TRELLEBORG

Environmental
Product
Declaration

According to EN15804+A2

This declaration is for:
Super Cone Fender system (SCN 1400)

Provided by:
Trelleborg Ridderkerk BV

MRPI® registration:
1.1.00994.2025

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ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00994.2025

DATE OF THIS ISSUE

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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.

PROGRAM OPERATOR

Stichting MRPI®
Kingsfordweg 151
1043 GR
Amsterdam

PRODUCT

Super Cone Fender system (SCN 1400)

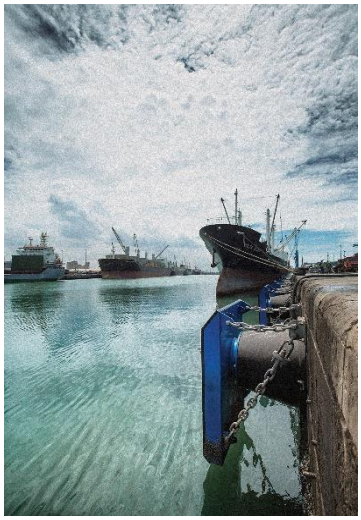
DECLARED UNIT / FUNCTIONAL UNIT

1 Piece

DESCRIPTION OF PRODUCT

Super Cone Fender system is a high-performance, conical-shaped fender system that delivers maximum energy absorption. Its robust, stable design ensures reliable protection across a wide range of berthing conditions, making it applicable for general caro berths, bulk terminals, oil and LNG facilities, container berths, RoRo and cruise terminals, parallel motion systems, and monopolies and dolphins.

VISUAL PRODUCT



MORE INFORMATION

https://www.trelleborg.com/en/marine-and-infrastructure/products-solutions-and-services/marine/marine-fenders/fixed-fenders/cone-fenders#1

Ing. L. L. Oosterveen MSc. MBA **Managing Director MRPI**	DEMONSTRATION OF VERIFICATION CEN standard EN15804 serves as the core PCR [1]
	Independent verification of the declaration an data according to EN15804+A2 Internal: External: X
	Third party verifier: Tim Mol, EcoReview
	[1] PCR = Product Category Rules

DETAILED PRODUCT DESCRIPTION

This EPD covers a Super Cone fender system (SCN), model 1400, produced by Trelleborg. The SCN fender system consists of the fender-body part and the steel panel attached to it. The ultra-high molecular weight polyethylene pads are attached to the steel panel to absorb the energy during the docking of vessels. Body – fender part is an engineered rubber compound made of Natural rubber (NR), Synthetic rubber (SBR), reclaimed rubber from EoL tires, Carbon black, and relevant additives. The conical body shape makes the SCN very stable even at large compression angles and provides excellent shear strength. With overload stops the Super Cone marine fender is even more resistant to over-compression. The fenders-bodies are produced in Trelleborg's production site in Qingdao, China. Polyethylene pads and steel parts are produced by Trelleborg's suppliers in China.

The reference unit for an SCN is 1 piece of Super Cone Fender system, which consists of 3105kg of a fender body, 4356kg of Steel panel with PE pads, and 496 of steel fixings. Wooden boxes and steel pallets are used as packaging material.

Product specification	Super Cone fender system 1400
Product quantity [pc]	1
Product weight per 1 quantity without packaging material	7957
Total packaging weight [kg]	981
Product service life [years]	20
Area of application	Marine terminals and docking stations
Georgraphic region of manufacturing	China

Component (>0,5%)	%
NR	Confidential
SBR	Confidential
Reclaimed rubber	Confidential
Carbon black	Confidential
Oil	Confidential
Antioxidants	Confidential
Sulfur	Confidential

