Environmental
Product
Declaration

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm

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

MRPI® registration:
1.1.00942.2025

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Stichting MRPI®
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MRPI® REGISTRATION

1.1.00942.2025

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 Bifix® G2 Clamp BUP EPDM M8/10 133-140mm

DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

The Walraven Bifix® G2 Clamp BUP EPDM M8/10 133–140mm is a durable two-screw clamp for steel, copper, cast iron, and multilayer pipes. It features a quick-locking mechanism and dual-component EPDM lining for secure positioning and noise reduction up to 23 dB(A). Suitable for indoor/outdoor use, it is corrosion-resistant (ISO 9227, 1000 hrs) and temperature-rated from -30 °C to +120 °C.

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 Bifix® G2 Clamp BUP EPDM M8/10 133-140mm is a premium two-screw pipe clamp designed for reliable installation of steel, copper, cast iron, and multilayer pipes. It features a fast-locking mechanism and dual-component EPDM lining for secure fit and excellent noise dampening up to 23 dB(A). Corrosion-resistant per ISO 9227 (1000 h), it's suitable for indoor and outdoor use in demanding mechanical and structural environments.

Manufacturing Location:
Manufactured in the Mijdrecht, Netherlands using high-precision, environmentally responsible processes.

Manufacturing Process Overview:
Steel Coil Processing: Raw steel is flattened and cut to shape, ensuring high structural integrity and minimal material waste.
Stamping & Bending: Clamp components are formed using precision tooling for consistent quality and material efficiency.
Threading & Welding: Resistance welding is used to attach the connecting nut, providing strong, energy-efficient joint construction.
Surface Treatment: Coated with BIS UltraProtect® 1000 (BUP 1000), delivering up to 1000 hours of corrosion resistance per ISO 9227:2012, without the need for additional coatings.
Rubber Lining Application: EPDM linings (black 55° ±5 Shore A, green 80° ±5 Shore A) are applied to meet DIN 4109 acoustic standards and support vibration and noise reduction.
Final Assembly: Includes pre-installed locking screws, captive nut holder (PP), and anti-loss washer (POM) to minimize installation steps and packaging components.

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

Reference: 0573-pro & Elektriciteit, hernieuwbaar, uit PV, bij consument, per kWh, Database: Ecoinvent v3.6 (Cut-off, NMD+EI), GWP : 0.095 kg CO2-eq /kWh

Environmental Performance:
Corrosion Resistance: BUP 1000 coating eliminates the need for post-installation corrosion protection, reducing environmental emissions and maintenance interventions.
Material Efficiency: All steel and polymer components are optimized for recyclability. EPDM linings are free from PVC and halogens.
Waste Reduction: All production waste is minimized, with metal and plastic offcuts reused or recycled within the supply chain.
Long Lifecycle: Designed for durability and reusability, significantly reducing environmental impacts over time through reduced replacement frequency.

Installation and Use Phase:
Zero VOC Emission: Product materials emit no Volatile Organic Compounds (VOCs), ensuring safe indoor air quality.

End-of-Life Considerations:
Disassembly: Clamp components can be easily separated for recycling at end-of-life.
Recyclability: Primary materials (steel, EPDM, PP, POM) are all recyclable through conventional industrial waste processing systems.

Name - Half parts	
Steel - Lower part	
Steel - Upper part	
Steel - Hollow pan head screw	
Steel - Nut	
Plastic - Nut holder	
Plastic - Anti-loss washer	
Rubber - EPDM	

Total Weight	309 g

Component (> 1%)	(%)
Steel (combined)	80,40%
Rubber - EPDM	16,42%

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 Bifix® G2 Clamps, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

