Declaration Owner
Victaulic
Aidan Niggel | Aidan.Niggel@victaulic.com
610-559-3300 | https://www.victaulic.com

Product:
Sprinkler Head – Fusible Link

Declared Unit
1 Sprinkler Head

EPD Number and Period of Validity
SCS-EPD-10542
EPD Valid December 9, 2025, through December 8, 2030

Product Category Rule
ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services

Program Operator
SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608
+1.510.452.8000 | www.SCSglobalServices.com

Declaration owner:	Victaulic
Address:	4901 Kesslersville Road, Easton, PA 18040
Declaration Number:	SCS-EPD-10542
Date of Issue:	December 9, 2025
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Program Operator:	SCS Global Services, 2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Declaration URL Link:	https://www.scsglobalservices.com/certified-green-products-guide
General Program Instructions:	SCS Type III Environmental Declaration Program: Program Operator Manual. V12.0
Product(s):	Sprinkler Heads – Fusible Link: V4804 | V4808
Declared Unit:	1 Sprinkler Head
Product's Intended Application and Use:	High Hazard Industrial Applications
Product RSL (if applicable):	N/A
Markets of Applicability:	North America, Europe, Asia
EPD Type:	Product specific
EPD Scope:	Cradle-to-Gate
Year(s) of Reported Manufacturer Primary Data:	May 1, 2024 – April 30, 2025
LCA Software & Version Number:	OpenLCA 2.5
LCI Database(s) & Version Number:	Ecoinvent 3.11, Ecoinvent 3.11 EN 15804 add-on
LCIA Methodology & Version Number:	TRACI 2.2, EF 3.1, CML – IA Baseline
Reference PCR:	ISO 21930:2017 Sustainability in buildings and civil engineering works – Core rules for environmental product declarations of construction products and services
PCR review:	ISO Technical Committee
LCA Practitioner:	Thomas Cygan, Trevor Campbell, Sahil Akolawala
Independent critical review of the LCA and data, according to ISO 14044 and the PCR:	☐ internal ☒ external
LCA Reviewer:	 Lucas Wathen, SCS Global Services
Independent verification of the declaration and data, according to ISO 14025 and the PCR:	☐ internal ☒ external
EPD Verifier:	 Lucas Wathen, SCS Global Services
Declaration Contents:	

Disclaimers: *An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication.*

Conformity: *This EPD conforms to ISO 14025:2006, and ISO 21930:2017.*

Ownership: *The EPD owner has the sole ownership, liability, and responsibility of the EPD.*

Accuracy of Results: *Due to PCR constraints, this EPD provides estimations of potential impacts that are inherently limited in terms of accuracy.*

Comparability: *The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled.*

In accordance with ISO 21930:2017, EPDs are comparable only if they comply with the core PCR, use the same sub-category PCR where applicable, include all relevant information modules and are based on equivalent scenarios with respect to the context of construction works.

1. Victaulic

Since 1919, Victaulic leads the fire protection industry with innovative solutions, serving customers across more than 140 countries. Headquartered in Easton, Pennsylvania, USA. Victaulic is a privately held company innovating technology in the piping and fire protection spaces providing a diverse line of products and services to address the most complex project challenges faced by engineers, site owners, contractors, and distributors.

Victaulic is vertically integrated with engineering, research, product development, and manufacturing all controlled from within, ensuring quality throughout all our global manufacturing facilities. With seven foundries and more than 50 strategically located facilities, Victaulic ensures proximity to its customer-base while sourcing high-quality raw materials and components, including graded scrap steel used to make ductile iron. Engineered for confidence, Victaulic solutions enhance safety, ensure reliability, maximize efficiency, and accelerate project timelines.

Through innovation, manufacturing excellence, and a strong commitment to sustainability, Victaulic continues to set industry standards for fire protection systems across a wide range of applications.

Victaulic operates globally and has two primary sprinkler manufacturing facilities: Leland, NC (US) and Victaulic Piping Products, Dalian (China).

2. Sprinkler Head – Fusible Link

2.1 PRODUCT DESCRIPTION

Victaulic is the global leader in fire protection solutions, delivering technologies and engineering services that address the most complex challenges faced by engineers, site owners, contractors, and distributors. Our products are utilized inside the world's most vital, mission-critical, and prestigious structures, making them safer, healthier, and more secure. With more than a century of pioneering experience, we continually raise standards and push boundaries, revolutionizing the way fire protection systems are designed, installed, and maintained around the world

This EPD covers Victaulic link sprinklers designed for high hazard applications. The three sprinkler models selected for the study are a representation of sprinklers used in high hazard and high-piled storage applications. The study includes the following sprinkler style: a fusible link. The remaining components include, frame, deflector, and Belleville seal. This EPD study is determined to be representative of future sprinkler models, covering both activation elements, unless there is a major design change.

Figure 1: Sprinkler Head – Fusible Link

2.2 MULTIPLE PRODUCT EPD

Findings for the three following fusible link sprinkler heads are included in this EPD. Studied SKUs were indistinguishable within this study after material analysis. All sprinkler heads have the same input and one representative set of results.

