ARDEX G4 BASIC 1-6

Grout 1-6 mm

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

ARDEX G4 BASIC 1-6, Grout 1-6 mm

meets the criteria of the attached Model EPD

EPD-FEI-20160042-IBG1-EN for "Modified mineral mortars, group 2"

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

ARDEX Baustoff GmbH





Dr. Julia Soldat
Sustainability Manager

Michaela Mandic, MSc.
Product Manager

Appendix:

EPD with declaration number: **EPD-FEI-20160042-IBG1-EN**

ENVIRONMENTAL PRODUCT DECLARATION

as per ISO 14025 and EN 15804

Owner of the Declaration	FEICA - Association of the European Adhesive and Sealant Industry
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-FEI-20160042-IBG1-EN
ECO EPD Ref. No.	ECO-00000373
Issue date	23.05.2016
Valid to	22.05.2021

Modified mineral mortars, group 2

FEICA - Association of the European Adhesive and Sealant Industry

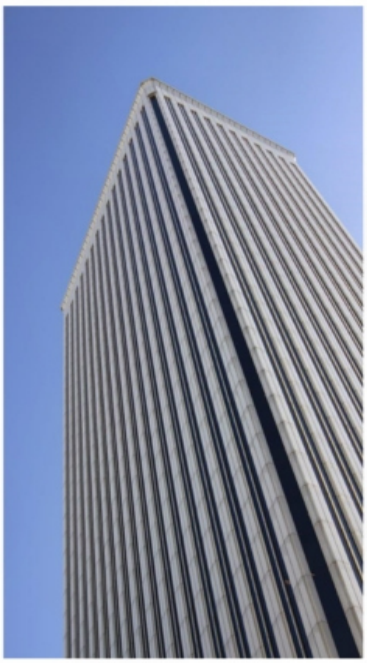
Institut Bauen und Umwelt e.V.

www.bau-umwelt.com / https://epd-online.com





ECO PLATFORM EPD EN 15804 VERIFIED







1. General Information

FEICA - Association of the European Adhesive and Sealant Industry

Programme holder
IBU - Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-FEI-20160042-IBG1-EN

This Declaration is based on the Product Category Rules:
Mineral factory-made mortar, 07.2014
(PCR tested and approved by the SVR)

Issue date
23.05.2016

Valid to
22.05.2021



Prof. Dr.-Ing. Horst J. Bossenmayer
(President of Institut Bauen und Umwelt e.V.)



Dr. Burkhart Lehmann
(Managing Director IBU)

Modified mineral mortars, group 2

Owner of the Declaration
FEICA - Association of the European Adhesive and Sealant Industry
Avenue E. van Nieuwenhuyse 4
1160 Brussels
Belgium

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

Scope:
This validated Declaration entitles the holder to bear the symbol of the *Institut Bauen und Umwelt e.V.* It exclusively applies for products produced in Europe and for a period of five years from the date of issue. This EPD may be used by FEICA members 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 FEICA secretariat. The members of FEICA are listed on its website.The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

Verification

The CEN Norm /EN 15804/ serves as the core PCR
Independent verification of the declaration according to /ISO 14025/
☐ internally ☒ externally



Mr Olivier Muller
(Independent verifier appointed by SVR)

2. Product

2.1 Product description

Modified mineral mortars are combinations of one or more inorganic binder, aggregates, water and if necessary additives. They comply with manifold, often specific, tasks 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).

