Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven HD500 Clamp BUP 1/2" 448-458mm

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

MRPI® registration:
1.1.00954.2025

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

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

1.1.00954.2025

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 HD500 Clamp BUP 1/2" 448-458mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

Two-part steel clamp with two locking bolts and CO_2 welded connection nut. Features anti-loss washers and BUP surface protection as part of the BIS UltraProtect® 1000 system. Suitable for indoor and 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 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 HD500 Clamp BUP 1/2" (448–458 mm) is a heavy-duty, unlined pipe clamp engineered for large-diameter pipe applications in mechanical, HVAC, and industrial systems. Constructed from high-grade steel, it features welded connection nuts, locking bolts, and anti-loss POM washers for secure and efficient installation. The clamp is treated with BIS UltraProtect® 1000 (BUP) surface protection, providing resistance to demanding atmospheric conditions and ensuring long-term corrosion protection.

Manufacturing Location
The product is manufactured in the Horka, Czech Republic at Walraven's certified facility, adhering to strict environmental management practices.

Manufacturing Process Overview
The clamp body is made from steel for both upper and lower components. It is fitted with Class 4.8 screws and Class 04 nuts, ensuring mechanical stability. Surface protection is achieved through the BIS UltraProtect® 1000 coating, which has been validated for a minimum of 1,000 hours salt spray resistance per ISO 9227. The product is delivered fully pre-assembled, including anti-loss POM washers, to facilitate immediate on-site installation.

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 offers robust corrosion resistance due to the BUP coating and incorporates approximately 50.2% recycled steel. It is VOC-free, contains no Substances of Very High Concern (SVHCs), and is modeled for lifecycle impacts using Ecochain Helix v4.3.1 with Ecoinvent v3.6 datasets, following EN 15804+A2 standards. The product has a Reference Service Life (RSL) of 50 years.

Installation and Use Phase
Delivered fully assembled, the clamp reduces on-site labor and preparation time. Its unlined design makes it suitable for rigid pipe support applications where acoustic insulation is not required. The materials and design ensure safe indoor air quality with no hazardous emissions during use. The necessary internal transport of Czech Republic to Netherlands has been accounted in the production process of A1-A3.

End-of-Life Considerations
The clamp is fully demountable, enabling manual disassembly and separation of steel components for recycling. Approximately 95–100% of materials are recyclable, and Module D modeling accounts for environmental credits associated with steel and zinc recovery, offsetting virgin material production.

Packaging and Transport
The clamp is shipped in recyclable cardboard cartons optimized for space. Transport modeling assumes Euro 5 truck distribution at 50% load utilization, following EN 15804 guidelines.

The clamp meets ISO 9227 corrosion testing requirements (≥1,000-hour salt spray), complies with EN 15804 + A2 and ISO 14025 lifecycle assessment standards, and has been modeled using Ecochain Helix v4.3.1 software.

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

Total Weight	3049 g

Component (> 1%)	(%)
Steel (combined)	97,03%

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.