V4804/V4808

The results of this EPD are representative of all Victaulic fusible link sprinklers for high hazard applications.

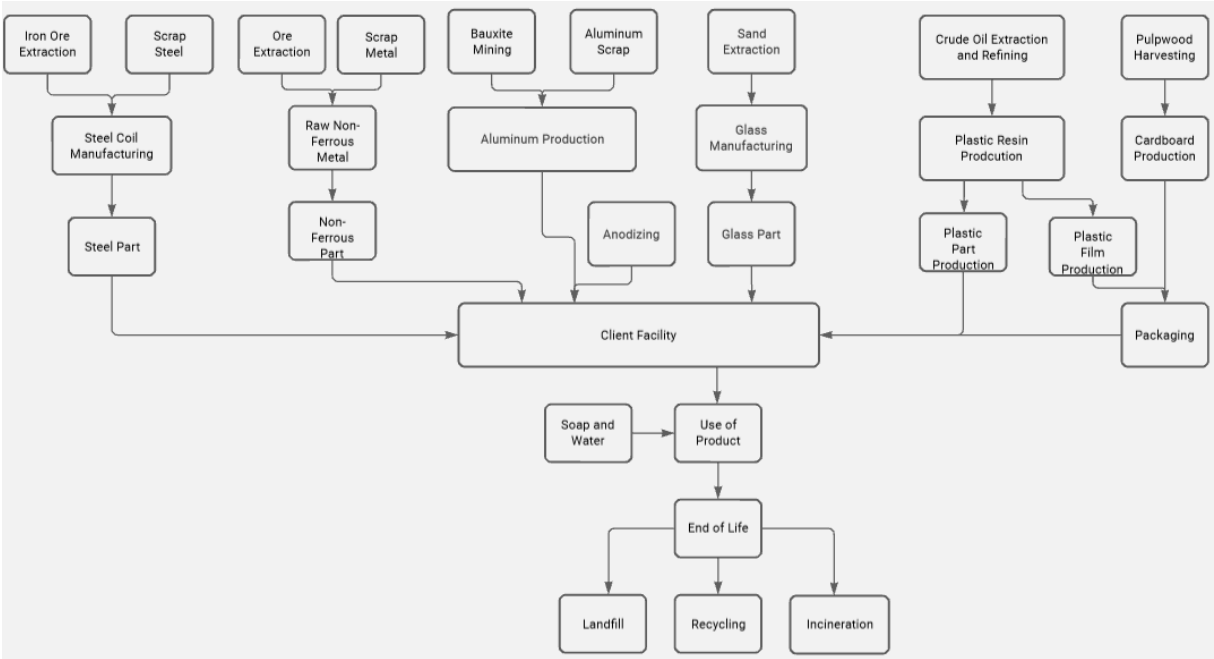
2.3 TECHNICAL SPECIFICATION

Table 1. Performance and technical data for product system Included.

Product System	Type	Number of Declared Units	kg Without Packaging	kg With Packaging	Expected Life Span
Victaulic FireLock Series V4804/4808/4702L Sprinkler Head	Bulb	1	1.84-01	2.04E-01	N/A

2.4 FLOW DIAGRAM

Figure 4: Visualization of material flows for Victaulic Sprinkler Head products.



2.5 APPLICATION

These sprinklers are designed for use in any system and are primarily used in industrial applications. The product is applicable to any fluid and different materials and temperature options are available to meet specific system needs.

2.6 DECLARATION OF METHODOLOGICAL FRAMEWORK

This LCA was conducted with an attributional approach. The scope of the EPD is cradle-to-gate.

Manufacturing resource use was allocated to the products based on mass. Impacts from transportation were allocated based on the mass of material and distance transported.

Processes contributing greater than 1% of the total environmental impact indicator for each impact are included in the inventory.

2.7 MATERIAL COMPOSITION

Note, there are no hazardous or dangerous substances to be known to be in the final products.

Table 2. Material composition per declared unit for 1 Firelock Series V4804/V4808 fusible link sprinkler head

Material	Mass [kg]	Percent	Pre-consumer Recycled Content %	Post-consumer Recycled Content %
Brass	9.07E-02	39.44%	0%	95%
Bronze	4.54E-02	19.72%	0%	0%
HDPE	1.81E-02	7.89%	0%	0%
Nickel	2.72E-03	1.18%	0%	0%
Stainless Steel	7.35E-02	31.95%	0%	0%
Total	**2.30E-01**	**100%**		

2.8 TRANSPORTATION

Table 3. Relevant transportation data for all products.

Name	Unit	Value
Type of transport		Diesel, Low Sulfur (Truck)
Type of vehicle		EURO 4 Lorry
Type and amount of energy carrier	liters/kg-1000 km	4.46E-03 (per kg shipped)

2.9 MANUFACTURE

Products are manufactured at both the Leland, USA and VPP, China facilities. All energy resources used in the production process are accounted for in the model. Electricity is associated to the correct grid using the most recently available Ecoinvent dataset. The suppliers' energy usage was normalized to the product weight based on the production numbers from May 2024 - April 2025. Mass based input and output flows were not available, and obtaining this information was outside of the resources available for the project scope.

