ENVIRONMENTAL PRODUCT DECLARATION

MULTIPLE PRODUCT EPD BASED ON WORST-CASE RESULTS IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Owner of declaration	R-Group Baltic OÜ
Program operator	The Building Information Foundation RTS sr
Declaration number	RTS_329_24
Publishing date	14.10.2024
EPD valid until	14.10.2029

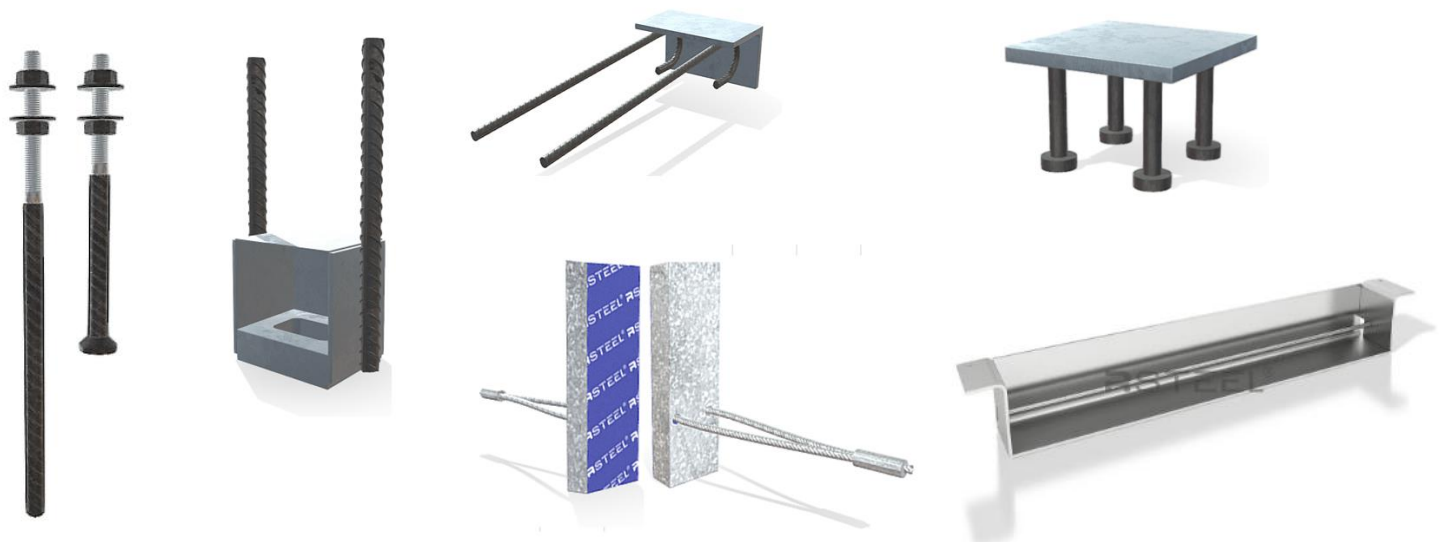
BOLTED CONNECTIONS
FASTENING SYSTEMS
WIRE LOOPS
SLAB SUPPORT
LIFTING SYSTEMS
BALCONY CONNECTORS
FIXING INSERTS

RSTEEL®
COMMITTED TO CONCRETE

ECO PLATFORM EPD VERIFIED

THE BUILDING INFORMATION FOUNDATION RTS · EPD

LCA SUPPORT



GENERAL INFORMATION

The EPD owner has the sole ownership, liability, and responsibility for the EPD. Construction products EPDs may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

EPDs within the same product category but from different programs may not be comparable.

EPD program operator
The Building Information Foundation RTS sr
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https://ymparisto.rakennustieto.fi/en/rakennustieto-epds

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Product category rules
The CEN standard EN 15804 serves as the core PCR. In addition, the RTS PCR (English version, 26.8.2020) is used.

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Independent verification of this EPD and data, according to ISO 14025:2010:
☐ Internal ☑ External

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R-Group is a Finnish leading global supplier of precast accessories and concrete connections. R-Group with its global brand of RSTEEL® provides high-quality steel solutions for safe, reliable, and enduring structures, throughout the world. Thriving on leading-edge technology, exceptional quality, excellent customer-oriented service, and a trusted network of suppliers, we offer standard and customized solutions to all small, medium, and large-scale companies globally. In our operations we comply with the ISO 9001:2015 and 14001:2015 standards. Our solutions have inspired the confidence of our clients and have helped us build a niche in precast and cast-in-situ construction industry.

Place of production
Kõrtsi tee 7/1, Lehmja, 75306, Harju maakond, Estonia

Products
Bolted connections
Fastening systems
Wire loops
Slab support
Lifting Systems
Balcony connectors
Fixing inserts

Declared unit
1 kg

Mass of declared unit
1 kg

Data period
2022

PRODUCT INFORMATION

PRODUCT DESCRIPTION AND APPLICATION

Bolted connections

Products included:

RPK-N3 and RPK-E5 Column shoes
RSK-N and RSK-E Wall shoes
RPP and RPP-E Base bolts

Figure 1. Column Shoe RPK-N3 / RPK-E5

RPK Column shoes are fastening components that are used to create moment resisting connections for precast columns. Stresses developed within the column are transferred to the column shoes, through the anchor bolts and across the grouted gap, to the adjoined structures e.g.to the foundations.

It is possible to adjust the vertical position and level of the column using the column shoes. The gap that remains between the base of the column and the top of the adjoined structure is grouted up as soon as possible after the connection is set. The base connection, once grouted, is designed to be stronger than the cross-section of the column.

Column shoes bring following benefits during the construction process:

- Simple connection by bolting members together
- Faster erection and easily adjustable connection
- Immediate transfer of erection forces once the column is erected and bolted
- No additional support or temporary bracing system required

For more information's RPK-N3 follow for link https://rsteel.fi/wp-content/uploads/RPK-N3-column-shoe-Technical-manual-19.12.2022-1.pdf

For more information's RPK-E5 follow for link https://rsteel.fi/wp-content/uploads/RPK-E5-column-shoe-Technical-manual-19.12.2022.pdf

Figure 2. Wall Shoe RSK-N / RSK-E

RSK Wall shoes are fastening components that are used with RPP- and RPP-E-base bolts to create tension resisting connections across joints between two precast wall elements or between precast wall elements and a cast-in-situ structure. Compression stresses are transferred directly across the grout filled joint. Shear stresses along the joint are transferred by friction or by additional installed shear studs for this purpose.

Tension stresses developed at the joint are transferred within the wall, via reinforcement, to the next wall joint above and below. The RSK-N wall shoes are designed with matching design tension resistance of the associated RPP base bolts.

Tension stresses developed at the joint are transferred within the wall, via reinforcement, to the next wall joint above and below. The RSK-E wall shoes are designed with matching design tension resistance of the associated RPP-E base bolts.

For more information on RSK-N follow the link https://rsteel.fi/wp-content/uploads/RSK-N-wall-shoe-Technical-manual-19.04.2023.pdf

For more information on RSK-E follow the link https://rsteel.fi/wp-content/uploads/RSK-E-wall-shoe-Technical-manual-19.04.2023.pdf

RPP Base bolts are anchor bolts used for moderate loads and **RPP-E Base bolts** are used for high loads.

The product range consists of: Headed Anchor Bolts (RPP-L and RPP-E-L) short stud-headed anchor bolts used as basic bolts suitable for use as foundation anchor connections. Straight Anchor Bolts (RPP-P and RPP-E-P) long anchor bolts with ribbed bars used as overlapping bolts suitable for forming continuous columns which have been prepared as independent precast components.

RPP base bolts transfer tension, compression and shear forces to reinforced concrete foundation structures. Tension and compression forces are transferred by anchorage of the ribbed rebars, and by bearing onto anchorage plates. Shear forces are transferred to the concrete by bearing onto the shank of the bolt.

Figure 3. RPP bolts

RPP-E base bolts constitutes 2 to 4 headed high quality reinforcement bars which are factory welded to a threaded high-strength steel stud. There are two main anchor types: long anchors (type P) and short anchors (type L). RPP-E-P type ribbed bar bolts are suitable as overlapping bolts in precast columns and as base bolts. RPP-E-base bolts are suitable for anchoring in large area components such as foundations or walls with sufficiently large edge distances.

