ENVIRONMENTAL PRODUCT DECLARATION

IN ACCORDANCE WITH EN 15804+A2 & ISO 14025

Carbon Steel Screws
ITW Construction Products

EPD HUB, HUB-5988
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Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804, EPD Hub PCR version 1.2 (24 Mar 2025) and JRC characterization factors EF 3.1.

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GENERAL INFORMATION

MANUFACTURER

Manufacturer	ITW Construction Products
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EPD STANDARDS, SCOPE AND VERIFICATION

Program operator	EPD Hub, hub@epdhub.com
Reference standard	EN 15804:2012+A2:2019/AC:2021 and ISO 14025
PCR	EPD Hub Core PCR Version 1.2, 24 Mar 2025
Sector	Construction product
Category of EPD	Third party verified EPD
Parent EPD number	-
Scope of the EPD	Cradle to gate with options, A4-A5, and modules C1-C4, D
EPD author	Anders Nissen - ITW Construction Products
EPD verification	Independent verification of this EPD and data, according to ISO 14025: ☐ Internal verification ☑ External verification
EPD verifier	Yazan Badour as an authorized verifier for EPD Hub

This EPD is intended for business-to-business and/or business-to-consumer communication. The manufacturer has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programs may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804 and if they are not compared in a building context.

PRODUCT

Product name	Carbon Steel Screws
Additional labels	-
Product reference	-
Place(s) of raw material origin	China
Place of production	China Hangzhou, Taiwan Kaohsiung, Denmark Middelfart
Place(s) of installation and use	DK, NO, SE, FI, DE, PL, FR, UK
Period for data	Calendar year 2023
Averaging in EPD	Multiple products and multiple factories – Based on worst-case results
Variation in GWP-fossil for A1-A3 (%)	−23%, −39%
GTIN (Global Trade Item Number)	Not applicable
NOBB (Norwegian Building Product Database)	Not applicable
A1-A3 Specific data (%)	53
Place(s) of end-of-life	Europe (DK, NO, SE, FI, DE, PL, FR, UK)

ENVIRONMENTAL DATA SUMMARY

Declared unit	1 kg of finished carbon steel wood screw with zinc-based surface treatment
Declared unit mass	0,988 kg
Mass of packaging	0,193 kg
GWP-fossil, A1-A3 ($kgCO_2e$)	3,88
GWP-total, A1-A3 ($kgCO_2e$)	3,85
Secondary material, inputs (%)	38,7
Secondary material, outputs (%)	0
Total energy use, A1-A3 (kWh)	12,4
Net freshwater use, A1-A3 (m^3)	0,03

PRODUCT AND MANUFACTURER

ABOUT THE MANUFACTURER

ITW Construction Products UK/Nordics is a division of ITW (Illinois Tool Works Ltd), a multinational industrial business operating across multiple industries. Since ITW's founding more than 100 years ago, it has become one of the world's leading diversified manufacturers of specialized industrial equipment, consumables, and related service businesses. The foundation of our company is the ITW Business Model, a unique and differentiated set of core capabilities and business practices that comprises three key elements: ITW's 80/20 Front to Back Process, customer-back innovation and a decentralized entrepreneurial culture. At ITW Construction Products UK/Nordics we are suppliers of innovative, engineered fastening systems and related consumables and software. These products are uniquely specified for a variety of materials, including wood, concrete and steel.

PRODUCT DESCRIPTION

Carbon steel wood screws are engineered fasteners designed for secure and durable connections in timber construction, interior fit-out, and general building assembly applications. The product group covers a wide range of diameters and lengths, accommodating diverse application requirements across residential, commercial, and light industrial construction projects.

The screws are manufactured from carbon steel and receive a zinc-based surface treatment to provide corrosion protection appropriate to the intended service environment. Surface treatment variants within the product group include zinc electroplating, zinc electroplating with Cr(III) passivation, zinc electroplating with powder coating (Rustpert), and black phosphate treatment.

PRODUCT APPLICATION

The product group is suitable for wood-to-wood connections in timber framing, joinery, and structural carpentry, including the fastening of joists, rafters, battens, and engineered timber elements. It is also suited to metal-to-wood connections for securing steel brackets, connectors, and light gauge steel framing components to timber substrates, and for plasterboard installation to timber and light gauge steel framing in wall and ceiling systems.

The screws are suitable for use in dry and limited-exposure service conditions consistent with the corrosion protection class of the applied surface treatment. They are not intended for use in permanently wet, submerged, or highly corrosive environments unless a compatible surface treatment variant is specified.

TECHNICAL CHARACTERISTICS

Base material: Carbon steel.

Surface treatment: Zinc electroplating, zinc electroplating with Cr(III) passivation, zinc electroplating with powder coating (Rustpert), or black phosphate, depending on product variant.

Corrosion resistance: Zinc electroplated variants achieve from 72 to 2000 hours to white rust in salt spray testing per ISO 9227. Rustpert variants provide enhanced corrosion resistance through a combined zinc and powder coat system. Black phosphate variants provide moderate corrosion resistance suited to dry internal applications.

Tensile and torsional strength: Hardened carbon steel construction providing high tensile strength and torsional resistance consistent with EN ISO 898-1 property classes applicable to the product range.

Thread type: Coarse thread optimized for wood substrate engagement. Specific thread geometry varies by product variant and application type.

Point type: Sharp point and self-drilling point variants are available depending on application. Sharp point variants are suited to timber and plasterboard installation. Self-drilling point variants are suited to metal-to-wood connections.

Applicable standards: EN 14592 (timber screws), EN 14566 (screws for plasterboard installations).

Declared unit: 1 kg of finished carbon steel wood screw with zinc-based surface treatment.

System boundary: A1–A3, A4, A5, C1–C4, D.

EPD SCOPE AND GROUPING
This EPD covers the full commercial range of carbon steel screws sold by ITW Construction Products across European and UK markets. The declared results are based on the worst-case production system within the product group, representing a conservative upper bound applicable to all covered product variants. The actual environmental impact of the specific product delivered may be lower than the declared value depending on the product variant and production system. The variation in GWP fossil for modules A1–A3 between the worst-case and best-case production systems is −39%. Specifiers and LCA practitioners requiring production-system-specific results should contact ITW Construction Products.

Further information can be found at:
https://www.itwbyg.dk/

PRODUCT RAW MATERIAL MAIN COMPOSITION

Raw material category	Amount, mass %	Material origin
Metals	100	China, Taiwan
Minerals	-	-
Fossil materials	-	-
Bio-based materials	-	-

BIOGENIC CARBON CONTENT

Product's biogenic carbon content at the factory gate

Biogenic carbon content in product, kg C	0
Biogenic carbon content in packaging, kg C	0,0109

FUNCTIONAL UNIT AND SERVICE LIFE

Declared unit	1 kg of finished carbon steel wood screw with zinc-based surface treatment
Mass per declared unit	0,988 kg
Functional unit	-
Reference service life	-

SUBSTANCES, REACH - VERY HIGH CONCERN

The product does not contain any REACH SVHC substances in amounts greater than 0,1 % (1000 ppm).

PRODUCT LIFE-CYCLE

SYSTEM BOUNDARY

This EPD covers the life-cycle modules listed in the following table.

