



Enduris™ 3500

Silicone Roof Coating

Product Description

GE Enduris 3500 silicone roof coating is a high performance, protective barrier for a variety of architectural surfaces and roofing substrates. Upon cure, Enduris 3500 silicone roof coating forms a durable, breathable, monolithic weatherproof roofing membrane that is highly resistant to degradation from Ultraviolet (UV)/Infrared (IR) and natural weathering.

Key Features and Typical Benefits

- **Silicone Durability**—Cured silicone rubber exhibits excellent long-term resistance to natural weathering including: extreme temperatures, ultraviolet radiation, rain and snow.
- **VOC Compliant**—Enduris high solid silicone has a solvent-free formulation. The VOC (Volatile Organic Compounds) content is well below the current limits of California's relevant Air Quality Management Districts.
- **Ease of Use**—Enduris 3500 silicone roof coating is a single component material that requires no mixing or separate components.
- **Versatile Application**—Enduris 3500 can be applied with high pressure spray equipment, roller or brush.
- **High Build Formulation**—Allows for single coat application and hangs on slopes without sagging.
- **Storage & Shelf Life**—Enduris 3500 silicone roof coating can be stored in unheated warehouses during the colder months without the risk of freezing. Shelf life is 24 months from date of manufacture when properly stored.

Potential Applications

For structurally sound roofing applications including over existing coatings, single ply, modified bitumen and BUR, spray polyurethane foam, low and steep sloped metal, and other horizontal and vertical substrates. All substrates require an adhesion test. Consult Momentive Performance Materials (MPM) technical services for proper technique.

Installation

Refer to Design and Application Guide for surface preparation requirements, design information and detailed application instructions.

Surface Preparation

Enduris 3500 silicone roof coating can be applied to itself as well as a variety of roofing materials and substrates including: single ply membranes (TPO, PVC, EPDM, CSPE), spray-applied polyurethane foam (SPF), metal, concrete, common parapet/coping materials and asphaltic substrates such as modified bitumen (granulated or smooth) or BUR. (Enduris Asphalt Bleed Blocker will aide in prevention of discoloration, "bleed through" or "tobacco staining", from oils wicking out of an asphaltic substrate). Surfaces to which Enduris 3500 silicone roof coating is to be applied must be clean, dry, structurally sound and free of loose particles, dirt, dust, oil, frost, mildew and other contaminants. Damage to the underlying roof system, such as cracks, openings, holes, etc. should be properly repaired prior to application. Saturated substrates must be removed and repaired appropriately. Users of Enduris 3500 silicone roof coating should verify that suitable adhesion can be attained to all existing roofing materials to be coated prior to large scale application of the coating.



Application Guidelines

Enduris 3500 silicone roof coating should be applied as received and dilution with solvent is not recommended. If settling in the package has occurred, gently stir the material immediately prior to use.

Enduris 3500 can be cleaned up before it has cured by wiping alternately with solvent and dry rags. Cured material can be removed from surfaces with a razor blade or scrubbed off with steel wool or synthetic abrasive pads and solvent. To control overspray, avoid spraying in winds that may cause drift. Care should be taken to avoid overspray onto adjacent building materials, vehicles, plants, etc. Surfaces not intended for coating should be masked or covered. Enduris 3500 silicone roof coating should be sprayed or rolled ensuring uniform build and thorough coverage and can be applied in one coat. If applying in multiple coats, allow adequate time between each coat for the coating to cure before applying additional coat. Final cured film thicknesses must be free of voids, pinholes, cracks or blisters.

Application Temperature

Enduris 3500 silicone roof coating can be applied throughout the year as long as the substrates being coated are completely dry. Frost and/or moisture will interfere with adhesion. Lower temperatures will lengthen the skin over, tack free and ultimate cure time and may require an overnight cure in winter months to allow the top coat application to proceed (film build may not be sufficient to allow walk over). Higher temperatures will accelerate the cure rate and decrease the open time of the coating.

Surface application temperature ranges from 0°F (-17°C) to 120°F (48°C). Contact MPM technical services for applications outside of normal temperature ranges.

Application Equipment

Enduris 3500 silicone roof coating can be applied by spraying, rolling or brushing. Enduris 3500 silicone roof coating works with most commercially available spray application equipment that can maintain pressure of 3,300 psi at the tip while spraying 2 gallons per minute.