SCOPE AND TYPE

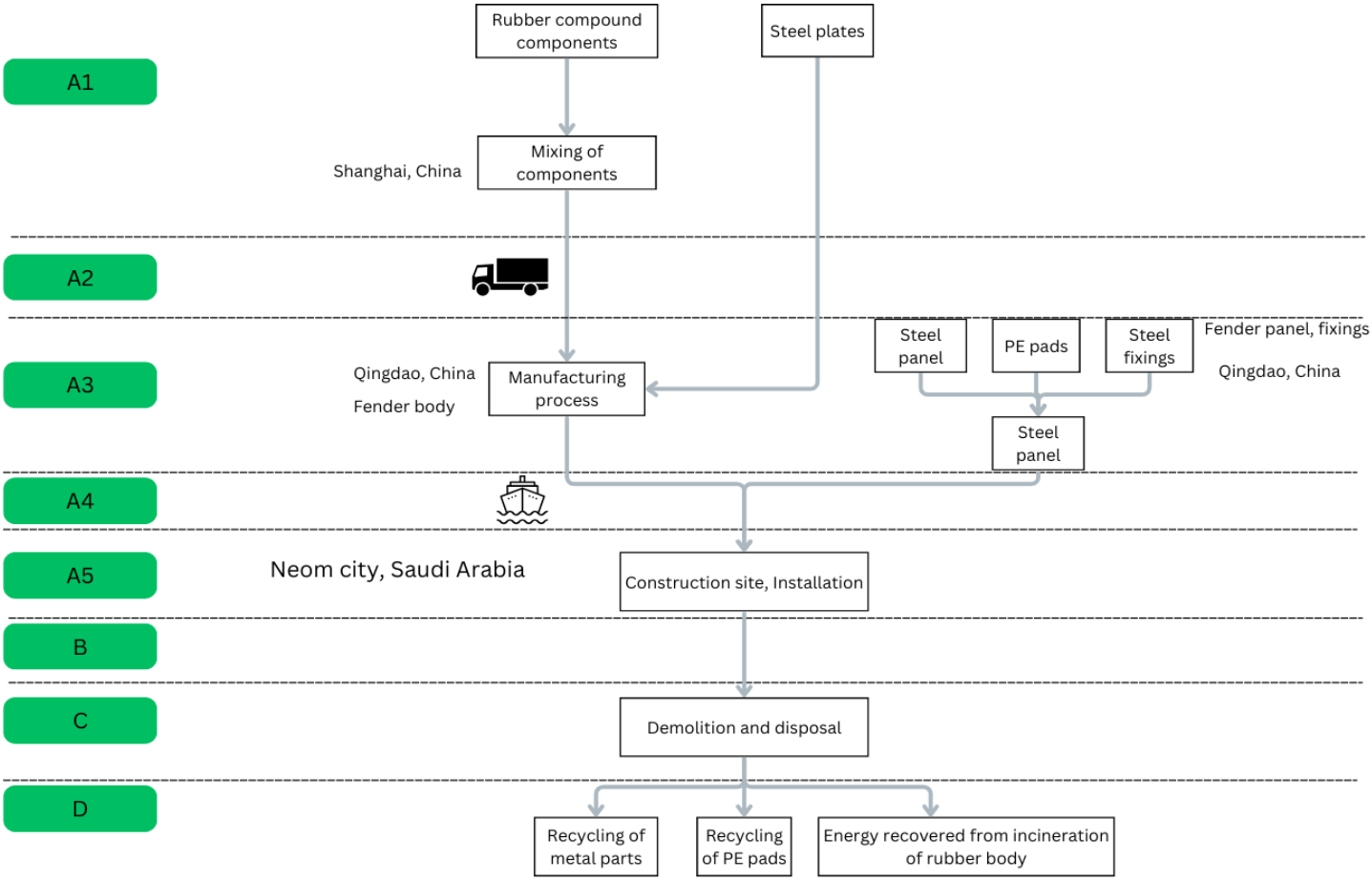
This EPD is a specific EPD made for SCN 1400 fender produced in a factory in Qingdao, China. The material input is from suppliers across China.
The product is intended for use in the Neom city, Kingdom of Saudi Arabia. At the end of its service life, the product is also assumed to reach its End-of-Life (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.	1,89E+04	1,30E+03	3,21E+03	2,34E+04	1,24E+03	1,41E+03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,34E+02	2,26E+03	0,00E+00	8,84E+03	-1,91E+03
GWP-fossil	kg CO2 eq.	2,25E+04	1,30E+03	3,23E+03	2,71E+04	1,23E+03	1,62E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,34E+02	2,26E+03	0,00E+00	6,43E+03	-1,91E+03
GWP-biogenic	kg CO2 eq.	-3,65E+03	0,00E+00	-1,60E+01	-3,66E+03	0,00E+00	1,25E+03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	2,42E+03	0,00E+00
GWP-luluc	kg CO2 eq.	1,45E+01	4,96E-01	1,50E+00	1,65E+01	6,44E-01	2,13E-02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,15E-02	8,68E-01	0,00E+00	3,53E-02	-3,17E+00
ODP	kg CFC11 eq.	2,36E-04	1,83E-05	1,17E-05	2,66E-04	1,77E-05	2,48E-06	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	2,06E-06	3,28E-05	0,00E+00	2,40E-06	-4,07E-05
AP	mol H+ eq.	1,02E+02	4,80E+00	1,39E+01	1,20E+02	3,55E+01	1,32E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,20E+00	9,06E+00	0,00E+00	1,21E+00	-1,55E+01
EP-fresh water	kg PO4 eq.	1,35E+00	1,19E-02	6,20E-02	1,42E+00	4,92E-03	6,99E-04	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	4,64E-04	2,07E-02	0,00E+00	1,73E-03	1,04E-02
EP-marine	kg N eq.	2,37E+01	1,62E+00	2,86E+00	2,82E+01	8,83E+00	5,86E-01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	5,47E-01	3,20E+00	0,00E+00	4,87E-01	-4,09E+00
EP-terrestrial	mol N eq.	2,39E+02	1,79E+01	3,14E+01	2,88E+02	9,81E+01	6,42E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	6,00E+00	3,53E+01	0,00E+00	5,38E+00	-6,22E+01
POCP	kg NMVOC eq.	8,66E+01	6,54E+00	8,68E+00	1,02E+02	2,66E+01	1,94E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,79E+00	1,24E+01	0,00E+00	1,38E+00	-1,36E+01
ADP-minerals & metals	kg Sb eq.	1,53E-01	4,09E-03	5,63E-03	1,63E-01	1,24E-03	1,31E-04	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	4,87E-05	7,14E-03	0,00E+00	3,17E-04	-9,72E-03
ADP-fossil	MJ, net calorific value	3,07E+05	1,79E+04	3,19E+04	3,56E+05	1,52E+04	2,15E+03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,76E+03	3,13E+04	0,00E+00	1,21E+03	-1,94E+04
WDP	m3 world eq. Deprived	1,71E+04	9,39E+01	4,11E+02	1,76E+04	4,69E+01	7,31E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	5,24E+00	1,66E+02	0,00E+00	3,11E+02	-2,44E+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	1,93E-03	9,12E-05	2,05E-04	2,23E-03	3,86E-05	3,55E-05	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	3,35E-05	1,61E-04	0,00E+00	5,97E-06	-3,09E-04
IRP	kBq U235 eq.	2,88E+02	5,93E+00	8,78E+01	3,81E+02	2,78E+00	4,17E-01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	3,00E-01	1,03E+01	0,00E+00	1,37E+00	-1,03E+01
ETP-fw	CTUe	4,69E+05	3,49E+03	7,91E+03	4,80E+05	1,96E+03	2,59E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,90E+02	6,09E+03	0,00E+00	1,24E+04	-5,71E+04
HTP-c	CTUh	1,42E-03	5,85E-06	3,30E-06	1,43E-03	5,22E-06	6,30E-07	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	5,14E-07	1,02E-05	0,00E+00	9,40E-07	-1,91E-04
HTP-nc	CTUh	3,72E-04	1,08E-05	1,67E-05	4,00E-04	4,07E-06	4,56E-07	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	2,40E-07	1,88E-05	0,00E+00	4,36E-06	3,06E-05
SQP	-	9,22E+05	9,26E+03	5,68E+03	9,37E+05	1,59E+03	3,02E+02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,22E+02	1,62E+04	0,00E+00	3,87E+02	-3,87E+05

