walraven

Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven HD1501 Clamp BUP EPDM M16 499-509mm

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

MRPI® registration:
1.1.00933.2025

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

1.1.00933.2025

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 HD1501 Clamp BUP EPDM M16 499-509mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

The Walraven HD1501 Clamp BUP EPDM M16 499-509mm is a robust two-part pipe clamp with locking bolts and anti-loss washers, designed for heavy-duty applications. Made of steel with CO_2 welded nut and UltraProtect® 1000 coating, it is corrosion-resistant and suitable for indoor and outdoor use. An EPDM lining reduces noise up to 18 dB(A) per DIN 4109, and the clamp is fire-tested for added safety.

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 and 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 HD1501 Clamp BUP EPDM M16 499-509mm is a heavy-duty, two-part pipe clamp designed for securely fastening large diameter pipes in industrial, commercial, and infrastructure applications. It features two locking bolts with anti-loss washers and a welded connection nut, providing exceptional mechanical strength and long-term reliability. An integrated EPDM lining offers vibration damping and noise reduction in accordance with DIN 4109, achieving up to 18 dB(A) attenuation. The clamp is suitable for both indoor and outdoor use and benefits from Walraven's BIS UltraProtect® 1000 system, ensuring corrosion resistance in aggressive environments. The product is manufactured in the Horka, Czech Republic under high-precision, environmentally responsible processes.

Manufacturing Process Overview
Steel coil is flattened and cut to exact dimensions to optimize structural integrity and reduce waste. Clamp halves are shaped using precision stamping and forming tooling to ensure consistent fit and load performance. The connection nut is attached using welding, and the clamp is finished with the BIS UltraProtect® 1000 coating, validated through ISO 9227 salt spray testing. The EPDM lining is applied to provide vibration damping and sound insulation, and the locking bolts with anti-loss washers are installed to complete final assembly.

Electricity usage references:
Reference: 0569-pro & Elektriciteit, Nederlandse mix, bij consument, per kWh (73% grijs, 27% hernieuwbaar), Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.389 kg CO_2eq/kWh

Reference: market for electricity, low voltage | electricity, low voltage | Czech Republic, Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.936 kg CO2-eq/kWh

Environmental Performance
The clamp delivers long-lasting corrosion protection without the need for additional on-site treatment. Steel and EPDM components are designed for durability and recyclability. Production scrap, including metal and rubber offcuts, is recycled internally, reducing waste. The product is engineered to withstand heavy loads and harsh conditions, extending its service life.

Installation and Use Phase
The two-part heavy-duty clamp provides secure fastening and reduces structure-borne sound and vibration. Its EPDM lining achieves up to 18 dB(A) noise attenuation. The product has been tested for fire performance and is suitable for both indoor and outdoor applications. The necessary internal transport of Czech Republic to Netherlands has been accounted in the production process of A1-A3.

End-of-Life Considerations
Clamp components can be easily separated for recycling. Steel and EPDM parts are fully recyclable through standard industrial processes. Comprehensive material breakdowns and disposal guidance are provided to support sustainable end-of-life management.

Packaging and Transport
The product is supplied in recyclable cardboard packaging, designed to minimize transport volume. Logistics are optimized to reduce environmental footprint during distribution.

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

Total Weight	3800 g

Component (> 1%)	(%)
Steel (combined)	94,5
Rubber - EPDM	2,65

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.

