Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven 2S Clamp zinc plated EPDM M8/10 96-103mm

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



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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

1.1.00925.2025

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 2S Clamp zinc plated EPDM M8/10 96-103mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

The Walraven 2S Clamp zinc plated EPDM M8/10 96-103mm is a robust, zinc-plated two-screw pipe clamp designed for secure installation of steel, copper, cast iron, and multilayer pipes. Featuring a fixed EPDM lining for acoustic insulation up to 22 dB(A) and anti-loss washers for ease of installation, it ensures vibration damping, noise reduction, and reliable performance in indoor and light outdoor use.

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 2S Clamp zinc plated EPDM M8/10 96-103mm is a high-performance two-screw pipe clamp engineered for secure, vibration-reducing installation of steel, copper, cast iron, and multilayer pipes. Featuring a two-screw closure system and pre-mounted EPDM rubber lining, the clamp ensures continuous acoustic insulation and prevents pipe damage. The integrated anti-loss washers prevent screw detachment during installation, enhancing safety and ease of use. With a corrosion-resistant zinc-plated finish and temperature resistance from -30 °C to +120 °C, it is ideal for indoor use and light-duty outdoor installations. The lining complies with DIN 4109 for sound insulation, reducing noise up to 22 dB(A) per ISO 3822-1.

Manufacturing Location:
Manufactured in the Netherlands at Walraven's certified facility, ensuring consistent quality and environmentally responsible production.

Manufacturing Process Overview:
Steel Processing: Raw steel is uncoiled, leveled, and cut with high precision to optimize structural strength and minimize scrap.

Forming & Bending: Precision forming tools produce the clamp body, creating a uniform, secure fit around the pipe.

Nut Welding: The M8/M10 combination nut is resistance-welded to the clamp for reliable threaded connection.

Surface Treatment: Zinc plating is applied for corrosion resistance, compliant with ISO 9227 salt spray testing standards.

Lining Application: A pre-assembled EPDM rubber lining is fixed into the steel profile to prevent slippage, providing noise and vibration insulation.

Final Assembly: The clamp is assembled with anti-loss washers and screws to streamline installation and reduce handling errors on site.

Environmental Performance (Modules A1–A3):
Material Modeling (A1): Based on the 2023–2024 bill of materials, inputs include multiple steel grades (57% primary, 43% secondary content), EPDM rubber, and zinc coating.

Data Sources: Environmental modeling uses datasets from the National Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. Generic references are used where specific data is unavailable.

Manufacturing (A2–A3): The environmental profile includes transport of raw materials, energy consumption in stamping, welding, and coating, and packaging inputs.

Performance and Use Phase:
Quick and Safe Installation: Gapless closure with pre-assembled screws and anti-loss washers streamlines handling and ensures secure positioning.

Noise and Vibration Control: EPDM lining offers acoustic insulation compliant with DIN 4109 and ISO 3822-1, reducing airborne and structure-borne noise by up to 22 dB(A).

Temperature Resilience: The clamp operates effectively across a wide range of temperatures (-30 °C to +120 °C), ensuring performance stability in HVAC and mechanical systems.

End-of-Life Considerations:
Disassembly: The clamp can be disassembled into steel, rubber, and plastic components for separate recycling.

Recyclability: Core materials (steel, EPDM, plastic) are fully recyclable via conventional industrial waste streams.

Module D Contribution: Benefits from material recycling are captured under Module D in accordance with EN 15804+A2 methodology.

Packaging and Transport:
Packaging: Supplied in compact, recyclable cardboard boxes.
Transport Modeling: Lifecycle inventory includes typical regional transport distances by Euro 5/6 freight truck, following EN 15804 transport modeling protocols.

