



# Statement of Verification

BREG EN EPD No: 000792

Issue: 01

This is to verify that the Environmental Product Declaration provided by:

## Johnson Controls International

are in accordance with the requirements of:

**EN 15804:2012+A2:2019**

and

BRE Global Scheme Document SD207

This declaration is for: 1 unit of Ultra Brass sprinkler with glass bulb K34-TY9101 with the weight of 0.45472 kg/unit

### Company Address

Johnson Controls International,  
5757 N. Green Bay Ave.,  
P.O. Box 591,  
Milwaukee, WI



*Hayley Thomson*  
Signed for BRE Global Limited

Hayley Thomson  
Operator

28 May 2026  
Date of this Issue

28 May 2026  
Date of First Issue

27 May 2031  
Expiry Date



This Statement of Verification is issued subject to terms and conditions (for details visit [www.greenbooklive.com/terms](http://www.greenbooklive.com/terms).)

To check the validity of this statement of verification please, visit [www.greenbooklive.com/check](http://www.greenbooklive.com/check) or contact us.

BRE Global Ltd., Garston, Watford WD25 9XX  
T: +44 (0)333 321 8811 F: +44 (0)1923 664603 E: [Enquiries@breglobal.com](mailto:Enquiries@breglobal.com)





# Environmental Product Declaration

EPD Number: 000792

## General Information

EPD Programme Operator	Applicable Product Category Rules
BRE Global Watford, Herts WD25 9XX United Kingdom	BRE Environmental Profiles 2025 Product Category Rules for Type III environmental product declaration of construction products to EN 15804+A2 PN 514 Rev 3.2
Commissioner of LCA study	LCA consultant/Tool
Johnson Controls International, 5757 N. Green Bay Ave., P.O. Box 591, Milwaukee, WI	Bala Subramanian/BRE LINA A2
Declared Unit	Applicability/Coverage
1 unit of Ultra Brass sprinkler with glass bulb K34-TY9101 with the weight of 0.45472 kg/unit	Other (please specify). Representative product  Product family - Brass sprinkler with glass bulb  Representative product - Ultra K34-TY9101
EPD Type	Background database
Cradle to Gate with Module C and D	Ecoinvent 3.8

### Demonstration of Verification

CEN standard EN 15804 serves as the core PCR <sup>a</sup>

Independent verification of the declaration and data according to EN ISO 14025:2010

Internal

External

(Where appropriate <sup>b</sup>) Third party verifier:

Kim Allbury

a: Product category rules

b: Optional for business-to-business communication; mandatory for business-to-consumer communication (see EN ISO 14025:2010, 9.4)

### Comparability

Environmental product declarations from different programmes may not be comparable if not compliant with EN 15804:2012+A2:2019. Comparability is further dependent on the specific product category rules, system boundaries and allocations, and background data sources. See Clause 5.3 of EN 15804:2012+A2:2019 for further guidance



## Information modules covered

Product			Construction		Use stage							End-of-life				Benefits and loads beyond the system boundary
					Related to the building fabric					Related to the building						
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw materials supply	Transport	Manufacturing	Transport to site	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
<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>

Note: Ticks indicate the Information Modules declared.

### Manufacturing site(s)

Johnson Controls, Inc.  
8902 N I H 27 Ford  
1201 Interstate 27 Service Road  
Lubbock, TX 79403

Johnson Controls, Inc  
Unit A3, A6,  
Trading Est, Yew St,  
Stockport SK4 2JW, United Kingdom

### Construction Product:

#### Product Description

Sprinklers are fixed fire protection devices designed to suppress fires. They operate through a heat sensitive glass bulb containing liquid. As the temperature rises, the liquid expands until the rated threshold is reached, causing the bulb to shatter. This action opens the sprinkler, allowing water to discharge and spread over the protected area.

Sprinklers are manufactured in multiple orientations such as upright, pendant, recessed, and sidewall types to suit various building layouts. They are available with K-factors ranging from 2.8 to 16.8 and temperature ratings from 57 °C to over 182 °C.

Sprinklers are installed in a wide range of building types such as banks, hotels, schools, offices, restaurants, and factories. Variants include standard response, quick response, extended coverage, and corrosion resistant designs, selected according to building requirements and environmental conditions.

For the purposes of this LCA analysis, the sprinkler includes the frame, deflector, compression screw, bulb, button, bushing, and sealing assembly. A standard bulb type sprinkler has been selected to assess and demonstrate the product's environmental impact, and the results apply specifically to this model.

