ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2007

SmartEPD-2024-037-0181-01.1

Carbocrylic 3359 MC

carboline®
Coatings - Linings - Fireproofing

SMART EPD
CERTIFIED
ENVIRONMENTAL PRODUCT DECLARATION

Date of Issue: Oct 24, 2024

Expiration: Oct 24, 2029

Last updated: Mar 18, 2025

General Information

Carboline

2150 Schuetz Rd, St. Louis, MO 63146 USA

1-800-848-4645

info@carboline.com carboline.com

Product Name:	Carbocrylic 3359 MC
Functional Unit:	1 m2 of covered and protected substrate for 60 years per coat, reference flow depends on service life
Declaration Number:	SmartEPD-2024-037-0181-01.1
Date of Issue:	October 24, 2024
Expiration:	October 24, 2029
Last updated:	March 18, 2025
EPD Scope:	Cradle to grave A1 - A3, A4, A5, B1 - B7, C1 - C4
Market(s) of Applicability:	North America

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2017
Core PCR:	NSF PCR for Architectural Coatings v.1 Date of issue: June 18, 2015 Valid until: June 30, 2025
Sub-category PCR review panel:	Contact Smart EPD for more information.
General Program Instructions:	Smart EPD General Program Instructions v.1.0, November 2022

Verification Information

LCA Author/Creator:	Juan David Villegas | juan@parqhq.com
EPD Program Operator:	Smart EPD | info@smartepd.com | www.smartepd.com | 585 Grove St., Ste. 145 PMB 966, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071: External Ranjani Theregowda | Smart EPD LLC | ranjani.theregowda@smartepd.com Independent external verification of EPD, according to ISO 14025 and reference PCR(s): External Ranjani Theregowda | Smart EPD LLC | ranjani.theregowda@smartepd.com

Limitations, Liability, and Ownership

Environmental declarations from different programs (ISO 14025) may not be comparable. Comparison of the environmental performance of products using EPD information shall be based on the products use and impacts at the building level, and therefore EPDs may not be used for comparability purposes when not considering the whole building life cycle. EPD comparability is only possible when all stages of a life cycle have been considered. However, variations and deviations are possible. Example of variations: Different LCA software and background LCI datasets may lead to differences results for upstream or downstream of the life cycle stages declared. The EPD owner has sole ownership, liability, and responsibility for the EPD.

Organization Information

For over seven decades, Carboline has been at the forefront of delivering cutting-edge product development alongside a wealth of technical expertise and experience, offering unparalleled protective coating solutions on a global scale. As a notable manufacturer of paint and coating products, Carboline is dedicated to showcasing its sustainability leadership while recognizing the business value in transparently reporting the comprehensive environmental impacts of its products, spanning from cradle to grave.

Further information can be found at: www.carboline.com

Product Description

Versatile high performance finish with excellent corrosion resistance and exterior weathering properties, as well as suitability for interior and mild environments.

Further information can be found at: https://www.carboline.com/products/product-details/Carbocrylic-3359-MC

Product Information

Functional Unit:	1 m2 of covered and protected substrate for 60 years per coat, reference flow depends on service life
Mass:	0.194 kg
Reference Service Life:	60 Years
Product Specificity:	✗ Product Average ✓ Product Specific

Plants

Carboline - Dayton, NV
95 E Airpark Vista Blvd, Dayton, NV 89403, USA

Product Specifications

Product SKU(s):	0281WITE0SZD
Product Classification Codes:	EC3 - Finishes -> PaintingAndCoating -> PaintByArea
Architectural Coating Subcategory:	Exterior Architectural Coating
Quality Designation:	Low Quality
Design Life:	5 years
Market-Based Lifetime:	10 years

Amount of Colorant Needed per Liter of Coating: 23 ml

Material Composition

Material/Component Category	Origin	% Mass
Pigments	Various	11 - 21
Solvent	Various	< 10
Water	Various	40 - 60
Resin	Various	18 - 38
Additives	Various	< 10