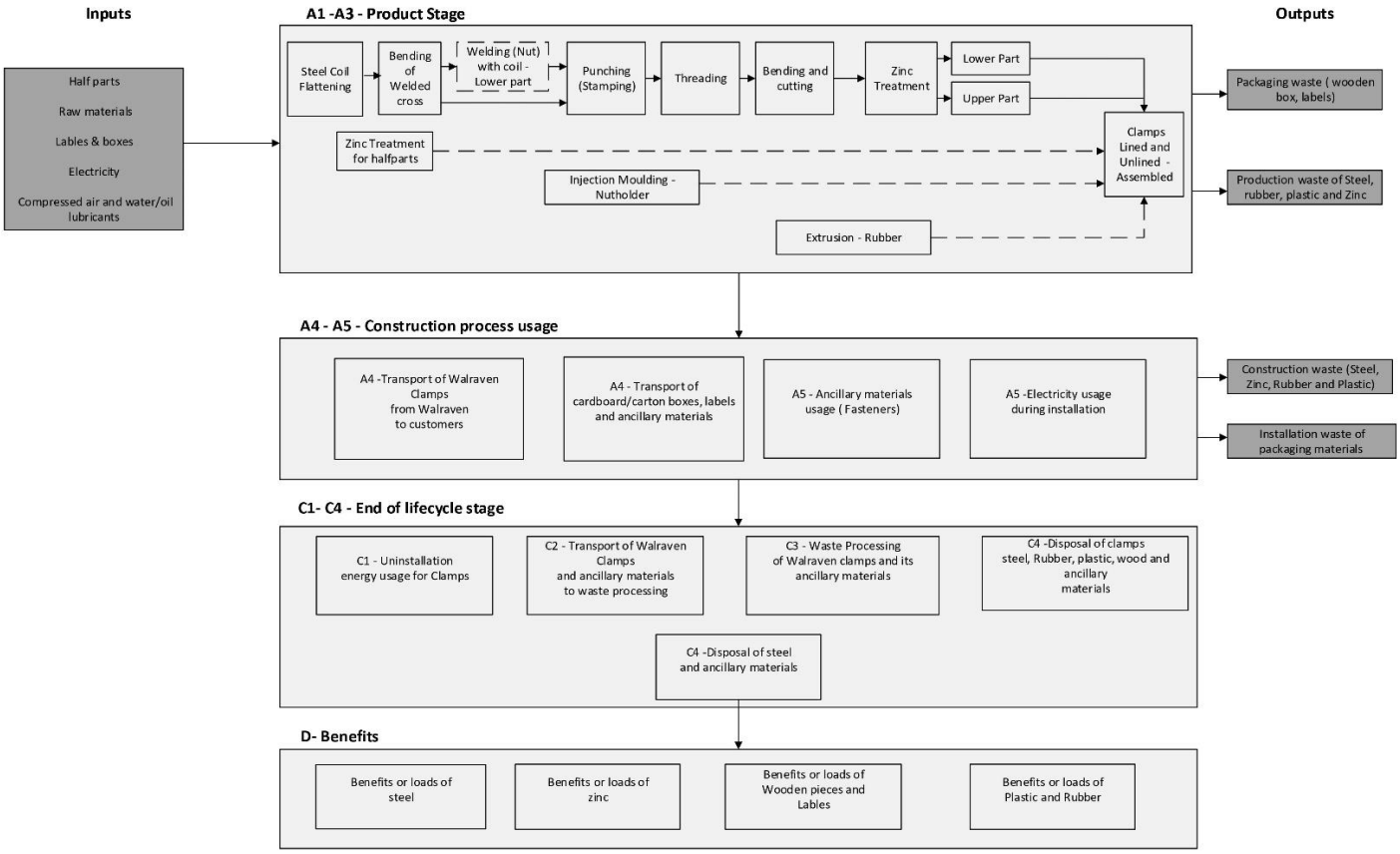
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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 HD500 Clamp BUP 1/2" 448-458mm. 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 HD500 Clamp BUP 1" 554-564mm
Walraven HD500 Clamp BUP 1/2" 554-564mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 220 (21
Walraven Split Band Clip DIN 3567 (untreated) Type A 220 (216 - 220 mm
Walraven HD500 Clamp BUP 1" 499-509mm
Walraven HD500 Clamp BUP 1/2" 499-509mm
Walraven HD500 Clamp BUP M16 499-509mm
Walraven HD500 Clamp BUP 1" 448-458mm
Walraven HD500 Clamp BUP 1/2" 448-458mm
Walraven HD500 Clamp BUP M16 448-458mm
Walraven HD500 Clamp BUP 1/2" 424-436mm
Walraven HD500 Clamp BUP M16 424-436mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 169 (16
Walraven HD500 Clamp BUP M16 408-418mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 169 (165 - 169 mm
Walraven HD500 Clamp BUP 1" 398-408mm
Walraven HD500 Clamp BUP 1/2" 398-408mm
Walraven HD500 Clamp BUP M16 398-408mm
Walraven HD500 Clamp BUP M16 379-389mm
Walraven HD500 Clamp BUP M16 364-374mm
Walraven HD500 Clamp BUP 1" 350-360mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 140 (13
Walraven HD500 Clamp BUP 1/2" 350-360mm
Walraven HD500 Clamp BUP M16 350-360mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 140 (136 - 140 mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 133 (12
Walraven HD500 Clamp BUP 1" 315-325mm