This document constitutes a representative Environmental Product Declaration (EPD) for the family of brass sprinkler products with glass bulbs. The models assessed in this product range includes the following models: Attic TY2180, Attic TY2182, CC3-TY3199, EC-14 TY6237, EC-11 TY5137, EC-5 TY3302, K17-231 TY7151, SW-20-ECOH-TY5332, TY-B TY1151, Ultra K34-TY9101, ELO-231FRB TY5231, LFII TY2234, TY-B TY315, TY-B TY425, and TY-FRB TY3431.

All products belong to the same product family and are assembled in the same production facilities using manufactured components, with the assembly process considered consistent across the range. However,



variations in product design led to differing energy demands per unit. Consequently, even where products have identical unit weights, electricity consumption may vary, reflecting differences in processing time. Therefore, a detailed Life Cycle Assessment (LCA) has been conducted for each individual product using product-specific production data. The Ultra K34-TY9101 model has been selected as the representative product for this EPD, as it has the highest mass within the product family and is therefore considered to be the most conservative (worst-case) scenario.

In addition, product-specific LCA results for life cycle stages A1–A3 are provided in the Annex section of this EPD to ensure transparency across the full product range.

### Technical Information

Property	Value, Unit
Maximum Working Pressure	175 psi (12,1 bar)
Pipe Thread Connection	1-1/4 in. NPT ISO 7-R 1 1/4
Discharge Coefficient	K=33.6 gpm/psi <sup>1/2</sup> (487 Lpm/bar <sup>1/2</sup> )
Temperature Ratings	286°F (141°C)
Maximum Coverage Area	100 ft <sup>2</sup> (9.3 m <sup>2</sup> )
Finish	Natural Brass

Note: The above technical properties are taken from the following website link:

<https://docs.johnsoncontrols.com/tycofire/api/khub/documents/4yWZyq806YFAa46QuCBqXQ/content> . For more information, please contact the JCI Tyco technical team.



### Main Product Contents

Material/Chemical Input	%
Brass	70-75
Copper	20-25%

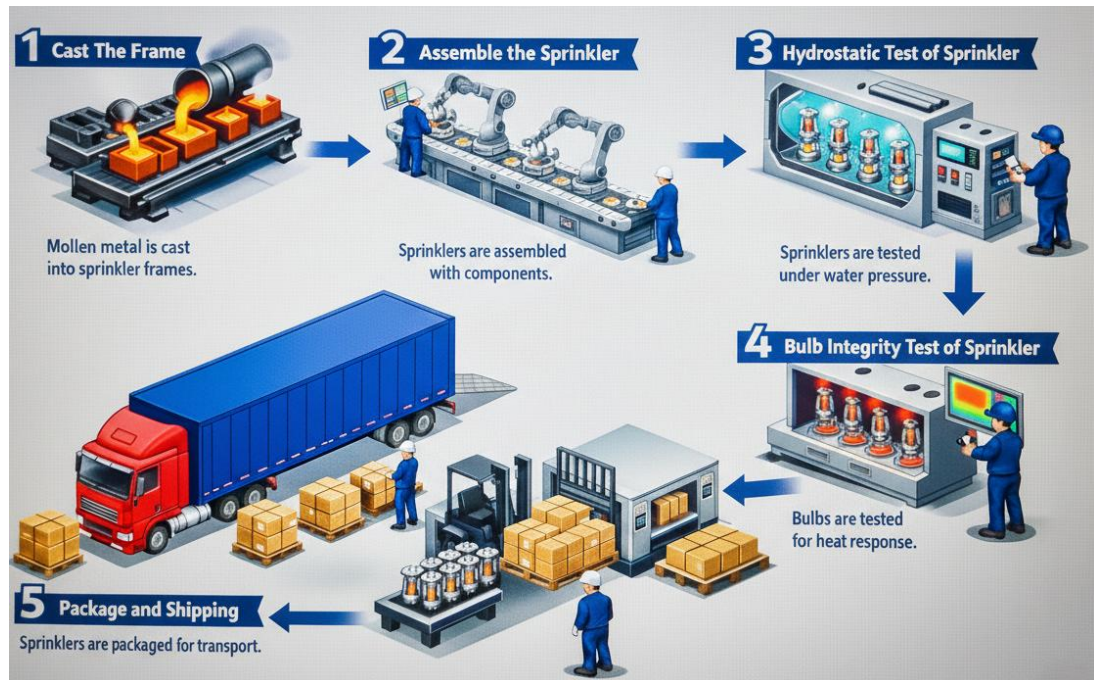
Material/Chemical Input	%
Others	<5
<b>Mass of the packaging</b>	<b>kg</b>
Cardboard box	0.41
Packaging film	0.008
Wooden pallet	0.017

