# ARDEX 8 + 9 L

## Sealing compound

FEICA (Association of European Adhesive & Sealant Industry) has developed so-called Model Environmental Product Declarations (Model EPDs) and had them independently verified by the Institute Construction and Environment (IBU). These IBU verified Model EPDs have been made publicly available by FEICA and IBU. The Model EPDs represent the current production technology in Europe. ARDEX Baustoff GmbH as a member of Fachverband der Chemischen Industrie Österreich (FCIO), which is a national association member of FEICA, has the right to declare that a specific FEICA Model EPD applies to the named product listed below. The compliance of our products to the Model EPDs is checked on the base of our formulations, by using an IBU-approved guideline procedure. We hereby declare that the product

### ARDEX 8, Sealing compound

meets the criteria of the attached Model EPD

**EPD-DBC-20220147-IBF1-EN for "Dispersion-based products, group 2"**

and

### ARDEX 9 L, Sealing compound

meets the criteria of the attached Model EPD

**EPD-DBC-20220218-IBF1-EN for "Modified mineral mortars, group 2"**

This means that the life cycle assessment data and other content of the Model EPD apply to these named products and may be used for sustainability assessment of the construction products and construction projects, in which they are used.

**ARDEX Baustoff GmbH**

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**Appendix:**

EPD with declaration number: **EPD-DBC-20220147-IBF1-EN**

EPD with declaration number: **EPD-DBC-20220218-IBF1-EN**

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Hersteller zertifiziert
nach EN ESIO 9001
und EN ISO 14001

# ENVIRONMENTAL PRODUCT DECLARATION
as per *ISO 14025* and *EN 15804+A2*

| | |
|---|---|
| Owner of the Declaration | DBC, EFCC, FEICA, IVK |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-DBC-20220147-IBF1-EN |
| Issue date | 08.06.2022 |
| Valid to | 07.06.2027 |

## Dispersion-based products, group 2

DBC - Deutsche Bauchemie e.V.

EFCC - European Federation for Construction Chemicals

FEICA - Association of the European Adhesive and Sealant Industry

IVK - Industrieverband Klebstoffe e.V.

**www.ibu-epd.com | https://epd-online.com**

Institut Bauen und Umwelt e.V.

ECO PLATFORM
EPD
VERIFIED

## 1. General Information

| DBC - Deutsche Bauchemie e.V.<br>EFCC - European Federation for Construction Chemicals<br>FEICA - Association of the European Adhesive and Sealant Industry<br>IVK - Industrieverband Klebstoffe e.V. | Dispersion-based products, group 2 |
|---|---|

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

**Owner of the declaration**
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EFCC, 172 Boulevard du Triomphe, B-1160 Brussels
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IVK, Völklingerstr. 4, D-40219 Düsseldorf

**Declaration number**
EPD-DBC-20220147-IBF1-EN

**This declaration is based on the product category rules:**
Dispersion adhesives and primers for floor coverings, 01.2019
(PCR checked and approved by the SVR)

**Declared product / declared unit**
1 kg / 1 kg; density 1,000 - 1,500 kg/m³

**Scope:**
This verified EPD entitles the holder to bear the symbol of the Institut Bauen und Umwelt e.V. It exclusively applies for products produced in Europe and for a period of five years from the date of issue. This EPD may be used by members of DBC, EFCC, FEICA and IVK and their members provided it has been proven that the respective product can be represented by this EPD. For this purpose, a guideline is available at the secretariats of the four associations. The members of the associations are listed on the respective websites.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.

**Issue date**
08.06.2022

**Valid to**
07.06.2027

**Verification**

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

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

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

Matthias Schulz
(Independent verifier)

## 2. Product

### 2.1 Product description/Product definition

This EPD comprises dispersion-based products with a Volatile Organic Compound (VOC) content ≤1 % (VOC definition according to *Decopaint Directive*). The products typically consist of organic binding agents based on synthetic and/or natural resins, mineral fillers such as chalk as well as water and smaller volumes of auxiliaries (thickening agents, defoaming agents, surface-active agents, preservatives etc.). They dry physically through evaporation of the water contained therein. They comply with manifold, often specific, functions in the construction, furnishing and repair of buildings. Using dispersion-based products decisively improves the fitness for use of structures and extends their life expectancy. The product displaying the highest environmental impacts within the class of dispersion-based products considered was used as a representative product for calculating the Life Cycle Assessment results (worst-case approach).

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

marking. For the application and use of the products the respective national provisions apply.

## 2.2 Application
Dispersion-based products are used for the following applications:

### Module 1: Dispersion adhesives, fixatives, precoatings and primers for floor coverings and parquet flooring
Adhesives for, e.g. tufted carpets with various backings, woven textile coverings, fibre-bonded and natural fibre coverings, resilient coverings (PVC, rubber, PVC-free luxury vinyl tiles), linoleum, insulating bases and underlays, parquet, laminate and wood blocks on surfaces ready for laying. The products are suitable for normal wear in residential and commercial areas, also on heated floor constructions.

### Module 2: Dispersion-based tile adhesive
Products for bonding ceramic tiles and paving as well as natural stone for internal and external installations on walls, floors and ceilings

### Module 3: *Dispersion-based adhesives and sealants*
As structural adhesives and sealants: structural and repair adhesives, dispersion filler compounds, joint sealants

### Module 4: Dispersion-based products for waterproofing of buildings
Products for waterproofing floors and/or walls in wet rooms inside buildings

### Module 5: Dispersion-based primers and bonding agents for concrete and floor screeds
Products to improve the adhesion of e.g. self-levelling compounds or repair mortars on absorbent cement and calcium sulphate screeds, concrete, dry construction boards

### Module 6: Dispersion-based products for surface protection of concrete
To increase the durability of concrete and reinforced steel structures as well as for new concrete and for maintenance and repair work (for areas without vehicle traffic)

### Module 7: Dispersion-based primers and barrier coatings
Products to protect a substrate from e.g. the immersion of water, thus preventing degradation, corrosion or damage

## 2.3 Technical Data
The density of the products is between 1,00 and 1,50 g/cm³, other relevant technical data can be found in the manufacturer's technical documentation.

### Module 1: Dispersion adhesives, fixatives, precoatings and primers for floor coverings and parquet flooring
Dispersion adhesives for floor coverings have to comply with the requirements of the *EN ISO 22636*. The mechanical requirements of *EN ISO 22636* don't apply to fixatives; their strengths are lower in accordance with their specifications. The performance characteristics of precoatings and primers are subject to the manufacturer's technical documentation / declaration of performance. Dispersion adhesives for

parquet: The test procedures and requirements of the *EN ISO 17178* have to be fulfilled.

### Module 2: Dispersion-based tile adhesive
The requirements on essential characteristics according to *EN 12004*, must be maintained. These are:
Tensile adhesion strength after dry storage (*EN 12004-2*)
-Tensile adhesion strength after water immersion (*EN 12004-2*)
-Tensile adhesion strength after heat ageing (*EN 12004*)
-Tensile adhesion strength after freeze/thaw cycles (*EN 12004-2*)
-Open time: Tensile strength (*EN 12004-2*)
Further essential characteristics in accordance with the manufacturer's technical documentation

### Module 3: Dispersion-based adhesives and sealants
Performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance

### Module 4: Dispersion-based products for waterproofing of buildings
The minimum requirement of *EAD 030352-00-0503 - Liquid applied watertight covering kits for wet room floors and/or walls-* must be maintained. The essential characteristics are to be specified in accordance with the European technical assessment (ETA, specification no.).

### Module 5: Dispersion-based primers and bonding agents for concrete and floor screeds
Performance characteristics in accordance with the manufacturer's technical documentation

### Module 6: Dispersion-based products for surface protection of concrete
The requirements on essential characteristics for all intended uses in accordance with *EN 1504-2*, Tables 1 and 5, must be maintained. These are:
- Permeability to $CO_2$ (*EN 1062-6*)
- Water vapour permeability (*EN ISO 7783-1/-2*)
- Capillary absorption and permeability to water (*EN 1062-3*)
- Adhesion strength by pull-off test (*EN 1542*)
Further essential characteristics in accordance with the manufacturer's technical documentation / declaration of performance

### Module 7: Dispersion-based primers and barrier coatings
The requirements of the *Decopaint Directive* must be maintained.
Essential characteristics in accordance with the manufacturer's technical documentation / declaration of performance.

