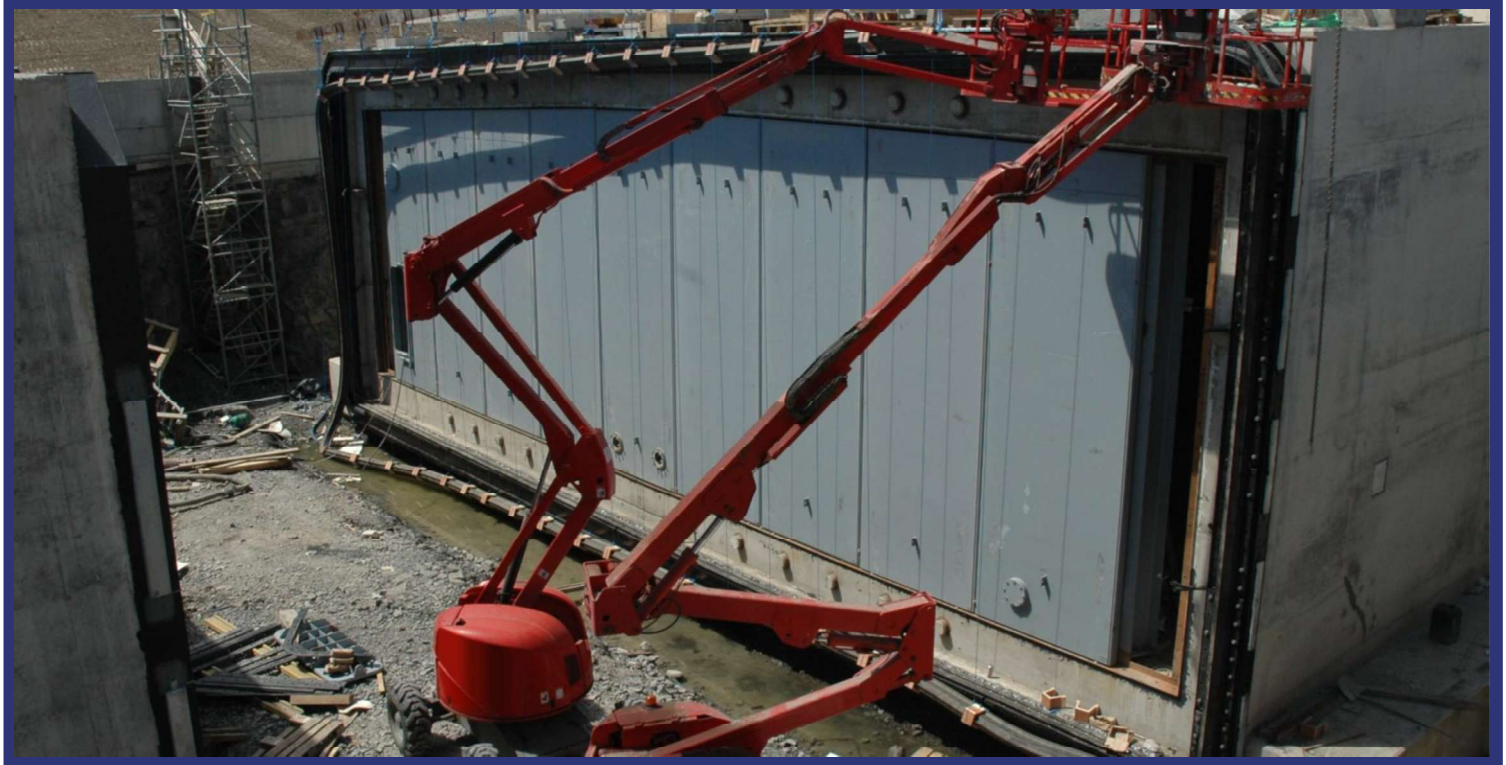
TRELLEBORG

Environmental
Product
Declaration

According to EN15804+A2

This declaration is for:
Gina gasket

Provided by:
Trelleborg BV



MRPI® registration
1.1.00783.2025

program operator
Stichting MRPI®
publisher
Stichting MRPI®
www.mrpi.nl

date of first issue
18-3-2025
date of this issue
18-3-2025
expiry date
18-3-2030

ECO PLATFORM EPD VERIFIED

MRPI milieu relevante product informatie

COMPANY INFORMATION

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MRPI® REGISTRATION

1.1.00783.2025

DATE OF THIS ISSUE

18-3-2025

EXPIRY DATE

18-3-2030

SCOPE OF DECLARATION

This MRPI®-EPD certificate is verified by Tim Mol, EcoReview. The LCA study has been done by Ayan Arinov, Trelleborg 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

