KALK ®

– Build lasting culture

EPD

ENVIRONMENTAL PRODUCT DECLARATION
ISO 14025   EN 15804

Owner of the declaration	KALK A/S
Declaration number	001
Issue date	10. February 2020
Valid to	10. February 2025

![KALK® – Build lasting culture]

Owner of the declaration   KALK A/S
Bredeløkkevej 12
4660 Store Heddinge

Declared product
Dry mortals Rødvig Juramørtel Kh 100/400 and Rødvig Juramørtel KKh 20/80/475
with minimum 80 % hydraulic lime NHL 5

Production   KALK A/S
Bredeløkkevej 12
4660 Store Heddinge

Product use
The mortars are used to build brick walls and to render brick walls

Functional unit
1 kg of mortar products

Basis for calculation
This Environmental Product Declaration is developed in accordance with ISO 14025
and EN 15804:2012 + A1:2013

Comparability
EPDs of construction products may not be comparable, if they do not comply with the
requirements in EN 15804:2012 + A1:2013. EPD data may not be comparable, if the
datasets used are not developed in accordance with EN 15804:2012 + A1:2013.

Validity
This EPD is valid for 5 years from the date of issue.

Use
The intended use of an EPD is to communicate scientifically based environmental
information for construction products, for the purpose of assessing the environmental
performance at building level. EPD of construction products may not be comparable, if
they do not comply with EN 15804 and seen in a building context.

EPD type
☒ Cradle-to-gate

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Rasmus Jørgensen – KALK A/S

System boundaries
(X=included, MND=module not declared)

Product stage			Construction Installation stage		User stage							End of life stage				Beyond the system
Raw materials	Transport	Manufacturing	Transport	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	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Product information

Product description
The dry mortar products are premixed ready for use with only water addition required and are packed in bags after the mixing process. The 3 raw materials are all preproduced and shipped to KALK A/S before the mixing process.

MATERIAL	WEIGHT (%) OF DECLARED PRODUCT
Hydraulic lime NHL 5	12 – 22
Hydrated lime	O – 5
Sand	78 – 85

Representativeness
This declaration, including data collection and the results, represent 1 kg of the mortar products. Product specification data are based on average values from 2018.

Dangerous substances
The mortar products do not contain substances listed in the "candidate List of Substances of Very High Concern for authorisation:
http://echa.europe.eu/candidate-list-tabl

Essential characterictics (CE)
The mortars are covered by the scope of the harmonized standards EN 998-1 and EN 998-2. The DoP's (Declaration of Performance) and other useful product information can be found on www.kalk.dk

Examples of product illustrations:

LCA background

Declared unit

The LCI and LCIA results in this EPD relates to 1 kg of mortar

Name	Value	Unit
Declared unit	1	Kg
Conversion factor to tonnes	1000	

PCR

This EPD is developed according to the core rules for the product category of construction products in EN 15804:2012 + A1:2013 and the product specific PCR for hydraulic lime and hydrated lime.

The final mortars only contain high quality mineral components such as hydraulic lime, hydrated lime and sand. The company KALK A/S is not producing these processed 3 mentioned minerals but is purchasing the finished 3 raw materials and is only mixing the components in the right amount according the experience of KALK A/S.

System boundary

This EPD is based on a cradle-to-gate LCA (module A1-A3), in which 100 weight (%) has been accounted for. All relevant processes during A1-A3 of the mortar products raw materials have been accounted for, in which significant environmental impacts are taking place for the 3 raw materials and for the mixing process.

The general rules for the exclusion of inputs and outputs follows the requirements in EN 15804:2012 + A1:2013, 6.3.5, where the total of neglected input flows per module shall be a maximum of 5 % of energy usage and mass and 1 % of energy usage and mass for unit processes. All the 3 mineral raw materials and all the essential energy is included. The production process for these 3 raw materials and energy flows are included with very only small amounts not being included.

The allocation is made in accordance with provisions in EN 15804. Incoming energy and water, and in-house waste from the production, is allocated equally among all products through mass allocation. All processes from raw material extraction to product from the factory gate are included in the analysis (A1-A3).

System boundary

The system boundary of this EPD is described in each life cycle phase.
Product stage (A1-A3) includes:

A1 – Extraction and processing of the 3 raw materials
A2 – Transport to the production site
A3 – Mixing and packaging processes

The product stage comprises the acquisition of all raw materials, products and energy, transport to mixing and packaging site. The LCA results are declared in aggregated form for the product stage which means, that the sub-modules A1, A2 and A3 are declared as one module A1-A3.

Production (A1-A3)

Description of the mortar products based on hydraulic lime NHL 5 with addition of sand plus a smaller or no addition also a of hydrated lime.

Hydraulic lime

When compared to hydrated lime, natural hydraulic lime (NHL 5) is a young binder (less than 500 years old). Natural hydraulic lime is produced by burning argillaceous limestone in a kiln at only 800-900 °C.

NHL 5 shows a notable hybrid binder behavior meaning both hydraulic and aerial (CO_2). Mixed with water it forms hydration developing compression resistance. On the long term, NHL 5 also behaves like slaked lime, reacting with atmospheric CO_2 by carbonation, increasing its compression and flexural resistances.