Contact spray equipment manufacturers for spray rig and tip sizes and hose recommendations.

For Enduris Bleed Blocker a 1/2" to 3/4" (12-19mm) nap roller cover is recommended. For Enduris 3500 silicone roof coating a 1 1/4" to 1 1/2" (32-38mm) nap roller cover, for use with coatings containing solvent is recommended.

When a squeegee is used back rolling is required.

Other application tools include, but are not limited to: Wet mil gage, "chip" or paint brush, cigar rollers, roller frames, solvents (for clean-up), shears (for cutting fabrics) and any PPE required.

Limitations

Enduris 3500 silicone roof coating should not be considered for:

- Use on pedestrian, deck or frequent traffic bearing surfaces.
- Cold storage roofing application without vapor barrier, cryogenic tank applications, or continuous water immersion service.
- Unprepared surfaces including but not limited to those that are wet, dusty, oily, mildewed, heavily chalked, blistered or structurally unsound.
- Building materials that might wick oil or solvents. These include, but are not limited to, certain vulcanized rubber products, tapes, failed sealants, some caulking compounds and asphaltic/mastic materials unless appropriate preparation or primers are used. Consult MPM technical services for primer recommendations.
- Surfaces where adhesion has not been verified by testing.
- Inclement weather may negatively affect uncured Enduris 3500 silicone roof coating by displacement of uncured material; therefore, application of coating should not proceed if heavy rain, hail or snowfall is impending or expected within 1 hour of application. Note: In colder temperatures 1 hour may not be sufficient time to form a firm skin and become tack free.
- Enduris 3500 silicone roof coating requires atmospheric moisture to aide in curing. It is not suitable for use in unventilated spaces.

Typical Physical Properties

Typical physical property values of Enduris 3500 silicone roof coating as supplied and cured are set forth in the tables below:

Typical Properties – Supplied

Property	Value ⁽¹⁾	Test Method
Solids Content Volume	90	ASTM D1644-01
Tack Free Time	20-30 minutes	ASTM D3960
Skin-Over Time	10-15 minutes	WPSTMC-560
Viscosity	22,000 centipoises	ASTM D2196
Tensile Strength	204 psi (1.41 MPa)	ASTM D2370
Elongation	540%	ASTM D2370
Durometer Hardness Shore A	36	ASTM D2240
TVOC	<24 g/L	EPA Method 24
Solar Reflectance - Initial ⁽²⁾	88%	ASTM C1549
Emittance - Initial ⁽²⁾	90	ASTM C1371
SRI Value - Initial ⁽²⁾	111	ASTM E1980
Solar Reflectance - Aged ⁽²⁾	55%	ASTM C1549
Emittance - Aged ⁽²⁾	89	ASTM C1371
SRI Value - Aged ⁽²⁾	65	ASTM E1980
Permeance	9.3 perms	ASTM E96 (BW)
Tear Resistance	32 lbf/in.	ASTM D624
Low Temperature Flexibility	Pass	ASTM D522 (B)
Resistance to Wind-Driven Rain	Pass	TT-C-555B

(1) Typical properties are average data and are not to be used as or to develop specifications.
(2) Values derived from testing on Enduris 3502 (white).



Packaging

Enduris 3500 silicone roof coating is available in nominal 1 gallon plastic pails 9.8 lbs. (4.45 kg), 5 gallon plastic pails 54.0 lbs. (24.5 kg) and 55 gallon chimed steel drums that weigh 540 lbs. (245.2 kg) equal to 50 gallons.

Colors

Enduris is available in white, tan, light grey, medium grey, black and protection yellow. Custom colors can be prepared with advance notice.

Uncured Product Storage

Enduris 3500 silicone roof coating should be stored in sealed containers in a dry area, out of direct sunlight and high heat. Do not open containers until ready for use and store containers at or below 90°F (32°C) to maintain full shelf life. Enduris 3500 silicone roof coating generally can be stored in unheated warehouses during colder months without the risk of freezing. Enduris 3500 silicone roof coating reacts with atmospheric moisture to cure. Once containers are open and exposed to air a skin will form on the material over time. The formation of skin will be negligible in winter months but can form quickly (minutes) under hot and humid conditions. Cured skin that has formed on the top of the material must be removed or screened from the bulk material, as it may contribute to pump clogging. Take appropriate precautions to cover open containers during use.

