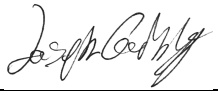
Wall Protection
HRB Integrated Handrails



This Acrovyn® handrail/crash rail combination offers aesthetics and protection in one railing. Offered in a variety of finish options, it features a Quick Lock mounting system that simplifies installation.

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ENVIRONMENTAL PRODUCT DECLARATION

Program Operator	NSF Certification LLC 789 N. Dixboro, Ann Arbor, MI 48105 www.nsf.org
General Program instructions and Version Number	NSF Program Operator Rules, NSF International. February 23, 2015
Manufacturer Name and Address	Construction Specialties Inc. 375-399 S Broad St, Hughesville, PA 17737
Declaration Number	EPD11166
Declared Product and Functional Unit	HRB Integrated Handrails – HRB20 Functional Unit: 1 linear meter of installed wall protection product for 75 years
Reference PCR and Version Number	ISO21930:2017 – Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
Product's intended Application and Use	Providing protection for vertical surfaces of wall or door
Product RSL	15 years
Markets of Applicability	North America
Date of Issue	December 15, 2025
Period of Validity	5 years from date of issue
EPD Type	Product Specific
Range of Dataset Variability	N/A
EPD Scope	Cradle-to-Grave
Year of reported manufacturer primary data	2023
LCA Software and Version Number	LCA FE 10.7
LCI Database and Version Number	MLC Database 2023.1
LCIA Methodology and Version Number	TRACI 2.1 CML 2001-Jan 2016 IPCC AR5
The sub-category PCR review was conducted by:	Thomas Gloria, PhD – Industrial Ecology Consultants Lindita Bushi, PhD – Athena Sustainable Materials Institute Bob Zabcik, P.E., LEED AP BD+C – NCI Building Systems
This declaration was independently verified in accordance with ISO 14025: 2006. The UL Environment "Part A: Life Cycle Assessment Calculation Rules and Report Requirements" v3.2 (December 2018), based on CEN Norm EN 15804 (2012) and ISO 21930:2017, serves as the core PCR, with additional considerations from the USGBC/UL Environment Part A Enhancement (2017) **☐ Internal ☒ External**	Joseph Geibig – Ecoform joseph@ecoform.com 
This life cycle assessment was conducted in accordance with ISO 14044 and the reference PCR by:	WAP Sustainability
This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	Joseph Geibig – Ecoform joseph@ecoform.com 

Limitations: Environmental declarations from different programs (ISO 14025) may not be comparable.
Comparison: EPDs from different programs may not be comparable. Full conformance with a PCR allows EPD comparability only when all stages of a life cycle have been considered, when they comply with all referenced standards, use the same sub-category PCR, and use equivalent scenarios with respect to construction works. 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. Comparison of the environmental performance of Structural and Architectural Wood 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 building energy phase as instructed under this PCR.
Further explanatory material can be obtained supporting this EPD by reaching out to sustainability@CS.com

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Company

Founded in 1948, Construction Specialties (CS) is a family-owned, specialty building products manufacturer. CS provides solutions to challenges that architects, designers, building owners, facility managers, and contractors face every day. Since inventing the first extruded louver, CS has become a global leader in all our product categories: Acrovyn® interior wall protection, impact-resistant doors, entrance flooring, expansion joint solutions, architectural louvers and screens, sunshades, and privacy curtains & tracks. Drawing upon our decades of experience, CS provides extensive services resulting in high-quality products found in some of the world's most significant architecture. For more information about CS products and solutions, please visit c-sgroup.com.

Product Description



Figure 1: HRB-20 Handrail

This product specific EPD represents the highest sales Construction Specialties' HRB Integrated Handrails: HRB-20. The HRB integrated handrails combine maximum protection with maximum aesthetics. Available in solid colors and woodgrain patterns, as well as real wood accents on some models. These handrails include options with Quick Lock brackets for fast installation and brackets for ligature resistant applications, as well as high load requirements.
HRB Integrated Handrails are categorized under Construction Specification Institute (CSI) Masterformat codes 10 26 00 and 10 26 16.16.

