TRELLEBORG

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

According to EN15804+A2

This declaration is for:
**Tee Bollard 100T**

Provided by:
**Trelleborg Ridderkerk BV**

MRPI® registration:
**1.1.00997.2025**

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

Date of first issue:
**15-10-2025**
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**15-10-2030**

## COMPANY INFORMATION

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## MRPI® REGISTRATION

1.1.00997.2025

## DATE OF THIS ISSUE

15-10-2025

## EXPIRY DATE

15-10-2030

## SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Tim Mol, EcoReview. The LCA study has been done by Ayan Arinov, Trelleborg Ridderkerk BV. The certificate is based on an LCA-dossier according to EN15804+A2. 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.

## PRODUCT

Tee Bollard 100T

## DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

## DESCRIPTION OF PRODUCT

Tee bollards are marine dock bollards, with a mooring line capacity range from 10 tonnes to 300 tonnes, covering a vast range of mooring line capacity requirements from small recreational jetties to the largest bulk handling terminals.

## VISUAL PRODUCT

## PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

## MORE INFORMATION

https://www.trelleborg.com/en/marine-and-infrastructure/products-solutions-and-services/marine/docking-and-mooring/bollards/tee-bollards

| **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 an data according to EN15804+A2<br>Internal: External: X |
| | Third party verifier: Tim Mol, EcoReview |
| | [1] PCR = Product Category Rules |

## DETAILED PRODUCT DESCRIPTION

This EPD covers Tee Bollard, model 100T, which corresponds to a bollard weight capacity of 100 tonnes, produced by Trelleborg.

The marine bollards are a simple, cost-effective way to fulfill mooring requirements and safely secure vessels alongside Industrial Oil & Gas, Bulk mineral & liquid terminal berths, material off-load & heavy-lift facilities, commercial Ro-Ro, ferry, Container & fishing wharfs, Local authority, Recreational jetties & marinas. Even at full working load, Trelleborg bollards remain highly stable and provide a safe and secure mooring operation. It consists of two main parts: the bollard body and its fixings, all manufactured from premium-grade cast steel, providing superior service life and resistance to impact. Both Bollard's body and fixings are produced in China

The reference is 1 piece of Tee Bollard 100T,  which consists of 264kg of a bollard body and  99kg of steel fixings. Wooden boxes are used as packaging material.

| Product specification | Tee Bollard 100T |
|---|---|
| Product quantity [pc] | 1 |
| Product weight per 1 quantity without packaging material [kg] | 363 |
| Packaging weight [kg] | 61 |
| Product service life [years] | 25 |
| Area of application | Marine terminals and docking stations |
| Georgraphic region of manufacturing | China |