Skylight Restoration

Skylights may be restored using GE Optic translucent coating. NEVER COAT SKYLIGHTS WITH ANYTHING OTHER THAN TRANSLUCENT (Clear) COATINGS.

Application Coating Vertical Surfaces

When coating vertical wall surfaces, other than parapets and walls associated with the roofing system, GE 3100 SilShield™ silicone architectural coating is suggested. Contact an MPM representative for additional information.

Applicable Standards

- **ASTM D6694**—Standard Specification for Liquid-Applied Silicone Coating Used in Spray Polyurethane Foam Roofing Systems. Result: Pass
- **Cool Roof Rating Council (CRRC)**—Enduris 3502 (white) only. Rated Product ID—1200- 0002.
- **UL 790**—Flammability Characteristics—Enduris 3500 silicone roof coating carries Class “A” and Class “B” credentials as tested under UL 790 procedures. Refer to the UL directory for specific information.

- **ASTM E84**—Standard Test Method for Surface Burning Characteristics of Building Materials. Result: Class A (Flame Spread Index 10, Smoke Developed Index 185).
- Miami Dade approved
- Florida Product Approval
- FM Global
- **NFS P151**—Enduris 3500 roof coating in White, Medium Gray, Tan and Dark Gray are certified to NSF P151. UL FDQR.MH61555: Certification of Rainwater Harvesting Components, also referred to as Rainwater Catchment System.

Technical Services

For additional technical resources, please contact your local customer service center. (See Customer Service Centers section herein for contact information.) Any technical advice furnished by MPM or any representative of MPM concerning any use or application of any MPM product is believed to be reliable, but MPM makes no warranty, expressed or implied, of suitability for use in any application for which such advice is furnished. Customers must evaluate MPM products and make their own determination as to the fitness of use in their particular applications.

Patent Status

Nothing contained herein shall be construed to imply the nonexistence of any relevant patents or to constitute the permission, inducement or recommendation to practice any invention covered by any patent, without authority from the owner of the patent.

Product Safety, Handling and Storage

Customers should review the latest Safety Data Sheet (SDS) and label for product safety information, safe handling instructions, personal protective equipment if necessary, emergency service contact information, and any special storage conditions required for safety. Momentive Performance Materials (MPM) maintains an around-the-clock emergency service for its products. SDS are available at www.gesilicones.com or, upon request, from any MPM representative. For product storage and handling procedures to maintain the product quality within our stated specifications, please review Certificates of Analysis, which are available in the Order Center. Use of other materials in conjunction with MPM products (for example, primers) may require additional precautions. Please review and follow the safety information provided by the manufacturer of such other materials.



Customer Service Centers

For additional information, please contact our [Customer Service Team](#)

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European Technical Assessment

**ETA-18/0472
of 17/02/2020**

(English translation prepared by CSTB – Original version in French language)

GENERAL PART

Technical Assessment Body issuing the European Technical Assessment:

Centre Scientifique et Technique du Bâtiment (CSTB)

Trade name of the construction product:

ENDURIS 3500 E / E+ System

Product family to which the construction product belongs:

Product Area Code: 03
Liquid applied roof waterproofing on the basis of polysiloxane

Manufacturer:

Momentive Performance Materials GmbH
Kaiser Wilhelm Allee 1, Gebäude V7,
D-51368 Leverkusen
Germany

Manufacturing plant(s):

Momentive Performance Materials Silicones B.V.
Plasticslaan 1
4612 PX
Bergen op Zoom
The Netherlands

This European Technical Assessment contains:

7 pages including 1 Annex(es) which form an integral part of this assessment

This European Technical Assessment is issued in accordance with regulation (EU) No 305/2011, on the basis of:

European Assessment Document 030019-00-0402, edition November 2016.

Translations of this European Technical Assessment in other languages shall fully correspond to the original issued document and should be identified as such.

Communication of this European Technical Assessment, including transmission by electronic means, shall be in full (excepted the confidential Annex(es) referred to above). However, partial reproduction may be made, with the written consent of the CSTB. Any partial reproduction has to be identified as such.