## 2.4 Delivery status
Liquid or pasty in containers made of plastic or metal. Typical container sizes contain 1 to 30 kg, usually 10 to 20 kg of product on pallets. For larger applications, vats with approx. volumes of 200 kg (litres) or IBCs

(intermediate bulk containers) with a capacity of 1 tonne (m³) or more are also used. A plastic container was modelled for the Life Cycle Assessment.

## 2.5    Base materials/Ancillary materials

Dispersion-based products usually comprise at least one synthetic resin dispersion, natural or synthetic resins dispersed in water, mineral fillers (e.g. chalk) and/or pigments. Auxiliaries such as thickening agents, defoaming agents, surface-active and dispersing agents as well as preservatives are used to fine-tune the product features. **Typically**, the products covered by this EPD contain the following range of base materials and auxiliaries (% by mass):
- Synthetic polymer dispersion (solids portion): 5 - 65
- Natural resins, natural resin derivatives: 0 - 25
- Mineral fillers: 0 - 60
- Pigments: 0 - 35
- Water: 15 - 95
- Auxiliaries: 1 - 5
- Thickening agents: < 3
- Dispersing agents / Emulsifying agents: < 2
- Wetting agent: 2
- Other: 0 - 2
- VOC according to *Decopaint Directive*: <1 % **(mandatory)**
These ranges are average values and the composition of products complying with the EPD can deviate from these concentration levels in individual cases. More detailed information is available in the respective manufacturer's documentation (e.g. product data sheets).

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

**1. substances from the "Candidate List of Substances of Very High Concern for Authorisation" (SVHC)**
If this product contains substances listed in the *candidate list* (latest version) exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD.
**2. CMR substances in categories 1A and 1B**
If this product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the *candidate list*, exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD.
**3. Biocide products added to the construction product**
If this construction product contains biocide products, the active substances, information on the concentration and/or concentration range, the product type together with information on their hazardous properties are listed in the safety data sheet of the respective product.

## 2.6    Manufacture
Dispersion-based products are usually mixed discontinuously in batch mode, i.e. in individual batches or a series of individual batches, and filled into the delivery containers.

## 2.7    Environment and health during manufacturing
As a general rule, no particular environmental or health protection measures other than those specified by law are necessary.

## 2.8    Product processing/Installation
Dispersion based products are processed on site using suitable tools, usually by hand. The products are applied by trowelling/knife-coating, painting, rolling or spraying. Precautions for safe handling and storage (e.g. air exchange, exhaust ventilation, personal protective measures, conditions for safe storage) must be observed in accordance with the information on the safety data sheet.
Depending on the application and product specifications, between 50 and 1,500 g/m² are applied.

## 2.9    Packaging
A detailed description of packaging is provided in section 2.4. Empty containers and clean foils can be recycled.

## 2.10    Condition of use
During the use phase, dispersion-based products are existent as hardened film. They are long-lasting products which protect our buildings in the form of adhesives, primers, coatings or sealants as well as make an essential contribution towards their appearance, function and sustainability.

## 2.11    Environment and health during use
**Option 1 – Products for applications outside indoor areas with permanent stays by people**
No risks are known for water, air and soil if the products are used as designated.
**Option 2 – Products for applications inside indoor areas with permanent stays by people**
When used in indoor areas with permanent stays by people, evidence of the emission performance of construction products in contact with indoor air must be submitted according to national requirements (see chapter 7). No further influences by emissions on the environment and health are known.

## 2.12    Reference service life
Dispersion-based products fulfill manifold, often specific, functions in the construction or refurbishment of building structures. They decisively improve the usability of building structures and significantly extend their original service lives. The anticipated reference service life depends on the specific installation situation and the exposure associated with the product. It can be influenced by weathering as well as mechanical or chemical load.

## 2.13    Extraordinary effects

**Fire**
In terms of the volumes applied, dispersion based products have no or only a marginal influence on the fire performance characteristics of the building structure in which they have been installed.

**Water**

Dispersion-based products are water-resistant only to a certain degree and their strength can deteriorate when exposed to water for longer periods (of time); detaching from the surface is possible in a worst-case scenario. The components of dispersion-based products are not hazardous to water or only slightly hazardous to water. Owing to the overall low volumes of dispersion-based products used on buildings, no relevant contribution towards environmental damage can be anticipated by buildings featuring dispersion-based products in the event of extraordinary exposure to water.

**Mechanical destruction**
The mechanical destruction of dispersion-based products does not lead to any decomposition products which are harmful to the environment or health.

### 2.14 Re-use phase
According to present knowledge, no environmentally hazardous effects in terms of landfilling are to be generally anticipated through dismantling and recycling components to which dispersion-based products have been applied and on which they have dried.

### 2.15 Disposal
The low amounts of a dispersion-based product applied to a construction product will not interfere with the disposal/recycling of this.
Hardened product residue mechanically removed from substrates must be disposed of as commercial/construction waste. The following waste codes according to the European List of Waste (*2000/532/EC*) can apply:
**Hardened product residue:**
080112 Paint and varnish waste with the exception of that covered by 08 01 11
080410 Adhesive and sealant compound waste with the exception of that covered by 08 04 09

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

## 3. LCA: Calculation rules

### 3.1 Declared Unit
This EPD refers to the declared unit of 1 kg of dispersion-based product, group 2; applied into the building with a density of 1,000 - 1,500 kg/m^3 in accordance with the *IBU PCR* part B for dispersion adhesives and primers for floor coverings.
The results of the Life Cycle Assessment provided in this declaration have been selected from the product with the highest environmental impact (worst-case scenario).
Depending on the application, a corresponding conversion factor such as the density to convert volumetric use to mass must be taken into consideration.

The Declaration type is according to *EN 15804*: Cradle to gate with options, modules C1–C3, and module D (A1–A3, C, D) and additional modules (A4-A5).

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |
| Gross density | 1,000-1,500 | kg/m^3 |

### 3.2 System boundary
Modules A1, A2 and A3 are taken into consideration in the LCA:
- A1 Production of preliminary products
- A2 Transport to the plant
- A3 Production incl. provision of energy, production of packaging as well as auxiliaries and consumables and waste treatment
- A4 Transport to site
- A5 Installation, product applied into the building during A5 phase operations and packaging disposal.
The end of life for the packaging material considered is described below:
  -Incineration, for materials like plastic and wood.
-C1-C2-C3-D

The building deconstruction (demolition process) takes place in the C1 module which considers energy production and consumption in terms of diesel and all the emissions connected with the fuel-burning process to run the machines. After the demolition, the product is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered. For precautionary principle and as a worst-case scenario, thermal treatment is the only end of life scenario considered. This is modelled by the incineration process (module C3) where the product ends its life cycle.
Module D accounts for potential benefits that are beyond the defined system boundaries. Credits are generated during the incineration of wastes and related electricity produced that are occurring in the A5 module.

### 3.3 Estimates and assumptions
For this EPD formulation and production data defined and collected by FEICA were considered. Production waste was assumed to be disposed of by incineration without credits as a worst case.
An average of plastic containers and wooden pallets was considered in the LCA.

### 3.4 Cut-off criteria
All raw materials submitted for the formulations and production data were taken into consideration.
The manufacture of machinery, plant and other infrastructure required for the production of the products under review was not taken into consideration in the LCA.
Transport of packaging materials is excluded.

### 3.5 Background data
Data from the *GaBi* database SP40 (2020) was used as background data.

### 3.6 Data quality
Representative products were applied for this EPD and the product in the group displaying the highest environmental impact was selected for calculating the

LCA results. The background datasets used are less than 4 years old.
Production data and packaging are based on details provided by the manufacturer. The formulation used for evaluation refers to a specific product.
The data quality of the background data is considered to be good.

### 3.7 Period under review
Representative formulations are valid for 2021.

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

### 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 *GaBi* database SP40 (2020) was used.

## 4. LCA: Scenarios and additional technical information

**Characteristic product properties**
**Information on biogenic Carbon**
The packaging material contains biogenic carbon content which is presented below.

**Information on describing the biogenic Carbon Content at factory gate**

| Name | Value | Unit |
|------|-------|------|
| Biogenic carbon content in product | - | kg C |
| Biogenic carbon content in accompanying packaging | 0.016 | kg C |

For the preparation of building life cycle assessments, it must be taken into account that in module A5 (installation in the building) the biogenic amount of $CO_2$ (0.016 kg C *3.67 = 0.059 kg $CO_2$-eq.) of the packaging bound in module A1-A3 is mathematically booked out.