Packaging Material	Origin	kg Mass
plastic pail	USA	0.0108

Hazardous Materials
DIBUTYL PHTHALATE (84-74-2)
DM GLYCOL ETHER (111-77-3)
GLYCOL ETHER SOLVENT (112-34-5)
TITANIUM DIOXIDE (13463-67-7)

EPD Data Specificity

Primary Data Year: 2022-2023

Manufacturing Specificity:

- ✗ Industry Average
- ✗ Manufacturer Average
- ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD

Software and LCI Data Sources

LCA Software: SimaPro v. 9.5

LCI Foreground Database(s): Ecoinvent v. 3.9.1

LCI Background Database(s): Ecoinvent v. 3.9.1

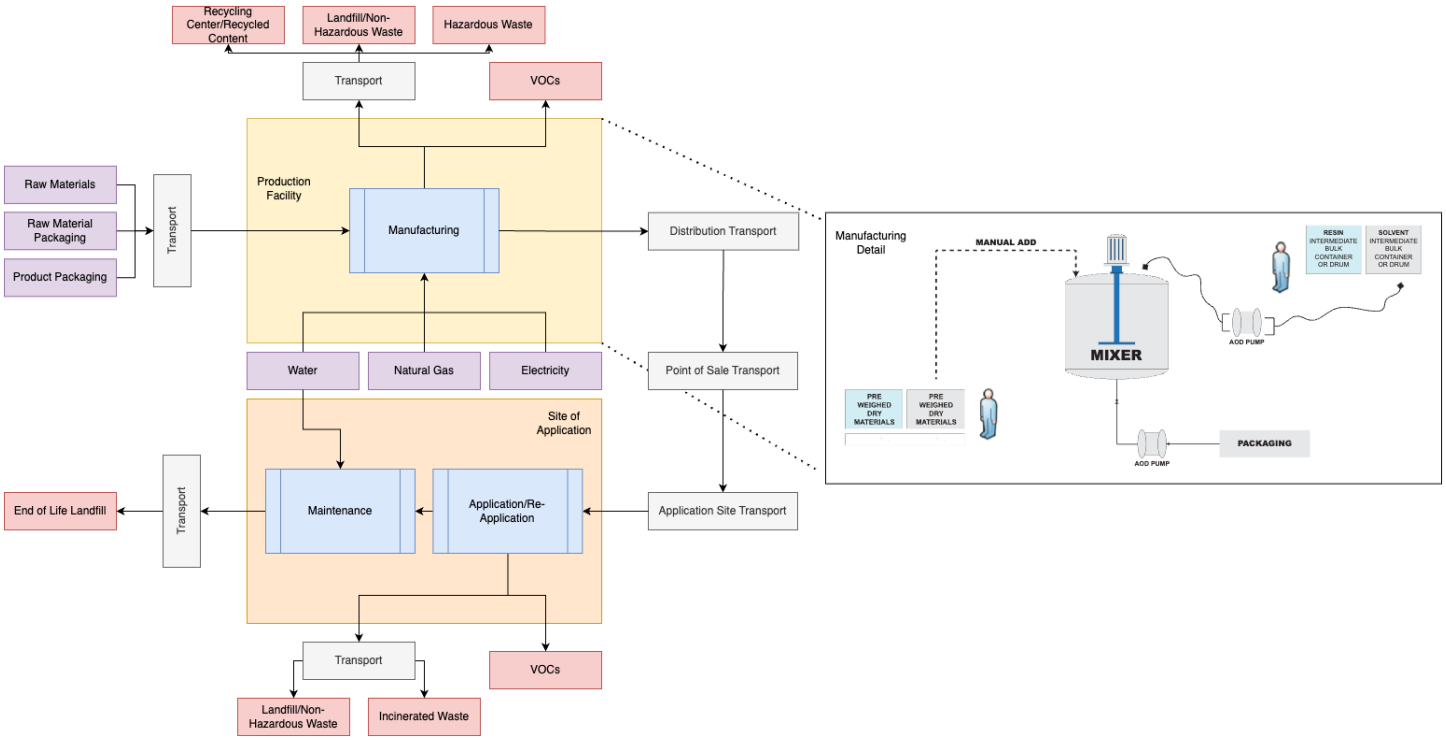
Renewable Electricity

Energy Attribute Certificates (EACs) such as Renewable Energy Certificates (RECs) or Power Purchase Agreements (PPAs) are included in the baseline reported results:	✗ No