The effects and emissions of carbonation for Victaulic sprinkler heads are none. No products in this study contain calcium oxide or calcium hydroxide.

2.10 PACKAGING

Packaging dunnage includes paper, instructions, cardboard inserts, and cardboard boxes. After assessing all packaging scenarios, it was assumed that each sprinkler head was packaged in a 50-piece set with 1 manual, 2 cardboard dividers, and 3 cardboard pads per box. This is the worst case.

Table 4. Biogenic and Land Use and Land Change (LULUC) global warming potential (GWP) for 1 declared unit of packaging materials – Leland facility.

Material	Kg / Declared Unit	Biogenic Impact	LULUC Impact
Cardboard	2.03E-02	-1.90E-04	5.56E-05
Paper	2.03E-02	-2.08E-02	3.47E-06

Table 5. Biogenic and Land Use and Land Change (LULUC) global warming potential (GWP) for 1 declared unit of packaging materials – VPP facility.

Material	Kg / Declared Unit	Biogenic Impact	LULUC Impact
Cardboard	2.03E-02	-1.20E-04	7.71E-05
Paper	2.03E-02	-2.08E-02	1.53E-06

2.11 DISTRIBUTION

Not included in module.

2.12 INSTALLATION

Not included in module.

2.13 PRODUCT USE

Not included in module.

2.14 END-OF-LIFE

Not included in module.

2.15 RE-USE PHASE

Re-use of products or product materials is not included in this study.

3. Methodological Framework

3.1 DECLARED UNIT

The declared unit is 1 sprinkler head. There is no service life or product lifetime associated with a declared unit, and none is applicable to this study as it is Cradle-to-Gate.

The product system is produced at two locations, one in Leland, North Carolina, USA, and one in China VPP.

3.2 SYSTEM BOUNDARY

Table 6. System Boundary

Product			Construction		Use							End-of-life				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 extraction and processing	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

X = Module Included | MND = Module Not Declared

3.3 ALLOCATION

This study is inclusive of all 3 products named in Section 2.2. Since there are no other co-products, no allocation based on co-products is required. A Cradle-to-Gate scope was used.

To derive a per-unit for manufacturing inputs and outputs such as electricity, thermal energy, and waste streams, allocation based on mass by unit was adopted. As a default, secondary Ecoinvent datasets use a mass basis for allocation.

The method in which recycled materials were handled is relevant to the defined system boundary. Throughout the study, recycled materials were accounted for via the cut-off method. In this method, impacts and benefits associated with the previous life of raw material from recycled stock are excluded from the system boundary. Additionally, impacts and benefits associated with secondary functions of materials at the end of life are also excluded (i.e. production into a third life or energy generation from incineration). The study does include the impacts associated with reprocessing and preparation of recycled materials feed streams that are included in the studied product.

3.4 CUT-OFF RULES

Any material present at or above 1 wt% of the final product was included within the scope of this study. 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 impacts.

No energy inputs were excluded in this study. Excluded materials include felts and adhesives used in assembly of the product.

3.5 DATA SOURCES

Table 7. Data Sources for the sprinkler head products. Two versions of each dataset were used: "Ecoinvent 3.11" and "Ecoinvent 3.11 EN15804GD, U" to accommodate all LCA methods reported.[1]

Flow	Dataset	Data Source	Publication Date
Raw Materials			
Brass	market for brass with 95% recycle | brass	Ecoinvent 3.11 / Custom	2025
Bronze	market for bronze | bronze	Ecoinvent 3.11	2024
Brass Casting	casting, brass | casting, brass	Ecoinvent 3.11	2024
HDPE	polyethylene production, high density, granulate | polyethylene, high density, granulate	Ecoinvent 3.11	2024
Plastic Injection Molding	injection moulding | injection moulding	Ecoinvent 3.11	2024
Glass	market for flat glass, coated | flat glass, coated	Ecoinvent 3.11	2024
Stainless Steel	market for steel, chromium steel 18/8 | steel, chromium steel 18/8	Ecoinvent 3.11	2024
Nickel	market for nickel concentrate, 16% Ni | nickel concentrate, 16% Ni	Ecoinvent 3.11	2024
Bronze Casting	casting, bronze | casting, bronze	Ecoinvent 3.11	2024
Paper (Packaging)	market for paper, woodcontaining, lightweight coated | paper, woodcontaining, lightweight coated	Ecoinvent 3.11	2024
Cardboard (Packaging)	market for corrugated board box | corrugated board box	Ecoinvent 3.11	2024
Resources			
Electricity	electricity, medium voltage	Ecoinvent 3.11	2024
Natural Gas	heat, district or industrial, natural gas	Ecoinvent 3.11	2024
Electricity	market for electricity, medium voltage | electricity, medium voltage	Ecoinvent 3.11	2024
Natural Gas	heat and power co-generation, natural gas, conventional power plant, 100MW electrical | heat, district or industrial, natural gas	Ecoinvent 3.11	2024
Water	market for tap water | tap water	Ecoinvent 3.11	2024
Transportation			
Container Ship Transport	market for transport, freight, sea, container ship, heavy fuel oil | transport, freight, sea, container ship, heavy fuel oil	Ecoinvent 3.11	2024
Lorry Transport	market for transport, freight, lorry, unspecified | transport, freight, lorry, diesel, unspecified	Ecoinvent 3.11	2024
Outbound Transport	transport, freight, sea, container ship | transport, freight, sea, container ship	Ecoinvent 3.11	2024
Waste			
Nonhazardous Solid Waste	market group for municipal solid waste | municipal solid waste	Ecoinvent 3.11	2024
Nonhazardous Liquid Waste	market for sewage sludge, 70% water, WWT-SLF, municipal solid waste | sewage sludge, 70% water, WWT-SLF, municipal solid waste	Ecoinvent 3.11	2024
Wastewater	market for wastewater, average | wastewater, average	Ecoinvent 3.11	2024
Glass Waste	market for glass cullet, from fluorescent lamps treatment | glass cullet, from fluorescent lamps treatment	Ecoinvent 3.11	2024
Hazardous Waste	market for hazardous waste, for incineration | hazardous waste, for incineration	Ecoinvent 3.11	2024