**Transport to the building site (A4)**

| Name | Value | Unit |
|------|-------|------|
| Transport distance | 1000 | km |
| Gross weight | 34 - 40 | t |
| Payload capacity | 27 | t |

**Installation into the building (A5)**

| Name | Value | Unit |
|------|-------|------|
| Other resources for packaging material | 0.067 | kg |
| Material loss | 0.01 | kg |

Material loss regards the amount of product not used during the application phase into the building. This amount is 1% of the product, impacts related to the production of this part are charged to the A5 module. This percentage is considered as waste to disposal and impacts of its end of life have been considered in the LCA model and declared in A5.

**End of life (C1-C3)**

| Name | Value | Unit |
|------|-------|------|
| Collected as mixed construction waste | 1 | kg |
| Incineration | 1 | kg |

## 5. LCA: Results

**DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 | ND | ND | MNR | MNR | MNR | ND | ND | X | X | X | ND | X |

**RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of dispersion-based product, group 2**

| Core Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | D |
|---|---|---|---|---|---|---|---|---|
| GWP-total | [kg CO$_2$-Eq.] | 2.00E+0 | 5.11E-2 | 1.80E-1 | 2.79E-4 | 1.24E-2 | 9.45E-1 | -3.98E-1 |
| GWP-fossil | [kg CO$_2$-Eq.] | 2.05E+0 | 5.06E-2 | 9.49E-2 | 2.66E-4 | 1.18E-2 | 4.29E-1 | -3.97E-1 |
| GWP-biogenic | [kg CO$_2$-Eq.] | -3.96E-2 | 1.48E-4 | 8.54E-2 | 1.24E-5 | 5.42E-4 | 5.15E-1 | -8.96E-4 |
| GWP-luluc | [kg CO$_2$-Eq.] | 8.17E-4 | 4.10E-4 | 9.68E-6 | 6.39E-9 | 2.79E-7 | 3.50E-5 | -2.51E-4 |
| ODP | [kg CFC11-Eq.] | 3.53E-14 | 6.08E-18 | 3.70E-16 | 2.84E-20 | 1.24E-18 | 3.02E-16 | -3.72E-15 |
| AP | [mol H$^+$-Eq.] | 8.99E-3 | 1.52E-4 | 1.14E-4 | 3.60E-6 | 3.73E-5 | 5.25E-4 | -5.26E-4 |
| EP-freshwater | [kg P-Eq.] | 2.85E-5 | 1.54E-7 | 2.88E-7 | 5.75E-11 | 2.51E-9 | 1.04E-7 | -4.62E-7 |
| EP-marine | [kg N-Eq.] | 1.70E-3 | 6.75E-5 | 2.42E-5 | 1.63E-6 | 1.72E-5 | 2.01E-4 | -1.39E-4 |
| EP-terrestrial | [mol N-Eq.] | 1.95E-2 | 7.56E-4 | 3.08E-4 | 1.79E-5 | 1.89E-4 | 2.52E-3 | -1.49E-3 |
| POCP | [kg NMVOC-Eq.] | 6.25E-3 | 1.33E-4 | 8.24E-5 | 4.91E-6 | 3.39E-5 | 5.22E-4 | -4.02E-4 |
| ADPE | [kg Sb-Eq.] | 7.32E-7 | 3.63E-9 | 7.60E-9 | 8.06E-12 | 3.52E-10 | 4.62E-9 | -6.06E-8 |
| ADPF | [MJ] | 4.44E+1 | 6.73E-1 | 4.75E-1 | 3.81E-3 | 1.66E-1 | 5.52E-1 | -6.70E+0 |
| WDP | [m³ world-Eq deprived] | 6.36E-2 | 4.52E-4 | 1.70E-2 | 5.27E-7 | 2.30E-5 | 1.57E-1 | -3.70E-2 |

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

**RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of dispersion-based product, group 2**

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | D |
|---|---|---|---|---|---|---|---|---|
| PERE | [MJ] | 6.19E+0 | 3.79E-2 | 6.58E-1 | 1.20E-5 | 5.25E-4 | 9.36E-2 | -1.32E+0 |
| PERM | [MJ] | 5.85E-1 | 0.00E+0 | -5.85E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PERT | [MJ] | 6.77E+0 | 3.79E-2 | 7.35E-2 | 1.20E-5 | 5.25E-4 | 9.36E-2 | -1.32E+0 |
| PENRE | [MJ] | 2.93E+1 | 6.74E-1 | 1.43E+0 | 3.81E-3 | 1.67E-1 | 1.48E+1 | -6.70E+0 |
| PENRM | [MJ] | 1.52E+1 | 0.00E+0 | -9.53E-1 | 0.00E+0 | 0.00E+0 | -1.42E+1 | 0.00E+0 |
| PENRT | [MJ] | 4.44E+1 | 6.74E-1 | 4.76E-1 | 3.81E-3 | 1.67E-1 | 5.52E-1 | -6.70E+0 |
| SM | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| RSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| NRSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | [m³] | 1.54E-2 | 4.38E-5 | 5.38E-4 | 2.16E-8 | 9.41E-7 | 3.70E-3 | -1.53E-3 |

| Caption | PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water |
|---|---|

**RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of dispersion-based product, group 2**

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | D |
|---|---|---|---|---|---|---|---|---|
| HWD | [kg] | 1.51E-8 | 3.14E-8 | 1.87E-10 | 3.70E-13 | 1.62E-11 | 1.77E-9 | -2.66E-9 |
| NHWD | [kg] | 2.75E-1 | 1.03E-4 | 4.97E-3 | 3.90E-7 | 1.70E-5 | 1.36E-1 | -2.94E-3 |
| RWD | [kg] | 1.09E-3 | 8.34E-7 | 1.27E-5 | 4.09E-9 | 1.79E-7 | 2.51E-5 | -4.51E-4 |
| CRU | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MFR | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MER | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | [MJ] | 0.00E+0 | 0.00E+0 | 2.77E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EET | [MJ] | 0.00E+0 | 0.00E+0 | 5.01E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |

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

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of dispersion-based product, group 2**

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C3 | D |
|-----------|------|-------|-----|-----|-----|-----|-----|-----|
| PM | [Disease Incidence] | ND | ND | ND | ND | ND | ND | ND |
| IRP | [kBq U235-Eq.] | ND | ND | ND | ND | ND | ND | ND |
| ETP-fw | [CTUe] | ND | ND | ND | ND | ND | ND | ND |
| HTP-c | [CTUh] | ND | ND | ND | ND | ND | ND | ND |
| HTP-nc | [CTUh] | ND | ND | ND | ND | ND | ND | ND |
| SQP | [-] | ND | ND | ND | ND | ND | ND | ND |
| Caption | PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index | | | | | | | |

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

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

**Additional environmental impact indicators** (suggested by *EN15804*, table 4) are not declared in the EPD. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high and as there is limited experience with the indicator (see ILCD classification in *EN 15804*, table 5). For this reason, results based on these indicators are not considered suitable for a decision-making process and are thus not declared in the EPD.

# 6. LCA: Interpretation

The majority of impacts are associated with the production phase (A1-A3). The most significant contribution to the production phase impacts is the upstream production of raw materials as the main driver. Another contributor in the production phase, in the category of Photochemical ozone formation (POCP), is the plastic used as a packaging material. Emissions associated with the manufacturing of products also have some influence on Ozone Depletion Potential (ODP) in the production phase. In all EPDs, $CO_2$ is the most important contributor to Global Warming Potential (GWP). For the Acidification Potential (AP), NOx and $SO_2$ contribute the largest share.

The majority of life cycle energy consumption takes place during the production phase (A1-A3). Significant contributions to Primary Energy Demand – Non-renewable (PENRT) come from the energy resources used in the production of raw materials. The largest contributor to Primary Energy Demand – Renewable (PERT) impacts comes from the consumption of renewable energy resources required for the generation and supply of electricity. It should be noted that Primary Energy Demand – Renewable (PERT) generally represents a small percentage of the production phase primary energy demand with the bulk of the demand coming from non-renewable energy resources.

Transportation to the construction site (A4) and the installation process (A5) make a low contribution to all impacts. Climate change from land-use change is the only indicator influenced by transport processes, due to the diesel production used as fuel because part of this diesel has been produced from bio-based raw materials.

The installation phase influence mainly climate change indicators, due to the impact related to the incineration processes used for packaging waste treatment and residual product treatment (1 % of the total mass).

The end-of-life phases influence climate change indicators, due to the thermal treatment process of the dispersion-based product occurring in the C3 module.