System Boundary

Production	A1	Raw material supply	✓
	A2	Transport	✓
	A3	Manufacturing	✓
Construction	A4	Transport to site	✓
	A5	Assembly / Install	✓
Use	B1	Use	✓
	B2	Maintenance	✓
	B3	Repair	✓
	B4	Replacement	✓
	B5	Refurbishment	✓
	B6	Operational Energy Use	✓
	B7	Operational Water Use	✓
End of Life	C1	Deconstruction	✓
	C2	Transport	✓
	C3	Waste Processing	✓
	C4	Disposal	✓
Benefits & Loads Beyond System Boundary	D	Recycling, Reuse Recovery Potential	ND

Product Flow Diagram



Life Cycle Module Descriptions

Primary data were collected for the 12 month period starting October 2022 and ending September 2023 to ensure technical, geographical and temporal the representativeness. The products in this study are manufactured at Carbolines facilities in Green Bay (Wisconsin), Lake Charles (Louisiana), and Dayton (Nevada). The manufacturing process entails the addition of pre-weighted ingredients, followed by mixing in the correct sequence to create the desired products. Subsequently, Carboline packages and distributes the finished products to various distribution centers. The process involves the use of grid electricity, heat from natural gas combustion, an process water. Non hazardous waste consisting mainly of packaging material is sent to disposal or recycling.

LCA Discussion

Allocation Procedure

Product packaging was allocated by mass. Allocation of co-products was avoided, to the extent it was possible, based on the guidance given in ISO 14044:2006, 4.3., in ISO 21930 and section 5 of NSF International PCR for Architectural Coatings v.1. Volumetric allocation was applied to energy and water use at the facility level, as it represents the partition among selling units (in gallons). Carboline Global, Inc. provided total volume produced at each facility.

Cut-off Procedure

No cut-off criteria are defined for this study. The system boundary was defined based on relevance to the goal of the study. For the processes within the system boundary, all available energy and material flow data have been included in the model. In cases where no matching life cycle inventories are available to represent a flow, proxy data have been applied based on conservative assumptions regarding environmental impacts.

Data Quality Discussion

The quality of inventory data is evaluated based on several criteria, including precision, completeness, consistency, and representativeness.

Precision and Completeness

- Precision: The inventory data used in this study were either directly measured, calculated, or estimated based on primary data sources, ensuring high precision. Background data from ecoinvent v3.9.1 database also has documented precision to the extent available.
- Completeness: The product system's mass balance and inventory completeness were thoroughly checked. Some exclusions were made in line with the PCR requirements, such as personnel impacts, R&D activities, business travel, secondary packaging, point of sale infrastructure, and the coating applicator. However, no data was intentionally omitted..

Consistency and Reproducibility

- Consistency: Primary data were collected with a similar level of detail, while background data came from the ecoinvent v3.9.1 database. The modeling approach and other methodological choices were applied consistently throughout the model. Default values from the PCR were considered where there was unavailability of primary data, For example, the default waste transport distance was used for product disposal assessment.
- Reproducibility: This study ensures reproducibility by providing comprehensive disclosure of input-output data, dataset choices, and modeling approaches. A knowledgeable third party should be able to approximate the results using the same data and modeling methods.

