Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven 434 Clamp stainless steel 1" PE-Pipe 200mm

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

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COMPANY INFORMATION

J. van Walraven Holding B.V.
Industrieweg 5
3641 RK
Mijdrecht
Netherlands
+31(0) 297 233000
Arunkumar Kuppusamy (info.nl@walraven.com)
https://www.walraven.com/int/

MRPI® REGISTRATION

1.1.00947.2025

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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 1" PE-Pipe 200mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

The Walraven 434 Clamp stainless steel 1" PE-Pipe 200mm is a robust two-screw clamp made from high-quality stainless steel (AISI 316). It features anti-loss washers for secure fastening and provides excellent corrosion resistance, making it ideal for long-lasting use in demanding environments. Designed for reliable pipe support, it ensures durability and stability in both indoor and outdoor applications.

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 1" PE-Pipe 200mm is a durable, two-screw pipe clamp designed for reliable pipe support in indoor and semi-sheltered environments. Manufactured from high-grade stainless steel AISI 316L (1.4404), the clamp offers inherent corrosion resistance without the need for additional coatings. It features a quick-locking system with stainless steel screws, enabling fast, secure installation, and comes fully assembled from the factory.

Manufacturing Location and Process
Produced at Walraven's certified manufacturing facility in the Horka, Czech Republic, the clamp is fabricated from precision-cut stainless steel halves. The assembly process uses a robust quick-locking system with stainless steel fasteners. Due to the inherent corrosion resistance of AISI 316L, no surface coating is required, reducing material use and potential environmental impacts.

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 is designed for long-term service, with a reference service life of up to 50 years. Material efficiency is maximized through optimized stainless steel volumes, and production waste is minimized. The product is free from substances of very high concern (SVHCs), VOC-free, and safe for clean indoor environments. Life cycle impacts were modeled using Ecochain Helix and Ecoinvent v3.6 data, capturing the environmental performance of materials, energy use, and end-of-life scenarios.

Installation and Use Phase
Lightweight and pre-assembled, the clamp is easy to mount, providing secure support for small- to medium-diameter pipes. While it does not include vibration or noise insulation, it is well-suited for standard mechanical applications and indoor installations. The design ensures safe handling, minimal installation time, and zero 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
At end-of-life, the clamp can be manually disassembled, and all stainless steel components are fully recyclable via standard metal recovery streams. Module D benefits include positive environmental credits for stainless steel recycling, reflecting avoided primary material production.

Packaging and Transport
The product is supplied in recyclable cardboard packaging designed for efficient storage and transport. Transport modeling is based on EURO 5 trucks, ensuring low-impact logistics and consolidated delivery wherever possible.

Compliance and Certifications
The Walraven 434 Clamp conforms to EN 15804 + A2 and ISO 14025 for environmental declarations and life cycle assessment. Its materials, including AISI 316L stainless steel, meet stringent corrosion and quality standards, ensuring reliability and sustainability.

Reference Service Life (RSL)
The clamp is designed for up to 50 years of service in indoor or semi-sheltered environments, combining durability, material efficiency, and minimal environmental impact.

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

Total Weight	690 g

Component (> 1%)	(kg / %)
Steel (combined)	

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.

