walraven

Environmental Product Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm

Provided by:
J. van Walraven Holding B.V.



MRPI® registration:
1.1.00928.2025

Program operator:
Stichting MRPI®
Publisher:
Stichting MRPI®
www.mrpi.nl

Date of first issue:
15-5-2025
Date of this issue:
15-5-2025
Expiry date:
15-5-2030

ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

COMPANY INFORMATION

J. van Walraven Holding B.V.
Industrieweg 5
3641 RK
Mijdrecht
Netherlands
+31(0) 297 233000
Arunkumar Kuppusamy (info.nl@walraven.com)
https://www.walraven.com/int/

MRPI® REGISTRATION

1.1.00928.2025

DATE OF THIS ISSUE

15-5-2025

EXPIRY DATE

15-5-2030

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Anne Kees Jeeninga , Advies Lab Vof. The LCA study has been done by Arunkumar Kuppusamy, J. van Walraven Holding B.V.. The certificate is based on an LCA-dossier according to ISO14025+EN15804 A2 (+indicators A1). It is verified according to the 'MRPI®-EPD verification protocol November 2020.v4.0'. EPDs of construction products may not be comparable if they do not comply with EN15804+A2. Declaration of SVHC that are listed on the 'Candidate list of Substances of Very High Concern for authorisation' when content exceeds the limits for registration with ECHA.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

PRODUCT

Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

The Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm Clamp is a durable two-screw pipe clamp with a quick closing mechanism for one-handed installation. Featuring a two-component EPDM lining for precise pipe positioning, noise reduction up to 23 dB(A), and vibration damping, it's ideal for steel, copper, cast iron, and multilayer pipes. Made from high-quality steel with BIS UltraProtect® 1000 coating for indoor/outdoor corrosion resistance.

VISUAL PRODUCT



MORE INFORMATION

https://www.walraven.com/int/products/standard-clamps/

Ing. L. L. Oosterveen MSc. MBA **Managing Director MRPI**	DEMONSTRATION OF VERIFICATION CEN standard EN15804 serves as the core PCR [1]
	Independent verification of the declaration an data according to ISO14025+EN15804 A2 (+indicators A1) Internal: External: X
	Third party verifier: Anne Kees Jeeninga , Advies Lab Vof
	[1] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

Product Description
The Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm is a high-performance two-screw pipe clamp engineered for fast and secure installation across a range of building services applications. It features a quick closing mechanism that enables one-handed locking, improving installation speed and efficiency. The clamp incorporates a two-component EPDM rubber lining that ensures precise pipe positioning during installation and provides enhanced noise and vibration reduction when the clamp is closed. Manufactured from high-quality steel and finished with the Walraven BIS UltraProtect® 1000 system, the clamp delivers exceptional corrosion resistance for both indoor and outdoor use. It has been tested to withstand at least 1,000 hours in a salt spray environment with a maximum of 5% red rust according to ISO 9227. The product also meets DIN 4109 sound insulation requirements, providing noise reduction of up to 23 dB(A), and operates reliably across temperatures from -30 °C to +120 °C.

Manufacturing Location
The clamp is produced in the Czech Republic under certified manufacturing processes, ensuring high standards of quality and environmental management.

Manufacturing Process Overview
The manufacturing process begins with precision cutting and forming of high-quality steel into two clamp halves, providing structural strength and durability. A two-component EPDM rubber lining is then integrated into the clamp interior to provide acoustic insulation and protect the pipe surface. Components of the quick closing mechanism are assembled to allow for one-handed operation. The clamp is coated under the BIS UltraProtect® 1000 system to ensure long-term corrosion protection. Final assembly includes the pre-installation of bolts, nuts, and lining to reduce installation time and simplify use on-site.

Environmental Performance
The BIS UltraProtect® 1000 surface treatment ensures long-term durability and resistance to corrosion in both indoor and outdoor environments. Material efficiency is maintained as steel and EPDM rubber components are fully recyclable at the end of the product's life. Waste is minimized during production through internal recycling of steel and rubber offcuts.