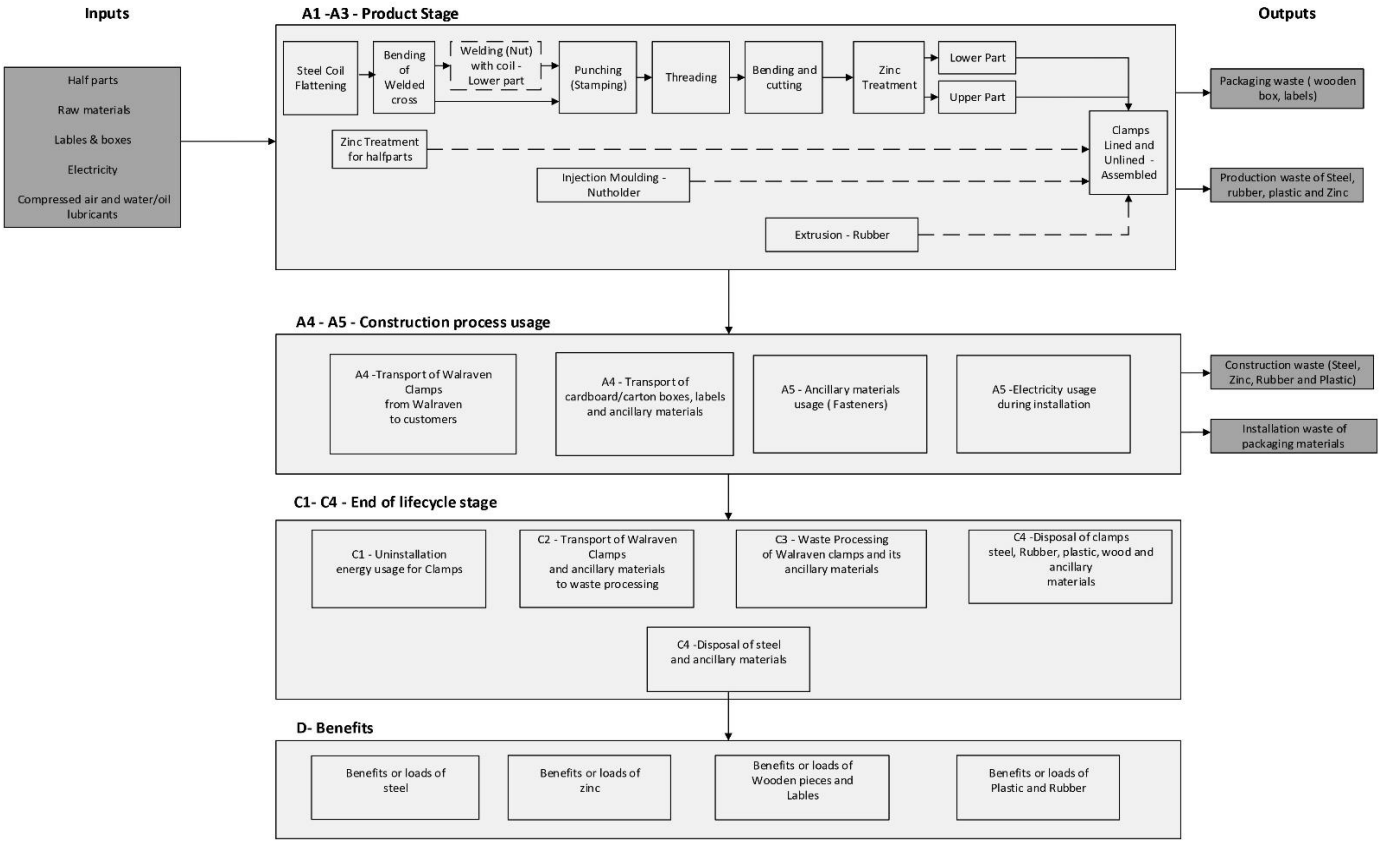
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental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



REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven HD1501 Clamp BUP EPDM M16 499-509mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst case scenario as per the EN 15804+A2 & NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven HD1501 Clamp BUP EPDM 1/2" 499-509mm
Walraven HD1501 Clamp BUP EPDM 1/2" 448-458mm
Walraven HD1501 Clamp BUP EPDM M16 448-458mm
Walraven HD1501 Clamp BUP EPDM 1/2" 398-408mm
Walraven HD1501 Clamp BUP EPDM M16 398-408mm
Walraven HD1501 Clamp BUP EPDM 1/2" 354-364mm
Walraven HD1501 Clamp BUP EPDM M16 354-364mm
Walraven HD1501 Clamp BUP EPDM 1/2" 315-325mm
Walraven HD1501 Clamp BUP EPDM M16 315-325mm
Walraven HD1501 Clamp BUP EPDM 1/2" 265-275mm
Walraven HD1501 Clamp BUP EPDM M16 265-275mm

