G*enable*™ *Decarbonizer Concrete Admixture*

Environmental Product Declaration
Cradle-to-Gate

ASTM INTERNATIONAL

UNIVERSAL MATTER
ADVANCED MATERIALS

General information

Manufacturer Name:	Universal Matter UM Inc. 1320 Heine Court, Burlington, ON, Canada.
Program Operator:	ASTM International 100 Barr Harbor Drive West Conshohocken, PA 19428-2959, USA
Declaration Number:	EPD 946
Reference PCR:	ISO 21930: 2017
Date of Issuance:	March 11, 2025
End of Validity:	March 11, 2030
Product Name:	Genable Decarbonizer (BD3152X)
EPD Owner:	Universal Matter
Declared Unit:	1 kg of Genable Decarbonizer
EPD Scope:	Cradle-to-gate (A1, A2, and A3)
Prepared By:	WAP Sustainability Consulting
Verification:	ISO 21930 serves as the core PCR. Independent verification of the declaration according to ISO 14025 and ISO 21930. ☐ internal ☒ external
LCA Reviewer and EPD Verifier:	Thomas Gloria, Ph.D., Industrial Ecology Consulants

Company information

Universal Matter has developed cleaner, faster, and more economical technology to scaleup and commercialize graphene/graphitized carbons, a carbon-based nanomaterial that can provide improved properties for other industrial materials. Their proprietary and patented Flash Joule Heating (FJH) process can convert diverse carbon sources into graphene with tunable characteristics for an almost unlimited number of applications.

Universal Matter's patented FJH process produces high-quality graphene and related advanced materials from sustainable and inexpensive carbon sources in minutes. The short burst of electricity breaks all chemical bonds and reorders the carbon into thin layers of turbostratic graphene and related materials. All non-carbon-based impurities are flashed off and the resulting products are >99% carbon. This new manufacturing process can be used on many carbon-based feedstocks, including petroleum coke, metallurgical coke, biomass, carbon from recycled plastic and rubber, methane-derived carbon, and even food waste. FJH creates high-quality graphene with 3 distinct morphologies providing our graphene superior properties that are critical for large industries.

Headquartered in Burlington, Ontario, Canada, with U.S. and U.K. subsidiaries and Innovation Centers in Houston, TX and Redcar, UK., Universal Matter's vision is to become the leading supplier of high-quality and sustainable graphene and advanced materials to decarbonize our planet. We upcycle diverse solid carbon streams (including waste) into graphene/graphitized carbon to decarbonize major industrial products thereby enabling significant GHG emissions reductions and circular economy creation.

Product information

Genable Decarbonizer is an innovative, patent-pending, graphene-based admixture that boosts concrete strength at both early and late ages. This breakthrough technology supports more sustainable construction practices by enabling reduced cement content in concrete mixtures without sacrificing compressive strength.

The unique chemistry of Genable Decarbonizer facilitates improved cement hydration, which is the key to its strength-enhancing effects. By optimizing this critical process, Genable Decarbonizer delivers superior strength development compared to reference concrete. Genable Decarbonizer meets the ASTM C 494/C 494M requirements for Type S, Specific Performance, admixtures. Its ability to maintain compressive strength with lower cement content translates directly to reduced CO2 emissions from cement production.

In summary, Genable Decarbonizer is a high-performance, sustainable admixture that enhances concrete strength while enabling lower cement usage. Its unique chemistry and proven performance make it an attractive option for concrete producers seeking to improve their environmental impact.

Genable Decarbonizer Product:

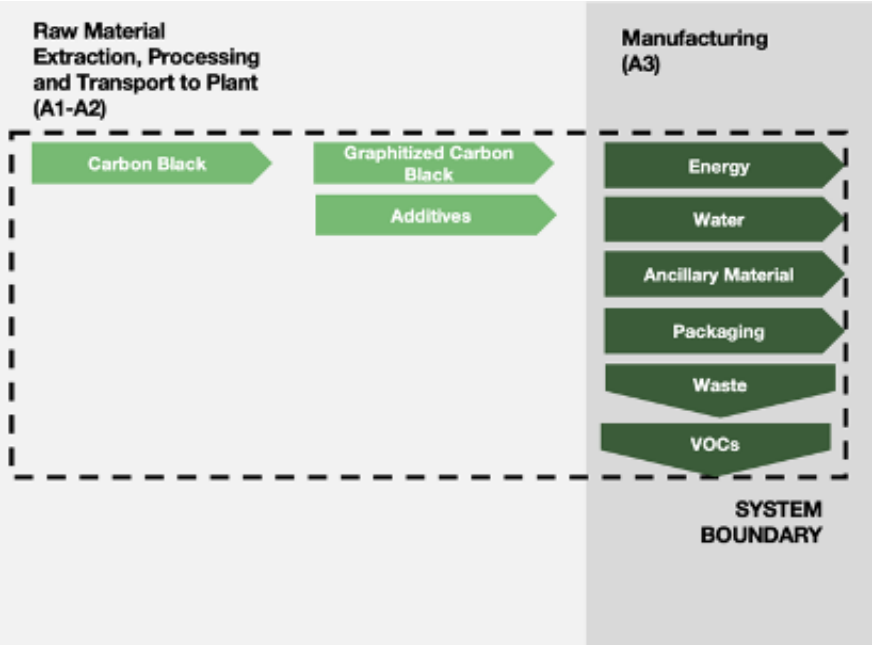
Parameter	
Appearance	Black Liquid
Specific gravity (@20C)	1.25 +/- 0.05 g/cm3
pH-value	5.5 +/- 0.3
Alkali content (%)	< 0.25 by mass
Chloride content (%)	< 0.10 by mass
Viscosity	5,000 +/- 1000 cP @ y = 1/s
Odor	Characteristics