Installation and Use Phase
The one-handed quick closing mechanism allows for rapid installation, improving efficiency and reducing labor effort. The EPDM lining provides excellent vibration and structure-borne noise reduction, with tested attenuation up to 23 dB(A) per DIN 4109. The clamp performs reliably across a wide temperature range from -30 °C to +120 °C, making it suitable for various pipe materials and environmental conditions.

End-of-Life Considerations
At the end of its service life, the clamp's steel and EPDM components can be separated and recycled via standard industrial metal and rubber waste streams, ensuring responsible disposal and resource recovery.

Packaging and Transport
The product is supplied in recyclable cardboard packaging, and transport logistics are optimized to reduce environmental impact.

Name - Half parts	
Steel - Lower part	
Steel - Upper part	
Steel - Hollow pan head screw	
Steel - BISMAT Hammer	
Rubber - EPDM	

Total Weight	566 g

Component (> 1%)	(%)
Steel (combined)	81,10%
Rubber - EPDM	16,30%

SCOPE AND TYPE

This study involves conducting a comprehensive Life Cycle Assessment (LCA) for the Walraven Clamps, aiming to analyze all life cycle phases from Cradle to Grave (A1–D) using the best available data. The assessment follows the full scope of LCA, meaning the product is evaluated not as a standalone item, but as part of a broader system aggregated with other materials and processed into other products. Consequently, the clamp becomes an integral component of a Declared Unit.

The LCA is performed using the Ecochain Helix software, leveraging background data from authoritative sources such as the Dutch Nationale Milieu Database v3.8 (based on Ecoinvent 3.6) and adhering to the NMD Bepalingsmethode 1.2 (2025) standard. This rigorous methodology ensures a detailed and transparent examination of the environmental impact of the Walraven Clamps across their entire life cycle from the extraction of raw materials (Cradle) through production, installation, and use, to final disposal or recycling (Grave).

The system boundary includes all relevant stages, up to and including Module D (benefits and loads beyond the system boundary). It excludes operational energy use (B6) and water consumption (B7) during the use phase. The environmental impact is declared per one piece of Walraven Clamp, inclusive of ancillary materials, installation, internal transport, and waste processing.

The reference service life is assumed to be 50 years, based on internal product owner data and supported by the European Technical Assessment (ETA) for Walraven Clamps, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

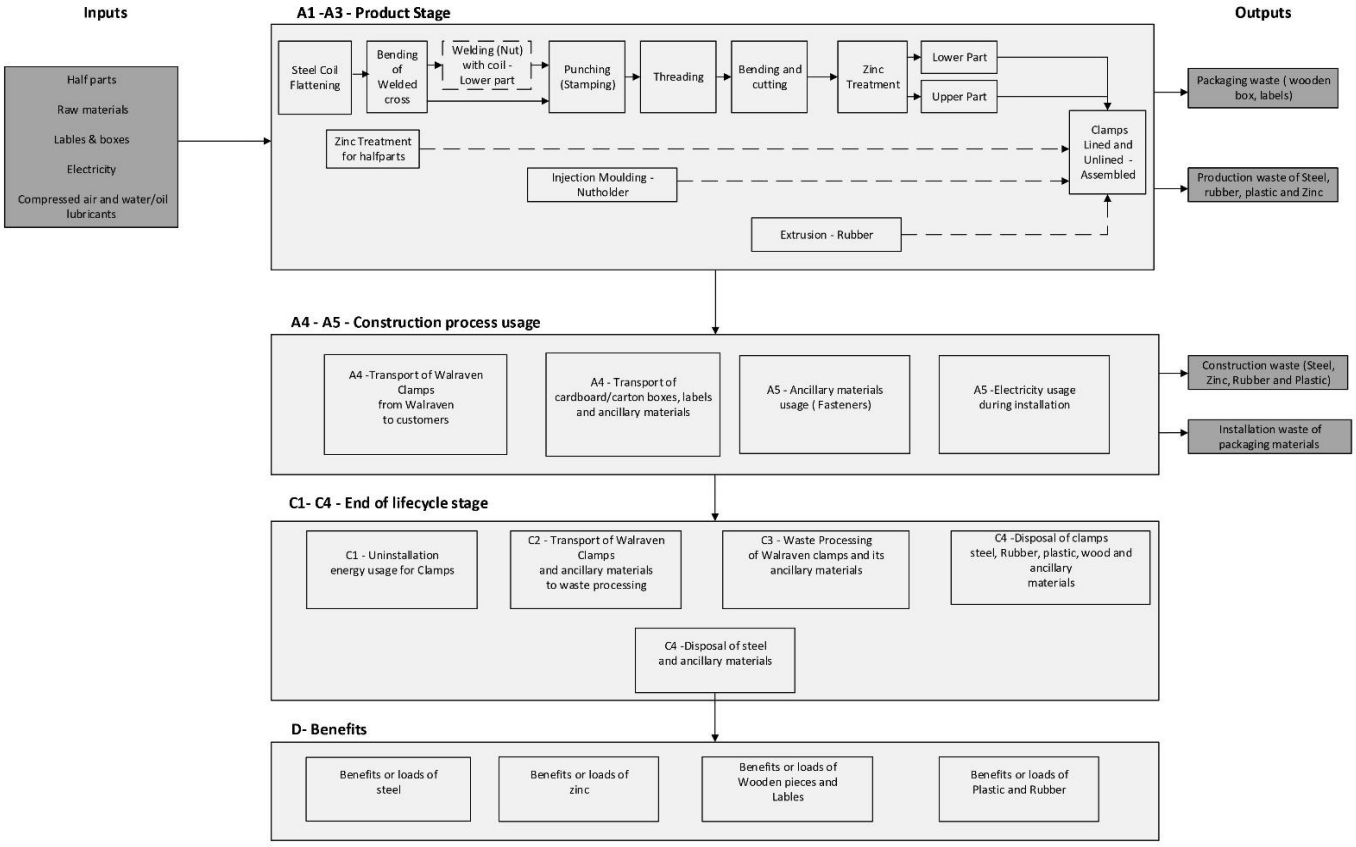
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental impact of excluded materials shall not exceed 5% for any given category.