Gina gasket

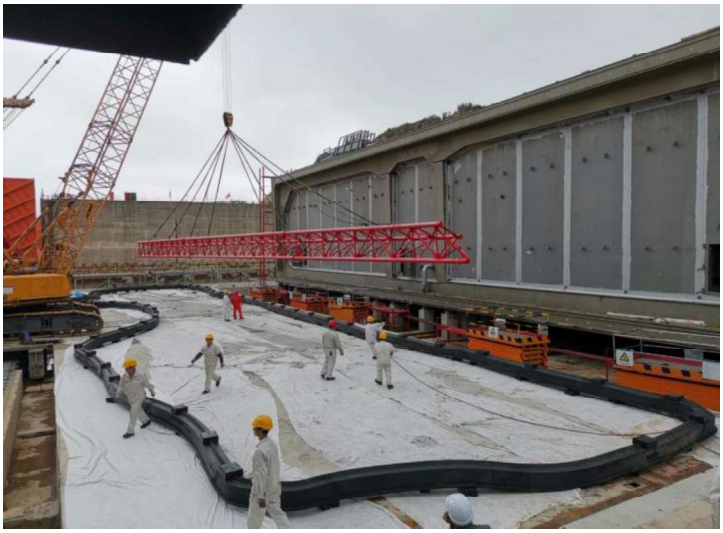
DECLARED UNIT / FUNCTIONAL UNIT

1 Mass (kg)

DESCRIPTION OF PRODUCT

The Gina gasket is used between the sectional elements of immersed tunnels to prevent water ingress due to external water pressure.

VISUAL PRODUCT



MORE INFORMATION

https://www.trelleborg.com/en/marine-and-infrastructure/products-solutions-and-services/infrastructure/seals/gina

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 (PART 1)

This EPD covers three Gina gasket models produced by Trelleborg: Gina gasket Shore 40A, Shore 50A, and Shore 60A. The Gina gasket is an engineered rubber compound made from natural rubber (NR), carbon black (CB), and relevant additives. It provides sealing and absorbs movements caused by soil settlement, concrete creep, temperature variations, and seismic activity. The gaskets are produced in Trelleborg's production site in Qingdao, China.
The reference unit for a gasket is 1kg, and the packaging consists of PE film. The reference lifetime for the products are 170 years for Gina Shore 40A, 200 years for Gina Shore50A, and Gina Shore 60A. The products are sold worldwide

Product specification	Gina 40A	Gina 50A	Gina 60A
Product weight [kg]	1	1	1
Packaging weight [kg]	0,004	0,004	0,004
Product service life	170	200	200
Area of application	Immersed tunnels	Immersed tunnels	Immersed tunnels
Georgraphic region of manufacturing	China	China	China

Component (>0,5%)	%
Natural Rubber	Confidential
Carbon black	Confidential
Oil	Confidential
Antioxidants	Confidential
Sulfur	Confidential

