ARDEX N23W
Adhesivo cementoso MICROTEC para cerámica y piedra natural, blanco

Declaración de Ambiental de Producto (DAP) según Modelo EPD

FEICA (Asociación de la Industria Europea de Adhesivos y Selladores) ha desarrollado las denominadas Declaraciones Ambientales de Producto (Modelo EPD) y las ha verificado de forma independiente por el Instituto de Construcción y Medio Ambiente (IBU). Estos modelos de EPD verificados por IBU han sido puestos a disposición del público por FEICA e IBU. Los modelos de EPD representan la tecnología de producción actual en Europa. ARDEX CEMENTO, S.A., como miembro de la Asociación Española de Fabricantes de Colas y Adhesivos (ASEFCA), que es una asociación nacional miembro de FEICA, tiene derecho a declarar que un modelo específico de EPD de FEICA aplica al producto mencionado que se enumera a continuación. La conformidad de nuestros productos con los modelos de EPD se verifica sobre la base de nuestras formulaciones, mediante el uso de un procedimiento de guía aprobado por IBU. Por la presente declaramos que el producto

ARDEX N23W, Adhesivo cementoso MICROTEC para cerámica y piedra natural, blanco

cumple los criterios del Modelo EPD adjunto

EPD-DBC-20220218-IBF1-EN para “Morteros minerales modificados, grupo 2”

Esto significa que los datos de evaluación del ciclo de vida y otros contenidos del Modelo de EPD se aplican a este tipo de productos y pueden usarse para la evaluación de la sostenibilidad de los productos de construcción y proyectos de construcción en los que se utilizan.

ARDEX CEMENTO, S.A.

ppa.

Joan Bo
Jefe del Departamento Técnico

Dr. Julia Soldat
Sustainability Manager

Apéndice:
EPD (DAP) con número de declaración: **EPD-DBC-20220218-IBF1-EN**

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ENVIRONMENTAL-PRODUCT DECLARATION

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

Owner of the Declaration	FEICA - Association of the European Adhesive and Sealant Industry
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	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 mortar, group 2

DBC, EFCC, FEICA, IVK

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

1. General Information

DBC, EFCC, FEICA, IVK

Programme holder

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

Declaration number

EPD-DBC-20220218-IBF1-EN

This declaration is based on the product category rules:

Mineral factory-made mortar, 08.03.2023
(PCR checked and approved by the SVR)

Issue date

26.09.2022

Valid to

25.09.2027

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

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

Modified mineral mortar, group 2

Owner of the declaration

FEICA - Association of the European Adhesive and Sealant Industry
Rue Belliard 40 box 10
1040 Brussels
Belgium

Declared product / declared unit

1 kg of modified mineral mortar with a density 800 - 1,700 kg/m³

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.
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 bezeichnet*.

Verification

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

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)	-	%

Please select one of the following options and delete the header of the selected [alternative]:

[Alternative 1a: Product according to the CPR, based on a hEN]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN xyz:date, title*.
- Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 1b: Product according to the CPR, based on an ETA]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *ETA no. xyz, date, title*.
- Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 2a: Product not harmonised in accordance with the CPR but in accordance with other provisions for harmonisation of the EU]:

Performance data of the product according to the harmonised standards, based on provisions for harmonization.

Voluntary data: *source, date, title* (not part of CE-marking).

[Alternative 2b: Product harmonized as well in accordance with the CPR as with other legal provisions of the EU]:

- Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN xyz: date, title* or *ETA no. xyz, date, title* respectively.
- Performance data of the product, based on the harmonised standards, in accordance with the other provisions for harmonization.
- Voluntary data: *source, date, title* (not part of CE-marking)

[Alternative 3: Product for which no legal provisions for harmonisation of the EU exist]:

Performance data of the product with respect to its characteristics in accordance with the relevant technical provision (no CE-marking).

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.
Description of the influences on the ageing of the product when applied in accordance with the rules of technology.

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/m^3

For IBU core EPDs (where clause 3.6 is part of the EPD): for average EPDs, an estimate of the robustness of the LCA values must be made, e.g. concerning variability of the production process, geographical representativeness and the influence of background data and preliminary products compared to the environmental impacts caused by actual production.

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 Geographic Representativeness

Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation

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

3.10 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.

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.

The following technical scenario information is required for the declared modules and optional for non-declared modules. Modules for which no information is declared can be deleted; additional information can also be listed if necessary.

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

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

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.

In case a **reference service life** according to applicable ISO standards is declared then the assumptions and in-use conditions underlying the determined RSL shall be declared. In addition, it shall be stated that the RSL applies for the reference conditions only.

The same holds for a service life declared by the manufacturer. Corresponding information related to in-use conditions needs not be provided if a service life taken from the list on service life by BNB is declared.

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

In Table 1 "Description of the system boundary", all declared modules shall be indicated with an "X"; all modules that are not declared shall be indicated with "MND" (As default the modules B3, B4, B5 are marked as MNR – module not relevant). In the following tables, columns can be deleted for modules that are not declared. Indicator values should be declared with three valid digits (eventually using exponential form (e.g. 1,23E-5 = 0,0000123). A uniform format should be used for all values of one indicator.
If several modules are not declared and therefore have been deleted from the table, the abbreviations for the indicators can be replaced by the complete names, while the readability and clear arrangement should be maintained; the legends can then be deleted.
If due to relevant data gaps, an indicator cannot be declared in a robust way, then the abbreviation “IND” (indicator not declared) should be used for this indicator.