| Component (>0,5%) | % |
|---|---|
| Steel | 100 |

## SCOPE AND TYPE

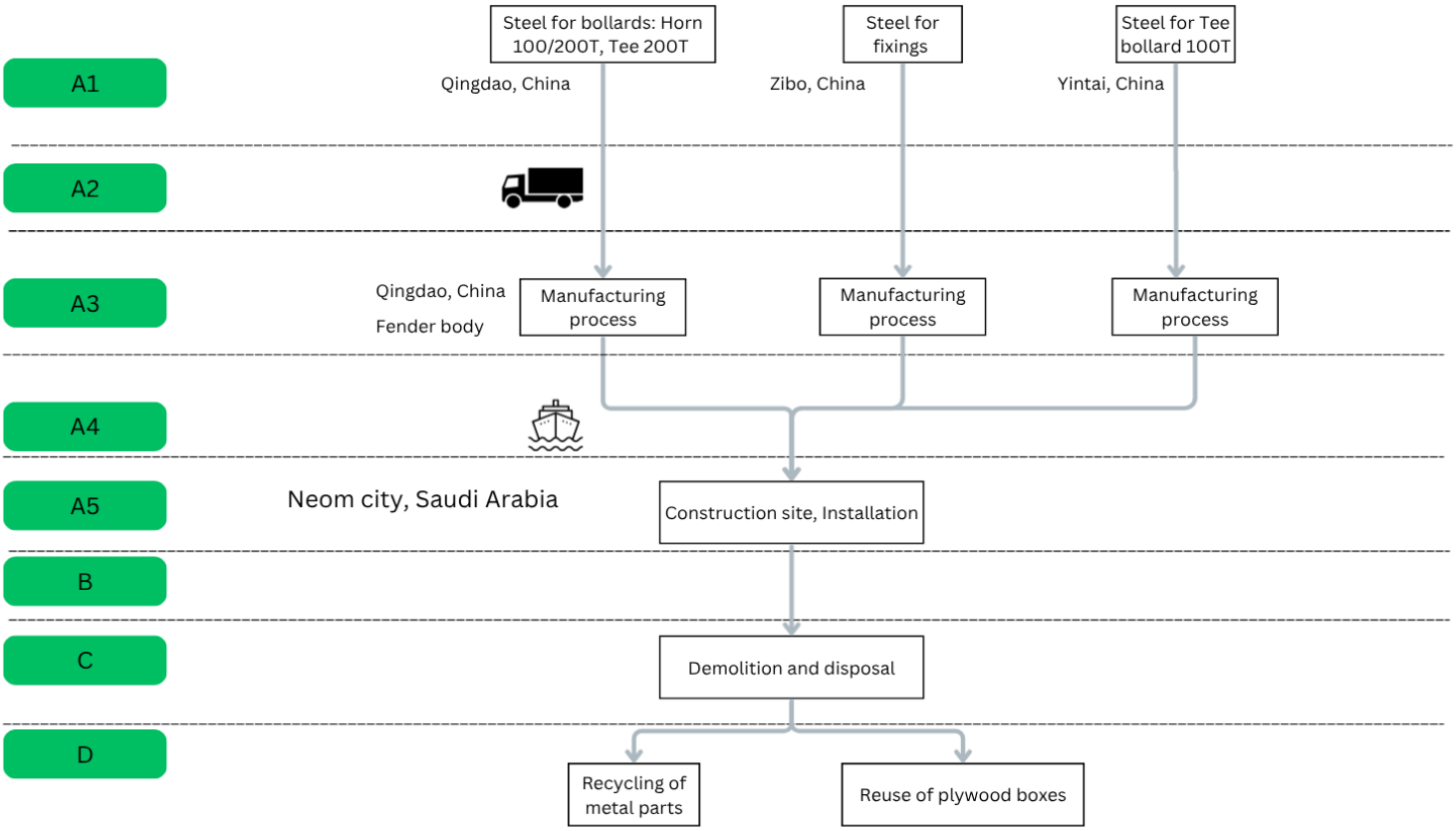
This EPD is a specific EPD made for the Tee Bollard 100T produced in a factory in China. The material input is from suppliers across China.
The product is intended for use in the Neom city, Kingdom of Saudi Arabia. At the end of its service life, the product is also assumed to reach its End-of-Life (EoL) stage in the Kingdom of Saudi Arabia.
Data collection was completed in 2025. The results are calculated with SimaPro 9.6.0.1, using the Ecoinvent 3.10 database (cut-off).

| 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 | x | X | ND | ND | ND | ND | X | X | X | X | X |