This comprehensive approach ensures a scientifically sound and holistic understanding of the Walraven Clamp’s environmental footprint throughout its full life cycle.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse - Recovery - Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x

X = Modules Assessed

ND = Not Declared


Inputs
A1 -A3 - Product Stage
Outputs
Half parts
Raw materials
Lables & boxes
Electricity
Compressed air and water/oil lubricants
Steel Coil Flattening
Bending of Welded cross
Welding (Nut) with coil - Lower part
Punching (Stamping)
Threading
Bending and cutting
Zinc Treatment
Lower Part
Upper Part
Zinc Treatment for halfparts
Injection Moulding - Nutholder
Extrusion - Rubber
Clamps Lined and Unlined - Assembled
Packaging waste (wooden box, labels)
Production waste of Steel, rubber, plastic and Zinc
A4 - A5 - Construction process usage
A4 -Transport of Walraven Clamps from Walraven to customers
A4 - Transport of cardboard/carton boxes, labels and ancillary materials
A5 - Ancillary materials usage (Fasteners)
A5 -Electricity usage during installation
Construction waste (Steel, Zinc, Rubber and Plastic)
Installation waste of packaging materials
C1- C4 - End of lifecycle stage
C1 - Uninstallation energy usage for Clamps
C2 - Transport of Walraven Clamps and ancillary materials to waste processing
C3 - Waste Processing of Walraven clamps and its ancillary materials
C4 -Disposal of clamps steel, Rubber, plastic, wood and ancillary materials
C4 -Disposal of steel and ancillary materials
D- Benefits
Benefits or loads of steel
Benefits or loads of zinc
Benefits or loads of Wooden pieces and Lables
Benefits or loads of Plastic and Rubber

REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst-case scenario approach as per EN 15804+A2 and NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven Bifix® G2 Clamp BUP EPDM M10 219-225mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 205-210mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M10 159-168mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 205-210mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 219-225mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 210-219mm
Walraven Bifix® G2 Clamp BUP EPDM M10 205-210mm
Walraven 2S Clamp set zinc plated EPDM M8/10 217-225mm
Walraven Heavy Duty Clamp Stainless EPDM M12 DN100 4" 108-116mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 200-210mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M10 159-168mm
Walraven 2S Clamp zinc plated EPDM M8/10 217-225mm
Walraven Bifix® G2 Clamp BUP EPDM M10 192-200mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 219-225mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 192-200mm
Walraven 2S Clamp zinc plated EPDM M8/10 206-216mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 176-180mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 205-210mm
Walraven Bifix® G2 Clamp BUP EPDM M10 176-180mm