For more information's RPP follow for link https://rsteel.fi/wp-content/uploads/R-STEEL-RPP-RPP-E-instructions-Eurocodes-7.02.2017-1.pdf

Fastening systems

Products included:

KL fastening plates
RJKL fastening plates
RBKL fastening plates
RT standard steel parts
RT non-standard steel parts

Figure 4. KL fastening plate

KL fastening plates are steel plates equipped with resistance welded stud head anchors. The fastening plates are cast into concrete. KL fastening plates are intended to be used as base plates to which steel profiles are welded. The fastening plates transfer loads from structures welded on it to concrete structures. The loads are transferred through rebar anchors.

KL fastening plates consist of a steel on which stud head anchors are welded. Multiple sizes of plates are manufactured with different material options.

Hot Dip Galvanized and Epoxy versions also available.

For more information on KL follow the link https://rsteel.fi/wp-content/uploads/KL-fastening-plate-Technical-manual-20.07.2022-1.pdf

Figure 5. RJKL fastening plate

RJKL fastening plates are steel plates equipped with resistance welded stud head anchors. The fastening plates are cast into concrete and are intended to be used as base plates to which steel profiles are welded. They transfer loads from structures welded on it to concrete structures. The loads are transferred through stud head anchors.

- Multiple sizes of plates are manufactured with different material options.
- The resistances of RJKL fastening plates are calculated for static loads.
- Used for heavy loading.
- Use of headed studs over conventional bended anchor rebars reduces installation hassles and time.
- Suitable for thick concrete structures.

For more information on RJKL follow the link https://rsteel.fi/wp-content/uploads/RJKL-fastening-plate-Technical-manual-21.05.2020-1.pdf

Figure 6. RBKL fastening plate

RBKL fastening plates are steel plates equipped with resistance welded stud head anchors. The fastening plates are cast into concrete and are intended to be used as base plates to which steel profiles are welded. They transfer loads from structures welded on it to concrete structures. The loads are transferred through stud head anchors.

- Multiple sizes of plates are manufactured with different material options.
- The resistances of RBKL fastening plates are calculated for static loads.
- Used for normal/moderate loading.
- Use of headed studs over conventional bended anchor rebars reduces installation hassles and time.
- Suitable for shallow concrete structures.

For more information on RBKL follow the link https://rsteel.fi/wp-content/uploads/RBKL-fastening-plates-Technical-manual-21.05.2020-1.pdf

Figure 7. RT standard steel parts

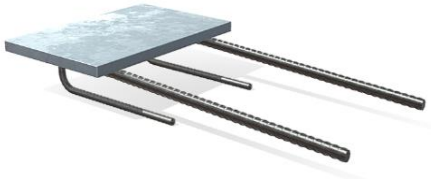
RT standard steel components are steel plates equipped with rebar anchors. The steel parts are casted into concrete. The main purpose of use of RT standard steel components is fastening of precast concrete element structures.

RT standard steel components consist of a steel plate or steel profile on which rebar anchors are welded. Multiple sizes of steel parts are manufactured with different material options. The resistances of RT standard steel parts are calculated for static loads. Minimum reinforcement according to SFS-EN 1992-1-1 is always to be used in the location of the RT standard steel components to guarantee ductility of the structure in ultimate limit state.

For more information on RT standard follow the link https://rsteel.fi/wp-content/uploads/RT-standard-steel-parts-Technical-manual-27.07.2022.pdf

RT non-standard steel components are steel plates or angle steels equipped with anchor bars. They are installed to concrete elements before casting and are used in attachment of concrete elements.

Figure 8. RT non-standard steel parts



RT non-standard steel components consist of a steel plate or steel profile on which rebar anchors are welded. Multiple sizes of steel parts are manufactured with different material options. The resistances of RT non-standard steel parts are calculated for static loads. Minimum reinforcement according to SFS-EN 1992-1-1 is always to be used in the location of the RT non-standard steel components to guarantee ductility of the structure in ultimate limit state.

For more information on RT non-standard follow the link https://rsteel.fi/wp-content/uploads/R-STEEL-RTR-Standard-Steel-Parts-instructions-Eurocodes-20.11.2013.pdf

Wire loop

Products included:

RVL wire loop
RVL-N wire loop
R3L wire loop
RSTEEL® -wire loop

Figure 9. RVL-wire loop

RVL wire loops consist of a single high strength steel wire and a steel box. RVL-loops are used in concrete elements, mainly walls, to form connections to resist the shear force between the joints.

When the joint between concrete elements is loaded, the longitudinal shear force in the joint is divided to an angled compression component and a horizontal pull component at the indented joint. RVL-loop transfers the shear forces acting in the joint between concrete elements by the pull component of the wire rope and the compression component formed by the steel boxes and the seam.

For more information on RVL follow the link https://rsteel.fi/wp-content/uploads/RVL-WIRE-LOOP_31.03.2022-1.pdf

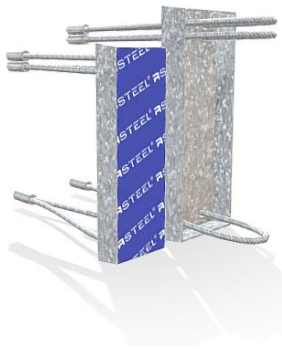
Figure 10. RVL-N wire loop

RVL-N wire loops are similar to RVL-wire loops with the difference in reduced size of each component and design resistances.

When the joint between concrete wall elements is loaded, the longitudinal shear force in the joint is divided to an angled compression component and a horizontal pull component at the indented joint. RVL-N-wire loop transfers the shear forces acting in the joint between concrete wall elements by the pull component of the wire rope and the compression component formed by the steel boxes and the joint.

For more information on RVL-N follow the link https://rsteel.fi/wp-content/uploads/RSTEEL-RVL-N-wire-rope-loops-design-instructions-Eurocodes-16.5.2014.pdf

Figure 11. R3L wire loop



R3L wire loops are similar to RVL-wire loops with the difference in three wire loop. When the joint between concrete wall elements is loaded, the longitudinal shear force in the joint is divided to an angled compression component and a horizontal pull component at the indented joint. R3L-wire loop transfers the shear forces acting in the joint between concrete wall elements by the pull component of the wire rope and the compression component formed by the steel boxes and the joint.

For more information on R3L follow the link https://rsteel.fi/wp-content/uploads/R3L-Wire-Rope-Loop-Box-manual_ENG.pdf

RSTEEL® wire loops are steel parts installed to concrete before casting. The wire rope is bent to loop and held together by compression sleeve. It may be used to tie concrete wall elements to the building frame with ribbed steel bars installed through the wire rope loop.

Figure 12. RSTEEL® wire loop

For more information on R3L follow the link https://rsteel.fi/wp-content/uploads/R-STEEL-wire-rope-loops-design-instructions-Eurocodes-31.10.2017.pdf

Slab supports

Products included:

ROK slab support

Figure 13. ROK slab support

ROK hollow core slab (HCS) supports manufactured by R-Group Baltic OÜ are factory made steel parts designed for support of HCS slab end at holes in HCS slab structure. ROK support transfers HCS slab end support reaction to adjacent HCS slabs or walls in both installation of HCS slabs and in the final situation. ROK support (together with seam grout) acts as support structure until fire resistance class R 60 without separate fire protection for the loads given in this design instruction.

For more information on ROK follow the link https://rsteel.fi/wp-content/uploads/RSTEEL-ROK-HCS-slab-support-Manual-EN-310321.pdf

Lifting Systems

Products included:

RPAS lifting anchor
RTA lifting anchor
RWTL lifting anchor
RWTS lifting anchor
R lifting anchor
RLS lifting ancor
RLL lifting key

RPAS plate lifting insert system manufactured by R-Group Finland OÜ are lifting inserts consisting of steel tube with inner thread welded to a flat steel plate and used with threaded lifting keys. RPAS plate lifting inserts are anchored to concrete with anchor reinforcement. RPAS plate lifting inserts are suitable for lifting of slabs, plates, tubes and other thin pre-cast concrete elements.