Representativeness

- Temporal: Primary data were collected for the one-year period of October 2022 to September 2023 to ensure the representativeness of post-consumer content. Secondary data from the ecoinvent v3.9.1 database is typically representative of recent years.
- Geographical: Primary data represent Carboline's production facilities in Green Bay (Wisconsin), Dayton (Nevada) and Lake Charles (Louisiana). Where applicable, differences in electric grid mix were considered using appropriate secondary data. The use of country-specific data ensures high geographical representativeness, and proxy data were only used when country-specific data were unavailable.
- Technological: Both primary and secondary data were tailored to the specific technologies studied, ensuring high technological representativeness. Where no direct raw material information was available in the ecoinvent 3.9.1 database, proxies were identified and used.

Results

Environmental Impact Assessment Results

TRACI 2.1

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Market

Impact Category	Method	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP-total	TRACI 2.1	kg CO2e	1.26	0.0746	ND	ND	ND	ND	6.67	ND	ND	ND	ND	0.00707	0.421	0.689
ODP	TRACI 2.1	kg CFC11 eq	0.0000146	1.23e-9	ND	ND	ND	ND	0.0000728	ND	ND	ND	ND	1.17e-10	2.88e-9	4.58e-10
AP	TRACI 2.1	kg SO2 eq	0.00632	0.0004	ND	ND	ND	ND	0.0336	ND	ND	ND	ND	0.0000379	0.000276	0.000189
EP	TRACI 2.1	kg N eq	0.00186	0.000076	ND	ND	ND	ND	0.00968	ND	ND	ND	ND	0.00000721	0.000178	0.00744
POCP	TRACI 2.1	kg O3 eq	0.0834	0.0112	ND	ND	ND	ND	0.473	ND	ND	ND	ND	0.00106	0.00363	0.00297

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Tech

Impact Category	Method	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
GWP-total	TRACI 2.1	kg CO2e	1.26	0.0746	ND	ND	ND	ND	14.7	ND	ND	ND	ND	0.0141	0.842	1.31
ODP	TRACI 2.1	kg CFC11 eq	0.0000146	1.23e-9	ND	ND	ND	ND	0.00016	ND	ND	ND	ND	2.34e-10	5.75e-9	8.72e-10
AP	TRACI 2.1	kg SO2 eq	0.00632	0.0004	ND	ND	ND	ND	0.074	ND	ND	ND	ND	0.0000758	0.000551	0.00036
EP	TRACI 2.1	kg N eq	0.00186	0.000076	ND	ND	ND	ND	0.0213	ND	ND	ND	ND	0.0000144	0.000357	0.0142
POCP	TRACI 2.1	kg O3 eq	0.0834	0.0112	ND	ND	ND	ND	1.04	ND	ND	ND	ND	0.00212	0.00726	0.00565

Note:

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Abbreviations:

GWP = Global Warming Potential, 100 years (may also be denoted as GWP-total, GWP-fossil (fossil fuels), GWP-biogenic (biogenic sources), GWP-luluc (land use and land use change)), ODP = Ozone Depletion Potential, AP = Acidification Potential, EP = Eutrophication Potential, SFP = Smog Formation Potential, POCP = Photochemical oxidant creation potential, ADP-Fossil = Abiotic depletion potential for fossil resources, ADP-Minerals&Metals = Abiotic depletion potential for non-fossil resources, WDP = Water deprivation potential, PM = Particular Matter Emissions, IRP = Ionizing radiation, human health, ETP-fw = Eco-toxicity (freshwater), HTP-c = Human toxicity (cancer), HTP-nc = Human toxicity (non-cancer), SQP = Soil quality index.

Comparisons cannot be made between product-specific or industry average EPDs at the design stage of a project, before a building has been specified. Comparisons may be made between product-specific or industry average EPDs at the time of product purchase when product performance and specifications have been established and serve as a functional unit for comparison. Environmental impact results shall be converted to a functional unit basis before any comparison is attempted. Any comparison of EPDs shall be subject to the requirements of ISO 21930 or EN 15804. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries. EPDs are not comparative assertions and are either not comparable or have limited comparability when they have different system boundaries, are based on different product category rules or are missing relevant environmental impacts. Such comparison can be inaccurate, and could lead to erroneous selection of materials or products which are higher-impact, at least in some impact categories.