SPECIFIC PART

1. Technical description of the product

The liquid applied roof waterproofing " ENDURIS 3500 E / E+ System " is a kit which consists of a single component polysiloxane based synthetic liquid material, with or without reinforcement.

Application is made in one time without drying time (wet on wet application):

Version 1 (non reinforced):

- One layer of "Enduris 3500 E / E+" (1,5 mm with wet gauge)

Version 2 (reinforced):

- One layer of "Enduris 3500 E / E+" (0,75 mm with wet gauge)
- One layer of reinforcement "(Non-woven fabric 90 to 110 g/m²)"
- One layer of "Enduris 3500 E / E+" (0,75 mm with wet gauge)

The colour of "Enduris 3500 E / E+" in both versions can vary between white and black with different shades of grey.

For an adequate adhesion of the waterproofing layer, the substrate may require a primer:

Admitted substrates	Primers
Concrete	none
Steel, Stainless steel	none
Extruded polystyrene panel	none
Polyurethane or polyisocyanurate panel with kraft or aluminum facing	none
SBS and APP bitumen waterproofing sheets	None (in option Bleed blocker)
PVC-P based waterproofing membranes	none
TPO - FPO based waterproofing membranes	SS4004P primer

For details and flashing application, the thixotropic version "Enduris Liquid Flashing", which is a part of the kit, can be used.

Optionally a Bleed Blocker, which is a part of the kit, can be used to prevent discoloration of the roof surface due to bleeding of bitumen oil from underlying Bitumen waterproofing sheets. The bleed blocking effect has not been assessed.

For version 1 (non- reinforced), the minimum layer thickness of the roof waterproofing applied " ENDURIS 3500 E / E+ System " after drying is 1,4 mm, it is non- accessible.

For version 2 (reinforced) the minimum layer thickness of the roof waterproofing applied " ENDURIS 3500 E / E+ System " after drying is 1,6 mm, it is accessible for maintenance of the roof only.

2. Specification of the intended use in accordance with the applicable European Assessment Document (hereinafter EAD)

The liquid applied roof waterproofing for the waterproofing of roof surfaces against penetration of atmospheric water.

The roof waterproofing shows certain levels of performance according to European Assessment Document 030019-00-0402 which facilitates the use taking account of national requirements.

In the manufacturer's technical dossier (MTD) to this European technical assessment (ETA) the manufacturer gave information concerning substrates which the roof waterproofing is suitable for and on how these substrates shall be pre-treated.

The verifications which are based on this ETA give reason for the assumption of an intended working life of the roof waterproofing of 25 years. The indications given on the working life cannot be interpreted as a guarantee given by the producer, but are regarded only as a means for choosing the right products in relation to the expected economically reasonable working life of the works

3. Performances of the product and references to the methods used for their assessment

Performances of the liquid applied waterproofing kit, related to the basic requirements for construction works (hereinafter BWR), were determined according to the European Assessment Document 030019-00-0402.

These performances, given in the following paragraphs, are valid as long as the components are the ones described in § 1 and Annexe 1 of this ETA.

3.1 Mechanical resistance and stability (BWR 1)

Not relevant.

3.2 Safety in case of fire (BWR 2)

Reaction to fire: E

External fire performance: Broof(t1), Broof(t2), Broof (t3), Broof(t4) (according to the classification reports n°18903 of June 2018 by Warringtonfiregent and the classification report n°0017-L-19/2 of March 2019 by Kiwa BDA Testing B.V.)

3.3 Hygiene, health and the environment (BWR 3)

3.3.1 Water vapour permeability

Water vapour permeability (Sd) is 1,5 m

3.3.2 Watertightness

Kit " ENDURIS 3500 E / E+ System " is watertight according to Technical Report EOTA 003.

3.3.3 Effects of highest and lowest surface temperatures

The resistance to mechanical damage is P1 to P2 depending on the nature of the substrate, cf. table on annex 1 (1/2), at the lowest surface temperature TL4 and the highest surface temperature TH4.

3.3.4 Resistance against ageing

Performance and tensile properties, after exposure W3 of accelerated ageing by heat, artificial weathering and accelerated ageing by hot water are kept.

3.3.5 Resistance to plant roots

No performance assessed.

3.3.6 Release of dangerous substances

According to Technical Report EOTA n° 034, the product does not contain dangerous substance.

