**Environmental**
**Product**
**Declaration**

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
**Walraven 4000 Clamp M8 BUP 160mm**

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

MRPI® registration:
**1.1.00937.2025**

Program operator:
**Stichting MRPI®**
Publisher:
**Stichting MRPI®**
**www.mrpi.nl**

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## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00937.2025

## 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 4000 Clamp M8 BUP 160mm

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

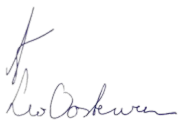
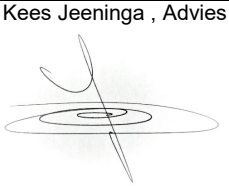
## DESCRIPTION OF PRODUCT

Two-screw steel clamp with quick-locking system to prevent opening during installation. Includes removable spacer washers for sliding or anchoring. Inner profile protects pipes; oversized diameter allows for expansion. Made from steel 1.0332 with BIS UltraProtect® 1000 surface protection. Suitable for indoor/outdoor use; tested to 1,000 hours salt spray per ISO 9227.

## 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<br>CEN standard EN15804 serves as the core PCR [1] |
|---|---|
|  | Independent verification of the declaration and data according to ISO14025+EN15804 A2 (+indicators A1)<br>Internal: External: X |
| | Third party verifier: Anne Kees Jeeninga , Advies Lab Vof<br>  |
| | [1] PCR = Product Category Rules |

## DETAILED PRODUCT DESCRIPTION

The Walraven 4000 Clamp M8 BUP 160mm is a robust two-screw pipe clamp designed for plastic pipes (Ø 160 mm). Manufactured in the Mijdrecht, Netherlands, it features a quick-locking system, removable spacer washers for sliding or anchoring, and an internal profile to protect pipes. Made from steel 1.0332 with BIS UltraProtect® 1000 coating, it offers excellent durability and corrosion resistance for both indoor and outdoor applications, withstanding 1,000 hours of salt spray testing per ISO 9227.

Manufacturing Process:
The clamp begins with steel that's flattened and precision-cut to form the body, helping maintain structural integrity and strength throughout its lifespan. The upper and lower sections are then stamped and bent so they fit securely together around the pipe. A connecting nut is resistance welded onto the body to provide a strong, reliable threaded connection during installation. To guard against corrosion, the entire clamp receives a durable zinc coating that meets EN ISO 9227 performance standards. In the final assembly stage, locking screws, nuts, a POM anti-loss washer, and a PP nut holder are all pre-installed, simplifying the installation process and ensuring a secure, ready-to-use product straight out of the box.

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 $CO_2$eq/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 and Installation Features:
Corrosion Protection: The zinc coating offers effective corrosion resistance, eliminating the need for additional on-site treatments and reducing environmental impact.
Sustainability Compliance: The manufacturing process adheres to high sustainability standards, with environmental product declarations (EPD) in accordance with EN 15804+A2:2019 and ISO 14025.

Packaging and Transport:
Packaging: The Walraven 4000 Clamp is delivered in standardized cardboard boxes with clear labeling for easy identification and transport.

Installation Readiness: The product is fully assembled, requiring no further preparation before installation.

| Name - Half parts | |
|---|---|
| Steel - Lower part | |
| Steel - Upper part | |
| Steel - Hollow pan head screw | |
| Steel - Nut | |
| Plastic - Nut holder | |
| Plastic - Anti-loss washer | |
| Plastic- Spacer 5000 cream | |

| Total Weight | 226 g |
|---|---|

| Component (> 1%) | %) |
|---|---|
| Steel (combined) | 94,60% |

## 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 4000 Clamp M8 BUP 160mm, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