### Manufacturing Process

- **Cast the Frame**  
→ Raw material is cast into the required frame shape and machined for dimensional accuracy.
- **Assemble the Sprinkler**  
→ All components (frame, deflector, bulb, etc.) assembled.
- **Hydrostatic Test the Sprinkler**  
→ Pressure test to ensure no leaks.
- **Bulb Integrity Test the Sprinkler**  
→ Verify bulb/Link strength and activation reliability.
- **Package and Ship the Package**  
→ Pack according to standards for shipping and Dispatch to customer or distribution centre

Note: There is no product waste, as the assembly process takes place at the factory. Any offcuts generated during assembly are negligible and are treated as factory waste, which is sent to the appropriate waste disposal or recycling stream.

### Process flow diagram



### Construction Installation

Prior to installation, it is imperative to consult the safety, installation, and maintenance instructions provided on or with the product. Additionally, installation must be performed by a qualified individual and comply with relevant installation codes and standards, such as *The LPC Rules for Automatic Sprinkler Installations 2015*.



## Use Information

All Tyco sprinklers are covered by a 10-year warranty and must undergo regular inspection, testing, and maintenance as outlined in relevant fire protection standards, including NFPA 25. These standards establish specific replacement or testing intervals for most product types.

According to NFPA 25:

- *Standard sprinklers* require testing or replacement after 50 years.
- *Fast response sprinklers* require testing or replacement after 20 years, with subsequent testing every 10 years.
- *Dry sprinklers* require testing or replacement after 10 years, followed by additional testing every 10 years.
- *Corrosion resistant sprinklers* require testing or replacement after 25 years, with further testing every 5 years thereafter.

A sprinkler that successfully passes testing at the prescribed intervals may remain in service throughout the building's lifespan.

## End of Life

The product family is covered by a 10-year warranty. Upon expiration of this period, refer to the product data sheet for guidance on material composition and proper disposal procedures for sprinklers. The sprinkler frames are suitable for recycling.



## Life Cycle Assessment Calculation Rules

### Declared unit description

1 unit of Ultra Brass sprinkler with glass bulb K34-TY9101 with the weight of 0.45472 kg/unit

### System boundary

In accordance with the modular approach as defined in EN15804:2012+A2:2019 and the BRE 2025 Product Category Rules (PN 514 Rev 3.2), this cradle-to-gate with modules C and D EPD includes the processes covered during the raw material extraction and manufacturing phase in modules A1 to A3 and the end-of-life scenario in modules C1, C2, C3, C4 and module D.

### Data sources, quality and allocation

Specific primary data derived from Johnson Controls International have been modelled using the LINA A2 tool for the period 01/01/2024 to 31/12/2024. In accordance with the requirements of EN15804, the most current available data have been used. Secondary data have been obtained for all remaining upstream and downstream processes that are beyond the control of the manufacturer (i.e. raw material production) from the ecoinvent 3.8 database. All ecoinvent datasets (Cut-off, EN 15804+A2) are complete within the context used and conform to the system boundary and the criteria for the exclusion of inputs and outputs, according to the requirements specified in EN15804+A2:2019. BRE LINA+A2 uses the characterisation factors that are specified in annex C of the 15804 A2 standard.

The LCA analysis has been conducted for the Brass sprinkler with glass bulb family including: Attic TY2180, Attic TY2182, CC3-TY3199, EC-14 TY6237, EC-11 TY5137, EC-5 TY3302, K17-231 TY7151, SW-20-ECOH-TY5332, TY-B TY1151, Ultra K34-TY9101, ELO-231FRB TY5231, LFII TY2234, TY-B TY315, TY-B TY425, and TY-FRB TY3431. An individual LCA model was developed for each product using product-specific production data, and the corresponding results have been included in the assessment. The Ultra K34-TY9101 model has been selected as the representative product for this EPD, as it has the highest mass within the product family and is therefore considered to be the most conservative (worst-case) scenario.

