

IWTM Protector™

IWTM AS

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Calculation number:	ReTHiNK-123317
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Table of content

1 Verification of the life cycle assessment	3	5 Life Cycle Inventory	14	8 Interpretation of results	61
2 General	3	5.1 Raw Materials Supply (A1)	14	8.1 Contribution analysis of the modules	61
2.1 Introduction	4	5.2 Transport To Manufacturer (A2)	28	8.2 Contribution analysis of the raw materials (A1)	62
2.2 Company information / declaration owner	4	5.3 Production Process (A3)	29	8.3 Contribution analysis of the inputs	63
2.3 Information LCA calculation	4	5.4 Transport To Construction Site (A4)	41	9 Sensitivity analysis	64
2.4 Comparability	4	5.5 Construction Stage (A5)	42	10 Data collection details	65
2.5 Calculation basis	4	5.6 Maintenance (B2)	42	10.1 Data quality of the lifecycle inventory data	65
2.6 Compiler LCA	4	5.7 De-construction, demolition (C1)	43	10.2 Approach of suppliers for LCA data	70
2.7 Abbreviations	4	5.8 Transport end-of-life (C2)	43	10.3 Used processes	71
3 Product	6	5.9 Waste Processing (C3))	43	11 References	75
3.1 Product description	6	5.10 Final Disposal (C4)	44		
3.2 Application (intended use of the product)	7	5.11 Benefits and loads beyond the system boundary	44		
3.3 Technical data	7	6 Waste Scenarios	47		
3.4 Substances of very high concern	7	6.1 Scenario design	47		
3.5 Description Production Process	7	6.2 End of waste status	48		
3.6 Description Construction Process	8	6.3 Waste processing	51		
3.7 Reference Service Life	8	6.4 Final disposal	52		
3.8 Product flow diagram	9	6.5 Loads from end-of-waste state to point of substitutio	52		
4 Goal and Scope Definition	10	6.6 Benefits recycling and/or re-use	53		
4.1 Purpose and target groups	10	6.7 Loads secondary material lost	54		
4.2 Functional Unit	10	6.8 Benefits energy recovery	55		
4.3 Conversion factors	10	7 Results	56		
4.4 Representativeness	10	7.1 Environmental impact indicators per kilogram	56		
4.5 Scope of declaration and system boundaries	11	7.2 Indicators describing resource use and	58		
4.6 Cut-Off Criteria	12	7.3 Information on biogenic carbon content per	60		
4.7 Allocation	12				
4.8 Data collection & reference period	12				
4.9 Estimates and assumptions	12				
4.10 Data quality	13				
4.11 Power mix	13				

1 Verification of the life cycle assessment

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804+A2:2019 serves as the core PCR.

☐ Internal ☒ External



Third party verifier: Anastasiia Huk, Kiwa GmbH

2 General

2.1 INTRODUCTION

This report for review is a result of a life cycle analysis (LCA) made by using the R<THINK application. The report is based on the following chapters which correspond to the phases of a LCA.

- Goal and Scope Definition
- Life Cycle Inventory
- Impact assessment
- Interpretation of results

2.2 COMPANY INFORMATION / DECLARATION OWNER

Declaration owner: IWTM AS

Address: Eternitveien 34, 3470 Oslo, Norway

E-mail: Alexander.Irgens@kiwa.com

Website: <https://iwtm.com/nb>

Production location: Wonderfil

Address production location: Via Benvenuto Cellini 60, 47521 Cesena, Italy

2.3 INFORMATION LCA CALCULATION

LCA calculation for: IWTM Protector™

Calculation number: ReTHINK-123317

Generation on: 28-01-2026

Date of issue: 28-01-2026

End of validity: 28-01-2026

Version calculation core R<THINK: v2.0

Version Environmental Profile database: v3.20c (20260113)

PCR:

Kiwa-Ecobility Experts (2025). General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025).

Kiwa-Ecobility Experts (2025). General Programme Instructions “Product Level” – Annex B1: Environmental Information Programme according to EN 15804 / ISO 21930, SOP EE 1203_R.3.0 (03.06.2025).

2.4 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2:2019. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2:2019 and ISO 14025.

2.5 CALCULATION BASIS

LCA method R<THINK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.6

Characterization method: RETHINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.20c (20260113)

* Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.

2.6 COMPILER LCA

The project team for drafting this LCA consists the following persons

Alexander Diego Skjelbred Irgens, Kiwa Kompetanse AS, Kabelgata 2, 0580 Oslo.

2.7 ABBREVIATIONS

EPD

Environmental Product Declaration

2 General

RSL Reference service life	PCR Product Category Rules
LCA Life Cycle Assessment	

3 Product

3.1 PRODUCT DESCRIPTION

International Water Treatment Maritime AS (IWTM), founded in 1992 and headquartered in Asker, Norway, is a leading provider of chemical-free water treatment solutions for fresh water systems. With the motto "Water by Design", IWTM delivers sustainable technologies that prevent corrosion and bacterial growth in heating, cooling, and steam-generating systems across industrial, residential, and maritime sectors.

The IWTM Protector™ series is designed to protect closed-loop systems using anodic/cathodic corrosion protection, eliminating the need for chemical additives. The system utilizes sacrificial magnesium anodes and integrated magnets to maintain water quality and extend system lifespan. A 40-micron basket filter ensures effective particle removal while maximizing contact between water and the protective elements.

This EPD represents a worst-case scenario for 1 kg of the largest and heaviest IWTM Protector™ product variant within the product range. All other variations of IWTM Protector™ that are smaller in size and weight and all produced at the same locations described in the production process, are also included within the scope of this declaration. The IWTM Protector™ variants are differentiated by weight, height and width.

A typical composition of the IWTM Protector™ covered in this EPD is as follows:

Raw Material	Value (m.%)
Steel	89.42
Rubber	7.32
Plastic	3.21
Copper	0.05

The main product components of the IWTM Protector™ covered in this EPD is as follows below. The components in the list amounts to 90 % of the product.

Part	Weight (kg)
Pipe	0.35
Domed bottom	0.09
Anode	0.08
Flange cover	0.06
Gasket	0.06
Edge protection profile	0.04

Base flange	0.04
CPR ring	0.03
Screen filter	0.03
Pressing tube	0.02
Deflector	0.02
Cartridge support	0.02
Isolating washer	0.02
Magnet	0.02
Tube	0.02
Insulation	0.02

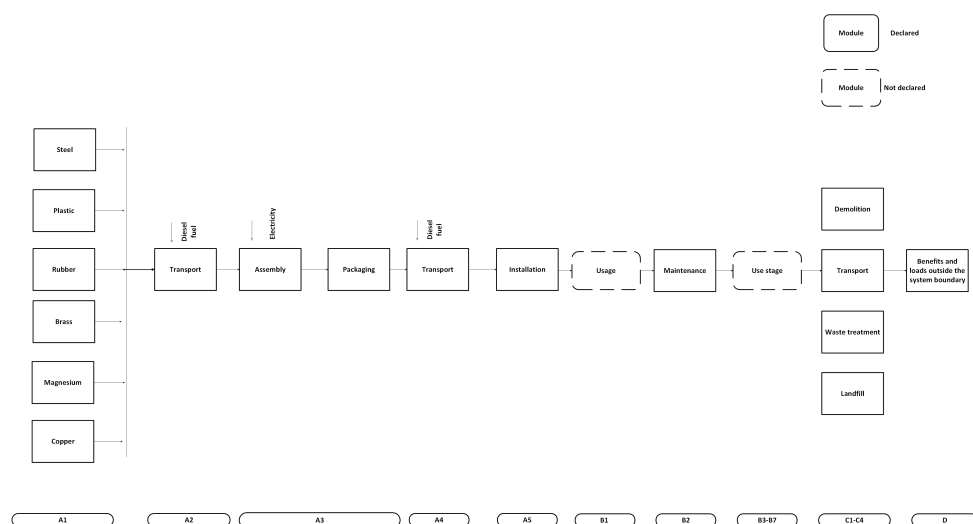
The composition of materials that are used for packaging of the IWTM Protector™, covered in this EPD are given below:

Raw Material	Value (%)
Wooden pallet	100

All types of IWTM Protector™ variants evaluated in this study are listed in the table below.

Model	Dry weight (kg)	Height (mm)	Width (mm)	Digital NRF-nr.
P5	12	540	184	8526076
P10	33	800	294	8526075
P25	50	1200	340	8525884
P40	59	1200	390	8526073
P70	88	1465	530	8526079
P200	160	1630	530	1401401

3 Product



3.2 APPLICATION (INTENDED USE OF THE PRODUCT)

The pressure vessel series is designed for use in closed heating and cooling systems to maintain stable pressure and compensate for thermal expansion. These vessels are essential for protecting system components and ensuring efficient operation in HVAC installations, district heating networks, and large-scale cooling systems.

The product range covers capacities from small residential systems to industrial applications with system volumes up to 200 000 liters. Typical installation environments include commercial buildings, hospitals, hotels, and industrial plants where reliable pressure control is critical for safety and performance.

3.3 TECHNICAL DATA

IWTM 's Protector™ is designed for heating and cooling systems and operates with water as the working medium. All models are rated for a maximum pressure of 10 bar and a maximum operating temperature of 95°C. Technical characteristics of the product range are given in the table below. The technical values are based on the largest IWTM 's Protector™ and represent the worst-case values.

Characteristics	Units	Value
Maximum pressure	bar	10

Characteristics	Units	Value
Maximum temperature	°C	95
Maximum system volume (cooling)	liters	200 000
Maximum system volume (heating)	liters	170 000
Dry weight (largest model)	kg	160
Wet weight (largest model)	kg	400
Height (largest model)	mm	1630
Width (largest model)	mm	530

A conversion factor of 0.999528 is provided to scale the results for smaller product sizes. The reference unit is 1 kg.

Full information for the IWTM Protector™ are published in declaration of performances (DoP). The declared technical data in this EPD refers to the applicable standards DIN 53505, DIN 53479, DIN 53504, ISO 188 and ISO 1817. Full documentation of product performance can be provided upon request.

3.4 SUBSTANCES OF VERY HIGH CONCERN

No substance present in the product with a concentration exceeding 0.1% of the total weight is included on the "List of Substances of Very High Concern" (SVHC) for authorization under REACH legislation.

3.5 DESCRIPTION PRODUCTION PROCESS

The production process begins with the procurement of certified components from selected suppliers. The product is manufactured using a variety of raw materials, including steel, rubber, plastic, and copper.

Component production takes place at external suppliers through processes such as hot rolling of steel or injection molding of various types of plastics. These components are then transported to the assembly facility in Cesena, Italy, where the final product is assembled through mechanical operations such as welding.

Once assembled, the products are securely packaged on wooden pallets to ensure safe transport. They are then shipped to IWTM AS headquarters in Slemmestad, Norway for distribution to customers.

3 Product

3.6 DESCRIPTION CONSTRUCTION PROCESS

This module is declared to account for the environmental impacts associated with the end-of-life packaging.

3.7 REFERENCE SERVICE LIFE

RSL PRODUCT

The reference service life (RSL) is set to 25 years, as declared by the manufacturer based on product experience and operational practice.

USED RSL (YR) IN THIS LCA CALCULATION:

25

RSL PARTS

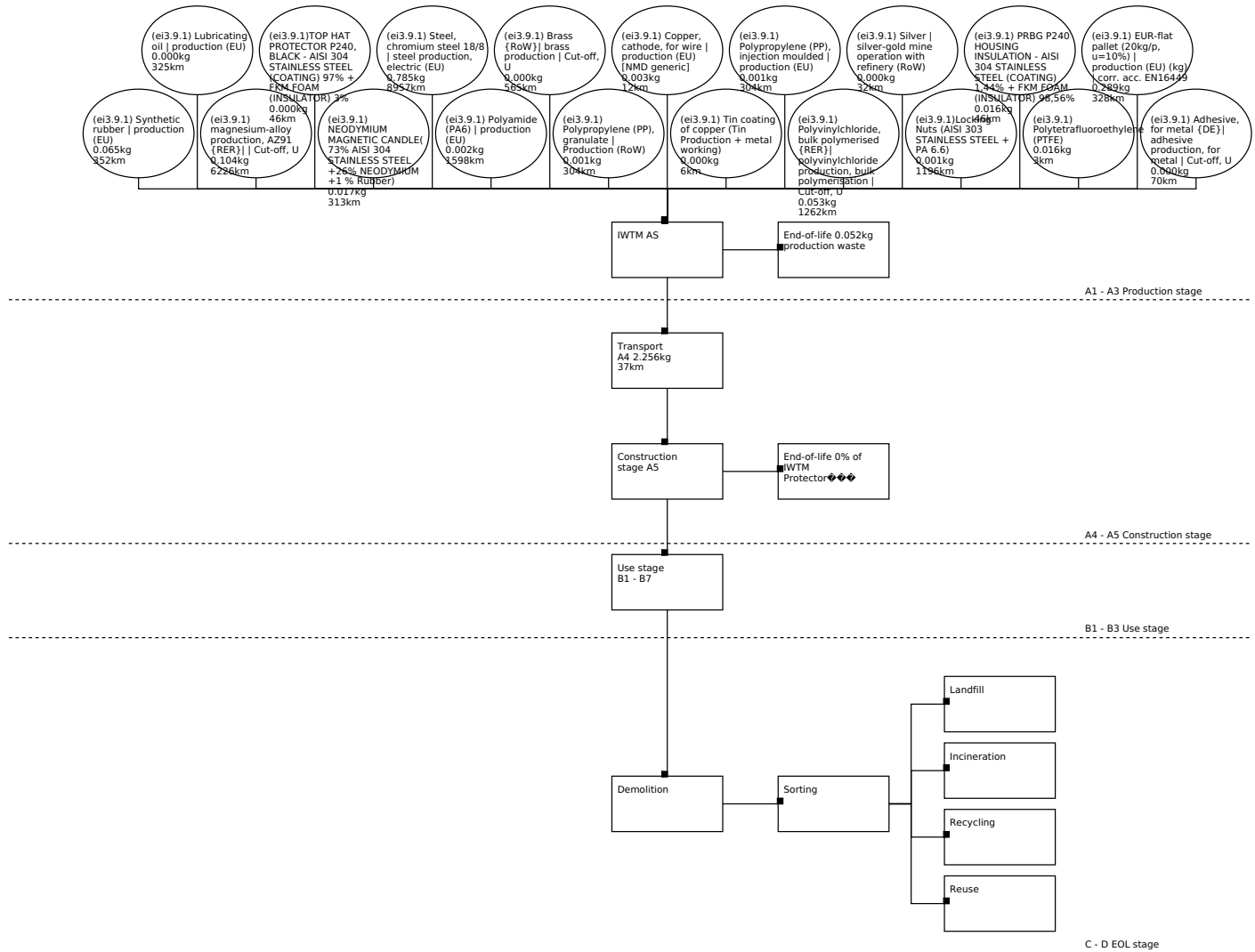
The reference service life (RSL) is set to 25 years, as declared by the manufacturer based on product experience and operational practice.