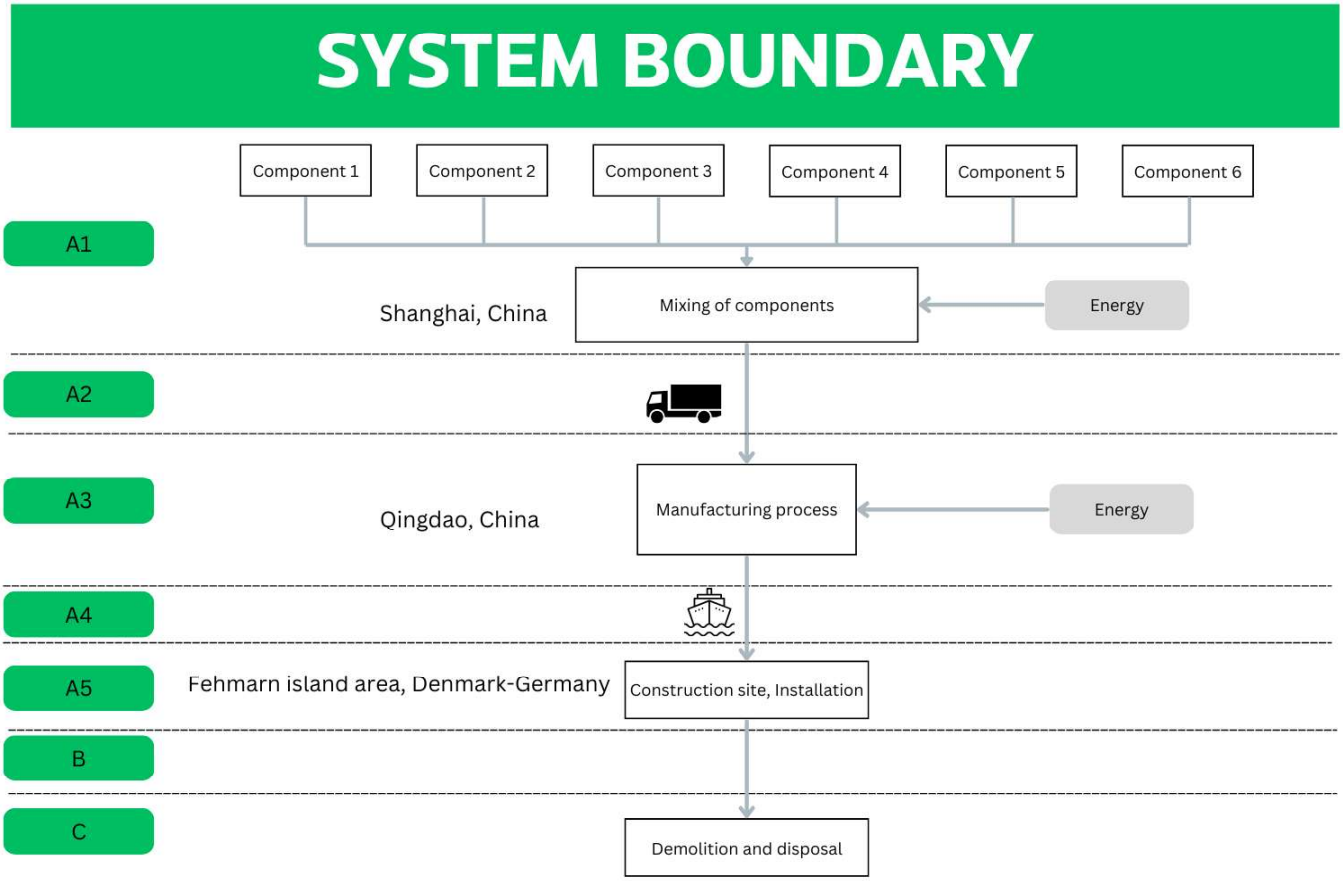
SCOPE AND TYPE

This EPD is a representative EPD made for Gina gaskets Shore 40A, 50A, and 60A produced in a factory in Qingdao, China. The material input is from suppliers across China.
Data collection was completed in 2024. The results are calculated with SimaPro 9.6.0.1, using the Ecoinvent 3.10 database (cut-off).

PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USER 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	X	ND	ND	ND	ND	X	X	X	X	X

X = Modules Assessed

ND = Not Declared



REPRESENTATIVENESS

Each type of gasket is composed of the same material inputs, differing only in the percentage of each component, which influences the final hardness and weight of the product. Gina 40A was selected as the reference model. While it has the lowest hardness, its specific component proportions result, in most cases, in the worst environmental impact. The deviation calculations were done: the biggest deviation was 17 % negative for Gina 50 (Indicator IRP) and 7% negative for Gina 60 (Indicators: SM and EEE). FOR GWP, the total deviation is 2% negative for Gina 50 and 1% positive for Gina 60

