



Hiermit bestätigen wir, dass unser Produkt

Nafuflex 2K-SP-05

mit der Muster-Umwelt-Produktdeklaration (Muster-EPD)

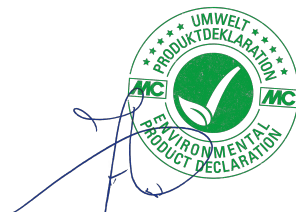
EPD-DBC-2019134-IBG1-EN

Polymer-modified bituminous thick coatings

gemäß ISO 14025 und EN 15804 übereinstimmen.

Der Industrieverband Deutsche Bauchemie e. V. ist Inhaber der zitierten Umwelt-Produktdeklaration („Muster-EPD“), die in seinem Auftrag vom Institut Bauen und Umwelt e. V. (IBU) aufgestellt wurde. Aus Mitglied der Deutschen Bauchemie e. V. ist die MC-Bauchemie Müller GmbH & Co. berechtigt, die Muster-EPD zu nutzen und hat verifiziert, dass die Zusammensetzung des Produkts unter die Rahmendaten der Muster-EPD fällt.

Das bedeutet, dass die Bewertungen und Ökobilanzdaten der Muster-EPD zur Bewertung der Nachhaltigkeit von Bauwerken herangezogen werden können, bei denen das Produkt eingebaut worden ist.



John van Diemen

Bereichsleitung
Forschung & Entwicklung

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)
Declaration number	EPD-DBC-2019134-IBG1-EN
Issue date	29.06.2020
Valid to	28.06.2025

Polymer-modified bituminous thick coatings Deutsche Bauchemie e.V. (DBC)

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DEUTSCHE
BAUCHEMIE



1. General Information

Deutsche Bauchemie

Programme holder

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

Declaration number

EPD-DBC-2019134-IBG1-EN

This declaration is based on the product category rules:

Polymer-enhanced bituminous thick layer compounds for sealing buildings, 07.2014
(PCR checked and approved by the SVR)

Issue date

29.06.2020

Valid to

28.06.2025



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



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

Polymer-modified bituminous thick coatings

Owner of the declaration

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

Declared product / declared unit

1 kg; 600-1200 kg/m³

Scope:

This declaration is exclusively valid for the specified product groups (polymer-modified bituminous thick coatings) for production plants in Germany for five years after the date of issue. This is a model EPD 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.

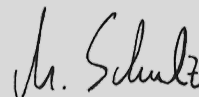
The EPD was created according to the specifications of *EN 15804+A1*. In the following, the standard will be simplified as *EN 15804*.

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

Polymer-modified bituminous thick coatings are paste-like bitumen-based emulsion masses which are enhanced with polymers and can be applied with a palette knife or sprayed on.

Polymer-modified bituminous thick coatings can be polystyrene-filled and/or fibre-reinforced and both single-component and twin-component. The second component can be powdery and mineral-based or liquid/paste-like.

Due to the possibility of applying them in thick layers, polymer-modified thick bituminous coatings represent a reliable and safe type of waterproofing which features good crack bridging.

These are long-life waterproofing products which protect construction components and contribute to their functionality and value retention. The serviceability of buildings can be significantly improved and their service life considerably extended through their use.

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

EU regulation no. 305/2011 (CPR) applies for placing the product on the market in the EU/EFTA (with the exception of Switzerland). The product requires a declaration of performance in compliance with /DIN EN 15814:2011+A2:2014/, Polymer modified bituminous thick coatings for waterproofing and CE marking. The respective national provisions apply to use.

2.2 Application

Polymer-modified bituminous thick coatings are used to waterproof construction components for the following applications:

Module 1: Areas in contact with soil

- Against ground water and impact of pressuring water
- Polymer-modified bituminous thick coatings protect the construction component against aggressive substances which occur naturally in the ground.