Module B2 is declared because the product requires replacement of specific internal parts during its service life. The other B-modules are excluded as the tank operates passively, has no additional maintenance, repair, replacement, or refurbishment needs, and does not generate emissions or resource use in those stages.

Description	Material	RSL [yr]
Maintenance (B2)		
Anode	(ei3.9.1) magnesium-alloy production, AZ91 {RER} Cut-off, U	3

3 Product

3.8 PRODUCT FLOW DIAGRAM



4 Goal and Scope Definition

4.1 PURPOSE AND TARGET GROUPS

The purpose of this study is to define the environmental impact of the examined product by creating an Environmental Product Declaration (EPD) based on a Life Cycle Assessment (LCA). The potential environmental impacts are calculated in accordance with ISO 14040 and 14044, which define the LCA method. The EPD is created in accordance with ISO 14025, which defines principles and procedures of Type III environmental declarations, and EN 15804, which defines core rules for EPDs of construction products.

The EPD serves not only the determination of environmental impact of the product, but it also shows the material and energy flows of the production and therefore identifies potential for optimization. Due to the publication of the LCA results by an EPD it is possible to communicate the environmental impacts of the product towards relevant stakeholder groups. Furthermore, the EPD enables the calculation of the environmental impacts on a building level. Therefore, the results of this study can support a fact-oriented dialogue based on a transparent environmental information of the examined products and can be used for business-to-business (B2B) and/or business-to-customer (B2C) communication.

4.2 FUNCTIONAL UNIT

1 kg of IWTM Protector™

The declared unit is 1 kg of IWTM Protector™. All other variations of IWTM Protector™ that are smaller in size and weight are also included within the scope of this declaration.

Reference unit: kilogram (kg)

4.3 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	kg
Conversion factor to 1 kg	0.999528	kg

4.4 REPRESENTATIVENESS

This EPD is representative for IWTM Protector™, a product of IWTM AS. The results of this EPD are representative for Norway.

4 Goal and Scope Definition

4.5 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with options, modules C1-C4 and module D EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	ND	X	ND	ND	ND	ND	ND	X	X	X	X	X

The modules of the EN 15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

4 Goal and Scope Definition

4.6 CUT-OFF CRITERIA

Product stage (A1-A3)

All input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. production waste) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Construction process stage (A4-A5)

All input flows (e.g. transportation to the construction site, additional raw material use for construction, installation energy (use) of energy use for assembly, etc.) and output flows (e.g. construction waste, packaging waste, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Use stage (B1-B3)

All (known) input flows (e.g. raw materials, transportation, energy use, packaging, etc.) and output flows (e.g. emissions to soil, air and water, construction waste, packaging waste, end-of-life waste, etc.) related to the building fabric are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

End of life stage (C1-C4)

All input flows (e.g. energy use for demolition or disassembly, transport to waste processing, etc.) and output flows (e.g. end-of-life waste processing of the product, etc.) are considered in this LCA. The total neglected input flows do therefore not exceed the limit of 5% of energy use and mass.

Benefits and loads beyond the system boundary (Module D)

All benefits and loads beyond the system boundary resulting from reusable products, recyclable materials and/or useful energy carriers leaving the product system are considered in this LCA.

Excluded Elements from LCA Calculation

- The transport of personnel to the plant;
- The transportation of personnel within the plant
- Research and development activities;
- Long-term emissions.

4.7 ALLOCATION

The EPD adheres to the principles of "polluter pays", ensuring that environmental costs are borne by those responsible for emissions and resource use. Furthermore, the system design follows the principle of 'modularity', allowing for flexible integration and scalability.

ALLOCATION USED ENVIRONMENTAL PROFILES / DATASETS

There is no allocation applied for the environmental profiles / datasets used in this LCA. For the sake of clarity, the generic processes which are not changed (e.g. EcolInvent waste treatment processes) are not shown in this overview.

4.8 DATA COLLECTION & REFERENCE PERIOD

All primary data were collected by the manufacturer, IWTM AS AS, for the reference year 2024, covering the period from January to December 2024

4.9 ESTIMATES AND ASSUMPTIONS

A payload factor of 50 percent was used for all truck transports, which in fact corresponds to a full delivery and empty return trip.

The product is assumed to have a lifespan of 25 years, based on IWTM 's experience and the lifespan of the components.

The customers are primarily located in Norway. The transport distance to these customers was estimated based on the average distance from IWTM's office to the central regions of each of the customers.

All scenarios included are currently in use and are representative for one of the most likely scenario alternatives. Office functions, production activities and warehouse operations are located at the same site, and the scenarios therefore reflect the actual operational setup.

4 Goal and Scope Definition

The production waste amount of the metal parts is assumed to be 5 %

Waste generation during the production phase is assumed to be 5 % for the metal raw materials, and 2 % for plastic raw materials. This assumption is used to account for manufacturing losses, off-cuts, and process-related scrap in the life cycle assessment.

The total weight of the product is 152 kg; however, the EPD is modeled for 1 kg of the product, including packaging, maintenance, and other components. Although the declared unit is 1.0 kg, the material inputs may result in a slightly higher weight due to production waste, losses, replacement of parts, and additional elements.

The water filtration tank is assumed to be manually removed at the end of its 25-year service life. No cutting, dismantling tools, lifting equipment, or energy-consuming operations are required. The tank can be detached and transported as a single unit, meaning no emissions or material flows occur in this stage.

Waste scenarios used in this LCA are based on scenarios. These scenarios are the default scenarios available in Rethink, the software used for this calculation. They are considered representative of real-world conditions, and the percentages for each treatment method are similar to, or closely reflect, actual scenarios for raw materials.

Only module B2 is declared, as the remaining B-modules are not technically relevant for this product and generate no emissions or material flows. This assessment is based on the company's operational experience and knowledge of the product's use conditions.

Module B2 is the replacement of the part called "anode". The frequency is based on the customers operational experience for the product.

4.10 DATA QUALITY

All primary data were collected by the manufacturer, IWTM AS AS, for the reference year 2024, covering the period from January 1, 2024, to December 31, 2024. For the data required for modeling that was not provided by the manufacturer and could not be influenced by them, generic data was used. Secondary data were sourced from the regularly updated Ecoinvent database (version 3.9.1), aligning with EN 15804 standards to ensure background data does not exceed 10 years.

The ReTHINK EPD web application was used to model the life cycle for the production and disposal of the declared product systems. To ensure the results are comparable, consistent background data from the international Ecoinvent database was used in the LCA (e.g., data records on energy, transport, auxiliary materials, and suppliers). Almost all consistent data sets contained in the Ecoinvent database are documented and can be viewed online.

The scenarios included are currently in use and are representative of one of the most likely scenario alternatives. According to the criteria of the "UN Environmental Global Guidance on LCA database development" mentioned in EN 15804+A2, the data quality for all three representativeness categories (geographical, technical, and time) can be described as good.

4.11 POWER MIX

The energy used for assembling the components is included in the environmental profiles and is modelled using a market-based approach. IWTM receives a fully processed product and does not modify it in any way before delivering it to their customer.

