ENVIRONMENTAL PRODUCT DECLARATION

CEMENT MORTAR FOR TILE INSTALLATION

LATICRETE MORTAR REPORT
LATICRETE MANUFACTURED IN NORTH AMERICA

This Environmental Product Declaration, provided by LATICRETE International, contains a comprehensive environmental analysis of approximately 240 million kg of mortar produced in North America.

This is a company-specific EPD commissioned by LATICRETE with the goal of further leveraging the business value associated with transparent reporting of its products' environmental impacts.

Established in 1956, LATICRETE International, Inc. is recognized for its manufacture and marketing of green flooring and façade materials, used in a variety of residential, commercial, and industrial applications.

For more information visit: www.laticrete.com
One LATICRETE Park North
Bethany, CT 06524-3423, USA

CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION
UL.COM/EPD

ENVIRONMENTAL PRODUCT DECLARATION

NORTH AMERICAN CEMENT MORTAR FOR TILE INSTALLATION
AS DEFINED BY ANSI A118.1, ANSI A118.4, ANSI A118.11, AND ANSI A118.15

According to ISO 14025

This declaration is an environmental product declaration (EPD) in accordance with ISO 14025. EPDs rely on Life Cycle Assessment (LCA) to provide information on a number of environmental impacts of products over their life cycle. Exclusions: EPDs do not indicate that any environmental or social performance benchmarks are met, and there may be impacts that they do not encompass. LCAs do not typically address the site-specific environmental impacts of raw material extraction, nor are they meant to assess human health toxicity. EPDs can complement but cannot replace tools and certifications that are designed to address these impacts and/or set performance thresholds – e.g. Type 1 certifications, health assessments and declarations, environmental impact assessments, etc. Accuracy of Results: EPDs regularly rely on estimations of impacts, and the level of accuracy in estimation of effect differs for any particular product line and reported impact. Comparability: EPDs are not comparative assertions and are either not comparable or have limited comparability when they cover different life cycle stages, are based on different product category rules or are missing relevant environmental impacts. EPDs from different programs may not be comparable.

PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	LATICRETE
DECLARATION NUMBER	4787630163.103.1
DECLARED PRODUCT	Cement mortar for tile installation
REFERENCE PCR	IBU Part A & B for Mineral Factory-made Mortar, 07.2014, with UL addendum
DATE OF ISSUE	November 29, 2016
PERIOD OF VALIDITY	5 Years
CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
The PCR review was conducted by:	PCR Review Panel Independent Expert Committee (SRV)
This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories ☐ INTERNAL ☒ EXTERNAL	Wade Stout, UL Environment
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Thomas P. Gloria, Industrial Ecology Consultants

Product Definition

Product Description

Cement mortar for tile installation is a blend of cement, very finely graded sand, and water retention compounds that allow the cement to properly hydrate. Its primary function is to adhere tile to a substrate, and it may contain polymers or other additives to improve adhesion, accommodate movement, and add strength.

Although there are many ways cement mortar can be used to install tile, most commonly today this is achieved by applying the cement mortar with a notched trowel to a pre-fixed substrate, pressing tiles into the mortar, and allowing the system to cure for a specified amount of time. The following are the most common classifications of cement mortar products used in this way:

– Dry-set cement mortar, defined per ANSI A118.1
– Modified dry-set cement mortar, defined per ANSI A118.4 and ANSI A118.11
– Improved modified dry-set cement mortar, defined per ANSI A118.15

Additionally, a variety of cement mortars for tile installation may be classified by ISO 13007-1 – Terms, Definitions and Specifications for Ceramic Tile Grouts and Adhesives.

Performance criteria for each of the above classifications of cement mortar for tile installation, including set time and open time, shear strength to various types of tiles, floor test performance, and sag resistance, are established by their respective standards.

As is the case with tile, cement mortar is capable of withstanding a wide range of environmental stresses. Once cured, it is durable, fire- and heat-resistant, non-combustible, non-sensitive to moisture, and maintenance-free.

Range of Applications

Mortar products are commonly used in interior, exterior, commercial, institutional, and residential tile installations.

Product Standards

The products considered in this EPD meet or exceed the following Technical Specifications:

– ANSI A118.1 – American National Standard Specifications for Dry-Set Cement Mortar
– ANSI A118.4/11 – American National Standard Specifications for Modified Dry-Set Cement Mortar
– ANSI A118.15 – American National Standard Specifications for Improved Modified Dry-Set Cement Mortar
– ISO 13007-1 – Terms, Definitions and Specifications for Ceramic Tile Grouts and Adhesives.