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 for structural and non-structural repair which are used to restore the original condition of concrete structures and/or to replace defective concrete
1.2 Products for reinforcement corrosion protection
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 cementitious screed, floor levelling compounds, filler, flowing screed*
Products for manufacturing bonded screed, screeds on separating or insulating layers, for levelling and repairing usual building substrates such as rough, uneven concrete floors, cement, anhydrite and mastic asphalt screed, heated screed and ceramic coverings for indoor and outdoor applications
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 mortar 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 waterproofing slurries*
Products for providing cement-based waterproofing surfaces in structural and civil engineering. For use in new and old buildings as well as beneath tiles (mineral or flexible waterproofing slurries)
Module 8: *Modified mineral mortars as repair mortar*
Products for carrying out repairs (e.g. for repairing minor voids and holes) on horizontal and vertical areas

2.3 Technical Data

Construction products with Declaration of Performance in accordance with /CPR/
Module 1: *Modified mineral mortars as repair mortar for the protection and repair of concrete structures*
The minimum requirements according to /EN 1504/ apply. These are:
1.1
Products for structural and non-structural repair - Requirements on performance characteristics for all intended uses in accordance with /EN 1504-3/, Table 1:
- Compressive strength (/EN 12190/)
- Chloride ion content (/EN 1015-17/)
- Adhesive strength by pull off test (/EN 1542/)
- Restrained shrinkage/expansion (/EN 12617-4/)

1.2 Reinforcement corrosion protection products – Requirements on all intended uses in accordance with /EN 1504-7/, Table 1:
- Corrosion protection (/EN 15183/)

Other performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance
Module 2: *Adhesives based on modified mineral mortar*
2.1 The minimum requirements in accordance with /EN 12004/ apply. These are:
- Tensile adhesion strength after dry storage (/EN 1348/)
- Tensile adhesion strength after water immersion (/EN 1348/)
- Tensile adhesion strength after heat ageing (/EN 1348/
- Tensile adhesion strength after freeze/thaw cycles (/EN 1348/)
- Open time: Tensile strength (/EN 1346/)

Other performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance
2.2 Performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance; /ETAG 004/ apply.
Module 3: *Modified mineral mortars as joint fillers*
The minimum requirements of /EN 13888/ must be maintained.
Module 4: *Modified mineral mortars as cementitious screed, floor levelling compounds, filler, flowing screed:*
The minimum requirements of /EN 13813/ must be maintained. These are:
- Reaction to fire (/EN 13501-1/)
- Release of corrosive substances
- Compressive strength (/EN 13892-2/)
- Flexural strength (/EN 13892-2/)

Other performance 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

Other performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance
Module 5.2: The minimum requirements of /EN 13279/ apply.
Performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance
Module 6: *Modified mineral mortars as grouts*
Module 7: *Modified mineral mortar for waterproofing slurries*
The minimum requirements in accordance with /EN 14891/ apply.
Module 8: *Modified mineral mortars as repair mortar*
Performance characteristics in accordance with the manufacturer's technical documentation / declaration of performance

2.4 Placing on the market / Application rules

For the placing on the market in the EU/EFTA (with the exception of Switzerland) products falling under the Regulation (EU) No 305/2011 need a Declaration of Performance taking into consideration either the relevant harmonised European standard as cited in chapter 2.3 or the European Technical Assessment and the CE-marking.
For the application and use of the products the respective national provisions apply.

2.5 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 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).

2.6 Base materials / Ancillary materials

On average, the products covered by this EPD contain the following ranges of base materials and auxiliaries referred to:
Cement: ~ 15 - 98%
Filler materials: ~ 0 - 80%
Plaster: ~ 0 - 20%
Additives: ~ 0 - 10%
Dispersion powder: ~ 0 - 10%

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).
In individual cases, it is possible that substances on the list of materials of particularly high concern for inclusion in Annex XIV of the /REACH/ regulation are contained in concentrations exceeding 0.1%. If this is the case, this information can be found on the respective safety data sheet. Mortar for special

applications can also contain fungicides, whereby the functional group of fungicides is dependent on the chemical specification.

2.7 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.
Quality and environmental standards in accordance with /ISO 9001:2008-12/ and the provisions outlined in the relevant regulations such as the Industrial Safety Regulation and Federal Pollution Control Act are adhered to.

2.8 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 taking consideration of 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.

2.9 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.

2.10 Packaging

A detailed description of packaging is provided in section 2.5. Empty, trickle-free paper containers and clean PE foils can be recycled.

2.11 Condition of use

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.

