walraven

**Environmental Product Declaration**

According to ISO14025+EN15804 A2 (+indicators A1)

This declaration is for:

**Walraven Bifix® 1301 Clamp Stainless EPDM M10 108-116mm**

Provided by:

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




MRPI® registration:

**1.1.00927.2025**

Program operator:

**Stichting MRPI®**

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**15-5-2030**

ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00927.2025

## 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® 1301 Clamp Stainless EPDM M10 108-116mm

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

## DESCRIPTION OF PRODUCT

The Walraven Bifix® 1301 Clamp Stainless EPDM M10 108-116 mm is a durable two-screw pipe clamp made from stainless steel 1.4404 (AISI 316L) for high corrosion resistance. It features a quick locking system and a black EPDM lining for noise and vibration reduction according to DIN 4109

## 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 Bifix® 1301 Clamp Stainless EPDM M10 108-116mm is a high-quality, corrosion-resistant two-screw pipe clamp designed for the secure fastening of pipes in demanding environments. It is constructed from stainless steel 1.4404 (AISI 316L), making it suitable for applications requiring exceptional corrosion resistance and long-term durability. The clamp features a black EPDM noise-insulating, age-resistant lining that provides vibration damping and noise reduction, meeting DIN 4109 acoustic standards. An integrated quick locking system enables efficient installation, making the clamp appropriate for both new installations and maintenance tasks.

Manufacturing Location
The clamp is manufactured in the Czech Republic using precision engineering processes under strict quality controls to ensure dimensional accuracy, performance, and reliability.

Manufacturing Process Overview
The production begins with material preparation, where stainless steel 1.4404 is cut and formed to achieve high strength and corrosion resistance. Stamping and forming operations shape the clamp halves with precision tooling to maintain dimensional accuracy. Threading and assembly involve pre-installing integrated nuts and bolts for ease of use. The black EPDM rubber lining is then applied to provide noise insulation and vibration damping in accordance with DIN 4109 standards. Finally, the two-screw design is fully assembled with the quick locking mechanism, resulting in a ready-to-install product.

Environmental and Performance Features
The clamp's stainless steel construction ensures exceptional corrosion resistance in aggressive environments, including marine and chemical exposure. The EPDM lining reduces structure-borne noise and absorbs vibrations, while its age-resistant properties maintain long-term performance. The lining also performs reliably across a wide range of operating temperatures.

Installation and Use Phase
The clamp allows for quick and secure installation thanks to the two-screw design and integrated quick locking system. It is compatible with a wide range of pipe materials, particularly in corrosion-sensitive or hygienic environments. The stainless steel construction minimizes the need for maintenance or replacement, contributing to long-term durability and operational efficiency.

End-of-Life Considerations
At the end of its service life, the clamp is easy to disassemble due to its bolted design, allowing separation of stainless steel and EPDM components. Both materials are recyclable, supporting sustainable end-of-life management and reducing environmental impact.

Packaging and Transport
The clamp is delivered in recyclable packaging materials, and transport logistics are optimized to minimize the environmental footprint through consolidated shipments and efficient routing.

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

| Total Weight | 224 g |
|---|---|

| Component (> 1%) | ( %) |
|---|---|
| Steel (combined) | 94,53% |
| Rubber - EPDM | 2,64% |