Fire performance: cement mortar is non-flammable and non-combustible.

No environmental burdens are expected for unforeseen flooding or mechanical destruction.

Information on leaching performance: No industry-wide data available as this EPD represents a broad range of cement mortar products.

Product Characteristics

Table 1: Construction data of cement mortar included in this EPD

	Value	Unit
Compressive strength	Industry-Wide Data Not Available*	
Adhesive shear strength	See ANSI A118.1, ANSI A118.4, and ANSI A118.15**	
Water absorption	Industry-Wide Data Not Available*	
Water vapor diffusion equivalent air layer thickness	Industry-Wide Data Not Available*	
Thermal conductivity	Industry-Wide Data Not Available*	
Tensile bond strength	See ISO 13007**	
Flexural strength	See ISO 13007**	

*Industry-wide data are not available as this property is not relevant and/or not standardized for cement mortar for tile installation. Consult with manufacturers and/or reference product-specific EPDs for additional information.

**This product specific EPD represents a broad range of cement mortar products. Shear strength, flexural strength, and tensile bond strength can vary depending on the type of tile, substrate, the mortar itself, and its intended application. Consult with manufacturers and/or reference product-specific EPDs for additional information. For industry-wide construction data on these properties, reference product standards.

Material Content

Table 2: Average material content of the mortar included in this EPD

Material	Mass [kg]
Mortar	
Sand	0.56
Calcium carbonate	0.045
Grey cement	0.18
White cement	0.12
E/VA	0.038
Admixture	0.040
Cellulose ether	0.0033
Other additives	0.014
Packaging	
Composite plastic and paper film	0
Corrugate	0
Paper	7.12E-05
Plastic film	5.39E-04
Wooden pallets	1.41E-04
Installation solution*	
Acrylate	0.017
Tap Water	0.15

*Installation solution concentration based on manufacturer recommendations

Mortar Production

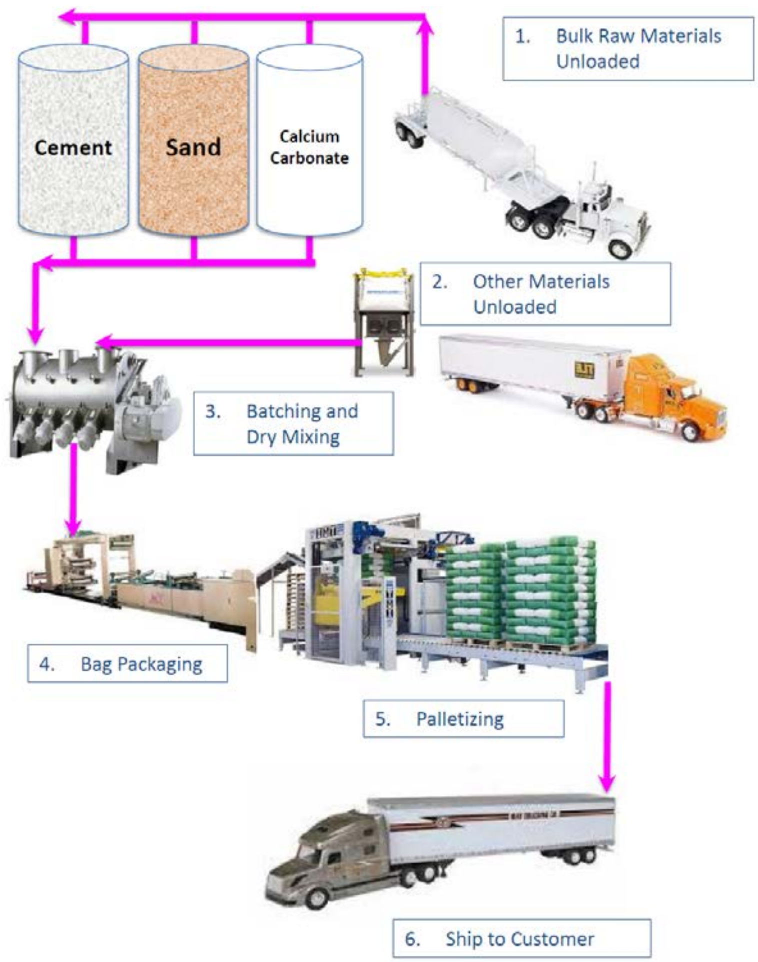

Figure 1: Process flow diagram for cement mortar (for tile installation) manufacturing

Raw materials, including cement, sand, calcium carbonate and other modifiers are unloaded and temporarily stored. When needed for production, materials are retrieved from storage, placed into specific batches based on formulation, dry-mixed, and then placed into packaging (usually bags). Packaged materials are then palletized, subjected to quality assurance inspections, placed into warehouse storage, and finally shipped to customer warehouse or job site. LATICRETE is governed by federal and local requirements for dust control.