[1] Two different versions of the same Ecoinvent database were used. The datasets and flows of the databases are identical, the main difference is in how flows are categorized when results are totaled. Different result totaling is necessary to use various LCA methodologies. TRACI 2.2 and CML – IA Baseline use Ecoinvent 3.11 while EF 3.1 requires Ecoinvent 3.11 EN15804GD, U.

3.6. DATA QUALITY

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 8. Data quality assessment for the Beyond product line.

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	Primary data was provided by the manufacturer and represents all data for May 2024 to April 2025. Time coverage of primary data is considered fully representative. Secondary dataset time coverage varies and is based on when the data was collected. Therefore, the most recent data set was chosen. Overall time coverage is considered to be completely representative and meets the PCR requirements of being no older than 10 years.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The geographical scope of the production stage of this study production in North America and Asia. All primary data was collected from the manufacturer; therefore, the geographical coverage of primary data is considered to be fully representative. The geographical scope of all remaining stages is in China, Germany, and the USA. In selecting secondary data from Ecoinvent, priority was given to technological representativeness of the data. Of the sets that were deemed of high enough quality, then the most representative geographical data was used. This led to Global, European, and Rest of World being used when North American data was not available. Overall geographical data quality is considered partially representative.
Technology Coverage: Specific technology or technology mix	Primary data provided by the manufacturer is specific to the technology that they use in their processes and products. Given that this study is for products manufactured at the Leland and VPP facilities, the technological coverage is completely representative. All facility data was allocated to the product using mass allocation. Secondary data was used to fill the gaps throughout the supply chain to address all inputs from Cradle-to-Gate. Technological coverage of these datasets is considered to be representative of the actual supply chain. Improving primary data in the supply chain would increase the technological coverage, but the use of secondary data sets for generic processes meets the goal and scope of the LCA.
Precision: Measure of the variability of the data values for each data expressed	The precision of the data is considered good. The Victaulic facility team provided the data for a full year of operations. Their team provided a list of suppliers and a Bill of Materials for all products in the scope of the study. All inbound transportation data was estimated. All outbound transportation data is a weighted average of sales.
Completeness: Percentage of flow that is measured or estimated	The data included is considered complete. The LCA model included all known materials and energy flows except for specified materials outlined in Section 3.4. As stated, no known material flows above 1% were excluded and the sum of all exclusions is below 5% when evaluated against mass, energy, and environmental impact.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	The data used in the assessment represent typical or average processes as currently reported from multiple data sources to Ecoinvent and are therefore generally representative of the actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis, though such a determination would require detailed data collection at each node upstream.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of this model is considered high. Victaulic tracks all relevant inputs and outputs of their suppliers' processes over a year, any other primary data used was collected with similar methods and time frame. Modelling assumptions are consistent across the model.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	This study is considered to be reproducible. All assumptions and secondary datasets are described in this report and would allow an LCA practitioner to use an LCA tool to generate the results for the declared unit.

Data Quality Parameter	Data Quality Discussion
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at the Leland, USA and VPP, CN facility represents a yearly consumption and is considered high quality, as this represents fluctuations in production. Secondary LCI datasets from the Ecoinvent database are used as appropriate.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty of any primary data provided by Victaulic is dependent on how the data was allocated to each product. This allocation came from the yearly totals of product produced and utility data. Sub metered processes would decrease the uncertainty of the primary data. For secondary data, all uncertainty is outlined and published by Ecoinvent for Ecoinvent 3.11 datasets.