NHL 5 by itself or mixed with hydrated lime is an extraordinary binder for renovation of old buildings and as a strong mortar for brick laying. NHL 5 is a quite rare product in the EU. There are only few producers of NHL 5 in the EU.

NHL 5 has a lower environmental impact than cement, and it is burned at much lower temperature than cement, therefore resulting in a smaller emission of CO_2.

The mortar products from KALK are premixed dry mortars based on NHL 5, hydrated lime and sand. When mixed with water, mortars are ready-to-use mortar for indoor and outdoor work.

Hydrated lime

During thousands of years, all over the planet – limestone is a very common rock – Lime Mortars have benefited of much research and developments and are as such not based on cement.

Hydrated lime is considered a very peculiar binder for many reasons. In terms of environmental contribution, the lifecycle of lime can be described as follows:

During the calcination phase, the limestone suffers decarbonation due to temperature, releasing CO_2 to the atmosphere. Lime oxide or Quicklime (CaO) is formed, accordingly to the chemical reaction: $CaCO_3 \rightarrow CaO + CO_2$.

Next phase is hydration of the Quicklime, following an exothermic reaction: $CaO + H_2O \rightarrow Ca(OH)_2$, also called hydrated lime.

During the hardening phase (carbonation), most of the previously released process CO_2 is absorbed again, accordingly to the reaction $Ca(OH)_2 + CO_2 \rightarrow CaCO_3 + H_2O$.

In module A1 the hydraulic lime, the hydrated lime and the sand is produced by sup-suppliers to KALK. The mortar company KALK is no producing the 3 raw materials but only mixing the 3 different mineral raw materials to high class mortars according to its own process experience.

In module A2 the raw materials are delivered by truck.

In module A3 the company KALK is mixing and packing the finish mortar products in paper bags.

The mortar product bags are placed on wooden pallets, which are part of a return system, because of this the pallets are reused and are excluded from the calculations.

All products of KALK are subjected to strict quality control prior to packing and shipping.

LCA results

Environmental impacts per kg mortar

Parameter	Unit	A1-A3: Mortars
GWP	[kg CO_2-eq.]	1,01E-01
ODP	[kg CFC11-eq.]	4,12E-10
AP	[kg SO_2-eq.]	2.04E-04
EP	[kg PO_4^{3-}-eq.]	1,06E-05
POCP	[kg ethene-eq.]	1,93E-05
ADPE	[kg Sb-eq.]	7,73E-08
ADPF	[MJ]	6,12E-01

GWP = Global warming potential; **ODP** = Ozone depletion potential; **AP** = Acidification potential of soil and water; **EP** = Eutrophication potential; **POCP** = Photochemical ozone creation potential; **ADPE** = Abiotic depletion potential for non fossil resources; **ADPF** = Abiotic depletion potential for fossil resources

Resource use per kg

Parameter	Unit	A1-A3: Mortars
PERE	[MJ]	7,02E-02
PERM	[MJ]	1,72E-01
PERT	[MJ]	2,82E-01
PENRE	[MJ]	5,92E-01
PENRM	[MJ]	0,00E-00
PENRT	[MJ]	5,92E-01
SM	[kg]	2,82E-02
RSF	[MJ]	0,00E-00
NRSF	[MJ]	1,02E-01
FW	[m^3]	1,04E-01

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

Waste categories and output flows per kg

Parameter	Unit	A1-A3: Mortars
HWD	[kg]	O
NHWD	[kg]	4,77E-O3
RWD	[kg]	O

CRU	[kg]	O
MFR	[kg]	O
MER	[kg]	O
EEE	[MJ]	O
EET	[MJ]	O

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

Additional information

Indoor air

The EPD does not give information on release of dangerous substances to indoor air because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Both hydrated lime and hydraulic lime is burned product and contains no organic components and are therefore not known to give any negative impacts to the indoor air climate.
Sand is a natural earth material also known not to give any negative impacts to the indoor air climate.

Soil and water

The EPD does not give information on release of dangerous substances to soil and water because the horizontal standards on measurement of release of regulated dangerous substances from construction products using harmonised test methods according to the provisions of the respective technical committees for European product standards are not available.

Both hydrated lime and hydraulic lime is burned product and contains no organic components or soluble dangerous elements. Mortars of these 2 binders are therefore not known to give any negative impacts to soil and ground water.
Sand is a natural earth product also known not to give any release to soil and ground water.

References

EN 15804:2012 + A1:2013
DS/EN 15804 + A1:2013 - "Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products"

EN 15942
DS/EN 15942:2011 – " Sustainability of construction works – Environmental product declarations – Communication format business-to-business"

ISO 14025
DS/EN ISO 14025:2010 – " Environmental labels and declarations – Type III environmental declarations – Principles and procedures"

ISO 14040
DS/EN ISO 14040:2008 – " Environmental management – Life cycle assessment – Principles and framework"

ISO 14044
DS/EN ISO 14044:2008 – " Environmental management – Life cycle assessment – Requirements and guidelines"

EN 16908:2017 *Cement and building lime - Environmental product declarations - Product Category Rules complementary to EN 15804.*