Environmental Product Declaration (EPD)
According to ISO 14025 and EN 15804+A2:2019

krafton® 400.80 FRP bridge decking plank

Registration number:	EPD-Kiwa-EE-177460-EN
Issue date:	03-06-2025
Valid until:	03-06-2030
Declaration owner:	krafton
Publisher:	Kiwa-Ecobility Experts
Programme operator:	Kiwa-Ecobility Experts
Status:	verified

1 General information

1.1 PRODUCT

krafton® 400.80 FRP bridge decking plank

1.2 REGISTRATION NUMBER

EPD-Kiwa-EE-177460-EN

1.3 VALIDITY

Issue date: 03-06-2025

Valid until: 03-06-2030

1.4 PROGRAMME OPERATOR

Kiwa-Ecobility Experts
Wattstraße 11-13
13355 Berlin
DE

Raoul Mancke

(Head of programme operations, Kiwa-Ecobility Experts)

Dr. Ronny Stadie

(Verification body, Kiwa-Ecobility Experts)

1.5 OWNER OF THE DECLARATION

Manufacturer: krafton

Address: Markweg Zuid 34, 4794 SN Heijningen, Netherlands

E-mail: info@krafton.nl

Website: www.krafton.nl

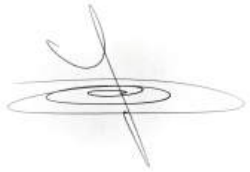
Production location: Production krafton Heijningen

Address production location: Markweg Zuid 34, 4794 SN Heijningen, Netherlands

1.6 VERIFICATION OF THE DECLARATION

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



Anne Kees Jeeninga, Advieslab

1.7 STATEMENTS

The owner of this EPD shall be liable for the underlying information and evidence. The programme operator Kiwa-Ecobility Experts shall not be liable with respect to manufacturer data, life cycle assessment data and evidence.

1.8 PRODUCT CATEGORY RULES

Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

1.9 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

1 General information

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.

1.10 CALCULATION BASIS

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

LCA software*: Simapro 9.6

Characterization method: R<THINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.19 (20250306)

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

1.11 LCA BACKGROUND REPORT

This EPD is generated on the basis of the LCA background report 'krafton® 400.80 FRP bridge decking plank' with the calculation identifier ReTHiNK-77460.

2 Product

2.1 PRODUCT DESCRIPTION

This concerning a manufaturer specific EPD for krafton® 400.80 Fiber Reinforced Plastics (FRP) bridge deck plank:

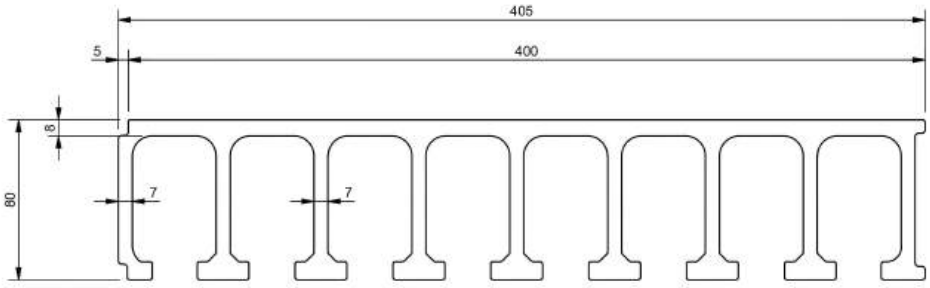
The krafton® 400.80 FRP bridge deck plank is lightweight, strong, and corrosion-resistant structural elements made from fiberglass-reinforced plastic. These innovative profiles are designed as a durable alternative to traditional materials like steel, aluminum, or wood in demanding environments. Application: Bicycle and Pedestrian Bridges, Scaffolding and Ramps.

The krafton® 400.80 FRP bridge deck plank is provided with an anti-slip layer, TÜV Certified Anti skid grit surface, Class R13

Load according to Eurocode - 5 Kn Load pro square Meter

And the NEN-EN 1991-2:
- 10 Kn Point load 100x100 mm maximum span 2000 mm

NEN-EN 13706-23
The krafton® FRP profiles and planks have been tested according to the European standard NEN EN 13706 23. This certification assures that the krafton® FRP profiles and planks will perform safely and durably in a variety of applications.



2.2 APPLICATION (INTENDED USE OF THE PRODUCT)

At 80 mm, this FRP bridge decking plank is higher than the other krafton® FRP bridge decking elements. As such, the plank can handle heavier loads and is less subject to deflection.

The result: a pedestrian or cycle bridge that service vehicles and even any incidental vehicles can cross with ease – unique for FRP bridge decking planks of this size. The planks also allow for a larger span than would be possible with bridge decking planks of a lower height.

