ENVIRONMENTAL PRODUCT DECLARATION

as per *ISO 14025* and *EN 15804+A2*

Owner of the Declaration	Peiner Träger GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Declaration number	EPD-PTR-20240223-CBA1-EN
Issue date	18.08.2025
Valid to	17.08.2030

SALCOS® Structural Steel - Beams and Sections

Peiner Träger GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

Peiner Träger GmbH

Programme holder

IBU – Institut Bauen und Umwelt e.V.
Hegelplatz 1
10117 Berlin
Germany

Declaration number

EPD-PTR-20240223-CBA1-EN

This declaration is based on the product category rules:

Structural steels, 01.08.2021
(PCR checked and approved by the SVR)

Issue date

18.08.2025

Valid to

17.08.2030

Dipl.-Ing. Hans Peters
(Chairman of Institut Bauen und Umwelt e.V.)

Florian Pronold
(Managing Director Institut Bauen und Umwelt e.V.)

SALCOS® Structural Steel - Beams and Sections

Owner of the declaration

Peiner Träger GmbH
Gerhard-Lucas-Meyer-Str. 10
31226 Peine
Germany

Declared product / declared unit

1 metric ton of SALCOS® structural steel beams and sections

Scope:

This environmental product declaration (EPD) applies to all hot rolled SALCOS® structural steel beams and sections produced by Peiner Träger GmbH (PTG) on average (average EPD), a company of Salzgitter AG, at its only production site in Peine, Germany.

The products are intended for the use in bolted, welded or otherwise connected constructions of buildings, bridges and other structures. SALCOS® structural steel beams and sections are produced by PTG via the electric arc furnace (EAF) route with 100 % steel scrap recycling and 100 % green electricity certified by guarantees of origin. The EPD does not consider any mass balance allocation.

The owner of the declaration shall be liable for the underlying information and evidence; the IBU shall not be liable with respect to manufacturer information, life cycle assessment data and evidences.

The EPD was created according to the specifications of EN 15804+A2. In the following, the standard will be simplified as *EN 15804*.

Verification

The standard EN 15804 serves as the core PCR
Independent verification of the declaration and data according to ISO 14025:2011
☐ internally ☒ externally

Therese Daxner,
(Independent verifier)

2. Product

2.1 Product description/Product definition
This EPD applies to 1 metric ton of hot-rolled SALCOS® structural steel beams and sections in structural steel grades.

For the placing on the market of the product in the European Union/European Free Trade Association (EU/EFTA) (with the exception of Switzerland) *regulation (EU) No. 305/2011 (CPR)* applies. The product needs a declaration of performance taking into consideration *EN 10025-1* and the CE-marking. In Great Britain, the construction products (amendment etc.) (EU Exit) *regulations 2020 (No. 1359)* applies in combination with the *UKCA-marking*.
For the application and use the respective national provisions apply.

2.2 Application
SALCOS® structural steel beams and sections are intended for use in bolted, welded or otherwise connected constructions of buildings, bridges and other structures, or in composite steel and concrete structures. Examples are:

- buildings (industrial and storage buildings, residential and office buildings, stadiums, airports, train stations, car parks, convention centres, etc.)
- bridges (railway bridges, road bridges, pedestrian bridges, etc.)
- other structures (industrial and power plants, onshore and offshore energy facilities, harbour and port constructions, etc.)

2.3 Technical Data
This EPD is valid for SALCOS® structural steel beams and sections of various steel grades and different forms of delivery. Specific information on steel grades, dimensions and tolerances can be found in the relevant declarations of performance, other literature and/or standards.
In Europe, the most relevant standards applicable for structural steel beams and sections are *EN 10025* and *EN 10365* in combination with *EN 10034* or *EN 10279*. Also, international product standards like *ASTM A6*, *ASTM A36*, *ASTM A992*, *ASTM A572*, etc. can be applicable.

