Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven 434 Clamp stainless steel M10 PE-pipe 200mm

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

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MRPI® REGISTRATION

1.1.00948.2025

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15-5-2025

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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 434 Clamp stainless steel M10 PE-pipe 200mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

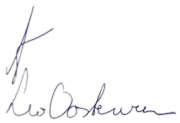
DESCRIPTION OF PRODUCT

Two-screw clamp made of stainless steel (AISI 316), designed for PE-pipe support. Features anti-loss washers and suitable for use with clamp liners for rigid fixing.

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 434 Clamp Stainless Steel M10 PE-pipe 200 mm is a corrosion-resistant two-screw pipe clamp designed for secure fastening of plastic pipes. It is made from high-grade AISI 316 stainless steel (1.4401), providing long-lasting mechanical strength and durability in both indoor and outdoor environments. The clamp can optionally accommodate liners for fixed-point installations.

Manufacturing Location
The clamp is manufactured in the Horka, Czech Republic at Walraven's certified facility, which adheres to environmental management standards.

Manufacturing Process Overview
The clamp body is made of AISI 316 stainless steel, assembled with two locking bolts and POM anti-loss washers. It is delivered pre-assembled for efficient installation, and optional liners can be added for fixed-point applications.

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 stainless steel body ensures excellent corrosion resistance, even in humid or aggressive environments. Components are over 95% recyclable and can be separated for recovery. The product is free from substances of very high concern (SVHC) and does not emit volatile organic compounds (VOC). Lifecycle assessment is compliant with EN 15804+A2, using Ecochain Helix v4.3.1 and Ecoinvent v3.6 datasets.

Installation and Use Phase
The pre-assembled clamp simplifies installation. It is suitable for mechanical and utility piping systems where sound insulation is not required and is designed for a reference service life of up to 50 years. 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 can be manually disassembled, allowing steel recovery and recycling. Module D modeling accounts for environmental benefits from recycling, and waste treatment is modeled as fully processed with appropriate recovery routes.

Packaging and Transport
The product is packed in recyclable cardboard and transported using a 16–32 t EURO 5 truck at 50% load efficiency.

Compliance and Certifications
The clamp uses stainless steel AISI 316 (1.4401), is tested according to ISO 9227 for corrosion resistance, and complies with EN 15804+A2, ISO 14025, and ISO 14040/44 standards. LCA 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 - POM (PolyOxyMethylene) - Anti loss washer	

Total Weight	570 g

Component (> 1%)	(%)
Steel (combined)	96,89%

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.