The krafton® 400.80 FRP bridge decking plank can be mounted on support structures made of steel, composite or wood.

Return Policy:
To ensure the circularity of FRP Bridge Decks by krafton®, there is set up a guaranteed return policy. Thanks to this guaranteed return policy, bridge deck operators can return their FRP Bridge Deck when a temporary construction project has ended or when the service life of the FRP Bridge Deck is nearing its end.

2 Product

2.3 REFERENCE SERVICE LIFE

RSL PRODUCT

Based on experience and generally accepted standards, a lifespan of 100 years has been assumed. Composite actually has no known degradation mechanism in the intended application.

As proof krafton® performed a logarithmic creep tensile test on the krafton® plank. This shows that the force required to break the krafton® plank after 100 years is >250% of the maximum allowable load.

USED RSL (YR) IN THIS LCA CALCULATION:

100

RSL PARTS

Based on experience and generally accepted standards, a lifespan of 100 years has been assumed. Composite actually has no known degradation mechanism in the intended application.

As proof krafton® performed a logarithmic creep tensile test on the krafton® plank. This shows that the force required to break the krafton® plank after 100 years is >250% of the maximum allowable load.

Description	Material	RSL [yr]
Maintenance (B2)		
Maintenance kit wear resistance	(ei3.6) Methyl methacylate | production (EU)	1
Maintenance kit wear resistance	(ei3.6) Hydrogen peroxide, without water (only active content), in 50% solution state| production (RoW)	1
Maintenance kit wear resistance	(ei3.6) Silica sand | production (DE)	1

2.4 TECHNICAL DATA

Geometric properties

- Width (b) 400 mm
- Height (h) 80 mm
- Number of ribs (n) 9
- Distance between ribs (d) 42.125 mm
- Sectional area (A) 9586 mm2
- Shear area (As) 4455 mm2
- Moment of inertia (I) 8048641 mm4
- Section modulus (W) 176245 mm3
- Weight of plank (G) 47.9 kg/m2
- Density : 1.850 kg/m3
- Barcol Hardness : 50 Barcol
- Waterabsortion (Weight percent) : 0.7%
- Linear expansioncoefficient : 10-16x10-6 m/m/0C

Mechanical properties

- krafton® unit400.80
- Elasticity modulus (Eb,kar) 32154 N/mm2
- Bending stress (ðb,kar) 293 N/mm2
- Shear stress (tkar) 50.5 N/mm2
- Transverse force on 100x100 (Dkar,100) 81138 N
- Transverse force on 200x200 (Dkar,200) 120646 N

2.5 SUBSTANCES OF VERY HIGH CONCERN

The product is not classifiable as dangerous. This product does not contain any SVHC listed in the REACH Candidate List above 0.1% (w/w).

Information concerning particular hazards for human environment not required.

Classification system
According to EU regulation 1272/2008: No classification

2.6 DESCRIPTION PRODUCTION PROCESS

1. Insertion of the glass fibre reinforcements

The process starts with insertion of the glass fibre reinforcements. Reel winding frames are located at the front of the machine. These frames hold reels of glass fibre thread. Approximately 2.1 kilometres of glass fibre thread, e.g. 9600 TEX, are wound on each reel.

2. Travel through the impregnation bath

The glass fibre threads, and possibly glass fibre matting, pass through the impregnation bath where they are coated with polyester resin. The liquid synthetic resin is mixed with a hardener, colourant, fire retardants and other additives.

2 Product

3. Travel through the infeed plates

The infeed plates guide the glass fibre threads and mats to the right position in the mould to ensure the correct glass fibre content. The glass fibre threads enhance linear tensile strength and the mats give the material transverse tensile strength. The amount of glass fibre material depends on the profile's design specifications and properties.