Resource Use Indicators

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Market

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RPRE	MJ	0.319	0.0096	ND	ND	ND	ND	1.64	ND	ND	ND	ND	0.00091	0.00883	0.0147
RPRM	MJ	0.378	0.00375	ND	ND	ND	ND	1.91	ND	ND	ND	ND	0.000355	0.00225	0.00306
RPRT	MJ	0.697	0.0133	ND	ND	ND	ND	3.55	ND	ND	ND	ND	0.00127	0.0111	0.0178
NRPRE	MJ	21.6	1.05	ND	ND	ND	ND	113	ND	ND	ND	ND	0.0999	1.89	0.377
NRPRM	MJ	0.000602	0.0000152	ND	ND	ND	ND	0.00309	ND	ND	ND	ND	0.00000144	0.00000733	0.0000298
NRPRT	MJ	21.6	1.05	ND	ND	ND	ND	113	ND	ND	ND	ND	0.1	1.89	0.377
ADPF	MJ	2.96	0.148	ND	ND	ND	ND	15.5	ND	ND	ND	ND	0.014	0.281	0.0444
FW	m3	0.0132	0.000119	ND	ND	ND	ND	0.0668	ND	ND	ND	ND	0.0000113	0.000186	0.000334

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Tech

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
RPRE	MJ	0.319	0.0096	ND	ND	ND	ND	3.61	ND	ND	ND	ND	0.00182	0.0177	0.028
RPRM	MJ	0.378	0.00375	ND	ND	ND	ND	4.2	ND	ND	ND	ND	0.00071	0.0045	0.00582
RPRT	MJ	0.697	0.0133	ND	ND	ND	ND	7.81	ND	ND	ND	ND	0.00253	0.0221	0.0338
NRPRE	MJ	21.6	1.05	ND	ND	ND	ND	249	ND	ND	ND	ND	0.2	3.77	0.718
NRPRM	MJ	0.000602	0.0000152	ND	ND	ND	ND	0.00679	ND	ND	ND	ND	0.00000288	0.0000147	0.0000567
NRPRT	MJ	21.6	1.05	ND	ND	ND	ND	249	ND	ND	ND	ND	0.2	3.77	0.718
ADPF	MJ	2.96	0.148	ND	ND	ND	ND	34.2	ND	ND	ND	ND	0.028	0.562	0.0844
FW	m3	0.0132	0.000119	ND	ND	ND	ND	0.147	ND	ND	ND	ND	0.0000225	0.000373	0.000636

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

RPRE or PERE = Renewable primary resources used as energy carrier (fuel), RPRM or PERM = Renewable primary resources with energy content used as material, RPRT or PERT = Total use of renewable primary resources with energy content, NRPRE or PENRE = Non-renewable primary resources used as an energy carrier (fuel), NRPRM or PENRM = Non-renewable primary resources with energy content used as material, NRPRT or PENRT = Total non-renewable primary resources with energy content, SM = Secondary materials, RSF = Renewable secondary fuels, NRSF = Non-renewable secondary fuels, RE = Recovered energy, ADPF = Abiotic depletion potential, FW = Use of net freshwater resources, VOCs = Volatile Organic Compounds.