3.4 Safety and accessibility in use (BWR 4)**3.4.1 Resistance to wind load**

Bond strength has been checked for substrate listed in §1. it is > 50kPa.

3.4.2 Resistance to slipperiness

No performance assessed.

3.5 Protection against noise (BWR 5)

No performance assessed.

3.6 Energy economy and heat retention (BWR 6)

No performance assessed.

3.7 Sustainable use of natural resources (BWR 7)

No performance assessed.

4. Assessment and verification of constancy of performance (hereinafter AVCP) system applied, with reference to its legal base

According to Decision 97/556/EC (Decision of the Commission of 14 July 1997, L 229 of 20.8.1997, p. 15), as amended by Decision 2001/596/EC (Decision of the Commission of 8 January 2001, L 209 of 2.8.2001, p. 33), the systems of AVCP given in the following table apply:

Product	Intended uses	Level or Class	System
Liquid applied roof waterproofing kits	For all roof waterproofing uses	-	3

The systems of AVCP are described in Annex V of Regulation (EU) No 305/2011, as amended by Delegated Regulation (EU) No 568/2014.

5. Technical details necessary for the implementation of the AVCP system, as provided for in the applicable EAD

Technical details necessary for the implementation of the AVCP system are laid down in the control plan deposited at the CSTB.

Issued in Marne-la-Vallée on 09/06/2020

by

Stephane GILLIOT, DEIS/ FACET of the CSTB



Applicable to roof waterproofing " ENDURIS 3500 E / E+ System ":

	VERSION 1 Without reinforcement	VERSION 2 With reinforcement
Minimum thickness of resin (wet gauge)	1,5 mm	0,75 + 0,75 mm
Minimum quantity consumed of resin	1,9 kg/m ²	1,9 kg/m ²
Minimum total dry thickness of the kit	1,4 mm	1,6 mm

Levels of use categories according to EAD 030019-00-0402 with relation to:

Working life	W3	
Climatic zones	S	
Imposed loads (on compressive and non compressive substrate)	P1	P2
Roof slope	S1 à S4	
Lowest surface temperature	TL4	
Highest surface temperature	TH4	

Performance du kit :

External fire performance	Broof(t1), Broof(t2), Broof (t3), Broof(t4)
Reaction to fire	E
Water vapour diffusion resistance	Sd = 1,5 m
Watertightness	Watertight
Statement on dangerous substances	Does not contain any
Resistance to plant roots	No performance assessed
Resistance to wind loads	≥ 50 kPa on substrate listed in §1
Resistance to slipperiness	No performance assessed

Roof waterproofing " ENDURIS 3500 E / E+ System"

Liquid applied roof waterproofing on the basis of polysiloxane

Characteristics of " ENDURIS 3500 E / E+ System"

ANNEX 1 (1/2)
of ETA-18/0472

Installation

The fitness for use of the roof waterproofing can be assumed only, if the processing is carried out according to the processing instructions stated in the MTD by the manufacturer, in particular taking account of the following points:

- processing by appropriately trained personnel,
- processing of only those components which are a marked component of the kit,
- processing with the required tools and adjuvants,
- precautions during processing,
- inspecting the roof surface for cleanliness and correct preparation and applying the primer before applying the roof waterproofing,
- inspecting compliance with suitable weather and curing conditions,
- ensuring a wet thickness of the waterproofing by processing of appropriate minimum quantities of material, of at least:
 - o 1,5 mm for version 1
 - o 0,75 mm + Reinforcement + 0,75 mm mm for version 2
- inspections during installation and of the finished roof waterproofing and documentation of the results.

<p>Roof waterproofing ' ENDURIS 3500 E / E+ System'' <i>Liquid applied roof waterproofing on the basis of polysiloxane</i></p>	<p>ANNEX 1 (2/2) of ETA-18/0472</p>
<p>Intended use of ' ENDURIS 3500 E / E+ System''</p>	

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-20220219-IBF1-EN
Issue date	26.09.2022
Valid to	25.09.2027

Modified mineral mortars, group 3

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>



ECO PLATFORM

EPD
VERIFIED



1. General Information

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.