4. Travel through the heated mould

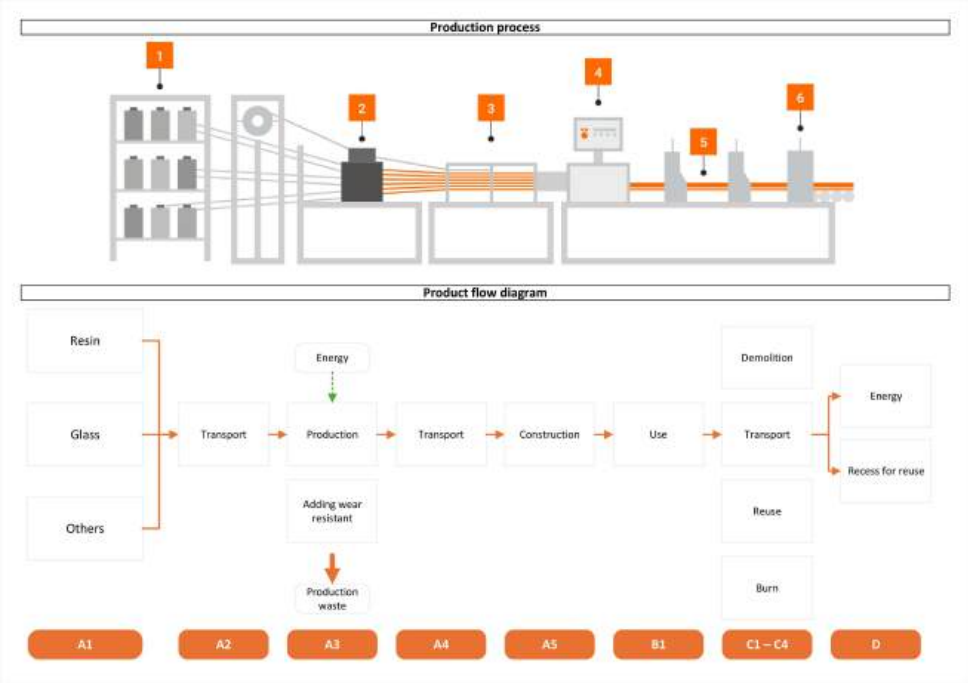
Next, the resin, fibres and mats are pulled through a heated mould. The profile is formed and cured in the hot mould. Halfway through the mould, the material is already starting to harden. Once it leaves the mould, it is fully cured and can be subjected to mechanical load. The profile requires no further processing. The mould is made from wear-resistant steel and assembled from several parts. The inside of the mould is chrome-plated. The programmable computer controls all machine operations. This is where the throughput speed, cutting length and the different temperature profiles in the mould's heating system are set. The moulds used by krafton® accommodate a maximum width of 1 metre. We have moulds for all profile types and dimensions, ranging from small bar profiles and angle profiles to wide bridge decking elements. We use our own moulds for the standard profiles. We also design custom moulds for customers. These moulds remain the property of the customer and are used to produce their unique and, in some cases patented, custom profiles on our pultrusion machine.

5. Pultrusion of the profile

A dual gripping and pulling system alternately clamps and pulls the profile. The clamps are shaped to exactly match the outside of the profile and are clad with soft plastic to avoid damaging it. Pultrusion is a continuous process with the added advantage of good quality control. The dimensions of the pultrusion profile's cross-section are controlled within tight tolerances. Pultrusion is suitable for all kinds of glass fibres. Different types of fibre can also be combined. As a result, a high fibre content (up to 70% by weight) can be achieved, resulting in high specific stiffness and strength.

6. Cutting the GRP profile to length

The cross-cut saw moves at the line speed and cuts the profile to the desired length. Because the saw moves synchronously with the profile, the saw cut is perfectly perpendicular. A diamond-coated saw blade is used for maximum service life. A dust extractor is fitted to the saw unit.



2.7 CONSTRUCTION DESCRIPTION

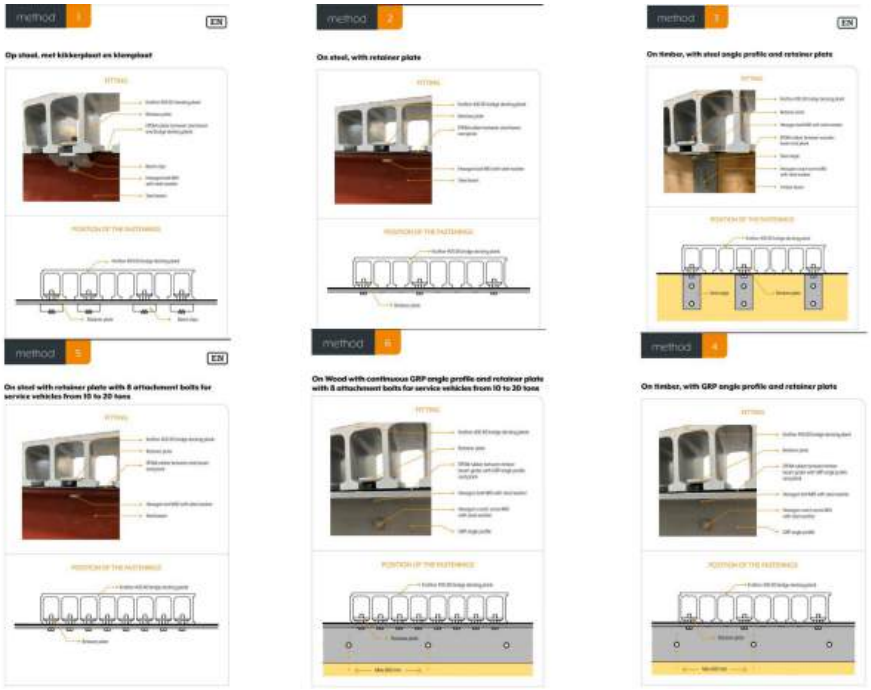
1. General
These assembly instructions are intended for fitting the krafton FRP bridge decking planks on various subconstructions and are applicable for bicycle bridges, pedestrian bridges and platforms. Special attention must be paid to the expansion of the bridge deck and the application of expansion joints where necessary. The material expands as a result of heating from the sun. Please follow the instructions in these assembly instructions. Please read these assembly instructions carefully and keep them handy when installing the product. Follow the instructions for safe and correct installation of the bridge decking planks. The manufacturer accepts no liability for damage resulting from improper installation and use.