Certain products (ELO-231FRB TY5231, LFII TY2234, TY-B TY315, TY-B TY425, and TY-FRB TY3431) are manufactured at both the US and UK Johnson Controls production facilities. Separate LCA models were developed for each manufacturing site, and weighted average results have been reported in the EPD.

The brass sprinkler with glass bulb product family is not the only product manufactured at these facilities. Therefore, allocation of energy use, water consumption, wastewater discharge, and waste (including non-production waste) was required. A physical allocation approach, based on the number of units produced, was applied to the site-level process data in accordance with EN 15804. The mass balance across all products was within acceptable tolerance limits, and no uplift of input materials was required to reconcile production output and waste. In addition, no proxy datasets were used in the LCA modelling.

The data quality assessment presented above has been carried out in accordance with Table E.1 in the Annex section of the BRE PCR EN 15804+A2 V3.2. The quality level of geography, time and technological representativeness is Very Good as specific UK and US datasets have been selected from the ecoinvent LCI, the background LCI datasets are from ecoinvent v3.8, which was compiled in 2021, and manufacturer-specific primary data has been modelled. Therefore, the most appropriate LCA data have been used.

Specific UK and US datasets have been selected from the ecoinvent LCI for this LCA. Manufacturer uses the national grid electricity for production, so therefore the national grid electricity dataset has been used for the LCA modelling (Ecoinvent 3.8).

US Production facility electricity/natural gas emission factor: The GWP carbon footprint for using 1 kWh of Electricity, medium voltage {TRE}| market for electricity, medium voltage | EN15804, U is 0.503 kgCO<sub>2</sub>e/kWh and for the US natural gas carbon footprint for using 1 kWh is 0.082 kgCO<sub>2</sub>eq.



The UK Production facility electricity/natural gas emission factor: The GWP of the electricity dataset used for this EPD is: 1 kWh UK electricity = 2.39E-01 kgCO<sub>2</sub>eq (Electricity GB (kWh) market for electricity, medium voltage). This is a 2022 UK consumption (or location-based) electricity mix dataset. The GWP of the natural gas dataset used for this EPD is: 1 kWh UK natural gas = 2.32E-01 kgCO<sub>2</sub>eq (Natural gas, at industrial furnace kWh, GB).

### **Cut-off criteria**

All raw materials and energy inputs to the manufacturing process have been included in the assessment, with the exception of direct emissions to air, water, and soil, and ancillary materials. Emissions to air have been reported; however, they are minimal and considered negligible in terms of overall environmental impact.

At the production facility, production and non-production waste streams cannot be separated. Therefore, all waste has been conservatively treated as non-production waste within the assessment.

The life cycle inventory (LCI) developed for this LCA includes all relevant data relating to raw materials, packaging materials, and consumable items used during the manufacturing process.



## LCA Results –1 unit of Ultra K34-TY9101 with the weight of 0.45472 kg/unit

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			GWP-total	GWP-fossil	GWP-biogenic	GWP-luluc	ODP	AP	EP-freshwater
			kg CO <sub>2</sub> eq	kg CO <sub>2</sub> eq	kg CO <sub>2</sub> eq	kg CO <sub>2</sub> eq	kg CFC11 eq	mol H <sup>+</sup> eq	kg (PO <sub>4</sub> ) <sup>3-</sup> eq
Product stage	Raw material supply	A1	2.97E+00	2.94E+00	2.60E-02	5.90E-03	1.67E-07	2.06E-01	1.63E-02
	Transport	A2	3.23E-01	3.22E-01	2.37E-04	1.34E-04	7.35E-08	2.26E-03	1.92E-05
	Manufacturing	A3	1.46E+00	1.61E+00	-1.56E-01	2.58E-03	1.29E-07	5.27E-03	1.53E-03
	Total (Consumption grid)	A1-3	4.76E+00	4.88E+00	-1.30E-01	8.62E-03	3.69E-07	2.13E-01	1.79E-02
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	3.78E-03	3.78E-03	3.22E-06	1.48E-06	8.74E-10	1.53E-05	2.43E-07
	Waste processing	C3	2.43E-02	2.43E-02	8.58E-06	2.43E-06	5.20E-09	2.53E-04	7.53E-07
	Disposal	C4	2.24E-04	2.22E-04	9.26E-07	2.17E-07	7.94E-11	1.99E-06	4.13E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-5.06E-01	-5.07E-01	1.59E-03	-1.44E-04	-2.02E-08	-1.84E-03	-2.00E-04

