

ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH ISO 14025 AND ISO 21930:2007

SmartEPD-2023-004-0014-01

Carboquick 200



Date of Issue:
Sep 14, 2023

Expiration:
Sep 14, 2028

Last updated:
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General Information

Carboline

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Product Name:	Carboquick 200
Functional Unit:	1 m2 of covered and protected substrate for 60 years
Declaration Number:	SmartEPD-2023-004-0014-01
Date of Issue:	September 14, 2023
Expiration:	September 14, 2028
Last updated:	July 05, 2024
EPD Scope:	Cradle to grave A1 - A3, A4, A5, B1 - B5, C1 - C4
Market(s) of Applicability:	North America

Reference Standards

Standard(s):	ISO 14025 and ISO 21930:2007
Core PCR:	PCR for Architectural Coatings v.1 Date of issue: June 18, 2015 Valid until: June 30, 2024
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:

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Verification:

Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071 :

External

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Independent external verification of EPD, according to ISO 14025 and reference PCR(s) :

External

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Limitations, Liability, and Ownership

In order to support comparative assertions, this EPD meets all comparability requirements stated in ISO 14025:2006. However, differences in certain assumptions, data quality, and variability between LCA data sets may still exist. As such, caution should be exercised when evaluating EPDs from different manufacturers, as the EPD results may not be entirely comparable. Any EPD comparison must be carried out at the building level per ISO 21930 guidelines. The results of this EPD reflect an average performance by the product, and its actual impacts may vary on a case-to-case basis.

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. For further details on Carboline's product range, visit their website at <https://www.carboline.com/>.

Further information can be found at: <https://www.carboline.com/>

Product Description

Carboline's Carboquick 200 is a fast cure high build polyaspartic coating providing excellent corrosion protection as well as long-term weatherability for industrial projects. This product serves as a protection against corrosion in an industrial environment. It also provides excellent color and gloss retention in UV exposure, exceeding long-term weatherability requirements.

Further information can be found at: <https://www.carboline.com/products/product-details/Carboquick-200>

Product Information

Functional Unit:

1 m2 of covered and protected substrate for 60 years

Mass:

4.14 kg

Product Specificity:

✗ Product Average

✓ Product Specific

Averaging:

Averaging was not conducted for this EPD.

Plants



Carboline - Green Bay, WI
2122 Angie Ave, Green Bay, WI 54302, USA

Product Specifications

Product SKU(s):

1349DEEPAD1

Product Classification Codes:

Masterformat - 09 96 00

EC3 - Finishes -> Painting and Coating

Architectural Coating Subcategory:

Exterior Architectural Coating

Quality Designation:

Mid Quality

Design Life:

10 years

Market-Based Lifetime:

10 years

Industry Durability Test:

ASTM D5894, ASTM D4060, ASTM D2794, ASTM D522, ISO 12944-6, SSPC Coating Specification No. 36 and SSPC Coating Specification No. 39

Amount of Colorant Needed per Liter of Coating:

78 ml

Material Composition

Material/Component Category	Origin	% Mass
Resin	US	25 - 35
Solvent	US	10 - 20
Curing Agent	US	20 - 30
Pigment	US	5 - 10
Additive	US	10 - 15

Packaging Material	Origin	kg Mass
Steel can	US	2.24

Hazardous Materials
Waste Flammable Liquid
Waste Absorbents
Waste Amines
Flammable Retains
Waste Resin Solution

EPD Data Specificity

Primary Data Year:	2022
Manufacturing Specificity:	✗ Industry Average ✓ Manufacturer Average ✓ Facility Specific

Software and LCI Data Sources

LCA Software:	📁 openLCA v. 1.10.3
LCI Foreground Database(s):	📁 Ecoinvent v. 3.8 📍 North America 🗑️ cut-off
LCI Background Database(s):	📁 Ecoinvent v. 3.8 📍 North America 🗑️ cut-off