## 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.

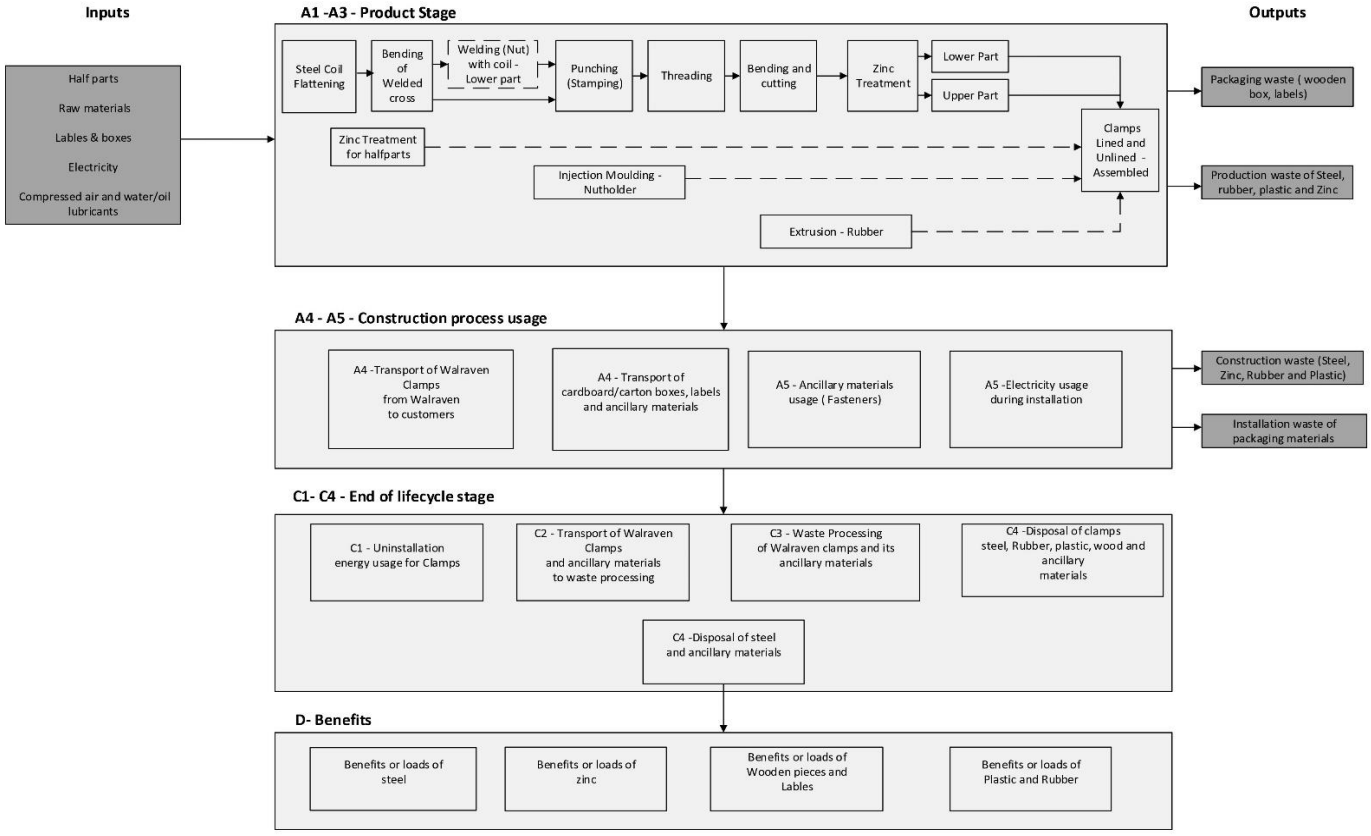
This comprehensive approach ensures a scientifically sound and holistic understanding of the Walraven Clamp’s environmental footprint throughout its full life cycle.

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| 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




ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

## REPRESENTATIVENESS

The aggregation was done by choosing the reference product as Walraven Bifix® 1301 Clamp Stainless EPDM M10 108-116mm. The remaining products which are aggregated in the same group by following the 20% allocation and worst-case scenario approach as per EN 15804+A2 and NMD Bepalingsmethode v1.2 (2025) are listed below:

Walraven Aero® Clamp pre-galvanized M8 TPE 250mm
Walraven Aero® Clamp pre-galvanized M8 TPE 225mm
Walraven HD1501 Clamp BUP EPDM 1/2" 53-59mm
Walraven Aero® Clamp pre-galvanized M8 TPE 200mm
Walraven Aero® Clamp pre-galvanized M8 TPE 400mm
Walraven Aero® Clamp pre-galvanized M8 TPE 355mm
Walraven Aero® Clamp pre-galvanized M8 TPE 180mm
Walraven HD1501 Clamp BUP EPDM 1/2" 30-35mm
Walraven Aero® Clamp pre-galvanized M8 TPE 140mm
Walraven Aero® Clamp pre-galvanized M8 TPE 125mm
Walraven Aero® Clamp pre-galvanized M8 TPE 100mm
Walraven Aero® Clamp pre-galvanized M8 TPE 160mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 200mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M8/10 133-141mm
Walraven HD1501 white EPDM M8/10 19-23mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 133-140mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 133-141mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 133-141mm
Walraven HD1501 Clamp BUP EPDM M8/10 19-23mm
Walraven HD1501 Clamp BUP EPDM 1/2" 108-116mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 125-130mm
Walraven HD1501 white EPDM M8/10 30-35mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 124-132mm
Walraven HD1501 Clamp BUP EPDM M8/10 59-64mm
Walraven HD1501 Clamp BUP EPDM M8/10 53-59mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 122-125mm
Walraven HD1501 white EPDM 1/2" 15-19mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 133-140mm
Walraven HD1501 white EPDM 1/2" 108-116mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 100-106mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 108-115mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 116-119mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 100-105mm
Walraven HD1501 white EPDM 1/2" 25-29mm
Walraven HD1501 Clamp BUP EPDM 1/2" 15-19mm
Walraven HD1501 Clamp BUP EPDM M8/10 30-35mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 108-116mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 124-131mm
Walraven 2S Clamp set zinc plated EPDM M8/10 138-144mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 160mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 100-106mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M8/10 108-114mm
Walraven Heavy Duty Clamp Stainless EPDM M12 DN80 3" 86-92mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 114-119mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 108-114mm
Walraven HD1501 Clamp BUP EPDM 1/2" 25-29mm
Walraven Heavy Duty Clamp Stainless EPDM M12 79-85mm
Walraven 2S Clamp set zinc plated EPDM M8/10 128-137mm
Walraven KSB2 Clamp zinc plated EPDM M8/10/1/2" 88-91mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 100-105mm
Walraven HD1501 white EPDM 1/2" 46-51mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 106-112mm
Walraven Heavy Duty Clamp Stainless EPDM M12 DN65 2 1/2" 72-78mm
Walraven 2S Clamp zinc plated EPDM M8/10 154-162mm
Walraven 2S Clamp set zinc plated EPDM M8/10 119-127mm
Walraven BISMAT® SL Socket Clamp M10 KA zinc plated 50mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 108-116mm
Walraven HD1501 Clamp BUP EPDM 1/2" 46-51mm
Walraven 2S Clamp zinc plated EPDM M8/10 145-153mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 125mm

Walraven Two-Screw Clamp Stainless EPDM M8/10 100-106mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 152-160mm
Walraven HD1501 white EPDM M8/10 15-19mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 150mm
Walraven 2S Clamp set zinc plated EPDM M8/10 113-118mm
Walraven HD1501 Clamp BUP EPDM M8/10 15-19mm
Walraven HD1501 white EPDM M8/10 46-51mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M8/10 83-91mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 87-92mm
Walraven 2S Clamp zinc plated EPDM M8/10 138-144mm
Walraven 2S Clamp set zinc plated EPDM M8/10 104-112mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 83-91mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 133-140mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 75-80mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 100mm
Walraven 2S Clamp zinc plated EPDM M8/10 128-137mm
Walraven HD1501 white EPDM M8/10 53-59mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 86-91mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 125-130mm
Walraven 2S Clamp zinc plated EPDM M8/10 119-127mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 67-73mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 86-91mm
Walraven 2S Clamp zinc plated EPDM M8/10 113-118mm
Walraven HD1501 Clamp BUP EPDM M8/10 46-51mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 60-64mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 79-85mm
Walraven 2S Clamp set zinc plated EPDM M8/10 88-95mm
Walraven HD1501 white EPDM 1/2" 40-45mm
Walraven HD1501 Clamp BUP EPDM 1/2" 40-45mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 70-76mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 51-55mm
Walraven 2S Clamp zinc plated EPDM M8/10 104-112mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 108-115mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 100-105mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 47-50mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 70-76mm
Walraven 2S Clamp zinc plated EPDM M8/10 96-103mm
Walraven BISMAT® 2000 Clamp zinc plated Silicon M8/10 73-80mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 38-42mm
Walraven Spiral Duct Clamp Stainless steel EPDM M8 80mm
Walraven 2S Clamp zinc plated EPDM M8/10 88-95mm
Walraven Bifix® 1301 Clamp Stainless EPDM M8 64-67mm
Walraven KSB2 Clamp zinc plated EPDM M8/10 88-91mm
Walraven Industrial Single Clamp pre-galvanized EPDM black 76mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 73-80mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 32-36mm
Walraven Bifix® 1301 Clamp Stainless EPDM M10 64-67mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 26-30mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 64-70mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 20-24mm
Walraven Two-Screw Clamp Stainless EPDM M8/10 15-18mm
Walraven BISMAT® 2000 Clamp zinc plated EPDM M8/10 57-64mm
Walraven Industrial Single Clamp pre-galvanized EPDM black 60mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 122-125mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 IP 4" 108-114mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 CT 4" 100-105mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 152-160mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 205-210mm
Walraven BISMAT® 2000 Clamp 3/8 1/2 IP 3" 83-91mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 192-200mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 133-140mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 176-180mm
Walraven KSB2 Clamp zinc plated EPDM UNC 3/8"-1/2" 125-130mm
Walraven W 5000 ZnMg MM 56-58