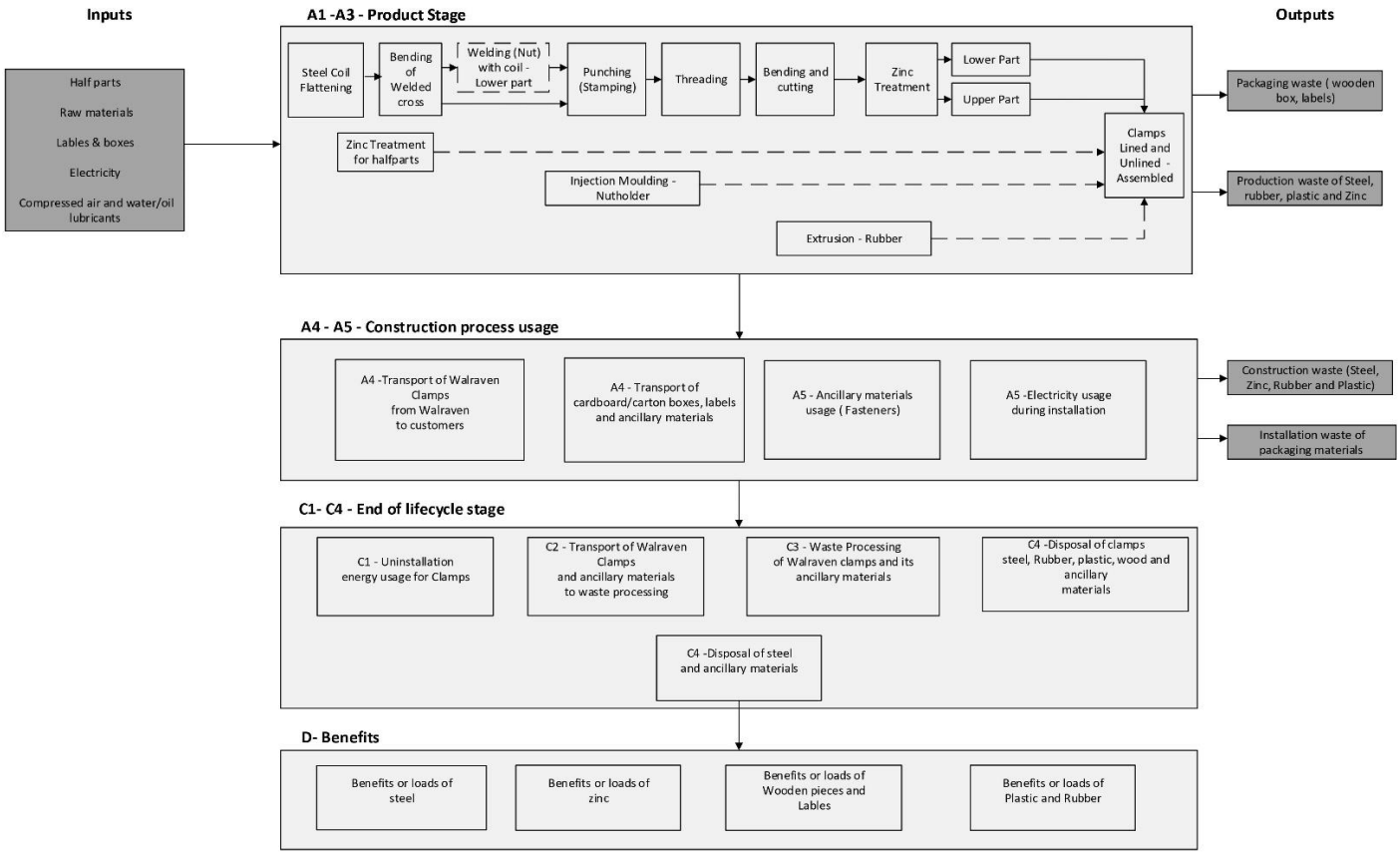
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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 1" 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 1/2" 40-45mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 27 (25 - 27 mm)
Walraven HD500 VdS DN 80 M10/M12, 3”
Walraven Split Band Clip DIN 3567 (untreated) Type A 27 (25 - 27 mm)
Walraven Bifix® 415 Clamp stainless M8 200mm
Walraven HD500 Clamp BUP M8/10 40-45mm
Walraven 2S Clamp zinc plated M8/10 206-216mm
Walraven 434 Clamp zinc plated G1/2" PE-Pipe 90mm
Walraven 434 Clamp stainless steel M10 PE-pipe 90mm
Walraven 2S Clamp zinc plated M8/10 195-205mm
Walraven 3000 Clamp zinc plated M8 160mm
Walraven 434 Clamp stainless steel M10 PE-pipe 75mm
Walraven HD500 Clamp BUP M8/10 66-71mm
Walraven HD500 Clamp BUP 1/2" 59-65mm
Walraven Bifix® 412 Clamp pre-galvanized M8 250mm
Walraven Bifix® 300 Clamp Stainless M10 157-162mm
Walraven 4000 Clamp M8 BUP 200mm
Walraven 2S Clamp zinc plated M8/10 184-194mm
Walraven HD500 Clamp BUP M8/10 37-42mm
Walraven 434 Clamp zinc plated M10 PE-pipe 90mm
Walraven HD500 Clamp BUP 1/2" 37-42mm
Walraven HD500 Clamp BUP M8/10 59-65mm
Walraven HD500 Clamp black M8/10 31-36mm
Walraven 2S Clamp zinc plated M8/10 173-183mm
Walraven 434 Clamp zinc plated G1/2" PE-Pipe 160mm
Walraven 434 Clamp zinc plated G1/2" PE-Pipe 75mm
Walraven HD500 Clamp BUP VdS DN20 M8/10 3/4"