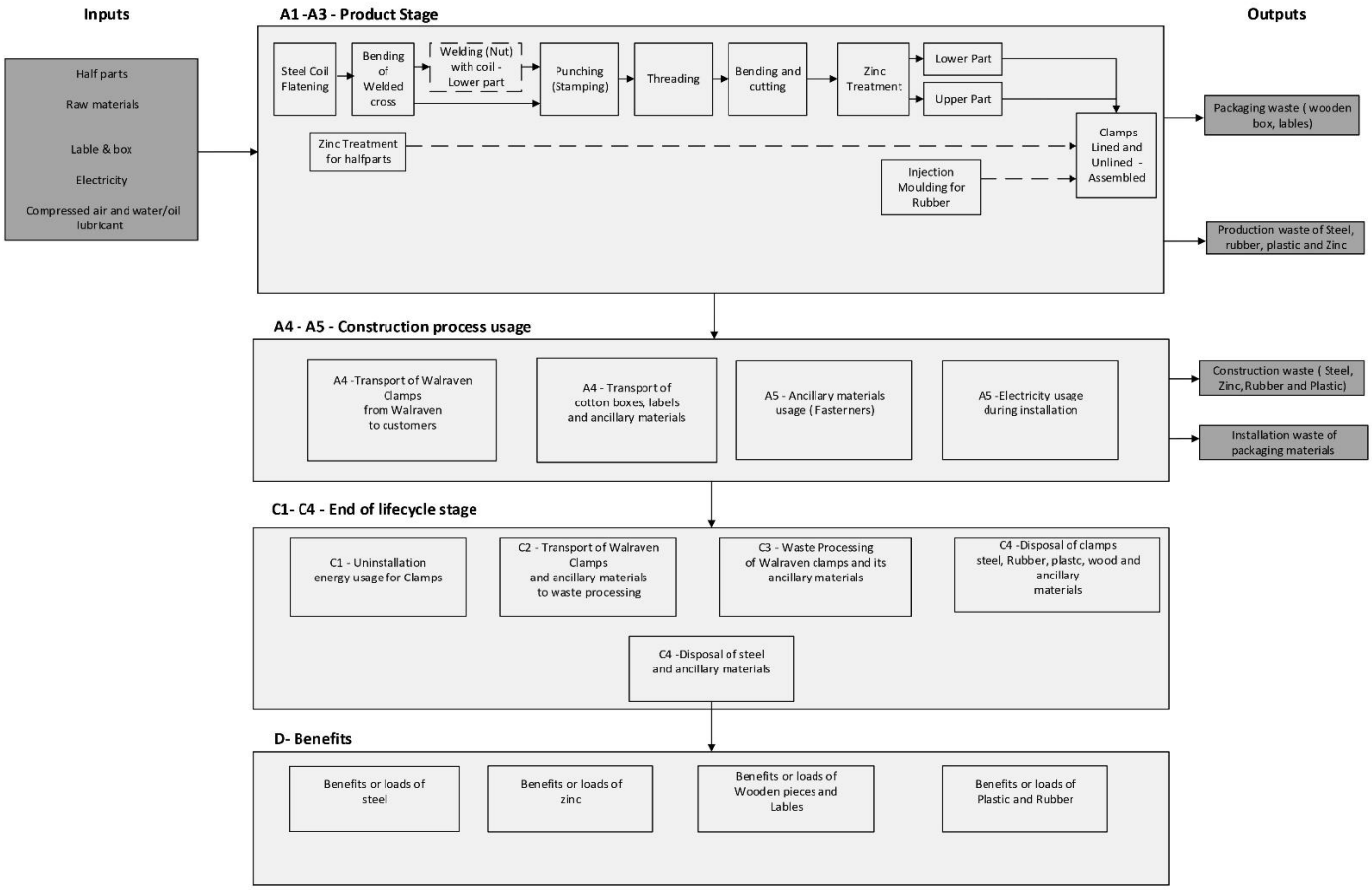
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental impact of excluded materials shall not exceed 5% for any given category.

This comprehensive approach ensures a scientifically sound and holistic understanding of the Walraven Clamp’s environmental footprint throughout its full life cycle.