Walraven W 5000 ZnMg IP 2", MM 60-63
Walraven W 5000 ZnMg MM 50-52
Walraven W 5000 ZnMg CT 2", MM 53-54
Walraven W 5000 ZnMg CT 1-1/2", IP 1-1/4", MM 40-43
Walraven W 5000 ZnMg IP 1-1/2", MM 47-49
Walraven W 5000 ZnMg CT 1-1/4", IP 1", MM 32-35
Walraven W 5000 ZnMg CT 1", IP 3/4", MM 26-29
Walraven W 5000 ZnMg, MM 24-25
Walraven W 5000 ZnMg IP 3/8", MM 17-18
Walraven W 5000 ZnMg CT 1/2", MM 15-16
Walraven W 5000 ZnMg IP 1/4", MM 14-15
Walraven W 5000 ZnMg CT 3/8", 12-13 MM
Walraven W 2000 ZnMg CTS 1/4" (9–10 mm)
Walraven W 2000 ZnMg CT 3/8" ACR 1/2" (11–13 mm)
Walraven W 2000 ZnMg CT 1/2" ACR 5/8" IPS 1/4" (14–16 mm)
Walraven W 2000 ZnMg CT 5/8" ACR 3/4" IPS 3/8" (17–19 mm)
Walraven W 2000 ZnMg CT 3/4" ACR 7/8" IPS 1/2" (20–22 mm)
Walraven W 2000 ZnMg CT 1" ACR 1-1/8" IPS 3/4" (25–29 mm)
Walraven W 2000 ZnMg CT 1-1/4" ACR 1-3/8" IPS 1" (32–35 mm)
Walraven W 2000 ZnMg – 1-1/2" ACR (37–40 mm)
Walraven W 2000 ZnMg CT 1-1/2" ACR 1-5/8" IP 1-1/4" (40–43 mm)
Walraven W 2000 ZnMg IP 1-1/2" (48–50 mm)
Walraven W 2000 ZnMg CTS 2" ACR 2-1/8" (54–56 mm)
Walraven W 2000 ZnMg IPS 2" (60–63 mm)
Walraven Clmp5000 Zn/Mg epdm grn, 19-22mm
Walraven Clamp HD1501 BUP Sil M10/12
Walraven Clamp HD1501 BUP Sil M10/12
Walraven Clamp HD1501 BUP Sil M10/12
Walraven Clamp HD1501 BUP Sil M10/12
Walraven W1000 Strut Clamp Zn/Mg
Walraven Clamp HD1501 BUP Sil M10/12
Walraven Clamp HD1501 BUP Sil M10/12
Walraven KSB2 Clamp 108-115 I 4" IPS UNC 3/8"-16 / UNC 1/2"-13
Walraven W5000 Strut Clamp 20-22
Walraven KSB2 Clamp 100-105 I 3-1/2" IPS
Walraven BISMAT® 2000 clamp UNC 3/8"/1/2" CT 3” - IP 2.1/2" | 73-80 mm
Walraven BISMAT® 2000 clamp UNC 3/8"/1/2" CT 2.1/2" | 64-70 mm
Walraven KSB2 Clamp 88-91 I 3" IPS / 3-1/2" CTS UNC 3/8"-16 / UNC 1/2"-13