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		
x	x	x	x	x	ND	ND	ND	ND	ND	ND	ND	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

Not declared = ND.

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. Also, fuels used by machines, and handling of waste formed in the production processes at the manufacturing facilities are included in this stage. The study also considers the material losses occurring during the manufacturing processes as well as losses during electricity transmission.

A market-based approach is used in modelling the electricity mix utilized in the factory. The product group is manufactured across multiple production systems involving facilities in China, Taiwan, and Denmark. All products follow the same general production route — wire drawing, cold forming, thread rolling, heat treatment, and zinc-based surface treatment of carbon steel wire rod — but differ in manufacturing location, energy sources, and surface treatment configuration. The declared worst-case results are based on the production system with the highest environmental impact, comprising full manufacture and surface treatment at a third-party manufacturing facility in China.

Worst-case production system — China (third-party manufacturer)
Raw screw production and surface treatment are carried out at a single third-party manufacturing facility in China. Production operations include wire drawing, cold forming, thread rolling, heat treatment, and zinc-based surface treatment. Heat treatment furnaces are fuelled by heavy fuel oil (HFO). Electricity is sourced from the North West China Grid (medium voltage, ecoinvent 3.12, 0.91 kg CO_2e/kWh). No certified green energy is claimed for this facility. A subset of products receives black phosphate surface treatment in place of zinc electroplating; zinc electroplating has been applied as a conservative proxy for this treatment in the LCA model, as described in the assumptions section. Packaging is completed at the China facility.
Ancillary inputs include process water, lubricating oil, and replacement tooling. Manufacturing waste includes steel production losses directed to landfill, waste mineral oil directed to hazardous waste incineration, and tool scrap. Wastewater is treated using average wastewater treatment.

Alternative production system — Taiwan manufacturing + Denmark surface treatment
Screw production takes place at a manufacturing facility in Taiwan, comprising wire drawing, cold forming, thread rolling, and heat treatment

using LPG-fired furnaces. Electricity is sourced from the Taiwanese national grid. Finished screws are shipped to the ITW Construction Products surface treatment facility in Middelfart, Denmark, where zinc electroplating and Cr(III) passivation coating are applied. A subset of products is supplied with Rustpert surface treatment, modelled as a combination of zinc electroplating and powder coating. The Denmark facility uses natural gas for space heating, sources electricity from the Danish national grid, and uses certified green electricity documented through a Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark A/S, covering 100% Nordic wind power for Calendar year 2023 measurement period, audited by PwC. Packaging is completed at the Denmark facility.

Alternative production system — Taiwan manufacturing and surface treatment
Screw production, heat treatment, zinc electroplating, and packaging are all carried out at a single manufacturing facility in Taiwan. Electricity is sourced from the Taiwanese national grid. No secondary surface treatment is applied.

Surface treatment modelling — all production systems
Zinc-based surface treatments are modelled using the ecoinvent 3.12 dataset Zinc coating, pieces as a proxy, scaled to reflect the actual coating thickness and coated surface area of each treatment type. Clear zinc electroplating (2 µm) is scaled to 0.00736 m² per kg of finished product. Black phosphate treatment (1 µm, China facility) is modelled using the same dataset scaled to 0.00368 m² per kg, representing the lower material and energy demand of phosphate conversion coatings. The proxy results in a conservative overestimate of surface treatment impacts for the black phosphate subset, consistent with the worst-case approach. Where country-specific datasets were unavailable, European average datasets were used as proxies. It should be noted that hot-dip galvanising and zinc electroplating are fundamentally different processes — hot-dip involves immersion in molten zinc at high temperature, while electroplating uses an electrolytic bath at ambient temperature with significantly lower energy and zinc consumption per unit area. The use of the hot-dip galvanising dataset therefore results in a deliberate and documented conservative overestimate of surface treatment impacts, which is consistent with and supported by the worst-case grouping approach applied in this EPD.

Transport of raw materials and finished goods (A1–A2)
Wire rod is transported to the China manufacturing facility by lorry (average 41.6 km, lorry >32 t, EURO 5). Transport from the China facility to the ITW Construction Products distribution warehouse is modelled as a combination of road transport by lorry >32 t EURO 5 and sea freight (heavy fuel oil container ship, ecoinvent 3.12), totalling approximately 18,000 km. A minor share of product (less than 5% of volume) is transported to the UK warehouse via a comparable combined road and sea freight route. Both flows are included in module A2.

Production losses
Steel production losses are modelled at 3% during wire drawing and forming operations at the China facility, generating steel scrap directed to landfill. Zinc coating losses are modelled at 2% for zinc electroplating and 1% for black phosphate treatment.

Manufacturing waste transport
Waste generated during manufacturing at all sites is transported to external treatment facilities at an assumed average distance of 50 km by lorry >32 t, EURO 5 (ecoinvent 3.12).

Packaging — all production systems
Finished products are packed using corrugated cardboard boxes as primary and secondary packaging. Depending on product format and customer requirements, plastic film, polypropylene collation strips, and EUR flat

pallets may also be used. Packaging is completed at the final production site in each supply chain and is modelled as part of module A3. All products are distributed to the ITW Construction Products warehouse in Denmark, with a minor share (less than 5% of volume) distributed to the UK market. Both distribution flows are included in module A2.

TRANSPORT AND INSTALLATION (A4-A5)

Transportation impacts from final product delivery to the construction site (A4) cover fuel direct exhaust emissions, environmental impacts of fuel production, as well as related infrastructure emissions.

Transport and installation (A4–A5)

Transportation to the construction site (A4) is modelled using the ecoinvent 3.12 dataset market for transport, freight, lorry >32 metric ton, diesel, EURO 5, and a sea freight leg using container ship (heavy fuel oil, ecoinvent 3.12). An average transport distance of 20 km by road and 7 km by sea is assumed, representing delivery from regional warehouse to construction site. Full truckload (FTL) utilisation is assumed. No material losses are assumed during transport.

No material losses are assumed during installation (A5). Energy consumption during installation is based on the use of a standard 18V/5Ah cordless power tool, estimated at 0.231 kWh per kg of screws installed. No dedicated installation machinery is required and no additional installation materials are needed beyond the fasteners themselves. Waste generated during installation consists exclusively of packaging materials accompanying the declared product. No waste of the product itself is assumed at the installation stage.

Packaging waste quantities per declared unit are as follows: corrugated cardboard 0.059 kg, wood pallet (EUR flat) 0.040 kg, plastic film (LDPE) 0.001 kg, and polypropylene collation 0.093 kg, totalling 0.193 kg per kg of finished fastener.

Packaging waste is treated according to the following European average end-of-life distributions, based on CEPI statistics for paper/cardboard and Plastics Europe statistics for plastic packaging. Corrugated cardboard: 83% recycling, 8% incineration, 9% landfill. Wood pallet: 32% recycling, 30% incineration, 38% landfill. Plastic film (LDPE) and polypropylene collation: 40% recycling, 37% incineration, 23% landfill. All scenarios are modelled using OneClickLCA built-in EU packaging end-of-life scenarios (ecoinvent 3.11 basis) and are representative of current European waste treatment practice.