# 7. Requisite evidence

### VOC
Special tests and evidence have not been carried out or provided within the framework of drawing up this Model EPD. Some member states require special documentation on VOC emissions into indoor air for specific areas of application. This documentation, as well as documentation for voluntary VOC labelling, has to be provided separately and is specific to the product in question.

Evidence pertaining to VOC emissions shall show
- either an attestation of compliance with,
- or documentation of test data that are required in any of the existing regulations or in any of the existing voluntary labelling programs for low-emitting products, as far as these

(1) include limits for the parameters TVOC, TSVOC, carcinogens, formaldehyde, acetaldehyde, LCI limits for individual substances (including but not limited to the European list of harmonized LCIs), and the R-value;
(2) base their test methods on *EN 16516*;
(3) perform testing and apply the limits after 28 days of storage in a ventilated test chamber, under the conditions specified in *EN 16516*; some regulations and programs also have limits after 3 days, on top of the 28 days limits;

(4) express the test results as air concentrations in the European Reference Room, as specified in *EN 16516*.

Examples of such regulations are the *Belgian Royal Decree C-2014/24239*, or the *German AgBB/* ABG. Examples of such voluntary labelling programs are *EMICODE*, *Blue Angel* or *Indoor Air Comfort*.

Relevant test results shall be produced either by an *ISO 17025* accredited commercial test lab or by a qualified internal test lab of the manufacturer. Examples for the applied limits after 28 days of storage in a ventilated test chamber are:
- TVOC: 1000 µg/m³
- TSVOC: 100 µg/m³

- Each carcinogen: 1 µg/m³
- Formaldehyde: 100 µg/m³
- LCI: different per substance involved
- R-value: 1 (meaning that, in total, 100 % of the combined LCI values must not be exceeded).

Informative Annexes (2 tables):
Table 1 shown below is an overview of the most relevant regulations and specifications as of October 2021, as regards requirements after 3 days of storage in a ventilated test chamber.
Table 2 provides an overview of the most relevant regulations and specifications as of October 2021, as regards requirements after 28 days of storage in a ventilated test chamber. Some details may be missing in the table due to lack of space. Values given represent maximum values/limits.

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

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

## 8. References

**EN 1062-3**
EN 1062-3:2008-04, Paints and varnishes - Coating materials and coating systems for exterior masonry and concrete - Part 3: Determination of liquid water permeability

**EN 1062-6**
EN 1062-6:2002-10, Paints and varnishes - Coating materials and coating systems for exterior masonry

and concrete - Part 6: Determination of carbon dioxide permeability

## EN 1504-2
EN 1504-2:2004-10, Products and systems for the protection and repair of concrete structures - Definitions, requirements, quality control and evaluation of conformity - Part 2: Surface protection systems for concrete

## EN 1542
EN 1542:1999-07, Products and systems for the protection and repair of concrete structures - Test methods - Measurement of bond strength by pull-off

## EN ISO 7783-1/-2
EN ISO 7783-1/-2:2019-02, Paints and varnishes - Determination of water-vapour transmission properties - Cup method

## EN 12004
EN12004:2012, Adhesives for ceramic tiles

## EN 12004-2
EN 12004-2:2017, Adhesives for ceramic tiles - Part 2: Test methods

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

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

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

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

## EN ISO 17178
EN ISO 17178:2020, Adhesives - Adhesives for bonding parquet to subfloor - Test methods and minimum requirements

## EN ISO 22636
EN ISO 22636:2020, Adhesives - Adhesives for floor coverings - Requirements for mechanical and electrical performance

## EAD 030352-00-0503
EAD 030352-00-0503:2019-01, Watertight covering kits for wet room floors and or walls Part 1: Liquid Applied Coverings with or without wearing surface Part 2: Kits based on flexible sheets Part 3: Kits based on inherently watertight boards

## (EU) No 528/2012
Biocidal Products 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 (current consolidated version: 2021-06)

## 2000/532/EC
Commission decision dated 3 May 2000 replacing decision 94/3/EC on a waste directory in accordance with Article 1 a) of Council Directive 75/442/EEC on waste and Council decision 94/904/EC on a directory of hazardous waste in terms of Article 1, paragraph 4 of Directive 91/689/EEC on hazardous waste

## Belgian Royal Decree C-2014/24239
Belgisch Staatsblad 8 MEI 2014, p. 60603. — Koninklijk besluit tot vaststelling van de drempelniveaus voor de emissies naar het binnenmilieu van bouwproducten voor bepaalde geoogde gebruiken

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

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

## CPR
CPR Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

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

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

## GaBi 10 software & documentation
Data base for Life Cycle Engineering LBP, University of Stuttgart and Sphera, documentation of GaBi 10 data sets http://documentation.gabi-software.com/, 2020

## German AgBB
Committee for Health-related Evaluation of Building Products: health-related evaluation of emissions of volatile organic compounds (VOC and SVOC) from building products; status: June 2012 www.umweltbundesamt.de/produkte/bauprodukte/agbb.htm

## IBU 2021
Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. EPD programme. Version 2.0. Berlin: Institut Bauen und Umwelt e.V., 2021 www.ibu-epd.com

## Indoor Air Comfort
Product certification by Eurofins, Hamburg, Germany www.eurofins.com .

**PCR Part A**

Product Category Rules for Building-Related Products and Services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project report, Version 1.1, Institut Bauen und Umwelt e.V., 2021-01

**PCR Part B**

Product Category Rules for Construction Products. Part B: Dispersion adhesives and primers for floor coverings, Version 1.7, 2019.

**REACH**

Directive (EG) No. 1907/2006 of the European Parliament and of the Council dated 18 December 2006 on the registration, evaluation, approval and restriction of chemical substances (REACH), for establishing a European Agency for chemical substances, for amending Directive 1999/45/EC and for annulment of Directive (EEC) No. 793/93 of the Council, Directive (EC) No. 1488/94 of the Commission, Guideline 76/769/EEC of the Council and Guidelines 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC of the Commission.

# ENVIRONMENTAL PRODUCT DECLARATION

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

| | |
|---|---|
| Owner of the Declaration | FEICA, EFCC, IVK, DBC |
| Programme holder | Institut Bauen und Umwelt e.V. (IBU) |
| Publisher | Institut Bauen und Umwelt e.V. (IBU) |
| Declaration number | EPD-DBC-20220218-IBF1-EN |
| Issue date | 26.09.2022 |
| Valid to | 25.09.2027 |

## Modified mineral mortars, group 2

FEICA - Association of the European Adhesive and Sealant Industry

EFCC - European Federation for Construction Chemicals

IVK - Industrieverband Klebstoffe e.V.

DBC - Deutsche Bauchemie e.V.

**www.ibu-epd.com | https://epd-online.com**

## 1. General Information

| | |
|---|---|
| DBC - Deutsche Bauchemie e.V.<br>EFCC - European Federation for Construction Chemicals<br>FEICA - Association of the European Adhesive and Sealant Industry<br>IVK - Industrieverband Klebstoffe e.V. | Modified mineral mortars, group 2 |

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

**Owner of the declaration**
DBC, Mainzer Landstr. 55, D-60329 Frankfurt a.M.
EFCC, 172 Boulevard du Triomphe, B-1160 Brussels
FEICA, Rue Belliard 40, B-1040 Brussels
IVK, Völklingerstr. 4, D-40219 Düsseldorf

**Declaration number**
EPD-DBC-20220218-IBF1-EN

**Declared product / declared unit**
1 kg of modified mineral mortar with a density 800 - 1,700 kg/m³

**This declaration is based on the product category rules:**
Mineral factory-made mortar, 11.2017
(PCR checked and approved by the SVR)

**Scope:**
This verified EPD entitles the holder to bear the symbol of the Institut Bauen und Umwelt e.V. It exclusively applies to products produced in Europe and for a period of five years from the date of issue. This EPD may be used by members of FEICA, EFCC, DBC and IVK and their members provided it has been proven that the respective product can be represented by this EPD. For this purpose, a guideline is available at the secretariats of the four associations. The members of the associations are listed on their respective websites.

**Issue date**
26.09.2022

**Valid to**
25.09.2027

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.
The EPD was created according to the specifications of *EN 15804+A2*. In the following, the standard will be simplified as *EN 15804*.

**Verification**

The standard *EN 15804* serves as the core PCR

Independent verification of the declaration and data according to *ISO 14025:2011*

☐ internally     ☒ externally

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

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

Matthias Schulz
(Independent verifier)

## 2. Product

**2.1    Product description/Product definition**
Modified mineral mortars are combinations of one or more inorganic binders, fillers, aqueous dispersions or dispersion powders, water and if necessary additives. They comply with manifold, often specific, functions in the construction, furnishing and refurbishment of buildings. The product displaying the highest environmental impacts was used as a representative product for calculating the Life Cycle Assessment results (worst-case approach).

