



**GENERAL INFORMATION**

This cradle to gate Environmental Product Declaration covers three cement products produced at the Mason City, IA Cement Plant. The Life Cycle Assessment (LCA) was prepared in conformity with ISO 21930, ISO 14025, ISO 14040, and ISO 14044. This EPD is intended for business-to-business (B-to-B) audiences.

**Heidelberg Materials**

Mason City Cement Plant and Terminal  
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Mason City, IA 50401



**PROGRAM OPERATOR**

National Ready Mixed  
Concrete Association  
900 Spring Street  
Silver Spring, MD 20910  
<https://www.nrmca.org/>

NRMCAEPD: 20063

**DATE OF ISSUE**

July 22, 2022 (valid for 5 years until July 21, 2027)

	Cement Products		
	Type II L	Type I	Type III
<b>Environmental Impacts</b>			
<b>Mason City Plant:</b> Product-Specific Type III EPD			
<b>Declared Cement Products (three):</b> Type II L; Type I; Type III			
<b>Declared Unit:</b> One metric tonne of cement			
<b>Global Warming Potential</b> (kg CO <sub>2</sub> -eq)			
	<b>687</b>	<b>735</b>	<b>727</b>
<b>Ozone Depletion Potential</b> (kg CFC-11-eq)	2.05E-05	2.17E-05	2.15E-05
<b>Eutrophication Potential</b> (kg N-eq)	1.31	1.38	1.37
<b>Acidification Potential</b> (kg SO <sub>2</sub> -eq)	1.83	1.95	1.93
<b>Photochemical Ozone Creation Potential</b> (kg O <sub>3</sub> -eq)	29.8	31.7	31.3
<b>Abiotic Depletion, nonfossil</b> (kg Sb-eq)	2.05E-04	2.14E-04	2.12E-04
<b>Abiotic Depletion, fossil</b> (MJ)	604	643	636
<b>Product Components:</b>			
<b>Clinker</b>	84.6%	91.3%	90.9%
<b>Limestone, Gypsum and Others</b>	15.4%	8.7%	9.1%

Additional detail and impacts are reported on page 5

ISO 21930:2017 Sustainability in Building Construction-Environmental Declaration of Building Products: serves as the core PCR  
NSF PCR for Portland, Blended, Masonry, Mortar, and Plastic (Stucco) Cements V3.2: serves as the sub-category PCR

**Sub-category PCR review was conducted by**

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**Independent verification of the declaration**, according to ISO 21930:2017 and ISO 14025:2006.:  internal  external

**Third party verifier** • Jack Geibig • EcoForm Consulting

**For additional explanatory material**

Manufacture Representative: Jeff Hook ([Jeff.Hook@HeidelbergMaterials.com](mailto:Jeff.Hook@HeidelbergMaterials.com))  
This EPD was prepared using the pre-verified GCCA Tool by: Athena Sustainable Materials Institute

EPDs are comparable only if they comply with ISO 21930 (2017), use the same, sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

# LIFE CYCLE ASSESSMENT

## PRODUCER



Heidelberg Materials is among the leading producers of cement and cementitious materials with plants in the U.S. and Canada. Heidelberg Materials plant in Mason City, Iowa, began operations in 1911. The Mason City area was selected because of the availability of raw materials, including a large deposit of limestone and deposits of glacial till and blue clay. Since its early days of operation, the plant has undergone many expansions and rehabilitations with the last major one in 1976. The plant has continued to upgrade its equipment to mitigate its environmental impacts through the installation of a scrubber, SNCR system to control NOx emissions, and a CEMS monitoring system for stack emissions.

The onsite truck and rail terminal assists cement distribution, reaching markets in Iowa, Minnesota, Wisconsin, and North Dakota. The Heidelberg Materials plant in Mason City plays a critical role in North Central Iowa and Southern Minnesota concrete paving markets since counties recognize the beneficial life cycle offered by concrete overlays and new roadways. EcoCem®PLC (Type IL) is the main cement being produced due to its reduction in embodied carbon for concrete. This product, along with the continuous focus on quality and alternative fuels (e.g., expired seed corn), demonstrates Heidelberg Materials commitment to more sustainable construction and environmental responsibility.

In addition, the Mason City plant team places a high priority on the safety of its employees, visitors, and surrounding community. The Mason City team is active in the local community and supports local recreation leagues and charitable organizations.

## PRODUCT

The cement products covered in this EPD meet UN CPC 3744 classification and the following standards:

Product Type	Applicable Standard	Standard Designation
Portland Limestone Cement (EcoCem®PLC)	ASTM C595, AASHTO M240	Type IL
Portland Cement	ASTM C150, AASHTO M85	Type I
Portland Cement	ASTM C150, AASHTO M85	Type III

## PRODUCT DESCRIPTION

This EPD reports environmental transparency information for three cement products, produced by Heidelberg Materials at the Mason City, IA facility. These cements are hydraulic binders and are manufactured by grinding cement clinker and other main or minor constituents into a finely ground, usually grey colored mineral powder. Cement is just one ingredient in the mixture that creates concrete, but it is the most chemically active ingredient and crucial to the quality of the final product. When mixed with water, cement acts as a glue to bind together the sand, gravel, or crushed stone to form concrete, one of the most durable, resilient, and widely used construction materials in the world. Our Type II is branded as **EcoCemPLC™** and was developed to be more environmentally friendly by reducing its carbon footprint (reduction measured through GWP). This product is a general use product for concrete and mortar as well as all the other various applications for cement, including engineered soils and solidification/stabilization of materials and wastes.