Transport to waste treatment facilities is embedded within the OneClickLCA built-in EU packaging end-of-life scenarios (ecoinvent 3.11 basis). No separate transport distance has been entered — distances are modelled as part of the pre-built scenario datasets.

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)

The end-of-life scenarios declared below are currently in use and are representative of the most likely end-of-life scenario alternatives for construction fasteners in European markets, in accordance with EN 15804+A2 Annex B.1.

The end-of-life stages (C1–C4) and benefits and loads beyond the system boundary (Module D) are modelled in accordance with EN 15804+A2 and the applicable Product Category Rules.

Demolition and deconstruction (C1) are assumed to be carried out using standard diesel-powered equipment. Energy consumption for demolition is

modelled as 0.01 kWh of diesel per kg of product, applying a generic assumption consistent with EN 15804+A2 practice for small metal fasteners, using the ecoinvent 3.12 dataset market for diesel, burned in building machine.

Transport of end-of-life materials (C2) is modelled as road transport by lorry >32 metric ton, diesel, EURO 5 (ecoinvent 3.12). An average transport distance of 50 km is assumed from the construction site to waste treatment facilities, representing typical European conditions. All transport is modelled as one-way; no return loads are assumed.

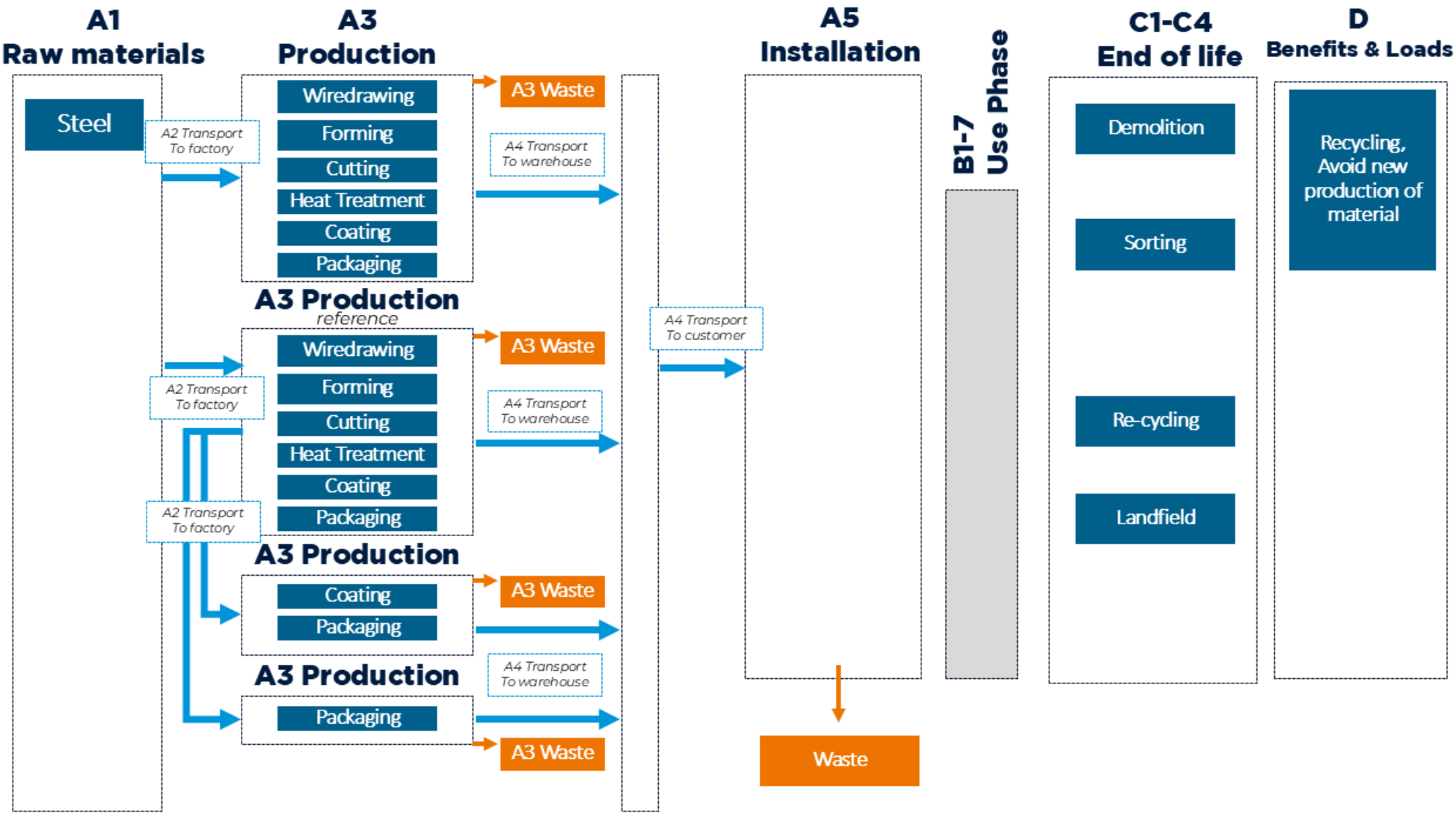
Waste processing (C3) and disposal (C4) are modelled using the following material-specific assumptions. Steel from the product: 85% is directed to recycling in module C3 via the dataset Treatment of metal scrap, mixed, for recycling, unsorted, sorting (ecoinvent 3.12); 15% is sent to landfill in module C4 via Treatment of scrap steel, inert material landfill (ecoinvent 3.12). The thin zinc surface coating is recovered as part of the standard steel recycling process and is not modelled separately. Packaging waste treatment follows European average assumptions as applied in module A5, with material-specific end-of-life shares for corrugated cardboard, wood pallets, and plastic packaging.

Module D accounts for benefits and loads beyond the system boundary arising from net material recycling. The system boundary for Module D covers the avoided burden of virgin material production, offset by the load of the actual recycling process applied. Recycled steel is credited with avoiding the production of virgin low-alloyed steel, modelled using the cut-off approach in accordance with EN 15804+A2. The net benefit is calculated as the difference between the avoided burden of virgin steel production and the load of the recycling process, applied to the net recyclable fraction only (85% of product steel mass). No energy substitution credits are claimed from packaging material incineration in Module D. The net benefit and burden are reported in Module D and excluded from all totals.

The secondary material input share (1.19% of declared unit mass) represents recycled steel content in the raw wire rod, modelled under the cut-off approach. The environmental burden of this recycled input has been excluded from Module A1 accordingly. The end-of-life recycling credit in Module D applies only to the net recyclable mass at end of life and does not overlap with the recycled input content, ensuring no double counting occurs.

All end-of-life assumptions, transport distances, and treatment routes are based on European average data and are consistent with the underlying LCA model..

MANUFACTURING PROCESS



LIFE-CYCLE ASSESSMENT

CUT-OFF CRITERIA

The cut-off criteria applied in this study follow EN 15804+A2 chapter 6.3.6, using a threshold of 1% for individual flows and 5% in aggregate per life cycle stage for both mass and energy. No mandatory life cycle stages as defined in EN 15804+A2 and the applicable PCR have been omitted from this study. The study does not exclude any modules or processes which are stated mandatory in the reference standard 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, 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. The production of capital equipment, construction activities, and infrastructure, maintenance and operation of capital equipment, personnel-related activities, energy and water use related to company management and sales activities are excluded.