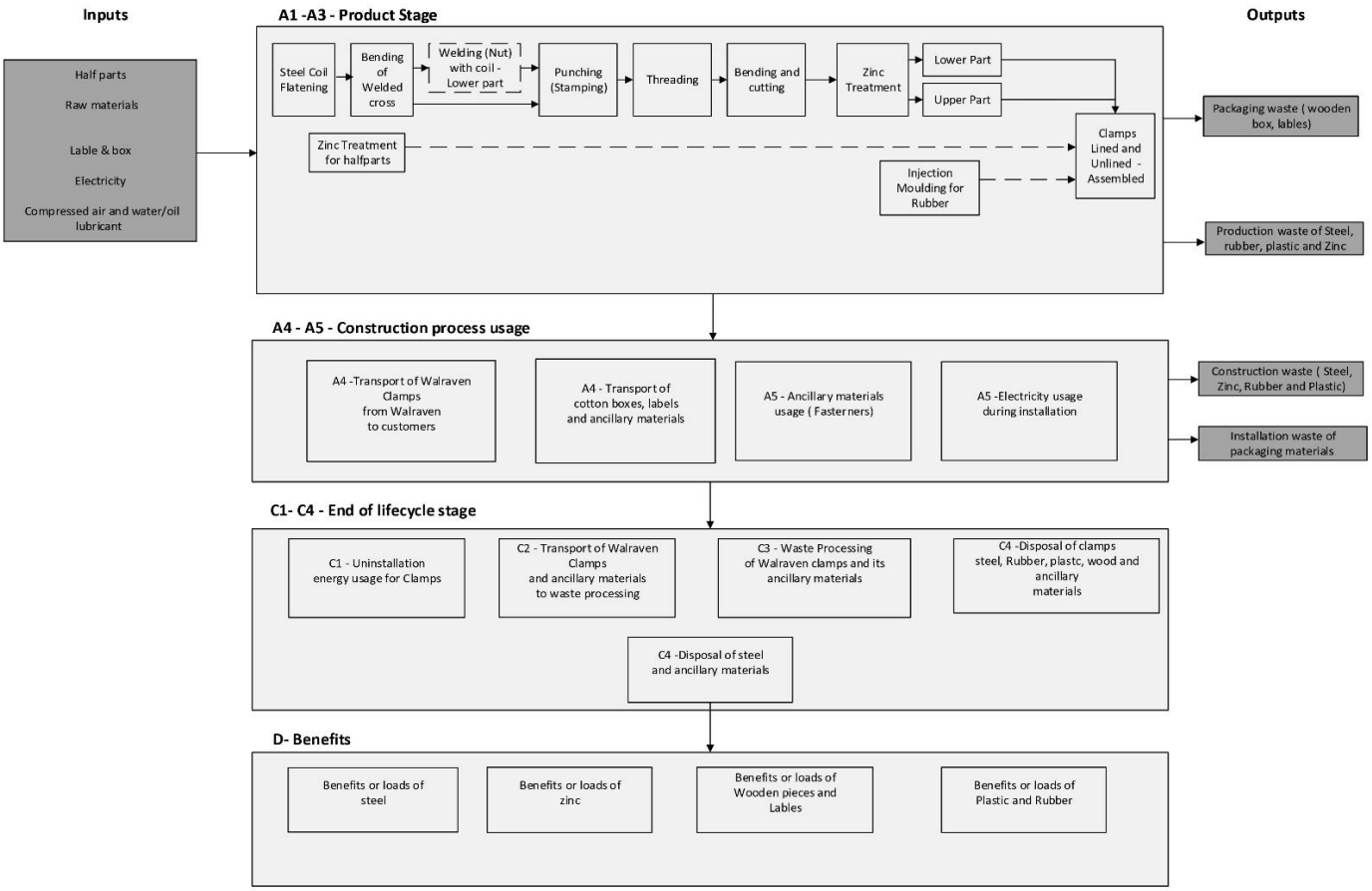
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental 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 4000 Clamp M8 BUP 160mm. 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® 5000 Clamp G2 BUP EPDM green M8/10 135mm
Walraven Bifix® G2 Clamp BUP M8/10 152-160mm
Walraven Bifix® 5000 Clamp G2 BUP EPDM green M8/10 125mm
Walraven 4000 Clamp M8 BUP 160mm
Walraven 4000 Clamp M8 zinc plated 160mm
Walraven Bifix® 5000 Clamp G2 BUP EPDM green M8/10 110mm
Walraven Bifix® G2 Clamp BUP M8/10 133-140mm
Walraven 3000 Clamp zinc plated M8 125mm
Walraven Bifix® G2 Clamp BUP M8/10 125-130mm
Walraven 3000 Clamp zinc plated M8 110mm
Walraven 4000 Clamp M8 BUP 125mm
Walraven 4000 Clamp M8 zinc plated 125mm
Walraven Sprinkler Clamp TA41 FM/UL M10 4" (DN100)
Walraven Duplo Double Pipe Clamp pre-galvanized 1 1/4"