GWP-total = Global warming potential, total;  
 GWP-fossil = Global warming potential, fossil;  
 GWP-biogenic = Global warming potential, biogenic;  
 GWP-luluc = Global warming potential, land use and land use change;

ODP = Depletion potential of the stratospheric ozone layer;  
 AP = Acidification potential, accumulated exceedance; and  
 EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing environmental impacts			EP-marine	EP-terrestrial	POCP	ADP-mineral & metal	ADP-fossil	WDP	PM
			kg N eq	mol N eq	kg NMVOC eq	kg Sb eq	MJ, net calorific value	m <sup>3</sup> world eq deprived	disease incidence
Product stage	Raw material supply	A1	1.04E-02	1.43E-01	3.95E-02	5.04E-03	3.67E+01	3.51E+00	4.73E-07
	Transport	A2	6.24E-04	6.87E-03	1.95E-03	1.02E-06	4.79E+00	2.01E-02	2.52E-08
	Manufacturing	A3	1.69E-03	9.73E-03	2.64E-03	4.14E-06	2.36E+01	5.04E-01	5.35E-08
	Total (Consumption grid)	A1-3	1.28E-02	1.60E-01	4.41E-02	5.04E-03	6.51E+01	4.03E+00	5.52E-07
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	4.62E-06	5.05E-05	1.55E-05	1.31E-08	5.71E-02	2.57E-04	3.26E-10
	Waste processing	C3	1.12E-04	1.23E-03	3.37E-04	1.25E-08	3.34E-01	7.71E-04	6.77E-09
	Disposal	C4	6.89E-07	7.52E-06	2.18E-06	6.11E-10	5.74E-03	2.61E-04	4.00E-11
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-4.36E-04	-4.63E-03	-2.55E-03	-3.82E-07	-5.13E+00	-3.64E-02	-3.39E-08

EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment;  
 EP-terrestrial = Eutrophication potential, accumulated exceedance;  
 POCP = Formation potential of tropospheric ozone;  
 ADP-mineral&metals = Abiotic depletion potential for non-fossil resources;

ADP-fossil = Depletion potential of the stratospheric ozone layer;  
 WDP = Water (user) deprivation potential, deprivation-weighted water consumption; and  
 PM = Particulate matter.



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

			Parameters describing environmental impacts				
			IRP	ETP-fw	HTP-c	HTP-nc	SQP
			kBq U <sup>235</sup> eq	CTUe	CTUh	CTUh	dimensionless
Product stage	Raw material supply	A1	3.67E-01	1.68E+03	3.84E-08	2.75E-06	6.78E+01
	Transport	A2	2.42E-02	3.63E+00	1.27E-10	3.75E-09	2.97E+00
	Manufacturing	A3	2.70E-01	1.71E+01	5.29E-10	1.32E-08	1.98E+01
	Total (Consumption grid)	A1-3	6.61E-01	1.70E+03	3.91E-08	2.77E-06	9.06E+01
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	2.94E-04	4.46E-02	1.44E-12	4.68E-11	3.93E-02
	Waste processing	C3	1.50E-03	1.95E-01	7.55E-12	1.42E-10	4.25E-02
	Disposal	C4	2.62E-05	3.83E-03	1.28E-13	2.54E-12	1.28E-02
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-9.08E-03	-1.52E+01	-2.71E-09	-1.04E-08	-1.00E+00

IRP = Potential human exposure efficiency relative to U235;  
 ETP-fw = Potential comparative toxic unit for ecosystems;  
 HTP-c = Potential comparative toxic unit for humans;

HTP-nc = Potential comparative toxic unit for humans; and  
 SQP = Potential soil quality index.