## 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. | 7,25E-03 | 7,26E-07 | 4,33E-06 | 7,25E-03 | 1,15E-07 | 3,62E-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 | 2,68E-07 | 5,37E-07 | 4,87E-10 | -4,06E-06 |
| ADPF | MJ | 1,12E+01 | 4,35E-01 | 5,67E+00 | 1,73E+01 | 6,87E-02 | 7,82E-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 | 1,60E-01 | 1,33E-01 | 1,48E-03 | -2,07E+00 |
| GWP | kg CO2 eq. | 7,50E-01 | 2,84E-02 | 4,21E-01 | 1,20E+00 | 4,50E-03 | 5,47E-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 | 1,05E-02 | 2,73E-02 | 5,22E-05 | -1,49E-01 |
| ODP | kg CFC11 eq. | 5,52E-08 | 5,04E-09 | 2,37E-08 | 8,40E-08 | 7,98E-10 | 4,05E-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 | 1,86E-09 | 1,23E-09 | 1,74E-11 | -6,94E-09 |
| POCP | kg ethene eq. | 6,94E-04 | 1,72E-05 | -1,21E-04 | 5,90E-04 | 2,71E-06 | 1,46E-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 | 6,33E-06 | 8,48E-06 | 5,56E-08 | -3,15E-04 |
| AP | kg SO2 eq. | 4,28E-03 | 1,25E-04 | 1,42E-03 | 5,82E-03 | 1,98E-05 | 2,74E-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 | 4,61E-05 | 9,54E-05 | 3,82E-07 | -5,17E-04 |
| EP | kg (PO4) 3 eq. | 6,14E-04 | 2,46E-05 | 3,03E-04 | 9,41E-04 | 3,88E-06 | 4,53E-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 | 9,06E-06 | 1,25E-05 | 7,36E-08 | -6,13E-05 |

Toxicity indicators and ECI (Dutch market)

| | | | | | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| HTP | kg DCB eq. | 1,45E+00 | 1,20E-02 | -1,65E-02 | 1,45E+00 | 1,89E-03 | 6,87E-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 | 4,42E-03 | 1,16E-02 | 2,36E-05 | -9,14E-02 |
| FAETP | kg DCB eq. | 2,39E-02 | 3,49E-04 | 2,02E-03 | 2,63E-02 | 5,53E-05 | 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 | 1,29E-04 | 2,18E-04 | 5,60E-07 | 9,90E-04 |
| MAETP | kg DCB eq. | 4,53E+01 | 1,26E+00 | 1,03E+01 | 5,68E+01 | 1,99E-01 | 2,95E+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 | 4,64E-01 | 9,42E-01 | 2,00E-03 | 5,89E-01 |
| TETP | kg DCB eq. | 8,76E-03 | 4,23E-05 | 2,03E-03 | 1,08E-02 | 6,69E-06 | 9,09E-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 | 1,56E-05 | 3,70E-05 | 5,93E-08 | 7,28E-03 |
| ECI | euro | 2,00E-01 | 3,43E-03 | 2,94E-02 | 2,33E-01 | 5,42E-04 | 1,10E-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 | 1,26E-03 | 3,04E-03 | 7,37E-06 | -1,85E-02 |
| ADPF | kg Sb eq. | 5,41E-03 | 2,09E-04 | 2,73E-03 | 8,34E-03 | 3,31E-05 | 3,76E-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 | 7,72E-05 | 6,39E-05 | 7,11E-07 | -9,97E-04 |

