



Environmental Product Declaration

Program Operator: Smart EPD®

www.smartepd.com

IN ACCORDANCE WITH ISO 14025:2006 AND ISO 21930:2017



SmartEPD-2026-141-0934-01

Southwest Type 5MD-HR

Date of Issue

Jun 23, 2026

Expiration Date

Jun 23, 2031

Last Updated

Aug 25, 2026



Refer to the EPD Library at www.smartepd.com for the latest EPD listing information

General Information

Carboline

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Product Name:	Southwest Type 5MD-HR
Declared Unit:	1 metric ton of SFRM
Declaration Number:	SmartEPD-2026-141-0934-01
Date of Issue:	June 23, 2026
Expiration:	June 23, 2031
Last updated:	August 25, 2026
EPD Scope:	Cradle to gate with other options A1 - A3, A4, A5
Market(s) of Applicability:	North America

General Organization Information

Carboline is a global leader in high-performance protective coatings, linings, and fireproofing, specializing in the preservation of critical infrastructure through advanced corrosion and fire protection technologies. Founded in 1947 and now a subsidiary of RPM International Inc., the company operates an extensive global network with over 20 manufacturing facilities serving industries such as oil and gas, power generation, and commercial construction. They are widely recognized for iconic product lines like Carbozinc, Carboguard, and Southwest fireproofing, as well as their rigorous UL-certified testing and commitment to low-VOC, sustainable solutions. By combining deep technical expertise with a focus on research and development, Carboline provides engineered systems that extend the service life of assets in some of the world's most aggressive environments.

Further information can be found at: <https://www.carboline.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 product's 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. A manufacturer shall not make claims based on an industry-average EPD which leads the market to believe the industry-average is representative of manufacturer-specific or product-specific results.

Reference Standards

Standard(s): ISO 14025:2006 and ISO 21930:2017

Core PCR:	Smart EPD® Part A Product Category Rules for Building and Construction Products and Services, 1000, v1.2 Date of issue: March 14, 2025
Sub-category PCR:	Smart EPD® Part B PCR for Spray-Applied Fire-Resistive Materials, 1000-003, v4.0 Date of issue: January 16, 2025 Valid until: January 16, 2030
Sub-category PCR review panel:	 Contact Smart EPD for more information.
General Program Instructions:	 Smart EPD General Program Instructions v.2.0, March 2025

Verification Information

LCA Author/Creator:	 Harshil Desai  harshil@parqhq.com
EPD Program Operator:	 Smart EPD  info@smartepd.com  www.smartepd.com  585 Grove St., Ste. 145, Herndon, VA 20170, USA
Verification:	Independent critical review of the LCA and data, according to ISO 14044 and ISO 14071:  Amy Landis  Michigan Technological University  landis@mtu.edu Independent external verification of EPD, according to ISO 14025 and reference PCR(s):  Amy Landis  Michigan Technological University  landis@mtu.edu

External

External

Product Information

Declared Unit:	1 metric ton of SFRM
Mass:	1 kg
Product Specificity:	☒ Product Average ☒ Product Specific ☒ Representative Product EPD

Product Description

Southwest Type 5MD-HR is a medium-density, gypsum-based Spray-applied Fire Resistive Material (SFRM) specifically engineered to provide up to 4 hours of fire protection for interior structural steel and concrete. Its standout feature is a high bond strength exceeding 1,000 psf, which fulfills International Building Code (IBC) requirements for high-rise structures over 420 feet tall. The cementitious, asbestos-free formulation is optimized for application efficiency, allowing for a significant thickness of 1/2" to 5/8" in a single pass, and can be optionally injected with an accelerator to speed up setting and increase material yield. While primers are generally not recommended, it is compatible with specific bonding agents for specialized deck designs; however, it is strictly an indoor solution limited to operating temperatures below 200°F (93°C) and should not be relied upon for corrosion protection.