X = Modules Assessed

ND = Not Declared

# SYSTEM BOUNDARY



## 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. | 9,49E+02 | 9,56E+00 | 3,85E+02 | 1,34E+03 | 5,13E+01 | 1,26E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,01E+01 | 9,51E+01 | 0,00E+00 | 0,00E+00 | -1,47E+02 |
| GWP-fossil | kg CO2 eq. | 1,04E+03 | 9,56E+00 | 3,85E+02 | 1,43E+03 | 5,13E+01 | 3,53E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,01E+01 | 9,50E+01 | 0,00E+00 | 0,00E+00 | -1,47E+02 |
| GWP-biogenic | kg CO2 eq. | -9,07E+01 | 0,00E+00 | 0,00E+00 | -9,07E+01 | -1,59E-02 | 9,07E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,20E-03 | 1,61E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| GWP-luluc | kg CO2 eq. | 6,22E-01 | 3,83E-03 | 2,08E-01 | 8,34E-01 | 2,68E-02 | 7,35E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 7,83E-04 | 3,65E-02 | 0,00E+00 | 0,00E+00 | -8,16E-02 |
| ODP | kg CFC11 eq. | 5,36E-06 | 1,41E-07 | 1,08E-06 | 6,58E-06 | 7,37E-07 | 5,41E-07 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,62E-07 | 1,38E-06 | 0,00E+00 | 0,00E+00 | -2,54E-07 |
| AP | mol H+ eq. | 4,31E+00 | 3,26E-02 | 1,95E+00 | 6,30E+00 | 1,47E+00 | 2,25E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 8,22E-02 | 3,82E-01 | 0,00E+00 | 0,00E+00 | -4,99E-01 |
| EP-fresh water | kg PO4 eq. | 5,13E-02 | 8,73E-05 | 7,67E-03 | 5,90E-02 | 2,04E-04 | 2,00E-04 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 3,09E-05 | 8,74E-04 | 0,00E+00 | 0,00E+00 | 1,20E-02 |
| EP-marine | kg N eq. | 9,64E-01 | 1,06E-02 | 4,05E-01 | 1,38E+00 | 3,67E-01 | 8,84E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 3,36E-02 | 1,35E-01 | 0,00E+00 | 0,00E+00 | -1,17E-01 |
| EP-terrestrial | mol N eq. | 1,07E+01 | 1,16E-01 | 4,45E+00 | 1,53E+01 | 4,08E+00 | 9,70E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 3,68E-01 | 1,48E+00 | 0,00E+00 | 0,00E+00 | -1,83E+00 |
| POCP | kg NMVOC eq. | 3,71E+00 | 4,80E-02 | 1,21E+00 | 4,97E+00 | 1,11E+00 | 3,06E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,12E-01 | 5,20E-01 | 0,00E+00 | 0,00E+00 | -5,44E-01 |
| ADP-minerals & metals | kg Sb eq. | 4,64E-03 | 2,60E-05 | 2,77E-04 | 4,94E-03 | 5,16E-05 | 5,75E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 4,97E-06 | 3,01E-04 | 0,00E+00 | 0,00E+00 | 9,88E-05 |
| ADP-fossil | MJ, net calorific value | 1,09E+04 | 1,39E+02 | 4,24E+03 | 1,53E+04 | 6,31E+02 | 4,79E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,35E+02 | 1,32E+03 | 0,00E+00 | 0,00E+00 | -1,32E+03 |
| WDP | m3 world eq. Deprived | 4,33E+02 | 8,48E-01 | 4,52E+01 | 4,79E+02 | 1,95E+00 | 2,03E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 4,65E-01 | 6,97E+00 | 0,00E+00 | 0,00E+00 | 4,34E+00 |

| | | |
|---|---|---|
| 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 | 9,43E-05 | 9,53E-07 | 2,69E-05 | 1,22E-04 | 1,60E-06 | 5,15E-06 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 2,04E-06 | 6,76E-06 | 0,00E+00 | 0,00E+00 | -1,85E-05 |
| IRP | kBq U235 eq. | 1,23E+01 | 4,78E-02 | 1,30E+01 | 2,53E+01 | 1,16E-01 | 1,08E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,94E-02 | 4,36E-01 | 0,00E+00 | 0,00E+00 | 6,60E-01 |
| ETP-fw | CTUe | 3,02E+04 | 2,39E+01 | 9,40E+02 | 3,12E+04 | 8,16E+01 | 6,51E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,23E+01 | 2,56E+02 | 0,00E+00 | 0,00E+00 | -6,95E+03 |
| HTP-c | CTUh | 9,42E-05 | 4,75E-08 | 3,21E-07 | 9,46E-05 | 2,17E-07 | 1,33E-07 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 3,25E-08 | 4,30E-07 | 0,00E+00 | 0,00E+00 | -2,47E-05 |
| HTP-nc | CTUh | 1,77E-05 | 9,16E-08 | 2,00E-06 | 1,98E-05 | 1,69E-07 | 1,65E-07 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,95E-08 | 7,93E-07 | 0,00E+00 | 0,00E+00 | 1,02E-05 |
| SQP | - | 1,29E+04 | 1,39E+02 | 6,95E+02 | 1,37E+04 | 6,63E+01 | 1,25E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 8,45E+00 | 6,80E+02 | 0,00E+00 | 0,00E+00 | -6,26E+03 |