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. | 7,73E-01 | 2,87E-02 | 4,18E-01 | 1,22E+00 | 4,54E-03 | 5,52E-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 | 1,06E-02 | 2,32E-02 | 5,32E-05 | -1,59E-01 |
| GWP-fossil | kg CO2 eq. | 7,68E-01 | 2,87E-02 | 4,17E-01 | 1,21E+00 | 4,53E-03 | 5,49E-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 | 1,06E-02 | 2,74E-02 | 5,32E-05 | -1,59E-01 |
| GWP-biogenic | kg CO2 eq. | 3,30E-03 | 1,07E-05 | 6,73E-04 | 3,98E-03 | 1,69E-06 | 2,10E-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 | 3,95E-06 | -4,19E-03 | 3,11E-08 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 1,50E-03 | 1,05E-05 | 4,35E-04 | 1,94E-03 | 1,66E-06 | 1,03E-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 | 3,88E-06 | 1,09E-05 | 1,48E-08 | 1,03E-04 |
| ODP | kg CFC11 eq. | 5,66E-08 | 6,33E-09 | 1,85E-08 | 8,15E-08 | 1,00E-09 | 4,01E-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 | 2,34E-09 | 1,42E-09 | 2,19E-11 | -6,13E-09 |
| AP | mol H+ eq. | 5,28E-03 | 1,66E-04 | 1,70E-03 | 7,14E-03 | 2,63E-05 | 3,36E-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 | 6,14E-05 | 1,19E-04 | 5,05E-07 | -6,30E-04 |
| EP-fresh water | kg PO4 eq. | 6,01E-05 | 2,89E-07 | 7,01E-05 | 1,30E-04 | 4,57E-08 | 6,28E-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 | 1,07E-07 | 6,60E-07 | 5,96E-10 | -5,65E-06 |
| EP-marine | kg N eq. | 1,11E-03 | 5,86E-05 | 2,39E-04 | 1,41E-03 | 9,27E-06 | 6,77E-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 | 2,16E-05 | 2,67E-05 | 1,74E-07 | -1,15E-04 |
| EP-terrestrial | mol N eq. | 1,23E-02 | 6,46E-04 | 2,91E-03 | 1,59E-02 | 1,02E-04 | 7,59E-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 | 2,38E-04 | 3,10E-04 | 1,91E-06 | -1,34E-03 |
| POCP | kg NMVOC eq. | 3,99E-03 | 1,84E-04 | 3,78E-04 | 4,55E-03 | 2,92E-05 | 1,92E-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 | 6,81E-05 | 8,42E-05 | 5,56E-07 | -8,93E-04 |
| ADP-minerals & metals | kg Sb eq. | 7,25E-03 | 7,26E-07 | 4,33E-06 | 7,25E-03 | 1,15E-07 | 3,62E-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 | 2,68E-07 | 5,37E-07 | 4,87E-10 | -4,06E-06 |
| ADP-fossil | MJ, net calorific value | 1,02E+01 | 4,32E-01 | 6,13E+00 | 1,67E+01 | 6,84E-02 | 7,88E-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 | 1,60E-01 | 1,36E-01 | 1,49E-03 | -1,34E+00 |
| WDP | m3 world eq. Deprived | 4,88E-01 | 1,55E-03 | 9,11E-02 | 5,81E-01 | 2,45E-04 | 2,74E-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 | 5,71E-04 | 1,55E-03 | 6,67E-05 | -3,51E-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 | 5,17E-08 | 2,57E-09 | -6,73E-09 | 4,75E-08 | 4,07E-10 | 2,05E-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 | 9,50E-10 | 1,48E-09 | 9,80E-12 | -9,27E-09 |
| IRP | kBq U235 eq. | 4,76E-02 | 1,81E-03 | 3,45E-02 | 8,39E-02 | 2,87E-04 | 4,35E-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 | 6,69E-04 | 6,71E-04 | 6,10E-06 | 1,53E-03 |
| ETP-fw | CTUe | 8,32E+01 | 3,86E-01 | 3,17E-01 | 8,39E+01 | 6,10E-02 | 3,98E+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 | 1,42E-01 | 6,03E-01 | 9,65E-04 | -5,21E+00 |
| HTP-c | CTUh | 5,09E-09 | 1,25E-11 | -5,83E-10 | 4,52E-09 | 1,98E-12 | 2,26E-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 | 4,62E-12 | 1,42E-11 | 2,23E-14 | -2,43E-11 |
| HTP-nc | CTUh | 8,71E-08 | 4,22E-10 | 1,62E-10 | 8,76E-08 | 6,67E-11 | 5,87E-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 | 1,56E-10 | 6,77E-10 | 6,86E-13 | 2,89E-08 |
| SQP | - | 3,95E+00 | 3,75E-01 | 1,67E+00 | 5,99E+00 | 5,93E-02 | 3,09E-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 | 1,38E-01 | 2,69E-01 | 3,12E-03 | -2,90E-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 | 9,44E-04 | 1,10E-06 | -7,74E-06 | 9,38E-04 | 1,73E-07 | 4,60E-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 | 4,04E-07 | 4,17E-07 | 2,22E-09 | -1,81E-05 |
| NHWD | kg | 2,15E-01 | 2,74E-02 | 3,37E-02 | 2,76E-01 | 4,34E-03 | 1,45E-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 | 1,01E-02 | 4,32E-03 | 1,01E-02 | -1,54E-02 |
| RWD | kg | 3,83E-05 | 2,84E-06 | 2,89E-05 | 7,01E-05 | 4,49E-07 | 3,60E-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 | 1,05E-06 | 7,98E-07 | 9,76E-09 | -4,33E-07 |
| 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 | 1,92E-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 | 5,64E-03 | 0,00E+00 |
| EEE | 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 | 4,76E-02 |
| ETE | 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 | 2,76E-02 |