Table 1: Product names and mass per functional unit

Declared Product	Mass Per Functional Unit (kg/m)	CS products included in this product category
HRB-20	1.33E+01	HRB-20; HRB-20CM; HRB-20HL; HRB-20CMHL; HRBW-20; HRBW-20CM
*The declared product was chosen because it is the highest volume seller in this product category. For results for additional products within this category please reach out to sustainability@CS.com		

Application

Handrail products are typically used in indoor commercial buildings. They can be installed on various types of walls and provide both decorative and protective functions.

Declaration of Methodological Framework

This LCA is a cradle-to-grave study as represented by the flow diagram below. A summary of the life cycle stages can be found in LCA Calculation Rules. ISO21930 serves as the core PCR with guidance from Part B: Wall and Door Protection EPD Requirements, Version 1.0, 2019. The reference service life (RSL) is outlined in the Reference Service Life & Estimated Building Service section of this EPD. The cut-off criteria are described in Cut-off rules and the allocation procedures are described in the Allocation section. No known flows are deliberately excluded from this EPD. Third party verified ISO 14040/44 secondary LCI data sets contribute more than 67% of total impacts in all impact categories required by the PCR.

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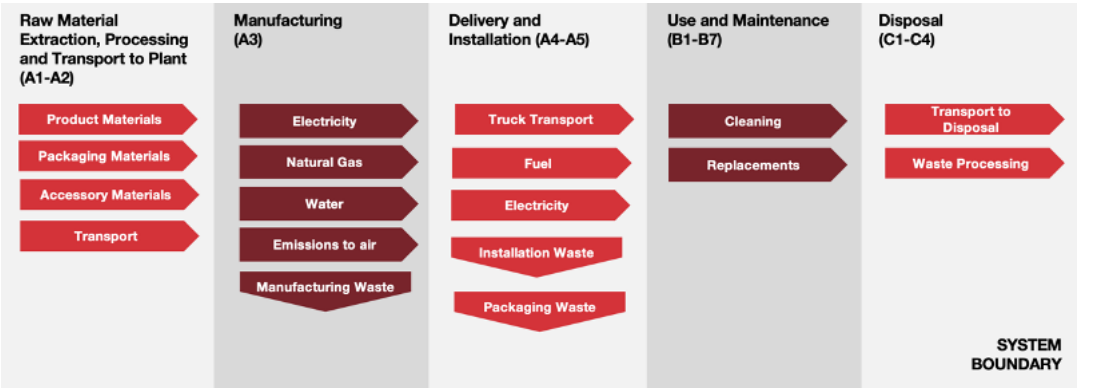


Figure 2: Process Flow Diagram

Technical Requirements

The following technical data describe the product undergoing the life cycle assessment.

Table 2: Technical Details

Specification Characteristic	Test Method	Test Result*
Fire Performance	ASTM E84	Acrovyn Part: Flame Spread: 25 Smoke Developed: 450
Chemical and Stain Resistance -	ASTM D-543	Conducted
Bacterial Resistance -	ASTM G-22	Conducted
Fungal Resistance -	ASTM GG-21	Conducted
Impact Strength [inch] -	ASTM F476-84	19”
Taber Abrasion [cycle] -	ASTM D 4060-07	16,000-18,000
VOC Emissions -	CDPH 01350	Compliant
*Test results are available at https://www.c-sgroup.com/		

Properties of Declared Product as Delivered

HRB integrated Handrails delivered in lengths specified by the buyer and/or cut to size in the field

Material Composition

Table 3: Material Composition

Material	Mass %
Acrovyn*	38.77%
Aluminum	60.75%
Other	0.48%
* Acrovyn is a formulated material proprietary to Construction Specialties. The LCA model for this EPD accounted for CS’s proprietary formulation and included standard raw materials and optional pigments.	

This product does not contain substances that are required to be disclosed per relevant regulations.

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Manufacturing
The raw materials for the product were obtained from various parts of the USA. Some components are supplied pre-fabricated by the suppliers. Such components include irregular shaped metal profiles, splice, brackets, and end caps used on HRB integrated handrails. All components that are not pre-fabricated, including Acrovyn profiles, are extruded or shaped in Muncy and Hughesville, PA facilities. Acrovyn compound is first fed to extruders to produce Acrovyn sheets. Acrovyn sheets are pressed for texture, cut and heat-bended to form the Acrovyn handrail cover for HRB integrated handrails. The Acrovyn handrail cover is then cut to size and assembled with the pre-fabricated components with fasteners or adhesives to form the product and packaged for delivery. The HRB-20 crash rail specifically, is manufactured entirely at the Hughesville, PA facility.