The following processes have been excluded from the system boundary in accordance with EN 15804+A2 cut-off criteria. All excluded processes are estimated to contribute less than 1% of total mass and energy flows individually and less than 5% in aggregate:

- Capital equipment, manufacturing machinery, and building infrastructure at all production sites
- Employee commuting and business travel
- Administrative and office activities at all sites
- R&D and product development activities
- Production and replacement of spare parts for manufacturing equipment
- Minor cleaning agents and maintenance chemicals below the 1% cut-off threshold
- Internal site transport between production buildings where not separately metered

No biomass balance (BMB), mass balance credit, or book and claim methods as defined in ISO 22095 have been used in this study. All material and energy flows are modelled using standard LCA cut-off allocation methodology.

The applicable category rules (EN 14592 for timber screws, EN 14566 for screws for plasterboard installations) have been reviewed. EN 17662 (Execution of steel structures and aluminium structures) has been assessed and confirmed as not applicable to this product group. No deviations from EPD Hub PCR v1.2 are required on this basis.

VALIDATION OF DATA

Data collection for production, transport, and packaging was conducted using time and site-specific information based on Calendar year 2023 measurement period, as defined in the general information section. Upstream process calculations rely on generic data as defined in the Bibliography section. Manufacturer-provided specific and generic data were used for the product's manufacturing stage. The analysis was performed in One Click LCA EPD Generator, with the 'Cut-Off, EN 15804+A2' allocation method, and characterization factors according to EN 15804:2012+A2:2019/AC:2021 and JRC EF 3.1.

ALLOCATION, ESTIMATES AND ASSUMPTIONS

Allocation is required if some material, energy, and waste data cannot be measured separately for the product under investigation. All allocations are done as per the reference standards and the applied PCR. In this study, allocation has been done in the following ways:

Data type	Allocation
Raw materials	No allocation
Packaging material	Allocated by mass or volume
Ancillary materials	Allocated by mass or volume
Manufacturing energy and waste	Allocated by mass or volume

Mass-based allocation is applied at all multi-product sites based on Calendar year 2023 production data. Allocation factors are derived from production records (kg of screws processed per product line per production run). No revenue-based allocation is applied at any site. The Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark A/S covers the total electricity consumption of the ITW Construction Products Middelfart facility (6,269,276 kWh, calendar year 2023). The contractual instrument covers the entire facility consumption and is not virtually allocated to specific product lines. Mass-based allocation is applied to distribute the facility electricity consumption across product lines as documented above. No loads or benefits arising from the certified green electricity have been declared in Module D.

Surface treatment proxy — zinc electroplating and black phosphate

No dedicated zinc electroplating dataset for fasteners is available in ecoinvent 3.12. The dataset Zinc coating, pieces (ecoinvent 3.12) has been applied as a proxy for all zinc-based surface treatments, scaled to reflect the actual coating thickness and coated surface area per treatment type. Clear zinc electroplating (2 µm) is scaled to 0.00736 m² per kg of finished product. Black phosphate treatment (1 µm) is modelled using the same proxy dataset scaled to 0.00368 m² per kg, reflecting the lower material and energy demand of phosphate conversion coatings relative to zinc electroplating. The proxy results in a conservative overestimate of surface treatment impacts, consistent with the worst-case grouping approach. Where country-specific datasets were unavailable, European average datasets were used. The potential influence of geographical differences in energy supply is considered a data limitation, noted particularly for the China and Taiwan production systems. It should be noted that hot-dip galvanising and zinc electroplating are fundamentally different processes — hot-dip involves immersion in molten zinc at high temperature, while electroplating uses an electrolytic bath at ambient temperature with significantly lower energy and zinc consumption per unit area. The use of the hot-dip galvanising dataset therefore results in a deliberate and documented conservative overestimate of surface treatment impacts, which is consistent with and supported by the worst-case grouping approach applied in this EPD.

Product mix weighting — China facility

The China facility produces a mixed product range comprising zinc electroplated and black phosphate treated screws. Surface treatment inputs are modelled as a weighted average reflecting the actual product mix.

Electricity datasets — market-based approach

A market-based approach is applied for electricity modelling in accordance with EN 15941 and LCA Calculation Rules V2.0 ch. 2.5. Contractual instruments are used where applicable.

Electricity at the China facility is modelled using Market for electricity, medium voltage, North West China Grid (ecoinvent 3.12, 0.91 kg CO_2e/kWh), reflecting the regional coal-intensive grid. No contractual instruments are claimed for this facility. Electricity at the Taiwan facility is modelled using the Taiwanese national consumption mix (ecoinvent 3.12). No contractual instruments are claimed for this facility. Electricity at the Denmark surface treatment facility is modelled using the Danish national grid mix (ecoinvent 3.12), with certified green electricity documented

through a Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark A/S, covering 100% Nordic wind power (0 g CO_2/kWh) for the Calendar year 2023 measurement period, audited by PwC. The GO validity period covers the Calendar year 2023 measurement period and will be renewed annually throughout the EPD validity period. Transformation and distribution losses from high to medium voltage are included in the ecoinvent datasets.

Total electricity consumption in modules A1–A3 is below the 30% threshold requiring separate GWP/kWh declaration for foreground processes. The GWP of the North West China Grid electricity (0.91 kg CO_2e/kWh) is noted above for transparency. For background processes outside the direct control of the manufacturer, ecoinvent 3.12 consumption mix datasets are used per geography. No residual mix substitution has been applied.

Heat treatment fuel
Heat treatment at the China facility is modelled using Heat production, heavy fuel oil, at industrial furnace 1MW (ecoinvent 3.12). eat treatment at the Taiwan facility is fuelled by LPG. Consumption is based on primary production data from Calendar year 2023 measurement period and is documented in the background LCA report. The dataset Liquefied petroleum gas production, petroleum refinery operation (ecoinvent 3.12) is used. Space heating at the Denmark facility is supplied by natural gas.

A2 transport — China facility to warehouse
Transport from the China manufacturing facility to the European distribution warehouse is modelled as 220 km by lorry >32 t EURO 5 followed by approximately 18,000 km by sea freight (container ship, heavy fuel oil, ecoinvent 3.12). A minor share of product (less than 5% of volume) is transported to the UK warehouse, modelled as 241 km by lorry followed by approximately 17,000 km by sea freight.

A4 transport to construction site
Average delivery distance of approximately 20 km by road and 7 km by sea assumed, representing delivery from regional warehouse to construction site. Full truckload (FTL) utilisation assumed. The UK market share (less than 5% of total volume) is included within the European average and not modelled separately.

Waste transport A1–A3
Average distance of 50 km assumed for transport of manufacturing waste to external treatment facilities at all sites, modelled by lorry >32 t, EURO 5 (ecoinvent 3.12).

C1 demolition energy
Generic assumption of 0.01 kWh diesel per kg of product for mechanical deconstruction, modelled using Market for diesel, burned in building machine (ecoinvent 3.12).