3.7 PERIOD UNDER REVIEW

Annual sales data was collected during May 2024 - April 2025 to inform the product distribution model. All other primary data was provided by the manufacturer and represents all data for the same year period. Secondary dataset time coverage varies and is based on when the data was collected. Therefore, the most recent dataset was chosen from Ecoinvent 3.11.1 with reference years ending in 2022.

3.8 COMPARABILITY AND BENCHMARKING

The PCR this EPD was based on was not written to support comparative assertions. EPDs based on different PCRs, or different calculation models, may not be comparable. When attempting to compare EPDs or life cycle impacts of products from different companies, the user should be aware of the uncertainty in the final results, due to and not limited to, the practitioner's assumptions, the source of the data used in the study, and the specifics of the product modeled. The comparability of any EPDs is limited to those applying the same functional or declared unit.

3.9 ESTIMATES AND ASSUMPTIONS

Choices and judgments that may have affected the LCA have been described. These decisions are summarized below. The sections referenced in these assumptions correspond to the LCA report for Victaulic sprinkler head products, see that report for complete details.

Data Limitations/Assumptions

- All primary and secondary data was modelled in OpenLCA using Ecoinvent datasets to calculate the potential environmental impacts during each stage of the product's life. For any processes that were not available in the Ecoinvent database, proxy data was used. Details for any proxy data used are outlined in Section 3.5.
- No proxy data was used for specific processes.
- Secondary data sets used in the model are disclosed in Table 9.
- The use and selection of secondary datasets from Ecoinvent to represent an aspect of the supply chain is a significant value choice. These datasets were chosen by the LCA Practitioner after discussions with Victaulic and review of the Ecoinvent datasets. No generic data is a perfect fit. Obtaining primary data from the supply chain data would improve the accuracy of results, however, budget and time constraints were considered.
- Availability of more regionally appropriate data sets would improve accuracy; best choices were made for fit.
- The EF 3.1 inventory flows (LCI) were used for all markets. Inventories using other methodologies were not to the practitioner at the time of this study, and this inventory was the most applicable.

Electrical, Fuels, and Water Consumption

- Data was collected over the year May 1, 2024 – April 30, 2025. The totals over the collection period were scaled by the ratio of the product mass and total mass shipped during that period to derive a usage-per-unit for use in this model.
- Expert built 'market for electricity' datasets were used for both the Leland and VPP facilities. These datasets were built with 2022 data, allocating each facility to the most applicable region available. The regionalization is accurate to the available secondary data, but more specific regions exist. Based on estimates using the most recent E-Grid data (2023) the dataset over represents Leland's electricity impact by 1-3%, varying by indicator. A similar overrepresentation is assumed to be true about VPP.

Raw Materials and Purchasing

- Victaulic provided all bills of materials. Plastic and Cardboard comprise raw materials.
- All declared product systems were modelled using the same assumptions within this study and the results can be applied to all systems using the performance characteristics in Section 2.3. All systems are made from the same materials and processed identically. The only variations of the systems are the material composition of the systems.
- All components were simplified to the material that makes up the most of their mass. At the highest level of detail available: various sprinkler head components included pieces or coatings of variety materials, especially small metal components. All materials of weight above a 1% cut-off were included in this study to the best of Victaulic's knowledge.
- After assessing all packaging scenarios, it was assumed that each sprinkler head was packaged in a 50-piece set with 1 manual, 2 cardboard dividers, and 3 cardboard pads per box. This is the worst case.

Waste Amounts

- Victaulic tracks all waste streams associated with manufacturing of the product at Victaulic facilities over the data collection period.
- Victaulic's suppliers are bound by code of conduct to follow all regional environmental regulations to ensure lawful disposal of materials.
- Victaulic tracks the recycled content of the brass used in the sprinkler heads. The sprinkler head frame contains all of the brass in the product.

Inbound Shipping Distance

- Distances from supplier facilities to the nearest port, port to port, or facility were calculated using the shortest reasonable route. These distances were averaged by country and applied to all materials sourced from that country.

4. LCA: Results

Results of the Life Cycle Assessment are presented below. It is noted that LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

This study reports findings for the international market using the CML – IA Baseline method, for the North American market using the TRACI 2.2 method, and for the European market using the EF 3.1 method. EF 3.1 is the International EPD System (IES) Environmental Performance Indicators; a program that is internationally recognized and operated by EPD International AB.

Based on sales, the North American market is applicable to the Leland facility, and all markets are applicable to the VPP facility. Full details are found in the LCA report for this study.

EN15804+A2 (EF 3.1) indicators and inventory flow results were declared for every product to meet to account for those requirements. The EF 3.1 inventory flows were used for all markets. Inventories using other methodologies were not to the practitioner at the time of this study, and this inventory was the most applicable of available methods.

Results reported in MJ are calculated using lower heating values. All values are rounded to three significant digits.

