walraven

**Environmental Product Declaration**

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:

**Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm**

Provided by:

**J. van Walraven Holding B.V.**



MRPI® registration:

**1.1.00935.2025**

Program operator:

**Stichting MRPI®**

Publisher:

**Stichting MRPI®**

**www.mrpi.nl**

Date of first issue:

**15-5-2025**

Date of this issue:

**15-5-2025**

Expiry date:

**15-5-2030**

ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00935.2025

## 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 KSB2 Clamp zinc plated EPDM M8/10 192-200mm

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

## DESCRIPTION OF PRODUCT

The Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm features a quick-closing mechanism for one-handed installation and a DIN 4109-compliant lining that reduces noise by up to 23 dB(A). Suitable for -30 °C to +120 °C, it offers secure fastening and reliable performance in indoor and outdoor applications.

## VISUAL PRODUCT



## MORE INFORMATION

https://www.walraven.com/int/products/standard-clamps/

| Ing. L. L. Oosterveen MSc. MBA<br>Managing Director MRPI | DEMONSTRATION OF VERIFICATION |
|---|---|
| | CEN standard EN15804 serves as the core PCR [1] |
| | Independent verification of the declaration an data according to ISO14025+EN15804 A2 (+indicators A1)<br>Internal: External: X |
| | Third party verifier: Anne Kees Jeeninga , Advies Lab Vof |
| | [1] PCR = Product Category Rules |

## DETAILED PRODUCT DESCRIPTION

Product Description

The Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm is a versatile zinc-plated steel pipe clamp designed for use in both residential and commercial installations. It features a quick-closing mechanism that allows one-handed locking, enhancing installation efficiency. The clamp incorporates an integrated sound-insulating lining that meets DIN 4109 requirements, reducing structure-borne noise by up to 23 dB(A) in accordance with ISO 3822-1. Built for reliable performance, it functions effectively across a wide temperature range from -30 °C to +120 °C.

Manufacturing Location
This product is manufactured in the Czech Republic under precision-controlled production standards, ensuring consistent quality and adherence to environmental compliance.

Manufacturing Process Overview
High-grade steel is first cut and formed to the required clamp dimensions. The halves of the clamp are precision-shaped through stamping and forming processes to ensure dimensional accuracy and mechanical strength. A zinc plating is applied to protect the steel from corrosion, extending its service life. Sound-insulating material is integrated to meet DIN 4109 acoustic requirements. The final assembly includes a two-screw design with a quick-closing mechanism, providing secure fastening while simplifying installation.

Performance and Environmental Features
The zinc-coated finish enhances corrosion resistance and reduces the need for maintenance, while the EPDM lining minimizes noise transmission and vibrations up to 23 dB(A). The clamp maintains reliable performance under temperatures ranging from -30 °C to +120 °C. The quick-closing system improves ease of use and installation speed.

Installation and Use Phase
The clamp is suitable for a wide range of pipe sizes, offering flexibility during installation. Its two-screw design ensures even clamping pressure and secure pipe fastening.

End-of-Life Considerations
At the end of its service life, the steel body and lining materials can be separated and recycled. The bolted design facilitates disassembly, supporting efficient recycling of all components.

Packaging and Transport
The clamp is supplied in recyclable packaging to minimize environmental impact during transport and handling.

| Name - Half parts | |
|---|---|
| Steel - Lower part | |
| Steel - Upper part | |
| Steel - Hollow pan head screw | |
| Steel - Nut | |
| Rubber - EPDM | |
| Plastic - Nut Holder | |

| Total Weight | 546 g |
|---|---|

| Component (> 1%) | ( %) |
|---|---|
| Steel (combined) | 81% |
| Rubber - EPDM | 16,35% |