Production Waste

The vast majority of scrap and waste is recycled back into the product. Dust emissions during the mixing of the mortar are collected through a dust collection system and recycled back into the production line.

LATICRETE offers varieties of products with pre- and post-consumer recycled content. This can contribute to overall building recycled content and help achieve compliance with recycled content targets in green building projects.

Additionally, high levels of responsibly recovered waste, including dust and powder, are commonly reincorporated into mortar manufacturing. Waste reclamation in such processes is a vital component to minimizing waste and maximizing resources. Reducing waste to zero and fully utilizing all inputs is paramount to efficient manufacturing.

Delivery and Installation of the Mortar

Delivery Status

For purposes of this study, the average transport distance from manufacturing to construction site was assumed to be 500 miles (805 km) by truck. The cementitious mortar included in this study is packaged in units of 50 lbs (22.7 kg).

Installation

Cement mortar for tile installation is primarily installed by hand, with potential limited use of machines to mix the mortar prior to application. Due to its material composition, mortar is typically quite alkaline and, as such, eye and skin contact should be avoided, especially for prolonged periods. In addition, precautions should be taken to reduce dust emissions and inhalation during installation. The installation safety instructions of a given mortar product should be followed during application. During installation, mortar is applied at approximately 0.833 lb. / $ft.^2$ (4.07 kg / m^2) with around 4.5% of the total material lost as waste. Though some of this waste could be recycled, this scrap is modeled as being disposed of in a landfill.

Packaging

Primary packaging is plastic bag, with secondary/tertiary packaging of shrink film and pallets. Packaging is assumed to be sent to landfill after installation. Landfill emissions from packaging are allocated to installation, while electricity generated from landfill gas (produced from the decomposition of bio-based packaging) is credited to the installation phase of the life cycle.

Use stage

The service life of mortar is unique in that does not depend on the amount of floor traffic and the type and frequency of maintenance. The service life of mortar is expected to be equivalent to the service life of ceramic tile as the majority of tile installations keep the original grout throughout their lifespan. Ceramic tile service life is, in turn, assumed to be equivalent to the service life of the building in which the products are installed (TCNA, 2014). A building's Reference Service Life (RSL) is typically assumed to be 60 years. Since mortar is expected to last at least as long as the building itself, the product will also have an RSL of 60 years.

The EPD must present results for the full 60 year RSL of the product, including the use stage impacts associated with that service life. Other scenarios such as the impacts for a 1-year service life or per m^2 of installed tile that are also of interest are included in the appendix.

Cleaning and Maintenance

Tile products should be cleaned routinely with tap water. However, as the mortar is completely covered by the installed tile and grout, it thus does not require cleaning or maintenance over its lifetime. As such, no cleaning or maintenance was modeled for mortar.

Prevention of Structural Damage

Interior floor covering should not be installed until any and all structural damage to the building has been adequately repaired and determined to be code compliant. Surfaces must be structurally sound, stable, and rigid enough to support the mortar, grout, and tile, in addition to any other ancillary tile installation products.

Health Aspects during Usage

Inherently, cement mortars do not emit VOCs. For polymer-modified cement mortars, the South Coast Air Quality Management District (SCAQMD) Rule #1168 details VOC thresholds that are most commonly specified. Cement mortars for tile installation are in compliance. Additionally, some products covered by this EPD have been engineered to minimize airborne dust or other job-site particulates. Some cement mortar for tile installation also has built-in mold and mildew protection to complement tile's inherent resistance to mold and mildew growth.

End of Life

As mortar is bound to the tile during application, it is typically disposed with the tile and as such, can be used in multiple applications—for example, clean fill material in land reclamation/contouring projects, base or substrate material for roadways and/or parking lots, replacement for raw materials used in cement or brick kilns, etc.

However, for purposes of this EPD, the analysis adopts the most conservative approach and assumes that 100% of all tile removal waste is disposed of in a landfill.

Life Cycle Assessment

A full life cycle assessment (LCA) was carried out according to ISO 14025 (ISO, 2011), ISO 14040 (ISO, 2009), and ISO 14044 (ISO, 2006), per the Product Category Rules (PCR) for Mineral Factory-made Mortar, as published by Institut Bauen und Umwelt e.V. (IBU, 2014), and the addendum as published by UL Environment (UL, 2016).

