Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven HD500 Clamp BUP 1/2" 208-219mm

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

MRPI® registration:
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MRPI® REGISTRATION

1.1.00956.2025

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" 208-219mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

Steel two-part clamp with two locking bolts and CO_2 welded connection nut. BUP surface protection as part of the BIS UltraProtect® 1000 system. Suitable for indoor and outdoor use with anti-loss washers and fire safety compliance.

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" (208–219mm) is a heavy-duty, unlined pipe clamp intended for large-diameter pipe applications in mechanical, HVAC, and industrial installations. The clamp is manufactured from high-grade steel and features welded connection nuts, locking bolts, and anti-loss POM washers, providing secure and efficient installation. BIS UltraProtect® 1000 (BUP) surface protection ensures durability in demanding atmospheric environments.

Manufacturing Location
The clamp is produced in Walraven's certified facility in the Horka, Czech Republic.

Manufacturing Process Overview
The clamp body consists of upper and lower parts made from steel. Fasteners are Class 4.8 hollow pan-headed screws, and washers are anti-loss components made of POM. The welded connection nut is steel, joined welding. The surface treatment comprises BIS UltraProtect® 1000 (BUP), validated for at least 1,000 hours in salt spray conditions per ISO 9227. The product is fully assembled before shipping to reduce on-site installation time.

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 BUP surface protection provides long-lasting corrosion resistance suitable for both indoor and outdoor use. Approximately 50.2% of the steel used is secondary (recycled) content. Manufacturing and LCA modeling comply with EN 15804+A2 standards, using Ecochain Helix v4.3.1 and Ecoinvent v3.6 data. The clamp is free of volatile organic compounds (VOC) and Substances of Very High Concern (SVHC). The product is designed with a Reference Service Life (RSL) of 50 years under standard operating conditions.

Installation and Use Phase
The clamp is delivered pre-assembled with dual locking bolts and pre-installed connection nuts, facilitating quick installation. It is intended for large-diameter mechanical pipe installations where acoustic insulation is not required. The clamp has also been fire-tested for performance in technical infrastructure. The necessary internal transport of Czech Republic to Netherlands has been accounted in the production process of A1-A3.

End-of-Life Considerations
Steel, BUP-coated, and plastic components can be separated and recycled efficiently. Environmental benefits from recycling are captured in Module D, contributing to reduced overall environmental impact.

Packaging and Transport
The clamp is packaged in recyclable cardboard optimized for palletizing and minimal waste generation. Transport assumptions are based on EURO 5 trucks at 50% load capacity in accordance with EN 15804 guidance.

The product has undergone corrosion testing per ISO 9227 (salt spray), and the life cycle assessment and environmental product declaration comply with EN 15804 + A2, ISO 14025, ISO 14040/44. Modeling was performed using Ecochain Helix v4.3.1.

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

Total Weight	1028 g

Component (> 1%)	(%)
Steel (combined)	97,07%

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.