## 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.

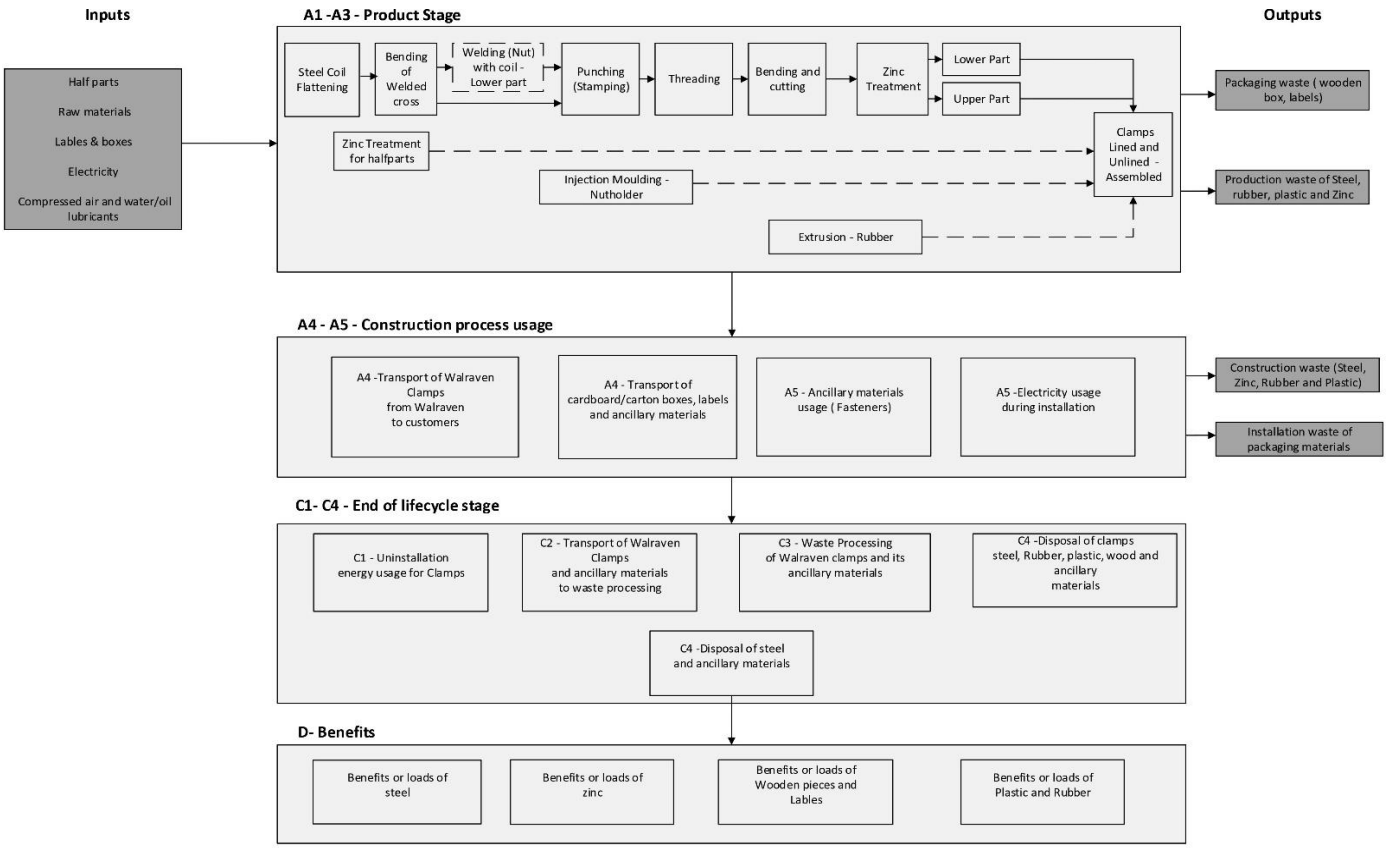
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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




## REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm. 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 KSB2 Clamp zinc plated EPDM M8/10/1/2" 176-180mm
Walraven BISMAT® SL Socket Clamp M10 KA/GA zinc plated DN150 160mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 159-168mm
Walraven 2S Clamp set zinc plated EPDM M8/10 195-205mm
Walraven BISMAT® SL Socket Clamp M10 KA/GA zinc plated DN100 110mm
Walraven Bifix® 5000 Clamp G2 BUP EPDM green M8/10 160mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm
Walraven BISMAT® SL Socket Clamp M10 KA zinc plated DN70 75mm
Walraven BISMAT® SL Socket Clamp M10 GA zinc plated DN125 135mm
Walraven BISMAT® SL Socket Clamp M10 KA zinc plated DN125 125mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 400mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 176-180mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 165-169mm
Walraven Bifix® G2 Clamp BUP EPDM M8/10 165-169mm
Walraven Bifix® G2 Clamp BUP EPDM M10 165-169mm
Walraven 2S Clamp zinc plated EPDM M8/10 195-205mm