RPAS plate lifting inserts are designed and manufactured in accordance with EU Machinery Directive 2006/42/EC and VDI/BV-BS 6205. RPAS plate lifting inserts meet the requirements for safe lifting and handling of concrete elements.

For more information RPAS follow for link https://rsteel.fi/wp-content/uploads/R-STEEL-RPAS-Lifting-Anchor-instructions-Eurocodes-13.7.2017.pdf

Figure 14. RPAS plate lifting anchor

RTA, RWTL and RWTS lifting anchors manufactured by R-Group Baltic OÜ are lifting anchors designed for lifting of concrete elements. They are inner thread sockets equipped with ribbed steel bars for anchoring. A separate lifting device is used for lifting. This lifting device can be reused.

RTA, RWTL and RWTS lifting anchors are designed and manufactured in accordance with EU Machinery Directive 2006/42/EC and VDI/BV-BS 6205. Lifting anchors meet the requirements for safe lifting and handling of concrete elements.

Figure 15. RTA lifting anchor

Figure 16. RWTL lifting anchor

Figure 17. RWTS lifting anchor

For more information on RTA, RWTL, RWTS follow for link https://rsteel.fi/wp-content/uploads/R-STEEL-RTA-RWTL-RWTS-Lifting-instructions-Eurocodes-15.06.23.pdf

Figure 18. R-lifting anchor

R lifting anchors systems manufactured R-Group Baltic OÜ are lifting anchors consisting of studded end round steel bars with rd thread and compatible lifting keys. R-lifting anchors are available as electrozinced, stainless or acid resistant.
R-lifting anchors enable lifting of slabs, columns, beams, walls and other precast concrete elements. R-lifting anchors can be used in all lifting directions and for lifting angles up to 90 degrees. R-lifting anchors are designed and manufactured in accordance with eu machinery directive 2006/42/ec and vdi/bv-bs 6205. Lifting anchors meet the requirements for safe lifting and handling of concrete elements.
For more information on R lifting anchor follow for link https://rsteel.fi/wp-content/uploads/r-lifting-anchor-technical-manual-16.05.2024.pdf

RLS lifting anchors are inner threaded inserts designed for lifting of concrete elements.
RLS lifting sockets enable lifting of columns, beams, walls and other pre-cast concrete elements. RLS lifting sockets are not suitable for lifting of slabs. RLS lifting sockets are designed and manufactured in accordance with eu machinery directive 2006/42/ec and vdi/bv-bs 6205. Lifting sockets meet the requirements for safe lifting and handling of concrete elements.
For more information on RLS lifting anchor follow for link https://rsteel.fi/wp-content/uploads/r-steel-rls-lifting-anchor-instructions-eurocodes-9.1.2017-2.pdf

Figure 19. RLL lifting anchor

Figure 20. RLL lifting key

RLL lifting keys manufactured by R-Group Baltic OÜ are lifting loops consisting of wire rope loops and threaded end parts. RLL threaded lifting loops can be used for lifting angles up to 45 degrees. RLL lifting loops are designed and manufactured in accordance with eu machinery directive 2006/42/ec and vdi/bv-bs 6205. Lifting keys meet the requirements for the safe lifting and handling of concrete elements.
RLL lifting keys are intended to be used with rsteel threaded lifting anchors. Other lifting anchors are not permitted. The load class and load capacity of the threaded lifting anchor must always be verified according to the lifting anchor technical manual. Only lifting anchors with corresponding load class may be used with

✓ R lifting anchor
✓ RLS lifting anchor
✓ RTA lifting anchor
✓ RWTL lifting anchor
✓ RWTS lifting anchor
✓ RPAS lifting anchor

RLL lifting key is installed and screwed into the lifting anchor socket by hand. It is not permitted to use any tools for screwing in and out. The use of tools can damage the lifting key and result in failure, leading to serious injury or death. RLL lifting keys are to be screwed in gently by hand, without using force. Dirty threads in the lifting anchor and/or lifting loop must be cleaned and, if necessary, lubricated before use. Dirty threads may reduce the screw-in depth, which reduces the load-carrying capacity significantly and may lead to serious injury or death.
For more information on RLL lifting key follow for link https://rsteel.fi/wp-content/uploads/rll-lifting-key-technical-manual-12.04.2022-1.pdf

Balcony connectors

Products included:

Square tubes
RPS balcony hinge

Balcony tubes serve to create seamless connections between balcony slab elements and the underlying structure, while maintaining the insulation integrity of wall components.
RSTEEL®370- square tubes are made of grade 370 stainless steel. STALA 350 or equivalent also available.
These tubes play a crucial role in transmitting vertical forces during both the installation and utilization phases, efficiently directing these forces into the load-bearing framework of the balcony slab. As the connection casting onto the load-bearing structure is finalized, the system adeptly manages tensile forces as well. This integration ensures a robust and reliable connection that contributes to the overall stability and safety of the balcony structure.

Figure 21. Balcony tubes

For more information on RTA, RWTL, RWTS follow the link https://rsteel.fi/en/product/rsteel370-square-tubes/

RPS balcony hinges are steel parts used in pre-cast concrete buildings to transfer horizontal loads from balcony slab to the building floor and at the same time allowing vertical momevent of balcony due to temperature changes.
RPS-balcony hinge consists of Rr 30 or Rr 36 lifting anchors installed to the balcony slab before casting and balcony hinge steel part installed to the floor grouting. These parts are connected with an attachment screw.
The way of connection is different from those of other balcony hinges, there is a connecting plate open of its lower edge, whereby the installation from top down is easy and can be performed without tools.

Figure 22. RPS Balcony hinges

The connecting anchors of the RPS also operate as the lifting inserts of the balcony slab during the installation of the balcony slab. One end of the steel section is installed at the work site in a connection formed by the connecting anchor, the elevating sleeve and the connecting screw and the other end is fastened to the slabs of the building in connection with the installation of the balcony slabs.

For more information on balcony hinges follow the link https://rsteel.fi/wp-content/uploads/R-STEEL-RPS-Balcony-Hinges-instructions-Eurocodes-20.4.2018.pdf

Fixing inserts

Products included:

RV inserts
RVT inserts

RV inserts are inner thread inserts designed for attachment to concrete elements. Inserts are installed to concrete elements before casting. Inserts anchor to concrete with the help of anchor pins which are attached to the body of the insert.
In all insert types can be also the nailing plate and it is the same material as the insert. RV-inserts are used for example in temporary erection of precast panels with diagonal struts. The struts are fixed on the anchors and the other part is fixed into concrete.

Figure 23. RV fixing insert

Figure 24. RVT fixing insert

RVT inserts are bent inner thread sockets installed to concrete before casting. Anchoring to concrete is with compression between concrete and the bend at the bottom of the insert.
In all insert types can be also the nailing plate and it is the same material as the insert.
For more information on RVT inserts follow the link https://rsteel.fi/wp-content/uploads/R-STEEL-RV-T-Inserts-instructions-Eurocodes-19.11.2013-1.pdf

PRODUCT RAW MATERIAL COMPOSITION PER DECLARED UNIT

Raw material category	Amount %
Metals	100%
Minerals	0%
Fossil materials	0%
Bio-based materials	0%
Total	100%

All declared compositions are for the worst-case variation of the product group.

	Bolted connections, wire loops, slab support	Fastening systems	Balcony connectors, Lifting systems, Fixing inserts
Product components	**Amount (%)**	**Amount (%)**	**Amount (%)**
Carbon steel	100%	65%	0%
Stainless steel	0%	35%	100%
Total	100%	100%	100%
Packaging: pallets, boards and cardboard box	>99%	>99%	>99%
Packaging: packaging film	<1%	<1%	<1%

	Material origin	Average share of post-consumer recycled material per declared unit (%)
Bolted connections	Europe	96%
Fastening systems	Global	57%
Wire loops	Global	5%
Slab support	Europe	58%
Lifting systems	Global	48%
Balcony connectors	Global	48%
Fixing inserts	Global	48%

Note. There was no data available for the scrap content of stainless steel used in products. Global average of 48% was assumed.