Table 9. TRACI 2.2 LCIA Impact Categories reported

Impact Category	Unit
Global Warming Potential [GWP]	kg CO_2 eq
Acidification Potential [AP]	kg SO_2 eq
Eutrophication Potential: Freshwater [EPF]	kg P eq
Eutrophication Potential: Marine [EPM]	kg N eq
Ozone Depletion Potential [ODP]	kg CFC^{-11} eq
Smog (Photochemical Oxidation Potential) [POCP]	kg O_3 eq

Table 10. CML – IA baseline LCIA Impact Categories reported

Impact Category	Unit
Global Warming Potential [GWP]	kg CO_2 eq
Abiotic Depletion Potential [ADPE]	Kg Sb eq
Abiotic Depletion Potential, Fossil [ADPF]	MJ, net calorific
Acidification Potential [AP]	kg SO_2 eq
Eutrophication Potential [EP]	kg N eq
Ozone Depletion Potential [ODP]	kg CFC^{-11} eq
Photochemical Oxidation Potential [POCP]	kg C_2H_4 eq

Table 11. EF 3.1 LCIA Impact Categories reported

Impact Category	Unit
Global Warming Potential: Biogenic [GWPB]	kg CO_2 eq
Global Warming Potential: Fossil [GWPF]	kg CO_2 eq
Global Warming Potential: Green House Gas [GWP-GHG]	kg CO_2 eq
Global Warming Potential: Land Use and Land Use Change [GWPL]	kg CO_2 eq
Global Warming Potential: Total [GWPT]	kg CO_2 eq
Abiotic Depletion Potential [ADPE]	Kg Sb eq
Abiotic Depletion Potential, Fossil [ADPF]	MJ, net calorific
Acidification Potential [AP]	mol H^+ eq
Eutrophication Potential: Aquatic Freshwater [EPF]	kg P eq
Eutrophication Potential: Aquatic Marine [EPM]	kg N eq
Eutrophication Potential: Terrestrial [EPT]	mol N eq
Ozone Depletion Potential [ODP]	kg CFC^{-11} eq
Photochemical Oxidation Potential [POCP]	kg NMVOC eq
Water Deprivation Potential [WDP]	m^3 world eq

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. The following inventory parameters, specified by the PCR, are also reported.

Table 12. EF 3.1 LCI Parameters reported.

Resources	Unit
Renewable Primary Energy Used as Energy Carrier [RPRE]	MJ, LHV
Renewable Primary Energy resources used as raw materials [RPRM]	MJ, LHV
Non-renewable Primary Energy Used as Energy Carrier [NRPRE]	MJ, LHV
Non-renewable primary energy resources used as raw materials [NRPRM]	MJ, LHV
Use of secondary materials [SM]	kg
Use of Renewable secondary fuels [RSF]	MJ, LHV
Use of non-renewable secondary fuels [NRSF]	MJ, LHV
Use of net fresh water resources [FW]	kg
Waste and Outflows	**Unit**
Hazardous waste disposed [HWD]	kg
Non-Hazardous waste disposed [NHWD]	kg
High Level Radioactive waste, conditioned, to final repository [HLRW]	kg
Intermediate/Low Level Radioactive waste, conditioned, to final repository [ILLRW]	kg
Components for reuse [CRU]	kg
Materials for recycling [MR]	kg
Materials for energy recovery [MER]	kg
Exported Energy, Electrical [EEE]	MJ, LHV
Exported Energy, Thermal [EET]	MJ, LHV

Table 13. TRACI 2.2 (North America market) Life Cycle Impact Assessment results for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the Leland, USA facility.

Impact Category	Life cycle stage		
	A1	A2	A3
TRACI 2.2			
GWP [kg CO_2 eq]	9.68E-01 81.46%	5.14E-02 04.33%	1.69E-01 14.21%
AP [kg SO_2 eq]	3.18E-02 95.79%	2.17E-04 00.66%	1.18E-03 03.56%
EPF [kg P eq]	3.32E-03 97.98%	5.19E-06 00.15%	6.34E-05 01.87%
EPM [kg N eq]	6.54E-03 85.93%	2.29E-04 03.00%	8.42E-04 11.06%
ODP [kg CFC-11eq]	1.03E-08 77.70%	7.92E-10 05.96%	2.17E-09 16.34%
POCP [kg O_3 eq]	1.44E-01 84.79%	5.59E-03 03.30%	2.02E-02 11.92%

Table 14. EF 3.1 (European market and required indicators) Life Cycle Impact Assessment results for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the Leland, USA facility.