2. Required tools and fasteners
Cutting: The material is best cut with a diamond saw. For example, a handheld circular saw with a diamond blade. Grinding: A grinder can also be used. This grinder must be fitted with a diamond blade for grinding dry concrete. Drilling: If you choose to drill, a metal drill will suffice in most cases. Our scope of delivery includes all necessary fixing materials.

2 Product

3. Symbols and Safety instructions
Please ensure correct use and application of personal protective equipment.
· Wear a dust mask, grinding goggles and gloves.
· We also recommend the use of dust extractors when cutting and drilling, as well as hearing protection.

4. Substructure
· The substructure should be constructed taking into account the technical properties of the bridge decking planks used.
· The substructure must be level.
· We recommend that you provide sufficient gradient to prevent puddles of water from forming. Dirt collects in these puddles, which can freeze in winter conditions. This can cause slipperiness and risk of skidding.



3 Calculation rules

3.1 FUNCTIONAL UNIT

1m - FRP Bridge Decking Plank

krafton® 400.80 FRP Bridge Decking Plank

The latest FRP bridge decking plank in the range is a real powerhouse. These FRP bridge decking elements are the perfect choice for places where pedestrians are king, but emergency services must still have easy access. With an allowable axle load of 10 tons, this plank has no trouble with that. The krafton® 400.80 FRP bridge decking plank is also an excellent choice for bridging longer distances. Heavier vehicles will have no trouble crossing.

Reference unit: meter (m^1)

3.2 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	m^1
Weight per reference unit	18.464	kg
Conversion factor to 1 kg	0.054161	m^1

3.3 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	X	X	X	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	

3.4 REPRESENTATIVENESS

This EPD is representative for krafton® 400.80 FRP bridge decking plank, a product of krafton. The results of this EPD are representative for European Union.

3.5 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. In the product stage Capital goods and packaging of incoming raw materials are not considered. The total not considered input flows do not exceed the limit of 5% of energy use and mass.

3 Calculation rules

The capital good for krafton® product production process can be estimated from EcoInvent processen for similar processing. The exact process (Pulltrusion) is unfortunately not available in ecoinvent, Instead, the plastic pipe extrusion process was used as a reference.
In this ecoinvent process the steel component for the installation/production equipment is estimated as 0,0012kg steel (low-alloyed) per kg of product that is processed. This steel has an environmental cost indicator (ECI) impact of 8,18E-04 euro per kg of extruded material. The environmental cost indicator (ECI) impact of Krafton 400.80 FRP bridge decking plank is 7,47 euro ECI for A1-A3. So the steel for the equipment would be far below 0,01% of the production impact and far below the cut-off criterium. Therefor is decided to not include the capital good in the calculation, based on this estimation.

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.

In this phase the average distance to all customers in Europe is calculated, whereby the products can be placed manually.

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.

During the life of the product the wear layer wears and material can get into the environment (B1). Annual maintenance has been added to keep this neat (B2) and repairs are not carried out on the product.

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.

3.6 ALLOCATION

Allocation has not been applied in this LCA.

3.7 DATA COLLECTION & REFERENCE PERIOD

The product composition and emissions are in accordance with the production method in the year 2022

3.8 ESTIMATES AND ASSUMPTIONS

All emissions and energy consumption data are calculated using data from Krafton van Bijl production. Please refer to the attached Excel table for the calculation method.

There will be undeclared modules from repair (B3) and waste during De-construction / Demolition (C1)

Regarding repair:
Planks do not need any repairs, only minor maintenance is required every year on the wear layer of the planks.

Regarding waste disassembly:
When dismantling the planks, all parts can be easily dismantled and reused. for this reason there is also no waste during disassembly.

3.9 DATA QUALITY

Data have been derived form the ERP systeem AFAS. Emissions data have been derived from the Ion Science CUB Instrument.

