 substances after 3 bzw. 28 d	10 / 1 **	µg/m ³
Total formaldehyde / acetaldehyde	- / -	ppb
VOC without NIK	100	µg/m ³
R (dimensionless) after 28 d	1	-

* Total after 3 days

** per individual substance after 28 days

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.

ISO 14025

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

Further References

IBU 2016

Institut Bauen und Umwelt e.V.: General Programme Instructions for the Preparation of EPDs at the Institut Bauen und Umwelt e.V. Version 1., Berlin: Institut Bauen und Umwelt e.V., 2016. <http://www.ibu-epd.>" www.ibu-epd.com

/EWC waste code/

European Waste Catalogue regulation (EWC)

/EN 13501-1/

DIN EN 13501-1:2019-05

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

/EN 14239/

DIN EN 14239:2004-04

Ventilation for buildings – Ductwork – Measurement of ductwork surface area

/GaBi 8/

GaBi Version 8.7: Software and database for integrated lifecycle assessment, 1992-2018, thinkstep AG, Leinfelden-Echterdingen, with recognition from the University of Stuttgart Institute for Acoustics and Building Physics (IABP)

/GaBi 8B/

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://www.gabi-software.com/international/support/gabi/gabi-database-2018-ici-documentation/>)

/ISO 16000-3/

DIN ISO 16000-3:2013-01

Indoor Air - Part 3: Determination of formaldehyde and other carbonyl compounds in indoor air and test chamber air - Active sampling method (ISO 16000-3:2011)

/ISO 16000-6/

DIN ISO 16000-6:2012-11

Indoor Air - Part 6: Determination of volatile organic compounds in indoor and test chamber air by active sampling on Tenax® sorbent, thermal desorption and gas chromatography using MS or MS-FID (ISO 16000-6:2011)

/ISO 16000-9/

DIN EN ISO 16000-9:2008-04

Indoor Air - Part 9: Determination of the emission of volatile organic compounds from building products and furnishing – emission test chamber method (ISO 16000-9:2006)

/ISO 16000-11/

DIN EN ISO 16000-11:2006-06

Indoor Air - Part 11: Determination of the emission of volatile organic compounds from building products and furnishing – Sampling, storage of samples and preparation of test specimens (ISO 16000-11:2006)

/ISO 2811-1/

DIN EN ISO 2811-1:2016-08

Paints and varnishes – Determination of density – Part 1: Pycnometer method (ISO 2811-1:2016)

/ISO 3219/

DIN EN ISO 3219:1994-10

Plastics – polymers/resins in the liquid state or as emulsions or dispersions – Determination of viscosity using a rotational viscometer with defined shear rate (ISO 3219:1993)

/ISO 7619-1/

DIN ISO 7619-1:2012-02

Rubber, vulcanised or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness) (ISO 7619-1:2010)

/ISO 9001/

DIN EN ISO 9001:2015-11

Quality management systems - Requirements (ISO 9001:2015)

/PCR Part A/

Product category rules for building products Part A, Calculation rules for the LCA and requirements of the project report, Version 1.7, Institut Bauen und Umwelt e.V. (IBU), www.bau-umwelt.com, 2018-03

/PCR Part B/

Product category rules for building products Part B, Requirements of the EPD for reaction resin products, 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 18th 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 and Commission Regulation (EC) No 1488/94 as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC, 2006-12

**Publisher**

Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Tel +49 (0)30 3087748- 0
Fax +49 (0)30 3087748- 29
Mail info@ibu-epd.com
Web www.ibu-epd.com

**Programme holder**

Institut Bauen und Umwelt e.V.
Panoramastr 1
10178 Berlin
Germany

Tel +49 (0)30 - 3087748- 0
Fax +49 (0)30 – 3087748 - 29
Mail info@ibu-epd.com
Web www.ibu-epd.com



thinkstep

**Author of the Life Cycle
Assessment**

thinkstep AG
Hauptstraße 111- 113
70771 Leinfelden-Echterdingen
Germany

Tel +49 711 341817-0
Fax +49 711 341817-25
Mail info@thinkstep.com
Web <http://www.thinkstep.com>

Logo

Owner of the Declaration

Deutsche Bauchemie e.V.
Mainzer Landstr. 55
60329 Frankfurt
Germany

Tel +49 (0)69 2556-1318
Fax +49 (0)69 2556-1319
Mail info@deutsche-bauchemie.de
Web www.deutsche-bauchemie.de