Further information can be found at: <https://www.carboline.com/products/product-details/Southwest-Type-5MD-HR/>

Product Specifications

Product SKU(s):	Southwest Type 5MD-HR
Product Classification Codes:	EC3 - ThermalMoistureProtection
Density Class:	Medium
Subcategory:	SW Type 5 MD

Material Composition

Material/Component Category	Origin	% Mass
Additive		< 10
Filler		23 - 35
Resin		56 - 84

Packaging Material	Origin	kg Mass
Plastic hdpe		2.00e-02

Biogenic Carbon Content	kg C per metric ton
Biogenic carbon content in product	0
Biogenic carbon content in accompanying packaging	0

Hazardous Materials
CALCIUM SULFATE HEMIHYDRATE (10034-76-1)
MICROCRYSTALLINE SILICA (14808-60-7)
LIMESTONE (1317-65-3)

Hazardous substances are disclosed in accordance with the PCR requirements and supplier SDS information prepared under OSHA Hazard Communication Standard 29 CFR 1910.1200.

EPD Data Specificity

Primary Data Year:	Jan 1, 2025 - Dec 31, 2025
Manufacturing Specificity:	✗ Industry Average ✗ Manufacturer Average ✓ Facility Specific

Averaging:

Averaging was not conducted for this EPD.

System Boundary

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

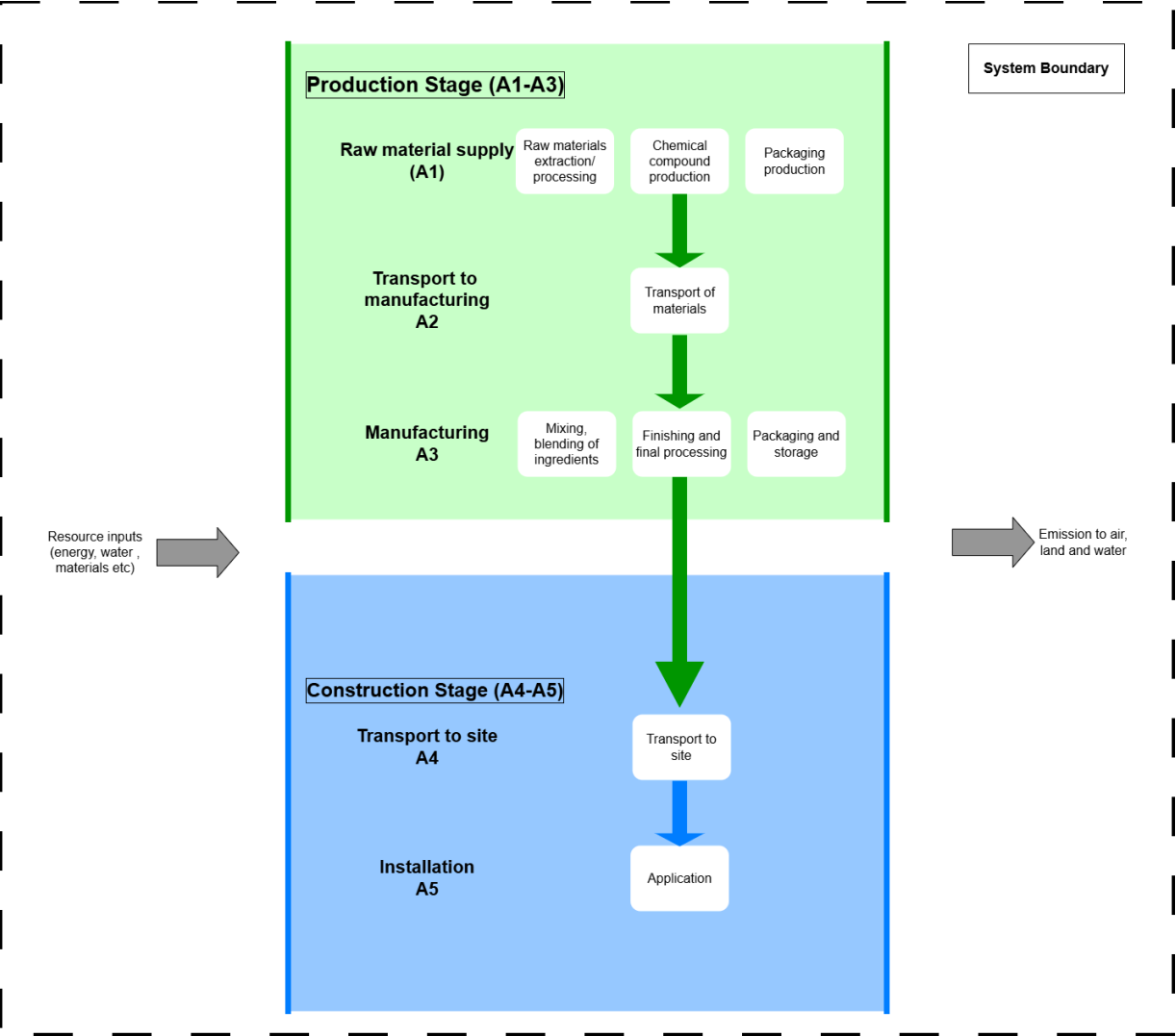
Note:

ND = Module not declared

Plants

 Carboline - Louisa 321 Duke St, Louisa, VA 23093, USA

Product Flow Diagram



Software And Database

- LCA Software:  SimaPro v. 10.2
- LCI Foreground Database(s):  Ecoinvent v. 3.11  Cut-off by Classification
- LCI Background Database(s):  Ecoinvent v. 3.11  Cut-off by Classification

A foreground LCI database is the database used to model the primary, site-specific data collected for this EPD. A background LCI database is the database used to model generic or non-specific data.

Data Quality

The quality of inventory data is evaluated based on several criteria, including precision, completeness, consistency, and representativeness. The analysis follows the data quality level and criteria of the UN Environment Global Guidance on LCA database development. Based on these factors, the overall data quality is rated as "Good".

Precision and completeness:

- Precision (Very Good): 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 database also has documented precision to the extent available.
- Completeness (Very Good): 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 (Good): Primary data were collected with a similar level of detail, while background data primarily came from the ecoinvent database, with other databases used only if necessary or more representative. The modeling approach and other methodological choices were applied consistently throughout the model.
- Reproducibility (Very Good): 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 (Good):

- Temporal: Primary data were collected for the totality of the reference study period to ensure the representativeness. Secondary data from the ecoinvent v3.11 database is typically representative of recent years, a detailed data quality analysis following ISO 21930 was performed on the background database and is available at request.
- Geographical: Primary data represents Carboline's production facility in Louisa, VA. We considered regional differences in electric grid mix using appropriate secondary data. Country-specific data ensures high geographical representativeness, with proxy data used only when necessary.
- Technological (Good): Both primary and secondary data were tailored to the specific technologies studied, ensuring high technological representativeness.

Life Cycle Module Description

The product stage (A1-A3) starts with raw material extraction and upstream processing, and continues through transport to the factory, manufacturing, and packaging of the spray-applied fire-resistive material. It also includes packaging waste, pre-consumer wastes, and any relevant recycling, reuse, landfill, or energy recovery of production wastes. The construction stage (A4-A5) starts when the packaged SFRM leaves the production site and ends with the material being installed at the building site. Impacts include transport to site, installation energy and water use, fuel use, and packaging waste generated during installation. The use stage (B1-B7) is not included in the scope of the SFRM Part B PCR. The PCR treats SFRM as a passive fire-resistive material that generally requires little or no maintenance or replacement during the building life, unless damaged or removed. The end-of-life stage (C1-C4) is not included in the scope of the SFRM Part B PCR. Benefits beyond the system boundary (Module D) are also not included in the scope of the SFRM Part B PCR.

LCA Discussion

Allocation Procedure

Allocation of co-products was avoided to the extent possible by subdividing unit processes or applying system expansion/substitution, where applicable, in accordance with ISO 14044, ISO 21930, and the Smart EPD Part A requirements. Where allocation could not be avoided, allocation was based on mass or

another relevant physical relationship. Economic allocation was applied only where physical allocation was not appropriate. For shared manufacturing-site flows, including energy use, water consumption, wastewater treatment, and emissions, impacts were allocated to the studied SFRM product based on mass where product-specific metering or process-specific data were not available. Solid waste was estimated using packaging masses, manufacturing losses, and site waste records, and was assigned to the module in which the waste was generated. Co-products leaving the production stage were treated in accordance with ISO 21930 and Smart EPD Part A allocation rules. Transport allocation was based on the mass of transported product. Secondary or recovered material inputs, where relevant, were modelled according to the cut-off approach required for the SFRM PCR.