Name - Half parts	
Steel - Lower part	
Steel - Upper part	
Steel - Hollow pan head screw	
Rubber - EPDM	
Plastic - Anti-loss washer	

Total Weight	232 g

Component (> 1%)	(%)
Steel (combined)	74,70%
Rubber - EPDM	23,00%

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 2S Clamp zinc plated EPDM M8/10 96-103mm, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

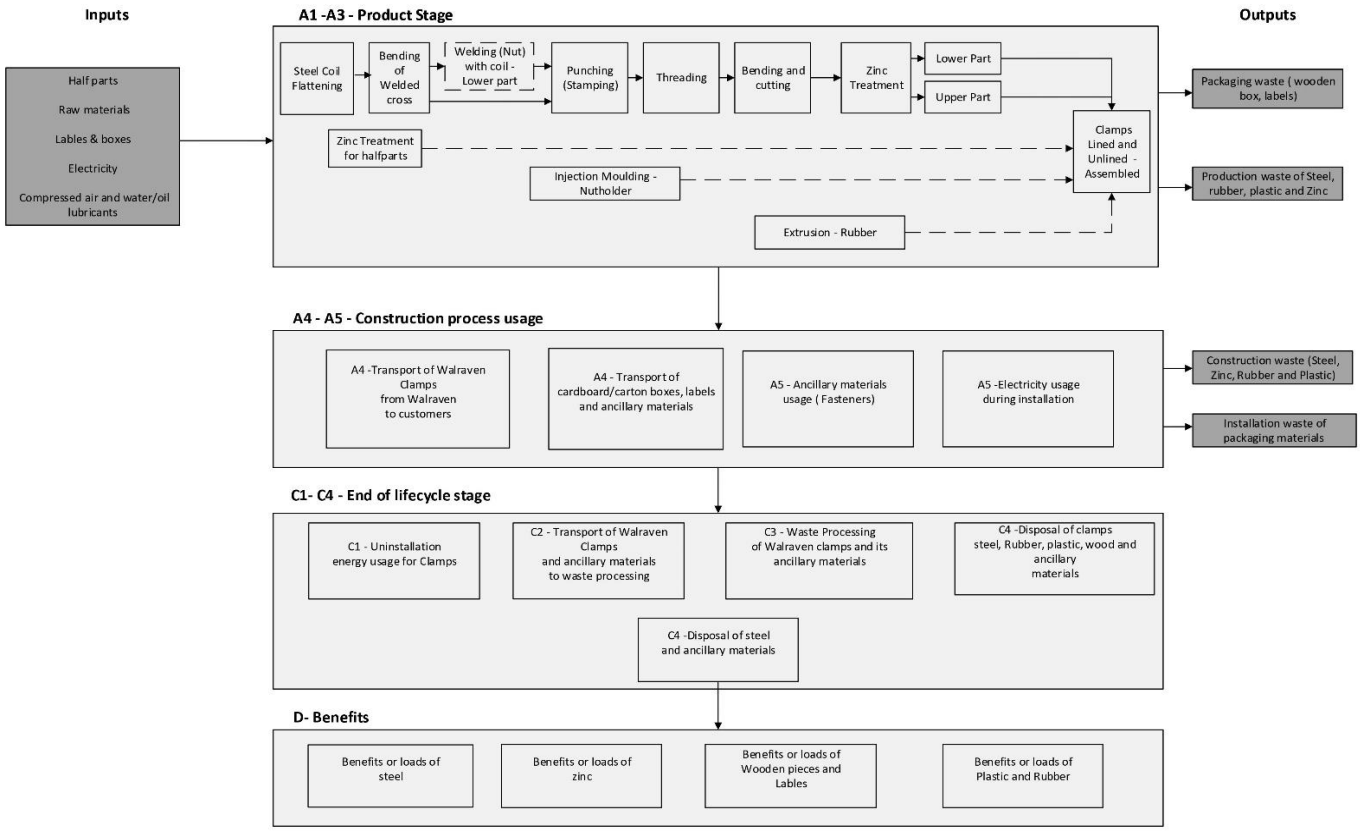
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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



REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven 2S Clamp zinc plated EPDM M8/10 96-103mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst-case scenario as per EN 15804+A2 and NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven KSB2 Clamp zinc plated EPDM M8/10 133-140mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 75-80mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 100mm
Walraven 2S Clamp zinc plated EPDM M8/10 128-137mm
Walraven HD1501 white EPDM M8/10 53-59mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 86-91mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 125-130mm
Walraven 2S Clamp zinc plated EPDM M8/10 119-127mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 67-73mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 86-91mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2"108-115mm
Walraven 2S Clamp zinc plated EPDM M8/10 113-118mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 100-105mm
Walraven HD1501 Clamp BUP EPDM M8/10 46-51mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 60-64mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 79-85mm
Walraven 2S Clamp set zinc plated EPDM M8/10 88-95mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 CT 3" IP 2 1/2" 73-80mm
Walraven HD1501 white EPDM 1/2" 40-45mm
Walraven HD1501 Clamp BUP EPDM 1/2" 40-45mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 70-76mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 51-55mm
Walraven 2S Clamp zinc plated EPDM M8/10 104-112mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 108-115mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 100-105mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 47-50mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 CT 2 1/2" 64-70mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 88-91mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 70-76mm
Walraven 2S Clamp zinc plated EPDM M8/10 96-103mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M8/10 73-80mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 38-42mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 80mm
Walraven 2S Clamp zinc plated EPDM M8/10 88-95mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 64-67mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 88-91mm
Walraven Industrial Single Clamp pre-galvanized EPDM black 76mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 73-80mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 32-36mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 64-67mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 26-30mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 64-70mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 20-24mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 15-18mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 57-64mm
Walraven Industrial Single Clamp pre-galvanized EPDM black 60mm

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.	5,58E-03	8,14E-07	3,56E-07	5,58E-03	1,19E-07	2,77E-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	2,78E-07	4,07E-08	3,71E-10	-3,34E-05
ADPF	MJ	1,20E+01	4,87E-01	4,20E-01	1,29E+01	7,12E-02	4,73E-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	1,66E-01	2,71E-02	1,13E-03	-3,74E+00
GWP	kg CO2 eq.	6,92E-01	3,19E-02	3,21E-02	7,56E-01	4,66E-03	3,70E-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	1,09E-02	1,50E-01	3,98E-05	-1,83E-01
ODP	kg CFC11 eq.	6,59E-08	5,65E-09	1,77E-09	7,33E-08	8,26E-10	2,76E-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	1,93E-09	3,42E-10	1,33E-11	-2,12E-08
POCP	kg ethene eq.	6,69E-04	1,92E-05	-1,39E-05	6,75E-04	2,81E-06	1,77E-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	6,56E-06	1,02E-06	4,24E-08	-3,31E-04
AP	kg SO2 eq.	3,85E-03	1,40E-04	1,12E-04	4,10E-03	2,05E-05	1,73E-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	4,78E-05	1,94E-05	2,91E-07	-7,35E-04
EP	kg (PO4) 3 eq.	5,37E-04	2,75E-05	2,45E-05	5,89E-04	4,02E-06	2,60E-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	9,39E-06	5,48E-06	5,62E-08	-8,72E-05