## 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. | 1,36E-02 | 1,85E-06 | 4,33E-06 | 1,36E-02 | 2,80E-07 | 6,76E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,53E-07 | 1,03E-06 | 9,06E-10 | -5,35E-05 |
| ADPF | MJ | 2,63E+01 | 1,12E+00 | 5,67E+00 | 3,30E+01 | 1,68E-01 | 1,34E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,91E-01 | 2,79E-01 | 2,75E-03 | -7,12E+00 |
| GWP | kg CO2 eq. | 1,58E+00 | 7,32E-02 | 4,21E-01 | 2,08E+00 | 1,10E-02 | 9,96E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,56E-02 | 2,60E-01 | 9,72E-05 | -3,82E-01 |
| ODP | kg CFC11 eq. | 1,39E-07 | 1,30E-08 | 2,37E-08 | 1,76E-07 | 1,94E-09 | 7,40E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,54E-09 | 2,76E-09 | 3,24E-11 | -3,70E-08 |
| POCP | kg ethene eq. | 1,51E-03 | 4,52E-05 | -1,21E-04 | 1,43E-03 | 6,61E-06 | 3,73E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,54E-05 | 1,68E-05 | 1,03E-07 | -7,24E-04 |
| AP | kg SO2 eq. | 8,86E-03 | 3,51E-04 | 1,42E-03 | 1,06E-02 | 4,82E-05 | 4,76E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,12E-04 | 2,00E-04 | 7,11E-07 | -1,48E-03 |
| EP | kg (PO4) 3 eq. | 1,25E-03 | 6,60E-05 | 3,03E-04 | 1,62E-03 | 9,47E-06 | 7,52E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,21E-05 | 3,03E-05 | 1,37E-07 | -1,75E-04 |

