Environmental Product Declaration

Environmental Product Declaration for steel studs & track, connectors, resilient channel, and framing accessories produced by CRACO Manufacturing Inc. at their facility in York, South Carolina

ADMINISTRATIVE INFORMATION

International Certified Environmental Product Declaration

Declared Product:	This Environmental Product Declaration (EPD) covers steel stud products produced by CRACO Manufacturing Inc. Declared unit:: 1 metric ton
Declaration Owner:	CRACO Manufacturing Inc. 1122 Johnson Rd York, South Carolina www.cracometals.com
Program Operator:	Labeling Sustainability Address, 11670 W Sunset Blvd. City, State, Los Angeles, CA www.epdregistration.com
Product Category Rule:	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services and Sub Product Category Rule Part B: Designated Steel Construction Product EPD Requirements. PCR Program Operator: UL PCR review was conducted by: Dr. Tom Gloria, Chair; Brandie Sebastian; James Littlefield
Independent LCA Reviewer and EPD Verifier:	This declaration was independently verified in accordance with ISO 14025:2006. Independent verification of the declaration, according to ISO 14025:2006 Internal ☐ ; External X Third Party Verifier Geoffrey Guest, Certified 3rd Party Verifier under the Labeling Sustainability Program (www.labelingsustainability.com), CSA Group (www.csaregistries.ca)
Date of Issue:	26 April 2023
Period of Validity:	5 years; valid until 24 April 2028
EPD Number:	01e6e6a3-c092-411f-a117-d333-dca51d2f

TABLE OF CONTENTS

COMPANY DESCRIPTION

CRACO was founded in the early 1980's on the principles of great customer service and a commitment to quality. Years of unwavering implementation of these values have allowed our business to grow and become the preferred brand in steel framing. Our growth can be largely attributed to the loyalty of our customers and the personal attention they receive, a trait not commonly found in today's automated business environment.

CRACO produces a full line of steel studs & track, connectors, resilient channel, and framing accessories for the building industry. CRACO products are manufactured from high quality steel that meets or exceeds specifications established by ICC, ASTM & AISI.

STUDY GOAL

The intended application of this life cycle assessment (LCA) is to comply with the procedures for creating a Type III environmental product declaration (EPD) and publish the EPD for public review on the website, www.labelingsustainability.com. This level of study is in accordance with EPD Product Category Rule (PCR) for Steel studs published by; International Standards Organization (ISO) 14025:2006 Environmental labels and declarations, Type III environmental declarations-Principles and procedures; ISO 14044:2006 Environmental management, Life cycle assessment- Requirements and guidelines; and ISO 14040:2006 Environmental management, Life cycle assessment-Principles and framework. The performance of this study and its subsequent publishing is in alignment with the business-to-business (B2B) communication requirements for the environmental assessment of building products. The study does not intend to support comparative assertions and is intended to be disclosed to the public.

This project report was commissioned to differentiate CRACO from their competition for the following reasons: generate an advantage for the organization; offer customers information to help them make informed product decisions; improve the environmental performance of CRACO Manufacturing Inc. by continuously measuring, controlling and reducing the environmental impacts of its products; help project facilitators working on Leadership in Energy and Environmental Design (LEED) projects achieve their credit goal; and to strengthen CRACO Manufacturing, Inc's license to operate in the community. The intended audience for this LCA report is CRACO Manufacturing Inc's employees, their suppliers, project specifiers of their products, architects, and engineers. The EPD report is also available for policy makers, government officials interested in sustainability, academic professors, and LCA professionals. This LCA report does not include product comparisons from other facilities.

.DESCRIPTION OF PRODUCT AND SCOPE

CRACO features the latest manufacturing technology for slitting, roll forming and brake forming steel. Our products are proudly and precisely manufactured in accordance with today's code requirements and standards and certified code compliant to ICC ESR #3943 and ESR #3957P and UL.