## DECLARED UNIT

The declared unit is one metric tonne of Type II, Type I and Type III cement.

## SYSTEM BOUNDARY

Production Stage			Construction Stage		Use Stage							End Of Life Stage			
Extraction And Upstream Production	Transport To Factory	Manufacturing	Transport To Factory	Installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction / Demolition	Transport	Waste Processing	Disposal Of Waste
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

Note: MND = module not declared; X = module included.

This EPD is a cradle-to-gate EPD covering A1-A3 stages of the life cycle.

Items excluded from system boundary include:

- production, manufacture, and construction of manufacturing capital goods and infrastructure;
- production and manufacture of production equipment, delivery vehicles, and laboratory equipment;
- personnel-related activities (travel, furniture, and office supplies); and
- energy and water use related to company management and sales activities that may be located either within the factory site or at another location.

## **CUT-OFF CRITERIA**

The cut-off criteria as per NSF PCR, Section 7.1.8, and ISO 21930, 7.1.8 were followed. All input/output data required were collected and included in the LCI modelling. No substances with hazardous and toxic properties that pose a concern for human health and/or the environment were identified in the framework of this EPD.

## **DATA COLLECTION AND SOURCES**

Gate-to-gate input/output flow data were collected for the following processes for the reference year 2020: Limestone quarry, clinker production and cement manufacture – Mason City, IA

All applicable North American background LCI data are publicly available in the GCCA LCA Database [4] - <https://demo.gcca.quantis.solutions/>.

## **ALLOCATION PROCEDURE**

Allocation follows the requirements and guidance of ISO 14044:2006, Clause 4.3.4; NSF PCR:2020; and ISO 21930:2017 section 7.2. Recycling and recycled content is modeled using the cut-off rule [5].

This sub-category PCR recognizes fly ash, silica fume, granulated blast furnace slag, cement kiln dust, flue gas desulfurization (FGD) gypsum, and post-consumer gypsum as recovered materials and thus the environmental impacts allocated to these materials are limited to the treatment and transportation required to use as a cement material input.

## **REFERENCES**

1. ASTM C150 / C150M – 20 Standard Specification for Portland Cement.
2. ASTM C595 / C595M – 21 Standard Specification for Blended Hydraulic Cements
3. Global Cement and Concrete Association (GCCA) 2021. N.A. version of Industry EPD tool for Cement and Concrete – v3.1. <https://concrete-epd-tool.org/>
4. Global Cement and Concrete Association (GCCA) 2021. LCA Database, North American version – v3.1, Prepared by Quantis. <https://demo.gcca.quantis.solutions/>
5. Global Cement and Concrete Association (GCCA) 2021. LCA Model, North American version – v3.1, Prepared by Quantis <https://demo.gcca.quantis.solutions/>
6. ISO 21930:2017 Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services
7. ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
8. ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
9. NSF 2020: PCR for Portland, Blended, Masonry, Mortar and Plastic (Stucco) Cements v3.2, September 2021
10. USLCI: 2015 The U.S. Life Cycle Inventory Database
11. WBCSD CSI 2013: CO2 and Energy Protocol Version 3.1 of 9 December 2013; <https://www.cement-co2-protocol.org/en/>
12. WCI: 2010 WCI, Final Essential Requirements of Mandatory Reporting

## LIFE CYCLE IMPACT ASSESSMENT RESULTS – Mason City Cement Products: Type II named EcoCem® PLC, Type I and Type III; per 1 metric tonne