5 Life Cycle Inventory

5.1 RAW MATERIALS SUPPLY (A1)

To produce the product the following raw material inputs are needed per kilogram. The net amounts (leaving the factory gate as a product) are displayed. Excluding additional amounts related to production waste, construction waste, etc., these amounts are declared at the module they appear. The waste scenario is declared per modeled input to show the link between the amounts accounted for waste processing and the net raw material input. However, waste processing, final disposal and loads and benefit beyond the system boundaries are not declared in module A1 but in C3, C4 and D." The total amount of secondary content at the last row of the table is displayed in kilograms.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
THREADED ROD M10 L925 _process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
PRE-INSULATED RING TERMINAL M8	(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	0.000	kg	17.60		Rexel S.p.A Cesena	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	
PRE-INSULATED RING TERMINAL M8_process	(ei3.9.1) Metal working, average for copper products manufacturing (EU)	0.000	kg	0.00		n.a.		
COPPER BRAIDS 6mm ² , L200	(ei3.9.1) Tin coating of copper (Tin Production + metal working)	0.000	kg	0.00		Rexel S.p.A Cesena	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
G2"1/2 RING NUT	(ei3.9.1) Polypropylene (PP), granulate Production (RoW)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	
G2"1/2 UNION	(ei3.9.1) Polypropylene (PP), granulate Production (RoW)	0.001	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	
G2"1/2 RING NUT_process	(ei3.9.1) Polypropylene (PP), injection moulded production (EU)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
G2"1/2 UNION_process	(ei3.9.1) Polypropylene (PP), injection moulded production (EU)	0.001	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	
INSULATING SLEEVE FOR PANEL CONNECTORS_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.000	kg	0.00		n.a.		
2" SOCKET PLASTIC ROSETTE_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.000	kg	0.00		n.a.		
PRBG P240 EDGE PROTECTION PROFILE_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.042	kg	0.00		n.a.		
Flat connector 6.3 Uninsulated	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Würth	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
PANEL CONNECTORS NON-INSULATED 6.3x0.8	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Rexel S.p.A Cesena	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
Flat connector 6.3 Uninsulated_process	(ei3.9.1) Metal working, average for copper products manufacturing (EU)	0.000	kg	0.00		n.a.		
PANEL CONNECTORS NON-INSULATED 6.3x0.8_process	(ei3.9.1) Metal working, average for copper products manufacturing (EU)	0.000	kg	0.00		n.a.		
INSULATING SLEEVE FOR PANEL CONNECTORS	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	Rexel S.p.A Cesena	(ei3.9.1) PVC, pipes (NMD ID 64)	
2" SOCKET PLASTIC ROSETTE	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	G.L. Articoli Tecnici	(ei3.9.1) PVC, pipes (NMD ID 64)	
PRBG P240 EDGE PROTECTION PROFILE		0.042	kg	0.00	21	Eutras kantenschutz	(ei3.9.1) PVC, pipes (NMD ID 64)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U							
Push button part 1	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	Schendeir Electric	(ei3.9.1) plastics, via residue (NMD ID 43)	
Push button part 2	(ei3.9.1) Silver silver-gold mine operation with refinery (RoW)	0.000	kg	0.00		Schendeir Electric	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	
Push button part 3	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Schendeir Electric	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
Push button part 4	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Schendeir Electric	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
Push button part_process 2,3&4	(ei3.9.1) Metal working, average for metal products manufacturing (EU)	0.000	kg	0.00		n.a.		
Push button part_process 1	(ei3.9.1) Injection moulding process (RoW) (only process)	0.000	kg	0.00		n.a.		
WING NUT WITH THREADED STAINLESS STEEL STUD M8x16	(ei3.9.1)Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		F.S.S	(ei3.9.1) steel, fasteners (NMD ID 69)	
T-HANDLE WITH M6 STAINLESS STEEL THREADED INSERT	(ei3.9.1)Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		F.S.S	(ei3.9.1) steel, fasteners (NMD ID 69)	
NEODYMIUM MAGNETIC CANDLE, Ø25 L600	(ei3.9.1) NEODYMIUM MAGNETIC CANDLE(73% AISI 304 STAINLESS STEEL +26% NEODYMIUM +1 % Rubber)	0.016	kg	30.00		Cibas	(ei3.9.1) steel, fasteners (NMD ID 69)	
PRBG P240 HOUSING INSULATION		0.015	kg	0.00		N.R.G	(ei3.9.1) plastics, via residue (NMD ID 43)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) PRBG P240 HOUSING INSULATION - AISI 304 STAINLESS STEEL (COATING) 1,44% + FKM FOAM (INSULATOR) 98,56%							
TOP HAT PROTECTOR P240, BLACK	(ei3.9.1)TOP HAT PROTECTOR P240, BLACK - AISI 304 STAINLESS STEEL (COATING) 97% + FKM FOAM (INSULATOR) 3%	0.000	kg	44.00		N.R.G	(ei3.9.1) steel, fasteners (NMD ID 69)	
M 6 SELF-LOCKING HIGH NUT UNI 7473	(ei3.9.1)Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		Inox Tecnia	(ei3.9.1) steel, fasteners (NMD ID 69)	
ANODE ISOLATING WASHER, Øe20 Øi8 Sp6	(ei3.9.1) Polytetrafluoroethylene (PTFE)	0.016	kg	0.00	23	Buratti Meccanica	(ei3.9.1) plastics, via residue (NMD ID 43)	
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_metal part	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		F.S.S	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_polyamide part	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)	
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_polyamide part process	(ei3.9.1) Injection moulding process (EU) (only process)	0.000	kg	0.00		n.a.		
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_metal part process	(ei3.9.1) Metal working, average for copper products manufacturing (EU)	0.000	kg	0.00		n.a.		
2x1 CABLE_PVC	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.005	kg	0.00	21	Rexel S.p.A Cesena	(ei3.9.1) PVC, pipes (NMD ID 64)	
2x1 CABLE_PVC process	(ei3.9.1) Injection moulding process (RoW) (only process)	0.005	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
2x1 CABLE_copper process	(ei3.9.1) Metal working, average for copper products manufacturing (EU)	0.003	kg	0.00		n.a.		
2x1 CABLE_copper	(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	0.003	kg	17.60		Rexel S.p.A Cesena	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	
D33 ANODE BUSHING, Øe40 Øi34 L20	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.004	kg	0.00	21	Buratti Meccanica	(ei3.9.1) PVC, pipes (NMD ID 64)	
D33 ANODE BUSHING, Øe40 Øi34 L20_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.004	kg	0.00		n.a.		
Ø273 HOUSING GASKET_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.060	kg	0.00		n.a.		
Ø323.9 HOUSING FILTER_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.000	kg	0.00		n.a.		
Ø266 FILTERING SCREEN GASKET_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.002	kg	0.00		n.a.		
PRBG P240 FLAT GASKET, Øe310 Øi255 Sp3_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.002	kg	0.00		n.a.		
ANODE ISOLATING WASHER, Øe20 Øi8 Sp6_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.016	kg	0.00		n.a.		
Ø33 L1140 ANODE	(ei3.9.1) magnesium-alloy production, AZ91 {RER} Cut-off, U	0.084	kg	0.00		Tigemer	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	
THREADED ROD M12 L65	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Berardi bullonerie	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
THREADED ROD M12 L65_process		0.000	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) Metal working, average for metal products manufacturing (EU)							
M10 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M12 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M14 FEMALE EYEBOLT DIN 582	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M12 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.003	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
HEXAGON CONNECTION NUT M 6, L30	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.005	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8x 10 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
HEXAGON CONNECTION NUT M10, L30	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8x 8 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8 LOW HEXAGON NUT UNI 5589		0.001	kg	45.75		Inox Tirrenica		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)						(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.002	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M10 HEXAGON NUT UNI 5588_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
M12 PLAIN WASHER UNI 6592_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
M14 FEMALE EYEBOLT DIN 582_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
M12 HEXAGON NUT UNI 5588_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.003	kg	0.00		n.a.		
HEXAGON CONNECTION NUT M 6, L30_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.005	kg	0.00		n.a.		
M 8x10 HEXAGON HEAD SCREW UNI 5739_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
HEXAGON CONNECTION NUT M10, L30_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
M 8x 8 HEXAGON HEAD SCREW UNI 5739_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.000	kg	0.00		n.a.		
M 8 LOW HEXAGON NUT UNI 5589_process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.001	kg	0.00		n.a.		
M 8 HEXAGON NUT UNI 5588 _process	(ei3.9.1) Hot rolling, steel processing (EU) (only process)	0.002	kg	0.00		n.a.		
G1/4" BSPP FEMALE SOCKET		0.000	kg	45.75		Inox Tecnia		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)						(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
G1/2" BSPP FEMALE SOCKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
G2" BSPP FEMALE SOCKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.010	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
0-10 BAR PRESSURE GAUGE, G1/4" BACK CONNECTION	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.003	kg	45.75		ItalManometri	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
ROUND FLANGE COVER Ø323.9 P240 8 ANODES, Øe386 Sp15 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.060	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
DOMED BOTTOM DN500 WITH Ø325 HOLE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
DOMED BOTTOM DN500 WITH Ø30 HOLE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.089	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
SHEET METAL Øe30 Sp3 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.003	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PLATE FOR PRBG P40 MAGNETS	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
INSULATION SUPPORT BRACKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P70 exhaust support bracket, 30x20x22 mm, SP2	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 cartridge pressing ring	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 UPPER DIVIDER	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 BASE FLANGE, Øe435 Øi325 Sp10 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.041	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
CRP RING PRBG P240	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.034	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 DEFLECTOR	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.020	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG BLIND BASKET END	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.003	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
8 UNSCREENED ANODES HOLDER, Ø220 Sp3	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.006	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
PRBG P240 HOUSING TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.013	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
ANALOG PRBG P240 FONT PANEL BLACK	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.002	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PIPE, Øe30 Sp2 L620 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.349	kg	45.75		Wonderfil	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 12" MANHOLE TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.015	kg	45.75		Wonderfil	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 BASE TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.008	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
PRBG P240 CARTRIDGE PRESSING TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.023	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
ANODE SCREW, CH17 M8x55	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.006	kg	45.75		Buratti Meccanica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
G1/4" BSPP FEMALE SOCKET_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
G1/2" BSPP FEMALE SOCKET_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
G2" BSPP FEMALE SOCKET_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.010	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
0-10 BAR PRESSURE GAUGE, G1/4" BACK CONNECTION_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.003	kg	0.00		n.a.		
ROUND FLANGE COVER Ø323.9 P240 8 ANODES, Øe386 Sp15 AISI 304_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.060	kg	0.00		n.a.		
DOMED BOTTOM DN500 WITH Ø325 HOLE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
DOMED BOTTOM DN500 WITH Ø30 HOLE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.089	kg	0.00		n.a.		
SHEET METAL Øe30 Sp3 AISI 304_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.003	kg	0.00		n.a.		
PLATE FOR PRBG P40 MAGNETS_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.001	kg	0.00		n.a.		
INSULATION SUPPORT BRACKET_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
PRBG P70 exhaust support bracket, 30x20x22 mm, SP2_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
PRBG P240 cartridge pressing ring_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
PRBG P240 UPPER DIVIDER_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
PRBG P240 BASE FLANGE, Øe435 Øi325 Sp10 AISI 304_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.041	kg	0.00		n.a.		
CRP RING PRBG P240_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.034	kg	0.00		n.a.		
PRBG P240 DEFLECTOR_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.020	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
PRBG BLIND BASKET END_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.003	kg	0.00		n.a.		
8 UNSCREENED ANODES HOLDER, Ø220 Sp3_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.006	kg	0.00		n.a.		
PRBG P240 HOUSING TUBE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.013	kg	0.00		n.a.		
ANALOG PRBG P240 FONT PANEL BLACK_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.002	kg	0.00		n.a.		
PIPE, Øe30 Sp2 L620 AISI 304_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.349	kg	0.00		n.a.		
PRBG P240 12" MANHOLE TUBE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.015	kg	0.00		n.a.		
PRBG P240 BASE TUBE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.008	kg	0.00		n.a.		
PRBG P240 CARTRIDGE PRESSING TUBE_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.023	kg	0.00		n.a.		
ANODE SCREW, CH17 M8x55_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.006	kg	0.00		n.a.		
Ø273 HOUSING GASKET	(ei3.9.1) Synthetic rubber production (EU)	0.060	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	
Ø323.9 HOUSING FILTER	(ei3.9.1) Synthetic rubber production (EU)	0.000	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	
Ø266 FILTERING SCREEN GASKET	(ei3.9.1) Synthetic rubber production (EU)	0.002	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
PRBG P240 FLAT GASKET, Øe310 Øi255 Sp3	(ei3.9.1) Synthetic rubber production (EU)	0.002	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	
Ø33 L1140 ANODE_process	(ei3.9.1) Metal working, average for metal products manufacturing (EU)	0.084	kg	0.00		n.a.		
AMMETER 100 mA	(ei3.9.1) Polyamide (PA6) production (EU)	0.001	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)	
AMMETER 100 mA_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.001	kg	0.00		n.a.		
LOCKING BRACKET WITH THROUGH HOLE_process	(ei3.9.1) Injection moulding process (EU) (only process)	0.000	kg	0.00		n.a.		
LOCKING BRACKET WITH THROUGH HOLE	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)	
G1" BSPT F/F 90° ELBOW	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.002	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
G1/4" M/F ADAPTER	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
40µm SIZE 50 REPS FILTER SCREEN	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.026	kg	45.75		Gaudenzi S.r.l	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
CARTRIDGE SUPPORT Ø266	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.016	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
G1" BSPT F/F 90° ELBOW_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.002	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
G1/4" M/F ADAPTER_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
40µm SIZE 50 REPS FILTER SCREEN_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.026	kg	0.00		n.a.		
CARTRIDGE SUPPORT Ø266_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.016	kg	0.00		n.a.		
M 8 HIGH HEXAGON NUT UNI 5587	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 6 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 6x 55 HEXAGON SOCKET SCREWS UNI 5931	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 6x 16 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
THREADED ROD M10 L925	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Berardi bullonerie	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	
M 8 HIGH HEXAGON NUT UNI 5587_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
M 6 PLAIN WASHER UNI 6592_process		0.000	kg	0.00		n.a.		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)							
M 8 PLAIN WASHER UNI 6592_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
M 6x 55 HEXAGON SOCKET SCREWS UNI 5931_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
M 6x 16 HEXAGON HEAD SCREW UNI 5739_process	(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	0.000	kg	0.00		n.a.		
Total [kg]		1.000		0.347				

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

5.2 TRANSPORT TO MANUFACTURER (A2)

The raw materials are transported from the production location and/or mining location of the supplier to the production location of the manufacturer. The following transport conveyances and distances are applicable for suppliers of the raw materials.

Supplier	Transport conveyance 1	Distance 1 [km]	Transport conveyance 2	Distance 2 [km]	Transport conveyance 3	Distance 3 [km]
Inox Tecnia	(ei3.9.1) Light commercial vehicle (Van)	152				
G.L. Articoli Tecnici	(ei3.9.1) Light commercial vehicle (Van)	154				
Eutras kantenschutz	Lorry (Truck), unspecified (default) market group for (GLO) (EI 3.9.1)	1093				
Schendeir Electric	(ei3.9.1) Light commercial vehicle (Van)	32.2				
Cibas	(ei3.9.1) Light commercial vehicle (Van)	313				
N.R.G	(ei3.9.1) Light commercial vehicle (Van)	46.8				
Tigemer	(ei3.9.1) Light commercial vehicle (Van)	2763		198		152

5 Life Cycle Inventory

Supplier	Transport conveyance 1	Distance 1 [km]	Transport conveyance 2	Distance 2 [km]	Transport conveyance 3	Distance 3 [km]
			(ei3.9.1) Barge tanker (inland waterways)		(ei3.9.1) Light commercial vehicle (Van)	
Berardi bullonerie	(ei3.9.1) Light commercial vehicle (Van)	71				
Inox Tirrenica	(ei3.9.1) Light commercial vehicle (Van)	341				
ItalManometri	(ei3.9.1) Light commercial vehicle (Van)	168				
Lamiera più	(ei3.9.1) Light commercial vehicle (Van)	154	(ei3.9.1) Light commercial vehicle (Van)	3.2		
F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Light commercial vehicle (Van)	12				
New rubber	(ei3.9.1) Light commercial vehicle (Van)	88				
Gaudenzi S.r.l	(ei3.9.1) Light commercial vehicle (Van)	197				

5.3 PRODUCTION PROCESS (A3)

ENERGY CONSUMPTION

To produce the product there's no energy used

EMISSIONS

No emissions to soil, water and/or air are taken into account in the LCA calculation.

EXTERNAL TREATMENTS

No treatments are performed by an external party during the production of the product.

PRODUCTION WASTE

The following amount of waste is generated during production per kilogram of the product. The additional needed raw materials, transport to the production plant and waste processing of the production waste up to the end-of-waste state are all included in module A3. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
PRE-INSULATED RING TERMINAL M8	(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	0.000	kg	17.60		Rexel S.p.A Cesena	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)
COPPER BRAIDS 6mm², L200	(ei3.9.1) Tin coating of copper (Tin Production + metal working)	0.000	kg	0.00		Rexel S.p.A Cesena	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
G2"1/2 RING NUT	(ei3.9.1) Polypropylene (PP), granulate Production (RoW)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)
G2"1/2 UNION	(ei3.9.1) Polypropylene (PP), granulate Production (RoW)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)
G2"1/2 RING NUT_process	(ei3.9.1) Polypropylene (PP), injection moulded production (EU)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)
G2"1/2 UNION_process	(ei3.9.1) Polypropylene (PP), injection moulded production (EU)	0.000	kg	0.00	32.78	Inox Tecnia	(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)
Flat connector 6.3 Uninsulated	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Würth	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
PANEL CONNECTORS NON-INSULATED 6.3x0.8	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Rexel S.p.A Cesena	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
INSULATING SLEEVE FOR PANEL CONNECTORS	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	Rexel S.p.A Cesena	(ei3.9.1) PVC, pipes (NMD ID 64)
2" SOCKET PLASTIC ROSETTE	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	G.L. Articoli Tecnici	(ei3.9.1) PVC, pipes (NMD ID 64)
		0.002	kg	0.00	21		