Environment & Health During Manufacturing
During the manufacturing of the products covered in the EPD, all legal regulations regarding emissions to air, wastewater discharge, solid waste disposal and noise emissions are followed.

Packaging
Depending on the quantity and size dimensions, handrails are delivered in packaging of different sizes. The average packaging utilized in the shipment of the product is provided in Table 4.

Table 4: Packaging

Material Type	Amount (kg)
LLPDE	4.54E-04
Cardboard	1.35E-01
PP	3.35E-02
Wood	1.74E-02

Transportation
It is assumed that all the raw materials sourced from the US are distributed by truck. An ingredient-weighted average distance using the locations of suppliers and the manufacturing facilities was calculated and used in the model.
An average shipping distance of 1,529 km from the manufacturing facility to the customer was utilized and was calculated from sales records. The transportation distance for all waste flows is assumed to be 161 km based on a conservative assumption.

Product Installation
Detailed installation instructions are provided online at c-sgroup.com. Installation equipment such as drills and saws common to construction work are required though not included in the study as these are multi-use tools and the impacts-per-functional unit is considered negligible. All waste generated during installation, including packaging waste, is disposed as per PCR Part A Section 2.8.5. Details are provided in Table 9.

Environment & Health During Installation
All recommended personal protective equipment (PPE) should be utilized during installation, as indicated on the SDS found online.

Use
The assumptions required to model the maintenance phase are detailed in PCR Part B Section 3.3. These assumptions are listed in the table below.

Reference Service Life & Estimated Building Service
The reference service life for the product is 15 years, as required by PCR Part B Section 2.13. For a building's estimated service life of 75 years, there will be four replacements needed after initial installation

Re-use Phase & Disposal
Handrails may be recyclable if local recycling facilities are available and may be incinerated for energy recovery if local facilities are available. Re-use after service is not recommended. End-of-life LCA modeling is based on the requirements of PCR Part A. Section 2.8.5.

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LCA CALCULATION RULES

Functional Unit
The functional unit of the wall surface protection product is 1 linear meter of product over a building's estimated service life of 75 years.

System Boundary
The type of EPD is cradle-to-grave. All relevant LCA modules are included and are summarized in Table 6.

Table 5: System Boundary

Module Name	Description	Analysis Period	Summary of Included Elements
A1	Product Stage: Raw Material Supply	2023	Raw Material sourcing and processing as defined by secondary data.
A2	Product Stage: Transport	2023	Shipping from supplier to manufacturing site. Fuel use requirements estimated based on product weights and estimated distance.
A3	Product Stage: Manufacturing	2023	Energy, water and material inputs required for manufacturing products from raw materials. Packaging materials and manufacturing waste are included as well.
A4	Construction Process Stage: Transport	2023	Shipping from manufacturing site to project site. Fuel use requirements estimated based on product weights and mapped distance.
A5	Construction Process Stage: Installation	2023	Installation waste and packaging material waste. As per Part A Section 2.8.4.2, the product is sold as a system and the impacts from the production of installation material is declared in A1-A3.
B1	Use Stage: Use	2023	The use of the product does not involve any consumption of energy and resources
B2	Use Stage: Maintenance	2023	Cleaning energy, water, and materials, including refinishing the product.
B3	Use Stage: Repair	2023	Materials provided to repair the product.
B4	Use Stage: Replacement	2023	Total materials and energy required to manufacture a replacement.
B5	Use Stage: Refurbishment	2023	Materials and energy required to refurbish the product. The product does not require refurbishment once installed.
B6	Operational Energy Use	2023	The product does not impact the operational energy use of the building.
B7	Operational Water Use	2023	The product does not impact the operational energy use of the building.
C1	EOL: Deconstruction	2023	No inputs required for deconstruction.
C2	EOL: Transport	2023	Shipping from project site to landfill. Fuel use requirements estimated based on product weight and mapped distance.
C3	EOL: Waste Processing	2023	Waste processing not required. All waste can be processed as is.
C4	EOL: Disposal	2023	The disposal process of the product varies with the material type as per Part A Section 2.8.5. The impacts from landfilling are modeled based on secondary data.
D	Benefits beyond system	MND	Credits from energy or material capture. This module is not considered.