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

## 2.2 Application

Modified mineral mortars are used for the following applications:

### Module 1: Modified mineral mortars as repair mortar for the protection and repair of concrete structures

**1.1** Products used to restore and/or replace defective concrete

**1.2** Products to protect reinforcement, necessary to extend the service life of a concrete structure exhibiting deterioration

### Module 2: Adhesives based on modified mineral mortars

**2.1** Products for bonding ceramic tiles as well as natural stone for internal and external installations on walls, floors and ceilings

**2.2** Products for bonding thermal insulation composite panels

### Module 3: Modified mineral mortars as joint fillers

Products for joint filling of wall and floor coverings made of ceramic tiles as well as natural stone for indoor and outdoor applications

### Module 4: Modified mineral mortars as screed, floor levelling compounds, fillers, flowing screed

Products for screed/synthetic resin screed for use in floor constructions

### Module 5: Modified mineral mortars as levelling compounds for walls and ceilings

Products for levelling and repairing rough, uneven walls, for repairing grit spots, closing blowholes and modelling broken corners and edges

### Module 6: Modified mineral mortars as grouts

Products for grouting on holes, recesses, concrete precast columns, foundations and for anchoring machine components indoors and outdoors

### Module 7: Modified mineral mortars for liquid applied products for waterproofing of buildings

Products for providing cement-based waterproofing surfaces in structural and civil engineering. For use in new and old buildings as well as beneath tiles

**7.1** Liquid-applied water impermeable products for use beneath ceramic tiling

**7.2** Products for waterproofing with mineral waterproofing slurries or flexible polymer modified thick coatings

**7.3** Products for water proofing in conjunction with ceramic tiles

**7.4** Products for waterproofing with flexible polymer modified mineral thick coatings

### Module 8: Modified mineral mortars for waterproofing floors and/or walls inside buildings

Products for watertight covering in wet rooms inside buildings

## 2.3 Technical Data

The density of the products is between 0,80 and 1,70 g/cm³, other relevant technical data can be found in the manufacturer's technical documentation.

Construction products with Declaration of Performance in accordance with *CPR* and the manufacturer's technical documentation:

### Module 1: Modified mineral mortars as repair mortar for the protection and repair of concrete structures

**1.1** Products used to restore and/or replace defective concrete

The requirements on essential characteristics for all intended uses in accordance with *EN 1504-3*, Tables 1 and 3, must be maintained. These are:
- Compressive strength (*EN 12190*)
- Chloride ion content (*EN 1015-17*)
- Adhesive strength by pull-off test (*EN 1542*)

**1.2** Products to protect reinforcement

The requirements on essential characteristics for all intended uses in accordance with *EN 1504-7*, Table 1, must be maintained. This is
- Corrosion protection (*EN 15183*)

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

### Module 2: Adhesives based on modified mineral mortars

**2.1** Products for bonding ceramic tiles as well as natural stone for internal and external installations on walls, floors and ceilings

The requirements on essential characteristics according to *EN 12004*, Table 1, must be maintained. These are:
- Tensile adhesion strength after dry storage (*EN 12004-2*)
- Tensile adhesion strength after water immersion (*EN 12004-2*)
- Tensile adhesion strength after heat ageing (*EN 12004-2*)
- Tensile adhesion strength after freeze/thaw cycles (*EN 12004-2*)
- Open time: Tensile strength (*EN 12004-2*)

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

**2.2** The minimum requirement of *EAD 040083-00-0404* External Thermal Insulation Composite Systems with Rendering must be maintained. The essential characteristics are to be specified in accordance with the European technical assessment (ETA, specification no.). Further essential characteristics in accordance with the manufacturer's technical documentation/declaration of performance

### Module 3: Modified mineral mortars as joint fillers

The minimum requirements of *EN 13888* must be maintained.

### Module 4: Modified mineral mortars as screed, floor levelling compounds, fillers, flowing screed

The requirements on essential characteristics according to *EN 13813* 'Screed material and floor screeds – Screed materials – Properties and requirements' must be maintained. For synthetic resin screeds, these are:
- Bond strength (*EN 13892-8*)
- Reaction to fire (*EN 13501-1*)

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

### Module 5: Modified mineral mortars as levelling compounds for walls and ceilings

**Module 5.1:** The minimum requirements of *EN 998-1* apply. These are: - Reaction to fire (*EN 13501-1*) -

Compressive strength - Dry bulk density - Capillary water absorption - Water vapour permeability
Further essential characteristics in accordance with the manufacturer's technical documentation/declaration of performance
**Module 5.2:** The minimum requirements of *EN 13279* apply. Further essential characteristics in accordance with the manufacturer's technical documentation/declaration of performance

### Module 6: Modified mineral mortars as grouts
The requirements of *DAfStb Guideline* on 'Production and use of cement-bound flow concrete and grouting mortar' (*VeBMR*) must be maintained.
The requirements according to *MVV TB* No. C 2.1.4.5 for "Ü-mark" must be maintained.

### Module 7: Modified mineral mortars for liquid applied products for waterproofing of buildings
**7.1**
The requirements according to *EN 14891* , table 1, must be maintained. These are:
 - initial tensile adhesion strength *EN 14891*
- Tensile adhesion strength after water contact *EN 14891*
- Waterproofing *EN 14891*
- Crack bridging ability *EN 14891*
**7.2**
The minimum requirements of the 'Testing principles for granting general building authority approved test certificates for waterproofing with mineral waterproofing slurries and flexible polymer modified thick coatings' (*PG MDS/FPD*) must be maintained. The characteristics for the proof of usability are to be specified in accordance with the test principles for granting general building authority test certificates for waterproofing with mineral waterproofing slurries and flexible polymer thick coatings.
**7.3**
The minimum requirements of the 'testing principles for granting general building authority approved test certificates for waterproofing in conjunction with ceramic tiles' (*PG AIV*) must be considered.
**7.4**
The minimum requirement of *EAD 030295-00-0605* must be maintained. The essential characteristics are to be specified in accordance with the European technical assessment (ETA, specification no.).

### Module 8: Modified mineral mortars for waterproofing floors and/or walls inside buildings
The minimum requirement of *EAD 030352-00-0503* must be maintained. The essential characteristics are to be specified in accordance with the European technical assessment (ETA, specification no.).

### Constructional data

| Name | Value | Unit |
|---|---|---|
| Compressive strength | - | N/mm$^2$ |
| Adhesive shear strength | - | N/mm$^2$ |
| Water absorption | - | mg |
| Water vapor diffusion equivalent air layer thickness | - | m |
| Thermal conductivity | - | W/(mK) |
| Tensile bond strength | - | N/mm$^2$ |
| Flexural strength | - | N/mm$^2$ |
| Sound absorption coefficient (if relevant) | - | % |

## 2.4  Delivery status
Modified mineral mortars are generally manufactured and supplied as factory-made dry mortars. Factory-made dry mortar is a finished mixture of base materials which merely requires the addition of water and/or a polymer dispersion on the building site. The products can be supplied in 1-5 kg bags, 15-25 kg sacks, big bags (1 t), minitainers (1.2 t) or as silo goods (5-15 t). Paper sacks with polyethylene lining were modelled as packaging (worst-case approach).

## 2.5  Base materials/Ancillary materials
 Typically, the products covered by this EPD contain the following range of base materials and auxiliaries (% by mass):
Inorganic binder: ~ 2 - 98
Filler materials: ~ 0 - 90
Additives: ~ 0 - 10
Aqueous dispersion and/or dispersion powder: ~ 0 - 35

These ranges are average values and the composition of products complying with the EPD can deviate from these concentration levels in individual cases. More detailed information is available in the respective manufacturer's documentation (e.g. product data sheets).
*Note: For companies to declare their products within the scope of this EPD it is not sufficient to simply comply with the product composition shown above. The application of this EPD is only possible for member companies of DBC, EFCC, FEICA, and IVK member associations and only for specific formulations with a total score below the declared maximum score for a product group according to the associated guidance document.*

**1. substances from the "Candidate List of Substances of Very High Concern for Authorisation" (SVHC)**
If this product contains substances listed in the *candidate list* (latest version) exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD.
**2. CMR substances in categories 1A and 1B**
If this product contains other carcinogenic, mutagenic, reprotoxic (CMR) substances in categories 1A or 1B which are not on the *candidate list*, exceeding 0.1 percentage by mass, the relevant information can be found in the safety data sheet of the relevant product covered by this model EPD.
**3. Biocide products added to the construction product**
If this construction product contains biocide products, the active substances, information on the concentration and/or concentration range, the product type together with information on their hazardous properties are listed in the safety data sheet of the respective product.