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
PRBG P240 EDGE PROTECTION PROFILE	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U					Eutras kantenschutz	(ei3.9.1) PVC, pipes (NMD ID 64)
Push button part 1	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	Schendeir Electric	(ei3.9.1) plastics, via residue (NMD ID 43)
Push button part 2	(ei3.9.1) Silver silver-gold mine operation with refinery (RoW)	0.000	kg	0.00		Schendeir Electric	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)
Push button part 3	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		Schendeir Electric	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
Push button part 4	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Schendeir Electric	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
WING NUT WITH THREADED STAINLESS STEEL STUD M8x16	(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		F.S.S	(ei3.9.1) steel, fasteners (NMD ID 69)
T-HANDLE WITH M6 STAINLESS STEEL THREADED INSERT	(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		F.S.S	(ei3.9.1) steel, fasteners (NMD ID 69)
NEODYMIUM MAGNETIC CANDLE, Ø25 L600	(ei3.9.1) NEODYMIUM MAGNETIC CANDLE(73% AISI 304 STAINLESS STEEL +26% NEODYMIUM +1 % Rubber)	0.001	kg	30.00		Cibas	(ei3.9.1) steel, fasteners (NMD ID 69)
PRBG P240 HOUSING INSULATION	(ei3.9.1) PRBG P240 HOUSING INSULATION - AISI 304 STAINLESS STEEL (COATING) 1,44% + FKM FOAM (INSULATOR) 98,56%	0.001	kg	0.00		N.R.G	(ei3.9.1) plastics, via residue (NMD ID 43)
TOP HAT PROTECTOR P240, BLACK	(ei3.9.1) TOP HAT PROTECTOR P240, BLACK - AISI 304 STAINLESS STEEL (COATING) 97% + FKM FOAM (INSULATOR) 3%	0.000	kg	44.00		N.R.G	(ei3.9.1) steel, fasteners (NMD ID 69)
M 6 SELF-LOCKING HIGH NUT UNI 7473	(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.000	kg	38.00		Inox Tecnia	(ei3.9.1) steel, fasteners (NMD ID 69)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
ANODE ISOLATING WASHER, Øe20 Øi8 Sp6	(ei3.9.1) Polytetrafluoroethylene (PTFE)	0.000	kg	0.00	23	Buratti Meccanica	(ei3.9.1) plastics, via residue (NMD ID 43)
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_metal part	(ei3.9.1) Brass {RoW} brass production Cut-off, U	0.000	kg	0.00		F.S.S	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_polyamide part	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)
2x1 CABLE_PVC	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	Rexel S.p.A Cesena	(ei3.9.1) PVC, pipes (NMD ID 64)
2x1 CABLE_copper	(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	0.000	kg	17.60		Rexel S.p.A Cesena	(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)
D33 ANODE BUSHING, Øe40 Øi34 L20	(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	0.000	kg	0.00	21	Buratti Meccanica	(ei3.9.1) PVC, pipes (NMD ID 64)
Ø33 L1140 ANODE	(ei3.9.1) magnesium-alloy production, AZ91 {RER} Cut-off, U	0.004	kg	0.00		Tigemer	(ei3.9.1) Metals, mixed (via residue (NMD ID 49)
THREADED ROD M12 L65	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Berardi bullonerie	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M10 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M12 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
M14 FEMALE EYEBOLT DIN 582	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M12 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
HEXAGON CONNECTION NUT M 6, L30	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8x 10 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
HEXAGON CONNECTION NUT M10, L30	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8x 8 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8 LOW HEXAGON NUT UNI 5589	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8 HEXAGON NUT UNI 5588	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
G1/4" BSPP FEMALE SOCKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
G1/2" BSPP FEMALE SOCKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
G2" BSPP FEMALE SOCKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
0-10 BAR PRESSURE GAUGE, G1/4" BACK CONNECTION	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		ItalManometri	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
ROUND FLANGE COVER Ø323.9 P240 8 ANODES, Øe386 Sp15 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.003	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
DOMED BOTTOM DN500 WITH Ø325 HOLE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
DOMED BOTTOM DN500 WITH Ø30 HOLE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.004	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
SHEET METAL Øe30 Sp3 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PLATE FOR PRBG P40 MAGNETS	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
INSULATION SUPPORT BRACKET	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
PRBG P70 exhaust support bracket, 30x20x22 mm, SP2	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 cartridge pressing ring	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 UPPER DIVIDER	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 BASE FLANGE, Øe435 Øi325 Sp10 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.002	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
CRP RING PRBG P240	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.002	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 DEFLECTOR	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG BLIND BASKET END	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
8 UNSCREENED ANODES HOLDER, Ø220 Sp3	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 HOUSING TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
ANALOG PRBG P240 FONT PANEL BLACK	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		F.Ili Vitali Lattonieri S.r.l.	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PIPE, Øe30 Sp2 L620 AISI 304	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.017	kg	45.75		Wonderfil	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 12" MANHOLE TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Wonderfil	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 BASE TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
PRBG P240 CARTRIDGE PRESSING TUBE	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
ANODE SCREW, CH17 M8x55	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Buratti Meccanica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
Ø273 HOUSING GASKET	(ei3.9.1) Synthetic rubber production (EU)	0.001	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)
Ø323.9 HOUSING FILTER	(ei3.9.1) Synthetic rubber production (EU)	0.000	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)
Ø266 FILTERING SCREEN GASKET	(ei3.9.1) Synthetic rubber production (EU)	0.000	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
PRBG P240 FLAT GASKET, Øe310 Øi255 Sp3	(ei3.9.1) Synthetic rubber production (EU)	0.000	kg	0.00	27.19	New rubber	(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)
AMMETER 100 mA	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)
LOCKING BRACKET WITH THROUGH HOLE	(ei3.9.1) Polyamide (PA6) production (EU)	0.000	kg	0.00	30.79	F.S.S	(ei3.9.1) plastics, via residue (NMD ID 43)
G1" BSPT F/F 90° ELBOW	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
G1/4" M/F ADAPTER	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tecnia	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
40µm SIZE 50 REPS FILTER SCREEN	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Gaudenzi S.r.l	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
CARTRIDGE SUPPORT Ø266	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.001	kg	45.75		Lamiera più	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8 HIGH HEXAGON NUT UNI 5587	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 6 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 8 PLAIN WASHER UNI 6592	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
							(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 6x 55 HEXAGON SOCKET SCREWS UNI 5931	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
M 6x 16 HEXAGON HEAD SCREW UNI 5739	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Inox Tirrenica	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
THREADED ROD M10 L925	(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.000	kg	45.75		Berardi bullonerie	(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)
Total [kg]		0.047	0.017				

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

PACKAGING MATERIALS

The following amount of packaging materials is modeled for the product per kilogram. The production of the packaging materials and transport to the production plant is included in module A3. Waste processing up to the end-of-waste state and final disposal of the packaging material is included in module A5. Loads and benefits beyond the system boundary in module D.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
Wooden packaging	(ei3.9.1) EUR-flat pallet (20kg/p, u=10%) production (EU) (kg) corr. acc. EN16449	0.289	kg	0.00	13.99	Orlandi	(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	
Total [kg]		0.289		0.000				

5 Life Cycle Inventory

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

ANCILLARY MATERIALS

The following amount of ancillary materials is modeled for the product per kilogram. The production of the used ancillary materials, transport to the production plant and waste processing up to the end-of-waste state of the ancillary materials are all included in module A3. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
Lubricant	(ei3.9.1) Lubricating oil production (EU)	0.000	kg	0.00	34.7	Henkel	(ei3.9.1) Waste mineral oil (100% Incineration)	
Sealant	(ei3.9.1) Adhesive, for metal {DE} adhesive production, for metal Cut-off, U	0.000	kg	0.00	30	Camon	(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	
water for testing	(ei3.9.1) Ground water	1.506	kg	0.00		n.a.		
Welding	(ei3.9.1) Welding, gas, steel (EU)	0.060	m	n.a.	n.a.	n.a.		
Total [kg]		1.506		0.000				

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

TRANSPORT TO MANUFACTURER

The following transport conveyances and distances to the production location are assumed. The supplier is stated per input flow at this module. The suppliers taken into account for production waste related to the net inputs at module A1 are declared at chapter 5.2.

Supplier	Transport conveyance 1	Distance 1 [km]
Orlandi	(ei3.9.1) Light commercial vehicle (Van)	328
Henkel	(ei3.9.1) Light commercial vehicle (Van)	325
Camon	(ei3.9.1) Light commercial vehicle (Van)	70

5 Life Cycle Inventory

OUTPUT FLOWS AT MODULE A3

The waste scenario(s) applicable for the production waste and/or ancillary materials are resulting in the following output flows at module A3:

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
Production waste					
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0	7.437e-6	0	0.0001413	0
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	0	0.0002112	0.0002112	0.003801	0
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0	1.92e-6	1.632e-5	9.6e-7	0
(ei3.9.1) PVC, pipes (NMD ID 64)	0	0.0002284	0.0004568	0.001599	0
(ei3.9.1) plastics, via residue (NMD ID 43)	0	0.0002262	0.0009048	0	0
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0	0.001868	0.001868	0.03362	0
(ei3.9.1) steel, fasteners (NMD ID 69)	0	8.35e-6	0	0.0008266	0
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0	0.0001265	0.001075	6.325e-5	0
Total	0.000	0.003	0.005	0.040	0.000

In the EN15804 is stated that, as a general rule, potential loads and/or benefits from modules A1-A3 do not appear in module D. Therefore the potential loads and/or benefits from A1-A3 as a result of the net output flows from the production stage are declared in module A3. The following table shows the amount of potential loads and/or benefits beyond the system boundaries that are taken into account.

The primary equivalent that has been accounted as benefit when recycling and/or reusing primary material (net output) are stated in chapter 6 Waste scenarios. This chapter also contains the process taken into account as a benefit for energy recovery for the energy amount as stated in the following table.

The net output flow [kg] is determined by reducing the 'materials for recycling [kg]' by the amount of 'secondary material input [kg]' resulting in the net output flow.

Waste Scenario	Recycling [kg]	Secondary material input [kg]	Net output flow [kg]	Re-use [kg]	Energy recovery [MJ]
Production waste					
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0.0001413	2.618e-5	0.0001151	0	0
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	0.003801	0	0.003801	0	0
Total	0.040	0.017	0.023	0.000	0.046

5 Life Cycle Inventory

Waste Scenario	Recycling [kg]	Secondary material input [kg]	Net output flow [kg]	Re-use [kg]	Energy recovery [MJ]
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	9.6e-7	0	9.6e-7	0	0.000535
(ei3.9.1) PVC, pipes (NMD ID 64)	0.001599	0	0.001599	0	0.009594
(ei3.9.1) plastics, via residue (NMD ID 43)	0	0	0	0	0.006976
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.03362	0.01709	0.01653	0	0
(ei3.9.1) steel, fasteners (NMD ID 69)	0.0008266	0.0002552	0.0005714	0	0
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	6.325e-5	0	6.325e-5	0	0.02924
Total	0.040	0.017	0.023	0.000	0.046

The amount of secondary material input during the production stage by using extra material to compensate production losses is based on the following raw materials which contain (partly) secondary content:

Environmental profile / dataset	Secondary material input [kg]	Primary equivalent for secondary material input
Production waste		
(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	2.618e-5	(ei3.9.1) Copper, anode market for (GLO)
(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.01709	(ei3.9.1) Benefits module D World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)
(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	1.026e-5	
(ei3.9.1) NEODYMIUM MAGNETIC CANDLE(73% AISI 304 STAINLESS STEEL +26% NEODYMIUM +1 % Rubber)	0.0002369	
(ei3.9.1) TOP HAT PROTECTOR P240, BLACK - AISI 304 STAINLESS STEEL (COATING) 97% + FKM FOAM (INSULATOR) 3%	8.14e-6	
Total	0.017	

5.4 TRANSPORT TO CONSTRUCTION SITE (A4)

The following scenario is applicable for transport of the product to the construction site

Transported mass [kg]	Transport conveyance 1	Distance 1 [km]
1.289	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	37

5 Life Cycle Inventory

5.5 CONSTRUCTION STAGE (A5)

CONSTRUCTION WASTE OF THE PRODUCT

Waste output flows as a result of losses at the construction site is assumed to be 0%.

ADDITIONAL INPUT FLOW(S) CONSTRUCTION STAGE

There are no (significant) raw material, energy or transport inputs needed in the construction stage.

WASTE FLOW(S) PACKAGING MATERIAL(S)

Waste processing is included in module A5, potential loads and/or benefits are included in module D. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

The waste scenario(s) applicable for the packaging material(s) are resulting in the following output flows at module A5:

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	0.000	0.029	0.246	0.014	0.000
Total	0.000	0.029	0.246	0.014	0.000

5.6 MAINTENANCE (B2)

To fulfil the requirements as stated in the applicable functional unit (4.2) and to achieve the reference service life as stated in chapter 3.7, maintenance is needed. The following maintenance activities are needed during the products reference service life:

Description	Environmental profile / dataset used*	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit	Comments
Anode	(ei3.9.1) magnesium-alloy production, AZ91 {RER} Cut-off, U	3	7.333	0.0116	0.0850628	kg	

The following end-of-life scenario(s) are used for the raw material(s) used for maintenance. Waste processing is included in module B2, potential loads and/or benefits are included in module D. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

Description	Total Amount	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario applicable
Anode	0.0850628	0		Tigemer	(ei3.9.1) Metals, mixed (via residue (NMD ID 49))

The waste scenario(s) applicable for maintenance are resulting in the following output flows.

5 Life Cycle Inventory

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) Metals, mixed (via residue (NMD ID 49))	0.000	0.004	0.004	0.077	0.000
Total	0.000	0.004	0.004	0.077	0.000

The following transport conveyances and distances to the production location are applicable for maintenance activities. The supplier is stated per input flow at this module.

Supplier	Transport conveyance 1	Distance 1 [km]	Transport conveyance 2	Distance 2 [km]	Transport conveyance 3	Distance 3 [km]
Tigemer	(ei3.9.1) Light commercial vehicle (Van)	2763	(ei3.9.1) Barge tanker (inland waterways)	198	(ei3.9.1) Light commercial vehicle (Van)	152

5.7 DE-CONSTRUCTION, DEMOLITION (C1)

No inputs are needed for the product at the de-construction / demolition phase

5.8 TRANSPORT END-OF-LIFE (C2)

The applicable end-of-life transport scenarios are in detail described in chapter 6 Waste scenarios.

5.9 WASTE PROCESSING (C3)

After demolition and transport of the waste streams to the applicable waste processing routes, the waste is processed for final disposal or recycling and/or reuse. The calculated quantities and the applicable end-of-life scenario are shown below. The processes taken into account for waste processing are shown in chapter 6.3.

Waste Scenario	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.003	0.000
(ei3.9.1) Metals, mixed (via residue (NMD ID 49))	0.004	0.076	0.000
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.002	0.000	0.000
(ei3.9.1) PVC, pipes (NMD ID 64)	0.010	0.036	0.000
(ei3.9.1) plastics, via residue (NMD ID 43)	0.026	0.000	0.000
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.037	0.672	0.000
Total	0.134	0.807	0.000

5 Life Cycle Inventory

Waste Scenario	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) steel, fasteners (NMD ID 69)	0.000	0.017	0.000
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.054	0.003	0.000
Total	0.134	0.807	0.000

5.10 FINAL DISPOSAL (C4)

Some waste streams are not used for reprocessing or energy recovery but are final disposed. This is the case when the material is land-filled and/or when the product is not removed and stays in the work. The following amounts per final disposal stream are applicable for the product. The processes taken into account for the type of final disposal can be found at the applicable waste scenario in chapter 6.4.