Toxicity indicators and ECI (Dutch market)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTP | kg DCB eq. | 2,78E+00 | 3,10E-02 | -1,65E-02 | 2,80E+00 | 4,61E-03 | 1,31E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,08E-02 | 2,25E-02 | 4,39E-05 | -2,18E-01 |
| FAETP | kg DCB eq. | 4,65E-02 | 8,96E-04 | 2,02E-03 | 4,94E-02 | 1,35E-04 | 2,55E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,14E-04 | 4,54E-04 | 1,04E-06 | 7,68E-04 |
| MAETP | kg DCB eq. | 9,10E+01 | 3,24E+00 | 1,03E+01 | 1,04E+02 | 4,85E-01 | 5,27E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,13E+00 | 1,87E+00 | 3,73E-03 | -2,56E+00 |
| TETP | kg DCB eq. | 1,66E-02 | 1,09E-04 | 2,03E-03 | 1,88E-02 | 1,63E-05 | 1,61E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,81E-05 | 8,11E-05 | 1,10E-07 | 1,34E-02 |
| ECI | euro | 3,95E-01 | 8,99E-03 | 2,94E-02 | 4,33E-01 | 1,32E-03 | 2,03E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,08E-03 | 1,63E-02 | 1,37E-05 | -4,76E-02 |
| ADPF | kg Sb eq. | 1,26E-02 | 5,37E-04 | 2,73E-03 | 1,59E-02 | 8,06E-05 | 6,44E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,88E-04 | 1,34E-04 | 1,32E-06 | -3,43E-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. | 1,63E+00 | 7,39E-02 | 4,18E-01 | 2,12E+00 | 1,11E-02 | 1,01E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,58E-02 | 2,52E-01 | 9,91E-05 | -4,03E-01 |
| GWP-fossil | kg CO2 eq. | 1,62E+00 | 7,39E-02 | 4,17E-01 | 2,11E+00 | 1,11E-02 | 1,00E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,58E-02 | 2,60E-01 | 9,90E-05 | -4,03E-01 |
| GWP-biogenic | kg CO2 eq. | 6,59E-03 | 2,74E-05 | 6,73E-04 | 7,29E-03 | 4,12E-06 | 3,70E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,62E-06 | -7,68E-03 | 5,79E-08 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 2,97E-03 | 2,75E-05 | 4,35E-04 | 3,44E-03 | 4,05E-06 | 1,79E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,45E-06 | 2,12E-05 | 2,76E-08 | 1,09E-04 |
| ODP | kg CFC11 eq. | 1,49E-07 | 1,63E-08 | 1,85E-08 | 1,84E-07 | 2,44E-09 | 7,77E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,69E-09 | 3,15E-09 | 4,08E-11 | -4,02E-08 |
| AP | mol H+ eq. | 1,09E-02 | 4,65E-04 | 1,70E-03 | 1,31E-02 | 6,41E-05 | 5,87E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,50E-04 | 2,52E-04 | 9,40E-07 | -1,79E-03 |
| EP-fresh water | kg PO4 eq. | 1,19E-04 | 7,37E-07 | 7,01E-05 | 1,89E-04 | 1,11E-07 | 8,81E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,60E-07 | 1,27E-06 | 1,11E-09 | -1,48E-05 |
| EP-marine | kg N eq. | 2,24E-03 | 1,59E-04 | 2,39E-04 | 2,64E-03 | 2,26E-05 | 1,24E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,27E-05 | 6,11E-05 | 3,23E-07 | -3,00E-04 |
| EP-terrestrial | mol N eq. | 2,48E-02 | 1,75E-03 | 2,91E-03 | 2,95E-02 | 2,49E-04 | 1,38E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 5,81E-04 | 7,02E-04 | 3,56E-06 | -3,50E-03 |
| POCP | kg NMVOC eq. | 8,28E-03 | 4,98E-04 | 3,78E-04 | 9,15E-03 | 7,11E-05 | 3,71E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,66E-04 | 1,88E-04 | 1,04E-06 | -2,16E-03 |
| ADP-minerals & metals | kg Sb eq. | 1,36E-02 | 1,85E-06 | 4,33E-06 | 1,36E-02 | 2,80E-07 | 6,76E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,53E-07 | 1,03E-06 | 9,06E-10 | -5,35E-05 |
| ADP-fossil | MJ, net calorific value | 2,42E+01 | 1,11E+00 | 6,13E+00 | 3,15E+01 | 1,67E-01 | 1,32E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,89E-01 | 2,82E-01 | 2,77E-03 | -5,86E+00 |
| WDP | m3 world eq. Deprived | 1,03E+00 | 3,94E-03 | 9,11E-02 | 1,12E+00 | 5,96E-04 | 4,94E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,39E-03 | 5,43E-03 | 1,24E-04 | -1,41E-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 | 1,09E-07 | 6,55E-09 | -6,73E-09 | 1,09E-07 | 9,93E-10 | 4,52E-09 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,32E-09 | 2,89E-09 | 1,82E-11 | -2,45E-08 |
| IRP | kBq U235 eq. | 1,05E-01 | 4,66E-03 | 3,45E-02 | 1,44E-01 | 6,98E-04 | 6,94E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,63E-03 | 1,33E-03 | 1,14E-05 | -9,02E-03 |
| ETP-fw | CTUe | 1,59E+02 | 9,86E-01 | 3,17E-01 | 1,60E+02 | 1,49E-01 | 7,51E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,47E-01 | 1,49E+00 | 1,80E-03 | -1,19E+01 |
| HTP-c | CTUh | 9,56E-09 | 3,24E-11 | -5,83E-10 | 9,01E-09 | 4,82E-12 | 4,47E-10 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,13E-11 | 2,88E-11 | 4,15E-14 | -1,05E-10 |
| HTP-nc | CTUh | 1,64E-07 | 1,08E-09 | 1,62E-10 | 1,66E-07 | 1,63E-10 | 1,10E-08 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,79E-10 | 1,40E-09 | 1,28E-12 | 5,23E-08 |
| SQP | - | 8,44E+00 | 9,51E-01 | 1,67E+00 | 1,11E+01 | 1,45E-01 | 5,41E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,37E-01 | 5,10E-01 | 5,80E-03 | -1,23E+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 | 1,76E-03 | 2,79E-06 | -7,74E-06 | 1,76E-03 | 4,22E-07 | 8,61E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 9,86E-07 | 9,45E-07 | 4,14E-09 | -3,56E-05 |
| NHWD | kg | 4,18E-01 | 6,94E-02 | 3,37E-02 | 5,21E-01 | 1,06E-02 | 2,75E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,47E-02 | 1,29E-02 | 1,88E-02 | -3,70E-02 |
| RWD | kg | 9,32E-05 | 7,30E-06 | 2,89E-05 | 1,29E-04 | 1,09E-06 | 5,93E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 2,55E-06 | 1,58E-06 | 1,82E-08 | -1,61E-05 |
| CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,57E-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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,69E-02 | 0,00E+00 |
| EEE | MJ | 0,00E+00 | 0,00E+00 | 5,37E-04 | 5,37E-04 | 0,00E+00 | 2,68E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 3,76E-01 |
| ETE | MJ | 0,00E+00 | 0,00E+00 | 9,23E-04 | 9,23E-04 | 0,00E+00 | 4,61E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 6,48E-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 | 2,24E+00 | 1,38E-02 | 6,87E-01 | 2,94E+00 | 2,09E-03 | 1,43E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,87E-03 | 4,05E-02 | 2,24E-05 | -1,23E-01 |
| PERM | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT | MJ | 2,24E+00 | 1,38E-02 | 6,87E-01 | 2,94E+00 | 2,09E-03 | 1,43E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,87E-03 | 4,05E-02 | 2,24E-05 | -1,23E-01 |
| PENRE | MJ | 2,58E+01 | 1,18E+00 | 6,61E+00 | 3,36E+01 | 1,77E-01 | 1,41E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,13E-01 | 3,00E-01 | 2,94E-03 | -6,19E+00 |
| PENRM | MJ | 2,09E+00 | 0,00E+00 | 0,00E+00 | 2,09E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 2,37E+01 | 1,18E+00 | 6,61E+00 | 3,15E+01 | 1,77E-01 | 1,41E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,13E-01 | 3,00E-01 | 2,94E-03 | -6,19E+00 |
| SM | kg | 1,62E-01 | 0,00E+00 | 7,72E-05 | 1,62E-01 | 0,00E+00 | 3,86E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | m3 | 3,04E-02 | 1,34E-04 | 1,14E-02 | 4,19E-02 | 2,03E-05 | 1,95E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,74E-05 | 4,30E-04 | 2,96E-06 | -3,42E-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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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 Overview
Data flows have been modeled as accurately as possible. The quality assessment prioritizes primary data collected directly from the Walraven production site. Where primary data was unavailable, appropriate reference data from reputable sources and databases was used.