## 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. | 1,49E-02 | 4,45E-06 | 4,28E-07 | 1,50E-02 | 1,16E-07 | 7,02E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,93E-07 | 3,39E-07 | 6,38E-10 | -9,19E-04 |
| ADPF | MJ | 1,67E+01 | 2,67E+00 | 4,29E-01 | 1,98E+01 | 6,94E-02 | 8,65E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,16E-01 | 8,43E-02 | 1,93E-03 | -2,75E+00 |
| GWP | kg CO2 eq. | 1,13E+00 | 1,74E-01 | 2,34E-02 | 1,33E+00 | 4,54E-03 | 5,74E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,56E-03 | 9,51E-03 | 6,87E-05 | -2,06E-01 |
| ODP | kg CFC11 eq. | 8,22E-08 | 3,09E-08 | 2,27E-09 | 1,15E-07 | 8,05E-10 | 5,49E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,34E-09 | 8,54E-10 | 2,27E-11 | -8,63E-09 |
| POCP | kg ethene eq. | 9,22E-04 | 1,06E-04 | 2,07E-07 | 1,03E-03 | 2,74E-06 | 3,29E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,56E-06 | 5,37E-06 | 7,27E-08 | -3,83E-04 |
| AP | kg SO2 eq. | 7,06E-03 | 7,77E-04 | 3,97E-05 | 7,87E-03 | 1,99E-05 | 3,56E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,32E-05 | 5,98E-05 | 4,98E-07 | -8,60E-04 |
| EP | kg (PO4) 3 eq. | 1,02E-03 | 1,52E-04 | 7,09E-06 | 1,17E-03 | 3,92E-06 | 5,41E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,53E-06 | 7,67E-06 | 9,66E-08 | -1,10E-04 |