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 | 1,09E+00 | 5,41E-03 | 6,87E-01 | 1,78E+00 | 8,56E-04 | 9,10E-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 | 2,00E-03 | 2,10E-02 | 1,20E-05 | 1,70E-02 |
| 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 | 1,09E+00 | 5,41E-03 | 6,87E-01 | 1,78E+00 | 8,56E-04 | 9,10E-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 | 2,00E-03 | 2,10E-02 | 1,20E-05 | 1,70E-02 |
| PENRE | MJ | 1,08E+01 | 4,59E-01 | 6,61E+00 | 1,79E+01 | 7,26E-02 | 8,44E-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 | 1,69E-01 | 1,44E-01 | 1,58E-03 | -1,39E+00 |
| PENRM | MJ | 1,53E-01 | 0,00E+00 | 0,00E+00 | 1,53E-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 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 1,07E+01 | 4,59E-01 | 6,61E+00 | 1,77E+01 | 7,26E-02 | 8,44E-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 | 1,69E-01 | 1,44E-01 | 1,58E-03 | -1,39E+00 |
| SM | kg | 8,69E-02 | 0,00E+00 | 7,72E-05 | 8,69E-02 | 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 | 1,47E-02 | 5,27E-05 | 1,14E-02 | 2,61E-02 | 8,33E-06 | 1,28E-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 | 1,94E-05 | 8,62E-05 | 1,59E-06 | -7,21E-04 |

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

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

| | Unit | A1 | A2 | A3 | A1-A3 | A4 | A5 | B1 | B2 | B3 | B4 | B5 | B6 | B7 | C1 | C2 | C3 | C4 | D |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BBCpr | kg C | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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:
Data flows have been modelled as realistically as possible. Data quality assessment is based on the principle that the primary data used for processes occurring at the production site is selected in the first instance. Where this is not available, other reference data is selected from appropriate sources and databases.

For Module A1, specific data for product composition was provided by the manufacturer. For Module A2, transportation data of raw materials to the production site was collected. For Module A3, energy consumption and waste data were recorded for the production year 2023/2024. Background data is sourced from the Dutch Nationale Milieudatabase v3.8 and is based on Ecoinvent 3.6.

Data Collection Period:
The dataset is representative for the production processes used in 2023/2024.

Methodology and Reproducibility:
The LCA is developed in accordance with EN15804+A2:2019, NEN-EN ISO 14040, 14044, and 14025, and follows the requirements of the NMD Bepalingsmethode v1.2 (2025). Calculations were performed using Ecochain Helix software version 4.3.1.

The life cycle stages included in this draft EPD are:

A1–A3: Raw material supply, transport, manufacturing

A4–A5: Transport to site and installation

B1–B7: Use stage (if applicable)

C1–C4: End-of-life processing

D: Benefits and loads beyond the system boundary (e.g., recycling credits).

Inventory and Allocation:
This section outlines the quantity, quality, and allocation of materials, energy flows, and emissions across relevant life cycle stages. System boundaries are defined using the modular approach as described in EN15804+A2 and the NMD Bepalingsmethode v1.2 (2025).

All manufacturing inputs were assigned to production processes and distributed to products using mass-based allocation. No secondary materials were used in the production phase. End-of-life assumptions follow standard treatment and recovery scenarios in the Dutch context. Cut-off criteria were applied to ensure that no more than 5% of mass or energy flows were excluded.

Data Sources:
Primary data was collected from Walraven's Czech Republic production site, including material composition, energy usage, transport distances, and waste outputs. Where supplier-specific data was unavailable, standard reference data for stainless steel, rubber, and coating materials were selected from Ecoinvent 3.6 and the Nationale Milieudatabase v3.8.