Figure 1: **CRACO products as covered in this study.**

As per PCR, the EPD shall include technical characteristics, description of the steel products and a complete declared unit. A concerted effort has been made to ensure the accuracy of the technical data represented in the above table.

Table 1: **Technical data for Cold-Formed Steel.**

Product category	Web depth (inches)	Gauge	Mils	Flange/Leg (inches)	Base steel thickness (inches)	Design thickness (inches)	Yield Strength (ksi)
Structural Framing Stud	2-1/2, 3-5/8, 4, 6, 8, 10, 12, 14	20-12	33-97	1-3/8, 1-5/8, 2, 2-1/2	0.0329 thru 0.0966	0.0346 thru 0.1017	33 thru 50
Structural Framing Track	2-1/2, 3-5/8, 4, 6, 8, 10, 12, 14	20-12	33-97	1-1/4, 1-1/2, 2, 2-1/2	0.0329 thru 0.0966	0.0346 thru 0.1017	33 thru 50
Interior Framing SmartStud	1-5/8, 2-1/2, 3-5/8, 4, 6	25-20	15-33	1-1/4	0.0149 thru 0.0329	0.0157 thru 0.0346	33 thru 50
Interior Framing SmartTrack	1-5/8, 2-1/2, 3-5/8, 4, 6	25-20	15-33	1-1/4, 2	0.0149 thru 0.0329	0.0157 thru 0.0346	33 thru 50
Framing Accessories & Connectors		25-12	15-97		0.0149 thru 0.0966	0.0157 thru 0.1017	33 thru 50

The shapes included in the scope of this PCR for Cold-Formed Steel Framing structural and nonstructural members/sections are defined in the American Iron and Steel Institute - North American Specification for the Design of Cold-Formed Steel Structural Members (AISI S100), North American Standard for Cold- Formed Steel Framing – Product Data (AISI S240), North American Standard for Cold-Formed Steel Framing – Nonstructural Members (AISI S220) and the Cold-Formed Steel Design Manual (AISI S100).

Table 2: **Manufacturing Codes & Standards**

Product Category	Product description	Product specification	Material specification
Structural Framing Members	Structural Framing Members are used for exterior applications and sometimes interior structural applications	AISI S100 AISI S240	ASTM A1003
Interior Framing Members	SmartStud & SmartTrack; Reinforced non-standard EQ products and standard thickness products	AISI S100 AISI S220	ASTM A1003
Framing Accessories	RC-1, RC-2, RC-1 MAGNUM, Furring Channel, Z-Furring, L-Angle, Strapping, Slotted Slip Track	AISI S100 AISI S220 AISI S240	ASTM A1003
Connectors	SmartFrame Connectors; SFBC, SFCC, SFVF, SFSF, SFWF, SFTFe, SFTFi, SFTC, SFTA, SFAP, SFWS, SFKB, SFSB, SFUA, SFUAH, SFSA, SFST, SFCS, SFGP, SFMP	AISI S100 AISI S220 AISI S240	ASTM A1003

This LCA assumes the impacts from products manufactured in accordance with the standards outlined in this report. This LCA is a cradle-to-gate study, and therefore, stages extending beyond the plant gate are not included in this LCA. Excluded stages include transportation of the manufactured material to the construction site; on-site construction processes and components; building (infrastructure) use and maintenance; and "end-of-life" effects.

STEEL STUDS DESIGN SUMMARY

The following tables provide a list of the steel studs products considered in this EPD along with key performance parameters.

Table 3: **Declared products with All declared products considered in this environmental product declaration**

Prod#	Unique name/ID	Short description	Product type	Unit	Density, dry kg/Unit	Density, kg/m3	productGroup
1	Steel Studs & Track	Average cold-formed steel framing products and connectors.	Steel	tonne	1,000	7,850	steel stud & track

STEEL STUDS DESIGN COMPOSITION

The following figures provide mass breakdown (kg per functional unit) of the material composition of each steel studs design considered.