2.12 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 used in accordance with the designated purpose of the respective products.
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 /AgBB/ test scheme or the /GEV/ (Gemeinschaft Emissionskontrollierte Verlegewerkstoffe, Klebstoffe und Bauprodukte e.V., Düsseldorf) /EMICODE/® marking system typically applied in Germany.

2.13 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.

2.14 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.

Water
No relevant volumes of water-soluble substances hazardous to water are washed out when exposed to water (e.g. flooding). Cement-based mortar is stable in terms of structure and is not subject to any changes in form when exposed to water and drying.

Mechanical destruction
The mechanical destruction of modified mineral mortars does not lead to any decomposition products which are harmful for the environment or health. Dust incurred during de-construction should be avoided by taking the appropriate measures (e.g. humidification).

2.15 Re-use phase
Components manufactured using modified mineral mortars can usually be easily demolished. When removing a building, the materials do not need to be treated as special waste; care should, however, be taken to ensure unmixed residual materials wherever possible. 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 re-using components comprising modified mineral mortar after decommissioning.

2.16 Disposal
The portion of a modified mineral mortar-based product applied at an other construction product is rather low. These low amounts do not play a role when the construction product is disposed. They do not interfere with the disposal/recycling of other components / building materials.
The following European Waste Codes waste (EWC) codes can apply:
Mineral mortar: /EWC 2000/532/EC 170101/ and /EWC 2000/532/EC 101314/
Mineral filler and levelling compound: /EWC 2000/532/EC 170107/
Calcium sulphate-based filler and levelling compound: /EWC 2000/532/EC 170802/

2.17 Further information
More information is available in the manufacturer's product or safety data sheets and is available on the manufacturer's Web sites or on request. Valuable technical information is also available on the associations' Web sites.

3. LCA: Calculation rules

3.1 Declared Unit
This EPD refers to the declared unit of 1 kg modified mineral mortar with a density of 800 - 1,700 kg/m³.
The results of the Life Cycle Assessment provided in this declaration have been calculated from the product with the highest environmental impact (worst-case scenario).
With the information about the consumption per surface area the results can be calculated into a declared unit of kg/m³.

Declared unit

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

3.2 System boundary
Modules A1-A3, A4, A5 and D are taken into consideration in the LCA:

- A1 Production of preliminary products
- A2 Transport to plant
- A3 Production incl. provision of energy, production of packaging as well as auxiliaries and consumables, waste treatment)
- A4 Transport to site
- A5 Installation (disposal of packaging & installation losses and emissions during installation)
- D Credits from incineration of packaging materials

The declaration is therefore from "cradle to gate - with options".

3.3 Estimates and assumptions
Where no specific /GaBi/ processes were available, the individual recipe ingredients of formulation were estimated on the basis of information provided by the manufacturer or literary sources.

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

3.5 Background data
Data from the /GaBi/ ts database was used as background data. Where no background data was available, it was complemented by manufacturer information and literary research.

3.6 Data quality
Representative products were applied for this EPD and the product in a group displaying the highest environmental impact was selected for calculating the LCA results. The datasets are less than 5 years old. Production data and packaging are based on details provided by the manufacturer. The formulation used for evaluation refers to a specific product.

3.7 Period under review
Representative formulations were accepted by FEICA Ltd and collected in 2011.

3.8 Allocation
No allocations were applied for production. A multiinput allocation with a credit for electricity and thermal energy was used for incineration of packaging materials. The credits achieved through packaging disposal are declared in Module D.

3.9 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to /EN 15804/ and the building context, respectively the product-specific characteristics of performance, are taken into account. In this case, 1 kg modified mineral mortar was selected as the declared unit. Depending on the application, a corresponding conversion factor such as the specific use per surface area must be taken into consideration.

4. LCA: Scenarios and additional technical information

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).