Programme holder

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

Declaration number

EPD-DBC-20220219-IBF1-EN

This declaration is based on the product category rules:

Mineral factory-made mortar, 11.2017
 (PCR checked and approved by the SVR)

Issue date

26.09.2022

Valid to

25.09.2027

Modified mineral mortars, group 3

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

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*.

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 A/IV*) 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 3; 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

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 factory 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 CO₂ (0.0194 kg C * 3.67 = 0.071 kg CO₂-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
Material loss	0.01	kg
Other resources for packaging material	0.055	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	1.128	kg
Landfilling	1.128	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 3

Core Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
GWP-total	[kg CO ₂ -Eq.]	1.62E+0	5.06E-2	1.16E-1	3.14E-4	1.40E-2	1.72E-2	-3.50E-2
GWP-fossil	[kg CO ₂ -Eq.]	1.68E+0	5.00E-2	2.48E-2	3.00E-4	1.33E-2	1.71E-2	-3.49E-2
GWP-biogenic	[kg CO ₂ -Eq.]	-6.25E-2	1.46E-4	9.11E-2	1.39E-5	6.12E-4	5.41E-5	-8.21E-5
GWP-luluc	[kg CO ₂ -Eq.]	1.32E-3	4.05E-4	1.47E-5	7.21E-9	3.15E-7	4.92E-5	-2.45E-5
ODP	[kg CFC11-Eq.]	1.31E-10	6.01E-18	1.31E-12	3.20E-20	1.40E-18	6.34E-17	-3.66E-16
AP	[mol H ⁺ -Eq.]	4.83E-3	1.50E-4	6.53E-5	4.06E-6	4.21E-5	1.23E-4	-4.90E-5
EP-freshwater	[kg P-Eq.]	2.48E-6	1.52E-7	3.05E-8	6.49E-11	2.83E-9	2.94E-8	-4.52E-8
EP-marine	[kg N-Eq.]	9.91E-4	6.68E-5	1.54E-5	1.84E-6	1.93E-5	3.16E-5	-1.27E-5
EP-terrestrial	[mol N-Eq.]	1.08E-2	7.48E-4	1.85E-4	2.02E-5	2.13E-4	3.47E-4	-1.36E-4
POCP	[kg NMVOC-Eq.]	4.60E-3	1.32E-4	6.09E-5	5.54E-6	3.82E-5	9.56E-5	-3.64E-5
ADPE	[kg Sb-Eq.]	1.78E-7	3.59E-9	2.00E-9	9.09E-12	3.97E-10	1.54E-9	-5.74E-9
ADPF	[MJ]	3.57E+1	6.66E-1	3.82E-1	4.30E-3	1.88E-1	2.24E-1	-5.92E-1
WDP	[m ³ world-Eq deprived]	1.54E-1	4.47E-4	2.49E-2	5.94E-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 3

Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
PERE	[MJ]	2.26E+0	3.74E-2	7.55E-1	1.35E-5	5.92E-4	2.94E-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]	2.98E+0	3.74E-2	3.42E-2	1.35E-5	5.92E-4	2.94E-2	-1.30E-1
PENRE	[MJ]	3.14E+1	6.67E-1	4.27E-1	4.30E-3	1.88E-1	2.25E-1	-5.92E-1
PENRM	[MJ]	4.29E+0	0.00E+0	-8.66E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	[MJ]	3.57E+1	6.67E-1	3.40E-1	4.30E-3	1.88E-1	2.25E-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	[m ³]	8.75E-3	4.33E-5	6.34E-4	2.43E-8	1.06E-6	5.66E-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 3

Indicator	Unit	A1-A3	A4	A5	C1	C2	C4	D
HWD	[kg]	1.42E-5	3.10E-8	1.43E-7	4.17E-13	1.82E-11	3.42E-9	-2.36E-10
NHWD	[kg]	1.22E-1	1.02E-4	1.53E-2	4.40E-7	1.92E-5	1.13E+0	-2.74E-4
RWD	[kg]	6.36E-4	8.25E-7	7.64E-6	4.62E-9	2.02E-7	2.56E-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 3**

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 35 % 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, CO₂ is the most important contributor to Global Warming Potential (GWP). For the Acidification Potential (AP), NO_x and SO₂ 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 ratio 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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MVV TB

Ü-mark in accordance with 'Model Administrative Order laying down Technical Building Regulations' (MVV TB) no. C 2.1.4.5

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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