Declared Unit Description

The declaration refers to the declared unit of 1 kg of product.

Table 3: Declared Unit

	Value	Unit
Declared unit	1	kg
Gross density	1282	kg/m^3
Conversion factor to 1 kg	1	–
Application rate	4.07	kg/m^2

System Boundaries

The chosen system boundary for this study is cradle to gate with options and the life cycle stages considered are summarized in Table 4.

Table 4: Life cycle modules included in EPD

Production			Installation		Use stage							End-of-Life				Next product system
Raw material supply	Transport to manufacturer	Manufacturing	Transport to building site	Installation into building	Use / application	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction / demolition	Transport to end-of-life	Waste processing for reuse, recovery or recycling	Disposal	Reuse, recovery or 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	X	MND	MND	MND	MND	MND	MND	X	MND	X	MND

X = declared module; MND = module not declared

Cut-off Criteria

No cut-off criteria were applied in this study. All reported data were incorporated and modeled using best available life cycle inventory (LCI) data.

Background Data

For life cycle modeling of the considered products, the GaBi ts Software System for Life Cycle Engineering (thinkstep, 2016), developed by thinkstep AG, was used to model the product systems considered in this assessment. All relevant background datasets were sourced from the GaBi 2016 database. The datasets from the GaBi database are documented in the online documentation (thinkstep, 2016).

Data Quality

A variety of tests and checks were performed throughout the project to ensure high quality of the completed LCA. Checks included an extensive review of project-specific LCA models, as well as the background data used.

Temporal Coverage

Primary data collected from LATICRETE represent a consecutive 12 month averages from July 2014 to July 2015. Background datasets are primarily based on data from the last 5 years (since 2011), with the exception of cement, which dates from 2004.

Technological Coverage

Data on material composition and manufacturing are primary data from LATICRETE. The raw material inputs, energy, waste, and emissions in the calculation for this LCA are based on annual purchases divided by annual production during the reference year.

Geographical Coverage

This background LCA represents LATICRETE products produced in Mexico and the United States.

Manufacturing energy representative for each country was included; proxy datasets were used as needed for raw material inputs to address lack of data for a specific material or for a specific geographical region. These proxy datasets were chosen for their technological representativeness of the actual materials.

Allocation

Co-Product Allocation

No co-product allocation occurs in the product system.

Multi-Input Processes Allocation

No multi-input allocation occurs in the product system.

Reuse, Recycling, and Recovery Allocation

The cut-off allocation approach is adopted in the case of any post-consumer recycled content, which is assumed to enter the system burden-free. Only environmental impacts from the point of recovery and forward (e.g., collection, sorting, processing, etc.) are considered.

Product and packaging waste are modeled as being disposed in a landfill rather than incinerated or recycled. Plastic and other construction waste is assumed to be inert in landfills so no system expansion or allocation is necessary as landfill gas is not produced. In the case of landfill gas generated by the decay of bio-based packaging after installation, credit is given for capture or utilization of the landfill gas.

Scenarios and Additional Technical Information

Information relevant to the life cycle modules included in this study are summarized in the following tables.

Table 5: Transport of 1 kg of mortar to the building site (A4)

Name	Value	Unit
Liters of fuel	0.0024*	L / (100 km.kg)
Transport distance	805	km
Capacity utilization (including empty runs)	78	%

*Equivalent to a fuel consumption of 38.8 L / 100 km or a fuel economy of 6.0 mpg

Table 6: Installation of 1 kg of mortar at the building site (A5)

Name	Value	Unit
Polymer (acrylate)	0.0174	kg
Water consumption	1.51E-04	m^3
Material loss (to landfill)	0.0455	kg
Dust in the air	unknown	kg

Table 7: Maintenance of 1 kg of mortar (B2)

Name	Value	Unit
Information on maintenance	None required	–

Table 8: Reference service life

Name	Value	Unit
Reference service life	60	a

Table 9: End of life (C1-C4)

Name	Value	Unit
Collected as mixed construction waste	1	kg
Landfilling	1	kg

Life Cycle Assessment – Results and Analysis

Results

Results for one kg installed mortar over the service life of 60 years are presented below. Results for the mortar required in 1 m^2 installed tile, as well as the impacts of a one year service life, are included in the appendix.