Cut-off Procedure

The system boundary was defined based on relevance to the goal of the study. For the raw material (A1) and process related inputs (A3), all available energy and material flow data have been included in the model. Exclusions allowed by the PCR such as secondary and tertiary packaging, were implemented.

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

Scenarios

Transport to the building/construction site (A4)

A4 Module

Fuel Type:	Diesel
Vehicle Type:	Truck and Trailer
Transport Distance:	1000 km
Capacity Utilization:	33 %
Packaging Mass:	1.76e-02 kg
Gross density of products transported:	205 kg/m ³
Weight of products transported:	1.02e+00 kg
Volume of products transported:	4.97e-06 m ³
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

Net Fresh Water Consumption Specified by Water	1.40e+03 m ³
Source and Fate:	
Electricity Consumption:	8.80e+00 kWh
Other Energy Carriers:	2.52e+02 MJ
Mass of Packaging Waste Specified by Type:	1.76e-02 kg

Assumptions for scenario development:

Water and Energy Installation Scenario Inputs per Declared Unit (1,000 kg) for SFRM based on PCR

Results

Environmental Impact Assessment Results

IPCC AR6 GWP 100, TRACI 2.2

per 1 metric ton of product of SFRM.

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

Impact Category	Unit	Method	A1 - A3	A4	A5
GWP-total	kg CO2 eq	IPCC AR6 GWP 100	1.46e+2	1.13e-1	3.05e+1
GWP-fossil	kg CO2 eq	IPCC AR6 GWP 100	1.46e+2	1.13e-1	3.05e+1
GWP-biogenic	kg CO2 eq	IPCC AR6 GWP 100	1.54e-2	2.65e-5	5.46e-3
GWP-luluc	kg CO2 eq	IPCC AR6 GWP 100	6.70e-3	5.12e-5	4.53e-3
ODP	kg CFC-11 eq	TRACI 2.2	4.21e-7	1.61e-9	7.86e-7
AP	kg SO2 eq	TRACI 2.2	2.47e-1	3.54e-4	1.70e-1
SFP	kg O3 eq	TRACI 2.2	6.60e+0	7.91e-3	4.98e+0
EP-freshwater	kg P eq	TRACI 2.2	1.14e-2	8.04e-6	2.10e-3
EP-marine	kg N eq	TRACI 2.2	5.68e-2	6.77e-5	4.19e-2

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.

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 Indicator

per 1 metric ton of product of SFRM.

Indicator	Unit	A1 - A3	A4	A5
RPRE	MJ	3.44e+1	2.17e-2	7.39e+0
RPRM	MJ	0	0	0
RPRT	MJ	3.44e+1	2.17e-2	7.39e+0
NRPRE	MJ	2.23e+3	1.60e+0	3.90e+2
NRPRM	MJ	0	0	0
NRPRT	MJ	2.23e+3	1.60e+0	3.90e+2
SM	kg	0	0	0
RSF	MJ	0	0	0
NRSF	MJ	0	0	0
RE	MJ	0	0	0
ADP-fossil	MJ	2.23e+3	1.60e+0	3.90e+2
FW	m3	8.12e+0	8.50e-3	6.08e+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:

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, NRPRM 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 metric ton of product of SFRM.

Indicator	Unit	A1 - A3	A4	A5
HWD	kg	0	0	0
NHWD	kg	2.73e-2	0	3.52e-3
HLLRW	kg	0	0	0
ILLRW	kg	0	0	0
CRU	kg	0	0	0
MR	kg	3.36e-2	0	0
MER	kg	2.75e-2	0	1.41e-2
EE	MJ	7.97e-1	0	4.34e-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.

Carbon Emissions and Removals

per 1 metric ton of product of SFRM.