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 | 3,16E+02 | 2,36E-01 | 4,44E+01 | 3,61E+02 | 8,45E-01 | 6,13E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,27E-01 | 2,26E+00 | 0,00E+00 | 0,00E+00 | 1,67E+00 |
| NHWD | kg | 3,54E+03 | 4,38E+00 | 3,17E+02 | 3,86E+03 | 1,16E+01 | 1,05E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,78E+00 | 4,37E+01 | 0,00E+00 | 0,00E+00 | 1,97E+03 |
| RWD | kg | 7,92E-03 | 3,00E-05 | 9,86E-03 | 1,78E-02 | 7,18E-05 | 6,66E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,20E-05 | 2,69E-04 | 0,00E+00 | 0,00E+00 | 3,82E-04 |
| 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 | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| MFR | kg | 2,00E-01 | 1,04E-03 | 2,51E-01 | 4,53E-01 | 7,33E-02 | 4,29E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,36E-03 | 9,89E-03 | 0,00E+00 | 0,00E+00 | 1,90E-02 |
| MER | kg | 2,73E-03 | 6,15E-06 | 1,29E-04 | 2,86E-03 | 1,21E-05 | 2,04E-05 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,75E-06 | 1,07E-04 | 0,00E+00 | 0,00E+00 | -4,65E-05 |
| EEE | MJ | 2,65E+00 | 1,12E-02 | 1,23E-01 | 2,78E+00 | 2,98E-02 | 2,45E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 4,84E-03 | 9,34E-02 | 0,00E+00 | 0,00E+00 | 9,48E-02 |
| ETE | MJ | 4,11E+00 | 1,41E-02 | 2,14E-01 | 4,34E+00 | 2,14E-02 | 2,46E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 3,20E-03 | 1,15E-01 | 0,00E+00 | 0,00E+00 | 4,25E-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 | 2,91E+03 | 1,82E+00 | 2,28E+02 | 3,14E+03 | 4,77E+00 | 4,24E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 6,84E-01 | 1,81E+01 | 0,00E+00 | 0,00E+00 | -1,30E+03 |
| 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 | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PERT | MJ | 2,91E+03 | 1,82E+00 | 2,28E+02 | 3,14E+03 | 4,77E+00 | 4,24E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 6,84E-01 | 1,81E+01 | 0,00E+00 | 0,00E+00 | -1,30E+03 |
| PENRE | MJ | 1,09E+04 | 1,39E+02 | 4,24E+03 | 1,53E+04 | 6,31E+02 | 4,79E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,35E+02 | 1,32E+03 | 0,00E+00 | 0,00E+00 | -1,32E+03 |
| PENRM | 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 | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| PENRT | MJ | 1,09E+04 | 1,39E+02 | 4,24E+03 | 1,53E+04 | 6,31E+02 | 4,79E+02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,35E+02 | 1,32E+03 | 0,00E+00 | 0,00E+00 | -1,32E+03 |
| SM | kg | 1,42E+02 | 5,90E-02 | 4,04E-01 | 1,43E+02 | 3,00E-01 | 1,78E-01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 4,44E-02 | 5,62E-01 | 0,00E+00 | 0,00E+00 | 8,42E+01 |
| RSF | MJ | 8,70E-02 | 7,49E-04 | 2,49E-03 | 9,02E-02 | 7,34E-04 | 1,30E-03 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,19E-04 | 6,74E-03 | 0,00E+00 | 0,00E+00 | 3,68E-03 |
| 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 | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| FW | m3 | 1,06E+01 | 2,07E-02 | 1,20E+00 | 1,19E+01 | 4,77E-02 | 4,95E-02 | 0,00E+00 | 0,00E+00 | 0,00E+00 | ND | ND | ND | ND | 1,12E-02 | 1,71E-01 | 0,00E+00 | 0,00E+00 | 1,13E-01 |