The products do not contain any biogenic carbon. The packaging does contain biogenic carbon.

Biogenic carbon content in product	0 kg (all products)
Biogenic carbon content in packaging	< 0.1 kg (all products)

Note. 1 kg biogenic carbon is equivalent to 44/12 kg of biogenic CO2.

SUBSTANCES, REACH - VERY HIGH CONCERN

The products do not contain any REACH SVHC substances in amounts greater than 0.1 % (1000 ppm).

MANUFACTURING PROCESS

Bolted connections

Column shoes
The rebars are mechanically cut. Secondary rebar is bent to shape. Plates are manufatured by flame cut, laser or plasma. Parts are welded according to ISO 5817 class B. The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material for transporting the product from the factory gate.

Wall shoes
The rebars are mechanically cut. Plates are manufatured by flame cut, laser or plasma. Parts are welded according to ISO 5817 class B. The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material for transporting the product from the factory gate.

Base bolts
The rebars and high strength steel bars are mechanically cut. If needed rebar can be bent to shape. The threads are mechanically machined or rolled. Plates are manufatured by flame cut, laser or plasma. Parts are welded according to ISO 5817 class B. The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material as well as wooden boards for transporting the product from the factory gate.

A hot-dip galvanized version for bolted connections also available on request.

Fastening systems

KL, RJKL and RBKL fastening plates
Steel materials are mechanically cut. Lubrication oils are used during the process to reduce the wear of machines and to ensure stable cutting conditions. The final products are welded with the rebar anchors. Welding: MAG welding, manual and robotic, are included by electricity input. The welding process consumes heat and electricity for welding machinery. Primer (resin) shall be applied to the visible surfaces of the fastening plates. The fastening plates are delivered with an approximately 40 μm shop priming. The manufacturing process requires electricity and fuels for the different equipment as well as heating. The steel waste produced at the plant is directed to recycling. The loss of material is considered, as well as wastewater treatments. A wooden pallet and packaging film are used as a packaging material as well as wooden boards for transporting the product from the factory gate.

RT-standard steel parts and RT-non-standard steel parts
Steel materials are mechanically cut. If needed rebar is bent to shape. Lubrication oils are used during the process to reduce the wear of machines and to ensure stable cutting conditions. The final products are welded with the rebar anchors. Welding: MAG welding, manual and robotic, are included by electricity input. The welding process consumes heat and electricity for welding machinery. Primer (resin) shall be applied to the visible surfaces of the fastening plates. The fastening plates are delivered with an approximately 40 μm shop priming. The manufacturing process requires electricity and fuels for the different equipment as well as heating. The steel waste produced at the plant is directed to recycling. The loss of material is considered, as well as wastewater treatments. A wooden pallet and packaging film are used as a packaging material as well as wooden boards for transporting the product from the factory gate.

A hot-dip galvanized and epoxy versions for fastening systems also available on request.

Wire loop

RVL / RVL-N / R3L **wire loops**
The steel is box is mechanically cut and bent to shape. The open wire rope is installed to the steel box and attached by the compression sleeve to form a loop. The wire rope is bent in to the steel box and the open part of the steel box is closed by tape to protect from casting concrete.

RSTEEL® -wire loop
Wire rope is cut to correct length, ends of the wire are inserted through the compression sleeve and the compression sleeve is compressed.

Slab support

Front and side plates are re manufatured by flame cut, laser or plasma and bent to shape. Bent side plates are welded to the front plate. Ribbed steel bar is cut mechanically and welded to the side plates. Parts are welded

according to ISO 5817 class B. The slab supports are delivered with an approximately 40 µm shop priming. The steel waste produced at the plant is directed to recycling. A wooden pallet is used for transporting the product from the factory gate.

Lifting Systems

RPAS, RPASR

Inner thread socket is cut from a round steel bar to correct length. RD inner thread is whirled to the socket.
Plates are manufatured by laser, plasma or mechanically cut.
Parts are welded according to ISO 5817 class B. RPAS lifting anchors are delivered with electro-zinc coating. The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material as well as wooden boards for transporting the product from the factory gate.

RTA, RWTL and RWTS

Inner thread socket is cut from a round steel bar to correct length. RD inner thread is whirled to the socket. Ribbed steel bar is cut to correct length and for RWTL and RWTS lifting anchors it is bent to shape. Parts are attached with a compression joint.
The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material as well as wooden boards for transporting the product from the factory gate.

R lifting anchor

Inner thread socket is cut from a round steel bar to correct length. RD inner thread is whirled to the socket.
The rod is pressed by a hot forging machine. Parts are attached with a compression joint.

RLS lifting anchor

Inner thread socket is cut from a round steel bar to correct length. RD inner thread is whirled to the socket.

RLL lifting key

RLL-lifting keys shall be manufactured by cutting the wire rope to correct length and manufacturing the threaded ferrule by molten metal socketing. Metal socketing is to be done according to EN 13411-4.
Products are delivered in cardboard boxes on a truck palette.

Balcony connectors

Square tubes

Square tubes are cut and drilled according to manufacturing drawings.

RPS balcony hinge

The rebars are mechanically cut. Plates are manufatured by flame cut, laser or plasma. Parts are welded according to ISO 5817 class B. The steel waste produced at the plant is directed to recycling. A wooden pallet and packaging film are used as a packaging material for transporting the product from the factory gate.

Fixing inserts

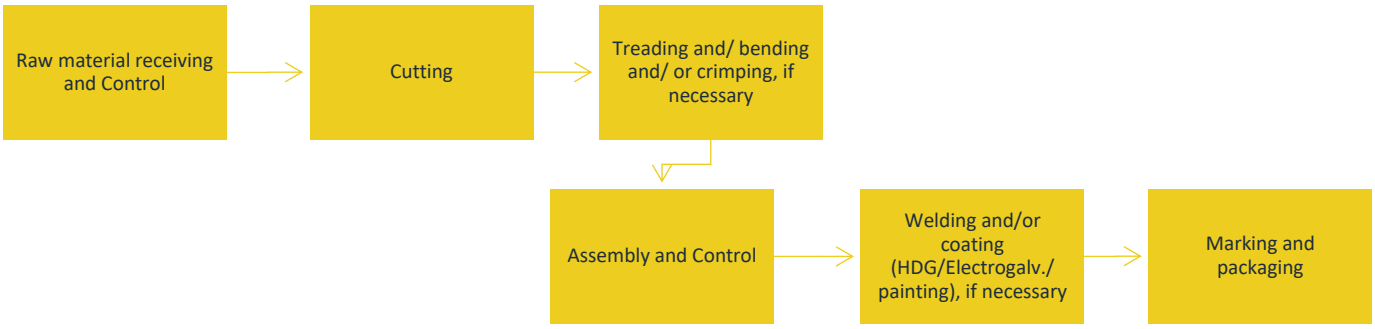
RV inserts

The threaded socket and anchoring pin are cut to the correct dimensions from a hot-rolled steel bar. An M inner thread is made into the threaded socket and a hole is drilled into the socket for the anchoring pin. The anchoring pin is installed to the hole in the threaded socket with a friction joint. Nailing plates are made from steel plate by punching. The nailing plate is attached to the RV-fixing insert by mechanically pressing and finally the RV-fixing inserts are electro-galvanized. RVr-fixing inserts have no surface treatment.

RVT inserts

RVT Insert billet is cut to correct length from a steel tube and bent to shape. Metric inner thread is lathed to the bent insert. Nailing plates are made from a steel plate by die cutting and pressed to the insert. Insert type RVTez is electro zinced and passivated. Insert types RVTr and RVTh are not surface finished.