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.	1,08E-01	9,88E-06	4,33E-06	1,08E-01	1,56E-06	5,42E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,61E-06	7,97E-06	7,15E-09	-1,49E-06
ADPF	MJ	1,59E+02	5,98E+00	5,67E+00	1,71E+02	9,36E-01	7,45E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,56E+00	1,94E+00	2,17E-02	-2,63E+01
GWP	kg CO2 eq.	1,08E+01	3,93E-01	4,21E-01	1,16E+01	6,12E-02	4,95E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,02E-01	1,42E-01	7,67E-04	-2,05E+00
ODP	kg CFC11 eq.	7,65E-07	6,95E-08	2,37E-08	8,58E-07	1,09E-08	4,17E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,81E-08	1,78E-08	2,56E-10	-7,15E-08
POCP	kg ethene eq.	9,98E-03	2,43E-04	-1,21E-04	1,01E-02	3,69E-05	2,93E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,15E-05	1,25E-04	8,17E-07	-4,46E-03
AP	kg SO2 eq.	6,23E-02	1,91E-03	1,42E-03	6,56E-02	2,69E-04	3,04E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,49E-04	1,40E-03	5,61E-06	-6,94E-03
EP	kg (PO4) 3 eq.	8,95E-03	3,56E-04	3,03E-04	9,61E-03	5,29E-05	4,55E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,81E-05	1,78E-04	1,08E-06	-8,24E-04

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,58E-02	1,02E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,29E-02	1,72E-01	3,47E-04	-1,28E+00
FAETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	7,52E-04	1,90E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,25E-03	3,21E-03	8,23E-06	1,59E-02
MAETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,71E+00	3,64E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,51E+00	1,39E+01	2,94E-02	1,33E+01
TETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	9,11E-05	1,19E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,52E-04	5,36E-04	8,71E-07	1,07E-01
ECI	euro	2,92E+00	4,83E-02	2,94E-02	3,00E+00	7,38E-03	1,40E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,23E-02	3,17E-02	1,08E-04	-2,56E-01
ADPF	kg Sb eq.	7,65E-02	2,88E-03	2,73E-03	8,22E-02	4,50E-04	3,58E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,50E-04	9,34E-04	1,04E-05	-1,27E-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.	1,12E+01	3,96E-01	4,18E-01	1,20E+01	6,18E-02	5,04E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,03E-01	9,19E-02	7,82E-04	-2,20E+00
GWP-fossil	kg CO2 eq.	1,11E+01	3,96E-01	4,17E-01	1,19E+01	6,17E-02	5,00E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,03E-01	1,44E-01	7,82E-04	-2,20E+00
GWP-biogenic	kg CO2 eq.	4,83E-02	1,47E-04	6,73E-04	4,91E-02	2,30E-05	2,64E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,84E-05	-5,18E-02	4,57E-07	0,00E+00
GWP-luluc	kg CO2 eq.	2,13E-02	1,48E-04	4,35E-04	2,19E-02	2,26E-05	1,19E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,77E-05	1,61E-04	2,18E-07	1,62E-03
ODP	kg CFC11 eq.	7,76E-07	8,72E-08	1,85E-08	8,82E-07	1,36E-08	4,43E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,27E-08	2,06E-08	3,22E-10	-5,37E-08
AP	mol H+ eq.	7,68E-02	2,52E-03	1,70E-03	8,10E-02	3,58E-04	3,76E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,97E-04	1,74E-03	7,42E-06	-8,49E-03
EP-fresh water	kg PO4 eq.	8,77E-04	3,94E-06	7,01E-05	9,51E-04	6,23E-07	4,43E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,04E-06	9,78E-06	8,76E-09	-7,76E-05
EP-marine	kg N eq.	1,63E-02	8,60E-04	2,39E-04	1,74E-02	1,26E-04	8,28E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,10E-04	3,84E-04	2,55E-06	-1,57E-03
EP-terrestrial	mol N eq.	1,80E-01	9,48E-03	2,91E-03	1,93E-01	1,39E-03	9,13E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,32E-03	4,46E-03	2,81E-05	-1,84E-02
POCP	kg NMVOC eq.	5,81E-02	2,69E-03	3,78E-04	6,12E-02	3,97E-04	2,55E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,62E-04	1,22E-03	8,17E-06	-1,25E-02
ADP-minerals & metals	kg Sb eq.	1,08E-01	9,88E-06	4,33E-06	1,08E-01	1,56E-06	5,42E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,61E-06	7,97E-06	7,15E-09	-1,49E-06
ADP-fossil	MJ, net calorific value	1,43E+02	5,95E+00	6,13E+00	1,55E+02	9,31E-01	7,22E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,55E+00	1,99E+00	2,19E-02	-1,54E+01
WDP	m3 world eq. Deprived	7,10E+00	2,11E-02	9,11E-02	7,21E+00	3,33E-03	3,41E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,55E-03	2,00E-02	9,80E-04	-4,19E-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	7,47E-07	3,51E-08	-6,73E-09	7,76E-07	5,54E-09	3,43E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,24E-09	2,19E-08	1,44E-10	-1,27E-07
IRP	kBq U235 eq.	6,80E-01	2,49E-02	3,45E-02	7,39E-01	3,90E-03	3,98E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,50E-03	9,91E-03	8,97E-05	3,76E-02
ETP-fw	CTUe	1,24E+03	5,28E+00	3,17E-01	1,24E+03	8,30E-01	5,89E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,38E+00	8,56E+00	1,42E-02	-7,37E+01
HTP-c	CTUh	7,52E-08	1,74E-10	-5,83E-10	7,48E-08	2,69E-11	3,74E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,49E-11	2,09E-10	3,28E-13	-2,81E-10
HTP-nc	CTUh	1,29E-06	5,75E-09	1,62E-10	1,30E-06	9,08E-10	8,67E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,51E-09	9,91E-09	1,01E-11	4,26E-07
SQP	-	5,71E+01	5,08E+00	1,67E+00	6,38E+01	8,07E-01	3,33E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,35E+00	4,01E+00	4,58E-02	-3,39E+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	1,41E-02	1,49E-05	-7,74E-06	1,41E-02	2,36E-06	6,94E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,93E-06	6,00E-06	3,27E-08	-2,64E-04
NHWD	kg	3,15E+00	3,71E-01	3,37E-02	3,55E+00	5,90E-02	1,85E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,84E-02	5,82E-02	1,48E-01	-2,15E-01
RWD	kg	5,35E-04	3,91E-05	2,89E-05	6,03E-04	6,11E-06	3,22E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,02E-05	1,18E-05	1,44E-07	1,30E-05
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	2,82E+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	0,00E+00	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	0,00E+00
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	0,00E+00