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

Modules A1 to A3: Raw Material Supply and Production
Modules A1 to A3 cover the initial life cycle stages of the Walraven Bifix® 1301 Clamp Stainless EPDM M10 40-43mm. Module A1 models the extraction and processing of raw and auxiliary materials, including packaging and lubricants. Material modeling is based on the 2023/2024 bill of materials. The primary components are stainless steel, EPDM rubber lining, and a PA6 plastic insert, modeled using generic datasets from Nationale Milieudatabase (NMD) v3.8 and Ecoinvent v3.6. Stainless steel is modeled according to standard market composition of primary and secondary content, following Dutch average market assumptions.

Module A2 addresses the transportation of raw materials from suppliers to the Walraven Czech Republic manufacturing site. Transport distances were determined based on supplier logistics and modeled in compliance with EN 15804+A2:2019 using Ecoinvent 3.6 and NMD 3.8 references. A 50% load factor was assumed for all truck transport, with fully loaded trips to the site and empty return, and international shipping included where applicable.

Module A3 represents the production stage, which includes electricity consumption from both the grid and renewable sources, use of fuel and lubricating oil, packaging materials, and generation of production waste such as steel scrap and EPDM offcuts. Production processes and emissions were modeled based on primary operational data from 2023/2024. Internal recycling of stainless steel waste was accounted for proportionally based on the facility's production share, and transport of waste to recycling or treatment facilities was included. Capital goods were excluded following the EN 15804+A2 cutoff rule, as their contribution is below 5% of total environmental impact.

Module A4: Product Transport to Installation Site
Module A4 models the transport of the finished clamp from the manufacturing site to the customer installation site. A standardized transport distance of 150 km was applied in accordance with Bepalingsmethode v1.2 (2025). Emissions were calculated using 0001-tra&Transport, vrachtwagen (freight, lorry, unspecified) from NMD v3.8 / Ecoinvent v3.6, assuming a 50% truck load factor.

Module A5: Installation
Module A5 covers the installation phase. A 5% material loss is assumed during manual installation, and no energy use is modeled as the installation process is non-mechanized. Installation waste transport is included, with steel sent 100 km to landfill or recycling and rubber and plastic transported 100 km to AVI incineration facilities. These assumptions follow the guidance in Bepalingsmethode v1.2 (2025), and material losses and waste flows are modeled on a per-clamp basis.

| 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)

Modules C1–C4: End-of-Life
Module C1 addresses the manual deconstruction of the Walraven Bifix® 1301 Clamp Stainless EPDM M10 40-43mm at the end of its service life. This phase is assumed to require no energy. Module C2 covers the transportation of deconstructed materials to their respective waste processing facilities. Stainless steel is transported 50 km to recycling facilities, while rubber and PA6 plastic are transported 100 km to AVI incineration plants. All transport emissions are modeled using the 0001-tra&Transport, vrachtwagen dataset from NMD v3.8 and Ecoinvent v3.6, assuming standard freight conditions.

Module C3 models the waste processing of end-of-life materials. Stainless steel is fully sorted and recycled, while rubber and PA6 plastic are incinerated with energy recovery. Emissions are calculated using 0260-avC&Verbranden rubber/EPDM (27.2 MJ/kg) for rubber, 0264-avC&Verbranden kunststoffen (28.67 MJ/kg) for plastic, and 0315-reC&Sorteren en persen oud ijzer for stainless steel, with all datasets sourced from NMD v3.8 and Ecoinvent v3.6. Module C4 covers the final disposal of residues. Five percent of stainless steel is sent to landfill, modeled with 0253-sto&Stort staal, while no landfill is assumed for rubber or plastic, which are fully incinerated.

Module D: Benefits Beyond the System Boundary
Module D quantifies the environmental benefits arising beyond the product's life cycle. Stainless steel recycling provides a 52% substitution benefit, calculated as the difference between the 95% recycling rate and the 43% secondary content in the material. Rubber and PA6 plastic incineration is modeled to provide 100% energy recovery, representing avoided fossil energy. This life cycle assessment complies fully with EN 15804+A2:2019/AC:2021 and the Dutch LCA methodology Bepalingsmethode v1.2 (2025). Material flows, energy use, waste, and end-of-life treatments are based on primary production data and internationally recognized datasets from Ecoinvent 3.6 and NMD v3.8.

## 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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