Constructional data

Name	Value	Unit
Density	7850	kg/m^3
Modulus of elasticity	210000	N/mm^2
Coefficient of thermal expansion	12	$10^{-6}K^{-1}$
Thermal conductivity	48	W/(mK)
Melting point	1536	°C
Shear modulus	81000	N/mm^2

Performance data of the product in accordance with the declaration of performance with respect to its essential characteristics according to *EN 10025-1*.
Additional information can be obtained from www.peinertraeger.de.

2.4 Delivery status
The products of PTG are shipped in accordance with customer requirements, intended use, and possible technical regulations and certification requirements, when applicable. Common dimensions for a single unit are nominal heights of up to 1,100 mm, nominal widths of up to 460 mm and lengths of up to 70 m. SALCOS® beams and sections are shipped as single units or as bundles of up to 36 units.

2.5 Base materials/Ancillary materials
SALCOS® structural steels are non-alloyed or low-alloyed iron alloys with a carbon content of typically below 0.3 %. The base material for SALCOS® structural steel beams and sections of this EPD is 99 % steel scrap, which is recycled by the EAF-steelmaking process. The other 1 % are auxiliary materials, e.g. alloying metals. The distribution of the scrap groups according to ISO 14021 is as follows:

- 87 % post-consumer scrap
- 12 % pre-consumer scrap

PTG produces SALCOS® structural steel beams and sections of different shapes, and/or sizes and steel grades. Steel grades vary less than 1 wt% per alloying component. Therefore, average data of the annual production are representative for all steel products covered by the declared average.

Alloying elements like manganese, silicon, aluminium and vanadium are added in the form of ferroalloys or metals. The final composition is on average: 98 % iron, 0.9 % manganese, 0.2 % silicon, 0.02 % vanadium, 0.01 % aluminium and < 0.1 % other alloying element (e.g. niobium, titanium). Other elements such as nitrogen or copper may be present in the steel, depending on the steel grade, but are generally not intentionally added.

The product for authorisation contains substances on the *ECHA* list of substances of very high concern (SVHC) (14 June 2023) above 0.1 % by mass: **No.**

The product contains further carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B that are not in *the candidate list*, above 0.1 mass % in at least one subproduct: **No.**

Biocides have been added to the construction product, or the product has been treated with biocides (a treated product pursuant to the *Biocidal Product Regulation* (EU) No. 528/2012): **No.**

2.6 Manufacture
At its only production site in Peine, Germany hot-rolled SALCOS® structural steel beams and sections are produced by PTG via the EAF route with 100 % steel scrap recycling and 100 % green electricity certified by guarantees of origin. Ferrous scrap is melted alongside additives in an EAF to produce crude liquid steel, which needs further treatment in the secondary metallurgy by adding alloying elements to finalise its chemical composition. Next, the steel is processed by the continuous casting machine into the semi-finished product called beam blanks, blooms or slabs. These semis are heated to temperatures between 1,000 and 1,300 °C and hot rolled into steel beams or profiles of various shapes.

2.7 Environment and health during manufacturing
The integrated management systems of Peiner Träger GmbH include the management systems in accordance with *ISO 9001*, *ISO 50001*, *ISO 45001* and *ISO 14001*. The occupational safety and energy management systems meet the requirements of the international standards *ISO 45001* and *ISO 50001*. Supported by continuous investment in environmental protection measures, emissions to air and water are kept to a minimum. Legal requirements are complied with and in many cases over-achieved. All operating facilities are inspected by the authorities at regular intervals to ensure environmental compatibility.

2.8 Product processing/Installation
Installation of SALCOS® structural steel beams and sections may require welding, bolting or other connecting operations and/or corrosion protection by the fabricator, depending on the customer's requirements and relevant standards and guidelines of the respective place of use.

2.9 Packaging
SALCOS® structural steel beams and sections are delivered unpackaged and in compliance with the legally prescribed transportation safety measures.

2.10 Condition of use
If used as intended, no change in the material quality is to be expected during service life. Maintenance and inspection times depend on the design of the construction and the place of use.

2.11 Environment and health during use
No effects on human or animal health or harmful emissions to air, soil or water are known in connection with the intended use of the SALCOS® structural steel beams and sections.

