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

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:
**Walraven Bifix® G2 Clamp BUP M8/10 176-180mm**

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

MRPI® registration:
**1.1.00953.2025**

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

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## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00953.2025

## 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 M8/10 176-180mm

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

## DESCRIPTION OF PRODUCT

Robust steel two-screw hinged clamp with a quick locking system, ideal for square pipe supports. Part of the BIS UltraProtect® 1000 system, offering high corrosion resistance with a minimum of 1,000 hours salt spray protection (ISO 9227). Suitable for both indoor and outdoor installations.

## 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 and 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 Bifix® G2 Clamp BUP M8/10 (176–180 mm) is a high-quality two-screw pipe clamp featuring a quick locking system, engineered for use with insulated, steel, and cast iron pipes. It is manufactured from steel and finished with the Walraven BIS UltraProtect® 1000 (BUP) coating, offering excellent corrosion resistance validated to ≥1,000 hours in salt spray testing according to ISO 9227. The clamp is supplied fully pre-assembled, ready for immediate installation.

Manufacturing Location
This product is manufactured at Walraven's certified facility in the Horka, Czech Republic under established environmental management systems.

Manufacturing Process Overview
The clamp consists of a steel, paired with stainless steel combi slot screws. The BUP surface system provides long-term protection without the need for additional coatings. All components are assembled at the facility to ensure ease of installation and consistent quality.

Electricity usage references:
Reference: 0569-pro & Elektriciteit, Nederlandse mix, bij consument, per kWh (73% grijs, 27% hernieuwbaar), Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.389 kg $CO_2$eq/kWh

Reference: market for electricity, low voltage | electricity, low voltage | Czech Republic, Database: Ecoinvent v3.6 (Cut-off, NMD), GWP : 0.936 kg CO2-eq/kWh

Environmental Performance
The clamp incorporates approximately 50.2% recycled steel content. It is free from volatile organic compounds (VOC-free) and Substances of Very High Concern (SVHC-free). The product's environmental performance has been modelled according to EN 15804 + A2 standards using Ecochain Helix v4.3.1 and Ecoinvent 3.6 data. Its Reference Service Life (RSL) is estimated at 50 years under typical use conditions.

Installation and Use Phase
The hinged design with an integrated quick locking mechanism reduces installation time. The clamp is suitable for various pipe types, including HVAC, plumbing, and infrastructure applications. Its unlined design is appropriate for installations where acoustic dampening is not required, and it can be used in both indoor and sheltered outdoor environments. The necessary internal transport of Czech Republic to Netherlands has been accounted in the production process of A1-A3.

End-of-Life Considerations
The clamp is designed for easy manual disassembly, allowing steel and stainless steel components to be fully recycled. Waste treatment and recovery are included in Modules C1–C4 and Module D, with transport distances modeled at 50–100 km and recycling credits applied to steel components.

Packaging and Transport
The product is supplied in recyclable cardboard packaging. Transport assumptions follow typical EURO 5 truck conditions at 50% load efficiency.

The product's corrosion resistance is tested per ISO 9227. The Life Cycle Assessment (LCA) is conducted in compliance with EN 15804 + A2, ISO 14040, ISO 14044, and ISO 14025 standards, using Ecochain Helix v4.3.1 for environmental modelling.

| Name - Half parts | |
|---|---|
| Steel - Lower part | |
| Steel - Upper part | |
| Steel - Hollow pan head screw | |
| Steel - Nut | |
| Plastic - POM (PolyOxyMethylene) - Anti loss washer | |
| Plastic - PA (PolyAmide) - Nut holder | |

| Total Weight | 351 g |
|---|---|

| Component (> 1%) | (%) |
|---|---|
| Steel (combined) | 96,20% |

## SCOPE AND TYPE

This study involves conducting a comprehensive Life Cycle Assessment (LCA) for the Walraven Clamps, aiming to analyze all life cycle phases from Cradle to Grave (A1–D) using the best available data. The assessment follows the full scope of LCA, meaning the product is evaluated not as a standalone item, but as part of a broader system aggregated with other materials and processed into other products. Consequently, the clamp becomes an integral component of a Declared Unit.