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.	1,09E-02	1,64E-06	4,33E-06	1,10E-02	3,54E-07	5,48E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,90E-07	7,76E-07	7,36E-10	-1,55E-07
ADPF	MJ	1,65E+01	1,03E+00	5,67E+00	2,32E+01	2,12E-01	1,06E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,53E-01	1,89E-01	2,23E-03	-2,72E+00
GWP	kg CO2 eq.	1,13E+00	6,83E-02	4,21E-01	1,62E+00	1,39E-02	7,28E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,31E-02	1,43E-02	7,89E-05	-2,11E-01
ODP	kg CFC11 eq.	8,11E-08	1,20E-08	2,37E-08	1,17E-07	2,46E-09	5,89E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,10E-09	1,74E-09	2,63E-11	-7,36E-09
POCP	kg ethene eq.	1,02E-03	4,54E-05	-1,21E-04	9,48E-04	8,36E-06	2,62E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,39E-05	1,22E-05	8,41E-08	-4,59E-04
AP	kg SO2 eq.	6,40E-03	4,26E-04	1,42E-03	8,25E-03	6,09E-05	3,92E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,02E-04	1,36E-04	5,77E-07	-7,14E-04
EP	kg (PO4) 3 eq.	9,25E-04	7,05E-05	3,03E-04	1,30E-03	1,20E-05	6,31E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,99E-05	1,74E-05	1,11E-07	-8,48E-05