The foreground data provided by Krafton van Bijl has been established for 2022. The time-related representativeness of the foreground data can be characterized as high (1). For the key background processes (from EcoInvent 3.6), the time-related representativeness is considered to be average (3) to high (1).

All reasonably expected environmental interventions have been quantified, and the completeness can be characterized as good (2).

The LCA study pertains to products intended for the European market. Geographically representative processes have been used for the key processes. The geographic representativeness can be characterized as high (1).

3 Calculation rules

All details have been described to replicate the LCA, and uniformity and consistency are high (1).

There are no aggregated processes. It concerns 1 production location and type of process operation.

3.10 POWER MIX

The residual power mix of the Netherlands was used for electricity. The following ecoinvent profile was used to represent the power mix: *Electricity, low voltage {NL}| electricity, low voltage, residual mix*

This environmental profile holds a GWP-total 0.483 kg CO2 per kWh.

4 Scenarios and additional technical information

4.1 TRANSPORT TO CONSTRUCTION SITE (A4)

For the transport from production place to assembly/user, the following scenario is assumed for module A4 of this EPD.

	Value and unit
Vehicle type used for transport	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Distance	200 km
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.2 ASSEMBLY (A5)

The following information describes the scenarios for flows entering the system and flows leaving the system at module A5.

FLOWS ENTERING THE SYSTEM

There are no significant environment impacts as a result of materials or energy used in the construction stage (A5).

FLOWS LEAVING THE SYSTEM

The following output flows leaving the system at module A5 are assumed.

Description	Value	Unit
Output materials as result of loss during construction	1.5	%
Output materials as result of waste processing of materials used for installation/assembly at the building site	0.000	kg
Output materials as result of waste processing of used packaging	0.070	kg

4.3 USE STAGE (B1)

Emissions to air/soil/water are applicable, the scenario accounted in module B1 is as follows in the table below:

Description	Cycle (yr)	Number of cycles	Amount per cycle	Total Amount	Unit
loss of wear layer	100	1	0.095344	0.095344	kg

4 Scenarios and additional technical information

4.4 MAINTENANCE (B2)

Technical maintenance is needed during Use Stage. For maintenance the scenario(s) as mentioned below are included in this EPD.

Description	Service cycle (yr)	Number of cycles (n)	Amount per cycle	Total Amount	Unit
Maintenance kit wear resistance	1	99	0.0016	0.1584	kg
Maintenance kit wear resistance	1	99	4.0E-5	0.00396	kg
Maintenance kit wear resistance	1	99	0.0024	0.2376	kg

4.5 REPAIR (B3)

Repairs are not applicable within the functional unit and to achieve the reference service life.

4.6 DE-CONSTRUCTION, DEMOLITION (C1)

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

4.7 TRANSPORT END-OF-LIFE (C2)

The following distances and transport conveyance are assumed for transportation during end of life for the different types of waste processing.

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
GVK re-use standaard profiel (obv NMD ID 46) EU	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	200
(ei3.6) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.6) steel, fasteners (NMD ID 69)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0
(ei3.6) finishes (adhered to wood, plastic, metal) (NMD ID 2)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0

4 Scenarios and additional technical information

Waste Scenario	Transport conveyance	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
(ei3.6) Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75)	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	0

The transport conveyance(s) used in the scenario(s) for transport during end of life has the following characteristics.

	Value and unit
Vehicle type used for transport	(ei3.6) Lorry (Truck), unspecified (default) | market group for (GLO)
Fuel type and consumption of vehicle	not available
Capacity utilisation (including empty returns)	50 % (loaded up and return empty)
Bulk density of transported products	inapplicable
Volume capacity utilisation factor	1

4.8 END OF LIFE (C3, C4)

The scenario(s) assumed for end of life of the product are given in the following tables.
First the assumed percentages per type of waste processing are displayed, followed by the assumed amounts.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
GVK re-use standaard profiel (obv NMD ID 46) EU	NL	0	0	10	0	90
(ei3.6) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	NL	0	10	85	5	0
(ei3.6) steel, fasteners (NMD ID 69)	NL	0	1	0	99	0
(ei3.6) finishes (adhered to wood, plastic, metal) (NMD ID 2)	NL	0	0	100	0	0
(ei3.6) Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75)	NL	0	5	0	95	0

4 Scenarios and additional technical information

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
GVK re-use standaard profiel (obv NMD ID 46) EU	0.000	0.000	1.708	0.000	15.375
(ei3.6) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.000	0.000	0.001	0.000	0.000
(ei3.6) steel, fasteners (NMD ID 69)	0.000	0.000	0.000	0.010	0.000
(ei3.6) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000	1.368	0.000	0.000
(ei3.6) Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75)	0.000	0.000	0.000	0.000	0.000
Total	**0.000**	**0.000**	**3.077**	**0.011**	**15.375**

4.9 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY (D)

The presented Benefits and loads beyond the system boundary in this EPD are based on the following calculated Net output flows in kilograms and Energy recovery displayed in MJ Lower Heating Value.