The LCA is performed using the Ecochain Helix software, leveraging background data from authoritative sources such as the Dutch Nationale Milieu Database v3.8 (based on Ecoinvent 3.6) and adhering to the NMD Bepalingsmethode 1.2 (2025) standard. This rigorous methodology ensures a detailed and transparent examination of the environmental impact of the Walraven Clamps across their entire life cycle from the extraction of raw materials (Cradle) through production, installation, and use, to final disposal or recycling (Grave).

The system boundary includes all relevant stages, up to and including Module D (benefits and loads beyond the system boundary). It excludes operational energy use (B6) and water consumption (B7) during the use phase. The environmental impact is declared per one piece of Walraven Clamp, inclusive of ancillary materials, installation, internal transport, and waste processing.

The reference service life is assumed to be 50 years, based on internal product owner data and supported by the European Technical Assessment (ETA) for Walraven Clamps, which confirms a minimum working life of 50 years under appropriate usage and maintenance conditions.

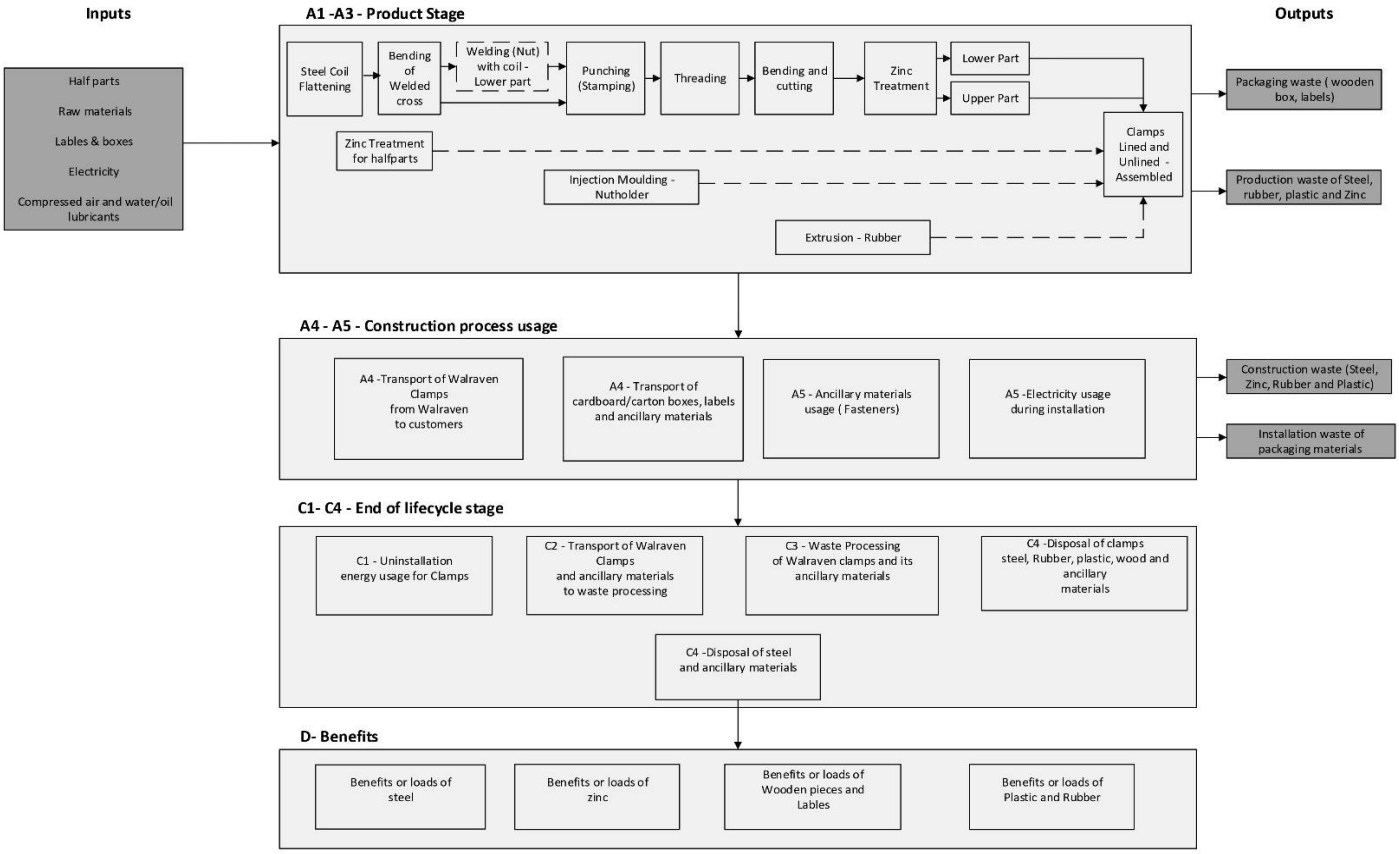
All significant inputs and outputs such as emissions, energy consumption, and material flows are accounted for. Materials representing less than 1% of the product's total weight may be excluded unless they are expected to contribute more than 5% to any environmental impact category. The cumulative environmental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