Estimates & Assumptions
All estimates and assumptions are within the requirements of ISO 14040/44 and PCR Part A & B. The majority of the estimations are within the primary data. The primary data was collected as annual totals including all utility usage and production information. For the LCA, the consumption information was divided by the production to create an energy and water use-per-kilogram. The manufacturing waste generation quantity was estimated based on the manufacturer's process improvement project. Another assumption is that the installation tools are used enough times that the per square meter impacts are negligible, while the electricity to power the tools is included.

Cut-off Rules

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All inputs in which data were available were included. No known flows are deliberately excluded from this EPD. Material inputs greater than 1% (based on total mass of the final product) were included within the scope of analysis. Material inputs less than 1% were included if sufficient data was available to warrant inclusion and/or the material input was thought to have significant environmental impact. Cumulative excluded material inputs and environmental impacts are less than 5% based on total weight of the functional unit.
The list of excluded materials and energy inputs include:

- The colorants used in Acrovyn (0%-0.45%).

Data Sources

Primary data were collected by facility personnel and was used for all manufacturing processes. Whenever available, supplier data was used for raw materials used in the production process. When primary data did not exist, secondary data for raw material production was utilized from GaBi Database Version 8.7, Service Pack 35.

Data Quality

The geographical scope of the manufacturing portion of the life cycle is Muncy and Hughesville PA. All primary data were collected from the manufacturer. The geographic coverage of primary data is considered excellent. The primary data provided by the manufacturer represent all information for calendar year 2023. Using this data meets the PCR requirements. Time coverage of this data is considered very good. Primary data provided by the manufacturer is specific to the technology that Construction Specialties uses in manufacturing their products. It is site- specific and considered of good quality. It is worth noting that the energy and water used in manufacturing the products includes overhead energy such as lighting, heating and sanitary use of water. Sub-metering would improve the technological coverage of data quality. Data necessary to model cradle-to-gate unit processes was sourced from GaBi LCI datasets. Improved life cycle data from suppliers would improve technological coverage.

Period Under Review

The period under review is calendar year 2023.

Allocation

General principles of allocation were based on ISO 14040/44. Where possible, allocation was avoided. When allocation was necessary it was done on a physical mass basis. In the study, the annual facility-level electricity, water, and natural gas usages were allocated to products based on the mass of the annual production. Allocation was most prevalent in the secondary GaBi datasets used to represent upstream processes. As a default, GaBi datasets use a physical mass basis for allocation.

Table 6: Description of the system boundary modules included in the LCA

	Product Stage			Construction Process Stage		Use Stage							End of Life Stage				Benefits and Loads Beyond the System Boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
	Raw material supply	Transport	Manufacturing	Transport from gate to site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Building Operational Energy Use During Product Use	Building Operational Water Use During Product Use	Deconstruction	Transport	Waste processing	Disposal	Reuse, Recovery, Recycling Potential
Cradle-to-Grave	**X**			**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**X**	**MND**

An X in the table above signifies that a module was included in the life cycle assessment. MND stands for Module Not Declared and signifies that a life cycle stage was not evaluated in the life cycle assessment.

LCA Scenarios and Additional Technical Information

Table 7: Transport to the building site (A4) per linear meter

Parameter	Value	Unit
Fuel Type	Diesel	-
Liters of fuel	3.84E+01	l/100km

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Parameter	Value	Unit
Vehicle Type	Truck - Heavy Heavy-duty Diesel Truck / 50,000 lb payload	-
Transport distance	5.91E+02	km
Capacity utilization	6.50E+01	%
Weight of products transported	2.84E+00	kg
Capacity utilization volume factor	1	-

Table 8: Installation into the building (A5) per linear meter

Parameter	Value	Unit
Ancillary Materials*	Steel Tool: 2.22E-03	kg
Electricity consumption	2.00E-02	kWh
Production loss per functional unit	2.65E-01	kg
Waste materials at the construction site before waste processing, generated by product installation	4.70E-01	kg
Plastic Recycling (15%)	3.37E-03	kg
Plastic Landfilling (68%)	2.54E-02	kg
Plastic Incineration (17%)	8.60E-03	kg
Total Plastic Packaging Waste	3.74E-02	kg
Pulp and Wood Recycling (75%)	1.14E-01	kg
Pulp and Wood Landfilling (20%)	3.36E-02	kg
Pulp and Wood Incineration (5%)	2.02E-02	kg
Total Pulp Packaging Waste	1.68E-01	kg
Biogenic carbon contained in packaging	2.65E-01	kg CO2
VOC emissions	<500	µg/m3
*The manufacturing of fasteners has been accounted in Stage A1-A3		