ENVIRONMENTAL IMPACT per functional unit or declared unit (indicators A1)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADPE	kg Sb eq.	1,63E-02	2,17E-06	4,33E-06	1,63E-02	2,90E-07	8,13E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,77E-07	1,24E-06	1,09E-09	-6,40E-05
ADPF	MJ	3,15E+01	1,31E+00	5,67E+00	3,85E+01	1,74E-01	1,54E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,05E-01	3,36E-01	3,31E-03	-8,55E+00
GWP	kg CO2 eq.	1,90E+00	8,60E-02	4,21E-01	2,41E+00	1,14E-02	1,15E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,65E-02	3,11E-01	1,17E-04	-4,58E-01
ODP	kg CFC11 eq.	1,67E-07	1,52E-08	2,37E-08	2,06E-07	2,02E-09	8,57E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,70E-09	3,31E-09	3,89E-11	-4,44E-08
POCP	kg ethene eq.	1,81E-03	5,29E-05	-1,21E-04	1,74E-03	6,86E-06	4,58E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,60E-05	2,02E-05	1,25E-07	-8,70E-04
AP	kg SO2 eq.	1,06E-02	4,08E-04	1,42E-03	1,25E-02	5,00E-05	5,55E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,17E-04	2,41E-04	8,55E-07	-1,77E-03
EP	kg (PO4) 3 eq.	1,50E-03	7,70E-05	3,03E-04	1,88E-03	9,81E-06	8,69E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,29E-05	3,65E-05	1,65E-07	-2,11E-04

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	3,35E+00	3,64E-02	-1,65E-02	3,37E+00	4,78E-03	1,57E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,12E-02	2,71E-02	5,28E-05	-2,62E-01
FAETP	kg DCB eq.	5,58E-02	1,05E-03	2,02E-03	5,89E-02	1,40E-04	3,04E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,26E-04	5,47E-04	1,25E-06	9,31E-04
MAETP	kg DCB eq.	1,09E+02	3,80E+00	1,03E+01	1,23E+02	5,02E-01	6,22E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,17E+00	2,25E+00	4,48E-03	-3,06E+00
TETP	kg DCB eq.	2,00E-02	1,28E-04	2,03E-03	2,21E-02	1,69E-05	1,92E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,94E-05	9,77E-05	1,33E-07	1,61E-02
ECI	euro	4,75E-01	1,05E-02	2,94E-02	5,15E-01	1,37E-03	2,41E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,20E-03	1,96E-02	1,65E-05	-5,72E-02
ADPF	kg Sb eq.	1,52E-02	6,31E-04	2,73E-03	1,85E-02	8,35E-05	7,42E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,95E-04	1,62E-04	1,59E-06	-4,11E-03

ADPE = Abiotic Depletion Potential for non-fossil resources
ADPF = Abiotic Depletion Potential for fossil resources
GWP = Global Warming Potential
ODP = Depletion potential of the stratospheric ozone layer
POCP = Formation potential of tropospheric ozone photochemical oxidants
AP = Acidification Potential of land and water
EP = Eutrophication Potential
HTP = Human Toxicity Potential
FAETP = Fresh water aquatic ecotoxicity potential
MAETP = Marine aquatic ecotoxicity potential
TETP = Terrestrial ecotoxicity potential
ECI = Environmental Cost Indicator
ADPF = Abiotic Depletion Potential for fossil resources