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

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

X = Modules Assessed

ND = Not Declared


Inputs
A1 -A3 - Product Stage
Outputs
Half parts
Raw materials
Lables & boxes
Electricity
Compressed air and water/oil lubricants
Steel Coil Flattening
Bending of Welded cross
Welding (Nut) with coil - Lower part
Punching (Stamping)
Threading
Bending and cutting
Zinc Treatment
Lower Part
Upper Part
Zinc Treatment for halfparts
Injection Moulding - Nutholder
Extrusion - Rubber
Clamps Lined and Unlined - Assembled
Packaging waste ( wooden box, labels)
Production waste of Steel, rubber, plastic and Zinc
A4 - A5 - Construction process usage
A4 -Transport of Walraven Clamps from Walraven to customers
A4 - Transport of cardboard/carton boxes, labels and ancillary materials
A5 - Ancillary materials usage ( Fasteners)
A5 -Electricity usage during installation
Construction waste (Steel, Zinc, Rubber and Plastic)
Installation waste of packaging materials
C1- C4 - End of lifecycle stage
C1 - Uninstallation energy usage for Clamps
C2 - Transport of Walraven Clamps and ancillary materials to waste processing
C3 - Waste Processing of Walraven clamps and its ancillary materials
C4 -Disposal of clamps steel, Rubber, plastic, wood and ancillary materials
C4 -Disposal of steel and ancillary materials
D- Benefits
Benefits or loads of steel
Benefits or loads of zinc
Benefits or loads of Wooden pieces and Lables
Benefits or loads of Plastic and Rubber

## REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven Bifix® G2 Clamp BUP M8/10 176-180mm. 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 2S Clamp zinc plated M8/10 217-225mm
Walraven Heavy Duty Clamp epoxy coated 3/8" 1/2" 110mm
Walraven Bifix® 412 Clamp pre-galvanized M8 400mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 49 (47
Walraven Bifix® G2 Clamp BUP M8/10 176-180mm
Walraven Bifix® 300 Clamp Stainless M10 193-200mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 49 (47 - 49 mm)
Walraven HD500 Clamp black M8/10 37-42mm
Walraven Industrial Saddle hot dip galvanized 125mm
Walraven HD500 Clamp BUP 1/2" 108-116mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 43 (40
Walraven Industrial Saddle hot dip galvanized 114.3mm 4"
Walraven Bifix® G2 Clamp BUP M8/10 165-169mm
Walraven Bifix® 412 Clamp pre-galvanized M8 355mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 43 (40 - 43 mm)
Walraven HD500 Clamp BUP M10/12 108-116mm
Walraven 434 Clamp stainless steel M10 PE-pipe 125mm
Walraven 3000 Clamp zinc plated M8 200mm
Walraven Split Band Clip DIN 3567 (hdg) Type A 34 (32
Walraven Bifix® 412 Clamp pre-galvanized M8 315mm
Walraven Split Band Clip DIN 3567 (untreated) Type A 34 (32 - 34 mm)
Walraven 434 Clamp stainless steel M10 PE-pipe 110mm
Walraven Bifix® 412 Clamp pre-galvanized M8 300mm
Walraven HD500 Clamp BUP M10 47-52mm