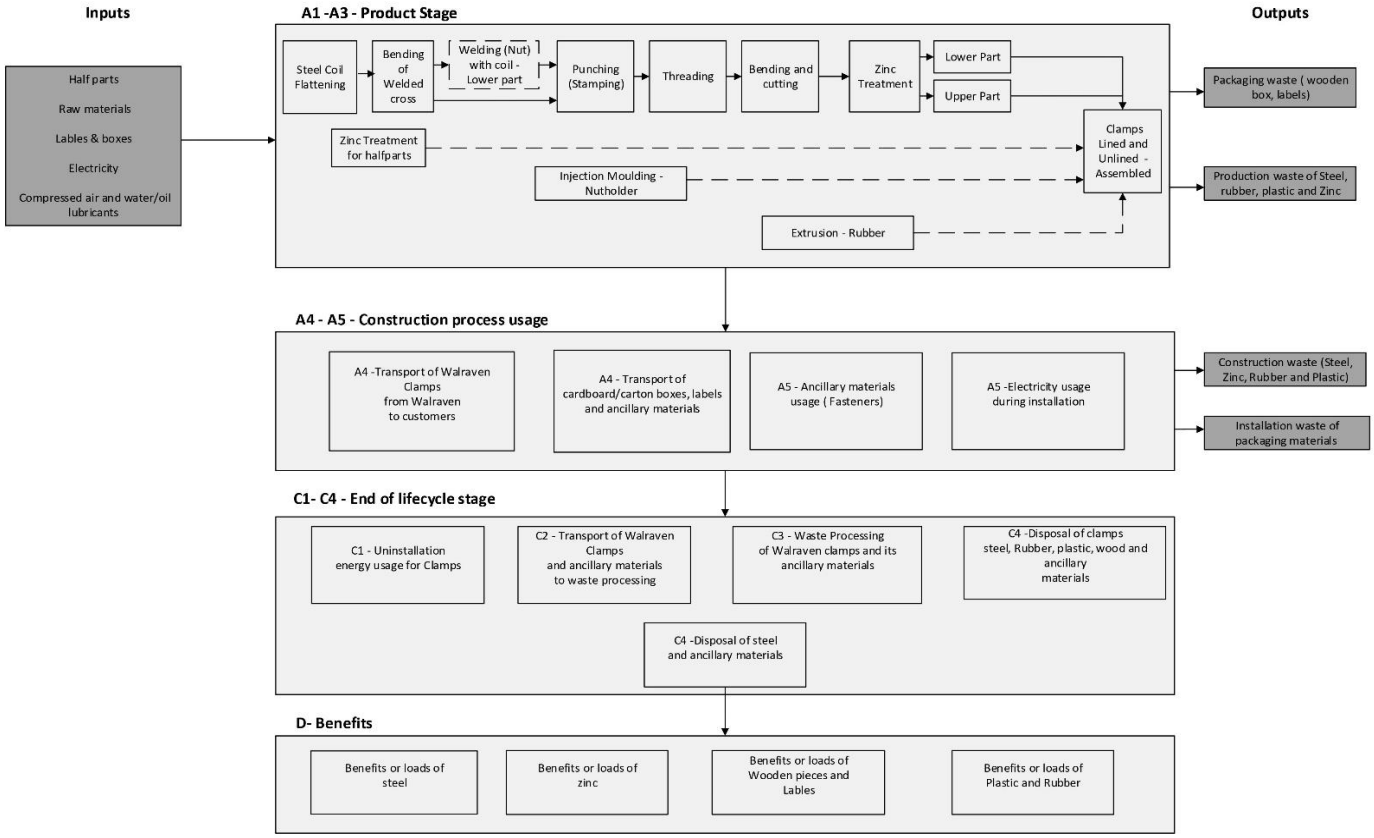
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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" 208–219mm. 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 HD500 Clamp BUP 1" 217-227mm
Walraven HD500 Clamp BUP 1/2" 217-227mm
Walraven HD500 Clamp BUP M10/12 217-227mm
Walraven HD500 Clamp BUP M16 217-227mm
Walraven 434 Clamp zinc plated M10 PE-pipe 225mm
Walraven 434 Clamp zinc plated G1" PE-Pipe 200mm
Walraven HD500 Clamp BUP VdS DN200 M16 8"
Walraven HD500 Clamp BUP 1/2" 208-219mm
Walraven HD500 Clamp BUP M10/12 208-219mm
Walraven Heavy Duty Clamp Stainless M16 240-250mm
Walraven HD500 Clamp BUP M10/12 86-92mm
Walraven HD500 Clamp black M10/12 86-92mm
Walraven HD500 Clamp BUP 1" 192-202mm
Walraven W1000 Strut Clamp ZnMg 18-21mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 89 (86
Walraven HD500 Clamp BUP 1/2" 79-85mm
Walraven HD500 Clamp BUP M10/12 192-202mm
Walraven HD500 Clamp BUP 1/2" 192-202mm
Walraven HD500 Clamp BUP M16 192-202mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 89 (86 - 89 mm)
Walraven HD500 Clamp BUP VdS DN125 M12 5"
Walraven 434 Clamp zinc plated M10 PE-pipe 200mm
Walraven HD500 Clamp BUP 1" 173-183mm
Walraven HD500 Clamp BUP M10/12 79-85mm
Walraven HD500 Clamp BUP M10/12 173-183mm
Walraven HD500 Clamp BUP 1/2" 173-183mm
Walraven HD500 Clamp BUP M16 173-183mm
Walraven 434 Clamp zinc plated G1" PE-Pipe 160mm
Walraven Heavy Duty Clamp Stainless M12 229-241mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 77 (74
Walraven Heavy Duty Clamp Stainless M12 192-202mm
Walraven HD Clamp UNC 3/8 inch - 1/2 inch 72-78
Walraven HD500 Clamp BUP 1" 159-169mm
Walraven HD500 Clamp black M8/10 59-65mm
Walraven W-1000 Rigid Strut Clamp 15-17 mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 77 (74 - 77 mm)
Walraven Heavy Duty Clamp epoxy coated 3/8" 1/2" 125mm
Walraven HD500 Clamp BUP 1/2" 159-169mm
Walraven HD500 Clamp BUP M10/12 159-169mm
Walraven HD500 Clamp BUP M16 159-169mm
Walraven HD500 Clamp BUP VdS DN150 M12 6"
Walraven Heavy Duty Clamp Stainless M12 173-183mm
Walraven Heavy Duty Clamp Stainless M12 DN200 8" 217-227mm
Walraven Heavy Duty Clamp Stainless M12 208-219mm
Walraven HD500 Clamp BUP VdS DN25 M8/10 1"
Walraven HD500 Clamp BUP 1/2" 98-106mm
Walraven HD500 Clamp BUP M10/12 98-106mm
Walraven W-1000 Rigid Strut Clamp 1-1/2" IPS I 1-1/2" EMT
Walraven W-1000 Rigid Strut Clamp 1-1/4" IPS I 1-1/4" EMT
Walraven W-1000 Rigid Strut Clamp 1" IPS I 1" EMT