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	2,18E+00	2,96E-02	-1,65E-02	2,20E+00	5,83E-03	1,05E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,72E-03	1,68E-02	3,57E-05	-1,32E-01
FAETP	kg DCB eq.	3,66E-02	8,21E-04	2,02E-03	3,94E-02	1,70E-04	2,09E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,84E-04	3,14E-04	8,47E-07	1,64E-03
MAETP	kg DCB eq.	6,79E+01	3,01E+00	1,03E+01	8,12E+01	6,12E-01	4,28E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,02E+00	1,36E+00	3,03E-03	1,36E+00
TETP	kg DCB eq.	1,36E-02	1,02E-04	2,03E-03	1,57E-02	2,06E-05	1,34E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,44E-05	5,23E-05	8,96E-08	1,10E-02
ECI	euro	3,01E-01	8,91E-03	2,94E-02	3,39E-01	1,67E-03	1,60E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,78E-03	3,11E-03	1,11E-05	-2,63E-02
ADPF	kg Sb eq.	7,94E-03	4,95E-04	2,73E-03	1,12E-02	1,02E-04	5,11E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,70E-04	9,11E-05	1,07E-06	-1,31E-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.	1,16E+00	6,89E-02	4,18E-01	1,65E+00	1,40E-02	7,36E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,33E-02	2,74E-03	8,05E-05	-2,26E-01
GWP-fossil	kg CO2 eq.	1,15E+00	6,88E-02	4,17E-01	1,64E+00	1,40E-02	7,31E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,33E-02	1,45E-02	8,04E-05	-2,26E-01
GWP-biogenic	kg CO2 eq.	5,01E-03	2,49E-05	6,73E-04	5,71E-03	5,21E-06	3,04E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,68E-06	-1,17E-02	4,70E-08	0,00E+00
GWP-luluc	kg CO2 eq.	2,45E-03	2,71E-05	4,35E-04	2,91E-03	5,12E-06	1,55E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,53E-06	1,57E-05	2,24E-08	1,67E-04
ODP	kg CFC11 eq.	8,22E-08	1,51E-08	1,85E-08	1,16E-07	3,08E-09	6,03E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,14E-09	2,02E-09	3,31E-11	-5,53E-09
AP	mol H+ eq.	7,90E-03	5,54E-04	1,70E-03	1,01E-02	8,10E-05	4,83E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,35E-04	1,70E-04	7,63E-07	-8,74E-04
EP-fresh water	kg PO4 eq.	9,20E-05	6,60E-07	7,01E-05	1,63E-04	1,41E-07	7,80E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,35E-07	9,54E-07	9,01E-10	-7,99E-06
EP-marine	kg N eq.	1,67E-03	1,75E-04	2,39E-04	2,08E-03	2,85E-05	1,02E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,76E-05	3,74E-05	2,63E-07	-1,62E-04
EP-terrestrial	mol N eq.	1,84E-02	1,94E-03	2,91E-03	2,33E-02	3,15E-04	1,13E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,25E-04	4,34E-04	2,89E-06	-1,89E-03
POCP	kg NMVOC eq.	5,93E-03	5,39E-04	3,78E-04	6,84E-03	8,99E-05	2,96E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,50E-04	1,19E-04	8,41E-07	-1,29E-03
ADP-minerals & metals	kg Sb eq.	1,09E-02	1,64E-06	4,33E-06	1,10E-02	3,54E-07	5,48E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,90E-07	7,76E-07	7,36E-10	-1,55E-07
ADP-fossil	MJ, net calorific value	1,50E+01	1,02E+00	6,13E+00	2,21E+01	2,11E-01	1,07E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,51E-01	1,94E-01	2,25E-03	-1,59E+00
WDP	m3 world eq. Deprived	7,30E-01	3,51E-03	9,11E-02	8,25E-01	7,54E-04	3,93E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,26E-03	1,97E-03	1,01E-04	-4,33E-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	7,62E-08	5,84E-09	-6,73E-09	7,53E-08	1,25E-09	3,39E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,09E-09	2,13E-09	1,48E-11	-1,31E-08
IRP	kBq U235 eq.	7,21E-02	4,30E-03	3,45E-02	1,11E-01	8,83E-04	5,91E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,47E-03	9,66E-04	9,22E-06	3,86E-03
ETP-fw	CTUe	1,25E+02	8,96E-01	3,17E-01	1,27E+02	1,88E-01	6,02E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,13E-01	8,39E-01	1,46E-03	-7,58E+00
HTP-c	CTUh	7,67E-09	3,08E-11	-5,83E-10	7,12E-09	6,09E-12	3,56E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,02E-11	2,04E-11	3,37E-14	-2,90E-11
HTP-nc	CTUh	1,31E-07	9,65E-10	1,62E-10	1,33E-07	2,05E-10	8,89E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,42E-10	9,67E-10	1,04E-12	4,38E-08
SQP	-	5,89E+00	8,35E-01	1,67E+00	8,39E+00	1,83E-01	4,46E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,04E-01	3,90E-01	4,71E-03	-3,49E-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	1,43E-03	2,48E-06	-7,74E-06	1,42E-03	5,34E-07	6,99E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,90E-07	5,85E-07	3,36E-09	-2,71E-05
NHWD	kg	3,23E-01	6,05E-02	3,37E-02	4,17E-01	1,34E-02	2,26E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,23E-02	5,67E-03	1,53E-02	-2,22E-02
RWD	kg	5,73E-05	6,76E-06	2,89E-05	9,30E-05	1,38E-06	4,96E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,31E-06	1,15E-06	1,48E-08	1,33E-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	6,13E-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	1,66E+00	1,24E-02	6,87E-01	2,36E+00	2,64E-03	1,22E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,40E-03	3,04E-02	1,82E-05	4,58E-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	1,66E+00	1,24E-02	6,87E-01	2,36E+00	2,64E-03	1,22E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,40E-03	3,04E-02	1,82E-05	4,58E-02
PENRE	MJ	1,59E+01	1,09E+00	6,61E+00	2,36E+01	2,24E-01	1,14E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,73E-01	2,06E-01	2,39E-03	-1,65E+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	1,59E+01	1,09E+00	6,61E+00	2,36E+01	2,24E-01	1,14E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,73E-01	2,06E-01	2,39E-03	-1,65E+00
SM	kg	2,78E-01	0,00E+00	7,72E-05	2,78E-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	2,21E-02	1,20E-04	1,14E-02	3,36E-02	2,57E-05	1,65E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	4,28E-05	9,26E-05	2,40E-06	-8,21E-04

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 modeled as accurately as possible. The quality assessment prioritizes the use of primary data collected directly from Walraven's production site in the Czech Republic. Where such data was unavailable, representative background data was selected from validated sources, including the Nationale Milieudatabase v3.8, based on Ecoinvent 3.6.

For Module A1, product-specific material composition data provided by the manufacturer was used. Module A2 incorporates actual transport distances of raw materials to the production site, and Module A3 accounts for measured energy consumption and production waste for the year 2023 and 2024. Background processes for auxiliary materials and upstream processes were sourced from NMD v3.8.

Data Collection Period

The dataset reflects production operations for the year 2023/2024 and is representative of the manufacturing processes used during that period.