Table 9: Reference Service Life (RSL)

Parameter	Value	Unit
RSL	15	Years
Declared product properties and finishes, etc	See Product Description	Units as appropriate
Design application parameters	Installation as per recommendation by manufacturer	Units as appropriate
An assumed quality of work, when installed in accordance with the manufacturer's instructions	Accepted industry standard	Units as appropriate
Indoor environment	Normal building operating conditions	Units as appropriate
Use conditions	No special use conditions required	Units as appropriate
Maintenance	As described in B2 and B4.	Units as appropriate

Table 10: Maintenance (B2) - Per Estimated Service Life (ESL) of the building (75 years)

Parameter	Value	Unit
Maintenance process information	PCR Part B Prescribed	-
Maintenance cycle	7.82E+02	Cycles/ RSL
Maintenance cycle	3.91E+03	Cycles/ ESL
Net freshwater consumption specified by water source and fate	9.78E-02	m3
Hydrochloric Acid (32%)	9.78E+01	kg
Direct emissions to ambient air (Hydrochloric Acid Evaporation)	19.6E+01 (HCl vapor) 1.76E+02 (Water vapor)	kg

Table 11: Replacement (B4) - Per Estimated Service Life (ESL) of the building (75 years)

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Parameter	Value	Unit
Reference Service Life	1.50E+01	Years
Replacement cycle	4.00E+00	(ESL/RSL)-1
Electricity input	8.00E-02	kWh
Net freshwater consumption	0.00E+00	m3
Ancillary materials	Steel Tool: 8.88E-03	kg
Replacement of worn parts	Replaced as a whole	kg
Direct emissions to ambient air, soil, and water	0.00E+00	kg
Further assumptions for scenario development	N/A	-

Table 12: End-of-life (C1-C4)

Parameter	Value	Unit
Assumptions for scenario development	The deconstruction of the hardware is manual. The deconstructed product is collected with mixed construction waste. As required by the PCR Part A, the non-metal waste is 100% landfilled, while the aluminum waste is 95% recycled and 5% landfilled, and the other metal waste is 74% recycled and 26% landfilled.	
Collected as mixed construction waste	2.65E+00	kg
Non-metal Landfilling (100%)	1.03E+00	kg
Aluminum Waste Recycling (95%)	1.53E+00	kg
Aluminum Waste Landfilling (5%)	8.04E-02	kg
Other Metal Waste Recycling (74%)	9.53E-03	kg
Other Metal Waste Landfilling (26%)	3.35E-03	kg
Removals of biogenic carbon (excluding packaging)	0.00E+00	kg CO2

Per the PCR requirements, modules B1, B3, B5, B6, and B7 shall be reported as “0” impact. As such, the scenario tables for these modules are excluded from this EPD.

LCA Results

All results are given per functional unit, which is 1 linear meter of installed product over an estimated building life of 75 years. Environmental Impacts were calculated using the GaBi software platform. Impact results have been calculated using both TRACI 2.1 and CML 2001-Jan 2016 characterization factors. LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Table 13: Key of Acronyms Used in the Results Tables

LCIA Indicators			
GWPi/e	Global warming potential (including/excluding biogenic carbon)	SFP	Smog Formation Potential
EP	Eutrophication potential	ODP	Depletion of stratospheric ozone layer
AP	Acidification potential of soil and water	ADPf	Abiotic depletion potential for fossil resources
These impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development, however the EPD users shall not use additional measures for comparative purposes.			