2.12 Reference service life
A reference service life for SALCOS® structural steel beams and sections is not declared. These are construction products with many different applications and purposes that define the service life of the construction and its components.

2.13 Extraordinary effects
Fire
SALCOS® structural steel beams and sections are non-flammable according to *EN 13501-1* and no flammable gases or vapours escape. The fire resistance depends on the area of application and the load.

Fire protection

Name	Value
Building material class	A1
Burning droplets	d0
Smoke gas development	s1

Water
Due to the low solubility of steel or its constituents in solid solution in water, no negative consequences for the environment are to be expected. In combination with oxygen and water, steel can corrode.

Mechanical destruction
Not relevant.

2.14 Re-use phase
SALCOS® structural steel beams and sections are 100 % recyclable and can either be reused directly or fed back into the steel industry as a valuable secondary raw material via recycling companies. Steel is a permanent material that can be recycled as often as required.

2.15 Disposal
The declared product can be fully recycled as a secondary raw material back into the life cycle. The waste code according to the *European Waste Catalogue* is: 17 04 05. The waste type is to be equated with the code number 35103 according to the nationally valid *Abfallverzeichnisverordnung* (*AVV*).

2.16 Further information
Further information are available under: www.peiner-traeger.de

3. LCA: Calculation rules

3.1 Declared Unit
The reference unit is 1 ton of SALCOS® structural steel beams and sections.
Foreground data for the production are integrated into the *LCA FE* (*GaBi*) Software model for the production site under study. LCI is assessed on the basis of the annual production data of PTG at the site Peine. Background data are taken from the *LCA FE* (*GaBi*) Database.

Declared unit and mass reference

Name	Value	Unit
Declared unit	1	t
Density	7850	kg/m^3
conversion factor	1000	-

For the calculation of the declared average, all grades produced were included in the form of an annual average. Input and production quantities for an entire calendar year were taken into account. PTG produces SALCOS® structural steel beams and sections of different shapes, sizes and steel grades. Steel grades vary less than 1 wt% per alloying component. Therefore, average data of the annual production are representative for all steel products covered by the declared average. The variance of the results is below 10 % for most impact indicators, just ODP, EP-freshwater and WDP show higher divergence.

PTG procures 100 % green electricity from Europe for manufacturing (module A3), which is certified for the validity of this EPD. Electricity might be procured from a mix of wind power (DE, DK, NL, PL), hydro power (AU, DE, NO) and photovoltaic (DE, ES). Since the ratio of the sources might change over the validity of this EPD, in a conservative approach only Norwegian hydro power (35 kg CO_{2eq}/MWh) is used for modelling.

3.2 System boundary
This EPD belongs to the type: cradle-to-gate - with options. Modules A1-A3, modules C1-C4 and module D were considered.

Modules A1-A3 | Product stage
The modules cover the production stage, including the upstream burdens of purchased raw materials (ferro-alloys, lime, dolomite, etc.), their transport and the manufacturing at the production site in Peine. Material and energy flows for the EAF and the hot rolling mills are considered. Electricity consumption is modelled via Norwegian hydro power.

Modules C1-C4 | End-of-life stage
The dismantling of the considered product (C1), the transportation of the dismantled components to their final EoL destination (C2), the waste processing for reuse, recovery or recycling (C3), as well as the disposal (C4) are considered. Steel beams are generally not connected to other materials and can be dismantled according to type. In addition, dismantled steel beams or steel scrap resulting from demolition hardly have to undergo any further processing steps, as their re-use generally meets the requirements of the recycling process in terms of purity, environmental and health regulations. The scrap is therefore immediately returned to the circular economy. Associated efforts are cut off, no environmental impacts from the deconstruction or waste processing of the products are

declared (Module C1 & C3). An average distance of 50 km truck traffic is assumed as a representative scenario for transportation to the scrap recycling site.