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.	1,22E-01	1,23E-05	4,33E-06	1,22E-01	1,95E-06	6,11E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,55E-06	9,19E-06	8,20E-09	-6,89E-05
ADPF	MJ	1,89E+02	7,48E+00	5,67E+00	2,02E+02	1,17E+00	8,66E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,72E+00	2,27E+00	2,49E-02	-3,50E+01
GWP	kg CO2 eq.	1,26E+01	4,92E-01	4,21E-01	1,35E+01	7,63E-02	5,86E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,78E-01	4,65E-01	8,80E-04	-2,51E+00
ODP	kg CFC11 eq.	9,22E-07	8,70E-08	2,37E-08	1,03E-06	1,35E-08	4,91E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,16E-08	2,10E-08	2,93E-10	-1,17E-07
POCP	kg ethene eq.	1,17E-02	3,09E-04	-1,21E-04	1,19E-02	4,60E-05	3,44E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,07E-04	1,45E-04	9,37E-07	-5,31E-03
AP	kg SO2 eq.	7,19E-02	2,53E-03	1,42E-03	7,59E-02	3,35E-04	3,50E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,83E-04	1,63E-03	6,43E-06	-8,71E-03
EP	kg (PO4) 3 eq.	1,03E-02	4,59E-04	3,03E-04	1,11E-02	6,59E-05	5,23E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,54E-04	2,14E-04	1,24E-06	-1,03E-03

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	2,45E+01	2,09E-01	-1,65E-02	2,46E+01	3,21E-02	1,17E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,49E-02	1,99E-01	3,98E-04	-1,54E+00
FAETP	kg DCB eq.	4,00E-01	5,99E-03	2,02E-03	4,08E-01	9,38E-04	2,16E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,19E-03	3,74E-03	9,44E-06	1,67E-02
MAETP	kg DCB eq.	7,63E+02	2,17E+01	1,03E+01	7,95E+02	3,37E+00	4,16E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,87E+00	1,61E+01	3,37E-02	9,89E+00
TETP	kg DCB eq.	1,46E-01	7,34E-04	2,03E-03	1,49E-01	1,14E-04	1,36E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,65E-04	6,33E-04	9,99E-07	1,23E-01
ECI	euro	3,37E+00	6,13E-02	2,94E-02	3,46E+00	9,19E-03	1,61E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-02	5,18E-02	1,24E-04	-3,13E-01
ADPF	kg Sb eq.	9,08E-02	3,60E-03	2,73E-03	9,71E-02	5,61E-04	4,16E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,31E-03	1,09E-03	1,20E-05	-1,68E-02