ENVIRONMENTAL IMPACT per functional unit or declared unit (core indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-total	kg CO2 eq.	1,96E+00	8,68E-02	4,18E-01	2,46E+00	1,15E-02	1,16E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,68E-02	3,02E-01	1,19E-04	-4,84E-01
GWP-fossil	kg CO2 eq.	1,95E+00	8,67E-02	4,17E-01	2,45E+00	1,15E-02	1,16E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,67E-02	3,11E-01	1,19E-04	-4,84E-01
GWP-biogenic	kg CO2 eq.	7,92E-03	3,22E-05	6,73E-04	8,62E-03	4,27E-06	4,37E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,97E-06	-9,08E-03	6,96E-08	0,00E+00
GWP-luluc	kg CO2 eq.	3,55E-03	3,22E-05	4,35E-04	4,02E-03	4,20E-06	2,09E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,80E-06	2,56E-05	3,32E-08	1,31E-04
ODP	kg CFC11 eq.	1,79E-07	1,91E-08	1,85E-08	2,17E-07	2,53E-09	9,05E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,90E-09	3,79E-09	4,91E-11	-4,82E-08
AP	mol H+ eq.	1,31E-02	5,40E-04	1,70E-03	1,53E-02	6,65E-05	6,85E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,55E-04	3,04E-04	1,13E-06	-2,15E-03
EP-fresh water	kg PO4 eq.	1,42E-04	8,67E-07	7,01E-05	2,13E-04	1,16E-07	9,87E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,70E-07	1,53E-06	1,34E-09	-1,77E-05
EP-marine	kg N eq.	2,69E-03	1,85E-04	2,39E-04	3,12E-03	2,34E-05	1,45E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,46E-05	7,36E-05	3,89E-07	-3,60E-04
EP-terrestrial	mol N eq.	2,98E-02	2,04E-03	2,91E-03	3,48E-02	2,58E-04	1,62E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,02E-04	8,46E-04	4,29E-06	-4,21E-03
POCP	kg NMVOC eq.	9,95E-03	5,81E-04	3,78E-04	1,09E-02	7,37E-05	4,39E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,72E-04	2,26E-04	1,25E-06	-2,59E-03
ADP-minerals & metals	kg Sb eq.	1,63E-02	2,17E-06	4,33E-06	1,63E-02	2,90E-07	8,13E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	6,77E-07	1,24E-06	1,09E-09	-6,40E-05
ADP-fossil	MJ, net calorific value	2,91E+01	1,30E+00	6,13E+00	3,65E+01	1,73E-01	1,52E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,03E-01	3,40E-01	3,33E-03	-7,03E+00
WDP	m3 world eq. Deprived	1,23E+00	4,63E-03	9,11E-02	1,33E+00	6,18E-04	5,84E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,44E-03	6,50E-03	1,49E-04	-1,69E-01

GWP-total	=	Global Warming Potential total
GWP-fossil	=	Global Warming Potential fossil fuels
GWP-biogenic	=	Global Warming Potential biogenictotal
GWP-luluc	=	Global Warming Potential land use and land use change
ODP	=	Depletion potential of the stratospheric ozone layer
AP	=	Acidification Potential, Accumulated Exceedence
EP-freshwater	=	Eutrophication Potential, fraction of nutrients reaching freshwater end compartment
EP-marine	=	Eutrophication Potential, fraction of nutrients reaching marine end compartment
EP-terrestrial	=	Eutrophication Potential, Accumulated Exceedence
POCP	=	Formation potential of tropospheric ozone photochemical oxidants
ADP-minerals & metals	=	Abiotic Depletion Potential for non-fossil resources [1]
ADP-fossil	=	Abiotic Depletion for fossil resources potential [1]
WDP	=	Water (user) deprivation potential, deprivation-weighted water consumption [1]

Disclaimer [1]:

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

ENVIRONMENTAL IMPACT per functional unit or declared unit (additional indicators A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PM	Disease inci-dence	1,31E-07	7,71E-09	-6,73E-09	1,32E-07	1,03E-09	5,47E-09	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,40E-09	3,48E-09	2,19E-11	-2,94E-08
IRP	kBq U235 eq.	1,26E-01	5,47E-03	3,45E-02	1,66E-01	7,24E-04	7,96E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,69E-03	1,60E-03	1,37E-05	-1,08E-02
ETP-fw	CTUe	1,91E+02	1,16E+00	3,17E-01	1,93E+02	1,54E-01	9,03E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,60E-01	1,79E+00	2,16E-03	-1,43E+01
HTP-c	CTUh	1,15E-08	3,80E-11	-5,83E-10	1,10E-08	5,00E-12	5,44E-10	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,17E-11	3,47E-11	4,99E-14	-1,26E-10
HTP-nc	CTUh	1,98E-07	1,26E-09	1,62E-10	1,99E-07	1,69E-10	1,32E-08	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,93E-10	1,69E-09	1,54E-12	6,30E-08
SQP	-	1,01E+01	1,12E+00	1,67E+00	1,29E+01	1,50E-01	6,29E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,50E-01	6,15E-01	6,98E-03	-1,48E+00