Module-Specific Data
For Module A1, product composition data was provided by the manufacturer. Module A2 includes actual transportation data of raw materials to the production facility. Module A3 incorporates energy consumption and waste generation recorded during the 2023/2024 production year. All background processes are derived from the Dutch Nationale Milieudatabase v3.8 and Ecoinvent v3.6.

Data Collection Period
The dataset represents production processes for the year 2023/2024.

Methodology and Reproducibility
The life cycle assessment was conducted in accordance with EN15804+A2:2019, ISO 14040, ISO 14044, ISO 14025, and the NMD Bepalingsmethode v1.2 (2025). All calculations and life cycle modeling were performed using Ecochain Helix software version 4.3.1. The assessment includes all life cycle stages, covering raw material extraction, transport, and manufacturing (A1–A3), transport to site and installation (A4–A5), the use phase (B1–B7), end-of-life processes (C1–C4), and potential benefits from reuse, recovery, and recycling (D).

Inventory and Allocation
All relevant inputs, outputs, emissions, and energy streams were included in the inventory. System boundaries follow the modular approach defined in EN15804+A2 and the NMD Bepalingsmethode v1.2 (2025). Manufacturing inputs such as energy and auxiliary materials were allocated to production processes and then distributed to products using mass-based allocation. No secondary materials were used during production, and end-of-life assumptions reflect realistic recycling and disposal pathways. The cutoff criteria ensure that excluded flows do not exceed 5% of total energy or mass for any module.

Data Sources
Primary data for the Walraven clamp, including material compositions, transport distances, energy consumption, and waste outputs, were collected at the Czech production facility. In cases where primary data was unavailable, appropriate reference datasets from Ecoinvent 3.6 and Nationale Milieudatabase v3.8 were applied to represent materials such as steel, EPDM rubber, polyamide, and zinc.