LCI Indicators			
RPR_E	Use of renewable primary energy excluding renewable primary energy resources used as raw materials	HWD	Hazardous waste disposed

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LCI Indicators			
RPR_M	Use of renewable primary energy resources used as raw materials	NHWD	Non-hazardous waste disposed
$NRPR_E$	Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	HLRW	High-level radioactive waste, conditioned, to final repository
$NRPR_M$	Use of non-renewable primary energy resources used as raw materials	ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository
SM	Use of secondary materials	CRU	Components for reuse
RSF	Use of renewable secondary fuels	MR	Materials for recycling
NRSF	Use of non-renewable secondary fuels	MER	Materials for energy recovery
RE	Use of recovered energy	EE	Exported energy
FW	Net use of fresh water		
Biogenic Carbon Indicators			
BCRP	Biogenic Carbon Removal from Product	BCEW	Biogenic Carbon Emission from Combustion of Waste from Renewable Sources Used in Production Processes
BCEP	Biogenic Carbon Emission from Product	CCE	Calcination Carbon Emissions
BCRK	Biogenic Carbon Removal from Packaging	CCR	Carbonation Carbon Removals
BCEK	Biogenic Carbon Emission from Packaging	CWNR	Carbon Emissions from Combustion of Waste from Non- Renewable Sources used in Production Processes

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HRB Integrated Handrails

The results are provided based on a functional unit of 1 linear meter of installed product over an estimated building service life of 75 years and are given for the representative product HRB-20.

LCIA Results

Table 14: LCIA Results for HRB-20 (per 1 linear meter of installed product)

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
TRACI 2.1 Results																
GWPi [kg CO_2 eq]	1.38E+01	3.73E-02	1.44E+00	0.00E+00	6.20E+00	0.00E+00	6.14E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-03	0.00E+00	2.41E-02	MND	8.29E+01
GWPe [kg CO_2 eq]	1.42E+01	3.73E-02	1.45E+00	0.00E+00	6.20E+00	0.00E+00	6.30E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.97E-03	0.00E+00	2.41E-02	MND	8.49E+01
ODP [kg CFC 11 eq]	6.78E-13	1.69E-15	6.89E-14	0.00E+00	5.40E-13	0.00E+00	3.02E-12	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.16E-16	0.00E+00	5.20E-15	MND	4.31E-12
AP [kg SO_2 eq]	5.39E-02	6.87E-05	5.43E-03	0.00E+00	1.12E-02	0.00E+00	2.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.28E-05	0.00E+00	1.28E-04	MND	3.09E-01
EP [kg N eq]	1.66E-03	6.69E-06	1.95E-04	0.00E+00	9.07E-04	0.00E+00	8.18E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.25E-06	0.00E+00	1.84E-04	MND	1.11E-02
SFP [kg O_3 eq]	4.93E-01	1.51E-03	5.00E-02	0.00E+00	2.22E-01	0.00E+00	2.19E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.82E-04	0.00E+00	2.25E-03	MND	2.96E+00
CML Results																
ADPf [MJ]	1.89E+02	4.80E-01	1.90E+01	0.00E+00	1.55E+02	0.00E+00	8.35E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.96E-02	0.00E+00	3.60E-01	MND	1.20E+03

Resource Use Results

Table 15: Resource Use Results for HRB-20 (per 1 linear meter of installed product)

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
RPR_E [MJ]	7.14E+01	2.02E-02	7.16E+00	0.00E+00	8.63E+00	0.00E+00	3.15E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.76E-03	0.00E+00	5.28E-02	MND	4.02E+02
RPR_M [MJ]	2.50E+00	0.00E+00	2.50E-01	0.00E+00	0.00E+00	0.00E+00	1.10E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	1.38E+01
$NRPR_E$ [MJ]	1.77E+02	4.85E-01	1.78E+01	0.00E+00	1.63E+02	0.00E+00	7.81E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.05E-02	0.00E+00	3.72E-01	MND	1.14E+03
$NRPR_M$ [MJ]	2.49E+01	0.00E+00	2.49E+00	0.00E+00	0.00E+00	0.00E+00	1.09E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	1.36E+02
SM [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00

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Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
RSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
NRSF [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
RE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
FW [m^3]	2.20E-01	2.18E-05	2.21E-02	0.00E+00	1.32E-01	0.00E+00	9.69E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.06E-06	0.00E+00	4.05E-05	MND	1.34E+00

Output Flows and Waste Results

Table 16: Output Flows and Waste Results for HRB-20 (per 1 linear meter of installed product)