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0.000	0.000
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	0.000	0.004
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.000
(ei3.9.1) PVC, pipes (NMD ID 64)	0.000	0.005
(ei3.9.1) plastics, via residue (NMD ID 43)	0.000	0.007
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.000	0.037
(ei3.9.1) steel, fasteners (NMD ID 69)	0.000	0.000
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.000	0.006
Total	0.000	0.060

5.11 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY

LOADS AND BENEFITS BEYOND THE SYSTEM BOUNDARY

When products are reused or materials are recycled a benefit may be taken into account in module D. According to the EN 15804+A2:2019 this benefit may only be calculated for the net output flow of secondary material that comes available for the next life cycle. Determined by reducing the material for recycling by the amount of secondary material input. The amounts are listed per assumed waste scenario in the table below.

In chapter 6.6 the avoided primary equivalent for recycling and re-use and the assumed Q factor ($Q_{r\ out}$ / Q_{sub}) are listed per waste scenario. In chapter 6.5 the additional needed

5 Life Cycle Inventory

loads to equal the avoided primary equivalent after reaching the end-of-waste state are declared.

The amount of energy content (LHV in MJ) taken into account for energy recovery by incineration of the materials is also listed. The avoided energy mix and thermal and electric efficiency for the incinerators taken into account are shown at chapter 6.7.

Waste Scenario	Recycling [kg]	Secondary material input [kg]	Net output flow [kg]	Re-use [kg]	Energy recovery [MJ]
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	0.003	0.001	0.002	0.000	0.000
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	0.076	0.000	0.076	0.000	0.000
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.000	0.000	0.000	0.000	0.053
(ei3.9.1) PVC, pipes (NMD ID 64)	0.036	0.000	0.036	0.000	0.214
(ei3.9.1) plastics, via residue (NMD ID 43)	0.000	0.000	0.000	0.000	0.336
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	0.672	0.342	0.331	0.000	0.000
(ei3.9.1) steel, fasteners (NMD ID 69)	0.017	0.005	0.011	0.000	0.000
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.003	0.000	0.003	0.000	1.462
Total	0.807	0.347	0.459	0.000	2.065

The following table shows the amount of secondary material input and when applicable which primary equivalent is taken into account for calculating the load to address to module D.

Environmental profile / dataset	Secondary material input [kg]	Primary equivalent for secondary material input
(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	0.0005236	(ei3.9.1) Copper, anode market for (GLO)
(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	0.3418	(ei3.9.1) Benefits module D World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)
(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	0.0002052	
(ei3.9.1) NEODYMIUM MAGNETIC CANDLE(73% AISI 304 STAINLESS STEEL +26% NEODYMIUM +1 % Rubber)	0.004737	
(ei3.9.1) TOP HAT PROTECTOR P240, BLACK - AISI 304 STAINLESS STEEL (COATING) 97% + FKM FOAM (INSULATOR) 3%	0.0001628	
Total	0.347	

5 Life Cycle Inventory

B3 MAINTENANCE

For B3 the same values are used as listed in the tables in this chapter for raw materials, but are multiplied with the 'Number of repair cycles (n)' factor as shown in chapter 5.8

6 Waste Scenarios

In this chapter the used waste scenarios for waste generated during production, construction, use and end-of-life are shown. Per needed input at every stage of the life cycle assessment the used waste scenario is declared. The used scenario design, used processes for impacts and other assumptions are listed per paragraph in this chapter.

6.1 SCENARIO DESIGN

The following scenario design is used per type of waste scenario.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	NL	0	5	0	95	0
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	NL	0	5	5	90	0
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	NL	0	10	85	5	0
(ei3.9.1) PVC, pipes (NMD ID 64)	NL	0	10	20	70	0
(ei3.9.1) plastics, via residue (NMD ID 43)	NL	0	20	80	0	0
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	NL	0	5	5	90	0
(ei3.9.1) steel, fasteners (NMD ID 69)	NL	0	1	0	99	0
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	NL	0	10	85	5	0
(ei3.9.1) Waste mineral oil (100% Incineration)	NL	0	0	100	0	0
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	NL	0	10	85	5	0

The following considered transport conveyance(s) and distances per waste flow are used for the (different) waste scenario(s).

Waste Scenario	Transport conveyance*	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) PVC, pipes (NMD ID 64)		0	100	150	50	50

6 Waste Scenarios

Waste Scenario	Transport conveyance*	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)					
(ei3.9.1) plastics, via residue (NMD ID 43)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) steel, fasteners (NMD ID 69)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) Waste mineral oil (100% Incineration)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	(ei3.9.1) Lorry (Truck), unspecified (default) market group for (GLO)	0	100	150	50	50

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.2 END OF WASTE STATUS

In accordance with the EN 15804+A2:2019 all process needed up until the end-of-waste state must be taken into account in module C. In the following table the assumed end-of-waste state for recycling for each used waste scenario is listed. When not applicable, when for example the scenario consists only of 100% incineration, it is declared at the waste scenario.

Waste Scenario	Substantiation End-of-Waste status
	The copper and copper alloys scrap shall have been segregated at source or while collecting and shall have been kept separate or the input wastes shall have been treated to separate the copper and copper alloys scrap from the non-metal and non-copper metal components. All mechanical treatments (like cutting,

6 Waste Scenarios

Waste Scenario	Substantiation End-of-Waste status
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	shearing, shredding or granulating; sorting, separation, cleaning, de-polluting, emptying) needed to prepare the metal scrap for direct input into final use shall have been completed. [End-of-waste Criteria for Copper and Copper Alloy Scrap: Technical Proposals, Publications Office of the European Union, 2011]
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	The iron or steel scrap shall have been segregated at source or while collecting and been kept separate; or the input wastes shall have been treated to separate the iron and steel scrap from the non-metal and nonferrous components. All mechanical treatment (like cutting, shearing, shredding or granulating; sorting, separation, cleaning, de-polluting, emptying) needed to prepare the material for direct input into final use shall have been completed. [End-of-waste Criteria for Iron and Steel Scrap: Technical Proposals, Publications Office of the European Union, 2010]. In accordance with the world steel method the impact of recycling is included in module D.
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Waste plastic streams used as input shall, once received by the producer or importer, be kept permanently separate from the contact with any other waste, including other waste plastic grades. All treatments needed to prepare the waste plastic for direct input in a free flowing form to manufacturing of plastic products, such as de-baling, sorting, separating, size-reducing, cleaning, melting, filtering, regranulating, or grading, shall have been completed. [End-of-waste criteria for waste plastic for conversion. Technical proposals, Publications Office of the European Union, 2014]
(ei3.9.1) PVC, pipes (NMD ID 64)	Waste plastic streams used as input shall, once received by the producer or importer, be kept permanently separate from the contact with any other waste, including other waste plastic grades. All treatments needed to prepare the waste plastic for direct input in a free flowing form to manufacturing of plastic products, such as de-baling, sorting, separating, size-reducing, cleaning, melting, filtering, regranulating, or grading, shall have been completed. [End-of-waste criteria for waste plastic for conversion. Technical proposals, Publications Office of the European Union, 2014]
(ei3.9.1) plastics, via residue (NMD ID 43)	In this scenario the end-of-waste point will not be reached.
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	The iron or steel scrap shall have been segregated at source or while collecting and been kept separate; or the input wastes shall have been treated to separate the iron and steel scrap from the non-metal and nonferrous components. All mechanical treatment (like cutting, shearing, shredding or granulating; sorting, separation, cleaning, de-polluting, emptying) needed to prepare the material for direct input into final use shall have been completed. [End-of-waste Criteria for Iron and Steel Scrap: Technical Proposals, Publications Office of the European Union, 2010]. In accordance with the world steel method the impact of recycling is included in module D.
(ei3.9.1) steel, fasteners (NMD ID 69)	The iron or steel scrap shall have been segregated at source or while collecting and been kept separate; or the input wastes shall have been treated to separate the iron and steel scrap from the non-metal and nonferrous components. All mechanical treatment (like cutting, shearing, shredding or granulating; sorting, separation, cleaning, de-polluting, emptying) needed to prepare the material for direct input into final use shall have been completed. [End-of-waste Criteria for Iron and Steel Scrap: Technical Proposals, Publications Office of the European Union, 2010]. In accordance with the world steel method the impact of recycling is included in module D.
	The end-of-waste status is reached when the wood is processed into chips. The processing up to and including chipping of the wood is included for recycling. For incineration and landfill, the end-of-waste status is not reached.

6 Waste Scenarios

Waste Scenario	Substantiation End-of-Waste status
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	
(ei3.9.1) Waste mineral oil (100% Incineration)	Not applicable the end-of-waste status is not reached.
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	Not applicable, when incinerating (efficiency <60%) the end-of-waste status is not reached.
(ei3.9.1) elastomers (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Waste plastic streams used as input shall, once received by the producer or importer, be kept permanently separate from the contact with any other waste, including other waste plastic grades. All treatments needed to prepare the waste plastic for direct input in a free flowing form to manufacturing of plastic products, such as de-baling, sorting, separating, size-reducing, cleaning, melting, filtering, regranulating, or grading, shall have been completed. [End-of-waste criteria for waste plastic for conversion. Technical proposals, Publications Office of the European Union, 2014]

6 Waste Scenarios

6.3 WASTE PROCESSING

The following processes are taken into account for each waste processing type. The applicable amount(s) can be found at chapter 5, where all inventory data is declared.

Waste Scenario	Waste processing type	Used environmental profile / dataset*
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	Recycling	(ei3.9.1) Iron scrap, sorted, pressed {RER} sorting and pressing of iron scrap
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	Incineration	(ei3.9.1) Scrap steel {Europe without Switzerland} treatment of scrap steel, municipal incineration
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	Recycling	(ei3.9.1) Materials for recycling, no waste processing taken into account
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Incineration	(ei3.9.1) Waste treatment of 21% PE, 21% PP, 20% PVC, 17% PS en 21% mixture {CH}, municipal incineration
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Recycling	(ei3.9.1) Waste polyethylene, for recycling (EU)
(ei3.9.1) PVC, pipes (NMD ID 64)	Incineration	(ei3.9.1) Waste polyvinylchloride {CH} treatment of, municipal incineration
(ei3.9.1) PVC, pipes (NMD ID 64)	Recycling	(ei3.9.1) Waste polyethylene, for recycling (EU)
(ei3.9.1) plastics, via residue (NMD ID 43)	Incineration	(ei3.9.1) Waste treatment of 21% PE, 21% PP, 20% PVC, 17% PS en 21% mixture {CH}, municipal incineration
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Incineration	(ei3.9.1) Scrap steel {Europe without Switzerland} treatment of scrap steel, municipal incineration
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Recycling	(ei3.9.1) Materials for recycling, no waste processing taken into account
(ei3.9.1) steel, fasteners (NMD ID 69)	Recycling	(ei3.9.1) Materials for recycling, no waste processing taken into account
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	Incineration	(ei3.9.1) Waste wood, untreated, municipal incineration (CH) (u=10%) corr. acc. EN16449
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	Recycling	(ei3.9.1) Waste wood, stationary electric chipper processing (EU) (u=10%) corr. acc. EN16449
(ei3.9.1) Waste mineral oil (100% Incineration)	Incineration	(ei3.9.1) Waste mineral oil {Europe without Switzerland} treatment of waste mineral oil, hazardous waste incineration Cut-off, U
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	Incineration	(ei3.9.1) Waste paint {Europe without Switzerland} treatment of waste paint, municipal incineration
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Incineration	(ei3.9.1) Waste rubber, unspecified {Europe without Switzerland} treatment of waste rubber, unspecified, municipal incineration
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Recycling	(ei3.9.1) Waste polyethylene, for recycling (EU)

6 Waste Scenarios

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.4 FINAL DISPOSAL

For final disposal the following process(es) are considered for the different types of final disposal. The applicable amount(s) can be found at chapter 5, where all inventory data is declared.

Waste Scenario	Type of final disposal	Used environmental profile / dataset*
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	Landfill	(ei3.9.1) Scrap tin sheet {CH} treatment of, sanitary landfill
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	Landfill	(ei3.9.1) Scrap tin sheet {CH} treatment of, sanitary landfill
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Landfill	(ei3.9.1) Waste polyethylene {Europe without Switzerland} treatment of waste polyethylene, sanitary landfill
(ei3.9.1) PVC, pipes (NMD ID 64)	Landfill	(ei3.9.1) Waste polyvinylchloride {Europe without Switzerland} treatment of waste polyvinylchloride, sanitary landfill
(ei3.9.1) plastics, via residue (NMD ID 43)	Landfill	(ei3.9.1) Waste treatment of 21% PE, 21% PP, 17% PVC, 21% PS en 20% mixture {ROW}, to sanitary landfill Cutt-off, U
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Landfill	(ei3.9.1) Scrap tin sheet {CH} treatment of, sanitary landfill
(ei3.9.1) steel, fasteners (NMD ID 69)	Landfill	(ei3.9.1) Scrap steel {Europe without Switzerland} treatment of scrap steel, inert material landfill
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	Landfill	(ei3.9.1) Waste wood, treatment of waste wood, untreated, sanitary landfill (EU) (u=10%) corr. acc. EN16449
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Landfill	(ei3.9.1) Waste polyethylene {Europe without Switzerland} treatment of waste polyethylene, sanitary landfill

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.5 LOADS FROM END-OF-WASTE STATE TO POINT OF SUBSTITUTION

When the substituted process for recycling and/or reuse of primary content goes beyond the end-of-waste state. An additional burden should be taken into account in module D for the difference between the end-of-waste state and the substituted process. When

6 Waste Scenarios

applicable, in the following table the additional process taken into account is declared per waste scenario.

Waste Scenario	Loads from EoW to point of substitution	Used environmental profile / dataset*
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	Recycling	
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	Recycling	
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Recycling	
(ei3.9.1) PVC, pipes (NMD ID 64)	Recycling	
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Recycling	
(ei3.9.1) steel, fasteners (NMD ID 69)	Recycling	
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	Recycling	
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Recycling	

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.6 BENEFITS RECYCLING AND/OR RE-USE

When recycling or reusing a raw material of product a benefit may be taken into account in module D. The following table shows the waste scenario's where recycling is applicable and which process is used as avoided primary equivalent. Also the used Q factor is declared and substantiated.