ENVIRONMENTAL IMPACTS

CML 2001 (Apr 2015)

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
GWP	kg CO_2 eq	6.83E-01	6.18E-02	8.11E-02	-	2.43E-03	4.48E-02
ODP	kg CFC-11 eq	1.24E-09	5.09E-13	1.90E-12	-	2.00E-14	8.58E-13
AP	kg SO_2 eq	2.92E-03	2.29E-04	1.45E-04	-	9.02E-06	1.94E-04
EP	kg PO_4^3 eq	2.27E-04	5.90E-05	2.30E-05	-	2.33E-06	2.48E-05
POCP	kg C_2H_4 eq	2.16E-04	2.73E-05	2.15E-05	-	1.07E-06	1.97E-05
ADPE	kg Sb eq	8.35E-07	9.25E-09	1.24E-07	-	3.64E-10	1.72E-08
ADPF	MJ	6.96E+00	8.68E-01	1.76E+00	-	3.42E-02	6.77E-01

TRACI 2.1

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
GWP	kg CO_2 eq	6.83E-01	6.18E-02	8.11E-02	-	2.43E-03	4.48E-02
ODP	kg CFC-11 eq	1.58E-09	5.41E-13	2.02E-12	-	2.13E-14	9.12E-13
AP	kg SO_2 eq	2.90E-03	3.00E-04	1.53E-04	-	1.18E-05	2.09E-04
EP	kg N eq	9.36E-05	2.79E-05	2.01E-05	-	1.10E-06	1.16E-05
SFP	kg O_3 eq	3.96E-02	9.54E-03	2.35E-03	-	3.76E-04	4.06E-03

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; SFP = Smog formation potential

RESOURCE USE

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
PERE	[MJ]	4.70E-01	1.44E-02	6.05E-02	-	5.69E-04	4.40E-02
PERM	[MJ]	-	-	-	-	-	-
PERT	[MJ]	4.70E-01	1.44E-02	6.05E-02	-	5.69E-04	4.40E-02
PENRE	[MJ]	7.45E+00	8.73E-01	1.82E+00	-	3.44E-02	6.95E-01
PENRM	[MJ]	-	-	-	-	-	-
PENRT	[MJ]	7.45E+00	8.73E-01	1.82E+00	-	3.44E-02	6.95E-01
SM	[kg]	4.02E-02	-	-	-	-	-
RSF	[MJ]	1.15E-06	-	1.87E-05	-	-	-
NRSF	[MJ]	1.06E-06	-	2.08E-04	-	-	-
FW	[m³]	1.76E-03	1.77E-04	4.75E-04	-	6.97E-06	1.07E-04

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

OUTPUT FLOWS AND WASTE CATEGORIES

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
HWD	[kg]	1.31E-07	1.11E-09	2.87E-07	-	4.37E-11	1.33E-09
NHWD	[kg]	1.69E-03	3.07E-05	5.04E-02	-	1.21E-06	1.00E+00
RWD	[kg]	1.52E-04	1.84E-06	2.27E-05	-	7.23E-08	7.07E-06
CRU	[kg]	-	-	-	-	-	-
MFR	[kg]	-	-	-	-	-	-
MER	[kg]	-	-	-	-	-	-
EEE	[MJ]	-	-	-	-	-	-
EET	[MJ]	-	-	-	-	-	-

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

Interpretation

Both the CML 2001 (Apr. 2013) and TRACI 2.1 methodologies find that the production of raw materials and the energy for manufacturing mortar are the two largest contributors in all impact categories considered. The upstream burdens in particular are driven by the cement required for the production of mortar. The installation of mortar is also a small but relevant contributor to Abiotic Depletion and Eutrophication Potential, especially in the TRACI methodology. As raw material production and manufacturing is such a large contributor to impacts in both impact assessment methods, the formulation of mortar would be the most effective area to focus burden reduction efforts.

These results do not constitute a comparative assertion, though architects and builders will be able to use them to compare LATICRETE's products with similar products presented in other EPDs that follow the same PCR.

References

IBU. (2014). Product Category Rule Guidance - Texts for building-related products and services: Part B: Requirements on the EPD for Mineral Factory-made Mortar. Institut Bauen und Umwelt e.V.

ISO. (2006). ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines.

ISO. (2009). ISO 14040: Environmental management - Life cycle assessment - principles and frameworks.

ISO. (2011). ISO 14025: Environmental labels and declarations - Type III environmental declarations - principles and procedures.

thinkstep. (2016). *GaBi LCA Database Documentation*. Retrieved from thinkstep AG: http://www.gabi-software.com/international/databases/gabi-databases/

thinkstep. (2016). GaBi ts: Software system and database for life cycle engineering. Stuttgart, Echterdingen, Germany.