Module 2: On horizontal and sloping surfaces

- Outdoors: Balconies, loggias and pergolas
- In areas in contact with soil: Earth-covered ceilings against non-pressuring water

Module 3: Joints

- Movement and butt joints between concrete building components with high water penetration resistance
- For intersections between building waterproofing on concrete components with high water penetration resistance

2.3 Technical Data

Information on the performance of the construction product in relation to its essential characteristics are contained in the declaration of performance in accordance with EU Regulation No. 305/2011 (Construction Products Regulation).

Technical data in accordance with /DIN EN 15814/, Polymer modified bituminous thick coatings for waterproofing:

- Crack-bridging capabilities to /EN 15812/, method A
- Flexibility at low temperatures to /EN 15813/
- Resistance to compression to /EN 15815/
- Resistance to rain to /EN 15816/
- Resistance to water to /EN 15817/
- Dimensional stability at high temperatures to /EN 15818/
- Reduction of layer thickness when fully dried to /EN 15819/
- Watertightness to /EN 15820/
- Water vapour diffusion resistance insofar as relevant for the application
- Pressure water (up to 3 m water column) to /PG-FBB, Part 1/

Additionally required for Module 3 Joints/transitions to concrete components with high water penetration resistance:

Technical data according to the Technical data according to the Testing principles regarding the issuing of general building supervisory inspection certificates for joint sealants in construction components in concrete components with high resistance to water penetration, Part 1: Seals for construction joints, crack cross-sections, transitions and connections (/PG-FBB, Part 1/).

The minimum requirements of the testing principles for the application areas indicated in the general building supervisory test certificate must be complied with. The characteristics for the proof of usability are to be specified in accordance with the testing principles.

Performance values for the product in accordance with declaration of performance in relation to its essential characteristics in accordance with /DIN EN 15814:2011+A2:2014/, Polymer-modified bituminous thick coatings for waterproofing.

2.4 Delivery status

Liquid or paste-like in white tin or plastic containers, in separate or combined containers suitably tailored to the correct mixing ratio for the specific application. Single-component products in individual white tin or plastic containers. A protective foil can be placed over the product surface to optimise storage stability.

Typical containers contain 10 to 32 kg or litres of material. Barrels with a capacity of approximately 200 kg or litres or IBCs (Intermediate Bulk Containers) with more than 1 tonne or 1 m³ of content are used for larger applications.

The second component is packaged in tubular bags, polyethylene (PE) foil bags, compound bags and/or plastic containers and can be packed separately in cartons if necessary.

The containers are packed onto pallets and enclosed in plastic foil to secure them for transport.

A tin container was modelled for the LCA.

2.5 Base materials/Ancillary materials

Polymer-modified bituminous thick coatings contain at least 35% binder (bitumen and polymers). They are classified under GISBAU-/GISCODE BBP 10 Bitumen Emulsions due to their composition.

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

Bitumen:	~ 20-60 %
Water:	~ 0-40 %
Polymers:	~ 0-25 %
Inorganic & organic fillers:	~ 0-30 %
Cement	~ 0-15 %
Additives:	~ 2-10 %

The margins specified are average values and the composition of products which comply with the EPD can 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).

No flame retardants are used in the polymer-modified bituminous thick coating (PMBC). Bitumen and polymer binding agents are used as dissolved watery emulsions or dispersions and not dissolved in organic solvents.

The auxiliary materials in the polymer-modified bituminous thick coating (PMBC) can be mineral-based mixtures, expanded polystyrene or inorganic and polymer fibres.

1) Does the product contain substances from the ECHA list of materials which are especially problematic for approval: substances of very high concern (SVHC) (Date 15/01/2019) above a mass of 0.1 %: no. At the time this model EDP was issued, none of the substances used was included in the REACH candidate list (list in accordance with Article 59, Paragraph 1 of the REACH regulation). Substances from the candidate list which are present at a concentration of 0.1% or above may be listed next to other ingredients to 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 percent of 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): yes.

In-can preservatives based on one or a combination of several of the following active ingredients:

Benzisothiazolinone (BIT),
chloromethylisothiazolinone (CIT)
chloromethylisothiazolinone
(CIT)/methylisothiazolinone (MIT) 3:1,
(ethylenedioxy)dimethanol (EDDM),
methylisothiazolinone (MIT), octylisothiazolinone (OIT),
o-phenylphenol (OPP), tetramethylol acetylenediurea
(TMAD).