Toxicity indicators and ECI (Dutch market)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTP | kg DCB eq. | 1,94E+00 | 7,35E-02 | 2,16E-03 | 2,02E+00 | 1,91E-03 | 9,47E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,18E-03 | 7,46E-03 | 3,34E-05 | -1,34E-01 |
| FAETP | kg DCB eq. | 4,32E-02 | 2,14E-03 | 8,59E-05 | 4,54E-02 | 5,58E-05 | 2,24E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,29E-05 | 1,48E-04 | 2,22E-06 | -8,38E-04 |
| MAETP | kg DCB eq. | 7,91E+01 | 7,71E+00 | 3,41E-01 | 8,72E+01 | 2,01E-01 | 4,29E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,34E-01 | 6,24E-01 | 2,83E-03 | -2,59E+00 |
| TETP | kg DCB eq. | 1,17E-02 | 2,60E-04 | 1,82E-04 | 1,21E-02 | 6,75E-06 | 1,04E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,13E-05 | 2,31E-05 | 8,37E-08 | 8,66E-03 |
| ECI | euro | 2,84E-01 | 2,11E-02 | 1,67E-03 | 3,07E-01 | 5,47E-04 | 1,41E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,11E-04 | 1,54E-03 | 9,95E-06 | -2,77E-02 |
| ADPF | kg Sb eq. | 8,02E-03 | 1,28E-03 | 2,06E-04 | 9,51E-03 | 3,34E-05 | 4,16E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,56E-05 | 4,05E-05 | 9,28E-07 | -1,32E-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 | 1,76E-01 | -3,41E-03 | 1,34E+00 | 4,58E-03 | 5,70E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,63E-03 | 9,62E-03 | 7,00E-05 | -2,19E-01 |
| GWP-fossil | kg CO2 eq. | 1,16E+00 | 1,76E-01 | 2,34E-02 | 1,36E+00 | 4,57E-03 | 5,79E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,62E-03 | 9,59E-03 | 6,99E-05 | -2,18E-01 |
| GWP-biogenic | kg CO2 eq. | 6,07E-03 | 6,56E-05 | -5,00E-07 | 6,14E-03 | 1,71E-06 | 3,05E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,84E-06 | 6,44E-03 | 4,49E-08 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 2,67E-03 | 6,46E-05 | -5,55E-07 | 2,73E-03 | 1,68E-06 | 1,38E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,79E-06 | 7,02E-06 | 1,95E-08 | 1,39E-05 |
| ODP | kg CFC11 eq. | 8,37E-08 | 3,88E-08 | 2,47E-09 | 1,25E-07 | 1,01E-09 | 6,07E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,68E-09 | 9,73E-10 | 2,85E-11 | -7,21E-09 |
| AP | mol H+ eq. | 8,72E-03 | 1,03E-03 | 5,35E-05 | 9,80E-03 | 2,65E-05 | 4,45E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,42E-05 | 7,46E-05 | 6,60E-07 | -1,06E-03 |
| EP-fresh water | kg PO4 eq. | 9,95E-05 | 1,77E-06 | 4,55E-07 | 1,02E-04 | 4,62E-08 | 4,59E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,69E-08 | 4,21E-07 | 7,93E-10 | -1,05E-05 |
| EP-marine | kg N eq. | 1,86E-03 | 3,62E-04 | 1,09E-05 | 2,24E-03 | 9,35E-06 | 1,04E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,56E-05 | 1,65E-05 | 2,28E-07 | -2,08E-04 |
| EP-terrestrial | mol N eq. | 2,07E-02 | 3,99E-03 | 1,65E-04 | 2,49E-02 | 1,03E-04 | 1,15E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,72E-04 | 1,92E-04 | 2,52E-06 | -2,40E-03 |
| POCP | kg NMVOC eq. | 6,26E-03 | 1,14E-03 | 2,68E-05 | 7,43E-03 | 2,94E-05 | 3,15E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,91E-05 | 5,23E-05 | 7,30E-07 | -1,25E-03 |
| ADP-minerals & metals | kg Sb eq. | 1,49E-02 | 4,45E-06 | 4,28E-07 | 1,50E-02 | 1,16E-07 | 7,02E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,93E-07 | 3,39E-07 | 6,38E-10 | -9,19E-04 |
| ADP-fossil | MJ, net calorific value | 1,55E+01 | 2,65E+00 | 3,98E-01 | 1,85E+01 | 6,90E-02 | 8,47E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,15E-01 | 8,60E-02 | 1,95E-03 | -1,86E+00 |
| WDP | m3 world eq. Deprived | 8,32E-01 | 9,47E-03 | 5,38E-03 | 8,46E-01 | 2,47E-04 | 3,87E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,11E-04 | 1,02E-03 | 8,13E-05 | -7,36E-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 | 7,11E-08 | 1,58E-08 | 8,22E-11 | 8,70E-08 | 4,11E-10 | 3,85E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,85E-10 | 9,29E-10 | 1,29E-11 | -1,19E-08 |
| IRP | kBq U235 eq. | 8,22E-02 | 1,11E-02 | 6,61E-04 | 9,40E-02 | 2,89E-04 | 4,72E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,82E-04 | 4,27E-04 | 8,13E-06 | -8,49E-04 |
| ETP-fw | CTUe | 1,56E+02 | 2,36E+00 | 2,13E-01 | 1,58E+02 | 6,15E-02 | 7,23E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,03E-01 | 4,04E-01 | 1,89E-03 | -1,44E+01 |
| HTP-c | CTUh | 7,52E-09 | 7,68E-11 | -1,12E-11 | 7,58E-09 | 2,00E-12 | 3,68E-10 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,33E-12 | 9,41E-12 | 3,39E-14 | -2,27E-10 |
| HTP-nc | CTUh | 1,46E-07 | 2,58E-09 | 1,58E-10 | 1,48E-07 | 6,73E-11 | 8,89E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,12E-10 | 4,30E-10 | 1,40E-12 | 2,90E-08 |
| SQP | - | 6,53E+00 | 2,30E+00 | 5,03E-01 | 9,33E+00 | 5,98E-02 | 4,56E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 9,97E-02 | 1,69E-01 | 4,14E-03 | -5,50E-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 | 1,93E-03 | 6,71E-06 | 1,56E-06 | 1,94E-03 | 1,75E-07 | 8,99E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,91E-07 | 2,57E-07 | 2,87E-09 | -1,41E-04 |
| NHWD | kg | 2,96E-01 | 1,68E-01 | 7,55E-04 | 4,65E-01 | 4,38E-03 | 2,35E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,29E-03 | 2,49E-03 | 1,28E-02 | -2,29E-02 |
| RWD | kg | 6,30E-05 | 1,74E-05 | 6,30E-07 | 8,11E-05 | 4,53E-07 | 4,05E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,55E-07 | 5,04E-07 | 1,28E-08 | -1,71E-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 | 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 | 2,32E-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 | 1,34E-03 | 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 | 1,01E-02 |
| 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 | 5,84E-03 |