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	1,16E+00	1,34E-02	-2,86E-03	1,17E+00	1,96E-03	5,39E-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	4,58E-03	1,02E-03	1,80E-05	-1,02E-01
FAETP	kg DCB eq.	1,95E-02	3,92E-04	1,61E-04	2,00E-02	5,72E-05	1,02E-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	1,34E-04	3,75E-05	4,27E-07	4,63E-05
MAETP	kg DCB eq.	3,89E+01	1,41E+00	8,41E-01	4,12E+01	2,06E-01	2,00E+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	4,80E-01	1,03E-01	1,53E-03	-1,96E+00
TETP	kg DCB eq.	6,89E-03	4,74E-05	1,57E-04	7,10E-03	6,93E-06	6,29E-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	1,62E-05	1,01E-05	4,52E-08	5,44E-03
ECI	euro	1,67E-01	3,84E-03	2,12E-03	1,73E-01	5,61E-04	8,01E-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	1,31E-03	7,75E-03	5,62E-06	-2,28E-02
ADPF	kg Sb eq.	5,78E-03	2,34E-04	2,02E-04	6,22E-03	3,42E-05	2,27E-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	7,99E-05	1,30E-05	5,42E-07	-1,80E-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.	7,13E-01	3,22E-02	3,17E-02	7,76E-01	4,70E-03	3,75E-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	1,10E-02	1,47E-01	4,06E-05	-1,92E-01
GWP-fossil	kg CO2 eq.	7,08E-01	3,21E-02	3,16E-02	7,72E-01	4,70E-03	3,73E-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	1,10E-02	1,50E-01	4,06E-05	-1,92E-01
GWP-biogenic	kg CO2 eq.	2,81E-03	1,20E-05	5,94E-05	2,88E-03	1,75E-06	1,41E-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	4,09E-06	-3,03E-03	2,37E-08	0,00E+00
GWP-luluc	kg CO2 eq.	1,26E-03	1,18E-05	3,76E-05	1,31E-03	1,72E-06	6,69E-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	4,02E-06	1,05E-06	1,13E-08	2,36E-05
ODP	kg CFC11 eq.	7,21E-08	7,09E-09	1,31E-09	8,05E-08	1,04E-09	3,03E-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	2,42E-09	3,74E-10	1,67E-11	-2,37E-08
AP	mol H+ eq.	4,72E-03	1,87E-04	1,34E-04	5,04E-03	2,72E-05	2,14E-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	6,36E-05	2,59E-05	3,85E-07	-8,86E-04
EP-fresh water	kg PO4 eq.	5,01E-05	3,24E-07	5,88E-06	5,63E-05	4,74E-08	2,47E-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	1,11E-07	5,44E-08	4,55E-10	-7,11E-06
EP-marine	kg N eq.	9,57E-04	6,57E-05	1,80E-05	1,04E-03	9,60E-06	4,69E-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	2,24E-05	9,16E-06	1,32E-07	-1,45E-04
EP-terrestrial	mol N eq.	1,06E-02	7,25E-04	2,18E-04	1,16E-02	1,06E-04	5,17E-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	2,47E-04	1,02E-04	1,46E-06	-1,69E-03
POCP	kg NMVOC eq.	3,60E-03	2,07E-04	1,99E-05	3,82E-03	3,02E-05	1,47E-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	7,05E-05	2,53E-05	4,24E-07	-1,01E-03
ADP-minerals & metals	kg Sb eq.	5,58E-03	8,14E-07	3,56E-07	5,58E-03	1,19E-07	2,77E-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	2,78E-07	4,07E-08	3,71E-10	-3,34E-05
ADP-fossil	MJ, net calorific value	1,12E+01	4,85E-01	4,73E-01	1,21E+01	7,08E-02	4,58E-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	1,65E-01	2,55E-02	1,13E-03	-3,25E+00
WDP	m3 world eq. Deprived	4,48E-01	1,73E-03	8,03E-03	4,58E-01	2,53E-04	1,92E-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	5,91E-04	1,81E-03	5,09E-05	-7,69E-02

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	4,77E-08	2,89E-09	-7,53E-10	4,99E-08	4,22E-10	1,98E-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	9,84E-10	1,57E-10	7,47E-12	-1,18E-08
IRP	kBq U235 eq.	4,70E-02	2,03E-03	2,94E-03	5,20E-02	2,97E-04	2,32E-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	6,92E-04	7,92E-05	4,65E-06	-6,66E-03
ETP-fw	CTUe	6,61E+01	4,32E-01	-5,32E-02	6,65E+01	6,32E-02	3,08E+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	1,47E-01	2,67E-01	7,36E-04	-5,43E+00
HTP-c	CTUh	3,94E-09	1,40E-11	-6,05E-11	3,89E-09	2,05E-12	1,92E-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	4,78E-12	2,06E-12	1,70E-14	-5,80E-11
HTP-nc	CTUh	6,79E-08	4,73E-10	-6,13E-11	6,83E-08	6,91E-11	4,49E-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	1,61E-10	1,26E-10	5,23E-13	2,11E-08
SQP	-	3,72E+00	4,20E-01	1,16E-01	4,26E+00	6,14E-02	1,90E-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	1,43E-01	1,73E-02	2,38E-03	-6,77E-01