UL. (2016, April). Product Category Rules for preparing an environmental product declaration (EPD) for PCR: IBU Product Category Rules Part B: Requirements on the EPD for Mineral factory-made mortar.

Appendix – Additional Results

The following two sections tabulate environmental impacts of grout use under two additional metrics.

Results for 1 m² of installed mortar over a 60 year service life

The impacts of the life cycle of 1 m² of installed mortar over a 60 year service life are presented here.

ENVIRONMENTAL IMPACTS

CML 2001 (Apr 2015)

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
GWP	kg CO_2 eq	2.78E+00	2.52E-01	3.30E-01	-	9.91E-03	1.82E-01
ODP	kg CFC-11 eq	5.05E-09	2.07E-12	7.74E-12	-	8.15E-14	3.49E-12
AP	kg SO_2 eq	1.19E-02	9.32E-04	5.90E-04	-	3.67E-05	7.90E-04
EP	kg PO_4^3 eq	9.25E-04	2.40E-04	9.34E-05	-	9.46E-06	1.01E-04
POCP	kg C_2H_4 eq	8.80E-04	1.11E-04	8.76E-05	-	4.37E-06	8.01E-05
ADPE	kg Sb eq	3.40E-06	3.76E-08	5.06E-07	-	1.48E-09	6.99E-08
ADPF	MJ	2.83E+01	3.53E+00	7.16E+00	-	1.39E-01	2.76E+00

TRACI 2.1

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
GWP	kg CO_2 eq	2.78E+00	2.52E-01	3.30E-01	-	9.91E-03	1.82E-01
ODP	kg CFC-11 eq	6.43E-09	2.20E-12	8.23E-12	-	8.67E-14	3.71E-12
AP	kg SO_2 eq	1.18E-02	1.22E-03	6.22E-04	-	4.81E-05	8.50E-04
EP	kg N eq	3.81E-04	1.14E-04	8.17E-05	-	4.47E-06	4.73E-05
SP	kg O_3 eq	1.61E-01	3.88E-02	9.58E-03	-	1.53E-03	1.65E-02

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; SFP = Smog formation potential

RESOURCE USE

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
PERE	[MJ]	1.91E+00	5.88E-02	2.46E-01	-	2.31E-03	1.79E-01
PERM	[MJ]	-	-	-	-	-	-
PERT	[MJ]	1.91E+00	5.88E-02	2.46E-01	-	2.31E-03	1.79E-01
PENRE	[MJ]	3.03E+01	3.55E+00	7.40E+00	-	1.40E-01	2.83E+00
PENRM	[MJ]	-	-	-	-	-	-
PENRT	[MJ]	3.03E+01	3.55E+00	7.40E+00	-	1.40E-01	2.83E+00
SM	[kg]	1.64E-01	-	-	-	-	-
RSF	[MJ]	4.68E-06	-	7.62E-05	-	-	-
NRSF	[MJ]	4.32E-06	-	8.46E-04	-	-	-
FW	[m³]	7.17E-03	7.20E-04	1.93E-03	-	2.84E-05	4.36E-04

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

OUTPUT FLOWS AND WASTE CATEGORIES

Parameter	Unit	A1-A3	A4	A5	B2	C2	C4
HWD	[kg]	5.31E-07	4.51E-09	1.17E-06	-	1.78E-10	5.42E-09
NHWD	[kg]	6.87E-03	1.25E-04	2.05E-01	-	4.92E-06	4.08E+00
RWD	[kg]	6.19E-04	7.48E-06	9.23E-05	-	2.94E-07	2.88E-05
CRU	[kg]	-	-	-	-	-	-
MFR	[kg]	-	-	-	-	-	-
MER	[kg]	-	-	-	-	-	-
EEE	[MJ]	-	-	-	-	-	-
EET	[MJ]	-	-	-	-	-	-

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 for 1 kg of installed mortar over a 1 year service life

As mortar requires no maintenance over its service life, the impacts of the life cycle of 1 kg of installed mortar over a 1 year service life are equal to the impacts of 1 kg of installed mortar over a 60 year service life, as presented in the body of this EPD.

Contact Information

Study Commissioner

LATICRETE International
One LATICRETE Park North
Bethany, CT 06524-3423, USA
www.laticrete.com

LCA Practitioner

thinkstep, Inc.
+1 (617) 247-4477
info@thinkstep.com
http://www.thinkstep.com