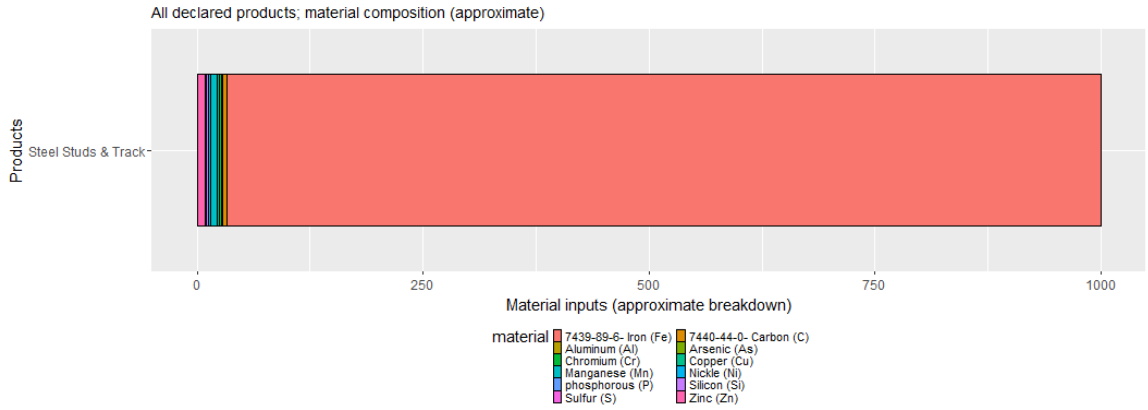

Figure 2: **Material composition - All declared products per metric ton**

A1 RAW MATERIAL RECYCLED CONTENT AND MATERIAL LOSSES

The following table provides a list of the raw material inputs (module A1) across all products considered, their recyclability content and assumed material losses.

Table 4: **Module A1 raw material inputs, the recyclability content and assumed material losses (dry basis)**

product.name	mix.category	primary.content	post.industrial. content	post.consumer. content	material. losses
Steel	steel, low-alloyed	100%	0%	0%	1%

SYSTEM BOUNDARIES

The following figure depicts the cradle-to-gate system boundary considered in this study:

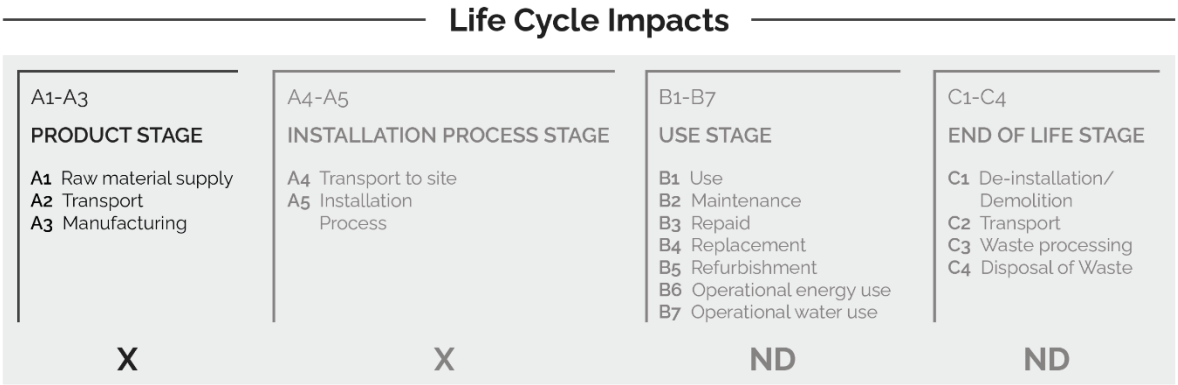

Figure 3: **General life cycle phases for consideration in a construction works system.**

This is a Cradle-to-gate life cycle assessment and the following life cycle stages are included in the study:

- A1: Raw material supply (upstream processes) - Extraction, handling, and processing of the materials used in manufacturing the declared products in this LCA.
- A2: Transportation - Transportation of A1 materials from the supplier to the "gate" of the manufacturing facility (i.e. A3).
- A3: Manufacturing (core processes)- The energy and other utility inputs used to store, move, and manufacturer the declared products and to operate the facility.