Impact Category	Life cycle stage		
	A1	A2	A3
EF 3.1			
GWPT [kg CO2 eq]	9.84E-01 82.89%	5.22E-02 04.40%	1.51E-01 12.71%
ADPE [kg Sb eq]	5.88E-04 99.91%	1.72E-07 00.03%	3.35E-07 00.06%
APDF [MJ, net calorific]	1.26E+01 77.72%	7.36E-01 04.54%	2.87E+00 17.74%
AP [kg SO2 eq]	4.07E-02 96.16%	2.39E-04 00.56%	1.39E-03 03.27%
EPF [kg P eq]	3.53E-03 97.98%	5.51E-06 00.15%	6.73E-05 01.87%
EPM [kg N eq]	2.47E-03 85.05%	8.88E-05 03.05%	3.46E-04 11.89%
EPT [mol N eq]	3.27E-02 87.78%	9.68E-04 02.60%	3.58E-03 09.62%
GWPB [kg CO2 eq]	1.14E-02 - 148.64%	2.12E-05 - 00.28%	-1.91E-02 248.91%
GWPF [kg CO2 eq]	9.71E-01 81.41%	5.22E-02 04.37%	1.70E-01 14.22%
GWP-GHG [kg CO2 eq]	9.79E-01 81.43%	5.22E-02 04.34%	1.71E-01 14.23%
GWPL [kg CO2 eq]	1.51E-03 77.20%	2.33E-05 01.19%	4.24E-04 21.61%
ODP [kg CFC 11 eq]	9.61E-09 77.81%	7.49E-10 06.07%	1.99E-09 16.12%
POCP [kg NMVOC eq]	9.45E-03 86.95%	3.35E-04 03.08%	1.08E-03 09.97%
WDP [m3 world eq]	5.95E-01 88.73%	4.11E-03 00.61%	7.14E-02 10.66%

Table 15. EF 3.1 Life Cycle Inventory for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the Leland, USA facility.

Parameter	Life cycle stage		
	A1	A2	A3
Resources			
PERE [MJ, LHV]	2.98E+00 81.27%	1.08E-02 00.29%	6.77E-01 18.44%
PERM [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
PENRE [MJ, LHV]	1.26E+01 77.72%	7.36E-01 04.54%	2.87E+00 17.74%
PENRM [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
SM [kg]	2.18E-01 96.44%	5.65E-04 00.25%	7.49E-03 03.31%
RSF [MJ, LHV]	8.56E-03 70.26%	8.01E-05 00.66%	3.54E-03 29.08%
NRSF [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
FW [kg]	1.80E-02 89.96%	1.03E-04 00.51%	1.90E-03 09.52%
Waste and Outflows			
HWD [kg]	5.63E-01 98.40%	1.17E-03 00.21%	7.97E-03 01.39%
NHWD [kg]	2.02E+00 89.12%	7.14E-03 00.32%	2.39E-01 10.56%
HLRW [kg]	3.89E-10 50.08%	8.54E-12 01.10%	3.79E-10 48.82%
ILLRW [kg]	1.29E-09 28.97%	4.52E-11 01.01%	3.13E-09 70.01%
CRU [kg]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
MR [kg]	4.19E-02 85.23%	4.86E-04 00.99%	6.78E-03 13.79%
MER [kg]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
EEE [MJ, LHV]	4.32E-03 58.07%	7.42E-05 01.00%	3.04E-03 40.93%
EET [MJ, LHV]	1.34E-02 93.33%	1.15E-04 00.80%	8.41E-04 05.86%

Table 16. CML – IA baseline Life Cycle Impact Assessment results for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the VPP, CN facility.

Impact Category	Life cycle stage		
	A1	A2	A3
CML – IA baseline			
GWP [kg CO2 eq]	9.94E-01 79.77%	5.24E-02 04.21%	2.00E-01 16.03%
ADPF [MJ]	5.94E-04 99.91%	1.69E-07 00.03%	3.46E-07 00.06%
ADPE [mol Sb eq]	1.14E+01 78.51%	7.27E-01 05.00%	2.40E+00 16.49%
AP [kg SO2 eq]	3.60E-02 97.37%	1.80E-04 00.49%	7.92E-04 02.14%
EP [kg PO4- eq]	1.37E-02 96.10%	6.84E-05 00.48%	4.89E-04 03.42%
ODP [kg CFC-11 eq]	7.83E-09 76.29%	6.08E-10 05.93%	1.83E-09 17.79%
POCP [kg C2H4 eq]	1.39E-03 96.92%	8.38E-06 00.59%	3.57E-05 02.49%

Table 17. TRACI 2.2 (North America market) Life Cycle Impact Assessment results for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the VPP, CN facility.

Impact Category	Life cycle stage		
	A1	A2	A3
TRACI 2.2			
GWP [kg CO_2 eq]	9.87E-01 79.79%	5.20E-02 04.20%	1.98E-01 16.01%
AP [kg SO_2 eq]	3.22E-02 96.73%	2.20E-04 00.66%	8.67E-04 02.61%
EPF [kg P eq]	3.36E-03 98.56%	5.25E-06 00.15%	4.37E-05 01.28%
EPM [kg N eq]	6.63E-03 88.82%	2.31E-04 03.09%	6.04E-04 08.09%
ODP [kg CFC-11eq]	9.94E-09 76.61%	8.00E-10 06.16%	2.24E-09 17.23%
POCP [kg O_3 eq]	1.46E-01 87.83%	5.65E-03 03.40%	1.46E-02 08.77%

Table 18. EF 3.1 (European market and required indicators) Life Cycle Impact Assessment results for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the VPP, CN facility.