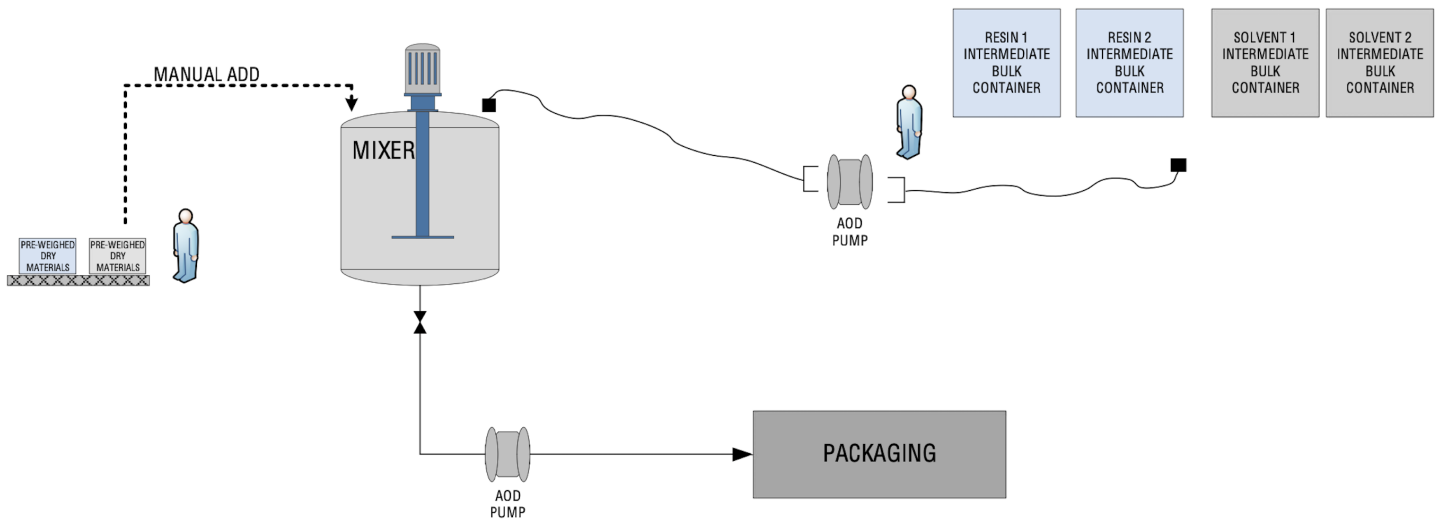
Renewable Electricity

Renewable electricity is used:	No
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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	ND
	B7	Operational Water Use	ND
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

The manufacturing of Carboline's Carboquick 200 involves the direct procurement of raw materials from suppliers. These materials are then transported to Carboline's manufacturing facility in Green Bay, WI, where they are stored and mixed to produce the coatings. The coating is available in a variety of colors, which are added during the manufacturing phase. The Carboquick 200 coating is distributed across North America and is spray-applied to various exterior structural components to add a protective barrier to the substrate. Maintenance and repairs are performed on a case-by-case basis, depending on the type of external exposure. The steel can packaging is discarded at end-of-life and inclusion of a 10% coating loss rate during application is included. The substrate with applied coating at end-of-life is landfilled, per the PCR.

LCA Discussion

The model includes over 95% of the total material mass, energy and environmental relevance throughout the product lifetime. Cut-off rules do not apply for hazardous or toxic materials, and the materials were included in the study. Product packaging was allocated by mass. Manufacturing inputs requiring allocation were electricity and natural gas as the production of multiple Carboline products is measured using a single meter for each. The allocation of each was based on the percentage of production for the Carboquick 200 product divided by the total site production output.

Results

Environmental Impact Assessment Results

IPCC AR5 GWP 100, TRACI 2.1

per 1 m2 of covered and protected substrate for 60 years.

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

Impact Category	Method	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
GWP-total	IPCC AR5 GWP 100	kg CO2 eq	2.61e+1	1.43e+0	9.29e-1	1.62e-1	1.79e+0	0	0	0	0	1.92e-3	4.36e-1	0
ODP	TRACI 2.1	kg CFC 11 eq	3.58e-4	3.39e-7	2.21e-7	1.94e-8	2.13e-7	0	0	0	0	4.55e-10	5.63e-9	0
AP	TRACI 2.1	kg SO2 eq	1.19e-1	8.83e-3	5.73e-3	2.63e-3	2.89e-2	0	0	0	0	1.19e-5	3.66e-4	0
EP	TRACI 2.1	kg N eq	8.96e-2	1.72e-3	1.12e-3	3.97e-4	4.36e-3	0	0	0	0	2.30e-6	1.21e-2	0
POCP	TRACI 2.1	kg O3 eq	1.58e+0	2.38e-1	1.55e-1	7.65e-3	8.42e-2	0	0	0	0	3.19e-4	5.53e-3	0
ADP-fossil	TRACI 2.1	MJ	5.12e+1	3.03e+0	1.97e+0	2.64e-1	2.90e+0	0	0	0	0	4.06e-3	6.66e-2	0
GWP-biogenic	IPCC AR5 GWP 100	kgCO2e	1.26e+0	1.23e-2	6.00e-3	3.39e-3	3.75e-2	0	0	0	0	1.24e-5	5.05e-1	0