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport gate to site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse - Recovery - Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	x	x	x	x	x

X = Modules Assessed

ND = Not Declared



REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst case senario as per the EN 15804+A2 & NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven Bifix® G2 Clamp BUP EPDM M8/10 100-105mm
Walraven Bifix® G2 Clamp BUP EPDM M10 100-105mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 108-115mm
Walraven Bifix® G2 Clamp BUP EPDM M10 108-115mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 125-130mm
Walraven Bifix® G2 Clamp BUP EPDM M10 125-130mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm
Walraven Bifix® G2 Clamp BUP EPDM M10 133-140mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 152-160mm
Walraven Bifix® G2 Clamp BUP EPDM M10 152-160mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 88-91mm
Walraven Bifix® G2 Clamp BUP EPDM M10 88-91mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 92-97mm
Walraven Bifix® G2 Clamp BUP EPDM M10 92-97mm

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.	1,13E-02	4,73E-06	4,28E-07	1,13E-02	1,58E-07	5,27E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,70E-07	3,64E-07	6,32E-10	-7,23E-04
ADPF	MJ	1,85E+01	2,84E+00	4,29E-01	3,14E+04	9,48E-02	8,56E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,21E-01	1,08E-01	1,91E-03	-5,12E+00
GWP	kg CO2 eq.	1,13E+00	1,86E-01	2,34E-02	1,34E+00	6,20E-03	6,22E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,45E-02	1,67E-01	6,80E-05	-2,79E-01
ODP	kg CFC11 eq.	9,80E-08	3,29E-08	2,27E-09	1,33E-07	1,10E-09	5,57E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,57E-09	1,11E-09	2,25E-11	-2,66E-08
POCP	kg ethene eq.	1,03E-03	1,12E-04	2,07E-07	1,14E-03	3,74E-06	3,37E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,73E-06	6,14E-06	7,21E-08	-4,88E-04
AP	kg SO2 eq.	6,55E-03	8,24E-04	3,97E-05	7,42E-03	2,73E-05	3,20E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,36E-05	7,69E-05	4,94E-07	-1,19E-03
EP	kg (PO4) 3 eq.	9,24E-04	1,61E-04	7,09E-06	1,09E-03	5,36E-06	4,88E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,25E-05	1,30E-05	9,58E-08	-1,47E-04

Toxicity indicators and ECI (Dutch market)