C2 end-of-life transport
Average distance of 50 km from construction site to waste treatment facility, road transport by lorry >32 t, EURO 5 (ecoinvent 3.12).

End-of-life steel treatment
85% of steel product mass directed to recycling in module C3 via Treatment of metal scrap, mixed, for recycling, unsorted, sorting (ecoinvent 3.12); 15% directed to landfill in module C4 via Treatment of scrap steel, inert material landfill (ecoinvent 3.12). The zinc surface coating is recovered as part of the standard steel recycling process and is not modelled separately.

A5 installation energy
Installation energy estimated at 0.231 kWh per kg of screws based on use of a standard 18V/5Ah cordless power tool installing approximately 48 screws per kg of product. Modelled using Market group for electricity, low voltage (ecoinvent 3.12).

Green energy — Denmark facility
Certified green electricity at the ITW Construction Products surface treatment facility in Middelfart, Denmark is documented through a Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark

A/S, covering 100% Nordic wind power for Calendar year 2023 measurement period, audited by PwC. Total documented consumption: 6,269,276 kWh at 0 g CO_2/kWh. No certified green energy is claimed for the China or Taiwan manufacturing facilities.

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PRODUCT & MANUFACTURING SITES GROUPING

Type of grouping	Multiple products and multiple factories
Grouping method	Based on worst-case results
Variation in GWP-fossil for A1-A3, %	Taiwan + Denmark: 2.80 kg CO_2e = −39%; Taiwan only: 2.98 kg CO_2e = −23%

This EPD covers multiple products manufactured across multiple factories in accordance with EPD Hub PCR v1.2 and EN 15941. The declared results are based on worst-case results as defined in PCR 1.3.2 Section 5.4.3.

Products covered: Carbon steel wood screws with zinc-based surface treatment, including zinc electroplated, zinc electroplated with Cr(III) passivation, zinc electroplated with powder coating (Rustpert), and black phosphate variants. All products serve equivalent structural and fastening functions in timber construction, metal-to-wood connections, and plasterboard installation. There are no differences in functional or performance rating between the product variants that would prevent grouping.

Factories covered: Three production systems are included. Production system 1 (worst case, declared results): full manufacture and surface treatment at a third-party facility in Hangzhou, China. Production system 2: screw manufacture in Kaohsiung, Taiwan with surface treatment at ITW Construction Products, Middelfart, Denmark. Production system 3: full manufacture and surface treatment at a facility in Kaohsiung, Taiwan.

Averaging method: Worst-case results. The declared GWP fossil result of 3.88 kg CO_2e per kg fastener (A1–A3) represents the highest-impact production system. No mathematical averaging has been applied — the worst-case system result is declared directly.

GWP fossil variance for A1–A3: The variation between the declared worst-case result and the other production systems is as follows: Production system 2 (Taiwan + Denmark): 2.80 kg CO_2e, −39% relative to declared value. Production system 3 (Taiwan only): 2.98 kg CO_2e, −23% relative to declared value. The variation is attributable to differences in national electricity grid carbon intensity and heat treatment fuel type between production systems, not to differences in product specification or function.

Geographical coverage: The declared results are applicable to all European and UK markets listed in the place of installation and use field. There are no geographical restrictions on the use of this EPD within these markets.

Representativeness: The three production systems represent the full commercial range of carbon steel screws sold by ITW Construction Products in the declared markets during Calendar year 2023 measurement period. The worst-case result provides a conservative declaration applicable to all products in the group regardless of production origin.

Restrictions on use: This EPD is based on worst-case results and is therefore conservative for all products in the group. It may not be used to make claims about the specific environmental performance of individual production systems or product variants. Specifiers and LCA practitioners requiring production-system-specific results should contact ITW Construction Products directly.

LCA SOFTWARE AND BIBLIOGRAPHY

This EPD has been created using One Click LCA EPD Generator for EPD Hub V3 and EPD Process Certification v3.2.4. The LCA and EPD have been prepared according to the reference standards and ISO 14040/14044. The EPD Generator uses Ecoinvent v3.10.1/3.11/3.12 and One Click LCA databases as sources of environmental data. Allocation used in Ecoinvent 3.10.1/3.11/3.12 environmental data sources follow the methodology 'allocation, Cut-off, EN 15804+A2'.

DOCUMENTATION OF OTHER ESTIMATES AND ASSUMPTIONS

Surface treatment proxy — zinc electroplating and black phosphate: No dedicated zinc electroplating dataset for fasteners is available in ecoinvent 3.12. The dataset Zinc coating, pieces (ecoinvent 3.12) has been applied as a proxy for all zinc-based surface treatments, scaled to reflect the actual coating thickness and coated surface area per treatment type. Clear zinc electroplating (2 µm) is scaled to 0.00736 m² per kg of finished product. Black phosphate treatment (1 µm) is modelled using the same proxy dataset scaled to 0.00368 m² per kg, reflecting the lower material and energy demand of phosphate conversion coatings relative to zinc electroplating. The proxy results in a conservative overestimate of surface treatment impacts, consistent with the worst-case grouping approach. Where country-specific datasets were unavailable, European average datasets were used. The potential influence of geographical differences in energy supply is considered a data limitation, noted particularly for the China and Taiwan production systems. It should be noted that hot-dip galvanising and zinc electroplating are fundamentally different processes — hot-dip involves immersion in molten zinc at high temperature, while electroplating uses an electrolytic bath at ambient temperature with significantly lower energy and zinc consumption per unit area. The use of the hot-dip galvanising dataset therefore results in a deliberate and documented conservative overestimate of surface treatment impacts, which is consistent with and supported by the worst-case grouping approach applied in this EPD

Product mix weighting — China facility: The China facility produces a mixed product range comprising zinc electroplated and black phosphate treated screws. Surface treatment inputs are modelled as a weighted average reflecting the actual product mix, as documented in the background LCA report

Electricity datasets: A market-based approach is applied for electricity modelling in accordance with EN 15941 and LCA Calculation Rules V2.0 ch. 2.5. Electricity at the China facility is modelled using Market for electricity, medium voltage, North West China Grid (ecoinvent 3.12, 0.91 kg CO_2e/kWh). Electricity at the Taiwan facility is modelled using the Taiwanese national consumption mix (ecoinvent 3.12). Electricity at the Denmark surface treatment facility is modelled using the Danish national grid mix (ecoinvent 3.12), with certified green electricity documented through a Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark A/S, covering 100% Nordic wind power (0 g CO_2/kWh) for Calendar year 2023 measurement period, audited by PwC. The GO validity period covers Calendar year 2023 measurement period and will be renewed annually throughout the EPD validity period. Transformation and distribution losses are included in the ecoinvent datasets. Total electricity consumption in modules A1–A3 is below the 30% threshold requiring separate GWP/kWh declaration for foreground processes. No residual mix substitution has been applied for background processes.

Heat treatment fuel: Heat treatment at the China facility is modelled using Heat production, heavy fuel oil, at industrial furnace 1MW (ecoinvent 3.12). Heat treatment at the Taiwan facility is fuelled by LPG. Consumption is based on primary production data from Calendar year 2023 measurement period and is documented in the background LCA report. The dataset Liquefied petroleum gas production, petroleum refinery operation (ecoinvent 3.12) is used. Space heating at the Denmark facility is supplied by natural gas.