Waste and Output Flow Indicators

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Market

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD	kg	0.00693	ND	ND	ND	ND	ND	0.0347	ND	ND	ND	ND	ND	0.116	ND
NHWD	kg	0.00694	ND	ND	ND	ND	ND	0.0347	ND	ND	ND	ND	ND	ND	1.1

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Tech

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
HWD	kg	0.00693	ND	ND	ND	ND	ND	0.0763	ND	ND	ND	ND	ND	0.232	ND
NHWD	kg	0.00694	ND	ND	ND	ND	ND	0.0764	ND	ND	ND	ND	ND	ND	2.09

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

HWD = Hazardous waste disposed, NHWD = Non-hazardous waste disposed, RWD = Radioactive waste disposed, HLRW = High-level radioactive waste, ILLRW = Intermediate- and low-level radioactive waste, CRU = Components for re-use, MFR or MR = Materials for recycling, MER = Materials for energy recovery, MNER = Materials for incineration, no energy recovery, EE or EEE = Recovered energy exported from the product system, EET = Exported thermal energy.

Carbon Emissions and Removals

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Market

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
BCRP	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BCEP	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BCRK	kg CO2	0.00000927	ND	ND	ND	ND	ND	0.0000463	ND	ND	ND	ND	ND	ND	ND
BCEK	kg CO2	-0.00000927	ND	ND	ND	ND	ND	-0.0000463	ND	ND	ND	ND	ND	ND	ND
BCEW	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CCE	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CCR	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CWNR	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

per 1 m2 of product of covered and protected substrate for 60 years per coat, reference flow depends on service life.

Tech

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4
BCRP	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BCEP	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
BCRK	kg CO2	0.00000927	ND	ND	ND	ND	ND	0.000102	ND	ND	ND	ND	ND	ND	ND
BCEK	kg CO2	-0.00000927	ND	ND	ND	ND	ND	-0.000102	ND	ND	ND	ND	ND	ND	ND
BCEW	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CCE	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CCR	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
CWNR	kg CO2	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

Note:

Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

Abbreviations:

BCRP = Biogenic Carbon Removal from Product, BCEP = Biogenic Carbon Emission from Product, BCRK = Biogenic Carbon Removal from Packaging, BCEK = Biogenic Carbon Emission from Packaging, BCEW = Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes, CCE = Calcination Carbon Emissions, CCR = Carbonation Carbon Removals, CWNR = Carbon Emissions from Combustion of Waste from Non-Renewable Sources used in Production Processes, GWP-luc = Carbon Emissions from Land-use Change.

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Truck and Trailer
Transport Distance:	1.893e+03 km
Capacity Utilization:	33 %
Packaging Mass:	1.076e-02 kg
Gross density of products transported:	1.161e+03 kg/m3
Weight of products transported:	1.935e-01 kg
Volume of products transported:	1.667e-04 m3
Capacity utilization volume factor:	1
Assumptions for scenario development:	Transport distance includes finished product to distribution center and distribution center to point of sale.

Installation in to the building/construction site (A5)

A5 Module

Product Lost per Functional Unit:	0.01935 kg
Mass of Packaging Waste Specified by Type:	0.01076 kg
VOC Emissions:	60000000000 ug/m3
Assumptions for scenario development:	As per the PCR, packaging waste management is reported in C1-C4 and VOC emissions in B1. The VOC content reported in this EPD is an estimated value and may not accurately represent the actual VOC emissions during the coating's curing process after installation. It is provided for informational purposes only and should not be used as a direct indicator of emissions under actual use conditions.
VOC Test Method:	ASTM D-2369

Reference Service Life (B1)

B1 Module

RSL: 60 Years

Declared Product Properties:

Multi-purpose interior/exterior coating. Excellent color and gloss retention. Single component. Outstanding corrosion protection. Low odor, low VOC

Design Application Parameters:

Pre-rinse equipment with undiluted Carboline Surface Cleaner 3 followed by clean water before use, employing suitable spray equipment from brands like Binks, DeVilbiss, and Graco. For airless spray, use a 30:1 or 45:1 pump ratio with a 3/8" hose, 0.017-0.019" tip, and 1800-2100 PSI output, while brushes and rollers are for touch-ups and rough surfaces only. Apply between 50-105°F with humidity not exceeding 85%, and ensure curing times of 1-3 hours for handling and topcoating vary with temperature, humidity, and film thickness. Consult product technical data sheet for detailed application parameters. Consult a Carboline representative for more information.