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.	3,72E-02	4,34E-06	4,33E-06	3,73E-02	5,27E-07	1,86E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,79E-07	2,70E-06	2,47E-09	-5,16E-07
ADPF	MJ	5,52E+01	2,69E+00	5,67E+00	6,36E+01	3,15E-01	2,80E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,26E-01	6,58E-01	7,51E-03	-9,11E+00
GWP	kg CO2 eq.	3,76E+00	1,78E-01	4,21E-01	4,36E+00	2,06E-02	1,88E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,44E-02	4,87E-02	2,65E-04	-7,09E-01
ODP	kg CFC11 eq.	2,68E-07	3,14E-08	2,37E-08	3,23E-07	3,66E-09	1,57E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,10E-09	6,03E-09	8,83E-11	-2,47E-08
POCP	kg ethene eq.	3,45E-03	1,16E-04	-1,21E-04	3,44E-03	1,25E-05	9,88E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,08E-05	4,24E-05	2,82E-07	-1,54E-03
AP	kg SO2 eq.	2,15E-02	1,03E-03	1,42E-03	2,40E-02	9,07E-05	1,11E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,51E-04	4,73E-04	1,94E-06	-2,40E-03
EP	kg (PO4) 3 eq.	3,10E-03	1,76E-04	3,03E-04	3,58E-03	1,78E-05	1,70E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,97E-05	6,03E-05	3,74E-07	-2,85E-04