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

Polymer-modified bituminous thick coatings are processed using palette knives, brushes, rollers or sprays.

Work safety measures are to be taken in accordance with the specifications in the safety data sheet and the conditions on-site and consistently complied with.

Polymer-modified bituminous thick coatings are marked with the /GISBAU-/GISCODE BPP 10 code due to their composition.

Polymer-modified bituminous thick coatings are worked at the ambient temperature and not under heat. No bitumen or solvent vapours occur as a result. No health-relevant inhalation exposure is therefore to be expected during the manufacture, processing and use of polymer-modified bituminous thick coatings.

2.9 Packaging

Completely empty containers and slightly product contaminated 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, polymer-modified bituminous thick coatings form a homogeneous sealing film which consists of bitumen and auxiliary materials.

2.11 Environment and health during use

During the use phase, polymer-modified bituminous thick coatings behave inertly.

No hazards for water, the air/atmosphere and soil are known of if used appropriately.

2.12 Reference service life

Polymer-modified bituminous thick coatings fulfil specialised tasks in the construction or renovation 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, polymer-modified bituminous thick coatings fulfil the requirements of /EN13501-1/ for fire classes E as a minimum. Due to their installation as building waterproofing with soil contact in mineral-based substrates such as masonry or concrete and due to the quantity used (thin-coated max. 4 mm) they also have only a minor influence on the fire properties of the building in which they are installed.

Water

Polymer-modified bituminous thick coatings are waterproof. They are used to waterproof buildings against damaging water ingress and flood impacts.

Mechanical destruction

The mechanical destruction of polymer-modified bituminous thick coatings does not lead to decomposition products which are hazardous to the environment or to health.

2.14 Re-use phase

According to the current state of knowledge, no environmentally harmful effects are to be expected from dismantling and recycling components to which polymer-modified bituminous thick coatings still adhere.

If polymer-modified bituminous thick coatings can be removed from building components without too much effort, then thermal recycling is a worthwhile recycling variant due to their energy content.

2.15 Disposal

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

Polymer-modified bituminous thick coatings are disposed of as follows:

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

- Completely empty, dried containers (free of drops and scraped-clean) can be recycled.
 - Residual quantities are to be disposed of in accordance with the local regulations.
- The following /EWC waste codes/ may be appropriate: if the bitumen products have not been contaminated with other products:

2-Component bitumen emulsion:

- Component A (bitumen component): 170302
- Component B (powder component) 101311 or 101314

Hardened product remains:

- Components A & B mixed and hardened: 050117 or 050199

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. Deutsche Bauchemie information is available from 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 polymer-modified bituminous thick coating at the mixing ratio of both components required for processing.

The assessments relate to the representative worst-case product; the data for the production process consists of average values from various manufacturers and production plants.

A consumption value per surface area unit and formulations are not specified in this EPD due to the different areas of application (depending on whether it is applied to a flat surface or in joints). Precise information is available in the manufacturer's data sheets.

The density of the products is within a range of approximately 600-1200 kg/m³.

Declared unit

Name	Value	Unit
Declared unit	1	kg
Conversion factor to 1 kg	1	-

3.2 System boundary

Modules A1-A3, A4, A5 and D 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
- A5 Transport to the building site
- A5 Installation (burning of packaging materials (wooden pallets) and product residues, emissions during installation)
- D Credits from the burning of the packaging materials and product residues and from recycling the metal containers

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

3.3 Estimates and assumptions

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

3.4 Cut-off criteria

No cut-off rules were applied in calculating the LCA. All raw materials which were sent for the formulations by the Deutsche Bauchemie association 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 were used and the product from the group which has the greatest environmental impact was used to calculate the LCA results for this model EPD. The primary data is not more than 6 years old.

3.7 Period under review

The production data relates to a primary data collection from 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

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. EPDs for building products may not be comparable if they are not based on /EN 15804/.