An Assumed Quality of Work, When Installed in Accordance with The Manufacturer's Instructions:

Long term protection is achieved when installed in accordance with manufacturer's instructions. Theoretical coverage is 610 ft2/gal at 1.0 mils (15.0 m2/l at 25 microns).

Replacement (B4)

B4 Module

Reference Service Life:	60 Years
Replacement Cycle:	5 (ESL/RSL)-1
Further assumptions for scenario development:	Product is assumed to be applied in an industrial environment. A market service lifetime and a technical service lifetime was adopted in the LCA model (see product specifications). Number of recoats is obtained by dividing the service lifetime. One initial coating application and subsequent recoats are required to maintain the average lifespan of a building, assumed to be 60 years.

End of Life (C1 - C4)

C1 - C4 Modules

Collection Process

Collected Separately:	0.01076 kg
Collected with Mixed Construction Waste:	0.1935 kg

Recovery

Recycling:	0.0009681 kg
Landfill:	0.1742 kg
Incineration:	0.01935 kg

Assumptions for scenario development:

Interpretation

The manufacturing of Carboline's products involves the direct procurement of raw materials from suppliers. These materials are then transported to Carboline's manufacturing facilities in Green Bay, WI, Dayton, NV, and Lake Charles, LA where they are stored and mixed to produce the coatings.

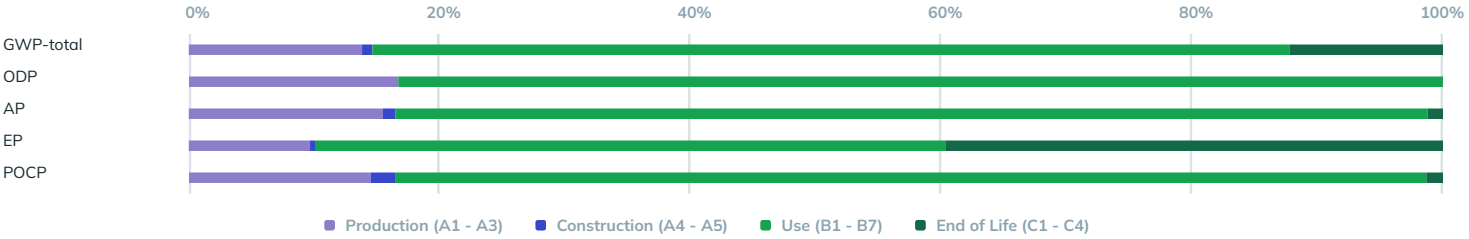
At the application site, coatings are spray or brush applied to various exterior steel structural components to add a protective barrier to the steel substrate. The use stage (stage 3) has a smaller contribution to the overall life cycle performance.

For the analysis, It was assumed that Carboline's coatings require one initial coating application and multiple recoats to achieve the recommended service life of 60 years, aligning with the building's life cycle. The results were presented per one square meter of covered and protected substrate at a recommended coating thickness.

The greatest contribution can be found in the use and maintenance stage due to the effect of the required repaints that will multiply the contribution of the product and design & construction stages together with the product application by the required number of recoats.

For one single recoat, production stage, has the highest impact across all impact categories due mainly to the manufacture and transport of raw material, with some contribution of the manufacturing stage. At the application site, coatings are spray or brush applied to various exterior steel structural components to add a protective barrier to the steel substrate. This activity has a smaller contribution to the overall life cycle performance. End-of-life impacts are generally limited because most of the product is assumed to be landfilled, although impacts accumulate at each successive recoating.

Given that the raw materials used in product manufacturing have the most significant impact, there are opportunities to substitute these materials with alternatives that have a lower environmental impact or to work with suppliers in order to reduce impact along the supply chain.



Additional Environmental Information

Before using this product, it is recommended that the operator read and follow all caution statements on the product data sheet and on the SDS for this product, and personal protective equipment must be used as directed.

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