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

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

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| PERE | MJ | 1,79E+00 | 3,32E-02 | 1,58E-01 | 1,99E+00 | 8,64E-04 | 9,83E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,44E-03 | 1,34E-02 | 2,30E-05 | -3,48E-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 | 1,79E+00 | 3,32E-02 | 1,58E-01 | 1,99E+00 | 8,64E-04 | 9,83E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,44E-03 | 1,34E-02 | 2,30E-05 | -3,48E-02 |
| PENRE | MJ | 1,65E+01 | 2,82E+00 | 4,35E-01 | 1,97E+01 | 7,33E-02 | 9,03E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,22E-01 | 9,12E-02 | 2,07E-03 | -1,94E+00 |
| PENRM | MJ | 3,24E-02 | 0,00E+00 | 0,00E+00 | 3,24E-02 | 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 | 1,65E+01 | 2,82E+00 | 4,35E-01 | 1,97E+01 | 7,33E-02 | 9,03E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,22E-01 | 9,12E-02 | 2,07E-03 | -1,94E+00 |
| SM | kg | 1,04E-01 | 0,00E+00 | 4,58E-05 | 1,04E-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 | 2,51E-02 | 3,23E-04 | 1,77E-04 | 2,56E-02 | 8,40E-06 | 1,19E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,40E-05 | 4,49E-05 | 2,11E-06 | -1,80E-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 reflect actual or best estimate industrial practices.

Primary Data Usage: Collected from Walraven's production and sourcing departments. Where primary data was unavailable, secondary data from Ecoinvent 3.6 and NMD 3.8 was utilized.

Reference Selection: In cases where specific supplier data was not supplied, generic references and literature sources filled the gap.

2. Data Collection Period
The modelling is representative of production conditions in 2023 and 2024.

3. Methodology & Reproducibility
Approach: Based on EN 15804+A2 (v1.2) and NMD Bepalingsmethode v1.2 (2025).

Grouping Principle: If the environmental impact of the Walraven 4000 Clamp M8 BUP 160mm falls within ±20% of a reference product's impact, grouping may be justifiable. Given its size, it is unlikely to fall within 20%  and might require independent modelling or a new worst-case scenario.

Data Sources: Internal templates and material specification sheets; fallback to standard database references for steel and rubber components where supplier data is missing.

4. Inventory and Allocation
System Boundaries: Modular, cradle-to-grave model aligned with EN 15804+A2 and NMD 2025.

Material Streams: Includes galvanized steel, rubber lining (if applicable), and any coating/powder treatments.

Energy & Transport: Transport distances from steel providers and intermediaries are included. Installation is treated per standard EN scenario assumptions.

5. Allocation Strategy
Worst case Methodology: If grouped with smaller 4000 Clamps, the 160 mm variant might serve as the new worst-case reference.

Allocation Threshold: Followed the 20% deviation guidance; otherwise, this clamp will be treated as a separate entity in the inventory.