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	1,57E+01	7,39E-02	6,87E-01	1,65E+01	1,17E-02	8,64E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,94E-02	3,12E-01	1,77E-04	4,46E-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	1,57E+01	7,39E-02	6,87E-01	1,65E+01	1,17E-02	8,64E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,94E-02	3,12E-01	1,77E-04	4,46E-01
PENRE	MJ	1,52E+02	6,32E+00	6,61E+00	1,65E+02	9,88E-01	7,70E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,65E+00	2,11E+00	2,32E-02	-1,59E+01
PENRM	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
PENRT	MJ	1,52E+02	6,32E+00	6,61E+00	1,65E+02	9,88E-01	7,70E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,65E+00	2,11E+00	2,32E-02	-1,59E+01
SM	kg	1,28E+00	0,00E+00	7,72E-05	1,28E+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	2,14E-01	7,17E-04	1,14E-02	2,26E-01	1,13E-04	1,10E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,89E-04	9,45E-04	2,33E-05	-7,95E-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	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 have been modelled as realistically as possible, with primary data from Walraven's Czech Republic production site prioritized. Where primary data was unavailable, appropriate reference datasets from standardized sources were used to ensure representativeness and reliability.

For Module A1, material composition data was sourced directly from internal records. Module A2 includes actual transport distances and methods from suppliers to the production site. Module A3 reflects measured energy consumption, waste outputs, and emissions from the 2023/2024 production year. Background datasets were selected from the Nationale Milieudatabase v3.8, based on Ecoinvent 3.6, ensuring consistency with recognized LCA methodologies.

The dataset is representative of production processes for the 2023/2024 period.