PM = Potential incidence of disease due to PM emissions
IRP = Potential Human exposure efficiency relative to U235 [1]
ETP-fw = Potential Comparative Toxic Unit for ecosystems [2]
HTP-c = Potential Comparative Toxic Unit for humans, cancer [2]
HTP-nc = Potential Comparative Toxic Unit for humans, non-cancer [2]
SQP = Potential soil quality index [2]

Disclaimer [1]:

- This impact category deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste.

Disclaimer [2]:

- The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

OUTPUT FLOWS AND WASTE CATEGORIES per functional unit or declared unit (A1 en A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
HWD	kg	2,12E-03	3,28E-06	-7,74E-06	2,11E-03	4,38E-07	1,04E-04	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,02E-06	1,14E-06	4,98E-09	-4,28E-05
NHWD	kg	5,02E-01	8,17E-02	3,37E-02	6,18E-01	1,10E-02	3,24E-02	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,56E-02	1,55E-02	2,26E-02	-4,45E-02
RWD	kg	1,12E-04	8,58E-06	2,89E-05	1,49E-04	1,13E-06	6,78E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,65E-06	1,90E-06	2,19E-08	-1,93E-05
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	0,00E+00	0,00E+00	2,64E-04	2,64E-04	0,00E+00	1,32E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,30E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,60E-05	1,60E-05	0,00E+00	8,01E-07	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,20E-02	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	5,37E-04	5,37E-04	0,00E+00	2,68E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,50E-01
ETE	MJ	0,00E+00	0,00E+00	9,23E-04	9,23E-04	0,00E+00	4,61E-05	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,75E-01

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	2,69E+00	1,62E-02	6,87E-01	3,39E+00	2,16E-03	1,65E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,05E-03	4,89E-02	2,69E-05	-1,47E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	2,69E+00	1,62E-02	6,87E-01	3,39E+00	2,16E-03	1,65E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,05E-03	4,89E-02	2,69E-05	-1,47E-01
PENRE	MJ	3,09E+01	1,39E+00	6,61E+00	3,89E+01	1,83E-01	1,62E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,28E-01	3,61E-01	3,54E-03	-7,42E+00
PENRM	MJ	2,50E+00	0,00E+00	0,00E+00	2,50E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	2,84E+01	1,39E+00	6,61E+00	3,64E+01	1,83E-01	1,62E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,28E-01	3,61E-01	3,54E-03	-7,42E+00
SM	kg	1,95E-01	0,00E+00	7,72E-05	1,95E-01	0,00E+00	3,86E-06	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
RSF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
NSRF	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	3,65E-02	1,58E-04	1,14E-02	4,81E-02	2,10E-05	2,23E-03	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,91E-05	5,15E-04	3,56E-06	-4,11E-03

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 resources excluding non-renewable 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 resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NSRF = Use of non-renewable secondary fuels
FW = Use of net fresh water

BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
BBCpr	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
BCCpa	kg C	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

CALCULATION RULES

Data Quality

Data flows have been modeled to reflect real production conditions as accurately as possible. Primary data used in this LCA was collected directly from the Walraven manufacturing facility in the Czech Republic. Where primary data was not available, reliable reference data from recognized databases was applied. Module A1 is based on specific product composition data provided by the manufacturer. Module A2 incorporates actual transportation data for raw materials to the production site, and Module A3 includes site-specific energy consumption and waste data from the 2023/2024 production year. Background data was sourced from the Dutch Nationale Milieudatabase v3.8 and is based on Ecoinvent 3.6.

Data Collection Period

The dataset is representative of production processes used in the year 2023/2024.