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 covered and protected substrate for 60 years.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
PERE	MJ, net calorific value	2.78e+1	1.74e-1	1.13e-1	9.44e-2	1.04e+0	0	0	0	0	2.35e-4	2.35e-2	0
PERM	MJ, net calorific value	8.86e+0	7.18e-2	4.67e-2	3.99e-2	4.39e-1	0	0	0	0	9.50e-5	3.38e-1	0
PERT	MJ, net calorific value	3.67e+1	2.46e-1	1.60e-1	1.34e-1	1.48e+0	0	0	0	0	3.30e-4	3.61e-1	0
PENRE	MJ, net calorific value	4.37e+2	2.15e+1	1.40e+1	2.35e+0	2.59e+1	0	0	0	0	2.88e-2	1.06e+0	0
PENRM	MJ, net calorific value	2.79e-2	9.05e-4	5.90e-4	6.98e-4	7.68e-3	0	0	0	0	1.22e-6	1.24e-3	0
PENRT	MJ, net calorific value	4.38e+2	2.15e+1	1.40e+1	2.36e+0	2.59e+1	0	0	0	0	2.88e-2	1.06e+0	0
SM	kg	0	0	0	0	0	0	0	0	0	0	0	0
RSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ, net calorific value	0	0	0	0	0	0	0	0	0	0	0	0
FW	m3	2.24e+2	1.02e-1	6.65e-2	1.12e+0	1.23e+1	0	0	0	0	1.35e-4	1.23e-1	0

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, NRPRRT 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 covered and protected substrate for 60 years.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
HWD	kg	6.59e-2	0	0	0	0	0	0	0	0	0	4.15e-1	0
NHWD	kg	3.20e-1	0	0	0	0	0	0	0	0	0	5.76e-1	0
RWD	kg	0	0	0	0	0	0	0	0	0	0	0	0
CRU	kg	0	0	0	0	0	0	0	0	0	0	0	0
MFR	kg	2.32e-2	0	0	0	0	0	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0

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 covered and protected substrate for 60 years.

Indicator	Unit	A1A2A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4
BCRP	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
BCEP	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
BCRK	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
BCEK	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
BCEW	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
CCE	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
CCR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0
CWNR	kg CO2	0	0	0	0	0	0	0	0	0	0	0	0

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:	3025 km
Capacity Utilization:	0.1 %
Packaging Mass:	0.576 kg
Gross density of products transported:	1138 kg/m ³
Weight of products transported:	16.1 kg
Volume of products transported:	0.011 m ³
Capacity utilization volume factor:	0.1

Installation in to the building/construction site (A5)

A5 Module

Installation Scrap Rate Assumed:	1 %
Net Fresh Water Consumption Specified by Water Source and Fate:	0.0000442 m ³
Electricity Consumption:	0.0915 kWh
Product Lost per Functional Unit:	0.414 kg
Mass of Packaging Waste Specified by Type:	0.576 kg
VOC Emissions:	57000000 ug/m ³

Reference Service Life

B1 Module

RSL:	60 Years
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Declared Product Properties:

Design for excellent corrosion protection as well as long-term durability to provide long service life. Meets ISO 12944-6 C3 High, direct-to-metal application with one coat. Exceeds SSPC Coating Specification No. 39 Level 3A and No. 36 Level 3A. The fast curing time significantly speeds up the painting process, saves labor, and saves money without sacrificing performance.

Design Application Parameters:

Airless spray is the preferred method of application. Industry standards are for substrate temperatures to be 5 °F (3 °C) above the dew point. This product requires the substrate to be above the dew point. To complete the final cure, the product reacts with atmospheric moisture. Thus, relative humidity below 30% will slow cure time. Brush and roll are optimal for touch-up or small area applications.

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

Excellent corrosion protection is achieved with one coat when installed in accordance with the manufacturer's instructions. A theoretical coverage of 112 ft²/gal at 10.0 mils (2.8 m²/l at 250 microns) is achieved.

Outdoor Environment:

Carboquick 200 is an exterior coating that protects steel substrates in all types of environmental conditions.

Maintenance:

Carboquick 200 is an exterior coating applied to various types of metal structures. A 10-year design lifetime was used in the LCA model, with one initial coating and 5 recoats to maintain the average building service life of 60 years.

Maintenance (B2)

B2 Module

Maintenance Cycle:	5 Cycles/RSL
Net Fresh Water Consumption Specified by Water Source and Fate:	0.57 m3
Energy Input:	1.1 kWh
VOC Emissions:	123000000000 ug/m3
Maintenance Process Information:	Carboquick 200 coating products are assumed to be applied in an exterior environment. A 10-year design lifetime was adopted in the LCA models. For the design-based lifetime, one initial coating application and 5 recoats are required to maintain the average lifespan of a building, assumed to be 60 years.