Module D | Benefits and loads beyond the system boundaries
Material losses during the life cycle (e.g. loss of iron due to slagging) mean that the amount of recycled scrap is less than the amount of scrap input. For this reason, the net amount of scrap for the system under consideration is negative and additional scrap needs to enter the system. At this point, the methodology of *EN15804* is not consistent because the production stage uses a cut-off approach for steel scrap supply while module D requires an avoided-burden approach for the net scrap quantity. Hence, module D should be considered rather independently from the other modules. This is done by the 'value of scrap" approach in accordance with *World Steel 2017*. A full re-use scenario must be treated differently because no scrap for recycling leaves the product system, so the net-flow methodology cannot be applied. Therefore, a simple urban mining scenario is assumed where one building is dismantled, steel beams are recovered and re-used immediately onsite for the new building without any significant treatment or transport. Reused structural steel beams are therefore credited via module A1-A3 of the product under study.

3.3 Estimates and assumptions
All assumptions are supported by detailed documentation and are based on real annual production data. Where no primary data was available, the data sets were taken from the *LCA FE (GaBi)* database or in few exceptions from literature. Most transport loads are included in the *LCA FE (GaBi)* datasets, so no detailed transport to PTG's production site in Peine was modelled. No primary or secondary data was available for some alloys (calcium aluminate, ferro-titanium, ferro-vanadium, ferro-niobium), thus ferro manganese as a high environmental impact ferro alloy is used to proxy these alloying elements in a conservative approach. The country-specific disposal scenario is based on the results of a study by *Sansom 2002*. SALCOS® structural steel beams and sections being reused are credited via module A1-A3 of the product under study. Possible benefits or loads from steel recycling at the EoL stage were modelled in accordance with the *World Steel 2017* methodology and *ISO 14040*.

3.4 Cut-off criteria
All production data collected were included in the modelling. Some loads were cut-off due to insufficient background data (e.g. some transport loads) or primary data gaps (e.g. capital goods). However, no processes, materials or emissions were omitted that are known to make a significant contribution to the environmental impacts of the declared product. Consequently, it can be assumed that no material flows that contribute more than 1 % to the total mass or energy of the system or that are significant for the environmental impact have been neglected. The sum of the cut-off material flows is well below 5 % of the total mass or energy. The production of capital goods, equipment and infrastructure required for manufacturing was not taken into account.

3.5 Background data
The LCA results were calculated with the help of the *LCA FE GaBi*) software from *Sphera Solutions*, Inc. and its respective background database.

3.6 Data quality
All production data relates to the calendar year 2021 and is primarily based on data collected for official or business reporting obligations. The annual volumes were checked for plausibility and data quality and robustness was assessed according to the EU's PEF approach. Accordingly, the overall quality of the primary data is rated as "very good".
The background data is evaluated by the company Sphera (content version 2025.1) and can be checked on their website. When selecting the background data, attention was paid to the technological, geographical and temporal representativeness of the data sets.

3.7 Period under review
The period under review is the calendar year 2021.

3.8 Geographic Representativeness
Land or region, in which the declared product system is manufactured, used or handled at the end of the product´s lifespan: Europe

3.9 Allocation
EAF steel production generates EAF slag as a co-product. According to *EN 15804* and *PCR Part A*:
"Allocation shall be avoided as far as possible by dividing the unit process [...] If a process can be subdivided but respective data are not available, the inputs and outputs of the system under study should be partitioned [...] in a way which reflects the underlying physical relationships between them."
Therefore, the methodology developed by *World Steel 2014* is applied to the production of SALCOS® structural steel beams and sections, which is in line with *EN 15804* in order to sub-divide the system. Each flow is assessed in terms of the reason for its addition to the EAF steelmaking process and thus how it should be treated in terms of partitioning. Some inputs have a very specific purpose in the process, whether for the quality of the steel or the quality of the slag – these flows are fully partitioned to the respective (co-)product. All other flows (mainly electrical and chemical energy flows for the EAF process as well as associated direct and indirect emissions) are partitioned between the (co-)products based on how much energy is used within the EAF to form the molten steel (aprox. 80 %) and molten slag (approx. 20%).

3.10 Comparability
Basically, a comparison or an evaluation of EPD data is only possible if all the data sets to be compared were created according to *EN 15804* and the building context, respectively the product-specific characteristics of performance, are taken into account. The *LCA FE* (*GaBi*) background database (content version 2025.1) was used to calculate the LCA.