- 0 - calculated value is 0
- 0 - value falls under the cut-off
- 0 - assumption which exclude any flows (e.g. exported electricity A1-A3)
- IND – in cases where the inventory does not support the methodological approach or the calculation of the specific indicator IND shall be used.

If no reference service life is declared (see chapter 2.13 "Reference Service Life"), the LCA results of the modules B1-B2 and B6-B7 shall refer to a period of one year. This shall then be indicated as an explanatory text below the tables. In addition, the formula for the quantification of such B-modules over the total life cycle shall be provided.

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

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-total	kg CO_2 eq	9.59E-01	5.06E-02	1.09E-01	3.14E-04	1.39E-02	1.72E-02	-3.5E-02
GWP-fossil	kg CO_2 eq	1.03E+00	5E-02	1.83E-02	3E-04	1.33E-02	1.71E-02	-3.49E-02
GWP-biogenic	kg CO_2 eq	-6.9E-02	1.46E-04	9.1E-02	1.39E-05	6.1E-04	5.4E-05	-8.21E-05
GWP-luluc	kg CO_2 eq	8.48E-04	4.05E-04	1.01E-05	7.2E-09	3.14E-07	4.91E-05	-2.45E-05
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	2.2E-03	1.5E-04	3.89E-05	4.06E-06	4.2E-05	1.22E-04	-4.9E-05
EP-freshwater	kg P eq	2.67E-06	1.52E-07	3.24E-08	6.47E-11	2.83E-09	2.93E-08	-4.52E-08
EP-marine	kg N eq	6.48E-04	6.68E-05	1.2E-05	1.84E-06	1.93E-05	3.15E-05	-1.27E-05
EP-terrestrial	mol N eq	7.12E-03	7.48E-04	1.48E-04	2.01E-05	2.13E-04	3.46E-04	-1.36E-04
POCP	kg NMVOC eq	2.17E-03	1.32E-04	3.66E-05	5.53E-06	3.81E-05	9.55E-05	-3.64E-05
ADPE	kg Sb eq	8.98E-08	3.59E-09	1.12E-09	9.07E-12	3.96E-10	1.53E-09	-5.74E-09
ADPF	MJ	1.29E+01	6.66E-01	1.54E-01	4.29E-03	1.87E-01	2.24E-01	-5.92E-01
WDP	m^3 world eq deprived	1.52E-01	4.47E-04	2.49E-02	5.93E-07	2.59E-05	1.79E-03	-3.63E-03

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PERE	MJ	1.91E+00	3.74E-02	7.52E-01	1.35E-05	5.9E-04	2.93E-02	-1.3E-01
PERM	MJ	7.21E-01	0	-7.21E-01	0	0	0	0
PERT	MJ	2.63E+00	3.74E-02	3.08E-02	1.35E-05	5.9E-04	2.93E-02	-1.3E-01
PENRE	MJ	1.17E+01	6.67E-01	2.3E-01	4.29E-03	1.87E-01	2.24E-01	-5.92E-01
PENRM	MJ	1.17E+00	0	-8.66E-02	0	0	0	0

PENRT	MJ	1.29E+01	6.67E-01	1.43E-01	4.29E-03	1.87E-01	2.24E-01	-5.92E-01
SM	kg	0	0	0	0	0	0	0
RSF	MJ	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0
FW	m^3	4.16E-03	4.33E-05	5.88E-04	2.43E-08	1.06E-06	5.65E-05	-1.5E-04

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

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
HWD	kg	8.58E-05	3.1E-08	8.58E-07	4.16E-13	1.82E-11	3.42E-09	-2.36E-10
NHWD	kg	6.53E-02	1.02E-04	1.47E-02	4.39E-07	1.92E-05	1.13E+00	-2.74E-04
RWD	kg	4.1E-04	8.25E-07	5.38E-06	4.61E-09	2.01E-07	2.55E-06	-4.43E-05
CRU	kg	0	0	0	0	0	0	0
MFR	kg	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0
EEE	MJ	0	0	1.48E-01	0	0	0	0
EET	MJ	0	0	2.66E-01	0	0	0	0

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

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

Parameter	Unit	A1-A3	A4	A5	C1	C2	C4	D
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND
IR	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	SQP	ND	ND	ND	ND	ND	ND	ND

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*. 7.1 Leaching
Measurement of leaching performance (eluate analysis) indicating the measurement process.
Example:
based on DIN EN 12457/1-4 or DIN/CEN TS 14405 combined with the Council decision dated 19.12.2002 (2002/33/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
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Engineering LBP, University of Stuttgart and Sphera, http://documentation.gabi-software.com/, 2020

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MVV TB
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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.
The literature referred to in the Environmental Product Declaration must be listed in full.Standards already fully quoted in the EPD do not need to be listed here again.
The current version of PCR Part A and PCR Part B of the PCR document on which they are based must be referenced.

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