ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025 / ISO 21930

TechCement RC100
OTB Materials Corp

EPD HUB, HUB-2324
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Created with One Click LCA

GENERAL INFORMATION

MANUFACTURER

Manufacturer	OTB Materials Corp
Address	62 East High St Building #2, New Freedom, PA 17349
Contact details	steve@otbmaterials.com
Website	www.otbmaterials.com

EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	ISO 21930:2017 and ISO 14025
PCR	EPD Hub Core PCR Version 1.1, 5 Dec 2023
Sector	Manufactured product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate
EPD author	Steven McLaughlin, OTB Materials Corp
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Imane Uald lamkaddam, as an authorized verifier acting for EPD Hub Limited

The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	TechCement RC100
Additional labels	
Product reference	
Place of production	62 East High St Building #2, New Freedom, PA 17349
Period for data	August, 2024
Averaging in EPD	No averaging
Variation in GWP-fossil for A1-A3	0 %

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 metric ton of cement
Declared unit mass	1000 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	4.32E+01
GWP-total, A1-A3 ($kgCO_2e$)	4.32E+01
Secondary material, inputs (%)	0.15
Secondary material, outputs (%)	0
Total energy use, A1-A3 (kWh)	326
Net freshwater use, A1-A3 (m^3)	0.22

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

Outside The Box Materials (OTB) is a pioneering company at the forefront of sustainable construction solutions, leveraging decades of expertise from a dedicated team of scientists with impeccable backgrounds in education and research. OTB has come together as a result of the fusion between worlds class experts in geopolymer technology and the precast industry. Its technical team boasts over 150 years of combined technical expertise. Our mission is to innovate and transform the construction industry by focusing on the impact of raw materials on concrete fabrication, leading us to develop innovative alternatives to traditional cement. At OTB, we are committed to reducing the environmental footprint of concrete production through our advanced formulations.

OTB Materials proudly presents TechCement, an innovative family of cement products poised to transform the construction industry. TechCement integrates state-of-the-art technology with premium materials to offer superior durability, sustainability, and versatility. Its unique formulations guarantee exceptional strength and longevity while promoting eco-friendly construction practices, making it the optimal choice for contemporary infrastructure projects. Unlike many competitors that claim to have eliminated portland cement from their formulations, TechCement not only achieves this but also delivers significantly lower CO2e Global Warming Potential (GWP) while maintaining high compressive strength. This means that precast manufacturers and large structural contractors can maximize their production capacity, potentially doubling output, by leveraging our superior early strength characteristics. TechCement's inherent microstructure also makes it sulfate resistant. Moreover, TechCement exhibits superior compressive and tensile strengths, making it ideal for high-stress environments.

In addition to its impressive technical specifications (compliant under ASTM C1157), TechCement is also an eco-friendly choice for the industry. It is manufactured using natural materials, and our processes utilize about half of the water required for conventional portland cements, leading to lower CO2e with respect to GWP. Our ability to adjust the formulation of TechCement ensures that we can meet the specific desires and requirements of our clients and their end customers, providing versatility in flowability (slump vs SCC), set times and strength. It can also incorporate lightweight as well as conventional aggregates. TechCement can be easily mixed using standard cement equipment, allowing for seamless integration into existing construction practices.

Demonstrating an unwavering commitment to quality and innovation, OTB Materials establishes a new standard in cement technology with TechCement, enabling project managers, architects, engineers, and builders to construct resilient and sustainable structures for the future.

PRODUCT DESCRIPTION

This LCA study represents 1 metric ton of cementitious material. The product consists of binders, fly ash, minerals, and other components. All of the components are dry when shipped. The cement is used in both horizontal and vertical structural applications.

TechCement RC100 is a revolutionary geopolymer product designed as a sustainable alternative to Ordinary Portland Cement (OPC) and High-Performance Concrete (HPC). Ideal for use in a variety of applications, TechCement RC100 excels in precast concrete, ornamental precast stone and pavers, prestressed precast structures, and tilt wall systems. Its versatility extends to water collection and treatment facilities, marine applications such as seawalls and docks, and both wet and dry cast environments. TechCement RC100 has a low heat of hydration, which occurs within the first 3-4 hours of the cure cycle and along with its high early strength development, it enables faster mold cycle times, allowing precast manufacturers to significantly increase daily production without compromising quality.

The production process generates over 90% less CO_2 emissions compared to traditional portland cement, and its formulation requires one-third to one-half the water used in conventional methods. TechCement RC100 provides a dense matrix that reduces permeability and enhances resistance to freeze/thaw scaling and aggressive sulfate conditions. Compliant with a range of performance-based standards, TechCement RC100 meets and exceeds industry benchmarks, making it an ideal choice for environmentally conscious construction projects. Overall, TechCement RC100 is an innovative product that is changing the way the construction industry approaches cement and concrete production. With its superior strength, durability, and versatility, TechCement RC100 is an excellent choice for anyone looking to build high-quality, long-lasting structures. It was designed to produce stronger, greener cement with a keen eye on the future of construction.

Further information can be found at www.otbmaterials.com.

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	0	
Minerals	100	North America
Fossil materials	0	
Bio-based materials	0	

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	4.88

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 metric ton of cement
Mass per declared unit	1000 kg
Functional unit	
Reference service life	

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D		
×	×	×	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND		
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

OTB Materials Corp (OTB) designs and prepares the formula for our TechCement at our laboratory and plant in New Freedom, PA. The portion of the product that is recycled (ash, slag, etc) is shipped unblended directly from its source to the customer. All ingredients arrive dry at the production site and include a range of traditional Supplementary Cementitious Materials (SCM's) that together with alkali activators, set-time retarders, and other additives required to control air, slump, and water permeability are mixed with the raw materials. The chemical activators are blended by OTB at an approved blending facility, packaged and also shipped to the customer.