A2 transport — China facility to warehouse: Transport from the China

manufacturing facility to the ITW Construction Products distribution warehouse is modelled as 220 km by lorry >32 t EURO 5 followed by approximately 18,000 km by sea freight (container ship, heavy fuel oil, ecoinvent 3.12). A minor share of product (less than 5% of volume) is transported to the UK warehouse, modelled as 241 km by lorry followed by approximately 17,000 km by sea freight.

A4 transport to construction site: Average delivery distance of approximately 20 km by road and 7 km by sea assumed, representing delivery from regional warehouse to construction site. Full truckload (FTL) utilisation assumed.

Waste transport A1–A3: Average distance of 50 km assumed for transport of manufacturing waste to external treatment facilities at all sites, modelled by lorry >32 t, EURO 5 (ecoinvent 3.12).

C1 demolition energy: Generic assumption of 0.01 kWh diesel per kg of product for mechanical deconstruction, modelled using Market for diesel, burned in building machine (ecoinvent 3.12).

C2 end-of-life transport: Average distance of 50 km from construction site to waste treatment facility, road transport by lorry >32 t, EURO 5 (ecoinvent 3.12).

End-of-life steel treatment: 85% of steel product mass directed to recycling in module C3 via Treatment of metal scrap, mixed, for recycling, unsorted, sorting (ecoinvent 3.12); 15% directed to landfill in module C4 via Treatment of scrap steel, inert material landfill (ecoinvent 3.12). The zinc surface coating is recovered as part of the standard steel recycling process and is not modelled separately. The cut-off approach is applied in accordance with EN 15804+A2. The net recycling credit is declared in Module D.

A5 installation energy: Installation energy estimated at 0.231 kWh per kg of screws based on use of a standard 18V/5Ah cordless power tool installing approximately 48 screws per kg of product. Modelled using Market group for electricity, low voltage (ecoinvent 3.12).

Green energy — Denmark facility: Certified green electricity at the ITW Construction Products surface treatment facility in Middelfart, Denmark is documented through a Proof of Purchase of Environmentally Friendly Electricity issued by Energi Danmark A/S, covering 100% Nordic wind power for Calendar year 2023, audited by PwC. Total documented consumption: 6,269,276 kWh at 0 g CO_2/kWh. No certified green energy is claimed for the China or Taiwan manufacturing facilities.

EN 17662 cPCR applicability: EN 17662 (Execution of steel structures and aluminium structures) has been reviewed for applicability. This standard applies to structural steel and aluminium components. Carbon steel wood screws are fastener products falling under EN 14592 (timber screws) and EN 14566 (screws for plasterboard installations) as the applicable product standards. EN 17662 is not applicable to this product group. No deviations from EPD Hub PCR v1.2 are required on this basis.

Allocation basis: Mass-based allocation applied at all multi-product sites based on Calendar year 2023 production data. Allocation factors are derived from production records (kg of screws processed per product line per production run). No revenue-based allocation applied at any site.

BIBLIOGRAPHY AND REFERENCES USED IN MODELLING

- EN 15804:2012+A2:2019 — Sustainability of construction works — Environmental product declarations — Core rules for the product category of construction products
- ISO 14040:2006 — Environmental management — Life cycle assessment — Principles and framework

- ISO 14044:2006 — Environmental management — Life cycle assessment — Requirements and guidelines
- ISO 14025:2006 — Environmental labels and declarations — Type III environmental declarations — Principles and procedures
- EN 15941:2021 — Sustainability of construction works — Environmental product declarations — Methodology for selection and use of generic data
- EPD Hub General Programme Instructions (GPI) v1.3, March 2025
- EPD Hub Product Category Rules (PCR) v1.2
- LCA Calculation Rules and Requirements V2.0 — EPD Hub / ECO Platform
- ecoinvent database v3.12, allocation cut-off by classification system
- OneClickLCA EPD Generator for EPD Hub V3 (EF 3.1)
- European Commission — Product Environmental Footprint (EF 3.1) characterisation factors
- ECHA Candidate List of Substances of Very High Concern for Authorisation — verified at time of EPD preparation
- EN 14592:2008+A1:2012 — Timber structures — Dowel-type fasteners — Requirements
- EN 14566:2008+A1:2012 — Mechanical fasteners for gypsum plasterboard systems — Definitions, requirements and test methods
- Primary production data — China, Taiwan, and Denmark manufacturing facilities, Calendar year 2023
- European average packaging waste treatment statistics — CEPI (corrugated board), Plastics Europe (plastic packaging)
- OneClickLCA built-in EU packaging end-of-life scenarios (ecoinvent 3.11 basis) — applied for A5 and C3/C4 packaging waste
- Energi Danmark A/S — Proof of Purchase of Environmentally Friendly Electricity, calendar year 2023, audited by PwC

ENVIRONMENTAL IMPACT DATA

The estimated impact results are only relative statements which do not indicate the end points of the impact categories, exceeding threshold values, safety margins or risks.

CORE ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP – total[1)]	kg CO_2e	2,47E+00	2,35E-01	1,15E+00	3,85E+00	0,00E+00	3,48E-01	ND	ND	ND	ND	ND	ND	ND	3,61E-03	5,12E-03	3,84E-02	9,28E-04	2,56E-01
GWP – fossil	kg CO_2e	2,46E+00	2,35E-01	1,19E+00	3,88E+00	0,00E+00	3,10E-01	ND	ND	ND	ND	ND	ND	ND	3,60E-03	5,08E-03	2,00E-02	9,27E-04	3,33E-01
GWP – biogenic	kg CO_2e	-3,30E-03	-2,23E-05	-4,07E-02	-4,40E-02	0,00E+00	3,75E-02	ND	ND	ND	ND	ND	ND	ND	3,68E-07	1,35E-05	1,85E-02	4,16E-07	-7,76E-02
GWP – LULUC	kg CO_2e	8,40E-03	1,66E-04	2,19E-03	1,07E-02	0,00E+00	1,73E-04	ND	ND	ND	ND	ND	ND	ND	3,69E-07	2,54E-05	1,44E-05	5,31E-07	7,98E-04
Ozone depletion pot.	kg CFC-$_{11}$e	1,51E-08	3,68E-09	1,31E-08	3,19E-08	0,00E+00	2,40E-09	ND	ND	ND	ND	ND	ND	ND	5,52E-11	1,26E-10	1,38E-10	2,58E-11	7,43E-10
Acidification potential	mol H^+e	9,53E-03	3,74E-03	6,25E-03	1,95E-02	0,00E+00	1,60E-03	ND	ND	ND	ND	ND	ND	ND	3,25E-05	1,65E-05	8,44E-05	6,49E-06	1,35E-03
EP-freshwater[2)]	kg Pe	1,33E-03	1,09E-05	2,54E-04	1,60E-03	0,00E+00	7,54E-05	ND	ND	ND	ND	ND	ND	ND	1,04E-07	3,69E-07	7,96E-06	8,11E-08	1,99E-04
EP-marine	kg Ne	2,29E-03	1,53E-03	1,43E-03	5,25E-03	0,00E+00	2,59E-04	ND	ND	ND	ND	ND	ND	ND	1,51E-05	6,01E-06	6,80E-05	2,49E-06	2,75E-04
EP-terrestrial	mol Ne	2,30E-02	1,70E-02	1,46E-02	5,46E-02	0,00E+00	2,52E-03	ND	ND	ND	ND	ND	ND	ND	1,65E-04	6,31E-05	2,31E-04	2,72E-05	2,83E-03
POCP ("smog")[3)]	kg NMVOCe	7,64E-03	4,57E-03	4,84E-03	1,70E-02	0,00E+00	8,26E-04	ND	ND	ND	ND	ND	ND	ND	4,93E-05	2,71E-05	6,56E-05	9,83E-06	6,26E-04
ADP-minerals & metals[4)]	kg Sbe	1,87E-05	4,29E-07	3,09E-06	2,22E-05	0,00E+00	1,04E-06	ND	ND	ND	ND	ND	ND	ND	1,29E-09	1,50E-08	3,34E-07	1,38E-09	8,63E-07
ADP-fossil resources	MJ	2,45E+01	2,95E+00	1,74E+01	4,48E+01	0,00E+00	2,75E+00	ND	ND	ND	ND	ND	ND	ND	4,72E-02	7,42E-02	1,39E-01	2,27E-02	2,99E+00
Water use[5)]	m^3e depr.	1,40E+00	1,03E-02	2,12E-01	1,62E+00	0,00E+00	2,72E-02	ND	ND	ND	ND	ND	ND	ND	1,18E-04	4,46E-04	4,42E-03	9,97E-04	2,54E-01