Methodology and Reproducibility

The LCA was conducted in accordance with the following standards and methodological frameworks: EN15804+A2:2019, ISO 14040, ISO 14044, ISO 14025, and the NMD Bepalingsmethode v1.2 (2025). Life cycle modeling and environmental impact calculations were performed using Ecochain Helix software (version 4.3.1). The assessment covers the following life cycle modules: A1–A3 (raw material supply, transport, and manufacturing), A4–A5 (transport to site and installation), C1–C4 (end-of-life processing), and D (benefits and loads beyond the system boundary, including recycling and energy recovery).

Inventory and Allocation

System boundaries and allocation procedures follow the modular approach defined in EN15804 and the NMD Bepalingsmethode v1.2. All relevant material, energy, and emission flows were included. Site-level inputs, such as energy and auxiliary materials, were distributed to individual products using mass-based allocation. No secondary materials were used during production. Cut-off criteria were applied, ensuring that excluded flows do not exceed 5% of energy or mass per module.

Data Sources

Primary data collected from Walraven's Czech production facility included material compositions, energy consumption, transport distances, and production waste. Where primary data was incomplete or unavailable, verified reference datasets from Ecoinvent 3.6 and the Nationale Milieudatabase v3.8 were used. Key references include datasets for steel, zinc coating, and transport emissions.

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 434 Clamp stainless steel 1" PE-Pipe 200mm. The primary materials in this clamp include various grades of stainless steel and zinc coating. The material inventory is based on the 2023/2024 production year, using bills of materials and environmental data from the Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. Where necessary, generic datasets were used. Steel content is modeled with 57% primary and 43% secondary (recycled) composition, aligning with standard market assumptions in the Dutch LCA framework.

Module A2 addresses the inbound transport of materials to the Walraven production site in the Czech Republic. Transport was modeled using EN 15804+A2 guidelines with a 50% load factor assumption (fully loaded inbound, empty outbound). Emissions were calculated using NMD v3.8 and Ecoinvent v3.6 references for unspecified freight lorries (0001-tra&Transport, vrachtwagen). Individual distances per material were recorded but are generalized in the model.

Module A3 evaluates the manufacturing phase. This includes electricity and auxiliary material use, packaging, and waste generation based on 2023/2024 operational data. Inputs consist of grid electricity (for both clamp production and zinc treatment), fuels, and lubricating oil. Packaging and steel production waste (scrap) are included, with recycled fractions modeled based on proportional allocation. Capital goods are excluded in accordance with the cutoff rule under EN 15804+A2, as their contribution to total environmental impact is less than 5%.

Module A4 covers distribution of the finished clamp from the production site to the customer. A standardized distance of 150 km was assumed in accordance with the Bepalingsmethode v1.2, using a 50% truck load factor. Transport emissions were modeled with unspecified lorry datasets from NMD v3.8 / Ecoinvent v3.6.

Module A5 includes installation activities and associated losses. Installation is performed manually and requires no additional energy. A 5% material loss is assumed due to handling inefficiencies. Installation waste is categorized and routed to waste processing: steel waste is transported 100 km to landfill or recycling, and rubber or plastic packaging (if present) is transported 100 km to AVI incineration. These assumptions follow default values in the Bepalingsmethode v1.2 (2025).

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%

At the end of its service life, the Walraven 2S Clamp is manually dismantled, modeled under Module C1, with negligible energy input required for removal. Module C2 accounts for the transport of waste materials, assuming steel and zinc are transported 50 km to recycling or landfill, and rubber and plastic are transported 100 km to incineration facilities, with emissions calculated using ton-kilometer factors based on NMD v3.8 and Ecoinvent v3.6 datasets. Module C3 addresses waste treatment, with steel and zinc fully sorted and recycled, while rubber and plastics are completely incinerated with energy recovery at AVI plants. Relevant emission factors applied include plastics (0264-avC&Verbranden kunststoffen), steel (0315-reC&Sorteren en persen oud ijzer), and rubber (0260-avC&Verbranden rubber/EPDM). Module C4 covers final disposal, assuming 5% of steel and zinc are landfilled, with no landfill for rubber or plastics.

Module D quantifies the environmental benefits of material recovery beyond the system boundary. Recycled steel is credited with 52% substitution efficiency, derived from 95% recycling and 43% secondary input content. Zinc benefits are modeled at 95% recycling efficiency, and energy recovery from incinerated rubber and plastics is assumed to achieve 100% substitution of conventional energy.

This end-of-life assessment, integrating Modules C1–C4 and D, is fully compliant with EN 15804+A2:2019 + AC:2021 and the Bepalingsmethode v1.2 (2025), ensuring the life cycle modeling aligns with Dutch and European standards for construction product environmental declarations.

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.