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	7,31E+03	3,09E+01	3,30E+02	7,67E+03	2,03E+01	2,54E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,93E+00	5,38E+01	0,00E+00	2,38E+02	-4,32E+02
NHWD	kg	6,96E+04	5,96E+02	2,79E+03	7,30E+04	2,79E+02	3,82E+01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	2,64E+01	1,04E+03	0,00E+00	3,16E+03	1,07E+04
RWD	kg	1,85E-01	3,67E-03	6,64E-02	2,55E-01	1,73E-03	2,61E-04	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,89E-04	6,39E-03	0,00E+00	1,11E-03	-6,85E-03
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	4,68E+00	1,35E-01	3,99E+00	8,80E+00	1,76E+00	1,03E-02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	6,14E-03	2,35E-01	0,00E+00	1,44E-02	-1,46E-01
MER	kg	7,95E-02	1,46E-03	1,05E-03	8,21E-02	2,92E-04	5,25E-05	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	2,39E-05	2,54E-03	0,00E+00	8,28E-05	-6,55E-03
EEE	MJ	5,91E+01	1,27E+00	2,95E+00	6,33E+01	7,18E-01	1,03E-01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	7,77E-02	2,22E+00	0,00E+00	1,03E+00	-2,52E+00
ETE	MJ	1,21E+02	1,57E+00	2,32E+00	1,25E+02	5,14E-01	7,32E-02	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	4,18E-02	2,74E+00	0,00E+00	1,01E+00	-7,81E+00