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	7,23E-04	1,23E-06	-9,19E-07	7,23E-04	1,79E-07	3,54E-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	4,19E-07	1,37E-07	1,70E-09	-1,51E-05
NHWD	kg	1,75E-01	3,07E-02	2,69E-03	2,09E-01	4,49E-03	1,09E-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	1,05E-02	3,64E-03	7,70E-03	-1,73E-02
RWD	kg	4,35E-05	3,18E-06	2,44E-06	4,91E-05	4,65E-07	2,02E-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	1,09E-06	9,59E-08	7,45E-09	-1,04E-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	1,51E-05	1,51E-05	0,00E+00	7,54E-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	1,46E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	9,16E-07	9,16E-07	0,00E+00	4,58E-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	0,00E+00	0,00E+00	4,75E-02	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	3,07E-05	3,07E-05	0,00E+00	1,53E-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	2,33E-01
ETE	MJ	0,00E+00	0,00E+00	5,27E-05	5,27E-05	0,00E+00	2,64E-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	4,01E-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	9,69E-01	6,07E-03	5,09E-02	1,03E+00	8,87E-04	4,71E-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	2,07E-03	1,75E-03	9,17E-06	-8,93E-02
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	9,69E-01	6,07E-03	5,09E-02	1,03E+00	8,87E-04	4,71E-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	2,07E-03	1,75E-03	9,17E-06	-8,93E-02
PENRE	MJ	1,19E+01	5,15E-01	5,10E-01	1,29E+01	7,52E-02	4,88E-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	1,75E-01	2,75E-02	1,21E-03	-3,44E+00
PENRM	MJ	1,29E+00	0,00E+00	0,00E+00	1,29E+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	1,06E+01	5,15E-01	5,10E-01	1,16E+01	7,52E-02	4,88E-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	1,75E-01	2,75E-02	1,21E-03	-3,44E+00
SM	kg	6,63E-02	0,00E+00	4,41E-06	6,63E-02	0,00E+00	2,21E-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	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	1,32E-02	5,90E-05	9,76E-04	1,42E-02	8,63E-06	6,26E-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	2,01E-05	1,95E-04	1,21E-06	-1,92E-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 modelled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources and databases.

For module A1, specific data for product composition was provided by the manufacturer. For module A2, transport data was collected regarding the movement of raw materials to the production site. For module A3, actual energy consumption and waste data were gathered from the 2023 production records at Walraven Czech Republic. Background datasets were selected from Nationale Milieudatabase v3.8, based on Ecoinvent 3.6.

Data Collection Period:
The dataset is representative for the production processes used in 2023 and 2024.

Methodology and Reproducibility:
The life cycle assessment (LCA) has been prepared according to the standards NEN-EN ISO 14040, 14044, 14025, and EN15804+A2:2019, and conforms with the NMD Bepalingsmethode v1.2 (2025). All LCA calculations were performed using the Ecochain Helix software v4.3.1.

Modules A1–A3 (production phase), A4–A5 (transport and installation), B1 (use), and C1–C4 (end-of-life) have been included. Module D accounts for the potential reuse, recovery, and recycling of materials, applying standardized end-of-life scenarios as defined by EN15804+A2 and NMD guidance.

Inventory and Allocation:
The inventory accounts for the quantity, quality, and allocation of materials, energy, and emissions associated with the product. System boundaries follow the modular structure prescribed in EN15804+A2 and the NMD Bepalingsmethode v1.2 (2025).

All manufacturing inputs (energy and auxiliary materials) were first allocated to relevant production processes and then allocated to the products via mass allocation. Cut-off criteria ensure that no more than 5% of material or energy flows are excluded per module. No secondary materials were used in the production phase, but recycling benefits for steel and zinc are included in Module D.

Data Sources:
Primary data was obtained from Walraven's Czech production facility, covering material composition, manufacturing energy, transport distances, and waste management practices. Where data was missing, reliable secondary data was used from Ecoinvent 3.6 and the Nationale Milieudatabase v3.8.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

Modules A1 to A3 include the life cycle stages from raw material acquisition through to manufacturing. Module A1 captures the upstream processes for the production of the clamp, which consists of steel parts (upper and lower sections), EPDM rubber lining, and a POM anti-loss washer. The raw materials are modeled based on the Bill of Materials for the 2023/2024 production year. Environmental data are sourced from the Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. For steel, a typical average composition of 57% primary and 43% secondary (recycled) content is assumed, in line with LCA guidance and standard market profiles.

Module A2 represents the inbound transport of materials to the production site. While specific distances are not provided, the modeling uses standard values in accordance with EN 15804+A2, applying a 50% load factor (fully loaded transport to the factory with empty return). Transport references from NMD 3.8 and Ecoinvent 3.6 are used, specifically: 0001-tra&Transport, vrachtwagen (freight, lorry, unspecified).

Module A3 quantifies the environmental impact of the production processes at the Czech manufacturing facility. Electricity, packaging, lubricants, and process-related losses are included in the analysis, based on 2023/2024 operational data. Waste generated during manufacturing primarily steel is tracked and partly recycled, with recycling rates derived using the production share of the plant. No capital goods are modeled in accordance with the cutoff rule in EN 15804+A2, as their contribution to the total environmental profile is under the 5% threshold.