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	7,35E+00	7,65E-02	-1,65E-02	7,41E+00	8,69E-03	3,53E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,45E-02	5,83E-02	1,20E-04	-4,43E-01
FAETP	kg DCB eq.	1,22E-01	2,15E-03	2,02E-03	1,26E-01	2,54E-04	6,68E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,23E-04	1,09E-03	2,84E-06	5,50E-03
MAETP	kg DCB eq.	2,29E+02	7,85E+00	1,03E+01	2,47E+02	9,12E-01	1,30E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,52E+00	4,73E+00	1,02E-02	4,59E+00
TETP	kg DCB eq.	4,46E-02	2,66E-04	2,03E-03	4,69E-02	3,07E-05	4,21E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,12E-05	1,82E-04	3,01E-07	3,70E-02
ECI	euro	1,01E+00	2,28E-02	2,94E-02	1,06E+00	2,49E-03	4,96E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,15E-03	1,08E-02	3,74E-05	-8,84E-02
ADPF	kg Sb eq.	2,65E-02	1,29E-03	2,73E-03	3,06E-02	1,52E-04	1,35E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,53E-04	3,16E-04	3,61E-06	-4,38E-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.	3,87E+00	1,79E-01	4,18E-01	4,47E+00	2,08E-02	1,91E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,47E-02	3,09E-02	2,70E-04	-7,60E-01
GWP-fossil	kg CO2 eq.	3,85E+00	1,79E-01	4,17E-01	4,44E+00	2,08E-02	1,89E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,47E-02	4,93E-02	2,70E-04	-7,60E-01
GWP-biogenic	kg CO2 eq.	1,67E-02	6,55E-05	6,73E-04	1,75E-02	7,76E-06	9,37E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,29E-05	-1,84E-02	1,58E-07	0,00E+00
GWP-luluc	kg CO2 eq.	7,70E-03	6,94E-05	4,35E-04	8,20E-03	7,63E-06	4,42E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,27E-05	5,45E-05	7,53E-08	5,61E-04
ODP	kg CFC11 eq.	2,71E-07	3,94E-08	1,85E-08	3,29E-07	4,59E-09	1,65E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,66E-09	7,00E-09	1,11E-10	-1,86E-08
AP	mol H+ eq.	2,66E-02	1,34E-03	1,70E-03	2,96E-02	1,21E-04	1,38E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,01E-04	5,90E-04	2,56E-06	-2,93E-03
EP-fresh water	kg PO4 eq.	3,06E-04	1,74E-06	7,01E-05	3,77E-04	2,10E-07	1,77E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,50E-07	3,31E-06	3,03E-09	-2,68E-05
EP-marine	kg N eq.	5,63E-03	4,34E-04	2,39E-04	6,30E-03	4,25E-05	3,00E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,09E-05	1,30E-04	8,82E-07	-5,44E-04
EP-terrestrial	mol N eq.	6,22E-02	4,79E-03	2,91E-03	6,99E-02	4,69E-04	3,32E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,81E-04	1,51E-03	9,72E-06	-6,35E-03
POCP	kg NMVOC eq.	2,00E-02	1,34E-03	3,78E-04	2,17E-02	1,34E-04	9,10E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,23E-04	4,12E-04	2,82E-06	-4,32E-03
ADP-minerals & metals	kg Sb eq.	3,72E-02	4,34E-06	4,33E-06	3,73E-02	5,27E-07	1,86E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,79E-07	2,70E-06	2,47E-09	-5,16E-07
ADP-fossil	MJ, net calorific value	4,98E+01	2,68E+00	6,13E+00	5,86E+01	3,14E-01	2,74E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,23E-01	6,74E-01	7,55E-03	-5,32E+00
WDP	m3 world eq. Deprived	2,46E+00	9,27E-03	9,11E-02	2,56E+00	1,12E-03	1,21E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,87E-03	6,82E-03	3,39E-04	-1,45E-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	2,58E-07	1,54E-08	-6,73E-09	2,66E-07	1,87E-09	1,17E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,11E-09	7,40E-09	4,98E-11	-4,39E-08
IRP	kBq U235 eq.	2,38E-01	1,12E-02	3,45E-02	2,84E-01	1,32E-03	1,52E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,19E-03	3,36E-03	3,10E-05	1,30E-02
ETP-fw	CTUe	4,25E+02	2,35E+00	3,17E-01	4,28E+02	2,80E-01	2,03E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,66E-01	2,91E+00	4,90E-03	-2,55E+01
HTP-c	CTUh	2,59E-08	7,97E-11	-5,83E-10	2,54E-08	9,08E-12	1,27E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,51E-11	7,08E-11	1,13E-13	-9,73E-11
HTP-nc	CTUh	4,44E-07	2,55E-09	1,62E-10	4,47E-07	3,06E-10	2,99E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,10E-10	3,36E-09	3,48E-12	1,47E-07
SQP	-	1,98E+01	2,22E+00	1,67E+00	2,36E+01	2,72E-01	1,23E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,54E-01	1,36E+00	1,58E-02	-1,17E+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	4,86E-03	6,55E-06	-7,74E-06	4,85E-03	7,95E-07	2,38E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,33E-06	2,03E-06	1,13E-08	-9,11E-05
NHWD	kg	1,09E+00	1,61E-01	3,37E-02	1,28E+00	1,99E-02	6,66E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,32E-02	1,97E-02	5,13E-02	-7,44E-02
RWD	kg	1,88E-04	1,76E-05	2,89E-05	2,35E-04	2,06E-06	1,24E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,43E-06	3,99E-06	4,96E-08	4,49E-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	9,75E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	1,60E-05	1,60E-05	0,00E+00	8,01E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	2,60E-04	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	1,95E-03
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	1,13E-03

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	5,50E+00	3,27E-02	6,87E-01	6,22E+00	3,93E-03	3,24E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,55E-03	1,06E-01	6,11E-05	1,54E-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	5,50E+00	3,27E-02	6,87E-01	6,22E+00	3,93E-03	3,24E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,55E-03	1,06E-01	6,11E-05	1,54E-01
PENRE	MJ	5,30E+01	2,84E+00	6,61E+00	6,24E+01	3,33E-01	2,93E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,55E-01	7,15E-01	8,02E-03	-5,52E+00
PENRM	MJ	6,29E-03	0,00E+00	0,00E+00	6,29E-03	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	5,30E+01	2,84E+00	6,61E+00	6,25E+01	3,33E-01	2,93E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,55E-01	7,15E-01	8,02E-03	-5,52E+00
SM	kg	4,41E-01	0,00E+00	7,72E-05	4,41E-01	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	7,41E-02	3,16E-04	1,14E-02	8,58E-02	3,82E-05	4,17E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,37E-05	3,21E-04	8,07E-06	-2,75E-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 to reflect actual processes as accurately as possible, prioritizing primary data from Walraven's production site in the Czech Republic. Where primary data was unavailable, appropriate background datasets from verified sources were used to ensure reliability.