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	5,37E+04	2,47E+02	4,60E+03	5,86E+04	1,15E+02	1,54E+01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,05E+01	4,31E+02	0,00E+00	6,32E+01	-8,24E+04
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	5,37E+04	2,47E+02	4,60E+03	5,86E+04	1,15E+02	1,54E+01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,05E+01	4,31E+02	0,00E+00	6,32E+01	-8,24E+04
PENRE	MJ	3,07E+05	1,79E+04	3,19E+04	3,56E+05	1,52E+04	2,15E+03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,76E+03	3,13E+04	0,00E+00	1,21E+03	-1,94E+04
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	3,07E+05	1,79E+04	3,19E+04	3,56E+05	1,52E+04	2,15E+03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,76E+03	3,13E+04	0,00E+00	1,21E+03	-1,94E+04
SM	kg	3,10E+03	7,65E+00	4,05E+00	3,11E+03	7,22E+00	3,36E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	7,12E-01	1,33E+01	0,00E+00	1,34E+00	6,18E+02
RSF	MJ	2,35E+00	9,17E-02	6,51E-02	2,51E+00	1,76E-02	3,65E-03	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,87E-03	1,60E-01	0,00E+00	3,70E-02	-1,19E-01
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	4,15E+02	2,31E+00	1,07E+01	4,28E+02	1,15E+00	1,78E-01	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	1,28E-01	4,06E+00	0,00E+00	7,27E+00	-6,68E+00

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	6,54E+02	0,00E+00	4,36E+00	6,59E+02	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	6,59E+02	0,00E+00
BCCpa	kg C	3,38E+02	0,00E+00	0,00E+00	3,38E+02	0,00E+00	3,38E+02	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 Qingdao facility and all 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, low voltage {CN-SD}| electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted | EN15804, U for installed solar panels energy, SD- Shandong region;
Electricity, medium voltage {CN-ECGC}| market for electricity, medium voltage | EN15804, U for electricity grid, ECGC - East Grid where part of the manufacturing operation happens;

Global warming potential of the electricity used	value
GWP-total of the electricity in kg CO2e/kWh	0.69
GWP-total [kg]	2590
Total electricity used [kWh]	3756

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 SCN 1400 fender system.

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 SCN 1400, including the use of electricity, steam, and solar energy (via PV panels).

Data on fender-body production were collected from the manufacturing site. Transportation distances and modes for steel, PE pads production and raw materials, 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
The SCN system parts 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 attaching the fender system 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 SCN 1400 fender system 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 fender system and its parts at the end of life. The removal of the fender system from the marine terminal is done using the building equipment.

C2. Transport of waste. This module includes the transportation distance to the plastic recycling site, the incineration plant for rubber compound fender body, and 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 fender system is based on a specific country regulation, company policy, and industry practices. Due to the release of biogenic carbon as a result of the incineration of fender body at the end of life, the result in module C4 was adjusted based on the biogenic uptake in modules A1-A3.

D. Reuse, recovery, recycling potential Module D provides information on the potential burdens and benefits from recycling of the product packaging, secondary use of the steel materials, secondary use of PE material, and recovered energy from the incineration process.

Scanario	value
Product share goes to Recycling, 5146 kg steel [%]	64.7
Product share goes to Incineration, 2300 rubber compound + 511 PE pads [%]	35.3
Total distance to processing sites [km]	1500

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.

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