Module A4 models the distribution of finished products to the customer, assuming a standard distance of 150 km from the production site to the construction site. This is aligned with the Bepalingsmethode v1.2 and modeled using a 50% truck load factor per EN 15804+A2 conventions. Emissions are modeled using standard transport datasets.

Module A5 covers installation. It assumes manual installation with no energy input and includes 5% material loss due to on-site inefficiencies. Waste includes steel, rubber, and plastic offcuts, all of which are modeled using end-of-life (EoL) processing scenarios per Bepalingsmethode v1.2 (2025). Transport distances to processing sites are 100 km for rubber/plastic (to AVI) and 100 km for steel (to landfill or recycling facilities).

The End-of-Life Scenario Fixed Values used are:

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)

Modules A1–A3 – Raw Material Supply and Manufacturing
Modules A1 to A3 cover the initial life cycle stages of the Walraven Bifix® stainless steel clamp. Module A1 models the extraction and processing of raw and auxiliary materials, including packaging and lubricants. Key materials include stainless steel, EPDM rubber lining, and a PA6 plastic insert. Material modeling is based on the 2023/2024 bill of materials, using primary data where available and generic datasets from NMD v3.8 and Ecoinvent v3.6 where necessary. Stainless steel is modeled according to standard Dutch market composition assumptions, with a mix of primary and secondary content. Module A2 addresses the transport of these materials to the Walraven Czech Republic manufacturing site. Distances are based on supplier logistics and modeled in accordance with EN 15804+A2:2019, using Ecoinvent 3.6 and NMD 3.8 transport datasets. A 50% truck load factor is assumed, with fully loaded deliveries to the site and empty returns. Module A3 represents the production stage, including electricity consumption from the grid and renewable sources, fuel and lubricating oil use, packaging, and waste generation such as stainless steel scrap and EPDM offcuts. Primary operational data from 2023/2024 informs the modeling, including internal recycling of stainless steel proportionally to the facility's output. Waste transport to recycling and treatment facilities is included. Capital goods are excluded according to the EN 15804+A2 cutoff rule, as their contribution is below 5% of total environmental impact.

Module A4 – Transport to Installation Site
Module A4 models the distribution of the finished clamp to installation sites, assuming a standardized transport distance of 150 km, in line with Bepalingsmethode v1.2 (2025). Road transport emissions are calculated using the 0001-tra&Transport, vrachtwagen dataset from NMD v3.8 / Ecoinvent v3.6 with a 50% load factor.

Module A5 – Installation
Module A5 addresses the installation phase, assuming a 5% material loss during manual handling. No energy consumption is modeled, as installation is non-mechanized. Installation waste transport is modeled as 100 km to landfill or recycling for steel and to AVI incineration for rubber and plastic.

Modules C1–C4 – End-of-Life
Modules C1 to C4 cover the deconstruction and end-of-life treatment of the clamp. Module C1 assumes manual dismantling with no energy use. Module C2 models the transport of materials to waste processing facilities: steel and zinc are transported 50 km to recycling, while rubber and plastic are transported 100 km to AVI incineration plants. Module C3 models waste processing, with steel and zinc fully sorted and recycled, and rubber and plastic fully incinerated with energy recovery. Emission factors are taken from NMD v3.8, including 0264-avC&Verbranden kunststoffen for plastics, 0315-reC&Sorteren en persen oud ijzer for steel, and 0260-avC&Verbranden rubber/EPDM for rubber. Module C4 models final disposal, with 5% of steel and zinc sent to landfill, while rubber and plastic are fully incinerated.

Module D – Benefits Beyond the System Boundary
Module D quantifies environmental benefits from recycling and energy recovery. Steel benefits from a 52% substitution efficiency, calculated as the difference between 95% recycling and 43% secondary material content. Zinc recycling is modeled at 95% efficiency. Energy recovered from incineration of rubber and plastic is assumed to provide a 100% substitution of fossil-based energy.

This life cycle assessment and environmental product declaration are fully compliant with EN 15804+A2:2019 + AC:2021 and the Dutch LCA framework Bepalingsmethode v1.2 (2025). All material, energy, waste, and transport flows are modeled using verified primary data and internationally recognized datasets (Ecoinvent 3.6 and NMD v3.8), following a modular structure that ensures consistent treatment of upstream and downstream environmental impacts.

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

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