HTP	kg DCB eq.	1,90E+00	7,82E-02	2,16E-03	1,98E+00	2,61E-03	9,17E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,09E-03	8,06E-03	3,25E-05	-1,65E-01
FAETP	kg DCB eq.	3,57E-02	2,28E-03	8,59E-05	3,81E-02	7,62E-05	1,87E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,78E-04	1,72E-04	1,84E-06	-1,11E-03
MAETP	kg DCB eq.	6,92E+01	8,20E+00	3,41E-01	7,77E+01	2,74E-01	3,74E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,40E-01	6,80E-01	2,76E-03	-4,47E+00
TETP	kg DCB eq.	1,12E-02	2,76E-04	1,82E-04	1,17E-02	9,23E-06	1,02E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-05	3,24E-05	8,15E-08	8,67E-03
ECI	euro	2,76E-01	2,24E-02	1,67E-03	3,00E-01	7,48E-04	1,38E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,74E-03	9,58E-03	9,79E-06	-3,63E-02
ADPF	kg Sb eq.	8,92E-03	1,36E-03	2,06E-04	1,51E+01	4,56E-05	4,12E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,06E-04	5,17E-05	9,21E-07	-2,46E-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	1,87E-01	2,34E-02	1,37E+00	6,26E-03	6,32E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,46E-02	1,61E-01	6,93E-05	-2,93E-01
GWP-fossil	kg CO2 eq.	1,15E+00	1,87E-01	2,34E-02	1,36E+00	6,26E-03	6,28E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,46E-02	1,67E-01	6,93E-05	-2,93E-01
GWP-biogenic	kg CO2 eq.	5,10E-03	6,98E-05	-5,00E-07	5,17E-03	2,33E-06	2,49E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,44E-06	-5,43E-03	4,35E-08	0,00E+00
GWP-luluc	kg CO2 eq.	2,20E-03	6,87E-05	-5,55E-07	2,27E-03	2,29E-06	1,13E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,35E-06	7,65E-06	1,93E-08	-1,88E-05
ODP	kg CFC11 eq.	1,05E-07	4,13E-08	2,47E-09	1,49E-07	1,38E-09	6,30E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,22E-09	1,26E-09	2,83E-11	-2,88E-08
AP	mol H+ eq.	8,06E-03	1,10E-03	5,35E-05	9,21E-03	3,63E-05	3,99E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	8,46E-05	9,79E-05	6,54E-07	-1,45E-03
EP-fresh water	kg PO4 eq.	8,75E-05	1,89E-06	4,55E-07	8,98E-05	6,31E-08	3,88E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,47E-07	4,53E-07	7,84E-10	-1,28E-05
EP-marine	kg N eq.	1,67E-03	3,85E-04	1,09E-05	2,07E-03	1,28E-05	9,39E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,98E-05	2,53E-05	2,26E-07	-2,56E-04
EP-terrestrial	mol N eq.	1,86E-02	4,24E-03	1,65E-04	2,30E-02	1,41E-04	1,04E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,29E-04	2,88E-04	2,49E-06	-2,97E-03
POCP	kg NMVOC eq.	6,02E-03	1,21E-03	2,68E-05	7,25E-03	4,02E-05	2,94E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,39E-05	7,60E-05	7,23E-07	-1,59E-03
ADP-minerals & metals	kg Sb eq.	1,13E-02	4,73E-06	4,28E-07	1,13E-02	1,58E-07	5,27E-04	ND	ND	ND	ND	ND	ND	ND	0,00E+00	3,70E-07	3,64E-07	6,32E-10	-7,23E-04
ADP-fossil	MJ, net calorific value	1,72E+01	2,82E+00	3,98E-01	2,04E+01	9,43E-02	8,27E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,20E-01	1,08E-01	1,93E-03	-4,30E+00
WDP	m3 world eq. Deprived	7,68E-01	1,01E-02	5,38E-03	7,84E-01	3,37E-04	3,33E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	7,87E-04	2,78E-03	8,21E-05	-1,22E-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	7,55E-08	1,68E-08	8,22E-11	9,23E-08	5,62E-10	3,90E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,31E-09	1,05E-09	1,27E-11	-1,72E-08
IRP	kBq U235 eq.	7,81E-02	1,18E-02	6,61E-04	9,06E-02	3,95E-04	4,17E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	9,22E-04	4,85E-04	8,02E-06	-8,97E-03
ETP-fw	CTUe	1,25E+02	2,51E+00	2,13E-01	1,28E+02	8,41E-02	5,75E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,96E-01	6,41E-01	1,72E-03	-1,41E+01
HTP-c	CTUh	6,81E-09	8,17E-11	-1,12E-11	6,88E-09	2,73E-12	3,34E-10	ND	ND	ND	ND	ND	ND	ND	0,00E+00	6,37E-12	1,08E-11	3,25E-14	-2,22E-10
HTP-nc	CTUh	1,23E-07	2,75E-09	1,58E-10	1,26E-07	9,20E-11	7,85E-09	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,15E-10	5,36E-10	1,26E-12	2,99E-08
SQP	-	6,23E+00	2,44E+00	5,03E-01	9,18E+00	8,18E-02	4,31E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,91E-01	1,79E-01	4,09E-03	-1,02E+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	1,45E-03	7,14E-06	1,56E-06	1,46E-03	2,39E-07	6,76E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	5,58E-07	3,88E-07	2,86E-09	-1,12E-04
NHWD	kg	2,89E-01	1,79E-01	7,55E-04	4,68E-01	5,98E-03	2,40E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,40E-02	6,22E-03	1,28E-02	-2,83E-02
RWD	kg	6,77E-05	1,85E-05	6,30E-07	8,68E-05	6,19E-07	3,84E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	1,45E-06	5,77E-07	1,27E-08	-1,28E-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	1,51E-04	1,51E-04	0,00E+00	7,55E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	2,35E-01	0,00E+00	0,00E+00
MER	kg	0,00E+00	0,00E+00	5,31E-06	5,31E-06	0,00E+00	2,65E-07	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	5,10E-02	0,00E+00
EEE	MJ	0,00E+00	0,00E+00	3,36E-04	3,36E-04	0,00E+00	1,68E-05	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	4,29E-01
ETE	MJ	0,00E+00	0,00E+00	1,96E-04	1,96E-04	0,00E+00	9,78E-06	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,49E-01

HWD = Hazardous Waste Disposed
NHWD = Non Hazardous Waste Disposed
RWD = Radioactive Waste Disposed
CRU = Components for reuse
MFR = Materials for recycling
MER = Materials for energy recovery
EEE = Exported Electrical Energy
ETE = Exported Thermal Energy