1) GWP = Global Warming Potential; 2) EP = Eutrophication potential. Required characterisation method and data are in kg P-eq. Multiply by 3,07 to get PO4e; 3) POCP = Photochemical ozone formation; 4) ADP = Abiotic depletion potential; 5) 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 experience with the indicator.

ADDITIONAL (OPTIONAL) ENVIRONMENTAL IMPACT INDICATORS – EN 15804+A2, EF 3.1

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Particulate matter	Incidence	2,19E-07	8,55E-09	9,29E-08	3,20E-07	0,00E+00	4,77E-09	ND	ND	ND	ND	ND	ND	ND	9,25E-10	5,27E-10	1,16E-09	1,49E-10	4,16E-08
Ionizing radiation[6]	kBq U235e	7,48E-02	1,66E-03	1,83E-02	9,48E-02	0,00E+00	3,50E-03	ND	ND	ND	ND	ND	ND	ND	2,09E-05	7,79E-05	1,84E-03	1,36E-05	9,48E-02
Ecotoxicity (freshwater)	CTUe	1,79E+01	3,78E-01	6,34E+00	2,46E+01	0,00E+00	1,45E+00	ND	ND	ND	ND	ND	ND	ND	2,60E-03	1,20E-02	2,00E-01	1,52E-02	1,66E+00
Human toxicity, cancer	CTUh	2,51E-09	5,05E-11	2,03E-10	2,76E-09	0,00E+00	5,01E-11	ND	ND	ND	ND	ND	ND	ND	3,71E-13	8,42E-13	1,40E-11	1,68E-13	2,45E-10
Human tox. non-cancer	CTUh	4,31E-08	9,79E-10	9,42E-09	5,35E-08	0,00E+00	2,40E-09	ND	ND	ND	ND	ND	ND	ND	5,87E-12	4,77E-11	4,63E-10	3,78E-12	5,96E-09
SQP[7]	-	8,15E+00	6,87E-01	6,84E+00	1,57E+01	0,00E+00	3,73E-01	ND	ND	ND	ND	ND	ND	ND	3,30E-03	7,87E-02	7,12E-01	4,46E-02	-4,89E+00

6) EN 15804+A2 disclaimer for Ionizing radiation, human health. 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; 7) SQP = Land use related impacts/soil quality.

USE OF NATURAL RESOURCES

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Renew. PER as energy[8]	MJ	2,60E+00	2,92E-02	1,02E+00	3,65E+00	0,00E+00	-1,13E+00	ND	ND	ND	ND	ND	ND	ND	2,99E-04	1,20E-03	2,55E-02	2,12E-04	3,63E-02
Renew. PER as material	MJ	0,00E+00	0,00E+00	7,53E-01	7,53E-01	0,00E+00	-7,53E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	8,42E-01
Total use of renew. PER	MJ	2,60E+00	2,92E-02	1,77E+00	4,40E+00	0,00E+00	-1,88E+00	ND	ND	ND	ND	ND	ND	ND	2,99E-04	1,20E-03	2,55E-02	2,12E-04	8,79E-01
Non-re. PER as energy	MJ	2,45E+01	2,95E+00	1,35E+01	4,10E+01	0,00E+00	-1,09E+00	ND	ND	ND	ND	ND	ND	ND	4,72E-02	7,44E-02	1,39E-01	2,27E-02	2,97E+00
Non-re. PER as material	MJ	0,00E+00	0,00E+00	3,11E+00	3,11E+00	0,00E+00	-3,11E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	1,62E+00
Total use of non-re. PER	MJ	2,45E+01	2,95E+00	1,66E+01	4,41E+01	0,00E+00	-4,21E+00	ND	ND	ND	ND	ND	ND	ND	4,72E-02	7,44E-02	1,39E-01	2,27E-02	4,59E+00
Secondary materials	kg	3,83E-01	1,62E-03	6,24E-02	4,47E-01	0,00E+00	5,44E-04	ND	ND	ND	ND	ND	ND	ND	1,96E-05	3,17E-05	2,63E-04	5,65E-06	1,03E+00
Renew. secondary fuels	MJ	2,41E-04	5,72E-06	6,55E-03	6,80E-03	0,00E+00	3,30E-06	ND	ND	ND	ND	ND	ND	ND	5,12E-08	4,20E-07	2,04E-05	1,18E-07	-4,66E-04
Non-ren. secondary fuels	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Use of net fresh water	m^3	2,20E-02	2,24E-04	4,34E-03	2,65E-02	0,00E+00	4,32E-04	ND	ND	ND	ND	ND	ND	ND	3,12E-06	1,10E-05	6,82E-05	2,35E-05	6,41E-03

8) PER = Primary energy resources.