As according to the PCR, the following figure illustrates the general activities and input requirements for producing steel studs products and is not necessarily exhaustive.

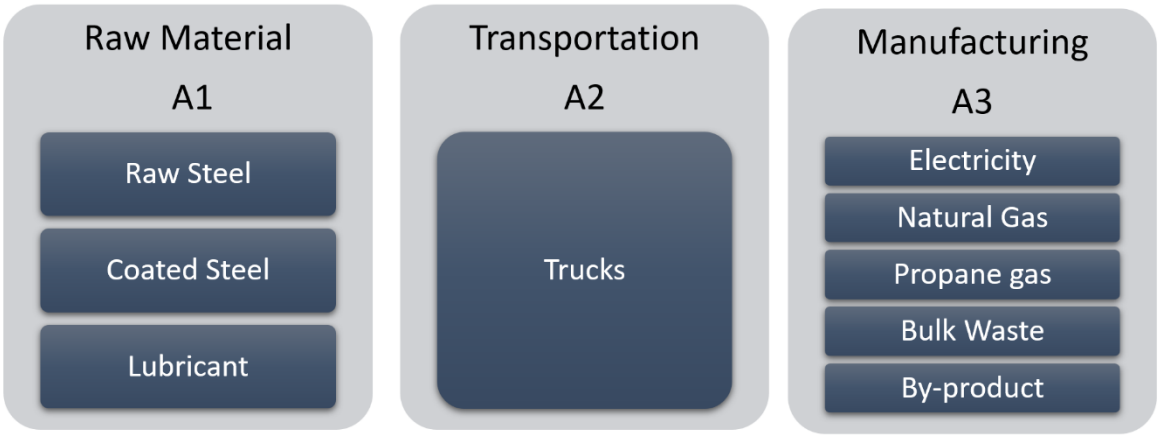

Figure 4: **General system inputs considered in the product system and categorized by modules in scope.**

In addition, as according to the relevant PCR, the following requirements are excluded from this study:

- Production, manufacture and construction of A3 building/capital goods and infrastructure;
- Production and manufacture of steel production equipment, steel delivery vehicles, earth-moving equipment, and laboratory equipment;
- Personnel-related activities (travel, furniture, office supplies);
- Energy use related to company management and sales activities.

For this LCA the manufacturing plant, owned and operated by CRACO Manufacturing Inc, is located at their CRACO facility in York, SC. All operating data is formulated using the actual data from CRACO Manufacturing Inc's plant at the above location, including water, energy consumption and waste generation. All inputs for this system boundary are calculated for the plant.

This life cycle inventory was organized in a spreadsheet and was then input into an RStudio environment where pre-calculated LCIA results for relevant products/activies stemming from the ecoinvent v3.8 database and a local EPD database in combination with primary data from CRACO were utilized. Explanations of the contribution of each data source to this study are outlined in the section 'Data Sources and Quality'. Further LCI details for each declared product

are provided in the sections 'Detailed LCI tables' and 'Transport tables' of the detailed LCA report. A parameter uncertainty analysis was also performed where key statistical results (e.g. min/mean/max etc.) are provided in the detailed LCA report.

No known flows are deliberately excluded from this EPD.

CUT-OFF CRITERIA

ISO 14044:2006 and the focus PCR requires the LCA model to contain a minimum of 95% of the total inflows (mass and energy) to the upstream and core modules be included in this study. The cut-off criteria were applied to all other processes unless otherwise noted above as follows. A 1% cut-off is considered for all renewable and non-renewable primary energy consumption and the total mass of inputs within a unit process where the total of the neglected inputs does not exceed 5%.

DATA SOURCES AND DATA QUALITY ASSESSMENT

No recovered on-site energy occurs at this facility.