End of Life

C1 - C4 Modules

Collection Process

Collected Separately:	0.456 kg
Collected with Mixed Construction Waste:	0.601 kg

Recovery

Landfill:	0.601 kg
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Disposal

Product or Material for Final Disposal:	0.456 kg
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Assumptions for scenario development:

The only waste generated at the end of the service life includes packaging and residue coating waste. The preferred method of transportation is via truck to the landfill.

Interpretation

Data was collected for the calendar year 2022 to ensure the representativeness of business activities and post-consumer materials. Manufacturing data represents Carboline's production facilities in Green Bay, Wisconsin. Secondary data was obtained from ecoinvent v3, representing the most recent years available. The overall quality of the data used is considered representative of the product systems.

The system boundary excludes manufacturing, transportation and disposal of packaging materials outside the product's primary packaging and construction, maintenance and operation of capital equipment.

Data was modelled based on information provided by Carboline, supplemented by data from technical and safety data sheets. Proxy materials were used when suitable secondary data sets were not available. While secondary data sets are presented as averages and may not account for process variations and supplier locations, the data is considered good quality. The LCA results are expressed relatively and should not be interpreted as predicting impacts on specific environmental categories exceeding thresholds or risks.

Product Stage:

The upstream raw material phase (1-1) is the primary contributor to all impact categories. This is due to the number of raw material processes required to produce the product. The manufacturing phase (1-3) contributes the most to eutrophication and ecotoxicity impact categories, approximately 9% and 6%, respectively.

Design & Construction:

Stage 2 includes the transportation of the product from manufacturing to the customer. The highest impact categories in this phase are smog, fossil fuel depletion and global warming. Transportation miles from the point of sale to the application site (2-3) accounts for low impacts across all impact categories.

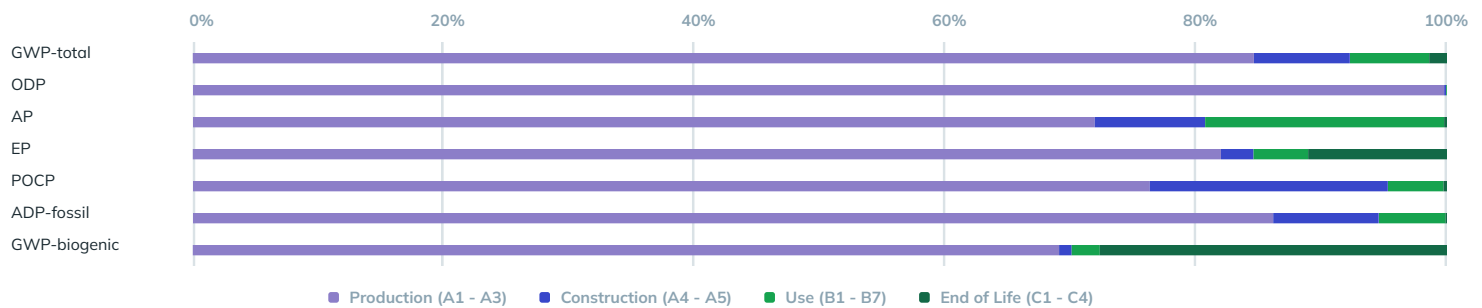
Use & Maintenance:

Carboquick is classified as a low-VOC coating per the EPA VOC test method 24. Therefore few VOC emissions are released during the drying process. The highest impact categories within Stage 3 are acidification, global warming and non-renewable resource depletion. The coating application phase (3-1) contributes the least to all product life cycle impacts.

End-of-life:

The end-of-life management phase (4-2) is the second most impactful lifecycle stage. Disposal contributes the highest to eutrophication and ecotoxicity. Acidification, ozone depletion and smog have the lowest impacts in Stage 4. Transportation to the disposal point (4-1) phase has a relatively small contribution to all product life cycle impacts.

Stage 1, Product Stage, was the highest contributor to all impact categories. Carboquick 200 is considered a quality coating with a long service life. Completion of long-term durability testing has the potential to reduce the amount of material inputs, and thus their impact, required for the exterior coating's assumed service life of 60 years.



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.

References

- [1] NSF International, Product Category Rules for Environmental Product Declarations for Architectural Coatings, June 2015.
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- [3] ISO 21930, "Sustainability in buildings and civil engineering works — Core rules for environmental product declarations of construction products and services", ISO 21930:2017.
- [4] Bare, J. 2014. Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) TRACI version 2.1 User's Guide. US EPA Office of Research and Development, Washington, DC, EPA/600/R-12/554, <http://nepis.epa.gov/Adobe/PDF/P100HN53.pdf>
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