END OF LIFE – WASTE

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	2,88E+00	1,69E-02	1,62E-01	3,06E+00	0,00E+00	1,73E-02	ND	ND	ND	ND	ND	ND	ND	5,25E-05	4,29E-04	1,12E-02	2,58E-05	3,77E-01
Non-hazardous waste	kg	1,03E+01	1,13E-01	2,98E+00	1,34E+01	0,00E+00	5,31E-01	ND	ND	ND	ND	ND	ND	ND	7,15E-04	8,88E-03	9,77E-02	5,98E-04	1,40E-01
Radioactive waste	kg	1,86E-05	3,94E-07	4,35E-06	2,34E-05	0,00E+00	8,29E-07	ND	ND	ND	ND	ND	ND	ND	5,12E-09	1,88E-08	4,63E-07	3,31E-09	2,39E-05

END OF LIFE – OUTPUT FLOWS

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	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	ND	ND	ND	ND	ND	ND	ND	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	7,50E-01	7,50E-01	0,00E+00	1,00E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Materials for energy rec	kg	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	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	6,60E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Electricity	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	2,78E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00
Exported energy – Heat	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00	3,82E-01	ND	ND	ND	ND	ND	ND	ND	0,00E+00	0,00E+00	0,00E+00	0,00E+00	0,00E+00

ENVIRONMENTAL IMPACTS – EN 15804+A1, CML

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Global Warming Pot.	kg CO_2e	2,46E+00	2,34E-01	1,19E+00	3,89E+00	0,00E+00	3,17E-01	ND	ND	ND	ND	ND	ND	ND	3,59E-03	5,08E-03	2,74E-02	9,19E-04	3,36E-01
Ozone depletion Pot.	kg $CFC_{-11}e$	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00
Acidification	kg SO_2e	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00
Eutrophication	kg PO_4^3e	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00
POCP (“smog”)	kg C_2H_4e	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00
ADP-elements	kg Sbe	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
ADP-fossil	MJ	0,00E+00	0,00E+00	0,00E+00	0,00E+00	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	0,00E+00

ADDITIONAL INDICATOR – GWP-GHG

Impact category	Unit	A1	A2	A3	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP-GHG[9)]	kg CO_2e	2,47E+00	2,35E-01	1,19E+00	3,90E+00	0,00E+00	3,10E-01	ND	ND	ND	ND	ND	ND	ND	3,61E-03	5,11E-03	2,00E-02	9,28E-04	3,33E-01

9) This indicator includes all greenhouse gases excluding biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. In addition, the characterisation factors for the flows – CH4 fossil, CH4 biogenic and Dinitrogen monoxide – were updated. This indicator is identical to the GWP-total of EN 15804:2012+A2:2019 except that the characterisation factor for biogenic CO2 is set to zero

SCENARIO DOCUMENTATION

DATA SOURCES

Manufacturing energy scenario documentation

- Market for diesel, burned in building machine, World, Ecoinvent 3.12, 0.10 $kgCO_2e/MJ$
- Heat production, heavy fuel oil, at industrial furnace 1MW, World, Ecoinvent 3.12, 0.27 $kgCO_2e/MJ$
- Liquefied petroleum gas production, petroleum refinery operation, World, Ecoinvent 3.12, 0.99 $kgCO_2e/kg$
- Market for electricity, medium voltage, North West China Grid, Ecoinvent 3.12, 0.91 $kgCO_2e/kWh$

Transport scenario documentation - A4 (Transport resources)

Market for transport, freight, lorry, >32 metric ton, diesel, EURO 5, 17.00 km
Market for transport, freight, sea, ferry, heavy fuel oil, 5.57 km

Transport to the building site (A4) - Scenario documentation

Scenario parameter	Value
Capacity utilization (including empty return) %	100
Bulk density of transported products	5,39E+02
Volume capacity utilization factor	≥1

Installation at the building site (A5) - Scenario documentation

Scenario parameter	Value
Energy: type and consumption (MJ or kWh)	Electricity — 0.231 kWh per kg of finished product installed. Modelled using Market group for electricity, low voltage (ecoinvent 3.12).
Water use (m^3)	Not applicable.
Ancillary materials: type and mass (kg)	Not applicable.
Waste materials: type and mass (kg)	Corrugated cardboard: 0.059 kg. Wood pallet (EUR flat): 0.040 kg. Plastic film (LDPE): 0.001 kg. Polypropylene collation: 0.093 kg. Total packaging waste: 0.193 kg per declared unit.
Waste materials: output routes	Corrugated cardboard: 83% recycling, 8% incineration, 9% landfill (source: CEPI, European average). Wood pallet: 32% recycling, 30% incineration, 38% landfill (source: European average wood packaging statistics). Plastic film (LDPE) and polypropylene collation: 40% recycling, 37% incineration, 23% landfill (source: Plastics Europe). All scenarios modelled using OneClickLCA built-in EU packaging end-of-life scenarios (ecoinvent 3.11 basis). Transport to waste treatment facilities is embedded within the OneClickLCA built-in EU packaging end-of-life scenarios (ecoinvent 3.11 basis). No separate transport distance has been entered — distances are modelled as part of the pre-built scenario datasets.
Direct emissions (kg)	No direct emissions to air, soil, or water are associated with the installation of this product. Installation is carried out using battery-powered hand tools. No combustion, cutting, welding, chemical application, or other emission-generating processes occur at the installation stage.

End of life (C1-C4) - Scenario documentation

Scenario information	Value
Collection process: collected separately (kg)	Steel fasteners are assumed to be collected separately as part of the metal waste stream during demolition and deconstruction. Collection as steel scrap is standard practice in European construction demolition. Separately collected steel mass per declared unit: 0.840 kg (85% of product mass directed to recycling, C3).
Collection process: Mixed waste (kg)	The remaining fraction of steel not separately collected is assumed to be disposed of as mixed construction and demolition waste directed to landfill. Mixed waste steel mass per declared unit: 0.148 kg (15% of product mass directed to landfill, C4).
Recovery: re-use (kg)	0
Recovery: recycling (kg)	0.840 kg (steel, directed to C3 recycling processing)
Recovery: energy recovery (kg)	0
Disposal (kg)	0.148 kg (steel, directed to C4 landfill)
Scenario assumptions e.g. transportation (mode, km) & other	The declared end-of-life scenarios are currently in use and are representative of the most likely end-of-life scenario alternatives for construction fasteners in European markets, in accordance with EN 15804+A2 Annex B.1. C1 demolition energy: 0.01 kWh diesel per kg of product, modelled using Market for diesel, burned in building machine (ecoinvent 3.12), assigned to module C1. C2 transport: road transport by lorry >32 metric ton, diesel, EURO 5 (ecoinvent 3.12), average distance 50 km from construction site to waste treatment facility. C3/C4 waste transport is included within the 50 km C2 transport assumption. All transport modelled as one-way; no return loads assumed.

THIRD-PARTY VERIFICATION STATEMENT

EPD Hub declares that this EPD is verified in accordance with ISO 14025 by an independent, third-party verifier. The project report on the Life Cycle Assessment and the report(s) on features of environmental relevance are filed at EPD Hub. EPD Hub PCR and ECO Platform verification checklist are used.

EPD Hub is not able to identify any unjustified deviations from the PCR and EN 15804+A2 in the Environmental Product Declaration and its project report.

EPD Hub maintains its independence as a third-party body; it was not involved in the execution of the LCA or in the development of the declaration and has no conflicts of interest regarding this verification.

The company-specific data and upstream and downstream data have been examined as regards plausibility and consistency. The publisher is responsible for ensuring the factual integrity and legal compliance of this declaration.

The software used in creation of this LCA and EPD is verified by EPD Hub to conform to the procedural and methodological requirements outlined in ISO 14025:2010, ISO 14040/14044, EN 15804+A2, and EPD Hub Core Product Category Rules and General Program Instructions.

Verified tools

Tool verifier: Magaly Gonzalez Vazquez
Tool verification validity: 27 March 2025 - 26 March 2028

Yazan Badour as an authorized verifier for EPD Hub Limited 13.04.2026