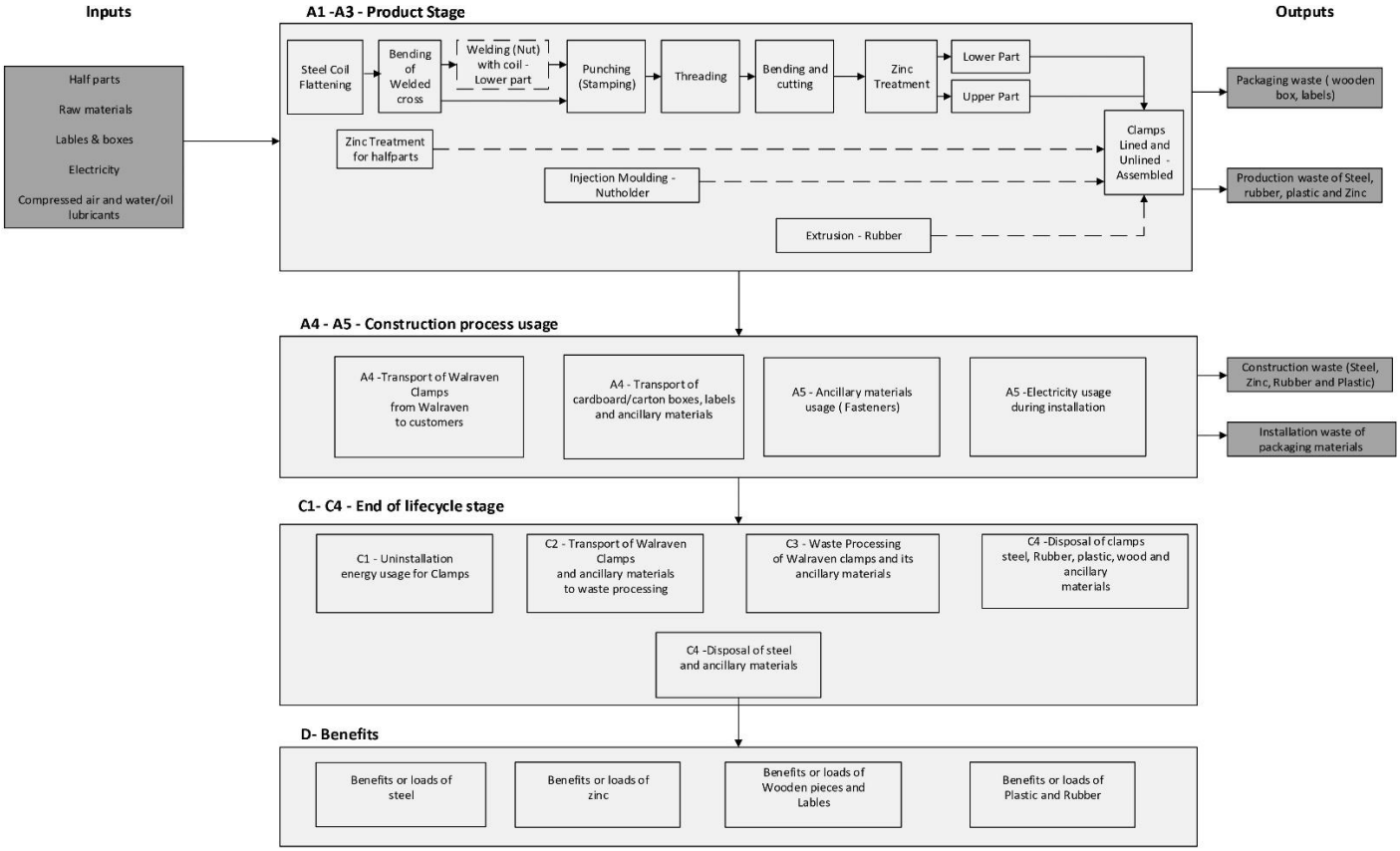
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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 434 Clamp stainless steel M10 PE-pipe 200mm. 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 M16 208-219mm
Walraven 434 Clamp stainless steel M10 PE-pipe 200mm
Walraven Heavy Duty Clamp epoxy coated 3/8" 1/2" 200mm
Walraven Heavy Duty Clamp Stainless M12 DN65 2 1/2" 72-78mm
Walraven Industrial Saddle hot dip galvanized 160mm
Walraven HD500 Clamp BUP VdS DN100 M10/12 4"
Walraven HD500 Clamp BUP M8/10 47-52mm
Walraven HD500 Clamp BUP 1/2" 72-78mm
Walraven Industrial Saddle hot dip galvanized 139.7mm 5"
Walraven Heavy Duty Clamp epoxy coated 3/8" 1/2" 160mm
Walraven Heavy Duty Clamp Stainless M12 93-99mm
Walraven HD500 Clamp BUP M10/12 72-78mm
Walraven Bifix® G2 Clamp BUP M8/10 219-225mm
Walraven HD500 Clamp black M8/10 47-52mm
Walraven Bifix® G2 Clamp BUP M8/10 205-210mm
Walraven 434 Clamp stainless steel M10 PE-pipe 160mm
Walraven Bifix® G2 Clamp BUP M8/10 192-200mm
Walraven HD500 Clamp BUP 1/2" 66-71mm
Walraven Industrial Saddle hot dip galvanized 110mm