Waste Scenario	Net output flow [kg]	Energy recovery [MJ]
GVK re-use standaard profiel (obv NMD ID 46) EU	0.000	13.504
(ei3.6) elastomeres (i.a. epdm) (i.a. roofing, foils) (NMD ID 20)	0.000	0.028
(ei3.6) steel, fasteners (NMD ID 69)	0.009	0.000
(ei3.6) finishes (adhered to wood, plastic, metal) (NMD ID 2)	0.000	0.000
(ei3.6) Zinc / zinc coating galvanised steel (i.a. profiles, sheets, zinc coating) (NMD ID 75)	0.000	0.000
Total	**0.009**	**13.532**

5 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.

5.1 ENVIRONMENTAL IMPACT INDICATORS PER METER

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
GWP-total	kg CO_2 eq.	3.66E+1	1.19E+0	2.73E+0	4.05E+1	5.01E-1	8.67E-1	5.03E-4	2.22E+0	0.00E+0	0.00E+0	4.78E-1	7.82E+0	1.86E-5	-3.21E+1
GWP-f	kg CO_2 eq.	3.68E+1	1.19E+0	2.84E+0	4.08E+1	5.00E-1	7.55E-1	5.02E-4	2.22E+0	0.00E+0	0.00E+0	4.77E-1	7.81E+0	1.85E-5	-3.24E+1
GWP-b	kg CO_2 eq.	-2.43E-1	4.74E-4	-1.11E-1	-3.53E-1	2.02E-4	1.12E-1	9.96E-7	1.55E-3	0.00E+0	0.00E+0	1.92E-4	7.88E-4	1.11E-8	3.65E-1
GWP-luluc	kg CO_2 eq.	8.60E-3	3.49E-4	9.59E-4	9.90E-3	1.83E-4	1.62E-4	1.40E-7	1.90E-5	0.00E+0	0.00E+0	1.75E-4	3.53E-4	8.37E-10	-7.39E-3
ODP	kg CFC 11 eq.	2.93E-6	2.80E-7	1.49E-7	3.36E-6	1.10E-7	5.68E-8	2.07E-10	7.91E-9	0.00E+0	0.00E+0	1.05E-7	1.40E-7	6.90E-13	-2.73E-6
AP	mol H+ eq.	1.68E-1	4.94E-3	8.26E-3	1.81E-1	2.90E-3	2.90E-3	4.77E-6	6.95E-3	0.00E+0	0.00E+0	2.77E-3	2.23E-3	1.80E-8	-1.33E-1
EP-fw	kg P eq.	8.65E-4	9.10E-6	9.44E-5	9.68E-4	5.04E-6	1.51E-5	5.63E-9	3.77E-5	0.00E+0	0.00E+0	4.81E-6	1.34E-5	3.15E-11	-7.58E-4
EP-m	kg N eq.	2.98E-2	1.47E-3	1.82E-3	3.31E-2	1.02E-3	5.54E-4	1.64E-6	1.30E-3	0.00E+0	0.00E+0	9.76E-4	6.58E-4	9.14E-9	-2.47E-2
EP-T	mol N eq.	3.18E-1	1.63E-2	2.28E-2	3.57E-1	1.13E-2	5.99E-3	1.81E-5	9.91E-3	0.00E+0	0.00E+0	1.08E-2	7.32E-3	6.75E-8	-2.73E-1
POCP	kg NMVOC eq.	1.58E-1	5.26E-3	2.08E-2	1.84E-1	3.22E-3	2.95E-3	5.25E-6	4.72E-3	0.00E+0	0.00E+0	3.07E-3	1.92E-3	2.33E-8	-1.37E-1
ADP-mm	kg Sb-eq.	2.40E-4	2.06E-5	2.68E-5	2.87E-4	1.27E-5	4.84E-6	4.59E-9	2.21E-6	0.00E+0	0.00E+0	1.21E-5	5.58E-6	2.04E-11	-2.06E-4
ADP-f	MJ	6.45E+2	1.85E+1	3.83E+1	7.02E+2	7.54E+0	1.09E+1	1.40E-2	1.92E+1	0.00E+0	0.00E+0	7.20E+0	3.41E+0	5.07E-5	-5.43E+2
WDP	m3 world eq.	1.72E+1	6.01E-2	4.08E-1	1.77E+1	2.70E-2	2.73E-1	6.29E-4	2.22E-1	0.00E+0	0.00E+0	2.58E-2	2.12E-1	2.01E-6	-1.37E+1