## 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. | 1,46E-02 | 1,18E-06 | 4,33E-06 | 1,46E-02 | 1,80E-07 | 7,30E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,00E-07 | 9,00E-07 | 8,10E-10 | -1,69E-07 |
| ADPF | MJ | 1,94E+01 | 7,19E-01 | 5,67E+00 | 2,58E+01 | 1,08E-01 | 1,17E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,80E-01 | 2,21E-01 | 2,46E-03 | -2,98E+00 |
| GWP | kg CO2 eq. | 1,32E+00 | 4,73E-02 | 4,21E-01 | 1,79E+00 | 7,05E-03 | 7,98E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,17E-02 | 1,88E-02 | 8,68E-05 | -2,32E-01 |
| ODP | kg CFC11 eq. | 9,42E-08 | 8,36E-09 | 2,37E-08 | 1,26E-07 | 1,25E-09 | 6,18E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,08E-09 | 2,08E-09 | 2,89E-11 | -8,09E-09 |
| POCP | kg ethene eq. | 1,17E-03 | 2,95E-05 | -1,21E-04 | 1,08E-03 | 4,25E-06 | 2,99E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,09E-06 | 1,42E-05 | 9,25E-08 | -5,05E-04 |
| AP | kg SO2 eq. | 7,80E-03 | 2,37E-04 | 1,42E-03 | 9,46E-03 | 3,10E-05 | 4,46E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,16E-05 | 1,58E-04 | 6,35E-07 | -7,85E-04 |
| EP | kg (PO4) 3 eq. | 1,12E-03 | 4,36E-05 | 3,03E-04 | 1,47E-03 | 6,09E-06 | 7,06E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,01E-05 | 2,02E-05 | 1,22E-07 | -9,33E-05 |