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Parameters describing resource use, primary energy			PERE	PERM	PERT	PENRE	PENRM	PENRT
			MJ	MJ	MJ	MJ	MJ	MJ
Product stage	Raw material supply	A1	9.34E+00	0.00E+00	9.34E+00	3.64E+01	2.45E-01	3.66E+01
	Transport	A2	5.60E-01	0.00E+00	5.60E-01	1.58E+02	0.00E+00	1.58E+02
	Manufacturing	A3	4.70E-01	5.44E+00	5.91E+00	2.33E+01	3.98E-01	2.37E+01
	Total (Consumption grid)	A1-3	1.04E+01	5.44E+00	1.58E+01	2.17E+02	6.43E-01	2.18E+02
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	8.05E-04	0.00E+00	8.05E-04	5.61E-02	0.00E+00	5.61E-02
	Waste processing	C3	1.87E-03	0.00E+00	1.87E-03	3.27E-01	0.00E+00	3.27E-01
	Disposal	C4	7.01E-05	0.00E+00	7.01E-05	5.64E-03	0.00E+00	5.64E-03
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-1.06E-01	0.00E+00	-1.06E-01	-5.08E+00	0.00E+00	-5.08E+00

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials;  
 PERM = Use of renewable primary energy resources used as raw materials;  
 PERT = Total use of renewable primary energy resources;

PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials;  
 PENRM = Use of non-renewable primary energy resources used as raw materials;  
 PENRT = Total use of non-renewable primary energy resource



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

			Parameters describing resource use, secondary materials and fuels, use of water			
			SM	RSF	NRSF	FW
			kg	MJ net calorific value	MJ net calorific value	m <sup>3</sup>
Product stage	Raw material supply	A1	1.22E-01	0.00E+00	0.00E+00	8.60E-02
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	4.98E-04
	Manufacturing	A3	4.04E-01	0.00E+00	0.00E+00	1.19E-02
	Total (Consumption grid)	A1-3	5.27E-01	0.00E+00	0.00E+00	9.85E-02
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	6.37E-06
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	1.90E-05
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	6.12E-06
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	-8.82E-04

SM = Use of secondary material;  
RSF = Use of renewable secondary fuels;

NRSF = Use of non-renewable secondary fuels;  
FW = Net use of fresh water



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing waste categories			HWD	NHWD	RWD
			kg	kg	kg
Product stage	Raw material supply	A1	8.61E-01	5.89E+01	1.33E-04
	Transport	A2	5.25E-03	8.77E-02	3.25E-05
	Manufacturing	A3	2.05E-02	2.36E+00	3.05E-05
	Total (Consumption grid)	A1-3	8.86E-01	6.14E+01	1.96E-04
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	6.30E-05	1.12E-03	3.87E-07
	Waste processing	C3	4.39E-04	3.08E-03	2.30E-06
	Disposal	C4	8.20E-06	1.01E-02	3.62E-08
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	-4.68E-02	-9.63E-01	-5.43E-06

HWD = Hazardous waste disposed;  
 NHWD = Non-hazardous waste disposed;  
 RWD = Radioactive waste disposed



## LCA Results (continued)

(MND = module not declared; MNR = module not relevant; INA = indicator not assessed; AGG = aggregated)

Other environmental information describing output flows – at end of life						
			CRU	MFR	MER	EE
			kg	kg	kg	MJ per energy carrier
Product stage	Raw material supply	A1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	A2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Manufacturing	A3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Total (Consumption grid)	A1-3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
End of life	Deconstruction, demolition	C1	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Transport	C2	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Waste processing	C3	0.00E+00	0.00E+00	0.00E+00	0.00E+00
	Disposal	C4	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Potential benefits and loads beyond the system boundaries	Reuse, recovery, recycling potential	D	0.00E+00	0.00E+00	0.00E+00	0.00E+00

CRU = Components for reuse;  
MFR = Materials for recycling

MER = Materials for energy recovery;  
EE = Exported Energy

BIOTIC CARBON CONTENT	Unit	Quantity
Biogenic carbon (product)	kgC	0.00E+00
Biogenic carbon (packaging)	kgC	1.91E-01