Figure 25. Manufacturing process for all products



RSTEEL®
COMMITTED TO CONCRETE

FULL LIST OF PRODUCT VARIATIONS INCLUDED

Bolted connections	
Bolted connections RPK-N3 and RPK-E5 Column shoes	**Type: RPK-N3** **Sizes:** M16, M20, M24, M30, M39 uncoated and HDG coated **Type: RPK-E5** **Sizes:** M30, M36, M39, M45, M52 uncoated and HDG coated
Bolted connections RSK-N and RSK-E Wall shoes	**Type: RSK-N** **Sizes:** M16, M20, M24, M30, M39 uncoated and HDG coated **Type: RSK-E** **Sizes:** M30, M36, M39, M45, M52 uncoated and HDG coated
Bolted connections RPP and RPP-E Base Bolts	**Type: RPP-P** **Sizes:** M16, M20, M24, M30, M39 uncoated and HDG coated **Type: RPP-E-P** **Sizes:** M30, M36, M39, M45, M52, M60 **Type: RPP-L** **Sizes:** M16, M20, M24, M30, M39 uncoated and HDG coated **Type: RPP-E-L** **Sizes:** M30, M36, M39, M45, M52, M60
Fastening systems	
KL fastening plates	**Types: KL, KLR, KLH** **Sizes:** 50x100 (-218); 100x100 (-218); 100x150 (-220); 150x150 (-222); 100x200 (-222); 200x200 (-312); 250x250 (-315); 100x300 (-315); 200x300 (-315); 300x300 (-315)
RJKL fastening plates	**Types: RJKL, RJKLR, RJKLH** **Sizes:** 150x150 (-220); 150x150 (-285); 150x200 (-220); 150x200 (-355); 150x250 (-220); 150x250 (-355); 200x200 (-220); 200x200 (-355); 200x250 (-220); 200x250 (-355); 200x300 (-280); 200x300 (-435); 250x250 (-220); 250x250 (-355); 300x300 (-280); 300x300 (-435); 300x500 (-280); 300x500 (-435); 400x400 (-280); 400x400 (-435); 500x500 (-280); 500x500 (-435); 600x600 (-280); 600x600 (-435) standard or with nailing holes or with HDG coating
RBKL fastening plates	**Types: RBKL, RBKLR, RBKLRr** **Sizes:** 50x100 (-68); 50x100 (-108); 100x100 (-68); 100x100 (-108); 100x150 (-70); 100x150 (-110); 150x150 (-70); 150x150 (-110); 100x200 (-72); 100x200 (-112); 100x200 (-162); 150x150 (-162); 200x200 (-72); 200x200 (-112); 200x200 (-162); 100x300 (-165); 200x300 (-165); 250x250 (-165); 300x300 (-165) standard or with nailing holes or with HDG coating
RT-standard steel parts	**Types: RT, RTR, RTRr** **Sizes**: -23 -24, -38, -39, -44
RT-non-standard steel parts	**Types: RT, RTR, RTRr, RTH** **Sizes:** -15, -16, -25, -26, -36, -37, -39E, -43, -45, -46
Wire loop	
RVL wire loop RVL-N wire loop R3L wire loop RSTEEL® wire loop	**Type/Sizes:** RVL 60, RVL 80, RVL 80/9,RVL 100, RVL 120, RVL 140/8, RVL 140/9 **Type/Sizes:** RVL-60N, RVL-80N, RVL-120N, RVL-140N **Type/Sizes:** R3L-THIN 80, R3L-THIN 100, R3L-THIN 120, R3L-WIDE 80, R3L-WIDE 100, R3L-WIDE 120 **Type/Sizes:** RSTEEL® wire loop 5
Slab support	
ROK slab support	**Type: ROK SOLID** **Sizes:** 150x1200, 150x1800, 150x2400, 175x1200, 175x1800, 175x2400, 200x1200, 200x1800, 200x2400, 220x1200, 220x1800, 220x2400, 265x1200, 265x1800, 265x2400, 300x1200, 300x1800, 300x2400, 320x1200, 320x1800, 320x2400, 350x1200, 350x1800, 350x2400, 370x1200, 370x1800, 370x2400, 400x1200, 400x1800, 400x2400, 450x1200, 450x1800, 450x2400, 500x1200, 500x1800, 500x2400
Lifting Systems	
RPAS lifting anchor RTA lifting anchor RWTL lifting anchor RWTS lifting anchor R lifting anchor RLS lifting anchor RLL lifting key	**Types: RPAS, RPASR** **Sizes:** 12, 14, 16, 20, 24, 30, 36, 42, 52 **Types: RTA, RTAr, RTAh** **Sizes:** 12x195, 14x235, 16x275, 16x400, 18x305, 20x360, 24x400, 30x505, 36x690, 42x840, 52x950 **Types: RWTL, RWTLr, RWTLh** **Sizes:** 12x137, 14x170, 16x216, 18x235, 20x257, 24x360, 30x450, 36x570, 42x620, 52x880 **Types: RWTS, RWTSr, RWTSh** **Sizes:** 12x108, 14x130, 16x167, 18x175, 20x187, 24x240, 30x300, 36x380, 42x450 **Types: R, Rr, Rh** **Sizes:** -16, -20, -20S, -24, -24S, -30, -30S, -36, -36S **Types: RLS, RLSr, RLSh** **Sizes:** -12, -16, -20, -24, -30, -36, -42, -52 **RLL lifting key with M/Rd thread** **Sizes:** -12, -14, -16, -18, -20, -24, -30, -36, -42, -52

Balcony connectors	
Square tubes RPS balcony hinge	**Types:** RPS **Sizes:** 30, 36 (Total length according to order) **Types:** RSTEEL® 370, STALA 350 **Sizes:** 80x80x5; 80x80x6; 100x100x5; 100x100x6
Fixing inserts	
RV inserts RVT inserts	**Types:** RV, RVr **Sizes:** M10x45, M10x50, M10x60, M12x50, M12x70, M16x50, M16x70, M16x90, M20x100, M24x120, M24x150 **Types:** RVT, RVTr, RVTh **Sizes:** M8x50, M10x45, M10x60, M12x45, M12x50, M12x70, M16x50, M16x60, M16x100, M20x80, M20x100, M24x100

PRODUCT LIFE-CYCLE AND LIFE-CYCLE ASSESSMENT

Period for data	2022
Declared unit	1 kg
Mass per declared unit	1 kg
Mass of packaging	0.04 kg (Bolted connections) 0.07 kg (Fastening systems) 0.03 kg (Wire loops) 0.12 kg (Slab support) 0.06 kg (Lifting Systems) 0.3 kg (Balcony connections) 0.06 kg (Fixing inserts)

All products are worst-case variations of the product group based on annual production volumes. The variation between the declared results and lowest results are as follows: 41% - Bolted connections; 45% - Fastening systems; 0% - Wire loops; 0% -Slab support; 69% - Lifting Systems; 6% - Balcony connections; 65% - Fixing inserts.

The study does not exclude any modules or processes which are stated mandatory in the EN 15804:2012+A2:2019 and the applied PCR. The study does not exclude any hazardous materials or substances.
The study includes all major raw material and energy consumption. All inputs and outputs of the unit processes, for which data is available for, are included in the calculation. There is no neglected unit process more than 1% of total mass or energy flows. The module specific total neglected input and output flows also do not exceed 5% of energy usage or mass.
Co-product allocation has not been used.
The data sources for the study are Ecoinvent 3.8 (2021) and EPDs. The tools used for the study were One Click LCA and Open LCA. The EN 15804 reference package used is based on EF 3.0.

SYSTEM BOUNDARY

The scope of the EPD is cradle to gate with options (A1-A4), modules C1–C4 and module D.

Product stage			Assembly stage		Use stage							End of life stage				Beyond the system boundaries		
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D	D	D
x	x	x	x	MND	MND	MND	MND	MND	MND	MND	MND	x	x	x	x	x	x	x
Raw materials	Transport	Manufacturing	Transport	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction/ demolition	Transport	Waste processing	Disposal	Reuse	Recovery	Recycling

Modules not declared = MND. Modules not relevant = MNR.