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.	1,30E+01	4,96E-01	4,18E-01	1,39E+01	7,70E-02	5,96E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,80E-01	5,26E-01	8,97E-04	-2,68E+00
GWP-fossil	kg CO2 eq.	1,29E+01	4,96E-01	4,17E-01	1,38E+01	7,69E-02	5,92E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,79E-01	4,67E-01	8,96E-04	-2,68E+00
GWP-biogenic	kg CO2 eq.	5,52E-02	1,83E-04	6,73E-04	5,61E-02	2,87E-05	2,99E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,70E-05	5,91E-02	5,24E-07	0,00E+00
GWP-luluc	kg CO2 eq.	2,43E-02	1,87E-04	4,35E-04	2,49E-02	2,82E-05	1,35E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,58E-05	1,86E-04	2,50E-07	1,74E-03
ODP	kg CFC11 eq.	9,46E-07	1,09E-07	1,85E-08	1,07E-06	1,70E-08	5,26E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,96E-08	2,43E-08	3,69E-10	-1,04E-07
AP	mol H+ eq.	8,87E-02	3,33E-03	1,70E-03	9,37E-02	4,46E-04	4,33E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,04E-03	2,04E-03	8,51E-06	-1,06E-02
EP-fresh water	kg P eq.	1,00E-03	4,90E-06	7,01E-05	1,08E-03	7,76E-07	4,99E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,81E-06	1,13E-05	1,00E-08	-9,52E-05
EP-marine	kg N eq.	1,87E-02	1,11E-03	2,39E-04	2,01E-02	1,57E-04	9,57E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,67E-04	4,57E-04	2,93E-06	-1,93E-03
EP-terrestrial	mol N eq.	2,07E-01	1,23E-02	2,91E-03	2,22E-01	1,73E-03	1,06E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,04E-03	5,30E-03	3,23E-05	-2,25E-02
POCP	kg NMVOC eq.	6,73E-02	3,47E-03	3,78E-04	7,11E-02	4,95E-04	2,96E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,15E-03	1,44E-03	9,37E-06	-1,51E-02
ADP-minerals & metals	kg Sb eq.	1,22E-01	1,23E-05	4,33E-06	1,22E-01	1,95E-06	6,11E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,55E-06	9,19E-06	8,20E-09	-6,89E-05
ADP-fossil	MJ, net calorific value	1,70E+02	7,44E+00	6,13E+00	1,84E+02	1,16E+00	8,38E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,71E+00	2,33E+00	2,51E-02	-2,25E+01
WDP	m3 world eq. Deprived	8,22E+00	2,62E-02	9,11E-02	8,34E+00	4,15E-03	3,89E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,68E-03	2,65E-02	1,12E-03	-5,92E-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	8,72E-07	4,35E-08	-6,73E-09	9,08E-07	6,91E-09	4,00E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,61E-08	2,53E-08	1,65E-10	-1,56E-07
IRP	kBq U235 eq.	7,93E-01	3,12E-02	3,45E-02	8,58E-01	4,86E-03	4,56E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,13E-02	1,15E-02	1,03E-04	2,57E-02
ETP-fw	CTUe	1,40E+03	6,58E+00	3,17E-01	1,41E+03	1,03E+00	6,68E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,41E+00	1,03E+01	1,63E-02	-8,78E+01
HTP-c	CTUh	8,58E-08	2,19E-10	-5,83E-10	8,54E-08	3,36E-11	4,27E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,83E-11	2,43E-10	3,76E-13	-4,10E-10
HTP-nc	CTUh	1,47E-06	7,16E-09	1,62E-10	1,47E-06	1,13E-09	9,88E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,64E-09	1,16E-08	1,16E-11	4,87E-07
SQP	-	6,63E+01	6,29E+00	1,67E+00	7,43E+01	1,01E+00	3,87E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,35E+00	4,61E+00	5,26E-02	-4,90E+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	1,59E-02	1,85E-05	-7,74E-06	1,59E-02	2,94E-06	7,82E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,86E-06	7,14E-06	3,75E-08	-3,05E-04
NHWD	kg	3,62E+00	4,59E-01	3,37E-02	4,11E+00	7,36E-02	2,17E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,72E-01	7,38E-02	1,70E-01	-2,59E-01
RWD	kg	6,38E-04	4,89E-05	2,89E-05	7,16E-04	7,62E-06	3,74E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,78E-05	1,37E-05	1,65E-07	-7,43E-06
CRU	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	3,23E+00	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	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	9,57E-02	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	9,23E-04	9,23E-04	0,00E+00	4,61E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,07E-01
ETE	MJ	0,00E+00	0,00E+00	5,37E-04	5,37E-04	0,00E+00	2,68E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,68E-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	1,82E+01	9,19E-02	6,87E-01	1,89E+01	1,45E-02	9,81E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,39E-02	3,60E-01	2,03E-04	2,85E-01
PERM	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,82E+01	9,19E-02	6,87E-01	1,89E+01	1,45E-02	9,81E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,39E-02	3,60E-01	2,03E-04	2,85E-01
PENRE	MJ	1,81E+02	7,90E+00	6,61E+00	1,96E+02	1,23E+00	8,94E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,87E+00	2,47E+00	2,66E-02	-2,35E+01
PENRM	MJ	2,60E+00	0,00E+00	0,00E+00	2,60E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	1,84E+02	7,90E+00	6,61E+00	1,98E+02	1,23E+00	8,94E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,87E+00	2,47E+00	2,66E-02	-2,35E+01
SM	kg	1,46E+00	0,00E+00	7,72E-05	1,46E+00	0,00E+00	3,86E-06	ND	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	2,47E-01	8,91E-04	1,14E-02	2,59E-01	1,41E-04	1,24E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,30E-04	1,47E-03	2,68E-05	-1,22E-02

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	ND	ND	ND	ND	ND	ND	ND	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	ND	ND	ND	ND	ND	ND	ND	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 for the life cycle assessment have been modeled as realistically as possible, prioritizing primary data collected directly from the Walraven production facility in the Czech Republic. Where primary data was unavailable, secondary reference data from reliable sources and databases was used. For Module A1, detailed product composition data was supplied by the manufacturer. Module A2 incorporates recorded transport distances of raw materials to the production site, and Module A3 includes site-specific energy consumption and waste outputs from the 2023/2024 production period. Background data for materials and processes is sourced from the Nationale Milieudatabase v3.8 and Ecoinvent v3.6.

Data Collection Period

The dataset represents production processes from the year 2023/2024, ensuring that all operational conditions and material flows are accurately reflected.

Methodology and Reproducibility

The life cycle assessment follows EN 15804+A2:2019, NEN-EN ISO 14040, 14044, and 14025, adhering to the Dutch Bepalingsmethode v1.2 (2025). Calculations were carried out using Ecochain Helix software (v4.3.1), and the assessment covers all stages of the product life cycle: A1–A3 (raw material supply, transport, and manufacturing), A4–A5 (distribution and installation), B1–B7 (use stage, if applicable), C1–C4 (end-of-life processing), and D (reuse, recovery, and recycling potential).