In this case 1 kg of polymer-modified bituminous thick coating was selected as the declared unit. An appropriate conversion factor such as the specific surface weight may need to be included depending on the application.

4. LCA: Scenarios and additional technical information

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)

Name	Value	Unit
Litres of fuel	0.0016	l/100km
Transport distance	500	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	600 - 1200	kg/m ³
Capacity utilisation volume factor	100	-

Installation in the building (A5)

Name	Value	Unit
Auxiliary	0	kg
Water consumption	0	m ³
Other resources	0	kg
Electricity consumption	0.025	kWh
Other energy carriers	0	MJ
Material loss	0.01	kg
Output substances following waste treatment on site	0	kg
Dust in the air	0	kg
VOC in the air	0	kg

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	X	X	MND	MND	MNR	MNR	MNR	MND	MND	MND	MND	MND	MND	X	

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A1: 1 kg polymer-modified bituminous thick coating

Parameter	Unit	A1-A3	A4	A5	D
Global warming potential	[kg CO ₂ -Eq.]	1.11E+0	2.59E-2	2.78E-1	-1.44E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	1.29E-10	8.81E-18	6.55E-16	-2.76E-15
Acidification potential of land and water	[kg SO ₂ -Eq.]	2.00E-3	5.36E-5	5.24E-5	-1.68E-4
Eutrophication potential	[kg (PO ₄) ³ -Eq.]	3.24E-4	1.33E-5	1.02E-5	-2.63E-5
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	2.30E-4	-1.84E-5	3.54E-6	-1.55E-5
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	7.49E-6	2.44E-9	9.10E-9	-3.11E-8
Abiotic depletion potential for fossil resources	[MJ]	3.21E+1	3.45E-1	1.86E-1	-1.81E+0

RESULTS OF THE LCA - RESOURCE USE according to EN 15804+A1: 1 kg polymer-modified bituminous thick coating

Parameter	Unit	A1-A3	A4	A5	D
Renewable primary energy as energy carrier	[MJ]	3.68E+0	2.11E-2	6.98E-1	-4.59E-1
Renewable primary energy resources as material utilization	[MJ]	5.90E-1	0.00E+0	-5.90E-1	0.00E+0
Total use of renewable primary energy resources	[MJ]	4.27E+0	2.11E-2	1.08E-1	-4.59E-1
Non-renewable primary energy as energy carrier	[MJ]	2.41E+1	3.46E-1	2.70E+0	-2.02E+0
Non-renewable primary energy as material utilization	[MJ]	9.52E+0	0.00E+0	-2.47E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	3.36E+1	3.46E-1	2.33E-1	-2.02E+0
Use of secondary material	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
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 ³]	6.88E-3	2.42E-5	6.62E-4	-2.62E-4

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES according to EN 15804+A1: 1 kg polymer-modified bituminous thick coating

Parameter	Unit	A1-A3	A4	A5	D
Hazardous waste disposed	[kg]	3.23E-6	1.97E-8	2.12E-10	-1.15E-9
Non-hazardous waste disposed	[kg]	2.11E-2	2.32E-5	2.10E-3	-9.10E-4
Radioactive waste disposed	[kg]	6.01E-4	4.11E-7	1.88E-5	-7.98E-5
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	1.03E-2	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	1.10E-1	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	4.30E-1	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	9.94E-1	0.00E+0

6. LCA: Interpretation

The **global warming potential (GWP)** is dominated by the manufacture of the pre-products (>50%) and the polymer-modified bituminous thick coating (approx. 15%). Amongst the pre-products, the bitumen (approx. 7%) and the polychloroprene dispersions (approx. 88%) contribute above all to the results. Installation in the building (A5) mainly contributes the burning of the packaging materials. In the manufacture of polymer-modified bituminous thick coatings (A3), the production of the various packaging materials has an effect on the global warming potential. The provision of cooling water and electricity production also contribute to the global warming potential.

In the case of **acidification potential (AP)**, the manufacture of the pre-products (A1) has the greatest influence with a share of more than 60%, which can above all be attributed to the production of the polychloroprene dispersion (78%) and the distillation bitumen (14%).