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 stratosperic ozon 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) deprication potential, deprivation-weighted water consumption (WDP)

5 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
PM	disease incidence	1.21E-6	1.07E-7	5.53E-8	1.37E-6	4.49E-8	2.26E-8	9.26E-11	5.58E-8	0.00E+0	0.00E+0	4.28E-8	1.68E-8	3.46E-13	-9.52E-7
IR	kBq U235 eq.	1.87E+0	8.10E-2	2.18E-2	1.97E+0	3.16E-2	3.12E-2	5.76E-5	2.18E-3	0.00E+0	0.00E+0	3.02E-2	1.39E-2	2.07E-7	-1.67E+0
ETP-fw	CTUe	9.09E+2	1.48E+1	1.10E+1	9.35E+2	6.73E+0	1.53E+1	9.11E-3	3.51E+0	0.00E+0	0.00E+0	6.42E+0	5.80E+1	6.65E-5	-7.66E+2
HTP-c	CTUh	5.22E-8	3.64E-10	3.15E-8	8.41E-8	2.18E-10	1.38E-9	2.10E-13	1.39E-9	0.00E+0	0.00E+0	2.08E-10	5.03E-9	1.31E-15	-6.65E-8
HTP-nc	CTUh	6.69E-7	1.67E-8	3.99E-8	7.26E-7	7.38E-9	1.18E-8	6.47E-12	7.16E-9	0.00E+0	0.00E+0	7.04E-9	3.04E-8	4.71E-14	-5.20E-7
SQP	Pt	3.87E+1	2.11E+1	4.70E+1	1.07E+2	6.54E+0	1.85E+0	2.94E-2	6.33E-1	0.00E+0	0.00E+0	6.24E+0	1.07E+0	1.16E-4	-8.35E+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 idex (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
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	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

5 Results

ILCD classification	Indicator	Disclaimer
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2
	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.

5.2 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	B1	B2	B3	C1	C2	C3	C4	D
PERE	MJ	1.52E+1	2.34E-1	1.29E+1	2.83E+1	9.44E-2	4.38E-1	1.13E-4	1.50E-1	0.00E+0	0.00E+0	9.01E-2	3.48E-1	9.43E-7	-1.82E+1
PERM	MJ	0.00E+0	0.00E+0	9.43E-1	9.43E-1	0.00E+0	1.45E-2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-1.51E+0
PERT	MJ	1.52E+1	2.34E-1	1.39E+1	2.93E+1	9.44E-2	4.52E-1	1.13E-4	1.50E-1	0.00E+0	0.00E+0	9.01E-2	3.48E-1	9.43E-7	-1.97E+1
PENRE	MJ	5.61E+2	1.97E+1	3.86E+1	6.20E+2	8.01E+0	9.72E+0	1.49E-2	2.07E+1	0.00E+0	0.00E+0	7.64E+0	3.63E+0	5.39E-5	-4.89E+2
PENRM	MJ	1.35E+2	0.00E+0	5.98E-1	1.36E+2	0.00E+0	2.06E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	-9.78E+1
PENRT	MJ	6.96E+2	1.97E+1	3.92E+1	7.55E+2	8.01E+0	1.18E+1	1.49E-2	2.07E+1	0.00E+0	0.00E+0	7.64E+0	3.63E+0	5.39E-5	-5.87E+2
SM	Kg	1.89E-3	0.00E+0	0.00E+0	1.89E-3	0.00E+0	2.83E-5	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
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	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	0.00E+0
FW	m^3	4.26E-1	2.11E-3	2.32E-2	4.51E-1	9.19E-4	7.01E-3	1.50E-5	5.39E-3	0.00E+0	0.00E+0	8.77E-4	6.89E-3	5.43E-8	-3.50E-1

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

5 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	C1	C2	C3	C4	D
HWD	Kg	5.41E-4	4.50E-5	1.58E-4	7.43E-4	1.91E-5	1.21E-5	2.10E-8	2.63E-6	0.00E+0	0.00E+0	1.83E-5	1.06E-5	7.52E-11	-5.32E-4
NHWD	Kg	1.60E+1	1.60E+0	2.05E-1	1.78E+1	4.79E-1	4.01E-1	9.53E-2	4.64E-1	0.00E+0	0.00E+0	4.57E-1	3.20E+0	2.47E-4	-1.53E+1
RWD	Kg	5.03E-4	1.26E-4	1.69E-5	6.46E-4	4.97E-5	1.16E-5	9.22E-8	3.20E-6	0.00E+0	0.00E+0	4.74E-5	1.19E-5	3.14E-10	-5.37E-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	B1	B2	B3	C1	C2	C3	C4	D
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	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	3.67E-3	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.09E-2	0.00E+0	0.00E+0
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	0.00E+0
EET	MJ	0.00E+0	0.00E+0	6.22E-2	6.22E-2	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	4.48E+0
EEE	MJ	0.00E+0	0.00E+0	3.61E-2	3.61E-2	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	2.60E+0