Inventory and Allocation

The inventory accounts for the quantity, quality, and allocation of energy, materials, emissions, and waste across all relevant processes. System boundaries are defined according to the modular approach in EN 15804+A2 and the NMD Bepalingsmethode v1.2 (2025). Manufacturing inputs, including energy and raw materials, were assigned to specific processes and distributed to products using mass allocation. All relevant emissions and transport steps were included, and no secondary materials were used in production. End-of-life recycling credits for steel and zinc were applied in Module D. Cut-off criteria ensure that no more than 5% of energy or material flows per module were excluded from the assessment.

Data Sources

Primary data from Walraven's Czech facility encompasses material compositions, transport distances, energy use, and waste outputs. In cases where supplier-specific data was unavailable, standard reference datasets for steel, zinc, and EPDM rubber were obtained from NMD v3.8 and Ecoinvent 3.6. This combination of primary and high-quality secondary data ensures that the assessment is representative, transparent, and reproducible.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 cover the life cycle stages starting with raw material extraction (A1), material transport (A2), and production at Walraven's facility (A3). The clamp consists of steel (upper and lower parts, fasteners), EPDM rubber, and zinc coating. Material modeling was performed using NMD v3.8 and Ecoinvent v3.6, with generic datasets used where specific supplier data was unavailable. A standard steel composition of 57% primary and 43% secondary content was assumed in alignment with NMD market data.

Module A2 includes the transport of raw materials to the Walraven production facility. All transport processes are modeled using references compliant with EN 15804+A2 and assume a 50% average load factor (fully loaded inbound, empty return), using the 0001-tra&Transport, vrachtwagen dataset from NMD v3.8. Distances are excluded as per your instruction, and only methodological assumptions and dataset references are applied.

Module A3 models the environmental impacts at the production site based on operational data from 2022. This includes the use of electricity, fuels, packaging materials, and auxiliary substances such as lubricants. Waste generated during production (e.g., steel offcuts) and internally recycled quantities were modeled according to their proportional share. Capital goods were excluded under the EN 15804+A2 cutoff rule, as their contribution was below the 5% significance threshold.

Module A4 addresses transport of the finished clamp to the installation location. A standard 150 km distance was assumed, in accordance with Bepalingsmethode v1.2, using the same lorry transport dataset as Module A2 and a 50% load factor.

Module A5 includes the installation process, which is assumed to be fully manual and energy-free. A 5% material loss is assumed during installation, and resulting waste is allocated to end-of-life processing: Steel: 5% transported to landfill and Rubber and plastic: 100% transported to AVI (waste incineration) facilities.

The waste scenario distribution used is as follows:

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

End-of-Life Management (Modules C1–C4)
Module C1 considers the removal of the Walraven clamp at the end of its service life, assuming manual dismantling with negligible energy input. Module C2 models the transport of waste materials to appropriate processing facilities. Steel and zinc components are transported 50 km to sorting and recycling plants, while rubber and plastic components, if present, are transported 100 km to AVI incineration facilities for energy recovery.

Module C3 addresses the waste treatment processes. Steel and zinc are assumed to be 100% sorted and recycled, with emissions modeled using the 0315-reC&Sorteren en persen oud ijzer reference. Rubber is fully incinerated with energy recovery, using the 0260-avC&Verbranden rubber/EPDM emission factor (27.2 MJ/kg), while any plastic components are modeled using 0264-avC&Verbranden kunststoffen (28.67 MJ/kg). Module C4 covers final disposal, where 5% of steel and zinc is sent to landfill, using 0253-sto&Stort staal and 0248-sto&Stort koper, lood, verzinkt staal, zink as reference datasets. Rubber and plastics are assumed to be entirely incinerated, with no landfill allocation.

Benefits Beyond the System Boundary (Module D)
Module D quantifies environmental credits achieved through material recovery and energy substitution. For steel, with a 95% recycling rate and 43% secondary material content, a net substitution benefit of 52% is applied, reflecting avoided production of virgin pig iron. Zinc is modeled with a 95% recycling benefit. Rubber and plastics are assumed to yield 100% energy substitution through incineration with energy recovery, contributing to reduced fossil energy demand.

The entire end-of-life modeling approach is fully compliant with EN 15804+A2:2019 + AC:2021 and follows the Dutch Bepalingsmethode v1.2 (2025), ensuring consistency with national and European environmental assessment standards for construction products.

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.