For Module A1, detailed product composition data was obtained directly from the manufacturer. Module A2 incorporates real transport distances and transport modes from suppliers to the production site. Module A3 includes energy consumption, production waste, and emissions data recorded during the 2023/2024 production year. Background processes were sourced from the Dutch Nationale Milieudatabase v3.8, based on Ecoinvent 3.6 datasets.

Data Collection Period

The dataset represents the production processes used in 2023/2024.

Methodology and Reproducibility

The life cycle assessment 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 performed using Ecochain Helix software version 4.3.1. The assessment covers the following 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, processing, and disposal), and D (reuse, recovery, and recycling potential).

Inventory and Allocation

All relevant material inputs, energy use, emissions, and waste streams have been included. Allocation follows the modular structure of EN 15804, with mass-based allocation used to distribute site-level inputs across individual processes and products. No secondary materials were used in production. Cut-off criteria ensure that excluded flows do not exceed 5% of total mass or energy per module.

Data Sources

Primary data was collected from Walraven's Czech production facility, including steel, zinc, POM, Class 4.8 screws and nuts, energy consumption, transport distances, and emissions. For processes where primary data was unavailable, verified datasets from Ecoinvent 3.6 and Nationale Milieudatabase v3.8 were used. Transport data accounts for road and sea distances, as well as zinc coating transport to treatment facilities (typically 100 km). Environmental impact categories were assessed using CML and EF 3.0 characterization methods where applicable.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 cover the life cycle stages beginning with raw material acquisition and upstream processes. Module A1 models the sourcing and processing of all raw and auxiliary materials used in manufacturing the Walraven HD500 Clamp BUP 1/2" 208-219mm. The primary materials used in the product include several grades of steel (for upper/lower clamp parts, nuts, and screws), zinc coating, and a small quantity of POM plastic (anti-loss washer). The bill of materials was based on 2023/2024 production data. Life cycle modeling references include the Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. Steel was modeled with a market average composition of 57% primary and 43% secondary content.

Module A2 addresses transport of raw materials to the Walraven production facility in the Czech Republic. While specific distances per material are documented in the background report, all transport scenarios are modeled using standard EN 15804+A2 assumptions and data from Ecoinvent and NMD databases. A 50% load factor is assumed (loaded inbound, empty return), and unspecified lorry datasets were applied across the materials.

Module A3 analyzes the manufacturing process, incorporating site-specific data on electricity consumption, zinc treatment energy, lubricating oil use, steel scrap generation, and process emissions. The electricity mix includes both local grid electricity and energy required for zinc coating processes. Steel waste and internal recycling are modeled proportionally, and lubricating oil is used as an auxiliary input. Capital goods are excluded based on the EN 15804+A2 cutoff rule, as their contribution falls below 5% of total impact.

Module A4 models distribution of the finished clamp to the point of installation. A standardized average distance of 150 km is assumed in accordance with the Bepalingsmethode v1.2. The transport model uses a 50% truck load factor and references the dataset 0001-tra&Transport, vrachtwagen from NMD v3.8 and Ecoinvent v3.6.

Module A5 includes manual installation of the product, with a 5% material loss rate assumed for steel and plastic components due to on-site inefficiencies. No additional energy is required for installation. Waste from this process is transported: steel and zinc 100 km to landfill or recycling, and plastic (POM) 100 km to AVI incineration facilities. These assumptions follow fixed waste treatment fractions defined in the Bepalingsmethode v1.2.

End-of-Life Scenario Fixed Values used:

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

Module C1 assumes the clamp is manually uninstalled at end-of-life with no energy requirements.

Module C2 models transport of waste: steel and zinc travel 50 km to recycling/landfill; plastic travels 100 km to incineration facilities.

Module C3 processes waste materials: steel and zinc are 100% recycled, while plastics are incinerated with energy recovery.

Module C4 reflects final disposal: 5% of steel and zinc go to landfill; all plastic is incinerated.

Module D accounts for environmental benefits of material recycling beyond the life cycle boundary. Recycled steel is credited using a substitution efficiency of 52% (based on 95% recycling and 43% already secondary content). Zinc recycling is modeled with a 95% efficiency. Plastics are assumed to contribute 100% energy substitution through AVI incineration.

This modeling approach follows EN 15804+A2:2019 + AC:2021 and is consistent with Bepalingsmethode v1.2 (2025). All datasets are derived from NMD v3.8 and Ecoinvent v3.6, and system boundaries are set per EN 15804's modular framework, ensuring comparability with similarly structured EPDs.

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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