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	-6,31E-02	5,06E-01	1,16E+00	1,60E+00	2,45E-01	4,01E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,33E-02	2,91E-02	0,00E+00	2,17E+00	-1,17E-01
GWP-fossil	kg CO2 eq	1,73E+00	5,06E-01	1,17E+00	3,41E+00	2,45E-01	3,93E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,32E-02	2,91E-02	0,00E+00	3,63E-01	-1,17E-01
GWP-biogenic	kg CO2 eq	-1,80E+00	8,80E-06	-1,25E-02	-1,81E+00	-7,71E-05	7,57E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	7,71E-05	5,72E-07	0,00E+00	1,81E+00	-6,18E-06
GWP-luluc	kg CO2 eq	1,75E-03	2,03E-04	4,14E-04	2,37E-03	1,28E-04	2,42E-04	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,29E-06	1,17E-05	0,00E+00	1,40E-04	-7,32E-05
ODP	kg CFC11 eq	4,16E-08	7,38E-09	3,60E-09	5,26E-08	3,52E-09	3,81E-09	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,42E-09	4,33E-10	0,00E+00	1,78E-09	-3,27E-09
AP	mol H+ eq.	1,28E-02	1,98E-03	5,22E-03	2,00E-02	7,12E-03	2,39E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	8,37E-04	1,21E-04	0,00E+00	1,17E-03	-4,29E-04
EP-fresh water	kg PO4 eq.	5,03E-04	3,97E-05	3,84E-04	9,27E-04	7,92E-06	1,31E-05	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	4,12E-07	2,28E-06	0,00E+00	4,65E-06	-2,68E-05
EP-marine	kg N eq.	4,66E-03	6,99E-04	1,01E-03	6,37E-03	1,77E-03	6,61E-04	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,87E-04	4,43E-05	0,00E+00	3,41E-04	-8,84E-05
EP-terrestrial	mol N eq.	3,19E-02	7,61E-03	1,04E-02	4,99E-02	1,97E-02	7,32E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	4,24E-03	4,83E-04	0,00E+00	3,88E-03	-9,17E-04
POCP	kg NMVOC eq.	8,46E-03	2,74E-03	2,91E-03	1,41E-02	5,34E-03	2,25E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,27E-03	1,68E-04	0,00E+00	1,13E-03	-6,12E-04
ADP-minerals & metals	kg Sb eq.	9,02E-06	1,63E-06	1,95E-06	1,26E-05	2,41E-07	5,84E-06	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,34E-08	9,38E-08	0,00E+00	9,57E-07	-7,91E-07
ADP-fossil	MJ, net calorific value	3,74E+01	7,12E+00	1,99E+01	6,44E+01	3,01E+00	4,62E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,22E+00	4,11E-01	0,00E+00	2,21E+00	-2,97E+00
WDP	m3 world eq. Deprived	3,39E-01	3,95E-02	1,72E-01	5,51E-01	9,16E-03	1,03E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,71E-03	2,29E-03	0,00E+00	4,25E-02	-3,91E-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	1,64E-07	4,09E-08	1,56E-07	3,61E-07	7,48E-09	4,61E-08	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	2,37E-08	2,37E-09	0,00E+00	1,22E-08	-4,47E-09
IRP	kBq U235 eq.	6,46E-02	5,85E-03	6,39E-02	1,34E-01	1,39E-03	7,42E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	2,46E-04	3,37E-04	0,00E+00	1,39E-03	-6,12E-03
ETP-fw	CTUe	9,62E+00	1,38E+00	5,43E+00	1,64E+01	3,87E-01	2,63E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,34E-01	7,93E-02	0,00E+00	2,52E+01	-2,77E-01
HTP-c	CTUh	7,32E-09	2,63E-09	3,48E-09	1,34E-08	1,03E-09	6,66E-09	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,63E-10	1,52E-10	0,00E+00	4,96E-10	-3,64E-10
HTP-nc	CTUh	1,26E-08	4,56E-09	5,53E-09	2,27E-08	7,89E-10	5,52E-09	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,69E-10	2,63E-10	0,00E+00	2,97E-09	-9,11E-10
SQP	-	5,55E+02	4,25E+00	3,97E+00	5,63E+02	2,78E-01	1,57E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	8,64E-02	2,45E-01	0,00E+00	2,30E+00	-3,33E-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 [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	3,48E-01	1,24E-02	1,83E-01	5,43E-01	4,01E-03	2,30E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,38E-03	7,16E-04	0,00E+00	2,02E+00	-6,93E-03
NHWD	kg	3,69E+00	2,34E-01	2,28E+00	6,20E+00	5,47E-02	8,01E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	2,25E-02	1,35E-02	0,00E+00	2,01E-01	-7,50E-01
RWD	kg	1,52E-05	1,43E-06	1,57E-05	3,23E-05	3,38E-07	4,79E-06	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,77E-07	8,25E-08	0,00E+00	8,67E-07	-1,51E-06
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	NA	NA	NA	NA	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
MFR	kg	3,88E-04	5,25E-05	4,27E-04	8,68E-04	3,54E-04	8,28E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,73E-06	3,02E-06	0,00E+00	2,65E-05	-2,91E-05
MER	kg	1,82E-06	4,60E-07	7,33E-07	3,01E-06	5,67E-08	3,34E-06	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,67E-08	2,65E-08	0,00E+00	3,14E-07	-1,68E-07
EEE	kg	3,37E-03	5,18E-04	3,96E-04	4,28E-03	1,41E-04	1,73E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,95E-04	2,98E-05	0,00E+00	2,72E-04	-6,48E-04
ETE	kg	4,83E-03	1,05E-03	1,20E-03	7,08E-03	9,90E-05	4,34E-03	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	3,10E-05	6,03E-05	0,00E+00	2,48E-04	-3,98E-04