RESOURCE USE per functional unit or declared unit (A1 and A2)

	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	1,64E+00	3,53E-02	1,58E-01	1,84E+00	1,18E-03	8,61E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,76E-03	1,45E-02	2,10E-05	-1,36E-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	1,64E+00	3,53E-02	1,58E-01	1,84E+00	1,18E-03	8,61E-02	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,76E-03	1,45E-02	2,10E-05	-1,36E-01
PENRE	MJ	1,83E+01	3,00E+00	4,35E-01	2,17E+01	1,00E-01	8,82E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,34E-01	1,15E-01	2,05E-03	-4,54E+00
PENRM	MJ	1,38E+00	0,00E+00	0,00E+00	1,38E+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	1,97E+01	3,00E+00	4,35E-01	2,31E+01	1,00E-01	8,82E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,34E-01	1,15E-01	2,05E-03	-4,54E+00
SM	kg	1,06E-01	0,00E+00	4,58E-05	1,06E-01	0,00E+00	2,29E-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	2,28E-02	3,43E-04	1,77E-04	2,33E-02	1,15E-05	1,02E-03	ND	ND	ND	ND	ND	ND	ND	0,00E+00	2,68E-05	2,47E-04	2,08E-06	-3,12E-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. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources and databases.

Data collection period:

The dataset is representative for the production processes used in 2023 and 2024.

Methodology and reproducibility:

The data regarding all the steel coils were collected from the supplier through the data collection template regarding the materials, transport, etc. For suppliers that have not delivered sufficient information, alternative sources such as public references, industry statistics, and literature references have been used. Based on this information, representative references from the EcoInvent 3.6 and Nationale Milieu Database v3.8 (NMD) database have been selected for the various materials and resources used for the Walraven Clamps.

The end-of-life processing for phase C2-C4 + D follows standardized scenarios outlined in NEN-EN15804+A2 (version 1.2, January 2025), which is the Environmental Performance Assessment Method for Construction Works.

In this case of Walraven Clamps, 20% allocation and worst case senario methods were used for the grouping by choosing the reference products following the Bepalingsmethode v1.2 (2025).

Inventory and Allocation:

In this section, the quantity, quality, and allocation of various materials, energy streams, and emissions by processes and products are outlined. The system boundaries that have been adopted are in accordance with the modular approach of I.S. EN 15804+A2 & NMD Bepalingsmethode v1.2 (2025). Due to the different products involved in this modelling, by choosing the worst-case scenario of taking the reference value of Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm and trying to group the products which has smaller deviations in the overall impact categories by following the 20% allocation as per the EN 15804+A2 & NMD Bepalingsmethode v1.2 (2025). The remaining dimensions were grouped along with Walraven Bifix® G2 Clamps Lined 133-140mm are listed above.

Data Sources:

The data used for the Walraven clamps products, its transport and installation processes come from the energy and resources administration, production, sourcing, and planning departments of Walraven. Distance from the raw material suppliers (possibly through the intermediary) and technical information sheet of the raw material has also been inventoried. And due to the unavailability of some raw material composition data, the generic reference for steel from NMD 3.8 and Ecoinvent 3.6 databases were chosen for the LCA modelling.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 cover the life cycle stages, beginning with A1 focusing on the extraction and production of raw materials and upstream processes such as packaging, water, lubricants, and material inputs. In this section, all relevant raw materials and auxiliary substances used to manufacture the Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm are modeled based on bill of materials from 2023-2024 production data. The primary components include steel (various grades), plastic (POM and PP), EPDM rubber, and zinc coatings. All materials are modeled using the National Milieudatabase (NMD) v3.8 and Ecoinvent v3.6, with generic references applied where necessary due to data limitations. For steel, a composition of 57% primary and 43% secondary content was used as per average market data from NMD.

Module A2 explains the transportation from the material suppliers to the production site at Walraven Mijdrecht. All relevant material transport distances were included and modeled according to EN 15804+A2 using Ecoinvent 3.6 and NMD 3.8 transport references, which assume an average load factor of 50% (fully loaded to the site, empty on return). Distances varied per material. The reference 0001-tra&Transport, vrachtwagen (freight, lorry, unspecified {GLO}) from NMD v3.8 was used for all road transport modeling.