MANUFACTURING AND PACKAGING (A1-A3)

The environmental impacts considered for the product stage cover the manufacturing of raw materials used in the production as well as packaging materials and other ancillary materials.
Vehicle capacity utilization volume factor is assumed to be 1, which means full load. In reality, it may vary but as role of transportation emission in total results is small and so the variety in load is assumed to be negligible. Empty returns are not taken into account as it is assumed that return trip is used by transportation company to serve the needs of other clients.
Fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. All fuel and energy use was allocated based on production volume. The electricity used in the plant is grid energy and this has been modelled based on Estonian residual mix for 2020-2022. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

Electricity data source and quality	Modelled electricity based on Estonian residual mix for 2020-2022
Specific emissions (GWP-fossil, CO2e/kWh)	0.64 kg CO2e/kWh
Heating data source and quality	Market for heat, district or industrial, natural gas (Reference product: heat, district or industrial, natural gas). Source: Ecoinvent 3.8, Europe. Unit: kWh
Specific emissions (GWP-fossil, CO2e/kWh)	0.014 kg CO2e/kWh

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts occurred from final products delivery to construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.
The transportation distance is defined according to RTS PCR - from the place of manufacture to Helsinki, Finland. According to the manufacturer, transportation doesn't cause losses as products are packaged properly. The final product is transported 110 km (75 km by ferry, 35 km by lorry). Vehicle capacity utilization volume factor is assumed to be 1.

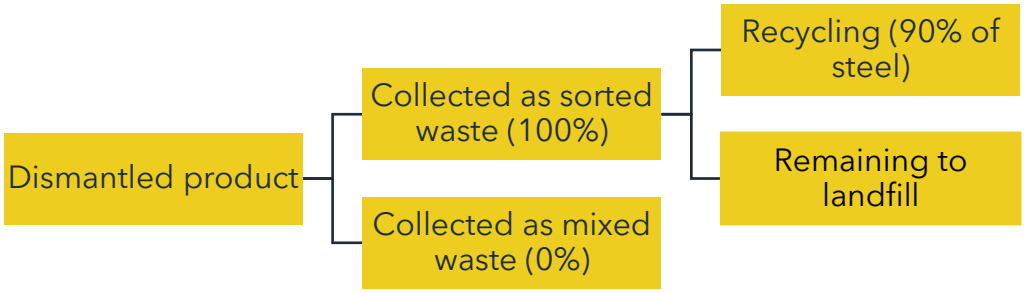
Vehicle type used for transport and distance	110 km (75 km by ferry, 35 km by lorry)
Specific transport emissions (GWP-fossil, CO2e/kWh)	Ferry: 0.11 kg CO2e Lorry: 0.17 kg CO2e
Capacity utilisation (including empty returns)	100%
Volume capacity utilisation factor	1

PRODUCT USE AND MAINTENANCE (B1-B7)

This EPD does not cover the use phase.
Air, soil, and water impacts during the use phase have not been studied.

PRODUCT END OF LIFE (C1-C4, D)

Figure 10. EOL scenarios



It is assumed that 100% of products are collected at demolition site. It is assumed that the dismantled product is transported 100 km by lorry (either to recycling facilities or landfill).
Based on EuRIC data, 90% of steel is assumed to be sent to recycling and later used as input in steelmaking.

Any material that left the product system in C3 has been considered in module D. Only net flows are considered. Waste packaging from A5 has not been considered. Module D scenario is representative of Europe.

	EOL mass of product	1 kg
Collection	**Collected separately**	1 kg (all products)
	Collected with mixed waste	0 kg (all products)
Recovery	**Re-use**	0 kg (all products)
	Recycling	0.9 kg (all products)
	Incineration with energy recovery	0 kg (all products)
Disposal	**Incineration without energy recovery**	0 kg (all products)
	Landfill	0.1 kg (all products)
	Total	1 kg
Scenario assumptions e.g. transportation		End-of-life product is transported 100 km with an average lorry

Note. All values in the table are rounded.

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BOLTED CONNECTIONS (1 kg)

ENVIRONMENTAL IMPACTS – CORE INDICATORS, EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	1.23E+0	1.48E-2	3.30E-3	1.71E-2	5.19E-2	1.11E-3	9.69E-2
Global warming potential – fossil	kg CO2e	1.23E+0	1.47E-2	3.30E-3	1.70E-2	5.18E-2	1.10E-3	9.69E-2
Global warming potential – biogenic	kg CO2e	3.49E-4	2.37E-5	3.00E-6	5.70E-5	9.45E-6	4.10E-6	1.80E-5
Global warming potential – LULUC	kg CO2e	1.35E-3	7.96E-6	3.30E-7	6.50E-6	5.16E-6	1.10E-6	1.50E-5
Ozone depletion potential	kg CFC-11e	1.25E-7	3.09E-9	7.10E-10	3.80E-9	1.11E-8	3.20E-10	3.73E-9
Acidification potential	mol H+e	5.27E-3	3.04E-4	3.40E-5	6.70E-5	5.38E-4	8.90E-6	3.91E-4
Eutrophication potential - freshwater	kg Pe	9.94E-4	7.15E-8	1.10E-8	1.20E-7	1.72E-7	1.60E-8	3.97E-6
Eutrophication potential - marine	kg Ne	1.19E-3	7.72E-5	1.50E-5	2.00E-5	2.39E-4	3.00E-6	8.24E-5
Eutrophication potential - terrestrial	mol Ne	1.20E-2	8.57E-4	1.70E-4	2.20E-4	2.61E-3	3.30E-5	9.69E-4
Photochemical ozone formation ("smog")	kg NMVOCe	3.75E-3	2.27E-4	4.60E-5	6.80E-5	7.18E-4	9.60E-6	4.81E-4
Abiotic depletion potential - minerals & metals	kg Sbe	3.19E-6	3.23E-8	1.70E-9	5.90E-8	2.63E-8	3.50E-9	1.83E-6
Abiotic depletion potential - fossil resources	MJ	1.94E+1	1.97E-1	4.45E-2	2.47E-1	6.97E-1	2.40E-2	8.39E-1
Water use	m3e depr.	5.04E-1	6.95E-4	1.20E-4	1.10E-3	1.87E-3	1.40E-4	1.74E-2

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	2.10E+00	1.95E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	7.04E-02
Renewable primary energy resources as material	MJ	9.68E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.07E+00	1.95E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	7.04E-02
Non-renewable primary energy resources as energy	MJ	1.72E+01	1.97E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	8.40E-01
Non-renewable primary energy resources as material	MJ	2.40E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	1.96E+01	1.97E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	8.40E-01
Secondary materials	kg	1.02E+00	7.44E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	-6.02E-02
Renewable secondary fuels	MJ	1.56E-02	4.55E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	9.02E-06
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	1.19E-02	1.76E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	1.99E-04

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	4.22E-02	2.34E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	3.25E-02
Non-hazardous waste	kg	5.59E-01	2.87E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	1.58E-01
Radioactive waste	kg	5.48E-05	1.38E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	-3.01E-07

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	1.89E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.86E-02	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	1.23E+00	1.48E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	9.69E-02
Global warming potential – fossil	kg CO2e	1.23E+00	1.47E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	9.69E-02
Global warming potential – biogenic	kg CO2e	3.49E-04	2.37E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	1.80E-05
Abiotic depletion potential - minerals & metals	kg Sbe	3.19E-06	3.23E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	1.83E-06
Abiotic depletion potential - fossil	MJ	1.94E+01	1.97E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	8.39E-01
Water use	m3e depr.	5.04E-01	6.95E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	1.74E-02
Secondary materials	kg	1.02E+00	7.44E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	-6.02E-02
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	1.83E-02	N/A	N/A	N/A	N/A	N/A	N/A

FASTENING SYSTEMS (1 kg)

ENVIRONMENTAL IMPACTS – CORE INDICATORS, EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	3.33E+00	1.53E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-5.38E-01
Global warming potential – fossil	kg CO2e	3.33E+00	1.53E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-5.38E-01
Global warming potential – biogenic	kg CO2e	4.24E-04	2.46E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.00E-04
Global warming potential – LULUC	kg CO2e	3.20E-03	8.25E-06	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-8.36E-05
Ozone depletion potential	kg CFC-11e	1.73E-07	3.20E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-2.07E-08
Acidification potential	mol H+e	1.76E-02	3.15E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-2.17E-03
Eutrophication potential - freshwater	kg Pe	1.19E-04	7.42E-08	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-2.21E-05
Eutrophication potential - marine	kg Ne	3.13E-03	8.01E-05	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-4.58E-04
Eutrophication potential - terrestrial	mol Ne	3.53E-02	8.89E-04	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-5.38E-03
Photochemical ozone formation ("smog")	kg NMVOCe	1.18E-02	2.35E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-2.67E-03
Abiotic depletion potential - minerals & metals	kg Sbe	8.66E-05	3.35E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.02E-05
Abiotic depletion potential - fossil resources	MJ	3.81E+01	2.04E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.66E+00
Water use	m3e depr.	1.14E+00	7.20E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-9.69E-02