At the place of final production, all materials along with sand, aggregates and water are mixed in a specific proportion according to the customer's standards. This process involves placing each of the ingredients in special hoppers which are then electronically driven to deposit the correct measurement into a suitable cementitious mixer which then blends them together. The finished product is then deposited into the appropriate medium for concrete production whether it be a Precast Mold, a Volumetric Truck, a traditional Cement Truck or bags to be shipped to a Ready-Mix distributor.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

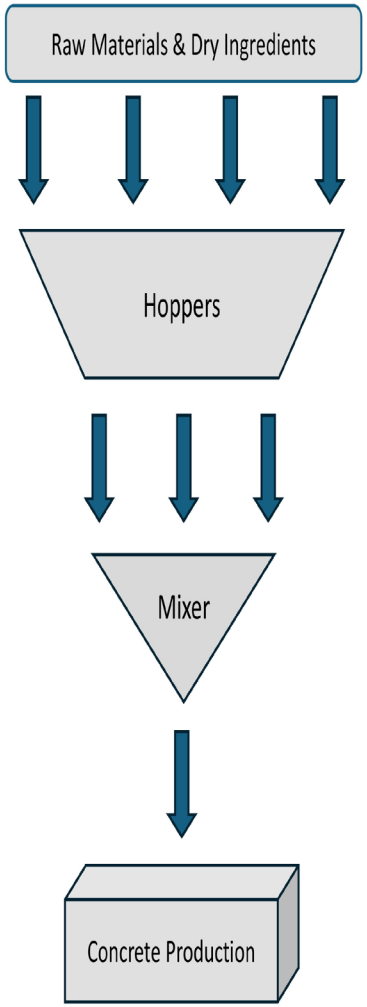
PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

The product end of life is not a part of this model.

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The study does not exclude any modules or processes which are stated mandatory in the reference standard and the applied PCR. The study does not exclude any hazardous materials or substances. The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

AVERAGES AND VARIABILITY

Type of average	No averaging
Averaging method	Not applicable
Variation in GWP-fossil for A1-A3	0

This EPD is product and factory specific and does not contain average calculations.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.8, Plastics Europe, Federal LCA Commons and One Click LCA databases as sources of environmental data.

ENVIRONMENTAL IMPACT DATA

ENVIRONMENTAL IMPACTS – TRACI 2.1. / ISO 21930

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	5.85E+01	3.02E+01	1.07E+01	9.94E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Ozone Depletion	kg $CFC_{-11}e$	1.20E-06	5.42E-06	7.35E-06	1.40E-05	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Acidification	kg SO_2e	5.02E-01	4.38E+00	3.24E+00	8.12E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Eutrophication	kg Ne	3.45E-02	1.07E-02	5.92E-03	5.11E-02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
POCP (“smog”)	kg O_3e	5.82E+00	5.46E-02	4.68E-02	5.92E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
ADP-fossil	MJ	1.62E+02	6.24E+01	1.95E+01	2.44E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8)]	MJ	3.81E+01	5.30E+00	3.16E+02	3.60E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. PER as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of renew. PER	MJ	3.81E+01	5.30E+00	3.16E+02	3.60E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as energy	MJ	1.68E+02	4.58E+02	1.45E+02	7.70E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-re. PER as material	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Total use of non-re. PER	MJ	1.68E+02	4.58E+02	1.45E+02	7.70E+02	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Secondary materials	kg	1.51E+00	1.40E-01	9.65E-01	2.62E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Renew. secondary fuels	MJ	1.85E+01	1.64E-03	8.30E+00	2.68E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-ren. secondary fuels	MJ	1.65E+01	0.00E+00	0.00E+00	1.65E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Use of net fresh water	m^3	6.43E-03	5.67E-02	1.59E-01	2.22E-01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	1.07E-02	6.33E-01	8.42E-01	1.49E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Non-hazardous waste	kg	2.78E-01	1.02E+01	1.32E+01	2.37E+01	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Radioactive waste	kg	4.62E-05	3.06E-03	4.50E-04	3.56E-03	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Materials for energy rec	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

VERIFICATION STATEMENT

VERIFICATION PROCESS FOR THIS EPD

This EPD has been verified in accordance with ISO 14025 by an independent, third-party verifier by reviewing results, documents and compliancy with reference standard, ISO 14025 and ISO 14040/14044, following the process and checklists of the program operator for:

- This Environmental Product Declaration
- The Life-Cycle Assessment used in this EPD
- The digital background data for this EPD

Why does verification transparency matter? Read more online
This EPD has been generated by One Click LCA EPD generator, which has been verified and approved by the EPD Hub.

THIRD-PARTY VERIFICATION STATEMENT

I hereby confirm that, following detailed examination, I have not established any relevant deviations by the studied Environmental Product Declaration (EPD), its LCA and project report, in terms of the data collected and used in the LCA calculations, the way the LCA-based calculations have been carried out, the presentation of environmental data in the EPD, and other additional environmental information, as present with respect to the procedural and methodological requirements in ISO 14025:2010 and reference standard.

I confirm that the company-specific data has been examined as regards plausibility and consistency; the declaration owner is responsible for its factual integrity and legal compliance.

I confirm that I have sufficient knowledge and experience of construction products, this specific product category, the construction industry, relevant standards, and the geographical area of the EPD to carry out this verification.

I confirm my independence in my role as verifier; I have not been involved in the execution of the LCA or in the development of the declaration and have no conflicts of interest regarding this verification.

Imane Uald lamkaddam, as an authorized verifier acting for EPD Hub Limited
13.12.2024