Toxicity indicators and ECI (Dutch market)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTP | kg DCB eq. | 2,48E+00 | 2,01E-02 | -1,65E-02 | 2,49E+00 | 2,97E-03 | 1,18E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,94E-03 | 1,96E-02 | 3,92E-05 | -1,45E-01 |
| FAETP | kg DCB eq. | 4,53E-02 | 5,77E-04 | 2,02E-03 | 4,79E-02 | 8,66E-05 | 2,52E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,44E-04 | 3,71E-04 | 9,31E-07 | 1,80E-03 |
| MAETP | kg DCB eq. | 8,47E+01 | 2,09E+00 | 1,03E+01 | 9,71E+01 | 3,12E-01 | 5,05E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,19E-01 | 1,60E+00 | 3,33E-03 | 1,50E+00 |
| TETP | kg DCB eq. | 1,49E-02 | 7,06E-05 | 2,03E-03 | 1,70E-02 | 1,05E-05 | 1,46E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,75E-05 | 6,08E-05 | 9,86E-08 | 1,21E-02 |
| ECI | euro | 3,48E-01 | 5,86E-03 | 2,94E-02 | 3,83E-01 | 8,49E-04 | 1,80E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,42E-03 | 3,73E-03 | 1,23E-05 | -2,90E-02 |
| ADPF | kg Sb eq. | 9,35E-03 | 3,46E-04 | 2,73E-03 | 1,24E-02 | 5,18E-05 | 5,62E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 8,64E-05 | 1,06E-04 | 1,18E-06 | -1,43E-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. | 1,36E+00 | 4,77E-02 | 4,18E-01 | 1,83E+00 | 7,11E-03 | 8,08E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,19E-02 | 1,16E-02 | 8,85E-05 | -2,49E-01 |
| GWP-fossil | kg CO2 eq. | 1,35E+00 | 4,77E-02 | 4,17E-01 | 1,82E+00 | 7,11E-03 | 8,02E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,18E-02 | 1,90E-02 | 8,85E-05 | -2,49E-01 |
| GWP-biogenic | kg CO2 eq. | 6,28E-03 | 1,76E-05 | 6,73E-04 | 6,97E-03 | 2,65E-06 | 3,69E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,42E-06 | -7,35E-03 | 5,17E-08 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 2,77E-03 | 1,79E-05 | 4,35E-04 | 3,23E-03 | 2,60E-06 | 1,72E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,34E-06 | 1,83E-05 | 2,47E-08 | 1,84E-04 |
| ODP | kg CFC11 eq. | 9,57E-08 | 1,05E-08 | 1,85E-08 | 1,25E-07 | 1,57E-09 | 6,26E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,61E-09 | 2,41E-09 | 3,64E-11 | -6,08E-09 |
| AP | mol H+ eq. | 9,63E-03 | 3,13E-04 | 1,70E-03 | 1,16E-02 | 4,12E-05 | 5,49E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,87E-05 | 1,97E-04 | 8,40E-07 | -9,61E-04 |
| EP-fresh water | kg PO4 eq. | 1,10E-04 | 4,73E-07 | 7,01E-05 | 1,81E-04 | 7,17E-08 | 8,65E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,19E-07 | 1,11E-06 | 9,92E-10 | -8,79E-06 |
| EP-marine | kg N eq. | 2,05E-03 | 1,06E-04 | 2,39E-04 | 2,39E-03 | 1,45E-05 | 1,15E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,42E-05 | 4,35E-05 | 2,89E-07 | -1,78E-04 |
| EP-terrestrial | mol N eq. | 2,27E-02 | 1,16E-03 | 2,91E-03 | 2,68E-02 | 1,60E-04 | 1,28E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,67E-04 | 5,05E-04 | 3,18E-06 | -2,08E-03 |
| POCP | kg NMVOC eq. | 7,15E-03 | 3,29E-04 | 3,78E-04 | 7,86E-03 | 4,57E-05 | 3,35E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,62E-05 | 1,38E-04 | 9,25E-07 | -1,41E-03 |
| ADP-minerals & metals | kg Sb eq. | 1,46E-02 | 1,18E-06 | 4,33E-06 | 1,46E-02 | 1,80E-07 | 7,30E-04 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 3,00E-07 | 9,00E-07 | 8,10E-10 | -1,69E-07 |
| ADP-fossil | MJ, net calorific value | 1,77E+01 | 7,16E-01 | 6,13E+00 | 2,45E+01 | 1,07E-01 | 1,17E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,79E-01 | 2,26E-01 | 2,47E-03 | -1,74E+00 |
| WDP | m3 world eq. Deprived | 9,00E-01 | 2,52E-03 | 9,11E-02 | 9,94E-01 | 3,83E-04 | 4,75E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 6,39E-04 | 2,40E-03 | 1,11E-04 | -4,75E-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 | 8,83E-08 | 4,20E-09 | -6,73E-09 | 8,58E-08 | 6,38E-10 | 3,78E-09 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,06E-09 | 2,47E-09 | 1,63E-11 | -1,44E-08 |
| IRP | kBq U235 eq. | 8,72E-02 | 3,00E-03 | 3,45E-02 | 1,25E-01 | 4,49E-04 | 6,57E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 7,48E-04 | 1,12E-03 | 1,01E-05 | 4,25E-03 |
| ETP-fw | CTUe | 1,61E+02 | 6,34E-01 | 3,17E-01 | 1,62E+02 | 9,56E-02 | 7,73E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,59E-01 | 9,99E-01 | 1,60E-03 | -8,34E+00 |
| HTP-c | CTUh | 9,02E-09 | 2,10E-11 | -5,83E-10 | 8,46E-09 | 3,10E-12 | 4,23E-10 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 5,17E-12 | 2,40E-11 | 3,71E-14 | -3,19E-11 |
| HTP-nc | CTUh | 1,61E-07 | 6,90E-10 | 1,62E-10 | 1,62E-07 | 1,05E-10 | 1,06E-08 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,74E-10 | 1,13E-09 | 1,14E-12 | 4,82E-08 |
| SQP | - | 7,18E+00 | 6,08E-01 | 1,67E+00 | 9,45E+00 | 9,29E-02 | 4,89E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,55E-01 | 4,51E-01 | 5,19E-03 | -3,84E-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 | 1,90E-03 | 1,79E-06 | -7,74E-06 | 1,89E-03 | 2,72E-07 | 9,31E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 4,53E-07 | 6,80E-07 | 3,70E-09 | -2,98E-05 |
| NHWD | kg | 3,71E-01 | 4,43E-02 | 3,37E-02 | 4,49E-01 | 6,80E-03 | 2,33E-02 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,13E-02 | 6,59E-03 | 1,68E-02 | -2,44E-02 |
| RWD | kg | 6,81E-05 | 4,71E-06 | 2,89E-05 | 1,02E-04 | 7,04E-07 | 5,32E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,17E-06 | 1,33E-06 | 1,62E-08 | 1,47E-06 |
| CRU | kg | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | kg | 0,00E+00 | 0,00E+00 | 2,64E-04 | 2,64E-04 | 0,00E+00 | 1,32E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 3,19E-01 | 0,00E+00 | 0,00E+00 |
| MER | kg | 0,00E+00 | 0,00E+00 | 1,60E-05 | 1,60E-05 | 0,00E+00 | 8,01E-07 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 1,06E-03 | 0,00E+00 |
| EEE | MJ | 0,00E+00 | 0,00E+00 | 9,23E-04 | 9,23E-04 | 0,00E+00 | 4,61E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 7,95E-03 |
| ETE | MJ | 0,00E+00 | 0,00E+00 | 5,37E-04 | 5,37E-04 | 0,00E+00 | 2,68E-05 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 4,62E-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 | 1,98E+00 | 8,86E-03 | 6,87E-01 | 2,67E+00 | 1,34E-03 | 1,38E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,24E-03 | 3,54E-02 | 2,00E-05 | 5,04E-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 | 1,98E+00 | 8,86E-03 | 6,87E-01 | 2,67E+00 | 1,34E-03 | 1,38E-01 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,24E-03 | 3,54E-02 | 2,00E-05 | 5,04E-02 |
| PENRE | MJ | 1,88E+01 | 7,60E-01 | 6,61E+00 | 2,62E+01 | 1,14E-01 | 1,25E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,90E-01 | 2,40E-01 | 2,63E-03 | -1,81E+00 |
| PENRM | MJ | 2,57E-02 | 0,00E+00 | 0,00E+00 | 2,57E-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 | 1,88E+01 | 7,60E-01 | 6,61E+00 | 2,62E+01 | 1,14E-01 | 1,25E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 1,90E-01 | 2,40E-01 | 2,63E-03 | -1,81E+00 |
| SM | kg | 1,44E-01 | 0,00E+00 | 7,72E-05 | 1,45E-01 | 0,00E+00 | 3,86E-06 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| RSF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| NSRF | MJ | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | m3 | 2,71E-02 | 8,60E-05 | 1,14E-02 | 3,86E-02 | 1,31E-05 | 1,89E-03 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 2,18E-05 | 1,10E-04 | 2,64E-06 | -9,01E-04 |