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
HWD [kg]	1.27E-07	8.04E-11	1.27E-08	0.00E+00	3.53E-08	0.00E+00	5.57E-07	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.50E-11	0.00E+00	8.89E-11	MND	7.32E-07
NHWD [kg]	3.72E+00	4.96E-05	5.39E-01	0.00E+00	9.60E-02	0.00E+00	2.15E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.26E-06	0.00E+00	1.11E+00	MND	2.70E+01
HLRW [kg]	4.71E-06	1.98E-09	4.72E-07	0.00E+00	3.35E-06	0.00E+00	2.08E-05	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.69E-10	0.00E+00	4.65E-09	MND	2.93E-05
ILLRW [kg]	4.42E-03	1.66E-06	4.44E-04	0.00E+00	2.80E-03	0.00E+00	1.95E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.10E-07	0.00E+00	4.09E-06	MND	2.72E-02
CRU [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
MR [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
MER [kg]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
EE [MJ]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00

Biogenic Carbon

Table 17: Biogenic Carbon Results for HRB-20 (per 1 linear meter of installed product)

Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
BCRP [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
BCEP [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
BCRK [kg CO2]	2.40E-01	0.00E+00	-1.56E-01	0.00E+00	0.00E+00	0.00E+00	3.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	4.23E-01

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Impact Category	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	Total
BCEK [kg CO2]	0.00E+00	0.00E+00	8.46E-02	0.00E+00	0.00E+00	0.00E+00	3.38E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	4.23E-01
BCEW [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
CCE [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
CCR [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00
CWNR [kg CO2]	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	MND	0.00E+00

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LCA Interpretation

Over the HRB20 product life cycle for all product variations studied, the greatest contributors to GWP for are A1-A3 and replacements (B4). The replacement phase accounts for 78%-80% of impacts, while A1-A3 accounts for 12%-19% of impacts across impact categories. This is illustrated in Figure 3.

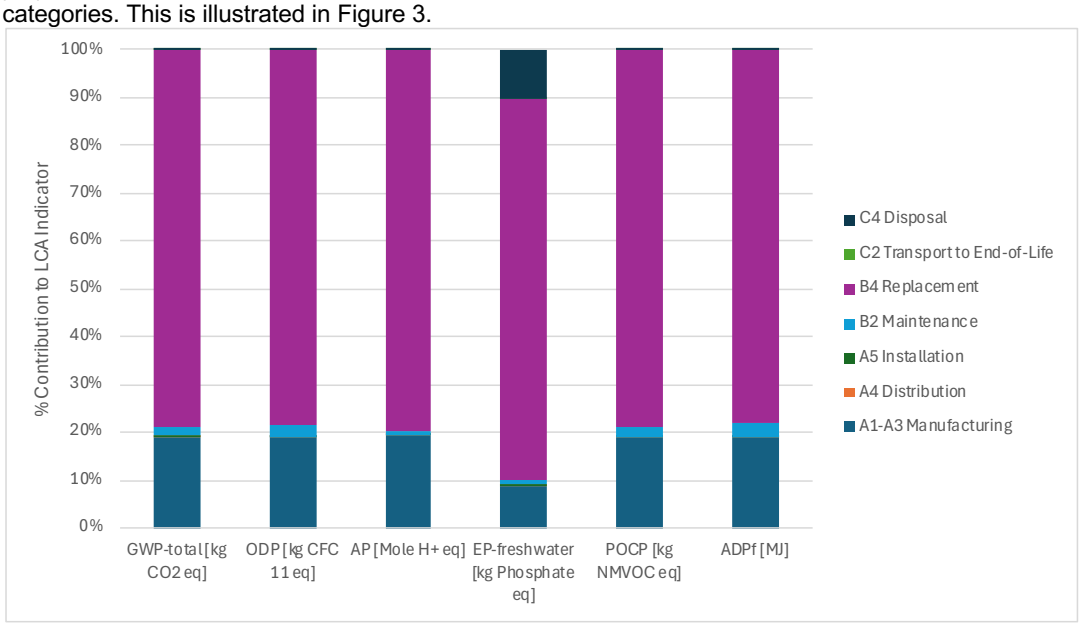


Figure 3: Contribution by life cycle stage to LCIA Results for HRB20

Environmental Activities & Certifications

All general information about the environmental certifications of Construction Specialties' products can be found on Construction Specialties' Sustainability website. Product-specific environment certification information can be located at each product detail webpage under the tab "Data Sheets & Sustainability".

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