## 2.6  Manufacture
The raw materials are stored in silos, big bags or sacks in the manufacturing plant and fed gravimetrically in

accordance with the respective formula and mixed intensively. The mix is then packaged.

## 2.7 Environment and health during manufacturing

The state of the art involves maximum recirculation of dry waste into production. Wherever dust is incurred during production in the plant, it is directed to a filter system considering the limit values applicable for the workplace and using the corresponding extraction plants. Sack discharge stations connected to the extraction plant offer employees additional protection from dust. Most of the dust collected in the filter system and any residue incurred during production is returned to the manufacturing process.

**Powder residues:** Residual product is returned to the production process wherever possible.

**Air:** Process air is dedusted autonomously, whereby the values are far below legal requirements.

**Water:** The production process does not involve water. Very low volumes of water are required for laboratory tests and for sanitary facilities.

**Noise:** Noise level measurements have indicated that all values established within the production facility fall below the hearing protection limit of 85dB(A).

**Waste:** The main types of waste are powder waste, paper (paper bags) and foil. Low volumes of metal scrap (metal containers), waste oil (maintenance), wood (pallets) and commercial waste are incurred. All waste is separated, stored and redirected to the recycling circuit or disposed of.

## 2.8 Product processing/Installation

Modified mineral mortars can be processed both automatically and manually. The mortars are either automatically removed from a silo using a dry conveyor or manually taken from the container, mixed with water and installed. The professional liability association's rules apply as well as the respective safety data sheets pertaining to the construction products. On account of the various hydrate levels of cement, lime and calcium sulphate binding agents in the mineral mortar, the fresh mortar mixed with water is usually strongly alkaline. In the case of more extensive contact, this alkaline state can cause serious damage to eyes and skin. Therefore, any contact with eyes or skin must be avoided by taking personal protective measures, and the information outlined on the safety data sheet must be observed. Uncontrolled dust emissions should be avoided. Modified mineral mortars may not be discharged into the sewage system, surface water or groundwater. Waste incurred on the building site (packaging, pallets, residual mortar) must be collected separately. Suitable waste disposal companies dispose of packaging materials and mortar sacks and return them to the recycling circuit. Dry mortar residue is taken back by the manufacturing plants and used as a raw material. No dry mortar residue in mortar sacks is incurred. Hard mortar residue can be recycled or disposed of as building site rubble.

## 2.9 Packaging

A detailed description of packaging is provided in section 2.4. Empty, trickle-free paper containers and clean PE foils can be recycled.

## 2.10 Condition of use

A modified mineral mortar does not rot and is resistant to ageing when used in accordance with the designated purpose of the respective products. It is a durable product which, when used as adhesive, screed, waterproofing material or repair product, makes an essential contribution towards improving building function and value.

## 2.11 Environment and health during use

Owing to the stable crystalline bond and firm structure achieved after curing, emissions are extremely low and harmless to health when the respective products are used in accordance with the designated purpose. No risks are known for water, air and soil if the products are used as designated. Natural ionising radiation from mineral mortar is extremely low and negligible in terms of health hazards. Options for applications in indoor areas with permanent stays by people: Evidence of the emission performance of construction products in contact with indoor air and depending on the designated use must be submitted for applications in indoor areas with permanent stays by people, e.g. in accordance with the *German AgBB* test scheme or the *GEV* (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V., Düsseldorf) *EMICODE®* marking system typically applied in Germany.

## 2.12 Reference service life

Modified mineral mortars decisively improve the usability of building structures and significantly extend their original service lives. The anticipated reference service life depends on the specific installation situation and the exposure associated with the product. It can be influenced by weathering as well as mechanical or chemical loads.

## 2.13 Extraordinary effects

**Fire**

In accordance with Commission Decision 94/611EC, modified mineral binding agents comprising finely distributed organic components must always be classified in reaction-to-fire class A1 'No contribution to fire' in accordance with *EN 13501-1*.

Where higher percentages of organic components are involved, it can also be assumed that at least the requirements of *EN 13501-1* are maintained for fire class E and Efl.

**Fire protection**

| Name | Value |
|---|---|
| Building material class | - |
| Burning droplets | - |
| Smoke gas development | - |

**Water**

No relevant volumes of water-soluble substances hazardous to water are washed out when hardened modified mineral mortars are exposed to water (e.g. flooding). Modified mineral mortar is stable in terms of structure and is not subject to any changes in form when exposed to water and drying. If non-hardened modified mineral mortars are exposed to water an increase of the pH will take place.

**Mechanical destruction**

The mechanical destruction of modified mineral mortars does not lead to any decomposition products which are harmful to the environment or health. Dust

incurred during de-construction should be avoided by taking the appropriate measures (e.g. humidification).

### 2.14 Re-use phase
Components manufactured using modified mineral mortars can usually be easily demolished. When a building is removed, the materials do not need to be treated as special waste; care should, however, be taken to ensure unmixed residual materials wherever possible. Modified mineral mortars can usually be redirected to normal building material recycling circuits. Re-use is generally in the form of recycled aggregate in building construction and civil engineering. No practical experience is currently available for reusing components comprising cementitious-based products after decommissioning.

### 2.15 Disposal
The portion of a modified mineral mortar applied to another construction product is rather low. These low amounts do not play a role when the construction product is disposed of. They do not interfere with the disposal/recycling of other components/building materials.
The following waste codes according to the European List of Waste (*2000/532/EC*) can apply:
Mineral mortar: *EWC 17 01 01* and *EWC 10 13 14*
Mineral filler and levelling compound: *EWC 17 01 07*
Calcium sulphate-based filler and levelling compound: *EWC 17 08 02*

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

## 3. LCA: Calculation rules

### 3.1 Declared Unit
This EPD refers to the declared unit of 1 kg of modified mineral mortar, group 2; applied into the building with a density of 800 - 1,700 kg/m³ in accordance with the IBU *PCR part B* for Mineral Factory-Made Mortars. The results of the Life Cycle Assessment provided in this declaration have been selected from the product with the highest environmental impact (worst-case scenario).
Depending on the application, a corresponding conversion factor such as the density to convert volumetric use to mass must be taken into consideration.

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

**Declared unit**

| Name | Value | Unit |
|---|---|---|
| Declared unit | 1 | kg |
| Gross density | 800 - 1700 | kg/m³ |

### 3.2 System boundary
Modules A1, A2 and A3 are taken into consideration in the LCA:
- A1 Production of preliminary products
- A2 Transport to the plant
- A3 Production incl. provision of energy, production of packaging as well as auxiliaries and consumables and waste treatment
- A4 Transport to site
- A5 Installation, product applied into the building during A5 phase operations and packaging disposal.
The end of life for the packaging material considered is described below:
    -Incineration, for materials like plastic, wood and paper.
-C1-C2-C4-D
The building deconstruction (demolition process) takes place in the C1 module which considers energy generation and consumption of diesel and all the emissions connected with the fuel-burning process to run the machines. After the demolition, the product is transported to the end-of-life processing (C2 module) where all the impacts related to the transport processes are considered. For precautionary principle and as a worst-case scenario, landfilling is the only end-of-life scenario considered. This is modelled by the landfill process (module C4) where the product ends its life cycle.
Module D accounts for potential benefits that are beyond the defined system boundaries. Credits are generated during the incineration of packaging material that is occurring in the A5 module.

### 3.3 Estimates and assumptions
For this EPD formulation and production data defined and collected by FEICA were considered. Production waste was assumed to be disposed of by landfilling as a worst-case.
An average of paper sacks with polyethylene lining and wooden pallets was considered in the LCA.

### 3.4 Cut-off criteria
All raw materials submitted for the formulations and production data were taken into consideration.
The manufacture of machinery, plant and other infrastructure required for the production of the products under review was not taken into consideration in the LCA.
Transport of packaging materials is excluded.

### 3.5 Background data
Data from the *GaBi 10* database SP40 (2020) was used as background data.

### 3.6 Data quality
Representative products were applied for this EPD and the product in the group displaying the highest environmental impact was selected for calculating the LCA results. The background datasets used are less than 4 years old.
Production data and packaging are based on details provided by the manufacturer. The formulation used for evaluation refers to a specific product.
The data quality of the background data is considered to be good.