PERE = Use of renewable primary energy excluding renewable primary energy used as raw materials
PERM = Use of renewable primary energy resources used as raw materials
PERT = Total use of renewable primary energy resources
PENRE = Use of non-renewable primary energy resources excluding non-renewable energy resources used as raw materials
PENRM = Use of non-renewable primary energy resources used as raw materials
PENRT = Total use of non-renewable primary energy resources
SM = Use of secondary materials
RSF = Use of renewable secondary fuels
NSRF = Use of non-renewable secondary fuels
FW = Use of net fresh water

## BIOGENIC CARBON CONTENT per functional unit or declared unit (A1 and A2)

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | kg C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| BCCpa | kg C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |

BCCpr = Biogenic carbon content in product
BCCpa = Biogenic carbon content in packaging

## CALCULATION RULES

Data Quality

Data flows for the Walraven Bifix® G2 Clamp BUP M8/10 176-180mm have been modelled to reflect actual conditions as closely as possible. Primary data from Walraven's Czech Republic production site was prioritized. Where supplier-specific data was unavailable or incomplete, representative background data from verified sources such as the Nationale Milieudatabase v3.8 and Ecoinvent 3.6 was used.

For Module A1, detailed product composition was obtained directly from Walraven's internal specifications. Module A2 incorporates the actual transport distances from material suppliers to the production site. Module A3 reflects measured data from 2023/2024 on energy consumption, waste generation, and material usage. Background data was selected for relevance and geographic proximity, ensuring compliance with EN15804+A2:2019 requirements.

Data Collection Period

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

Methodology and Reproducibility

The LCA was conducted in accordance with EN15804+A2:2019, ISO 14040, ISO 14044, ISO 14025, and the NMD Bepalingsmethode v1.2 (2025). Modelling and calculations were performed using Ecochain Helix version 4.3.1. The study covers the following life cycle stages: A1–A3 for raw material extraction, transport, and manufacturing; A4–A5 for transport to site and installation; C1–C4 for end-of-life treatment including deconstruction, transport, processing, and disposal; and D for reuse, recovery, and recycling potential.