Waste Scenario	Benefit for	Avoided primary equivalent	Q factor (Q _{out} / Q _{sub})	Substantiation Q factor
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	Recycling	(ei3.9.1) Copper, anode market for (GLO)	1	No loss of quality when recycling the material
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	Recycling	(ei3.9.1) Benefits module D World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)	1	No loss of quality when recycling the material
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	Recycling	(ei3.9.1) Polyethylene, high-density (HDPE), granulate production (EU)	0.67	Estimation has been made that recycling is possible with a maximum of 3 cycles, therefore a Q-factor of $2/3 = 0,67$ is used.

6 Waste Scenarios

Waste Scenario	Benefit for	Avoided primary equivalent	Q factor (Qr out / Qsub)	Substantiation Q factor
(ei3.9.1) PVC, pipes (NMD ID 64)	Recycling	(ei3.9.1) Polyvinylchloride, suspension polymerised (S-PVC) production (EU)	0.67	Estimation has been made that recycling is possible with a maximum of 3 cycles, therefore a Q-factor of $2/3 = 0,67$ is used.
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	Recycling	(ei3.9.1) Benefits module D World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)	1	No loss of quality when recycling the material
(ei3.9.1) steel, fasteners (NMD ID 69)	Recycling	(ei3.9.1) Benefits module D World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)	1	No loss of quality when recycling the material
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	Recycling	(ei3.9.1) Wood chips, dry, measured as dry mass (u=0%) (EU) no biogenic CO2 uptake	1	No loss of quality when recycling the material
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	Recycling	(ei3.9.1) Polyethylene, high-density (HDPE), granulate production (EU)	0.67	Estimation has been made that recycling is possible with a maximum of 3 cycles, therefore a Q-factor of $2/3 = 0,67$ is used.

6.7 LOADS SECONDARY MATERIAL LOST

In R<THiNK the net output flow is determined by reducing the materials for recycling by the secondary material input. The amount of materials for recycling and the amount of secondary material input are declared in the applicable chapters. The following table shows the Q factor used for secondary material input and the substantiation of the value.

Waste Scenario	Q factor (Qr out / Qsub)	Substantiation Q factor
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	1	Not applicable
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	1	Not applicable
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	0.67	Equal to quality factor recycling
(ei3.9.1) PVC, pipes (NMD ID 64)	0.67	Equal to quality factor recycling
(ei3.9.1) plastics, via residue (NMD ID 43)	1	Not applicable
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	1	Not applicable

6 Waste Scenarios

Waste Scenario	Q factor (Q _{r out} / Q _{sub})	Substantiation Q factor
(ei3.9.1) steel, fasteners (NMD ID 69)	1	Not applicable
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	1	Equal to quality factor recycling
(ei3.9.1) Waste mineral oil (100% Incineration)	1	Not applicable
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	1	Not applicable
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.67	Equal to quality factor recycling

6.8 BENEFITS ENERGY RECOVERY

When waste is incinerated with energy recovery a benefit may be taken into account in module D. The following table shows the waste scenario where benefits related to energy recovery is applicable, which energy process is taken into account for avoided energy production and the used electrical en thermal efficiency.

Waste Scenario	Used environmental profile / dataset*
(ei3.9.1) copper (i.a. sheets, pipes) (NMD ID 41)	not_applicable
(ei3.9.1) Metals, mixed (via residue (NMD ID 49)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) polyolefines (i.a. pe,pp) (i.a. pipes, foils) (NMD ID 57)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) PVC, pipes (NMD ID 64)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) plastics, via residue (NMD ID 43)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) Metals, others (i.a. fasteners, fittings) (NMD ID 50)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) steel, fasteners (NMD ID 69)	not_applicable
(ei3.9.1) wood 'clean', via residue (NMD ID 35) (u=10%) corr. acc. EN16449	(ei3.9.1) Benefits Energy recovery,renewable raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) Waste mineral oil (100% Incineration)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) finishes (adhered to wood, plastic, metal) (NMD ID 2)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)
(ei3.9.1) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	(ei3.9.1) Benefits Energy recovery, fossil based raw material (eff. 18% electric, 31% Thermal) (per MJ LHV)

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

7 Results

For the impact assessment long-term emissions (>100 years) are not considered. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

7.1 ENVIRONMENTAL IMPACT INDICATORS PER KILOGRAM

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C1	C2	C3	C4	D	Total
GWP-total	kg CO ₂ eq.	1.12E+1	6.45E-1	1.98E-1	1.20E+1	7.11E-3	4.92E-1	2.89E+0	0.00E+0	9.89E-3	2.92E-1	2.38E-3	-5.88E-1	1.51E+1
GWP-f	kg CO ₂ eq.	1.11E+1	6.45E-1	6.78E-1	1.24E+1	7.08E-3	8.69E-3	2.89E+0	0.00E+0	9.85E-3	2.91E-1	2.38E-3	-5.89E-1	1.50E+1
GWP-b	kg CO ₂ eq.	5.87E-2	4.38E-4	-4.81E-1	-4.22E-1	2.31E-6	4.84E-1	1.75E-3	0.00E+0	3.21E-6	1.05E-3	1.86E-6	6.73E-4	6.56E-2
GWP-luluc	kg CO ₂ eq.	8.20E-3	4.56E-4	9.40E-4	9.59E-3	2.52E-5	2.26E-5	1.79E-3	0.00E+0	3.51E-5	4.64E-5	2.73E-7	-3.59E-5	1.15E-2
ODP	kg CFC 11 eq.	6.95E-5	1.05E-8	1.80E-6	7.13E-5	1.26E-10	3.17E-10	7.40E-8	0.00E+0	1.75E-10	6.05E-9	1.80E-11	-4.84E-8	7.14E-5
AP	mol H ⁺ eq.	4.62E-2	3.15E-3	3.14E-3	5.25E-2	3.39E-5	1.08E-4	1.18E-2	0.00E+0	4.72E-5	1.78E-4	4.47E-6	-3.65E-3	6.10E-2
EP-fw	kg P eq.	4.16E-4	9.00E-6	2.83E-5	4.54E-4	7.04E-8	1.23E-7	1.18E-4	0.00E+0	9.80E-8	1.55E-6	7.05E-9	2.79E-5	6.02E-4
EP-m	kg N eq.	2.00E-2	1.02E-3	1.38E-3	2.24E-2	1.29E-5	4.84E-5	2.87E-3	0.00E+0	1.79E-5	4.57E-5	2.35E-6	-4.57E-4	2.49E-2
EP-T	mol N eq.	8.63E-2	1.11E-2	8.51E-3	1.06E-1	1.37E-4	5.36E-4	3.20E-2	0.00E+0	1.91E-4	4.93E-4	1.94E-5	-7.72E-3	1.32E-1
POCP	kg NMVOC eq.	3.36E-2	4.21E-3	3.31E-3	4.11E-2	4.69E-5	1.52E-4	1.49E-2	0.00E+0	6.53E-5	1.54E-4	7.47E-6	-3.92E-3	5.26E-2
ADP-mm	kg Sb-eq.	1.97E-4	5.05E-6	8.31E-6	2.11E-4	2.22E-8	2.49E-8	1.02E-5	0.00E+0	3.09E-8	2.49E-7	1.54E-9	-2.43E-5	1.97E-4
ADP-f	MJ	1.11E+2	8.91E+0	8.20E+0	1.28E+2	1.01E-1	1.19E-1	3.68E+1	0.00E+0	1.41E-1	4.72E-1	1.49E-2	-6.66E+0	1.59E+2
WDP	m ³ world eq.	1.78E+0	4.67E-2	1.59E-1	1.98E+0	5.54E-4	1.46E-3	2.33E-1	0.00E+0	7.71E-4	1.39E-2	2.44E-4	-7.17E-1	1.52E+0

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratospheric ozone layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprivation potential, deprivation-weighted water consumption (WDP)

7 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C1	C2	C3	C4	D	Total
PM	disease incidence	2.03E-6	6.36E-8	1.26E-7	2.22E-6	6.99E-10	1.26E-9	1.75E-6	0.00E+0	9.73E-10	2.05E-9	1.04E-10	-5.22E-8	3.92E-6
IR	kBq U235 eq.	5.27E-1	6.58E-3	2.60E-2	5.60E-1	3.96E-5	1.09E-4	4.13E-2	0.00E+0	5.51E-5	2.02E-3	1.71E-5	4.06E-3	6.07E-1
ETP-fw	CTUe	8.89E+1	4.69E+0	6.22E+0	9.99E+1	7.49E-2	9.80E-2	1.14E+1	0.00E+0	1.04E-1	2.70E+0	3.83E-1	2.43E+0	1.17E+2
HTP-c	CTUh	4.58E-8	9.33E-10	3.09E-9	4.99E-8	3.75E-12	7.59E-11	1.29E-8	0.00E+0	5.22E-12	4.41E-11	5.93E-13	4.66E-9	6.75E-8
HTP-nc	CTUh	2.01E-7	7.21E-9	1.12E-8	2.19E-7	8.15E-11	2.17E-10	2.30E-8	0.00E+0	1.13E-10	6.41E-10	3.93E-11	1.32E-8	2.57E-7
SQP	Pt	5.25E+1	3.67E+0	4.47E+1	1.01E+2	8.01E-2	9.24E-2	8.45E+0	0.00E+0	1.11E-1	2.26E-1	3.47E-2	-1.10E+1	9.88E+1

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality index (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
ILCD type / level 3	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2

7 Results

ILCD classification	Indicator	Disclaimer
	Potential Soil quality index (SQP)	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 disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.		
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 experienced with the indicator.		

7.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B2	C1	C2	C3	C4	D	Total
PERE	MJ	1.76E+1	2.23E-1	4.32E+0	2.21E+1	1.43E-3	2.96E-3	1.70E+0	0.00E+0	2.00E-3	5.78E-2	7.63E-4	-2.23E+0	2.17E+1
PERM	MJ	0.00E+0	0.00E+0	4.04E+0	4.04E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	4.04E+0
PERT	MJ	1.76E+1	2.23E-1	8.36E+0	2.62E+1	1.43E-3	2.96E-3	1.70E+0	0.00E+0	2.00E-3	5.78E-2	7.63E-4	-2.23E+0	2.57E+1
PENRE	MJ	1.07E+2	8.91E+0	8.13E+0	1.24E+2	1.02E-1	1.19E-1	3.68E+1	0.00E+0	1.41E-1	4.72E-1	1.49E-2	-6.05E+0	1.56E+2
PENRM	MJ	3.27E+0	0.00E+0	6.77E-2	3.34E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-6.07E-1	2.73E+0
PENRT	MJ	1.11E+2	8.91E+0	8.20E+0	1.28E+2	1.02E-1	1.19E-1	3.68E+1	0.00E+0	1.41E-1	4.72E-1	1.49E-2	-6.66E+0	1.59E+2
SM	Kg	3.48E-1	0.00E+0	1.74E-2	3.65E-1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-4.54E-4	3.65E-1
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	m ³	6.02E-2	1.64E-3	4.91E-3	6.68E-2	2.45E-5	1.48E-4	8.19E-3	0.00E+0	3.41E-5	6.32E-4	1.75E-5	-1.34E-2	6.25E-2

PERE=Use of renewable primary energy excluding renewable primary energy resources 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 excluding non-renewable primary 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 material | **RSF**=Use of renewable secondary fuels | **NRSF**=Use of non-renewable secondary fuels | **FW**=Net use of fresh water

7 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B2	C1	C2	C3	C4	D	Total
HWD	Kg	3.30E-4	1.95E-4	9.44E-5	6.19E-4	6.47E-7	6.80E-7	2.25E-4	0.00E+0	9.00E-7	1.55E-6	7.03E-8	-8.79E-5	7.59E-4
NHWD	Kg	5.26E+0	2.79E-1	3.44E-1	5.89E+0	6.70E-3	2.82E-1	4.43E-1	0.00E+0	9.33E-3	1.49E-1	6.03E-2	7.93E-2	6.92E+0
RWD	Kg	6.03E-4	4.37E-6	2.97E-5	6.37E-4	2.32E-8	9.73E-8	2.85E-5	0.00E+0	3.23E-8	1.56E-6	9.56E-9	2.40E-6	6.70E-4

HWD=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1- A3	A4	A5	B2	C1	C2	C3	C4	D	Total
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	4.01E-2	4.01E-2	0.00E+0	1.44E-2	8.04E-2	0.00E+0	0.00E+0	8.07E-1	0.00E+0	0.00E+0	9.42E-1
MER	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
EET	MJ	0.00E+0	0.00E+0	1.46E-2	1.46E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.71E+0	1.72E+0
EEE	MJ	0.00E+0	0.00E+0	8.49E-3	8.49E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	9.90E-1	9.99E-1

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy, Thermic | **EEE**=Exported Energy, Electric

7 Results

7.3 INFORMATION ON BIOGENIC CARBON CONTENT PER KILOGRAM

BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per kilogram:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.1314	kg C

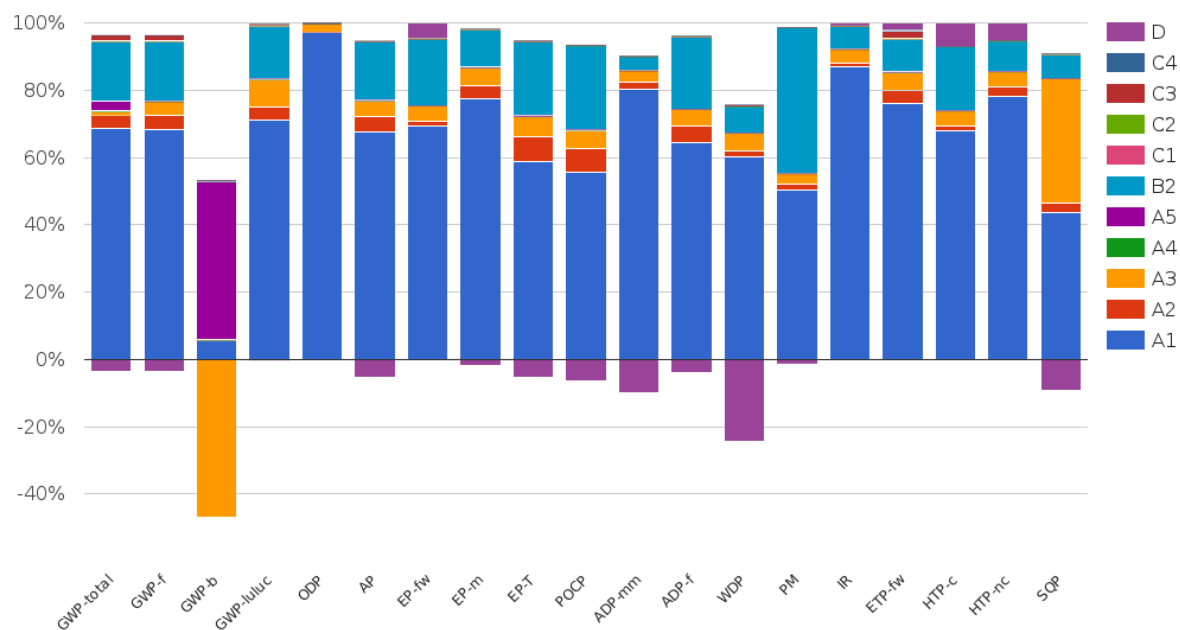
UPTAKE OF BIOGENIC CARBON DIOXIDE

The following amount of carbon dioxide uptake is taken into account. Related uptake and release of carbon dioxide in downstream processes are not taken into account in this number although they do appear in the presented results. One kilogram of biogenic Carbon content is equivalent to 44/12 kg of biogenic carbon dioxide uptake.