### 3.7　Period under review

Representative formulations are valid for 2021.

### 3.8　Allocation

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

### 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 *GaBi 10* database SP40 (2020) was used.

## 4.　LCA: Scenarios and additional technical information

**Characteristic product properties**
**Information on biogenic carbon**
The packaging material contains biogenic carbon content which is presented below.

**Information on describing the biogenic Carbon Content at factury gate**

| Name | Value | Unit |
|---|---|---|
| Biogenic carbon content in product | - | kg C |
| Biogenic carbon content in accompanying packaging | 0.0194 | kg C |

For the preparation of building life cycle assessments, it must be taken into account that in module A5 (installation in the building) the biogenic amount of $CO_2$ (0.0194 kg C *3.67 = 0.071 kg $CO_2$-eq.) of the packaging bound in module A1-A3 is mathematically booked out.

**Transport to the building site (A4)**

| Name | Value | Unit |
|---|---|---|
| Transport distance | 1000 | km |
| Gross weight | 34 - 40 | t |
| Payload capacity | 27 | t |

**Installation into the building (A5)**

| Name | Value | Unit |
|---|---|---|
| Other resources for packaging material | 0.055 | kg |
| Material loss | 0.01 | kg |
| Water consumption | 0.0003 | m$^3$ |

Material loss considers the amount of product not used during the application phase into the building. This amount is 1 % of the product, impacts related to the production of this part are accounted to the A5 module. This percentage is considered as waste to disposal and impacts of its end of life have been considered into the LCA model and declared in A5.

**End of life (C1-C4)**

| Name | Value | Unit |
|---|---|---|
| Collected as mixed construction waste | 1.126 | kg |
| Landfilling | 1.126 | kg |

The value above 1 kg is due to the use of water during the installation phase where 50 % of water evaporate while 50 % remain in the product.

# 5. LCA: Results

## DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 | ND | ND | MNR | MNR | MNR | ND | ND | X | X | ND | X | X |

## RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 kg of modified mineral mortar, group 2

| Core Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| GWP-total | [kg CO₂-Eq.] | 9.59E-1 | 5.06E-2 | 1.09E-1 | 3.14E-4 | 1.39E-2 | 1.72E-2 | -3.50E-2 |
| GWP-fossil | [kg CO₂-Eq.] | 1.03E+0 | 5.00E-2 | 1.83E-2 | 3.00E-4 | 1.33E-2 | 1.71E-2 | -3.49E-2 |
| GWP-biogenic | [kg CO₂-Eq.] | -6.90E-2 | 1.46E-4 | 9.10E-2 | 1.39E-5 | 6.10E-4 | 5.40E-5 | -8.21E-5 |
| GWP-luluc | [kg CO₂-Eq.] | 8.48E-4 | 4.05E-4 | 1.01E-5 | 7.20E-7 | 3.14E-7 | 4.91E-5 | -2.45E-5 |
| ODP | [kg CFC11-Eq.] | 8.55E-12 | 6.01E-18 | 8.55E-14 | 3.19E-20 | 1.39E-18 | 6.33E-17 | -3.66E-16 |
| AP | [mol H⁺-Eq.] | 2.20E-3 | 1.50E-4 | 3.89E-5 | 4.06E-6 | 4.20E-5 | 1.22E-4 | -4.90E-5 |
| EP-freshwater | [kg P-Eq.] | 2.67E-6 | 1.52E-7 | 3.24E-8 | 6.47E-11 | 2.83E-9 | 2.93E-8 | -4.52E-8 |
| EP-marine | [kg N-Eq.] | 6.48E-4 | 6.68E-5 | 1.20E-5 | 1.84E-6 | 1.93E-5 | 3.15E-5 | -1.27E-5 |
| EP-terrestrial | [mol N-Eq.] | 7.12E-3 | 7.48E-4 | 1.48E-4 | 2.01E-5 | 2.13E-4 | 3.46E-4 | -1.36E-4 |
| POCP | [kg NMVOC-Eq.] | 2.17E-3 | 1.32E-4 | 3.66E-5 | 5.53E-6 | 3.81E-5 | 9.55E-5 | -3.64E-5 |
| ADPE | [kg Sb-Eq.] | 8.98E-8 | 3.59E-9 | 1.12E-9 | 9.07E-12 | 3.96E-10 | 1.53E-9 | -5.74E-9 |
| ADPF | [MJ] | 1.29E+1 | 6.66E-1 | 1.54E-1 | 4.29E-3 | 1.87E-1 | 2.24E-1 | -5.92E-1 |
| WDP | [m³ world-Eq deprived] | 1.52E-1 | 4.47E-4 | 2.49E-2 | 5.93E-7 | 2.59E-5 | 1.79E-3 | -3.63E-3 |

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

## RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 kg of modified mineral mortar, group 2

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| PERE | [MJ] | 1.91E+0 | 3.74E-2 | 7.52E-1 | 1.35E-5 | 5.90E-4 | 2.93E-2 | -1.30E-1 |
| PERM | [MJ] | 7.21E-1 | 0.00E+0 | -7.21E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PERT | [MJ] | 2.63E+0 | 3.74E-2 | 3.08E-2 | 1.35E-5 | 5.90E-4 | 2.93E-2 | -1.30E-1 |
| PENRE | [MJ] | 1.17E+1 | 6.67E-1 | 2.30E-1 | 4.29E-3 | 1.87E-1 | 2.24E-1 | -5.92E-1 |
| PENRM | [MJ] | 1.17E+0 | 0.00E+0 | -8.66E-2 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| PENRT | [MJ] | 1.29E+1 | 6.67E-1 | 1.43E-1 | 4.29E-3 | 1.87E-1 | 2.24E-1 | -5.92E-1 |
| SM | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| RSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| NRSF | [MJ] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| FW | [m³] | 4.16E-3 | 4.33E-5 | 5.88E-4 | 2.43E-8 | 1.06E-6 | 5.65E-5 | -1.50E-4 |

| Caption | PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water |
|---|---|

## RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 kg of modified mineral mortar, group 2

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| HWD | [kg] | 8.58E-5 | 3.10E-8 | 8.58E-7 | 4.16E-13 | 1.82E-11 | 3.42E-9 | -2.36E-10 |
| NHWD | [kg] | 6.53E-2 | 1.02E-4 | 1.47E-2 | 4.39E-7 | 1.92E-5 | 1.13E+0 | -2.74E-4 |
| RWD | [kg] | 4.10E-4 | 8.25E-7 | 5.38E-6 | 4.61E-9 | 2.01E-7 | 2.55E-6 | -4.43E-5 |
| CRU | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MFR | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| MER | [kg] | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EEE | [MJ] | 0.00E+0 | 0.00E+0 | 1.48E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |
| EET | [MJ] | 0.00E+0 | 0.00E+0 | 2.66E-1 | 0.00E+0 | 0.00E+0 | 0.00E+0 | 0.00E+0 |

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

**RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 kg of modified mineral mortar, group 2**

| Indicator | Unit | A1-A3 | A4 | A5 | C1 | C2 | C4 | D |
|---|---|---|---|---|---|---|---|---|
| PM | [Disease Incidence] | ND | ND | ND | ND | ND | ND | ND |
| IRP | [kBq U235-Eq.] | ND | ND | ND | ND | ND | ND | ND |
| ETP-fw | [CTUe] | ND | ND | ND | ND | ND | ND | ND |
| HTP-c | [CTUh] | ND | ND | ND | ND | ND | ND | ND |
| HTP-nc | [CTUh] | ND | ND | ND | ND | ND | ND | ND |
| SQP | [-] | ND | ND | ND | ND | ND | ND | ND |
| Caption | PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index | | | | | | | |

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

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

**Additional environmental impact indicators** (suggested by *EN15804*, table 4) are not declared in the EPD. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high and as there is limited experience with the indicator (see ILCD classification in *EN 15804*, table 5). For this reason, results based on these indicators are not considered suitable for a decision-making process and are thus not declared in the EPD.

## 6. LCA: Interpretation

The majority of impacts are associated with the production phase (A1-A3). The most significant contribution to the production phase impacts is the upstream production of raw materials as the main driver. Besides the cement also the dispersion powder influences the results significantly, although this is only used for up to 9 % of the total composition. Significant contributions to Primary Energy Demand – Non-renewable (PENRT) derive from the energy resources used in the production of raw materials. The largest contributor to Primary Energy Demand – Renewable (PERT) is the consumption of renewable energy resources required for the generation and supply of electricity. During manufacturing (A1-A3) some influence also arises due to the wooden pallets and paper used as packaging that need solar energy for photosynthesis. It should be noted that Primary Energy Demand – Renewable (PERT) generally represents a small percentage of the production phase primary energy demand with the bulk of the demand coming from non-renewable energy resources.