Transport to the building site (A4)

Name	Value	Unit
Litres of fuel	0.0016	l/100km
Transport distance	1000	km
Capacity utilisation (including empty runs)	85	%
Gross density of products transported	800 - 1700	kg/m^3
Capacity utilisation volume factor	1	-

Installation into the building (A5)

Name	Value	Unit
Water consumption	0.0003	m^3
Material loss	0.013	kg

5. LCA: Results

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE NOT DECLARED)

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	MND	MND	MND	MND	MND	MND	MND	MND	MND	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT: 1 kg modified mineral mortar, group 2

Parameter	Unit	A1-A3	A4	A5	D
Global warming potential	[kg CO_2-Eq.]	6.38E-1	4.82E-3	9.97E-2	-3.69E-2
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	5.14E-9	2.21E-14	3.60E-13	-1.21E-11
Acidification potential of land and water	[kg SO_2-Eq.]	2.03E-3	1.19E-5	1.24E-5	-5.84E-5
Eutrophication potential	[kg $(PO_4)^{3-}$-Eq.]	1.82E-4	2.75E-6	2.44E-6	-5.91E-6
Formation potential of tropospheric ozone photochemical oxidants	[kg ethene-Eq.]	1.92E-4	-3.33E-6	1.13E-6	-6.20E-6
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.06E-6	3.21E-10	1.09E-9	-6.27E-9
Abiotic depletion potential for fossil resources	[MJ]	7.09E+0	6.64E-2	2.20E-2	-5.06E-1

RESULTS OF THE LCA - RESOURCE USE: 1 kg modified mineral mortar, group 2

Parameter	Unit	A1-A3	A4	A5	D
Renewable primary energy as energy carrier	[MJ]	2.05E+0	-	-	-
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	-	-	-
Total use of renewable primary energy resources	[MJ]	2.05E+0	3.77E-3	3.16E-3	-8.34E-2
Non-renewable primary energy as energy carrier	[MJ]	6.80E+0	-	-	-
Non-renewable primary energy as material utilization	[MJ]	1.20E+0	-	-	-
Total use of non-renewable primary energy resources	[MJ]	8.00E+0	6.66E-2	2.56E-2	-6.19E-1
Use of secondary material	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	-	-	-	-

RESULTS OF THE LCA – OUTPUT FLOWS AND WASTE CATEGORIES: 1 kg modified mineral mortar, group 2

Parameter	Unit	A1-A3	A4	A5	D
Hazardous waste disposed	[kg]	-	-	-	-
Non-hazardous waste disposed	[kg]	-	-	-	-
Radioactive waste disposed	[kg]	-	-	-	-
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	1.29E-1	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	2.99E-1	0.00E+0

Not all of the used inventories for the calculation of the LCA support the methodological approach for the declaration of water and waste indicators. The material amounts, displayed with these inventories, contribute significantly to the production. The indicators Use of fresh water, Hazardous waste disposed, Non-hazardous waste disposed and Radioactive waste disposed are therefore not declared (decision of IBU advisory board 2013-01-07).

6. LCA: Interpretation

All 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 main driver. The majority of life cycle energy consumption takes place during the production phase (A1-A3). Besides the cement also the dispersion powder influences the results significantly, although this is only used up to 5%. 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. CO_2 is the most important contributor to Global Warming Potential (GWP). For the Acidification Potential (AP), NO_x and SO_2 contribute to the largest share.

Transportation to the construction site (A4) and the installation process (A5) make a negligible 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 paper and pallets.
In module A4, transport to construction site, values for Photochemical Ozone Creation Potential (POCP) are negative due to emission profile modelled for the selected transportation process and of the characterisation method used in CML 2001 for the calculation of the POCP. Transportation processes are responsible for the emission of NOx in the ground layer atmosphere. NO in particular can have an ozone depleting effect that is reflected in CML 2001 by assigning a negative characterisation factor to this substance. However, although these negative values may appear unusual, it should be considered that POCP is only one of the analysed environmental impact categories. All other potential impacts would increase with greater transportation distances, showing that transportation is a process leading to net environmental burdens. Furthermore, even for POCP, transportation processes needed for supply of materials and product distribution only have limited counterbalance effects on the overall LCA results. Energy credit from incineration of packaging material reported in module D show a negligible influence on the overall results.