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	1,26E+00	9,35E-02	1,71E+00	3,06E+00	2,25E-02	6,69E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,73E-03	5,39E-03	0,00E+00	9,24E-02	-8,38E-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	NA	NA	NA	NA	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PERT	MJ	1,26E+00	9,35E-02	1,71E+00	3,06E+00	2,25E-02	6,69E-01	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,73E-03	5,39E-03	0,00E+00	9,24E-02	-8,38E-02
PENRE	MJ	3,74E+01	7,12E+00	1,99E+01	6,44E+01	3,01E+00	4,62E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,22E+00	4,11E-01	0,00E+00	2,21E+00	-2,97E+00
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	NA	NA	NA	NA	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
PENRT	MJ	3,74E+01	7,12E+00	1,99E+01	6,44E+01	3,01E+00	4,62E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,22E+00	4,11E-01	0,00E+00	2,21E+00	-2,97E+00
SM	kg	3,91E-02	3,20E-03	1,83E-03	4,41E-02	1,43E-03	2,61E-02	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	5,04E-04	1,84E-04	0,00E+00	5,54E-04	3,28E-03
RSF	MJ	2,20E-04	4,07E-05	2,85E-05	2,89E-04	3,32E-06	9,70E-05	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	1,32E-06	2,35E-06	0,00E+00	1,21E-05	-4,44E-06
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	NA	NA	NA	NA	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
FW	m3	9,13E-03	9,64E-04	4,31E-03	1,44E-02	2,24E-04	1,46E-02	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	9,08E-05	5,60E-05	0,00E+00	1,04E-03	-9,50E-04

PERE = Use of renewable energy excluding renewable primary energy resources
PERM = Use of renewable 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	4,94E-01	0,00E+00	0,00E+00	4,94E-01	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	NA	NA	NA	NA	0,00E+00	0,00E+00	0,00E+00	-4,94E-01	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	NA	NA	NA	NA	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 (PART 1)

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 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 for similar products. The data collection period for specific data was the year 2024.

SCENARIOS AND ADDITIONAL TECHNICAL INFORMATION (PART 1)

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 Gina gasket 60A.

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

A3. Manufacturing
This stage describes the production process of Trelleborg's Gina gaskets, including the use of electricity, steam, and solar energy (via PV panels).

Data on gasket production was collected from the manufacturing site where all three Gina 40A, 50A, and 60A are produced. Transportation distances and modes for raw materials, packaging materials, and deliveries to customers were provided by Trelleborg and its suppliers.

The construction site data includes factors such as lighting, 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
All gaskets are transported from the production facility to customers primarily via road and sea transport. Fehmarn Island has been chosen as the final destination for this assessment.

A5. Installation Process
This module covers the environmental aspects and impacts of attaching the gasket to the tunnel block. The installation process involves building equipment such as drills and lifting machines, and their energy consumption is considered. 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 Gina gasket is installed within tunnel blocks and becomes inaccessible after installation. As a result, no use, maintenance or repair impacts are associated with these stages. No further inputs or outputs are related to the use stage, as there are no emissions from the products.

C1. Deconstruction and demolition This module includes the disassembly and demolition of the gaskets at the end of life. The removal of the gasket from the tunnel block is done using the building equipment.

C2. Transport of waste This module includes one-way transportation distance to a landfill site.

C3. Waste processing and C4. Disposal The end-of-life stage is encompassed in these modules. The end-of-life scenario of the gaskets is based on the industry practices assumption. Due to the release of biogenic carbon as a result of landfilling the gaskets at the end of life, the result in module C4 was adjusted based on the biogenic uptake in module A1.

D. Reuse, recovery, recycling potential Module D provides information on the potential burdens and benefits from recycling of the product packaging.

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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REMARKS