## Scenarios and additional technical information

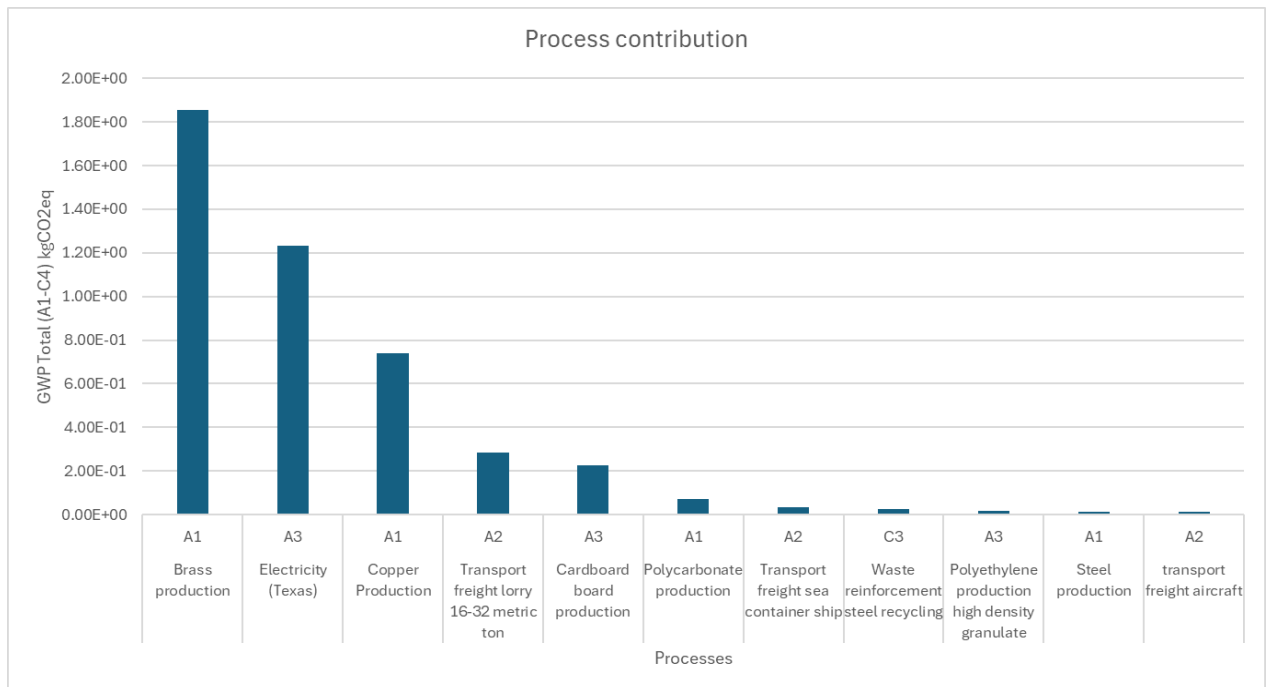
Scenarios and additional technical information			
Scenario	Parameter	Units	Results
C1 - Deconstruction	At end of life, the fire sprinkler system is dismantled through the manual process, with steel and brass components manually removed and sent for recycling, plastics directed to energy recovery where feasible, and only minor residual fractions disposed of to landfill. It's assumed that 100% of the product is recovered at the end of life		
C2 – Transportation	50km by road has been modelled for module C2 as a typical distance from the demolition site to the disposal unit. However, end-users of the EPD can use this information to calculate the impacts of a bespoke transport distance for module C2 if required.		
	Road transport	Lorry, 16-32 tonne	50
C3 – Waste processing	Once the waste fire sprinkler reaches the waste processing facility, the product will undergo sorting and further processing. The fire sprinkler is made of stainless steel, bronze, and brass; the bulb protector is made of polycarbonate, and it also contains a glass bulb.		
	At the waste processing plant, the fire sprinkler will be treated as steel waste, as the brass, copper and bronze components cannot be separated. As a result, as per the BRE PCR EN15804+A2 EOL scenario - 95% of the steel waste will be recycled, while the remaining 5% cannot be recovered during waste processing and will therefore be sent to landfill. The glass bulb and the bulb protector cannot be recovered and will also be sent to landfill.		
Ultra K34-TY9101	Metal waste to recycling	kg	0.42250
C4 – Disposal	Some of the products won't be recycled at the waste processing facility. Therefore, 5% of the waste steel will be landfilled along with glass and its glass protector.		
	Steel waste to landfill	kg	0.022237
Ultra K34-TY9101	Inert waste to landfill	kg	0.0100
	<p>It is assumed that 95% of the fire sprinkler, comprising stainless steel, bronze, and brass used in the Ultra K34-TY9101, is recovered for recycling at end of life, while the remaining 5% is landfilled.</p> <p>As described in Module C3, the fire sprinkler is treated as steel waste, as the brass and bronze components cannot be separated. Therefore, "Benefits and loads beyond the system boundary" (Module D) account for the environmental benefits and loads associated with the net steel scrap used as raw material in the electric arc furnace (EAF), based on the material collected for recycling at end of life.</p> <p>The net effect is that Module D primarily models the burdens associated with scrap input (secondary material) to the steelmaking process. However, the benefits have been calculated only for the virgin fraction of brass, copper, and stainless steel, with the secondary material content removed.</p> <p>All <b>secondary material (SM) percentages</b> have been sourced from <b>ecoinvent v3.8</b>.</p> <ul style="list-style-type: none"> <li>• <b>Copper SM</b> = 0.35 kg/kg</li> <li>• <b>Brass SM</b> = 0.26 kg/kg</li> <li>• <b>Stainless steel SM</b> = 0.57 kg/kg</li> </ul>		
Module D	Total SM	Per unit	0.1224
	Virgin quantity	Per unit	0.3001