Methodology and Reproducibility

The LCA follows the guidelines of EN15804+A2:2019, NEN-EN ISO 14040, 14044, and 14025, as well as the NMD Bepalingsmethode v1.2 (2025). Calculations were performed using Ecochain Helix software version 4.3.1. The life cycle stages considered in this assessment include A1–A3 (raw material supply, transport, manufacturing), A4–A5 (transport to site and installation), B1–B7 (use stage), C1–C4 (end-of-life processing), and D (benefits from reuse, recovery, and recycling).

Inventory and Allocation

All inputs, including energy, emissions, and raw materials, have been accounted for. Allocation was carried out in accordance with EN15804, with mass-based allocation used to distribute shared inputs across production processes and products. No secondary materials were used during production, and cut-off criteria were applied to ensure that excluded material or energy inputs in any module do not exceed 5%.

Data Sources

Primary data was obtained from Walraven's Czech Republic facility, including detailed information on product composition, transport distances, energy consumption, and waste outputs. Where supplier-specific data was unavailable, standard reference datasets for steel, EPDM rubber, PA/POM plastics, and zinc were sourced from NMD v3.8 and Ecoinvent 3.6.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

Modules A1 to A3: Upstream and Core Life Cycle Stages
Modules A1 to A3 cover the upstream and core life cycle stages for the Walraven Bifix® G2 Clamp BUP EPDM M8/10 192-200mm. Module A1 addresses raw material extraction and pre-processing, including inputs such as packaging and lubricants. The primary materials used are various grades of steel, EPDM rubber lining, POM and PP plastics, and zinc coating. Material flows were modeled using standard datasets from the Nationale Milieudatabase v3.8 and Ecoinvent v3.6, with generic references applied where product-specific data were unavailable. For steel, the composition assumes 57% primary and 43% recycled content.

Module A2 represents the transport of all material inputs to the Walraven production facility in the Czech Republic. Distances and transport routes are derived from supplier data and standardized assumptions. A 50% load factor was applied, reflecting fully loaded deliveries to the site and empty returns. Both truck and ship transport are included depending on the material origin. Emissions associated with transport were modeled using the 0001-tra&Transport, vrachtwagen dataset from NMD v3.8 and Ecoinvent v3.6, consistent with EN 15804+A2 methodology.

Module A3 captures production impacts at the Czech manufacturing site. This includes electricity and fuel use from grid and renewable sources, consumption of lubricating oil, and packaging materials. Production waste, particularly steel and rubber scrap, is accounted for, with internal recycling of scrap incorporated proportionally to the product's share of output. Zinc treatment is modeled separately, including its specific electricity demand. Transport of production waste to appropriate recycling or treatment facilities is also included. Capital goods are excluded according to the EN 15804+A2 cutoff rule, as their contribution to overall environmental impact is below the five percent threshold.

Module A4: Transport to Installation Site
Module A4 addresses the transport of finished clamps from the Czech production site to the installation location. A standard transport distance of 150 kilometers was applied, with a 50% load factor reflecting full outbound deliveries and empty returns. Emissions were modeled using NMD v3.8 transport datasets for freight lorries, in alignment with EN 15804+A2 requirements.

Module A5: Installation
Module A5 captures the installation phase on-site. A 5% material loss is assumed for all input materials during manual handling. No energy is consumed during installation, as the process is non-mechanized. Packaging and installation waste are modeled for transport to appropriate recycling or waste treatment facilities in accordance with Dutch regulations.

End-of-Life Scenario
End-of-life treatment assumptions follow standardized fixed values, ensuring consistent accounting for material recovery, energy recovery, and final disposal. Steel and zinc components are primarily recycled, with a small fraction directed to landfill, while rubber and plastic are assumed to undergo 100% incineration with energy recovery. All modeling is conducted in compliance with EN 15804+A2:2019/AC:2021 and Bepalingsmethode v1.2 (2025).

Material	Leave	Landfill	Incineration (AVI)	Recycling	Reuse
Steel, Zinc	0%	5%	0%	95%	0%
Rubber/Plastic	0%	0%	100%	0%	0%

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 2)

Module C1: Deconstruction
Module C1 covers the manual removal of the clamp at the end of its service life. This deconstruction is assumed to be non-mechanized and does not require additional energy input.