Inventory and Allocation

All material and energy inputs, emissions, and outputs are included in line with the modular EN15804 structure. Mass-based allocation was applied to distribute shared site-level inputs, such as electricity and packaging, across products. No secondary materials were used in production. Cut-off criteria were respected, ensuring that excluded flows do not exceed 5% of mass or energy per module.

Data Sources

Primary data was collected from Walraven's Czech production facility, including product composition, energy use, transport distances, and waste treatment. Where supplier-specific data was missing, representative datasets from Ecoinvent 3.6 and Nationale Milieudatabase v3.8 were applied. Emissions, grid energy mix, and end-of-life scenarios were included using validated background data, with infrastructure and capital goods considered where relevant.

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

Modules A1 to A3 represent the upstream and core production processes. Module A1 includes the sourcing and preparation of raw materials such as various steel components, zinc coating, and small plastic parts (PA and POM). The steel parts (upper and lower clamp sections, screws, nuts) and zinc surface treatment are modeled using production data from 2023/2024 and are based on background data from NMD v3.8 and Ecoinvent v3.6. Steel inputs were modeled assuming 57% primary and 43% secondary content, in line with typical European supply chain mixes. Zinc inputs were modeled using updated galvanized coating references. Plastic components (nut holders and washers) were included in trace amounts.

Module A2 models the transport of raw materials to the Walraven Czech Republic facility. Transport data includes road freight (truck), and overseas shipment (ship) for selected materials like screws and nuts. All routes and distances are documented in the background LCA. A standard load efficiency of 50% is assumed (full inbound, empty return), per EN 15804+A2 and Bepalingsmethode v1.2 guidance.

Module A3 addresses the manufacturing processes at Walraven's Czech facility using 2023/2024 primary site data. The model includes electricity consumption (low-voltage Czech grid mix), fuels for zinc treatment, lubricating oil as an auxiliary input, and packaging materials. Production waste such as steel scrap is internally recycled, and emissions from manufacturing and welding are captured. Capital goods are excluded under the <5% cutoff rule in EN 15804+A2.

Module A4 models transport of the finished product to the construction site, assuming a 150 km distribution distance based on Bepalingsmethode v1.2 default values. A 50% load factor is used, and emissions are modeled using generic lorry data from Ecoinvent v3.6 / NMD v3.8.

Module A5 covers product installation. A 5% material loss is assumed due to manual handling. No energy is used during installation. The resulting waste (steel, zinc, plastic) is transported for treatment: steel and zinc to landfill (100 km), plastics to incineration (100 km). These assumptions align with the standardized Dutch end-of-life model.

End-of-Life Scenario Fixed Values used:

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

Module C1 assumes that the Walraven Bifix® G2 Clamp BUP M8/10 176-180mm is manually deconstructed without the use of energy. Module C2 models the transportation of waste materials to processing sites, with steel and zinc transported 50 km for recycling or disposal, and plastic components transported 100 km to incineration facilities (AVI), using emission factors from NMD v3.8.

Module C3 addresses waste treatment, with steel and zinc fully recycled and plastic components entirely incinerated with energy recovery. Emission references for these processes include Plastics: 0264-avC&Verbranden kunststoffen and Steel: 0315-reC&Sorteren en persen oud ijzer. Module C4 accounts for final disposal, with 5% of steel and zinc sent to landfill, while plastic is fully incinerated, using disposal references Steel: 0253-sto&Stort staal and Zinc: 0248-sto&Stort koper, lood, verzinkt staal, zink.

Module D captures the environmental benefits beyond the system boundary. Recycled steel receives a credit of 52% (95% recycling efficiency minus 43% secondary content), zinc is credited at 95% recycling efficiency, and energy recovered from plastic incineration contributes 100% energy substitution. These credits reduce the net environmental impact of the product.

This end-of-life modeling is fully compliant with EN 15804+A2:2019 + AC:2021 and the Dutch Bepalingsmethode v1.2 (2025), following a modular LCA approach with consistent system boundaries and cutoff criteria.

## DECLARATION OF SVHC

No substances that are listed in the latest “Candidate List of Substances of Very High Concern for authorisation” are included in the product that exceeds the limit for registration

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