Table 5: **Reused or recycled components/materials at the A3 facility site**

Component/material for re-use/recycling	Value	Units	Re-used/recycled on-site or off-site
Steel Scrap	302990.4	kg	On-site

The following statements explain how the above facility requirements/generation were derived:

Raw material transport: Raw material transport is based on the actual distances between the manufacturer and the average of CRACO 's largest suppliers. The steel arrives at CRACO, already coated. All distances are calculated based on CRACO manufacturing primary data. Materials arrive at the CRACO facility by freight truck. The product originates at a manufacturer within the United States and is sold to different distributors by trucks.

Electricity: Primary electricity consumption was calculated for the CRACO manufacturing facility from the electricity bill. CRACO 's fiscal year started in Jan 2022; twelve consecutive months were used, from January through December 2022. CRACO 's utility providers' monthly usage was in kilowatt-hours (kWh), so no conversions were performed.

Process/space heating: Natural gas usage was calculated using CRACO 's utility bills and reported using megajoules (MJ) for the fiscal year from January to December 2022. The products covered in this EPD comprise 99% of the overall product volume; therefore, all natural gas was allocated based on that 99% figure.

Fuel required for machinery: Propane usage for moving materials was calculated from primary CRACO information. Utility bills were used for the fiscal year from January to December 2022. The products covered in this EPD comprise 99% of the overall product volume; therefore, all natural gas was allocated based on that 99% figure.

Waste generation: Only bulk waste is generated at the facility; all materials are consumed and can be re-process and therefore are not waste.

Recovered energy: No on-site energy is recovered on site.

Recycled/reused material/components: By-product steel scrap from drilling and cutting of the finished product has been sold to steel manufacturers for remelting and casting as their raw material.

Module A1 material losses: Actual material loss factors were used as reported by CRACO. Since they are not manufacturing the steel and are just cutting and forming it the loss factors are 0.5% as a conservative estimate.

Direct A3 emissions accounting: Direct emissions were modeled with best available ecoinvent processes (see LCI list).

The following tables depict a list of assumed life cycle inventory utilized in the LCA modeling to generate the impact results across the life cycle modules in scope. An assessment of the quality of each LCI activities utilized from various sources is also provided.

Table 6: **LCI inputs assumed for module A1 (i.e. raw material supply)**

Input	LCI.activity	Data.source	Geo	Year	Technology	Time	Geography	Reliability	Completeness
Structural steel	steel production, electric, low-alloyed/steel, low-alloyed/RoW/kg	Progam Operator: Labeling Sustainability- EPD ID: 730dc7d6-71e3-4b36-9dd7-4fa03b2aba6e	Multiple Regions	21 April 2023	2	3	2	3	3

DATA QUALITY ASSESSMENTS

Data quality/variability requirements, as specified in the PCR, are applied. This section describes the achieved data quality relative to the ISO 14044:2006 requirements. Data quality is judged based on its precision (measured, calculated or estimated), completeness (e.g., unreported emissions), consistency (degree of uniformity of the methodology applied within a study serving as a data source) and representativeness (geographical, temporal, and technological).

Precision: Through measurement and calculation, the manufacturers collected and provided primary data on their annual production. For accuracy, the LCA practitioner and 3rd Party Verifier validated the plant gate-to-gate data.

Completeness: All relevant specific processes, including inputs (raw materials, energy and ancillary materials) and outputs (emissions and production volume) were considered and modeled to represent the specified and declared products. The majority of relevant background materials and processes were taken from ecoinvent ecoinvent v3.8 LCI datasets where relatively recent region-specific electricity inputs were utilized. The most relevant EPDs requiring key A1 inputs were also utilized where readily available.

Consistency: To ensure consistency, the same modeling structure across the respective product systems was utilized for all inputs, which consisted of raw material inputs and ancillary material, energy flows, water resource inputs, product and co-products outputs, returned and recovered Steel studs materials, emissions to air, water and soil, and waste recycling and treatment. The same background LCI datasets from the ecoinvent ecoinvent v3.8 database were used across all product systems. Crosschecks concerning the plausibility of mass and energy flows were continuously conducted. The LCA team conducted mass and energy balances at the plant and selected process level to maintain a high level of consistency.