LCA information

Declared unit	1 kg of Genable Decarbonizer
Reference service life	Not declared as use phase is not included in the study
Description of the system boundaries	Cradle to Gate
Geographical representativeness	A1-A3: Can
Manufacturing location	Burlington, ON
Time representativeness	Data collected on batch assumption and calculated to estimate for calendar year 2024.
Cut-off rules	All flows for which data were provided are included in the assessment, accounting for at least 99% of the energy or mass flows and at least 99% of the environmental impacts from the product system. Production of capital equipment is excluded from this assessment.
Allocation method	Mass was deemed the most appropriate physical parameter for allocation
Database and LCA software used	SimaPro v9.6.0.1 Ecoinvent V3.10
LCA Report	LCA of Genable Decarbonizer Concrete Admixture, December 2024
Scenario Description: A2	Primary data of transportation from suppliers: 0-100 km by truck in China, 35-4300 km by truck in NA, 0-9000 km by ship
Scenario Description: A3	Electricity Source: Canada-ON region specific grid mix

EPDs are comparable only if they comply with this document, 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.

System diagram:



Modules declared and geographical scope:

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	**A1**	**A2**	**A3**	**A4**	**A5**	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**C1**	**C2**	**C3**	**C4**	**D**
Modules declared	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	Can			ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

No substances in the product are on the Candidate List of Substances of Very High Concern (SVHC) which exceed the limits for registration with the Conservation and Recovery Act (RCRA), Subtitle 3. Content information is proprietary and can be obtained, if necessary, by reaching out to Universal Matter directly.

Results of the environmental performance indicators

The results presented here are for 1 declared unit, which is 1 kg of Genable Decarbonizer for Concrete Admixture.

Impact Category	A1-A3	A1	A2	A3
IPCC AR6				
GWP excl. bio [kg CO_2 eq]	2.51E+00	1.94E+00	3.38E-01	2.33E-01
TRACI LCIA Impacts (North America)				
AP [kg SO_2 eq]	1.17E-02	7.29E-03	3.86E-03	5.44E-04
EP [kg N eq]	2.99E-03	2.70E-03	2.08E-04	8.25E-05
ODP [kg CFC 11 eq]	7.55E-08	6.38E-08	4.78E-09	6.96E-09
SFP [kg O_3 eq]	1.90E-01	9.43E-02	8.70E-02	8.63E-03
Resource Use Indicators				
RPR_E [MJ]	2.14E+00	1.60E+00	1.39E-01	4.00E-01
RPR_M [MJ]	4.75E-01	4.75E-01	0.00E+00	0.00E+00
$NRPR_E$ [MJ]	4.40E+01	3.45E+01	4.60E+00	4.89E+00
$NRPR_M$ [MJ]	1.24E+01	0.00E+00	0.00E+00	1.24E+01
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW [m^3]	1.98E+01	3.69E+00	3.74E-01	1.58E+01
Output Flows and Waste Categories				
HWD [kg]	6.99E-05	6.99E-05	0.00E+00	0.00E+00
NHWD [kg]	3.53E-01	1.91E-04	0.00E+00	3.53E-01
HLRW [kg]	1.92E-08	1.01E-09	7.80E-11	1.81E-08
ILLRW [kg]	2.85E-08	5.45E-09	4.09E-10	2.26E-08
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EEE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Additional environmental information

The application of Genable Decarbonizer to concrete mixtures results in a decreased amount of cement use in a mix design. In a standard 25MPa mix design, there is 260 kg of cement. Genable Decarbonizer removes 39 kg of cement (15%) by adding 0.71835 liters (0.898 kg) of the concrete admixture.

References

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