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

5 Results

5.3 INFORMATION ON BIOGENIC CARBON CONTENT PER METER

BIOGENIC CARBON CONTENT

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

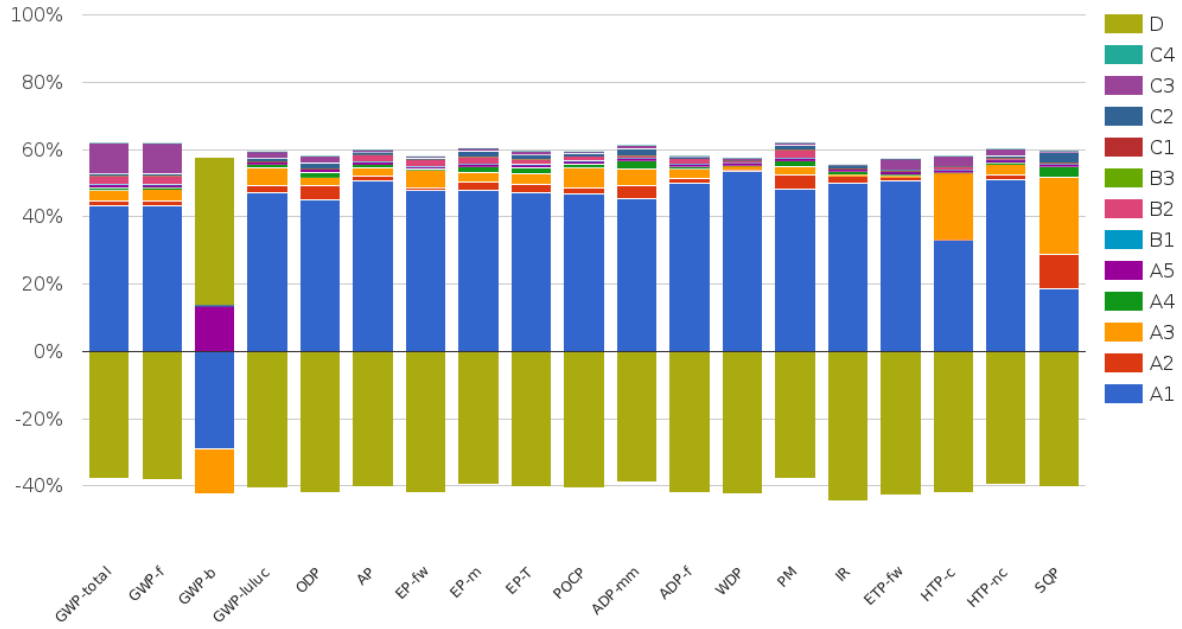
Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0.03136	kg C

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	0.115	kg CO2 (biogenic)

6 Interpretation of results



The ratio between de most important modules is as expected. Because of re-use EOL scenario and the Q-factor of 90% we see in module D an avoided impact that is equal to about 80% of module A1-A3. For certain environmental effects the contributions in module A4-C4 are higher, these are not avoided and then the balance of module D/A1-A3 is lsight lower.

For Biogenic GWP the balance is different. There are no biogenic raw materials in our product, so the GWP-b contributions are all chain effects and they ar small. no effort has been done to track and explain these impacts. GWP-b is less then 0.1% of GWP total and thus neglected.

7 References

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Ecoinvent Datenbank Version 3.6 (2019)

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ISO 14025
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EN 15804+A2
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General PCR Ecobility Experts
Kiwa-Ecobility Experts (Kiwa-EE) – General Product Category Rules (2022-02-14)

NMD Determination method
NMD Determination method Environmental performance Construction works v1.1 March 2022, foundation NMD

8 Contact information

Publisher	Operator	Owner of declaration
Kiwa-Ecobility Experts Wattstraße 11-13 13355 Berlin, DE	**Kiwa-Ecobility Experts** Wattstraße 11-13 13355 Berlin, DE	**krafton** Markweg Zuid 34 4794 SN Heijningen, Netherlands, NL
E-mail: DE.Ecobility.Experts@kiwa.com	**E-mail:** DE.Ecobility.Experts@kiwa.com	**E-mail:** info@krafton.nl
Website: https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/	**Website:** https://www.kiwa.com/de/en/themes/ecobility-experts/ecobility-experts-epd-program/	**Website:** www.krafton.nl

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