Reproducibility: Internal reproducibility is possible since the data and the models are stored and available in a machine readable project file for all foreground and background processes, and in Labeling Sustainability's proprietary Steel studs LCA calculator* for all production facility and product-specific calculations. A considerable level of transparency is provided throughout the detailed LCA report as the specifications and material quantity make-up for the declared products are presented and key primary and secondary LCI data sources are summarized. The provision of more detailed publicly accessible data to allow full external reproducibility was not possible due to reasons of confidentiality.

*Labeling Sustainability has developed a proprietary tool that allows the calculation of PCR-compliant LCA results for Steel studs product designs. The tool auto-calculates results by scaling base-unit technosphere inputs (i.e. 1 kg sand, 1 kWh electricity, etc.) to replicate the reference flow conversions that take place in any typical LCA software like openLCA or SimaPro. The tool was tested against several LCAs performed in openLCA and the tool generated identical results to those realized in openLCA across every impact category and inventory metric (where comparisons could be readily made).

Representativeness: The representativeness of the data is summarized as follows.

- Time related coverage of the manufacturing processes' primary collected data from 2021-01-01 to 2021-12-31.
- Upstream (background) LCI data was either the PCR specified default (if applicable) or more appropriate LCI datasets as found in the country-adjusted ecoinvent ecoinvent v3.8 database.
- Geographical coverage for inputs required by the A3 facility(ies) is representative of its region of focus; other upstream and background processes are based on US, North American, or global average data and adjusted to regional electricity mixes when relevant.
- Technological coverage is typical or average and specific to the participating facilities for all primary data.

ENVIRONMENTAL INDICATORS AND INVENTORY METRICS

Per the PCR, this EPD supports the life cycle impact assessment indicators and inventory metrics as listed in the tables below. As specified in the PCR, the most recent US EPA Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI), impact categories were utilized as they provide a North American context for the mandatory category indicators to be included in the EPD. Additionally, the PCR requires a set of inventory metrics to be reported with the LCIA indicators (see tables below).

Table 9: **Life cycle impact categories and life cycle inventory metrics**

ID	LCIA.indicators	Abbreviations	Units
1	environmental impact: acidification	AP	moles of H+-Eq
2	environmental impact: eutrophication	EP	kg N
3	environmental impact: global warming	GWP	kg CO2-Eq
4	environmental impact: ozone depletion	ODP	kg CFC-11-Eq
5	environmental impact: photochemical oxidation	PCOP	kg NOx-Eq
6	material resources: metals/minerals: abiotic depletion potential (ADP): elements (ultimate reserves)	ADPe	kg Sb-Eq
7	energy resources: non-renewable: abiotic depletion potential (ADP): fossil fuels	ADPf	MJ, net calorific value
Inventory metrics			
8	Total primary energy	TPE	MJ-Eq
9	Renewable energy	RE	MJ-Eq
10	Non-renewable energy	NRE	MJ-Eq
11	Non-Renewable Resources	NRR	kg
12	Renewable Resources	RR	m3
13	water depletion: WDP	WDP	m3
14	land filling: bulk waste	LFW	kg waste
15	land filling: hazardous waste	LFHW	kg waste

It should be noted that emerging LCA impact categories and inventory items are still under development and can have high levels of uncertainty that preclude international acceptance

pending further development. Use caution when interpreting data in any of the following categories.

- Renewable primary energy resources as energy (fuel);
- Renewable primary resources as material;
- Non-renewable primary resources as energy (fuel);
- Non-renewable primary resources as material;
- Secondary Materials;
- Renewable secondary fuels;
- Non-renewable secondary fuels;
- Recovered energy;
- Abiotic depletion potential for non-fossil mineral resources.
- Land use related impacts, for example on biodiversity and/or soil fertility;
- Toxicological aspects;
- Emissions from land use change [GWP 100 (land-use change)];
- Hazardous waste disposed;
- Non-hazardous waste disposed;
- High-level radioactive waste;
- Intermediate and low-level radioactive waste;
- Components for reuse;
- Materials for recycling;
- Materials for energy recovery;
- Recovered energy exported from the product system.