Impact Category	Life cycle stage		
	A1	A2	A3
EF 3.1			
GWPT [kg CO2 eq]	1.00E+00 84.58%	5.27E-02 04.44%	1.77E-01 14.92%
ADPE [kg Sb eq]	5.94E-04 100.94%	1.74E-07 00.03%	3.65E-07 00.06%
APDF [MJ, net calorific]	1.28E+01 78.97%	7.43E-01 04.59%	2.55E+00 15.77%
AP [kg SO2 eq]	4.12E-02 97.25%	2.42E-04 00.57%	9.86E-04 02.33%
EPF [kg P eq]	3.57E-03 99.04%	5.57E-06 00.15%	4.64E-05 01.29%
EPM [kg N eq]	2.51E-03 86.28%	8.97E-05 03.08%	2.43E-04 08.37%
EPT [mol N eq]	3.31E-02 88.98%	9.78E-04 02.63%	2.56E-03 06.88%
GWPB [kg CO2 eq]	1.14E-02 - 148.37%	2.14E-05 - 00.28%	-2.30E-02 300.25%
GWPF [kg CO2 eq]	9.91E-01 83.09%	5.27E-02 04.42%	2.00E-01 16.76%
GWP-GHG [kg CO2 eq]	9.99E-01 83.11%	5.27E-02 04.39%	2.01E-01 16.70%
GWPL [kg CO2 eq]	1.54E-03 78.56%	2.36E-05 01.20%	1.61E-04 08.19%
ODP [kg CFC 11 eq]	9.23E-09 74.78%	7.57E-10 06.13%	2.03E-09 16.41%
POCP [kg NMVOC eq]	9.58E-03 88.09%	3.38E-04 03.11%	7.98E-04 07.34%
WDP [m3 world eq]	6.01E-01 89.74%	4.15E-03 00.62%	4.87E-02 07.27%

Table 19. EF 3.1 Life Cycle Inventory for 1 Firelock Series V4804/V4808 fusible link sprinkler head at the VPP, CN facility.

Parameter	Life cycle stage		
	A1	A2	A3
Resources			
PERE [MJ, LHV]	3.01E+00 81.97%	1.09E-02 00.30%	6.11E-01 16.64%
PERM [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
PENRE [MJ, LHV]	1.28E+01 78.98%	7.43E-01 04.59%	2.55E+00 15.76%
PENRM [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
SM [kg]	2.19E-01 96.98%	5.70E-04 00.25%	5.43E-03 02.40%
RSF [MJ, LHV]	8.02E-03 65.87%	8.09E-05 00.66%	2.50E-03 20.52%
NRSF [MJ, LHV]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
FW [kg]	1.82E-02 91.01%	1.04E-04 00.52%	1.13E-03 05.67%
Waste and Outflows			
HWD [kg]	5.69E-01 99.55%	1.18E-03 00.21%	1.47E-02 02.57%
NHWD [kg]	1.87E+00 82.68%	7.21E-03 00.32%	7.99E-02 03.53%
HLRW [kg]	3.87E-10 49.89%	8.64E-12 01.11%	9.23E-11 11.90%
ILLRW [kg]	1.25E-09 28.03%	4.56E-11 01.02%	5.06E-10 11.33%
CRU [kg]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
MR [kg]	4.14E-02 84.13%	4.91E-04 01.00%	4.79E-03 09.74%
MER [kg]	0.00E+00 00.00%	0.00E+00 00.00%	0.00E+00 00.00%
EEE [MJ, LHV]	4.03E-03 54.22%	7.50E-05 01.01%	5.74E-04 07.73%
EET [MJ, LHV]	1.35E-02 93.96%	1.16E-04 00.81%	8.49E-04 05.92%

5. LCA: Interpretation

In summary, raw material acquisition of metals was by far the largest contributor to the product's environmental impact. Specifically, bronze was by far the most dominant factor across all products. It had the highest impact per weight, enough that even increases or decreases caused significant emission shifts. Within the gate-to-gate (production) boundary, the electricity consumption at the Victaulic's facility was the largest contributor.

To reduce environmental impact associated with their products, Victaulic should increase the amount of recycled content in the materials they source, particularly bronze; partner with its suppliers to investigate energy efficiency and reduction projects and explore adding onsite renewable generation or source electricity from renewable sources.

6. Additional Environmental Information

6.1 ENVIRONMENTAL ACTIVITIES AND CERTIFICATIONS

Background LCA report can be available upon request.

6.2 FURTHER INFORMATION

Link to Victaulic resources: https://www.victaulic.com/sustainability/#Resources

7. References

- 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 21930: 2017 Sustainability in building construction – Environmental declaration of building products.
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- EPD International. Environmental Performance Indicators for PCRs under GPI 4 and before. 2022
- IPCC, 2013: Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, 1535 pp.
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For more information, contact:
Victaulic
Aidan Niggel | Aidan.Niggel@victaulic.com
610-559-3300 | https://www.victaulic.com

SCS Global Services
2000 Powell Street, Ste. 600, Emeryville, CA 94608 USA
Main +1.510.452.8000 | fax +1.510.452.8001