Uptake Biogenic Carbon dioxide	Amount	Unit
Packaging	0.4817	kg CO2 (biogenic)

8 Interpretation of results

8.1 CONTRIBUTION ANALYSIS OF THE MODULES



Module A1 is by far the dominant contributor across nearly all impact categories, highlighting that the environmental performance of the product is largely driven by raw material production. This reflects the energy- and resource-intensive nature of upstream material extraction and processing. In particular, the production of multiple metals used in the product, such as magnesium and chromium steel, is highly energy-intensive and therefore contributes significantly to the overall environmental impacts.

Module A3 has a minor contribution to several impact categories, with the most notable effect observed in GWP-B, reflecting emissions related to biogenic carbon associated with the wooden packaging.

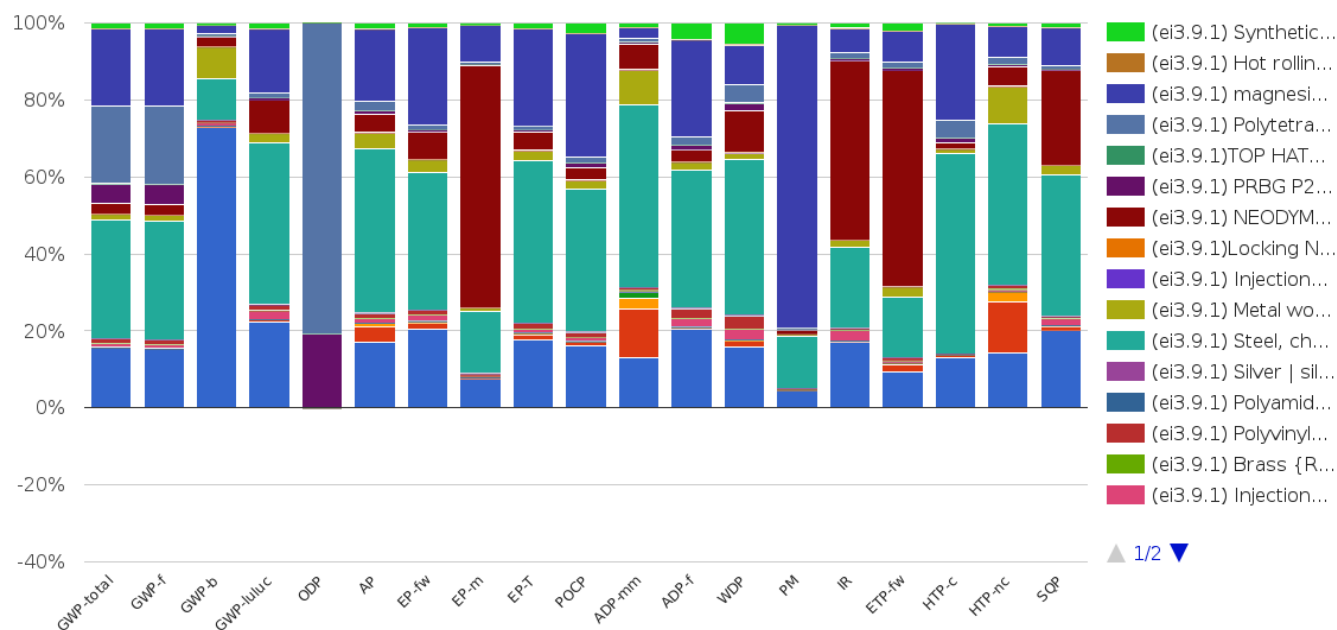
8 Interpretation of results

Module B2, contributes substantially to indicators such as GWP-total, ODP, AP, and EP, associated with the maintenance of replacing Anodes every third year.

Other modules like A5, C2, C3 and C4 show relatively minor impacts contributions in most categories.

The disposal stage (D) accounts for the environmental benefits and burdens from the reuse, recycling, or energy recovery of materials at the end of the product's life cycle.

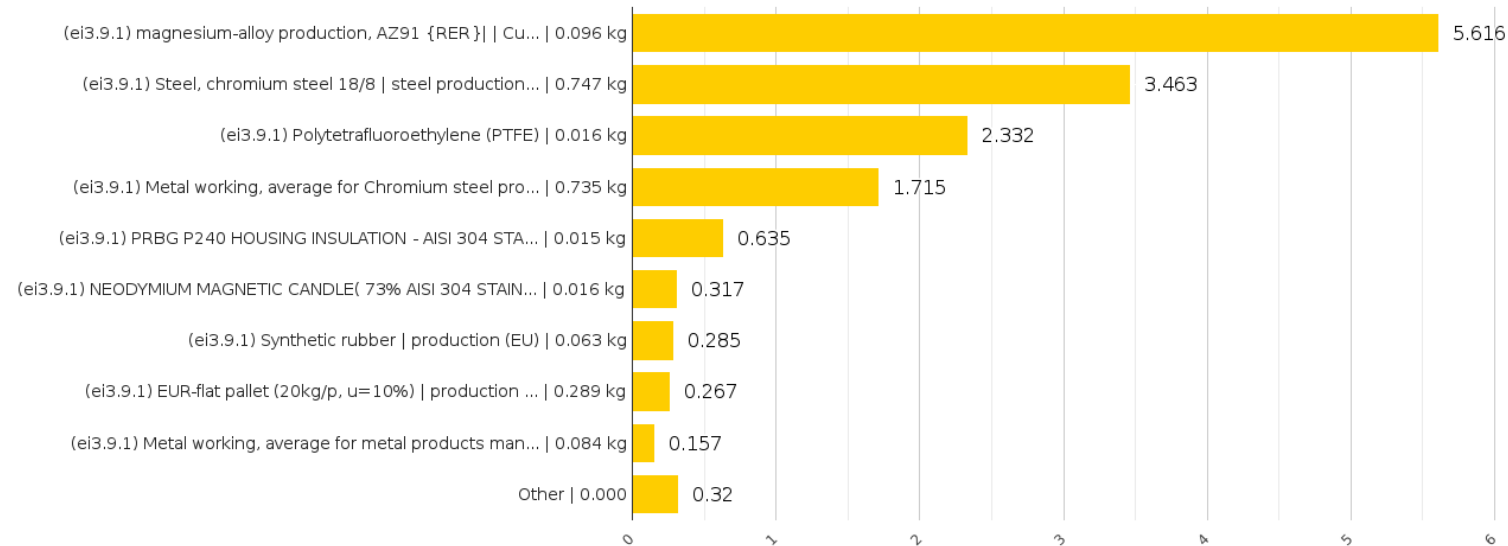
8.2 CONTRIBUTION ANALYSIS OF THE RAW MATERIALS (A1)



8 Interpretation of results

8.3 CONTRIBUTION ANALYSIS OF THE INPUTS

The following diagram shows the contribution of the inputs, expressed in the Global warming potential - total. The results per input are the sum of all declared modules including module D.



9 Sensitivity analysis

10 Data collection details

10.1 DATA QUALITY OF THE LIFECYCLE INVENTORY DATA

Description	Determination matter	Data source
Raw material(s)		
THREADED ROD M10 L925 _process	measured	Company
PRE-INSULATED RING TERMINAL M8	measured	Company
PRE-INSULATED RING TERMINAL M8_process	measured	Company
COPPER BRAIDS 6mm ² , L200	measured	Company
G2"1/2 RING NUT	measured	Company
G2"1/2 UNION	measured	Company
G2"1/2 RING NUT_process	measured	Company
G2"1/2 UNION_process	measured	Company
INSULATING SLEEVE FOR PANEL CONNECTORS_process	measured	Company
2" SOCKET PLASTIC ROSETTE_process	measured	Company
PRBG P240 EDGE PROTECTION PROFILE_process	measured	Company
Flat connector 6.3 Uninsulated	measured	Company
PANEL CONNECTORS NON-INSULATED 6.3x0.8	measured	Company
Flat connector 6.3 Uninsulated_process	measured	Company
PANEL CONNECTORS NON-INSULATED 6.3x0.8_process	measured	Company
INSULATING SLEEVE FOR PANEL CONNECTORS	measured	Company
2" SOCKET PLASTIC ROSETTE	measured	Company
PRBG P240 EDGE PROTECTION PROFILE	measured	Company
Push button part 1	measured	Company
Push button part 2	measured	Company
Push button part 3	measured	Company
Push button part 4	measured	Company
Push button part_process 2,3&4	measured	Company
Push button part_process 1	measured	Company
WING NUT WITH THREADED STAINLESS STEEL STUD M8x16	measured	Company
T-HANDLE WITH M6 STAINLESS STEEL THREADED INSERT	measured	Company

10 Data collection details

Description	Determination matter	Data source
NEODYMIUM MAGNETIC CANDLE, Ø25 L600	measured	Company
PRBG P240 HOUSING INSULATION	measured	Company
TOP HAT PROTECTOR P240, BLACK	measured	Company
M 6 SELF-LOCKING HIGH NUT UNI 7473	measured	Company
ANODE ISOLATING WASHER, Øe20 Øi8 Sp6	measured	Company
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_metal part	measured	Company
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_polyamide part	measured	Company
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_polyamide part process	measured	Company
STAR HANDWHEEL WITH THREADED THROUGH-HOLE INSERT M10_metal part process	measured	Company
2x1 CABLE_PVC	measured	Company
2x1 CABLE_PVC process	measured	Company
2x1 CABLE_copper process	measured	Company
2x1 CABLE_copper	measured	Company
D33 ANODE BUSHING, Øe40 Øi34 L20	measured	Company
D33 ANODE BUSHING, Øe40 Øi34 L20_process	measured	Company
Ø273 HOUSING GASKET_process	measured	Company
Ø323.9 HOUSING FILTER_process	measured	Company
Ø266 FILTERING SCREEN GASKET_process	measured	Company
PRBG P240 FLAT GASKET, Øe310 Øi255 Sp3_process	measured	Company
ANODE ISOLATING WASHER, Øe20 Øi8 Sp6_process	measured	Company
Ø33 L1140 ANODE	measured	Company
THREADED ROD M12 L65	measured	Company
THREADED ROD M12 L65_process	measured	Company
M10 HEXAGON NUT UNI 5588	measured	Company
M12 PLAIN WASHER UNI 6592	measured	Company
M14 FEMALE EYEBOLT DIN 582	measured	Company
M12 HEXAGON NUT UNI 5588	measured	Company
HEXAGON CONNECTION NUT M 6, L30	measured	Company
M 8x 10 HEXAGON HEAD SCREW UNI 5739	measured	Company

10 Data collection details

Description	Determination matter	Data source
HEXAGON CONNECTION NUT M10, L30	measured	Company
M 8x 8 HEXAGON HEAD SCREW UNI 5739	measured	Company
M 8 LOW HEXAGON NUT UNI 5589	measured	Company
M 8 HEXAGON NUT UNI 5588	measured	Company
M10 HEXAGON NUT UNI 5588_process	measured	Company
M12 PLAIN WASHER UNI 6592_process	measured	Company
M14 FEMALE EYEBOLT DIN 582_process	measured	Company
M12 HEXAGON NUT UNI 5588_process	measured	Company
HEXAGON CONNECTION NUT M 6, L30_process	measured	Company
M 8x 10 HEXAGON HEAD SCREW UNI 5739_process	measured	Company
HEXAGON CONNECTION NUT M10, L30_process	measured	Company
M 8x 8 HEXAGON HEAD SCREW UNI 5739_process	measured	Company
M 8 LOW HEXAGON NUT UNI 5589_process	measured	Company
M 8 HEXAGON NUT UNI 5588 _process	measured	Company
G1/4" BSPP FEMALE SOCKET	measured	Company
G1/2" BSPP FEMALE SOCKET	measured	Company
G2" BSPP FEMALE SOCKET	measured	Company
0-10 BAR PRESSURE GAUGE, G1/4" BACK CONNECTION	measured	Company
ROUND FLANGE COVER Ø323.9 P240 8 ANODES, Øe386 Sp15 AISI 304	measured	Company
DOMED BOTTOM DN500 WITH Ø325 HOLE	measured	Company
DOMED BOTTOM DN500 WITH Ø30 HOLE	measured	Company
SHEET METAL Øe30 Sp3 AISI 304	measured	Company
PLATE FOR PRBG P40 MAGNETS	measured	Company
INSULATION SUPPORT BRACKET	measured	Company
PRBG P70 exhaust support bracket, 30x20x22 mm, SP2	measured	Company
PRBG P240 cartridge pressing ring	measured	Company
PRBG P240 UPPER DIVIDER	measured	Company
PRBG P240 BASE FLANGE, Øe435 Øi325 Sp10 AISI 304	measured	Company
CRP RING PRBG P240	measured	Company