TOTAL IMPACT SUMMARY

Results Interpretation The study represents steel studs & track, connectors, resilient channel, and framing accessories produced at CRACO Manufacturing Inc. in York, SC. Primary CRACO data includes energy data, raw materials, and waste. The most significant contribution to CRACO's Carbon footprint, measured in kg CO2 eq, was from the raw materials, A1. Purchased steel contributed 91.67% of the total impact per metric ton of steel studs & track, connectors, resilient channel, and framing accessories manufactured. CRACO only buys steel from domestic steel producers who use scrap as the primary source of iron and have electric arc furnaces (EAF). The A2 transportation stage contributes 2% to the overall carbon footprint of one metric ton of steel product. The A3 manufacturing stage contributes the remainder of the product's overall GWP, global warming potential, through electricity's highest single process contribution at 3.88% of the product footprint.

The following table reports the total LCA results for each product produced at the given steel stud facility on a per metric ton basis.

Table 11: **Total life cycle (across modules in scope) impact results for All declared products, assuming the geometric mean point values on a per metric ton basis**

a) Midpoint Impact Categories:

Indicator/LCI Metric	AP	EP	GWP	ODP	PCOP	ADPe	ADPf
Unit	**moles of H+-Eq**	**kg N**	**kg CO2-Eq**	**kg CFC-11-Eq**	**kg NOx-Eq**	**kg Sb-Eq**	**MJ, net calorific value**

Steel Studs & Track	447	1.7	2010	0.00024	5.36	0.0376	25200

b) Inventory Metrics:

Indicator/LCI Metric	TPE	RE	NRE	NRR	RR	WDP	LFW	LFHW
Unit	**MJ-Eq**	**MJ-Eq**	**MJ-Eq**	**kg**	**m3**	**m3**	**kg waste**	**kg waste**
Steel Studs & Track	28100	1730	26200	1610	0.0391	6.72	831	0.203

ADDITIONAL ENVIRONMENTAL INFO

No regulated substances of very high concern are utilized on site.

REFERENCES

ISO Standards:

- ISO 6707-1: 2014 Buildings and Civil Engineering Works - Vocabulary - Part 1: General Terms
- ISO 14021:1999 Environmental Labels and Declarations - Self-declared Environmental Claims (Type II Environmental Labeling)
- ISO 14025:2006 Environmental Labels and Declarations - Type III Environmental Declarations - Principles and Procedures
- ISO 14040:2006 Environmental Management - Life Cycle Assessment - Principles and Framework
- ISO 14044:2006 Environmental Management - Life Cycle Assessment - Requirements and Guidelines
- ISO 14067:2018 Greenhouse Gases – Carbon Footprint of Products – Requirements and Guidelines for Quantification
- ISO 14050:2009 Environmental Management - Vocabulary
- ISO 21930:2017 Sustainability in Building Construction - Environmental Declaration of Building Products

EN Standards:

- EN 16757 Sustainability of construction works - Environmental product declarations – Product Category Rules for concrete and concrete elements
- EN 15804 Sustainability of construction works - Environmental product declarations -Core rules for the product category of construction products

Other References:

- USGBC LEED v4 for Building Design and Construction, 11 Jan 2019 available at https://www.usgbc.org/resources/pcr-committee-process-resources-part-b
- USGBC PCR Committee Process & Resources: Part B, USGBC, 7 July 2017 available at https://www.usgbc.org/resources/pcr-committee-process-resources-part-b.
- US EPA (2020) Advancing Sustainable Materials Management: 2018 Fact Sheet, https://www.epa.gov/sites/production/files/2021-01/documents/2018_ff_fact_sheet_dec_2020_fnl_508.pdf