## Interpretation of results

The bulk of the environmental impacts and primary energy demand are attributed to the manufacturing of Ultra K34-TY9101 product, covered by information modules A1-C4 of EN15804:2012+A2:2019. The Ultra K34-TY9101 has been taken as a representative as this the most weighted product in the range.

Out of the total mass of input materials, Brass makes up 74%, Copper 23%, and remaining of other components. The chart illustrates the relative contributions of various processes to overall greenhouse gas emissions, measured as global warming potential. It highlights that material production, particularly of metals has the highest environmental impact, with primary Brass production standing out as the most significant contributor. Energy used for the production; transportation of the raw materials also plays major roles.





## Annex – Individual product results

Brass sprinkler products with glass bulbs include numerous SKU's and the following models were assessed as part of this family LCA: Attic TY2180, Attic TY2182, CC3-TY3199, EC-14 TY6237, EC-11 TY5137, EC-5 TY3302, K17-231 TY7151, SW-20-ECOH-TY5332, TY-B TY1151, Ultra K34-TY9101, ELO-231FRB TY5231, LFII TY2234, TY-B TY315, TY-B TY425, and TY-FRB TY3431.

In this EPD, the Ultra K34-TY9101 product has been selected as a representative of the brass sprinkler with glass bulb family, as it is the most weighted product, and its results have been included in the EPD. In addition, a separate LCA analysis has been conducted for each representative product listed below using product-specific production data, and the A1–A3 results are presented in the table below.

To access the full set of results for the individual product range, please contact the Johnsons control sustainability team.

Product name	Weight (kg)	Indicator	Unit	A1	A2	A3	A1-A3
Attic TY2180	0.12036	GWP-total	kg CO2 eq	0.52	0.14	1.24	1.90
Attic TY2182	0.09534	GWP-total	kg CO2 eq	0.36	0.13	1.25	1.73
CC3-TY3199	0.0794	GWP-total	kg CO2 eq	0.39	0.12	0.41	0.92
EC-14- TY6237	0.10662	GWP-total	kg CO2 eq	0.58	0.13	0.40	1.11
EC-11- TY5137	0.12716	GWP-total	kg CO2 eq	0.65	0.14	0.40	1.19
EC-5 TY3302	0.09107	GWP-total	kg CO2 eq	0.47	0.12	0.41	1.00
K17-231 TY7151	0.14279	GWP-total	kg CO2 eq	0.77	0.16	0.66	1.58
SW-20-ECOH-TY5332	0.13923	GWP-total	kg CO2 eq	0.72	0.15	1.56	2.43
TY-B TY1151	0.07873	GWP-total	kg CO2 eq	0.42	0.12	0.29	0.83
ELO-231FRB TY5231	0.1417	GWP-total	kg CO2 eq	0.88	0.15	0.35	1.37
LFII TY2234	0.07195	GWP-total	kg CO2 eq	0.42	0.18	0.03	0.63
TY-B TY315	0.05985	GWP-total	kg CO2 eq	0.35	0.11	0.29	0.76
TY-B TY4251	0.08183	GWP-total	kg CO2 eq	0.49	0.13	0.47	1.08
TY-FRB TY3431	0.07272	GWP-total	kg CO2 eq	0.45	0.12	0.31	0.88



## References

BSI. Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products. BS EN 15804:2012+A2:2019. London, BSI, 2019.

BSI. Environmental labels and declarations – Type III Environmental declarations – Principles and procedures. BS EN ISO 14025:2010 (exactly identical to ISO 14025:2006). London, BSI, 2010.

BSI. Environmental management – Life cycle assessment – Principles and framework. BS EN ISO 14040:2006. London, BSI, 2006.

BSI. Environmental management – Life cycle assessment – requirements and guidelines. BS EN ISO 14044:2006. London, BSI, 2006.