Module A3 models the environmental impact during production at the Walraven Mijdrecht facility. The analysis covers all key inputs and outputs, including electricity consumption, fuel use, packaging materials, and production waste, based on primary operational data for the 2023–2024 production year. Electricity usage was sourced from both the national grid and on-site rooftop solar panels, reflecting a mixed-energy profile. Additional electricity was consumed specifically for zinc treatment processes.

Production waste primarily included steel scrap, and a proportion of steel was recycled within the clamp production process. These waste and recycling figures were derived by applying the site-specific production share relative to the total company-wide output. Transport of production waste to recycling or disposal facilities was also accounted for. Furthermore, lubricating oil was used as an auxiliary input in the manufacturing of clamps.

This module excludes capital goods, as their contribution falls below the 5% threshold in accordance with the cutoff rule in EN 15804+A2, and thus do not significantly influence the environmental profile in this stage..

Regarding modeling boundaries, capital goods were excluded under the EN 15804+A2 cutoff rule, as their impact represented less than 5% of the total environmental footprint.

Module A4 addresses the transportation of the finished Walraven Bifix® G2 Clamp BUP EPDM M8/10 133-140mm from the production site to installation locations. Transport modeling is based on EN 15804+A2 standards and includes a standard 150 km distance, based on values from the Bepalingsmethode v1.2. A load factor of 50% was assumed (fully loaded to site, empty return). Transport emissions were calculated using the reference 0001-tra&Transport, vrachtwagen from NMD v3.8 / Ecoinvent v3.6.

Module A5 delves into the installation process, including material losses and waste treatment. A standard 5% material loss was assumed based on site handling and inefficiencies during manual installation. No energy is required for installation. The 5% waste from steel, rubber, and plastic was calculated per clamp and transported to processing facilities plastics and rubber over 100 km to AVI (incineration) plants, and steel 100 km to landfill. Emissions were calculated in ton-kilometers. Waste processing and disposal are modeled using fixed end-of-life scenario values from the Bepalingsmethode v1.2 (2025), as shown below.

End-of-Life Scenario Fixed Values:

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

Module C1 addresses the manual uninstallation or demolition of the clamp at the end of its service life. No energy consumption is modeled for this stage.

Module C2 covers the transport of end-of-life materials to processing facilities. Steel and zinc are transported 50 km to recycling or landfill sites, while plastic and rubber are transported 100 km to AVI incineration plants, in line with Bepalingsmethode v1.2 assumptions. Transport emissions are modeled using the dataset 0001-tra&Transport, vrachtwagen from NMD v3.8 and Ecoinvent 3.6.

Module C3 models waste processing operations. Steel and zinc are assumed to be fully sorted and recycled, while plastic and rubber are completely incinerated with energy recovery at AVI facilities. Relevant emission references include 0264-avC&Verbranden kunststoffen (28.67 MJ/kg) for plastics, 0315-reC&Sorteren en persen oud ijzer for steel, and 0260-avC&Verbranden rubber/EPDM (27.2 MJ/kg) for rubber. All datasets are sourced from NMD v3.8 and Ecoinvent 3.6.

Module C4 accounts for final disposal. A residual fraction of 5% of steel and zinc is assumed to be landfilled, using the datasets 0253-sto&Stort staal for steel and 0248-sto&Stort koper, lood, verzinkt staal, zink for zinc.

Module D quantifies environmental benefits beyond the system boundary. Steel recycling is credited with a 52% substitution benefit, reflecting a 95% recycling rate minus 43% primary content, representing avoided virgin steel production. Zinc recycling is modeled with a 95% substitution benefit. Plastics and rubber incinerated at AVI plants are credited with 100% energy substitution, displacing fossil-based electricity.

The modeling approach adheres fully to EN 15804+A2:2019+AC:2021 and employs the modular structure for environmental product declarations. Material losses, waste transport, recycling, and post-use energy recovery are assessed according to Bepalingsmethode v1.2 (2025), reflecting current Dutch and international best practices.

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.