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	7.46E+00	2.03E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-3.91E-01
Renewable primary energy resources as material	MJ	1.34E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	8.79E+00	2.03E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-3.91E-01
Non-renewable primary energy resources as energy	MJ	3.61E+01	2.04E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.67E+00
Non-renewable primary energy resources as material	MJ	2.23E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	3.83E+01	2.04E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.67E+00
Secondary materials	kg	5.66E-01	7.72E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	3.34E-01
Renewable secondary fuels	MJ	3.24E-02	4.71E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-5.01E-05
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	3.23E-02	1.83E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-1.10E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	2.48E+00	2.42E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-1.80E-01
Non-hazardous waste	kg	5.29E+00	2.97E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-8.79E-01
Radioactive waste	kg	1.08E-04	1.43E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	1.67E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	1.74E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.86E-02	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	3.33E+00	1.53E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-5.38E-01
Global warming potential – fossil	kg CO2e	3.33E+00	1.53E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-5.38E-01
Global warming potential – biogenic	kg CO2e	4.24E-04	2.46E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.00E-04
Abiotic depletion potential - minerals & metals	kg Sbe	8.66E-05	3.35E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.02E-05
Abiotic depletion potential - fossil	MJ	3.81E+01	2.04E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.66E+00
Water use	m3e depr.	1.14E+00	7.20E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-9.69E-02
Secondary materials	kg	5.66E-01	7.72E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	3.34E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	3.74E-02	N/A	N/A	N/A	N/A	N/A	N/A

WIRE LOOPS (1 kg)

ENVIRONMENTAL IMPACTS – CORE INDICATORS, EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	3.34E+00	1.47E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-1.37E+00
Global warming potential – fossil	kg CO2e	3.33E+00	1.46E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-1.37E+00
Global warming potential – biogenic	kg CO2e	1.57E-04	2.36E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-2.55E-04
Global warming potential – LULUC	kg CO2e	1.08E-02	7.92E-06	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-2.13E-04
Ozone depletion potential	kg CFC-11e	2.16E-07	3.07E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-5.27E-08
Acidification potential	mol H+e	2.11E-02	3.03E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-5.53E-03
Eutrophication potential - freshwater	kg Pe	1.76E-04	7.12E-08	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-5.61E-05
Eutrophication potential - marine	kg Ne	4.52E-03	7.69E-05	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-1.16E-03
Eutrophication potential - terrestrial	mol Ne	5.13E-02	8.53E-04	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-1.37E-02
Photochemical ozone formation (“smog”)	kg NMVOCe	1.80E-02	2.26E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-6.80E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.31E-04	3.21E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-2.58E-05
Abiotic depletion potential - fossil resources	MJ	3.52E+01	1.96E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-1.19E+01
Water use	m3e depr.	1.93E+00	6.91E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-2.47E-01

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	3.56E+00	1.94E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-9.95E-01
Renewable primary energy resources as material	MJ	3.97E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.95E+00	1.94E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-9.95E-01
Non-renewable primary energy resources as energy	MJ	3.52E+01	1.96E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-1.19E+01
Non-renewable primary energy resources as material	MJ	2.62E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	3.52E+01	1.96E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-1.19E+01
Secondary materials	kg	2.76E-01	7.41E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	8.50E-01
Renewable secondary fuels	MJ	1.37E-02	4.52E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-1.28E-04
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	4.53E-02	1.75E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-2.81E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	1.18E+00	2.33E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-4.59E-01
Non-hazardous waste	kg	5.40E+00	2.85E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-2.24E+00
Radioactive waste	kg	9.13E-05	1.37E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	4.25E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	3.34E+00	1.47E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-1.37E+00
Global warming potential – fossil	kg CO2e	3.33E+00	1.46E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-1.37E+00
Global warming potential – biogenic	kg CO2e	1.57E-04	2.36E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-2.55E-04
Abiotic depletion potential - minerals & metals	kg Sbe	1.31E-04	3.21E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-2.58E-05
Abiotic depletion potential - fossil	MJ	3.52E+01	1.96E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-1.19E+01
Water use	m3e depr.	1.93E+00	6.91E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-2.47E-01
Secondary materials	kg	2.76E-01	7.41E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	8.50E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	1.58E-02	N/A	N/A	N/A	N/A	N/A	N/A

SLAB SUPPORT (1 kg)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	1.85E+00	1.59E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-5.23E-01
Global warming potential – fossil	kg CO2e	1.85E+00	1.59E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-5.22E-01
Global warming potential – biogenic	kg CO2e	4.57E-04	2.55E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-9.74E-05
Global warming potential – LULUC	kg CO2e	1.45E-03	8.57E-06	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-8.11E-05
Ozone depletion potential	kg CFC-11e	1.53E-07	3.33E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-2.01E-08
Acidification potential	mol H+e	7.75E-03	3.28E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-2.11E-03
Eutrophication potential - freshwater	kg Pe	8.39E-04	7.70E-08	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-2.14E-05
Eutrophication potential - marine	kg Ne	1.64E-03	8.32E-05	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-4.45E-04
Eutrophication potential - terrestrial	mol Ne	1.79E-02	9.23E-04	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-5.22E-03
Photochemical ozone formation ("smog")	kg NMVOCe	6.95E-03	2.44E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-2.60E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.53E-05	3.48E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-9.87E-06
Abiotic depletion potential - fossil resources	MJ	2.44E+01	2.12E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.53E+00
Water use	m3e depr.	7.68E-01	7.48E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-9.41E-02

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	3.29E+00	2.10E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-3.80E-01
Renewable primary energy resources as material	MJ	1.55E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	4.83E+00	2.10E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-3.80E-01
Non-renewable primary energy resources as energy	MJ	2.42E+01	2.12E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.53E+00
Non-renewable primary energy resources as material	MJ	2.35E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	2.44E+01	2.12E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.53E+00
Secondary materials	kg	7.42E-01	8.02E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	3.25E-01
Renewable secondary fuels	MJ	4.96E-02	4.90E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-4.87E-05
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	1.77E-02	1.90E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-1.07E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	4.25E-01	2.52E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-1.75E-01
Non-hazardous waste	kg	2.18E+00	3.09E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-8.54E-01
Radioactive waste	kg	6.02E-05	1.49E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	1.62E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	1.33E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	1.50E-01	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	5.62E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	1.85E+00	1.59E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-5.23E-01
Global warming potential – fossil	kg CO2e	1.85E+00	1.59E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-5.22E-01
Global warming potential – biogenic	kg CO2e	4.57E-04	2.55E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-9.74E-05
Abiotic depletion potential - minerals & metals	kg Sbe	1.53E-05	3.48E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-9.87E-06
Abiotic depletion potential - fossil	MJ	2.44E+01	2.12E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-4.53E+00
Water use	m3e depr.	7.68E-01	7.48E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-9.41E-02
Secondary materials	kg	7.42E-01	8.02E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	3.25E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	5.83E-02	N/A	N/A	N/A	N/A	N/A	N/A