7. Requisite evidence

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

Evidence pertaining to VOC emissions shall show
- either an attestation of compliance with,
- or documentation of test data that are required in,

any of the existing regulations or in any of the existing voluntary labelling programs for low-emitting products, as far as these
(1) include limits for the parameters TVOC, TSVOC, carcinogens, formaldehyde, acetaldehyde, LCI limits for individual substances (including but not limited to the European list of harmonized LCIs), and the R value;
(2) base their test methods on /CEN/TS 16516/ (or /EN 16516/, after the on-going revision of /CEN/TS 16516/);
(3) perform testing and apply the limits after 28 days storage in a ventilated test chamber, under the conditions specified in /CEN/TS 16516/; some regulations and programs also have limits after 3 days, on top of the 28 days limits;
(4) express the test results as air concentrations in the European Reference Room, as specified in /CEN/TS 16516/.

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

Relevant test results shall be produced either by an /ISO 17025/ accredited commercial test lab, or by a qualified internal test lab of the manufacturer.
Examples for the applied limits after 28 days of storage in a ventilated test chamber are:
- TVOC: 1000 µg/m³
- TSVOC: 100 µg/m³
- Each carcinogen: 1 µg/m³
- Formaldehyde: 100 µg/m³
- LCI: different per substance involved
- R value: 1 (meaning that, in total, 100% of the combined LCI values must not be exceeded).

Informative Annexes (2 tables):

Table 1 shows an overview of the most relevant regulations and specifications as of April 2015, as regards requirements after 3 days of storage in a ventilated test chamber.
Table 2 provides an overview of the most relevant regulations and specifications as of April 2015, as regards requirements after 28 days of storage in a ventilated test chamber. Some details may be missing in the table due to lack of space. Values given represent maximum values/limits.

	TVOC [µg/m³]	Sum of carcinogens. C1A,CA2 [µg/m³]	Formal-dehyde [µg/m³]	Acet-aldehyde [µg/m³]	Sum of Form- and Acet-aldehyde
German DIBt/AgBB regulation	10 000	10	-/-	-/-	-/-
draft Lithuanian regulation	10 000	10	-/-	-/-	-/-
EMICODE EC1	1 000	10	50	50	50 ppb
EMICODE EC1 *PLUS*	750	10	50	50	50 ppb

	TVOC [µg/m³]	TSVOC [µg/m³]	Each carcinogen C1A,CA2 [µg/m³]	Formaldehyde [µg/m³]	Acetaldehyde [µg/m³]	LCI	R value	Specials	Sum non-LCI & non-identified [µg/m³]
Belgian regulation	1000	100	1	100	200	Belgian list	1	Toluene 300 µg/m³	-/-
French regulations class A+	1000	-/-	-/-	10	200	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class A	1500	-/-	-/-	60	300	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class B	2000	-/-	-/-	120	400	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
French regulations class C	>2000	-/-	-/-	>120	>400	-/-	-/-	List of 8 VOCs, 4 CMR	-/-
German DIBt/AgBB regulation	1000	100	1	100	1200	German AgBB list	1	-/-	100
draft Lithuanian regulation	1000	100	1	product type specific	-/-	Lithua-nian list	1	-/-	-/-
EMICODE EC1	100	50	1	(after 3 days)	(after 3 days)	-/-	-/-	-/-	-/-
EMICODE EC1 *PLUS*	60	40	1	(after 3 days)	(after 3 days)	German AgBB list	1	-/-	40
Finnish M1, sealants	20	-/-	1	10	-/-	-/-	-/-	Ammonia, odour	-/-
Finnish M1, adhesives	200 µg/m²h	-/-	5 µg/m²h	50 µg/m²h	-/-	-/-	-/-	Ammonia, odour	-/-

LeachingMeasurement of leaching performance (eluate analysis) indicating the measurement process.

Leaching is only relevant for specific applications. In this case, information can be provided by the manufacturer.

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