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 | ND | ND | ND | ND | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 0,00E+00 |
| BCCpa | kg C | 2,47E+01 | 0,00E+00 | 0,00E+00 | 2,47E+01 | 0,00E+00 | 2,47E+01 | 0,00E+00 | 0,00E+00 | 0,00E+00 | 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

No cut-offs were intentionally applied to inputs and outputs within the system boundaries of the models. All known energy and material flows within the system boundaries are considered.

Specific data was collected from Trelleborg's suppliers and all packaging material suppliers through a questionnaire, covering details such as exact raw material composition, energy consumption, packaging, logistics (e.g., transport), and production information. The end-of-life scenario is based on industry practices and regulations in a specific region. The data collection period for specific data was the year 2025.

As the manufacturing process takes place in China, country and region-specific datasets for electricity were used:
Electricity, medium voltage {CN-ECGC}| market for electricity, medium voltage | EN15804, U for electricity grid, ECGC - East Grid, where the manufacturing operation happens.

| Global warming potential of the electricity used | value |
|---|---|
| GWP-total of the electricity in kg CO2e/kWh | 0.85 |
| GWP-total [kg] | 388 |
| Total electricity used [kWh] | 455 |

## SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION

A1. Raw Material Supply
This module considers the extraction and processing of all raw materials and energy used upstream in the manufacturing process of the Tee Bollard.

A2. Transport of Raw Materials to Manufacturer
This module accounts for the transportation of raw materials and spare parts to the manufacturing facility via road. Distances and transport modes were modeled using primary data.

A3. Manufacturing
This stage describes the production process of Tee Bollard, including steel processing.

Transportation distances and modes for steel, packaging materials, and deliveries to customers were provided by Trelleborg and its suppliers.

The construction site data includes factors such as lights, heating, and office facilities. However, the manufacture of production equipment and infrastructure is excluded from the system boundary. Manufacturing waste and production loss treatment are included in this module.

A4. Transport to Customer
Bollards are transported from the production facility to customers primarily via road and sea transport. Neom City, Kingdom of Saudi Arabia, has been chosen as the final destination for this assessment.

A5. Installation Process
This module covers the environmental aspects and impacts of fixing of bollards to the marine terminal and assembly of the full installation. Additionally, product packaging is discarded, and its waste treatment is included in this module.

B1 – B3. Use stage.
B1 (Use Stage), B2 (Maintenance) & B3 (Repair): The Tee Bollard is installed on the terminal block and settled in a stable position. User stage includes regular inspections with minor adjustments, such as strengthening of fixings and other related operations. No further inputs or outputs are related to the use stage, as there are no emissions from the product exploitation.

C1. Deconstruction and demolition. This module includes the disassembly and demolition of the bollards and its parts at the end of life. The removal of the bollards from the marine terminal is done using the building equipment.

C2. Transport of waste. This module includes the transportation distance to the steel secondary processing site for steel parts.

C3. Waste processing C4. Disposal: The end-of-life stage is encompassed in these modules. The end-of-life scenario of the bollard is based on a specific country regulation, company policy, and industry practices.  Biogenic carbon uptake and release were manually adjusted as wooden packaging leaves the system for reuse.

D. Reuse potential in module D provides information on the potential burdens and benefits from secondary use of the steel materials

| Scanario | value |
|---|---|
| Product share goes to Recycling [%] | 100 |
| Total distance to processing sites [km] | 1000 |

## DECLARATION OF SVHC

No SVHCs were present in the product or factory during the manufacturing of the materials in concentrations exceeding 0.1% w/w. This determination is based on engineering evaluations, testing conducted in a manufacturing facility, and supplier declarations.

## REFERENCES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7. Trelleborg Marine & Infrastructure. Tee Bollards [available at: https://www.trelleborg.com/en/marine-and-infrastructure/products-solutions-and-services/marine/docking-and-mooring/bollards/tee-bollards]
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