In all EPDs, $CO_2$ is the most important contributor to Global Warming Potential (GWP). For the Acidification Potential (AP), NOx and $SO_2$ contribute the largest share.
Transportation to the construction site (A4) and the installation process (A5) make a minor contribution to almost all impacts. The only exception is a relevant influence of carbon dioxide emissions in module A5 to Global Warming Potential (GWP) due to the incineration of the packaging materials plastic, paper and pallets.
In module A4, transport to construction site, values for Eutrophication (freshwater, marine and terrestrial) have an impact due principally to the emission of phosphate. Furthermore, climate change from land use change is influenced by transport processes, due to the diesel production used as fuel, because part of this diesel has been produced from bio-based raw materials.
The end-of-life phases have a negligible influence on all impacts.

## 7. Requisite evidence

Leaching
Special tests and evidence have not been carried out or provided within the framework of drawing up this Model EPD. Some member states require special documentation on leaching for specific areas of application. This documentation has to be provided separately and is specific to the product in question.

If of relevance for the application (usually if the products are used outside of buildings) the leaching behaviour has to be measured e.g. according to *DIN EN 12457/1--4* or *DIN EN 14405* combined with the Council decision *2003/33/EC*.

## 8. References

**EN 998-1**

EN 998-1:2016, Specification for mortar for masonry –
Part 1: Rendering and plastering mortar

**EN 1015-17**
EN 1015-17:2005-01, Methods of test for mortar for
masonry – Part 17: Determination of water-soluble
chloride content of fresh mortars

**EN 1504-3**
EN 1504-3:2005-12, Products and systems for the
protection and repair of concrete structures –
Definitions, requirements, quality control and
evaluation of conformity – Part 3: Structural and non-
structural repair

**EN 1504-7**
EN 1504-7:2006-08, Products and systems for the
protection and repair of concrete structures –
Definitions, requirements, quality control and
evaluation of conformity – Part 7: Reinforcement
corrosion protection

**EN 1542**
EN 1542:1999-07, Products and systems for the
protection and repair of concrete structures – Test
methods – Measurement of bond strength by pull-off

**EN 12004**
EN 12004:2012, Adhesives for tiles – Requirements,
evaluation of conformity, classification and designation

**EN 12004-2**
EN 12004-2:2017, Adhesives for ceramic tiles - Part 2:
Test methods

**EN 12190**
EN 12190:1998-12, Products and systems for the
protection and repair of concrete structures – Test
methods – Determination of compressive strength of
repair mortar

**DIN EN 12457-1**
DIN EN 12457-1:2003-01, Characterization of waste -
Leaching; Compliance test for leaching of granular and
sludges - Part 1: One stage batch test at a liquid to
solid ration of 2 l/kg with particle size below 4 mm
(without or with size reduction)

**DIN EN 12457-2**
DIN EN 12457-2:2003-01, Characterization of waste -
Leaching; Compliance test for leaching of granular and
sludges - Part 2: One stage batch test at a liquid to
solid ratio of 10 l/kg with particle size below 4 mm
(without or with size reduction)

**DIN EN 12457-3**
DIN EN 12457-3:2021-03, Characterization of waste -
Leaching - Compliance test for leaching of granular
waste materials and sludges - Part 3: Two stage batch
test at a liquid to solid ratio of 2 l/kg and 8 l/kg for
materials with high solid content with particle size
below 4 mm (without or with size reduction)

**DIN EN 12457-4**
DIN EN 12457-4:2003-01, Characterization of waste -
Leaching; Compliance test for leaching of granular
waste materials and sludges - Part 4: One stage batch
test at a liquid to solid ratio of 10 l/kg for materials with
particle size below 10 mm (without or with limited size
reduction)

**EN 13279**
EN 13279-1:2008, Gypsum binders and gypsum
plasters – Part 1: Definitions and requirements

**EN 13501-1**
EN 13501-1:2018, Fire classification of construction
products and building products – Part 1: Classification
using data from reaction to fire tests

**EN 13813**
EN 13813:2002-10, Screed material and floor screeds
– Screed materials – Properties and requirements

**EN 13888**
EN 13888:2009, Grout for tiles – Requirements,
evaluation of conformity, classification and designation

**EN 13892-8**
EN 13892-8:2003-02, Methods of test for screed
materials – Part 8: Determination of bond strength

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

**DIN EN 14405**
DIN EN 14405:2017-05, Characterization of waste -
Leaching behaviour test - Up-flow percolation test
(under specified conditions)

**EN 14891**
EN 14891:2012-04, Liquid-applied water impermeable
products for use beneath ceramic tiling bonded with
adhesives – Requirements, test methods, evaluation of
conformity, classification and designation

**EN 15183**
EN 15183:2006-11, Products and systems for the
protection and repair of concrete structures – Test
methods – Corrosion protection test

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

**EAD 030295-00-0605**
EAD 030295-00-0605, Flexible polymer modified
mineral thick coating

**EAD 030352-00-0503**
EAD 030352-00-0503:2019:01, Liquid applied
watertight covering kits for wet room floors and/or walls

**EAD 040083-00-0404**
EAD 040083-00-0404:2013, External Thermal
Insulation Composite Systems with Rendering

**96/603/EC**
Commission decision of 4 October 1996 for specifying
a directory of products to be classified as category A
"No contribution to fire" in accordance with decision
94/611/EC on construction products for implementing
Article 20 of Directive 89/106/EEC

**2000/532/EC**

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

**2003/33/EC:**
Council Decision of 19 December 2002 establishing criteria and procedures for the acceptance of waste at landfills pursuant to Article 16 of and Annex II to Directive 1999/31/EC

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

**CPR**
CPR Regulation (EU) No 305/2011 of the European Parliament and of the Council of 9 March 2011 laying down harmonised conditions for the marketing of construction products and repealing Council Directive 89/106/EEC

**DAfStb Guideline**
DAfStb Guideline on 'Production and use of cement-bound flow concrete and grouting mortar' (VeBMR), 2019-07

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

**EWC 101314**
2000/532/EC European Waste Catalogue / Ordinance on European List of Wastes: Waste concrete and concrete sludge

**EWC 170101**
2000/532/EC European Waste Catalogue / Ordinance on European List of Wastes: Concrete

**EWC 170107**
2000/532/EC European Waste Catalogue / Ordinance on European List of Wastes: Mixtures of concrete, bricks, tiles and ceramics

**EWC 170802**
2000/532/EC European Waste Catalogue / Ordinance on European List of Wastes: Gypsum based construction metals e.g. for plasterboard

**GaBi 10**

GaBi 10: Software and database for comprehensive analysis. LBP, University of Stuttgart and Sphera, 2020

**GaBi 10 documentation**
Gabi 10: documentation of GaBi 10 data sets from the data base for Life Cycle Engineering LBP, University of Stuttgart and Sphera, http://documentation.gabi-software.com/, 2020

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Institut Bauen und Umwelt e.V.: General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. EPD programme. Version 2.0. Berlin: Institut Bauen und Umwelt e.V., 2021
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**PCR Part A**
Product Category Rules for Building-Related Products and Services, Part A: Calculation Rules for the Life Cycle Assessment and Requirements on the Project report, Version 1.1, Institut Bauen und Umwelt e.V., 2021-01

**PCR Part B**
Product Category Rules for Construction Products, Part B: Mineral Factory-Made Mortars, 2017-11

**PG AIV**
Testing principles regarding the issuing of general building authority test certificates for waterproofing with waterproofing in conjunction with ceramic tiles (PG-AIV:2018-03)

**PG MDS/FPD**
Testing principles regarding the issuing of general building authority test certificates for waterproofing with mineral waterproofing slurries and flexible polymer thick coatings (PG-MDS/FPD:2016-11)

**REACH**
Directive (EG) No. 1907/2006 of the European Parliament and of the Council dated 18 December 2006 on the registration, evaluation, approval and restriction of chemical substances (REACH), for establishing a European Agency for chemical substances, for amending Directive 1999/45/EC and for annulment of Directive (EEC) No. 793/93 of the Council, Directive (EC) No. 1488/94 of the Commission, Guideline 76/769/EEC of the Council and Guidelines 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC of the Commission.

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