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.	2,11E-02	1,93E-06	4,33E-06	2,11E-02	2,92E-07	1,05E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,87E-07	1,49E-06	1,34E-09	-2,80E-07
ADPF	MJ	3,03E+01	1,18E+00	5,67E+00	3,71E+01	1,75E-01	1,65E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,92E-01	3,64E-01	4,07E-03	-4,94E+00
GWP	kg CO2 eq.	2,06E+00	7,76E-02	4,21E-01	2,56E+00	1,14E-02	1,12E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,91E-02	2,71E-02	1,44E-04	-3,85E-01
ODP	kg CFC11 eq.	1,46E-07	1,37E-08	2,37E-08	1,83E-07	2,03E-09	8,93E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,38E-09	3,34E-09	4,79E-11	-1,34E-08
POCP	kg ethene eq.	1,88E-03	4,89E-05	-1,21E-04	1,81E-03	6,90E-06	5,08E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,15E-05	2,35E-05	1,53E-07	-8,35E-04
AP	kg SO2 eq.	1,19E-02	4,04E-04	1,42E-03	1,37E-02	5,03E-05	6,41E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,38E-05	2,62E-04	1,05E-06	-1,30E-03
EP	kg (PO4) 3 eq.	1,71E-03	7,28E-05	3,03E-04	2,09E-03	9,88E-06	9,96E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,65E-05	3,34E-05	2,03E-07	-1,54E-04

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,82E-03	1,92E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,03E-03	3,23E-02	6,50E-05	-2,40E-01
FAETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,41E-04	3,73E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,34E-04	6,02E-04	1,54E-06	2,98E-03
MAETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	5,06E-01	7,39E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,43E-01	2,62E+00	5,51E-03	2,49E+00
TETP	kg DCB eq.	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,70E-05	2,32E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,84E-05	1,01E-04	1,63E-07	2,01E-02
ECI	euro	5,53E-01	9,69E-03	2,94E-02	5,92E-01	1,38E-03	2,77E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,30E-03	5,97E-03	2,03E-05	-4,79E-02
ADPF	kg Sb eq.	1,46E-02	5,67E-04	2,73E-03	1,78E-02	8,41E-05	7,94E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,40E-04	1,75E-04	1,96E-06	-2,38E-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.	2,12E+00	7,83E-02	4,18E-01	2,62E+00	1,15E-02	1,13E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,92E-02	1,68E-02	1,47E-04	-4,12E-01
GWP-fossil	kg CO2 eq.	2,11E+00	7,82E-02	4,17E-01	2,60E+00	1,15E-02	1,12E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,92E-02	2,74E-02	1,46E-04	-4,12E-01
GWP-biogenic	kg CO2 eq.	9,31E-03	2,88E-05	6,73E-04	1,00E-02	4,30E-06	5,35E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,17E-06	-1,06E-02	8,56E-08	0,00E+00
GWP-luluc	kg CO2 eq.	4,10E-03	2,96E-05	4,35E-04	4,57E-03	4,23E-06	2,46E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,05E-06	3,02E-05	4,08E-08	3,04E-04
ODP	kg CFC11 eq.	1,48E-07	1,72E-08	1,85E-08	1,84E-07	2,55E-09	9,21E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,24E-09	3,88E-09	6,03E-11	-1,01E-08
AP	mol H+ eq.	1,47E-02	5,32E-04	1,70E-03	1,69E-02	6,69E-05	7,92E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,12E-04	3,26E-04	1,39E-06	-1,59E-03
EP-fresh water	kg PO4 eq.	1,68E-04	7,72E-07	7,01E-05	2,39E-04	1,16E-07	1,13E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,94E-07	1,83E-06	1,64E-09	-1,45E-05
EP-marine	kg N eq.	3,12E-03	1,77E-04	2,39E-04	3,54E-03	2,36E-05	1,69E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,93E-05	7,20E-05	4,78E-07	-2,95E-04
EP-terrestrial	mol N eq.	3,45E-02	1,96E-03	2,91E-03	3,94E-02	2,60E-04	1,87E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,33E-04	8,35E-04	5,27E-06	-3,44E-03
POCP	kg NMVOC eq.	1,11E-02	5,52E-04	3,78E-04	1,20E-02	7,42E-05	5,04E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,24E-04	2,28E-04	1,53E-06	-2,34E-03
ADP-minerals & metals	kg Sb eq.	2,11E-02	1,93E-06	4,33E-06	2,11E-02	2,92E-07	1,05E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,87E-07	1,49E-06	1,34E-09	-2,80E-07
ADP-fossil	MJ, net calorific value	2,73E+01	1,17E+00	6,13E+00	3,46E+01	1,74E-01	1,63E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,90E-01	3,73E-01	4,09E-03	-2,89E+00
WDP	m3 world eq. Deprived	1,36E+00	4,12E-03	9,11E-02	1,46E+00	6,23E-04	6,92E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,04E-03	3,78E-03	1,84E-04	-7,87E-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	1,41E-07	6,85E-09	-6,73E-09	1,41E-07	1,04E-09	6,22E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,73E-09	4,10E-09	2,70E-11	-2,38E-08
IRP	kBq U235 eq.	1,31E-01	4,92E-03	3,45E-02	1,70E-01	7,29E-04	9,05E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,22E-03	1,86E-03	1,68E-05	7,04E-03
ETP-fw	CTUe	2,38E+02	1,04E+00	3,17E-01	2,40E+02	1,55E-01	1,14E+01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,59E-01	1,61E+00	2,66E-03	-1,38E+01
HTP-c	CTUh	1,43E-08	3,45E-11	-5,83E-10	1,37E-08	5,03E-12	6,85E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,39E-12	3,92E-11	6,14E-14	-5,28E-11
HTP-nc	CTUh	2,47E-07	1,13E-09	1,62E-10	2,48E-07	1,70E-10	1,65E-08	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,83E-10	1,86E-09	1,89E-12	7,98E-08
SQP	-	1,09E+01	9,90E-01	1,67E+00	1,36E+01	1,51E-01	7,06E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,52E-01	7,51E-01	8,59E-03	-6,36E-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	2,75E-03	2,91E-06	-7,74E-06	2,74E-03	4,41E-07	1,35E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,35E-07	1,13E-06	6,12E-09	-4,94E-05
NHWD	kg	5,95E-01	7,21E-02	3,37E-02	7,00E-01	1,10E-02	3,64E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,84E-02	1,09E-02	2,78E-02	-4,03E-02
RWD	kg	1,03E-04	7,72E-06	2,89E-05	1,39E-04	1,14E-06	7,35E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,90E-06	2,21E-06	2,69E-08	2,43E-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	5,28E-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	1,80E-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	1,35E-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	7,84E-04