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

Module A1 – Raw Material Supply
This stage covers the extraction and upstream processing of raw materials, as well as auxiliary inputs such as water, lubricants, and packaging. For the Walraven KSB2 Clamp zinc plated EPDM M8/10 192-200mm, material data from the 2023/2024 production year were used. The main components include multiple grades of steel, EPDM rubber, polyamide (PA) plastic, and zinc coatings. Materials were modeled using Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6, applying generic datasets when specific data were unavailable. Steel is assumed to consist of 57% primary and 43% secondary (recycled) content, reflecting Dutch market averages.

Module A2 – Transport of Raw Materials
This stage models transportation from suppliers to the Walraven production site in the Czech Republic. Distances and transport modes were obtained from supply chain data. Most materials were transported by truck, with sea transport applied for international suppliers. Transport modeling follows EN 15804+A2 methodology, assuming a 50% truck load factor (fully loaded outbound, empty return). The main reference used is 0001-tra&Transport, vrachtwagen (freight, lorry, unspecified {GLO}) from NMD v3.8 / Ecoinvent v3.6.

Module A3 – Production
Production impacts include electricity consumption (grid and renewable), fuel use, packaging materials, lubricating oils, and production waste such as steel scrap, rubber, and plastic offcuts. Primary operational data from 2023/2024 were used. Internal recycling of steel waste was included proportionally to the clamp's production volume. Transport of production waste to recycling or disposal sites was modeled. Capital goods were excluded following EN 15804+A2 cutoff rules, as their contribution is below 5% of total impact.

Module A4 – Transport to Installation Site
Transportation of the finished product to the installation location is modeled as a 150 km truck journey, following Bepalingsmethode v1.2 (2025). A 50% truck load factor is assumed. Emissions are calculated using 0001-tra&Transport, vrachtwagen, NMD v3.8 / Ecoinvent v3.6.

Module A5 – Installation
This stage accounts for on-site installation of the BIS KSB Clamp. A 5% material loss is assumed due to handling. Waste transport distances are 100 km for steel to recycling/landfill and 100 km for rubber and plastic to AVI incineration facilities. Material losses and waste streams were modeled per clamp according to Bepalingsmethode v1.2 (2025) fixed values.

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

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 2)

Module C1 – Deconstruction
Manual removal of the Walraven HD1501 clamps is assumed, and no energy consumption is modeled for this stage. The dismantling process is straightforward due to the two-part design and pre-installed captive nuts and bolts, allowing for efficient on-site uninstallation.

Module C2 – Transport to Waste Processing
After deconstruction, steel and zinc components are transported 50 km to recycling or landfill facilities, while rubber and plastic components are transported 100 km to AVI incineration plants. Transport emissions are modeled using standard lorry datasets: 0001-tra&Transport, vrachtwagen from NMD v3.8 / Ecoinvent v3.6.

Module C3 – Waste Processing
Steel and zinc are assumed to be 100% recycled. Pre-treatment is modeled as sorting and pressing of scrap metal. Rubber and plastic are modeled as 100% incinerated with energy recovery at AVI facilities. Emission references used include NMD v3.8 datasets: 0264-avC&Verbranden kunststoffen for plastics (28.67 MJ/kg), 0315-reC&Sorteren en persen oud ijzer for steel, and 0260-avC&Verbranden rubber/EPDM for rubber (27.2 MJ/kg).

Module C4 – Final Disposal
Residual waste disposal assumes that 5% of steel and zinc is sent to landfill, using NMD v3.8 references 0253-sto&Stort staal for steel and 0248-sto&Stort koper, lood, verzinkt staal, zink for zinc. Rubber and plastic are fully incinerated, with no landfill contribution.

Module D – Benefits Beyond the System Boundary
Environmental credits from material recovery and energy substitution are included. Steel benefits are calculated as a 52% substitution efficiency, derived from 95% recycling minus 43% secondary input. Zinc is modeled with a 95% recycling benefit. Energy recovery from incineration of rubber and plastic is assumed to provide a 100% substitution of fossil energy.

This Environmental Product Declaration (EPD) is fully compliant with EN 15804+A2:2019/AC:2021 and follows the modular life cycle approach. The methodology aligns with the Dutch Bepalingsmethode v1.2 (2025). Material flows, waste treatment, transport, emissions, and benefits are modeled using primary production and end-of-life data from Walraven's Czech operations, supplemented with recognized reference datasets from NMD v3.8 and Ecoinvent v3.6.

## 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


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