Impact Assessment	Unit	GUL (Type II)	GU (Type I)	HE (Type III)
Global warming potential (GWP) <sup>1</sup>	kg CO <sub>2</sub> eq	687	735	727
Depletion potential of the stratospheric ozone layer (ODP)	kg CFC-11 eq	2.05E-05	2.17E-05	2.15E-05
Eutrophication potential (EP)	kg N eq	1.31	1.38	1.37
Acidification potential of soil and water sources (AP)	kg SO <sub>2</sub> eq	1.83	1.95	1.93
Formation potential of tropospheric ozone (POCP)	kg O <sub>3</sub> eq	29.8	31.7	31.3
<b>Resource Use</b>				
Abiotic depletion potential for non-fossil mineral resources (ADPelements)*	kg Sb eq	2.05E-04	2.14E-04	2.12E-04
Abiotic depletion potential for fossil resources (ADP <sub>fossil</sub> )	MJ, NCV	604	643	636
Renewable primary energy resources as energy (fuel), (RPRE)*	MJ, NCV	191	201	199
Renewable primary resources as material, (RPRM)*	MJ, NCV	0.00	0.00	0.00
Non-renewable primary resources as energy (fuel), (NRPRE)*	MJ, NCV	4970	5290	5230
Non-renewable primary resources as material (NRPRM)*	MJ, NCV	0.00	0.00	0.00
Consumption of fresh water	m <sup>3</sup>	0.73	0.77	0.77
<b>Secondary Material, Fuel and Recovered Energy</b>				
Secondary Materials, (SM)*	kg	35.5	14.1	51.0
Renewable secondary fuels, (RSF)*	MJ, NCV	129	139	137
Non-renewable secondary fuels (NRSF)*	MJ, NCV	0.00	0.00	0.00
Recovered energy, (RE)*	MJ, NCV	0.00	0.00	0.00
<b>Waste &amp; Output Flows</b>				
Hazardous waste disposed*	kg	0.00	0.00	0.00
Non-hazardous waste disposed*	kg	14.6	15.7	15.5
High-level radioactive waste*	kg	n/c	n/c	n/c
Intermediate and low-level radioactive waste* <sup>2</sup>	kg	n/c	n/c	n/c
Components for reuse*	kg	0.00	0.00	0.00
Materials for recycling*	kg	3.3	3.6	3.5
Materials for energy recovery*	kg	0.00	0.00	0.00
Recovered energy exported from the product system*	MJ, NCV	0.00	0.00	0.00
<b>Additional Inventory Parameters for Transparency</b>				
CO <sub>2</sub> emissions from calcination and uptake from carbonation*	kg CO <sub>2</sub> eq	444	478	471
Biogenic CO <sub>2</sub> , reporting the removals and emissions associated with biogenic carbon content contained within biobased products*	kg CO <sub>2</sub> eq	0.13	0.14	0.14

\* Emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance pending further development. Use caution when interpreting data in these categories.

Only EPDs prepared from cradle-to-grave life-cycle results and based on the same function, quantified by the same functional unit, and taking account of replacement based on the product reference service life (RSL) relative to an assumed building service life, can be used to assist purchasers and users in making informed comparisons between products.

<sup>1</sup> GWP 100; 100-year time horizon GWP factors are provided by the IPCC 2013 Fifth Assessment Report (AR5).

CO<sub>2</sub> from biomass secondary fuels (agriculture waste) used in kiln are climate-neutral (CO<sub>2</sub> sink = CO<sub>2</sub> emissions), ISO 21930, 7.2.7.

<sup>2</sup> Not calculated by GCCA Tool

## **ADDITIONAL ENVIRONMENTAL INFORMATION**

### **Environmental Management System (EMS)**

The Mason City Plant has an EMS in place. The EMS identifies environmental impacts and compliance requirements and ensures that these are continually updated to reflect current environmental knowledge and regulations. Environmental requirements are documented in the EMS which serves as a reference and provides operating personnel with relevant information and compliance deadlines. For environmental reporting, the plant complies with the U.S. EPA and Iowa Department of Environmental Management requirements:

- Toxics Release Inventory (TRI) Program
- Greenhouse Gas Reporting Program
- Portland Cement MACT (40 CFR 63 Subpart LLL) Semi-annual Reporting
- Air Permit Compliance Monitoring Reporting, Compliance Certification, Emission Statement
- Toxic Substances Control Act (TSCA) Chemical Data Reporting
- NPDES Discharge Monitoring Reports

### **Air Permit**

The Mason City Plant has been issued a Part 70 Title V Operating Permit from the Iowa Department of Natural Resources. The permit details all state and federal regulations and pollution control requirements applicable to the Mason City Plant.

### **Oil, Used Oil, Waste Chemicals, and Anti-Freeze:**

The Mason City Plant stores these materials and wastes in appropriate storage containers in a containment area and in compliance with Spill Containment, Control and Countermeasure (SPCC) requirements. The facility maintains an SPCC Plan that is in compliance with all applicable regulations and has been certified by a Professional Engineer. A third-party contractor removes these wastes and properly recycles or disposes of them in accordance with Federal, State, and Local regulations. Documentation of final disposal is provided to the Mason City Plant.

### **Recycling Programs**

The Mason City Plant has instituted a recycling program to ensure that the following materials are recycled: used batteries, spent fluorescent bulbs, discarded paper, cardboard, aluminum, and other scrap metals, and outdated or damaged electronic hardware and parts. Used vehicle batteries are collected and sent off-site for recycling.

### **Heidelberg Materials Sustainability Commitments 2030**

The world needs smart, sustainable and resilient infrastructure, buildings, and public spaces. At Heidelberg Materials, we are transforming our business to address these challenges, and are placing sustainability at the core of what we do.

The United Nations Sustainable Development Goals (SDGs) shape our strategy and sustainability commitments. Our Sustainability Commitments 2030 support our vision to build a more sustainable future that is net zero, safe and inclusive, nature positive, and circular and resilient. Learn more at [Sustainability Commitments 2030 \(heidelbergmaterials.com\)](https://www.heidelbergmaterials.com).