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	3,01E+00	1,45E-02	6,87E-01	3,71E+00	2,18E-03	1,93E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,63E-03	5,85E-02	3,31E-05	8,34E-02
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	3,01E+00	1,45E-02	6,87E-01	3,71E+00	2,18E-03	1,93E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,63E-03	5,85E-02	3,31E-05	8,34E-02
PENRE	MJ	2,90E+01	1,25E+00	6,61E+00	3,69E+01	1,85E-01	1,74E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,08E-01	3,96E-01	4,35E-03	-2,99E+00
PENRM	MJ	4,36E-03	0,00E+00	0,00E+00	4,36E-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	2,90E+01	1,25E+00	6,61E+00	3,69E+01	1,85E-01	1,74E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,08E-01	3,96E-01	4,35E-03	-2,99E+00
SM	kg	2,39E-01	0,00E+00	7,72E-05	2,39E-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	4,10E-02	1,40E-04	1,14E-02	5,25E-02	2,12E-05	2,56E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,53E-05	1,78E-04	4,37E-06	-1,49E-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 were modeled as realistically as possible. Primary data from Walraven's Czech Republic production site was used wherever available. Where supplier-specific data was missing, representative background datasets were sourced from verified databases. Site-specific data was prioritized for all production-related modules.

For Module A1, product composition data was supplied by the manufacturer. Module A2 incorporates actual transport data of raw materials to the production site. Module A3 includes energy consumption, production waste, and emissions data for 2023/2024. Background data was sourced from Nationale Milieudatabase v3.8 based on Ecoinvent 3.6.

Data Collection Period

The dataset represents production processes used in 2023/2024.

Methodology and Reproducibility

This LCA follows EN 15804+A2:2019, ISO 14040, ISO 14044, ISO 14025, and NMD Bepalingsmethode v1.2 (2025). Modeling and calculations were conducted using Ecochain Helix v4.3.1. The life cycle stages included are A1–A3 (raw material supply, transport, manufacturing), A4–A5 (transport to site, installation), C1–C4 (end-of-life deconstruction, transport, treatment, disposal), and D (reuse, recovery, and recycling potential).