Indicator	Unit	A1 - A3	A4	A5
Bio Carbon Removal from Product	kg CO2	0	0	0
Bio Carbon Emission from Product	kg CO2	0	0	0
Bio Carbon Removal from Packaging	kg CO2	0	0	0
Bio Carbon Emission from Packaging	kg CO2	0	0	0
Bio Carbon Emission from Waste during Manufacturing (renewable source)	kg CO2	0	0	0
Calcination Carbon Removal	kg CO2	0	0	0
Carbonation Carbon Emission	kg CO2	0	0	0
Carbon Emission from Waste during Manufacturing (non-renewable source)	kg CO2	0	0	0

Note:

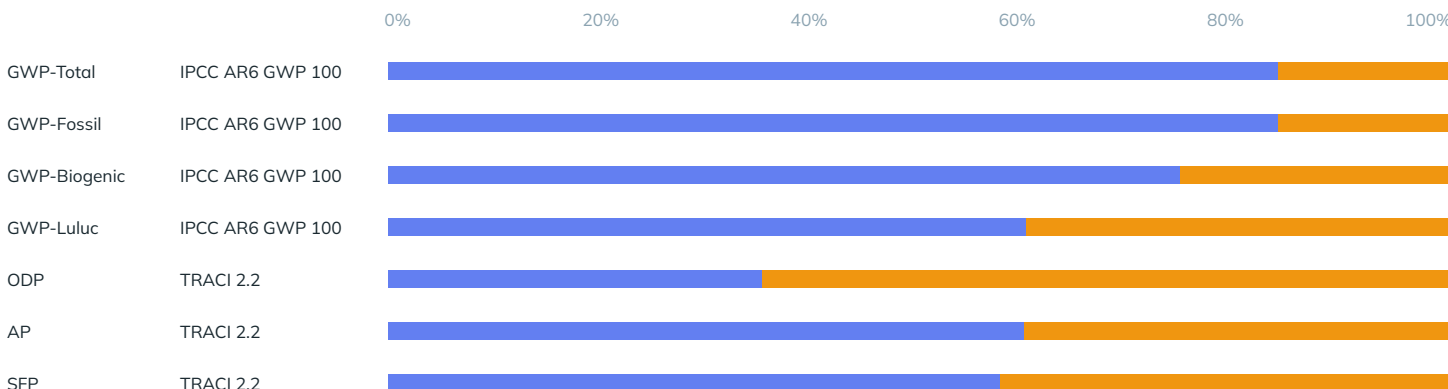
Not all abbreviated indicators listed below may be present in the results above. The inclusion of indicators varies based on PCR requirements.

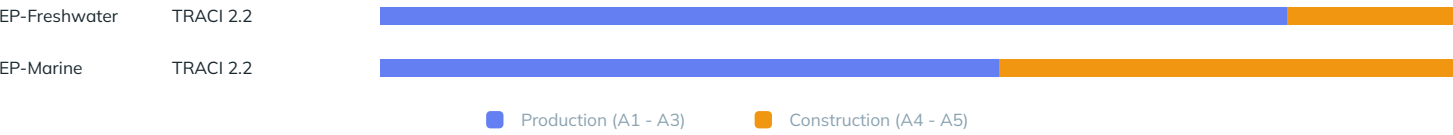
Abbreviations:

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.

Interpretation

Raw materials are sourced from suppliers, transported to manufacturing facilities, and processed into spray-applied fire-resistive material products. The Product Stage (A1–A3) is the main contributor to environmental impact, mainly due to upstream raw material production and manufacturing energy use. The Construction Stage includes transport to the construction site (A4) and installation (A5). A4 impacts depend on distribution distance, transport mode, product density, and load utilization. A5 impacts are driven by the water and energy inputs required for installation, with the applicable scenario selected by SFRM product type and density class. Use-stage impacts, recoating, service-life scenarios, end-of-life treatment, and Module D are not included because they are outside the scope of the SFRM Part B PCR. Sustainability improvements should therefore focus on lower-impact raw materials, supplier engagement, renewable electricity, manufacturing energy efficiency, transport optimization, and efficient installation practices.





Additional Environmental Information

None

References

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Smart EPD. (2025). Part A Product Category Rules for Building and Construction Products and Services, Standard 1000, Version 1.2.

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International Organization for Standardization. (2006). ISO 14044:2006 Environmental management – Life cycle assessment – Requirements and guidelines.

American Center for Life Cycle Assessment. (2019). Guidance to Calculating Non-LCIA Inventory Metrics in Accordance with ISO 21930:2017.