This LCA was conducted in accordance with EN 15804+A2:2019, ISO 14040, ISO 14044, ISO 14025, and the NMD Bepalingsmethode v1.2 (2025). Modelling and calculations were carried out using Ecochain Helix version 4.3.1. The assessment covers life cycle modules A1–A3 (raw material extraction, transport, and manufacturing), A4–A5 (transport to site and installation), C1–C4 (end-of-life including demolition, transport, treatment, and disposal), and D (reuse, recovery, and recycling potential).

System boundaries follow the modular EN15804+A2 approach, with all relevant inputs and outputs considered. Manufacturing site inputs, such as electricity and auxiliaries, were allocated using mass-based allocation. No secondary materials were used, and cut-off criteria were applied to ensure that excluded flows do not exceed 5% of mass or energy per module.

Primary data from Walraven's Czech facility includes raw material composition, energy consumption, transport distances (e.g., 300 km for steel, 100 km for zinc treatment), and waste generation. Where supplier-specific data was unavailable, standardized datasets for steel, zinc, and transport processes were used from NMD v3.8 and Ecoinvent 3.6 to maintain methodological rigor and comparability.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 cover the cradle-to-gate phase of the product's life cycle. Module A1 includes the raw material extraction and processing of all key materials used in the Walraven HD500 Clamp BUP 1/2" 448-458mm. The main constituents of this unlined clamp are multiple steel grades and a zinc coating. The material inventory is derived from 2023/2024 production data at Walraven's Czech Republic facility, using references from the Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. Steel is modeled with an average composition of 57% primary and 43% secondary input based on generic European datasets.

Module A2 models the transport of raw materials to the production site. All relevant inbound transportation, including road, ship, and inter-site truck logistics (e.g., to zinc plating facilities), are considered. Transport impacts are modeled with a 50% average load factor, and vehicle/process references are drawn from NMD v3.8 and Ecoinvent v3.6 datasets (e.g., 0001-tra&Transport, vrachtwagen).

Module A3 addresses the production impacts at the Walraven Czech facility. The modeling includes electricity consumption (grid mix), use of lubricating oils, and zinc treatment. Waste such as steel scrap generated during production is captured and partially recycled through internal processes. Energy use during clamp production and zinc treatment was modeled based on metered site-specific values. CO_2 emissions, water use, and electricity usage were factored in. Capital goods were excluded under the EN15804+A2 cutoff rule due to their <5% environmental contribution.

Module A4 considers the transportation of the finished clamp to customers. This is modeled as an average 150 km distribution by freight lorry with a 50% load factor. The impact is calculated using 2023/2024 logistics data and standard transport datasets (e.g., unspecified lorry type from NMD v3.8 / Ecoinvent v3.6).

Module A5 accounts for installation at the construction site. It assumes a 5% material loss due to manual installation inefficiencies. Waste from installation (including zinc-coated steel parts) is transported: 100 km for recycling (steel/zinc) and incineration (if applicable). Packaging waste treatment is also included. No operational energy is required for installation.

End-of-Life Scenario Fixed Values used:

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

Module C1 assumes manual uninstallation of the clamp at the end of its life, with no associated energy input. Module C2 accounts for transportation of waste materials to processing sites, with steel and zinc assumed to travel 50 km to recycling facilities or landfill. Emissions for transport are modeled using standard lorry datasets.

Module C3 addresses waste treatment, with steel and zinc fully sorted and recycled at 100% efficiency. Steel recycling is modeled using reference 0315-reC&Sorteren en persen oud ijzer, while zinc is included within the steel recycling process due to its coating. Module C4 represents final disposal, assuming that 5% of steel and zinc are sent to landfill. Relevant landfill references include 0253-sto&Stort staal for steel, with analogous references applied to zinc components as processed in NMD v3.8.

Module D captures benefits beyond the system boundary. Recycled steel is credited with a 52% substitution benefit, derived from a 95% recycling rate minus 43% secondary input. Zinc is credited at 95% recycling efficiency. As the product contains no rubber or plastic components, no incineration or energy recovery credits are applied.

The LCA modeling for these end-of-life stages complies with EN 15804+A2:2019 + AC:2021 and follows the Dutch Bepalingsmethode v1.2 (2025), ensuring reliability, reproducibility, and comparability across construction product life cycle assessments.

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.