Inventory and Allocation

All relevant material and energy flows, emissions, and waste streams are included. Allocation follows EN 15804 modular principles, with mass-based allocation distributing site-level inputs across products. No secondary materials were used in production. Cut-off criteria were applied so excluded flows do not exceed 5% of mass or energy per module.

Data Sources

Primary data from Walraven's Czech production site includes material composition (steel, zinc, POM), energy consumption, and transport distances. Where primary data was incomplete, datasets from Ecoinvent 3.6 and NMD v3.8 were used. Transport modeling includes truck and sea freight for steel and zinc, with distances specified. Environmental impacts were characterized using CML and EF 3.0 methods.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 address the production stage of the clamp. Module A1 captures raw material extraction and upstream inputs such as energy and auxiliary materials. The clamp consists of stainless steel components (upper and lower parts, nut, screw), a zinc coating, and a small POM (plastic) washer. Material compositions are based on 2023/2024 bill of materials from the Czech Republic production site. Data from NMD v3.8 and Ecoinvent v3.6 were used for modeling, with a primary/secondary steel composition of 49.8% primary and 50.2% secondary for certain elements. No substances of very high concern (SVHC) were identified.

Module A2 includes transportation of raw materials to the production site. Distances varied, including up to 4150 km by truck and 20,000 km by ship for steel and plastic inputs. Transport references were modeled according to EN 15804+A2 using a 50% load factor, with data derived from NMD v3.8 and Ecoinvent v3.6.

Module A3 evaluates the production phase at Walraven's Czech Republic site. It incorporates electricity (regional grid mix), lubricating oil use, and process emissions. Steel scrap from production is considered, and internal recycling is included. Capital goods are excluded following the EN 15804+A2 cutoff rule.

Module A4 covers transportation of finished products to customers, modeled using standard assumptions from Bepalingsmethode v1.2: 150 km by truck, 50% load capacity. Emissions were calculated using the NMD v3.8 dataset.

Module A5 includes installation on-site. A standard 5% material loss is assumed due to manual handling inefficiencies. No energy is consumed during installation. Waste generated includes steel (5%) and minimal plastic/POM. Steel waste is assumed to travel 100 km to landfill/recycling and plastics 100 km to incineration (AVI). These transport distances and emissions were calculated in ton-kilometers.

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 – Deconstruction
The Walraven 434 Clamp is assumed to be manually dismantled at end-of-life. No machinery is used, and energy consumption is considered negligible, reflecting typical on-site practices for small to medium-sized pipe clamps.

Module C2 – Transport to Waste Facilities
After removal, waste materials are transported to their respective processing locations. Steel and zinc are transported 50 km to recycling facilities, while POM plastic components are transported 100 km to incineration (AVI) plants. Emissions from transport are calculated using standard NMD v3.8 freight lorry datasets.

Module C3 – Waste Processing
Steel and zinc are modeled as 100% sorted and recycled, using reference processes such as 0315-reC&Sorteren en persen oud ijzer for steel. POM plastic is fully incinerated with energy recovery at AVI facilities. Relevant emission and energy flow factors include 0264-avC&Verbranden kunststoffen (28.67 MJ/kg) for plastics, with zinc recycling modeled analogously to steel scrap.

Module C4 – Final Disposal
Final disposal considers residual waste streams. Approximately 5% of steel and zinc are sent to landfill, while all POM plastic is fully incinerated. Landfill datasets applied include 0253-sto&Stort staal for steel and 0248-sto&Stort koper, lood, verzinkt staal, zink for zinc.

Module D – Environmental Benefits Beyond the System Boundary
Recycling and energy recovery benefits are accounted for in Module D. Steel, with 50.2% secondary content and 95% recycling rate, is credited with a 44.8% substitution benefit. Zinc recycling is modeled with 95% efficiency. Energy recovered from POM incineration is assigned a 100% substitution credit, reflecting avoided fossil energy use.

The entire modeling approach adheres to EN 15804+A2:2019 + AC:2021 and the Dutch Bepalingsmethode v1.2 (2025), ensuring full life cycle coverage from raw material sourcing to end-of-life material recovery.

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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