10 Data collection details

Description	Determination matter	Data source
PRBG P240 DEFLECTOR	measured	Company
PRBG BLIND BASKET END	measured	Company
8 UNSCREENED ANODES HOLDER, Ø220 Sp3	measured	Company
PRBG P240 HOUSING TUBE	measured	Company
ANALOG PRBG P240 FONT PANEL BLACK	measured	Company
PIPE, Øe30 Sp2 L620 AISI 304	measured	Company
PRBG P240 12" MANHOLE TUBE	measured	Company
PRBG P240 BASE TUBE	measured	Company
PRBG P240 CARTRIDGE PRESSING TUBE	measured	Company
ANODE SCREW, CH17 M8x55	measured	Company
G1/4" BSPP FEMALE SOCKET_process	measured	Company
G1/2" BSPP FEMALE SOCKET_process	measured	Company
G2" BSPP FEMALE SOCKET_process	measured	Company
0-10 BAR PRESSURE GAUGE, G1/4" BACK CONNECTION_process	measured	Company
ROUND FLANGE COVER Ø323.9 P240 8 ANODES, Øe386 Sp15 AISI 304_process	measured	Company
DOMED BOTTOM DN500 WITH Ø325 HOLE_process	measured	Company
DOMED BOTTOM DN500 WITH Ø30 HOLE_process	measured	Company
SHEET METAL Øe30 Sp3 AISI 304_process	measured	Company
PLATE FOR PRBG P40 MAGNETS_process	measured	Company
INSULATION SUPPORT BRACKET_process	measured	Company
PRBG P70 exhaust support bracket, 30x20x22 mm, SP2_process	measured	Company
PRBG P240 cartridge pressing ring_process	measured	Company
PRBG P240 UPPER DIVIDER_process	measured	Company
PRBG P240 BASE FLANGE, Øe435 Øi325 Sp10 AISI 304_process	measured	Company
CRP RING PRBG P240_process	measured	Company
PRBG P240 DEFLECTOR_process	measured	Company
PRBG BLIND BASKET END_process	measured	Company
8 UNSCREENED ANODES HOLDER, Ø220 Sp3_process	measured	Company
PRBG P240 HOUSING TUBE_process	measured	Company

10 Data collection details

Description	Determination matter	Data source
ANALOG PRBG P240 FONT PANEL BLACK_process	measured	Company
PIPE, Øe30 Sp2 L620 AISI 304_process	measured	Company
PRBG P240 12" MANHOLE TUBE_process	measured	Company
PRBG P240 BASE TUBE_process	measured	Company
PRBG P240 CARTRIDGE PRESSING TUBE_process	measured	Company
ANODE SCREW, CH17 M8x55_process	measured	Company
Ø273 HOUSING GASKET	measured	Company
Ø323.9 HOUSING FILTER	measured	Company
Ø266 FILTERING SCREEN GASKET	measured	Company
PRBG P240 FLAT GASKET, Øe310 Øi255 Sp3	measured	Company
Ø33 L1140 ANODE_process	measured	Company
AMMETER 100 mA	measured	Company
AMMETER 100 mA_process	measured	Company
LOCKING BRACKET WITH THROUGH HOLE_process	measured	Company
LOCKING BRACKET WITH THROUGH HOLE	measured	Company
G1" BSPT F/F 90° ELBOW	measured	Company
G1/4" M/F ADAPTER	measured	Company
40µm SIZE 50 REPS FILTER SCREEN	measured	Company
CARTRIDGE SUPPORT Ø266	measured	Company
G1" BSPT F/F 90° ELBOW_process	measured	Company
G1/4" M/F ADAPTER_process	measured	Company
40µm SIZE 50 REPS FILTER SCREEN_process	measured	Company
CARTRIDGE SUPPORT Ø266_process	measured	Company
M 8 HIGH HEXAGON NUT UNI 5587	measured	Company
M 6 PLAIN WASHER UNI 6592	measured	Company
M 8 PLAIN WASHER UNI 6592	measured	Company
M 6x 55 HEXAGON SOCKET SCREWS UNI 5931	measured	Company
M 6x 16 HEXAGON HEAD SCREW UNI 5739	measured	Company
THREADED ROD M10 L925	measured	Company

10 Data collection details

Description	Determination matter	Data source
M 8 HIGH HEXAGON NUT UNI 5587_process	measured	Company
M 6 PLAIN WASHER UNI 6592_process	measured	Company
M 8 PLAIN WASHER UNI 6592_process	measured	Company
M 6x 55 HEXAGON SOCKET SCREWS UNI 5931_process	measured	Company
M 6x 16 HEXAGON HEAD SCREW UNI 5739_process	measured	Company
Ancillary materials		
Lubricant	measured	Company
Sealant	measured	Company
water for testing	measured	Company
Welding	measured	Company
Packaging material(s)		
Wooden packaging	measured	Company
Maintenance		
Anode	measured	Company

10.2 APPROACH OF SUPPLIERS FOR LCA DATA

Supplier	supplier approached for company-specific environmental data?	Manner in which the supplier is approached	Received document type
Rexel S.p.A Cesena	no		
Inox Tecnia	no		
Würth	no		
G.L. Articoli Tecnici	no		
Eutras kantenschutz	no		
Schendeir Electric	no		
F.S.S	no		
Cibas	no		
N.R.G	no		
Buratti Meccanica	no		
Tigemer	no		

10 Data collection details

Supplier	supplier approached for company-specific environmental data?	Manner in which the supplier is approached	Received document type
Berardi bullonerie	no		
Orlandi	no		
Henkel	no		
Camon	no		
Inox Tirrenica	no		
ItalManometri	no		
Lamiera più	no		
F.Ili Vitali Lattonieri S.r.l.	no		
Wonderfil	no		
New rubber	no		
Gaudenzi S.r.l	no		

10.3 USED PROCESSES

Shortened name in report	Processes used	Source	Third-party verified	Valid until	Comments
(ei3.9.1) Metal working, average for Chromium steel products manufacturing (EU)	1kg Metal working, average for chromium steel product manufacturing {RER} metal working, average for chromium steel product manufacturing Cut-off, U	ecoinvent 3.9.1 (2022)	no		Includes capital goods, energie use, loss of material, etc.
(ei3.9.1) Copper, cathode, for wire production (EU) [NMD generic]	1kg 0059-fab&Koper, kathode, voor draad (European mix for cathodes o.b.v. 49% Copper, cathode {GLO} electrorefining of copper, anode , 9% Copper {RER} treatment of scrap by electrolytic refining & 42% Copper, cathode {GLO} market for; 82,6% primair, 17,4% secundair)	NMD 3.11	no		
(ei3.9.1) Metal working, average for copper products manufacturing (EU)	1kg Metal working, average for copper product manufacturing {RER} metal working, average for copper product manufacturing Cut-off, U	ecoinvent 3.9.1 (2022)	no		Includes capital goods, energie use, loss of material, etc.
(ei3.9.1) Tin coating of copper (Tin Production + metal working)	Tin {RoW} tin production Cut-off, U + Metal working, average for metal product manufacturing {RER} metal working, average for metal product manufacturing Cut-off, U	ecoinvent 3.9.1(2022)	no		

10 Data collection details

Shortened name in report	Processes used	Source	Third-party verified	Valid until	Comments
(ei3.9.1) Polypropylene (PP), granulate Production (RoW)	1kg Polypropylene, granulate {RoW} polypropylene production, granulate Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Polypropylene (PP), injection moulded production (EU)	1kg NIBE Polypropylene (PP), injection moulded production (RER)	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Injection moulding process (EU) (only process)	1kg Injection moulding {RER} injection moulding Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Brass {RoW} brass production Cut-off, U	Brass {RoW} brass production Cut-off, U	ecoinvent 3.9.1(2022)	no		
(ei3.9.1) Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	Polyvinylchloride, bulk polymerised {RER} polyvinylchloride production, bulk polymerisation Cut-off, U	ecoinvent 3.9.1(2022)	no		
(ei3.9.1) Polyamide (PA6) production (EU)	1kg Nylon 6 {RER} nylon 6 production Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Silver silver-gold mine operation with refinery (RoW)	Silver {RoW} silver-gold mine operation with refinery Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Steel, chromium steel 18/8 steel production, electric (EU)	1kg Steel, chromium steel 18/8 {RER} steel production, electric, chromium steel 18/8 Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Metal working, average for metal products manufacturing (EU)	1kg Metal working, average for metal product manufacturing {RER} metal working, average for metal product manufacturing Cut-off, U	ecoinvent 3.9.1 (2022)	no		Includes capital goods, energie use, loss of material, etc.
(ei3.9.1) Injection moulding process (RoW) (only process)	1kg Injection moulding {RoW} injection moulding Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Locking Nuts (AISI 303 STAINLESS STEEL + PA 6.6)	Steel, chromium steel 18/8 {RER} steel production, electric, chromium steel 18/8 Cut-off, U + Metal working, average for chromium steel product manufacturing {RER} metal working, average for chromium steel product manufacturing Cut-off, U + Nylon 6-6, glass-filled {RER} nylon 6-6	ecoinvent 3.9.1(2022)	no		

10 Data collection details

Shortened name in report	Processes used	Source	Third-party verified	Valid until	Comments
	production, glass-filled Cut-off, U + Injection moulding {RER} injection moulding Cut-off, U used ratio:0.85: 0.15 (steel: nylon 6.6)				
(ei3.9.1) NEODYMIUM MAGNETIC CANDLE(73% AISI 304 STAINLESS STEEL +26% NEODYMIUM +1 % Rubber)	Steel, chromium steel 18/8 {RER} steel production, electric, chromium steel 18/8 Cut-off, U + Neodymium oxide {RoW} rare earth oxides production, from rare earth carbonate concentrate Cut-off, U + Synthetic rubber {RER} synthetic rubber production Cut-off, U + Metal working, average for chromium steel product manufacturing {RER} metal working, average for chromium steel product manufacturing Cut-off, U	ecoinvent 3.9.1(2022)	no		
(ei3.9.1) PRBG P240 HOUSING INSULATION - AISI 304 STAINLESS STEEL (COATING) 1,44% + FKM FOAM (INSULATOR) 98,56%	Steel, chromium steel 18/8 {RER} steel production, electric, chromium steel 18/8 Cut-off, U + FKM foam (synthetic rubber (70%), tetrafluoroethylene (25%), stabilizer magnesium oxide (5%))	ecoinvent 3.9.1(2022)	no		
(ei3.9.1)TOP HAT PROTECTOR P240, BLACK - AISI 304 STAINLESS STEEL (COATING) 97% + FKM FOAM (INSULATOR) 3%	Steel, chromium steel 18/8 {RER} steel production, electric, chromium steel 18/8 Cut-off, U + FKM foam (synthetic rubber (70%), tetrafluoroethylene (25%), stabilizer magnesium oxide (5%)) + Metal working, average for chromium steel product manufacturing {RER} metal working, average for chromium steel product manufacturing Cut-off, U	ecoinvent 3.9.1(2022)	no		
(ei3.9.1) Polytetrafluoroethylene (PTFE)	Tetrafluoroethylene {RER} tetrafluoroethylene production Cut-off, U + Electricity, medium voltage {DE} electricity, medium voltage, residual mix Cut-off, U	ecoinvent 3.9.1(2022)	no		In this profile, it is assumed that producing PTFE consumes 1 kWh of electricity per 1 kg of product. This electricity amount is similar to the electricity consumption for polyethylene in ecoinvent.
(ei3.9.1) magnesium-alloy production, AZ91 {RER} Cut-off, U	magnesium-alloy production, AZ91 {RER} Cut-off, U	ecoinvent 3.9.1(2022)	no		
	0,05p EUR-flat pallet {RER} EUR-flat pallet production Cut-off, U	ecoinvent 3.9.1 (2022)	no		Weight of 20kg per piece is assumed based on inputs of wood in the

10 Data collection details

Shortened name in report	Processes used	Source	Third-party verified	Valid until	Comments
(ei3.9.1) EUR-flat pallet (20kg/p, u=10%) production (EU) (kg) corr. acc. EN16449					process. Uptake of biogenic CO2 is adapted acc. EN16449, assuming 0% glue and 10% moisture (1,667kg)
(ei3.9.1) Lubricating oil production (EU)	1kg Lubricating oil {RER} lubricating oil production Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Adhesive, for metal {DE} adhesive production, for metal Cut-off, U	Adhesive, for metal {DE} adhesive production, for metal Cut-off, U	ecoinvent 3.9.1(2022)	no		
(ei3.9.1) Ground water	1kg NIBE Ground water	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Welding, gas, steel (EU)	1m Welding, gas, steel {RER} welding, gas, steel Cut-off, U	ecoinvent 3.9.1 (2022)	no		Including emissions, energie and material use.
(ei3.9.1) Hot rolling, steel processing (EU) (only process)	1kg Hot rolling, steel {Europe without Austria} hot rolling, steel Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Synthetic rubber production (EU)	1kg Synthetic rubber {RER} synthetic rubber production Cut-off, U	ecoinvent 3.9.1 (2022)	no		

11 References

ISO 14040

ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044

ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

ISO 14025

ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2

EN 15804:2012+A2:2019/AC:2021, Sustainability of Buildings - Environmental Product Declarations - Framework Development Rules by Product Category

Kiwa-Ecobility Experts (2025).

General Programme Instructions

“Product Level”, SOP EE 1201_R.3.0 (03.06.2025).

Kiwa-Ecobility Experts (2025).

General Programme Instructions “Product Level” –

Annex B1: Environmental Information Programme according to EN 15804 / ISO 21930, SOP EE 1203_R.3.0 (03.06.2025).

Ecoinvent

ecoinvent Version 3.9.1 (December 2022)

R<THINK characterization method

ecoinvent 3.9.1: EN 15804+A1 indicators (CML-IA Baseline v3.09), EN 15804+A2 indicators (EF 3.1)