LIFTING SYSTEMS (1 kg)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	8.25E+00	1.51E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil	kg CO2e	8.24E+00	1.50E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic	kg CO2e	7.21E-05	2.42E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Global warming potential – LULUC	kg CO2e	8.75E-03	8.13E-06	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-1.05E-04
Ozone depletion potential	kg CFC-11e	4.49E-07	3.16E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-2.60E-08
Acidification potential	mol H+e	5.02E-02	3.11E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-2.73E-03
Eutrophication potential - freshwater	kg Pe	3.11E-04	7.31E-08	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-2.77E-05
Eutrophication potential - marine	kg Ne	9.16E-03	7.89E-05	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-5.75E-04
Eutrophication potential - terrestrial	mol Ne	1.01E-01	8.76E-04	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-6.76E-03
Photochemical ozone formation ("smog")	kg NMVOCe	3.06E-02	2.32E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-3.36E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.76E-04	3.30E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil resources	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.58E+00	7.10E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	1.82E+01	2.00E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Renewable primary energy resources as material	MJ	7.45E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	1.89E+01	2.00E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Non-renewable primary energy resources as energy	MJ	9.34E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Non-renewable primary energy resources as material	MJ	4.92E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Secondary materials	kg	7.11E-01	7.61E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Renewable secondary fuels	MJ	2.78E-02	4.64E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-6.30E-05
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	7.40E-02	1.80E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-1.39E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	6.25E+00	2.39E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-2.27E-01
Non-hazardous waste	kg	1.29E+01	2.93E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-1.10E+00
Radioactive waste	kg	2.48E-04	1.41E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	2.10E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.86E-02	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	8.25E+00	1.51E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil		8.24E+00	1.50E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic		7.21E-05	2.42E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Abiotic depletion potential - minerals & metals	kg Sbe	1.76E-04	3.30E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.58E+00	7.10E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01
Secondary materials	kg	7.11E-01	7.61E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	2.96E-02	N/A	N/A	N/A	N/A	N/A	N/A

BALCONY CONNECTORS (1 kg)

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	6.05E+00	2.61E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil	kg CO2e	6.04E+00	2.60E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic	kg CO2e	2.34E-04	4.19E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Global warming potential – LULUC	kg CO2e	6.73E-03	1.41E-05	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-1.05E-04
Ozone depletion potential	kg CFC-11e	3.29E-07	5.46E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-2.60E-08
Acidification potential	mol H+e	3.78E-02	5.37E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-2.73E-03
Eutrophication potential - freshwater	kg Pe	2.30E-04	1.26E-07	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-2.77E-05
Eutrophication potential - marine	kg Ne	6.72E-03	1.36E-04	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-5.75E-04
Eutrophication potential - terrestrial	mol Ne	7.61E-02	1.51E-03	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-6.76E-03
Photochemical ozone formation ("smog")	kg NMVOCe	2.39E-02	4.01E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-3.36E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.49E-04	5.71E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil resources	MJ	6.89E+01	3.48E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.06E+00	1.23E-03	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	2.11E+01	3.45E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Renewable primary energy resources as material	MJ	1.05E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	3.15E+01	3.45E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Non-renewable primary energy resources as energy	MJ	6.82E+01	3.48E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Non-renewable primary energy resources as material	MJ	6.90E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	6.89E+01	3.48E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Secondary materials	kg	6.57E-01	1.32E-04	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Renewable secondary fuels	MJ	3.54E-01	8.03E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-6.30E-05
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	6.13E-02	3.11E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-1.39E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	5.32E+00	4.13E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-2.27E-01
Non-hazardous waste	kg	9.77E+00	5.06E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-1.10E+00
Radioactive waste	kg	1.81E-04	2.44E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	2.10E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.86E-02	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	6.05E+00	2.61E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil		6.04E+00	2.60E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic		2.34E-04	4.19E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Abiotic depletion potential - minerals & metals	kg Sbe	1.49E-04	5.71E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil	MJ	6.89E+01	3.48E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.06E+00	1.23E-03	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01
Secondary materials	kg	6.57E-01	1.32E-04	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	4.16E-01	N/A	N/A	N/A	N/A	N/A	N/A

FIXING INSERTS (1 kg)

ENVIRONMENTAL IMPACTS – CORE INDICATORS, EN 15804+A2, PEF

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	8.25E+00	1.51E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil	kg CO2e	8.24E+00	1.50E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic	kg CO2e	7.21E-05	2.42E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Global warming potential – LULUC	kg CO2e	8.75E-03	8.13E-06	3.30E-07	6.50E-06	5.16E-06	1.10E-06	-1.05E-04
Ozone depletion potential	kg CFC-11e	4.49E-07	3.16E-09	7.10E-10	3.80E-09	1.11E-08	3.20E-10	-2.60E-08
Acidification potential	mol H+e	5.02E-02	3.11E-04	3.40E-05	6.70E-05	5.38E-04	8.90E-06	-2.73E-03
Eutrophication potential - freshwater	kg Pe	3.11E-04	7.31E-08	1.10E-08	1.20E-07	1.72E-07	1.60E-08	-2.77E-05
Eutrophication potential - marine	kg Ne	9.16E-03	7.89E-05	1.50E-05	2.00E-05	2.39E-04	3.00E-06	-5.75E-04
Eutrophication potential - terrestrial	mol Ne	1.01E-01	8.76E-04	1.70E-04	2.20E-04	2.61E-03	3.30E-05	-6.76E-03
Photochemical ozone formation ("smog")	kg NMVOCe	3.06E-02	2.32E-04	4.60E-05	6.80E-05	7.18E-04	9.60E-06	-3.36E-03
Abiotic depletion potential - minerals & metals	kg Sbe	1.76E-04	3.30E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil resources	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.58E+00	7.10E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01

EN 15804+A2 disclaimer for Abiotic depletion and Water use and optional indicators except Particulate matter and Ionizing radiation, human health. The results of these environmental impact indicators shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

USE OF NATURAL RESOURCES

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Renewable primary energy resources as energy	MJ	1.82E+01	2.00E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Renewable primary energy resources as material	MJ	7.45E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of renewable primary energy resources	MJ	1.89E+01	2.00E-03	2.50E-04	3.50E-03	3.99E-03	4.20E-04	-4.91E-01
Non-renewable primary energy resources as energy	MJ	9.34E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Non-renewable primary energy resources as material	MJ	4.92E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Total use of non-renewable primary energy resources	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Secondary materials	kg	7.11E-01	7.61E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Renewable secondary fuels	MJ	2.78E-02	4.64E-07	5.70E-08	9.10E-07	8.91E-07	3.40E-07	-6.30E-05
Non-renewable secondary fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of net fresh water	m3	7.40E-02	1.80E-05	2.70E-06	3.10E-05	4.23E-05	2.60E-05	-1.39E-03

END OF LIFE – WASTE

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Hazardous waste	kg	6.25E+00	2.39E-04	6.00E-05	2.80E-04	9.36E-04	0.00E+00	-2.27E-01
Non-hazardous waste	kg	1.29E+01	2.93E-03	4.20E-04	4.90E-03	6.55E-03	1.00E-01	-1.10E+00
Radioactive waste	kg	2.48E-04	1.41E-06	3.10E-07	1.70E-06	4.91E-06	0.00E+00	2.10E-06

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Components for re-use	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	5.86E-02	0.00E+00	0.00E+00	0.00E+00	9.00E-01	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

KEY INFORMATION PER KG

Impact category	Unit	A1-A3	A4	C1	C2	C3	C4	D
Global warming potential – total	kg CO2e	8.25E+00	1.51E-02	3.30E-03	1.71E-02	5.19E-02	1.11E-03	-6.76E-01
Global warming potential – fossil	kg CO2e	8.24E+00	1.50E-02	3.30E-03	1.70E-02	5.18E-02	1.10E-03	-6.76E-01
Global warming potential – biogenic	kg CO2e	7.21E-05	2.42E-05	3.00E-06	5.70E-05	9.45E-06	4.10E-06	-1.26E-04
Abiotic depletion potential - minerals & metals	kg Sbe	1.76E-04	3.30E-08	1.70E-09	5.90E-08	2.63E-08	3.50E-09	-1.28E-05
Abiotic depletion potential - fossil	MJ	9.35E+01	2.01E-01	4.45E-02	2.47E-01	6.97E-01	2.40E-02	-5.86E+00
Water use	m3e depr.	2.58E+00	7.10E-04	1.20E-04	1.10E-03	1.87E-03	1.40E-04	-1.22E-01
Secondary materials	kg	7.11E-01	7.61E-05	1.70E-05	8.30E-05	2.73E-04	8.80E-06	4.20E-01
Biogenic carbon in product (A3)	kg C	0.00E+00	N/A	N/A	N/A	N/A	N/A	N/A
Biogenic carbon in packaging (A3)	kg C	2.96E-02	N/A	N/A	N/A	N/A	N/A	N/A