6. Data Sources
Primary: Walraven's production, logistics, and planning departments.

Secondary: Generic steel data from Ecoinvent 3.6 and NMD 3.8, particularly for unprovided raw material specifics.

Additional: Transport scenarios and end-of-life aligned with NEN-EN15804+A2, version 1.2 (2025).

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1–A3 cover the upstream and manufacturing stages of the Walraven 4000 Clamp M8 BUP 160mm. Module A1 includes raw material extraction, pre-processing, and packaging inputs. Modeling is based on 2023–2024 production data. The clamp is composed of steel (multiple grades), with BUP surface treatment, and includes zinc coatings and removable spacer washers. Data is sourced from NMD v3.8 and Ecoinvent v3.6, using generic datasets where primary data was unavailable. Steel content follows standard NMD assumptions of 57% primary and 43% secondary material.

Module A2 models the transport of raw materials to the Walraven production site in Mijdrecht. All transport calculations are in line with EN 15804+A2:2019/AC:2021 and assume an average load factor of 50%, representing a full trip to the site and an empty return. Modeled distances reflect the sourcing of major components. Zinc coating materials are assumed to travel 100 km, with an additional 100 km secondary transport applied to several materials. Transport emissions are modeled using the reference dataset “0001-tra&Transport, vrachtwagen (freight, lorry, unspecified {GLO})” from NMD v3.8 and Ecoinvent v3.6.

Module A3 represents the manufacturing processes at the Walraven Mijdrecht facility, incorporating electricity (from both the grid and rooftop solar panels), fuels, packaging materials, and production waste. Zinc treatment requires dedicated electricity, and auxiliary materials such as lubricating oil are used.

Steel scrap generated during production is partly recycled, with quantities scaled based on the Mijdrecht facility's production share of total output. Waste transport to treatment and disposal facilities was accounted for.Capital goods were excluded under the cutoff rule in EN 15804+A2, as their contribution to the total environmental footprint was below 5%.

Module A4 covers distribution from production to installation locations. A default 150 km transport distance was used, in line with Bepalingsmethode v1.2 (2025). Modeling assumes a 50% load factor, and emissions were calculated using:
0001-tra&Transport, vrachtwagen, from NMD v3.8 / Ecoinvent v3.6.

Module A5 includes activities during installation. A 5% material loss was assumed for steel, plastic, and rubber due to on-site inefficiencies. Installation is manual, and no additional energy inputs were modeled. Waste transport distances are:Steel: 100 km to landfill and Rubber/Plastic: 100 km to AVI (incineration).

Fixed values for waste distribution were used per Bepalingsmethode v1.2:

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

End-of-Life (Modules C1–C4 and D)

Module C1 assumes manual deconstruction of the clamp, with no energy consumption modeled during dismantling.

Module C2 covers the transport of end-of-life materials. Steel and zinc are transported 50 km to either recycling facilities or landfill sites, while rubber and plastic components are assumed to travel 100 km to AVI incineration plants. All transport emissions are modeled using the standard NMD freight dataset “0001-tra&Transport, vrachtwagen” (NMD v3.8 / Ecoinvent v3.6).

Module C3 represents waste processing. Steel and zinc are assumed to be fully sorted and recycled, while plastic and rubber undergo complete incineration with energy recovery. Emissions are modeled using the following datasets: “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. These datasets are consistent with NMD v3.8 and Ecoinvent v3.6.

Module C4 accounts for residual disposal. A residual fraction of 5% of both steel and zinc is assumed to be landfilled. The datasets applied are “0253-sto&Stort staal” for steel and “0248-sto&Stort koper, lood, verzinkt staal, zink” for zinc.

Module D quantifies the environmental benefits beyond the life cycle boundary. Steel recycling provides a 52% substitution benefit, reflecting a 95% recycling rate offset against the 43% already accounted for as secondary material. Zinc recycling is modeled with a 95% substitution benefit. For rubber and plastic, incineration is credited with a 100% energy substitution benefit due to recovery of energy from combustion.

This modeling approach complies with EN 15804:2012+A2:2019/AC:2021 and is consistent with Bepalingsmethode v1.2 (2025). All datasets are derived from verified Walraven site records and modeled using 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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