Module C2: Transport to Waste Processing
Module C2 addresses the transport of deconstructed materials to appropriate waste processing facilities. Steel and zinc components are transported 50 kilometers to recycling or landfill sites, while rubber and plastic parts are transported 100 kilometers to incineration facilities (AVI). Transport emissions are modeled using the same truck reference datasets applied in the upstream modules, ensuring consistency across the life cycle assessment.

Module C3: Waste Processing
Module C3 models the end-of-life treatment of materials. Steel and zinc are fully sorted and recycled, using the 0315-reC&Sorteren en persen oud ijzer dataset to represent associated impacts. Rubber and plastic components are 100% incinerated with energy recovery. Emission factors for these processes are based on 0264-avC&Verbranden kunststoffen for plastics and 0260-avC&Verbranden rubber/EPDM for rubber, as sourced from NMD v3.8 and Ecoinvent v3.6.

Module C4: Final Disposal
Module C4 accounts for residual waste sent to landfill. Five percent of steel and zinc is directed to landfill, modeled using 0253-sto&Stort staal for steel and 0248-sto&Stort koper, lood, verzinkt staal, zink for zinc. Rubber and plastic are assumed to be entirely incinerated, with no landfill allocation.

Module D: Benefits Beyond the System Boundary
Module D quantifies the environmental credits that occur outside the product system. Steel recycling delivers a 52% substitution benefit, calculated as the 95% recycling rate minus 43% secondary material content. Zinc recycling is modeled with a 95% efficiency. Energy recovery from incineration of plastics and rubber is assumed to offset 100% of the corresponding fossil energy. The modeling approach fully aligns with EN 15804+A2:2019/AC:2021 and the Bepalingsmethode v1.2 (2025), using verified LCA data from NMD v3.8 and Ecoinvent v3.6.

DECLARATION OF SVHC

No substances that are listed in the latest “Candidate List of Substances of Very High Concern for authorisation” are included in the product that exceeds the limit for registration

REFERENCES

[1] ISO, ISO 14040: Environmental management – Life cycle assessment – Principles and Framework, ISO 14040:2006 + Amd 1:2020, International Organization for Standardization, 2020.

[2] ISO, ISO 14044: Environmental management – Life cycle assessment – Requirements and guidelines, ISO 14044:2006 + Amd 2:2020, International Organization for Standardization, 2020.

[3] ISO, ISO 14025: Environmental labels and declarations – Type III environmental declarations – Principles and procedures, ISO 14025:2006, International Organization for Standardization, 2006.

[4] European Technical Assessment (ETA) for Walraven Bifix® G2 Clamps, Walraven, Mijdrecht, 2024.

[5] NMD, Bepalingsmethode ‘Milieuprestatie Bouwwerken’ versie 1.2 inclusief de bijbehorende wijzigingsbladen, Nationale Milieudatabase, 2025.

[6] CE Delft, Handboek Schaduwprijzen, 2010. [Online]. Available: https://ce.nl/publicaties/handboek-schaduwprijzen-waardering-en-weging-van-emissies-en-milieueffecten/

[7] TNO, Toxiciteit heeft z'n prijs: schaduwprijzen voor (eco-)toxiciteit en uitputting van abiotische grondstoffen binnen DuboCalc. [Online]. Available: https://puc.overheid.nl/rijkswaterstaat/doc/PUC_119145_31/

[8] NEN, NEN-EN 15804: Duurzaamheid van bouwwerken – Milieuverklaringen van producten – Basisregels voor de productgroep bouwproducten, NEN-EN 15804:2012 + A2:2019 + AC:2021, Nederlands Normalisatie-instituut, 2021.

[9] P. P. Lahoti and V. D. M., Lubrication in cold rolling of steel, Journal of Materials Processing Technology, vol. 209, no. 9, pp. 4638–4642, 2009.

[10] F. G. H. van Wees, J. V. B., J. O. P. R., Energy Consumption for Steel Production, in World Energy Conference, Cannes, Nov. 1986.

[11] The Engineering Toolbox, 2001. [Online]. Available: https://www.engineeringtoolbox.com/

[12] NMD, Environmental Performance Assessment Method for Construction Works, January 2025. [Online]. Available: https://milieudatabase.nl/wp-content/uploads/2022/05/Bepalingsmethode_Milieuprestatie_Bouwwerken_maart_2022_Engels.pdf.