The production of packaging materials (approx. 60%) makes the greatest contribution to acidification potential for the production process (A3) (approx. 20%). Electricity generation has a 20% share of production.

The **eutrophication potential (EP)** is dominated mainly by the production of the pre-products (A1),

which takes a share of more than 60%. The major influence of the polychloroprene dispersion (approx. 85%) can be seen again here, followed by distillation bitumen (approx. 7%) and also fatty acids and their condensation (approx. 4%).

The production of polymer-modified bituminous thick coatings (A3) causes a share of approximately 20%. Apart from the packaging materials, the necessary electricity contributes mainly to the eutrophication potential.

The **photochemical ozone creation potential** (POCP) is dominated by the production of the pre-products (A1) with approximately 80%. This is mainly dominated by the production of the polychloroprene dispersion (approx. 70%), followed by the distillation bitumen (approx. 25%).

The production of polymer-modified bituminous thick coat systems (A3) has an influence of approximately 20% on POCP, although this mainly originates from the packaging materials and to a smaller extent the electricity generation.

7. Requisite evidence

7.1 Leaching

Tests carried out so far to determine leaching behaviour (eluate analysis) give no clear indication that any negative effects on soil and ground water are to be expected.

Tests based on the Requirements of Buildings with Regard to their Effect on Soil and Ground Water

(ABuG), July 2017 edition, can be performed on a voluntary basis in accordance with Appendix 10 of the Model Administrative Provisions of the Technical Building Regulations (/MVV TB/).

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+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 References

Title of the software/database

Title of the software/database. Addition to the title, version. Place: Publisher, Date of publication [Access on access date].

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.
www.ibu-epd.com

/DIN 18195/

DIN 18195:2017-07, Waterproofing of buildings - Vocabulary

/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 15812/

DIN EN 15812:2011-06, Polymer modified bituminous thick coatings for waterproofing - Determination of crack bridging ability

/EN 15813/

DIN EN 15813:2011-06, Polymer modified bituminous thick coatings for waterproofing - Determination of flexibility at low temperatures.

/EN 15814/

DIN EN 15814:2015-03, Polymer modified bituminous thick coatings for waterproofing - Definitions and requirements

/EN 15815/

DIN EN 15815:2011-06, Polymer modified bituminous thick coatings for waterproofing - Resistance to compression.

/EN 15816/

DIN EN 15816:2011-06, Polymer-modified bituminous thick coatings for waterproofing - Resistance to rain.

/EN 15817/

DIN EN 15817:2011-06, Polymer modified bituminous thick coatings for waterproofing - Water resistance.

/EN 15818/

DIN EN 15818:2011-06, Polymer modified bituminous thick coatings for waterproofing - Determination of dimensional stability at high temperature.

/EN 15819/

DIN EN 15819:2011-06, Polymer modified bituminous thick coatings for waterproofing - Reduction of the thickness of the layer when fully dried.

/EN 15820/

DIN EN 15820:2011-06, Polymer modified bituminous thick coatings for waterproofing - Determination of watertightness.

/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-lci-documentation/>).

/GISBAU/

GISBAU: Construction industry trade association hazardous substance information system <https://www.bgbau.de/>.

/ISO 9001/

DIN EN ISO 9001:2015-11, Quality management systems - Requirements.

/MVV TB/

Model Administrative Provisions of the Technical Building Regulations, 2019/1 edition.

/PCR Part A/

Calculation rules for the LCA and requirements of the project report, Version 1.7, Institut Bauen und Umwelt e.V., www.bau-umwelt.com, 2018.

/PCR Part B/

Product category rules for building products Part B: Requirements of the EPD for polymer-modified bituminous thick coatings for sealing buildings, Institut Bauen und Umwelt e.V. (IBU), 2017-11.

/PG-FBB/, Part 1

Testing principles regarding the issuing of general building supervisory inspection certificates for joint seals in components made of concrete and other materials with a high resistance to water penetration, Part 1: Seals for construction joints, crack cross-sections and transitions, September 2017.

/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.

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