4. LCA: Scenarios and additional technical information

Characteristic product properties of biogenic carbon
The declared product does not include biogenic carbon.
There is no packaging considered within the given study.
Note: 1 kg of biogenic carbon is equivalent to 44/12 kg of CO_2.

The EPD covers three End-of-life scenarios. The first scenario assumes that all collected SALCOS® steel beams and sections are recycled at the EoL. The second scenario models the complete reuse of SALCOS® steel beams and sections. The third scenario shows the country-specific average according to

Sansom 2002. In a conservative approach, the collection losses are assumed to be 1 % and considered as landfilled in module C4.

- Scenario 0: 99 % Recycling and 1 % Loss
- Scenario 1: 99 % Reuse and 1 % Loss
- Scenario 2: 88 % Recycling, 11 % Reuse and 1 % Loss

End of life (C1 - C4)

Name	Value	Unit
Scenario 0		
- Recycling	990	kg
- Reuse	0	kg
- Landfilling	10	kg
Scenario 1		
- Recycling	0	kg
- Reuse	990	kg
- Landfilling	10	kg
Scenario 2		
- Recycling	880	kg
- Reuse	110	kg
- Landfilling	10	kg

Reuse, recovery and/or recycling potentials (D), relevant scenario information

Name	Value	Unit
Net scrap quantity Scenario 0	-142	kg
Net scrap quantity Scenario 2	-252	kg

Material losses during the life cycle (e.g. iron losses due to slagging) lead to a lower amount of recycled scrap at the EoL than the amount of secondary raw material required in the product stage. For this reason, the net amount of scrap for the system is negative and leads to an environmental burden, which is modelled according to the methodology of *World Steel 2017* and *ISO 14040*. Scenario 1 must be treated differently because no scrap for recycling leaves the product system, so the net-flow methodology cannot be applied. A simple, yet transparent urban mining scenario is assumed where one building is dismantled, steel beams are recovered and re-used immediately onsite for the new building without any significant treatment or transport. Thus, reused structural steel beams are credited via module A1-A3 of the product under study.

5. LCA: Results

The following table contains the LCA results for a declared unit of 1 ton structural steel beams and sections.

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; MND = MODULE OR INDICATOR NOT DECLARED; MNR = MODULE NOT RELEVANT)

Product stage			Construction process stage		Use stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MNR	MNR	MNR	MND	MND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 t SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C2/1	C2/2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
GWP-total	kg CO_2 eq	299	0	3.36	3.36	3.36	0	0	0	0.213	0.213	0.213	246	-299	436
GWP-fossil	kg CO_2 eq	2.82E+02	0	3.26E+00	3.26E+00	3.26E+00	0	0	0	2.13E-01	2.13E-01	2.13E-01	2.47E+02	-2.82E +02	4.38E+02
GWP-biogenic	kg CO_2 eq	9.29E+00	0	1.55E-02	1.55E-02	1.55E-02	0	0	0	3.01E-04	3.01E-04	3.01E-04	1.46E+00	-9.29E +00	2.58E+00
GWP-luluc	kg CO_2 eq	8.05E+00	0	8.44E-02	8.44E-02	8.44E-02	0	0	0	6.68E-04	6.68E-04	6.68E-04	3.29E-02	-8.05E +00	5.83E-02
ODP	kg CFC11 eq	9.92E-07	0	9.17E-13	9.17E-13	9.17E-13	0	0	0	6.88E-13	6.88E-13	6.88E-13	-3.32E-10	-9.92E-07	-5.89E-10
AP	mol H^+ eq	6.53E-01	0	4.3E-03	4.3E-03	4.3E-03	0	0	0	1.33E-03	1.33E-03	1.33E-03	6.05E-01	-6.53E-01	1.07E+00
EP-freshwater	kg P eq	7.69E-03	0	6.22E-06	6.22E-06	6.22E-06	0	0	0	3.01E-07	3.01E-07	3.01E-07	5.76E-05	-7.69E-03	1.02E-04
EP-marine	kg N eq	2.03E-01	0	1.62E-03	1.62E-03	1.62E-03	0	0	0	3.23E-04	3.23E-04	3.23E-04	9.72E-02	-2.03E-01	1.72E-01
EP-terrestrial	mol N eq	2.22E+00	0	1.8E-02	1.8E-02	1.8E-02	0	0	0	3.52E-03	3.52E-03	3.52E-03	8.71E-01	-2.22E +00	1.54E+00
POCP	kg NMVOC eq	7.01E-01	0	4.02E-03	4.02E-03	4.02E-03	0	0	0	1E-03	1E-03	1E-03	3.95E-01	-7.01E-01	7E-01
ADPE	kg Sb eq	1.16E-04	0	4.39E-07	4.39E-07	4.39E-07	0	0	0	1.44E-08	1.44E-08	1.44E-08	1.4E-03	-1.16E-04	2.48E-03
ADPF	MJ	3.75E+03	0	4.25E+01	4.25E+01	4.25E+01	0	0	0	3.48E+00	3.48E+00	3.48E+00	2.46E+03	-3.75E +03	4.36E+03
WDP	m^3 world eq deprived	3.39E+01	0	1.25E-02	1.25E-02	1.25E-02	0	0	0	2.48E-02	2.48E-02	2.48E-02	1.67E+01	-3.39E +01	2.96E+01

GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources; WDP = Water (user) deprivation potential)

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 t SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C2/1	C2/2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PERE	MJ	2.44E+03	0	3.67E+00	3.67E+00	3.67E+00	0	0	0	5.67E-01	5.67E-01	5.67E-01	-9.71E +01	-2.44E +03	-1.72E +02
PERM	MJ	1.25E+00	0	0	0	0	0	0	0	0	0	0	0	-1.25E +00	0
PERT	MJ	2.44E+03	0	3.67E+00	3.67E+00	3.67E+00	0	0	0	5.67E-01	5.67E-01	5.67E-01	-9.71E +01	-2.44E +03	-1.72E +02
PENRE	MJ	3.74E+03	0	4.25E+01	4.25E+01	4.25E+01	0	0	0	3.48E+00	3.48E+00	3.48E+00	2.46E+03	-3.74E +03	4.36E+03
PENRM	MJ	1.02E+01	0	0	0	0	0	0	0	0	0	0	0	-1.02E +01	0
PENRT	MJ	3.75E+03	0	4.25E+01	4.25E+01	4.25E+01	0	0	0	3.48E+00	3.48E+00	3.48E+00	2.46E+03	-3.75E +03	4.36E+03
SM	kg	1.13E+03	0	0	0	0	0	0	0	0	0	0	-1.42E +02	0	-2.52E +02
RSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NRSF	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
FW	m^3	4.18E+00	0	2.61E-03	2.61E-03	2.61E-03	0	0	0	7.32E-04	7.32E-04	7.32E-04	2.5E+01	-4.18E +00	4.43E+01

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2:
1 t SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C2/1	C2/2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
HWD	kg	9.04E-01	0	2.22E-09	2.22E-09	2.22E-09	0	0	0	7.51E-10	7.51E-10	7.51E-10	1.84E-05	-9.04E-01	3.26E-05
NHWD	kg	2.66E+01	0	6.32E-03	6.32E-03	6.32E-03	0	0	0	1E+01	1E+01	1E+01	-2.98E +01	-2.66E+01	-5.28E+01
RWD	kg	1.83E-02	0	6.15E-05	6.15E-05	6.15E-05	0	0	0	4.82E-05	4.82E-05	4.82E-05	-2.7E-04	-1.83E-02	-4.78E-04
CRU	kg	0	0	0	0	0	0	9.9E+02	1.1E+02	0	0	0	0	0	0
MFR	kg	4.26E+01	0	0	0	0	9.9E+02	0	8.8E+02	0	0	0	0	0	0
MER	kg	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EEE	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0
EET	MJ	9.2E+01	0	0	0	0	0	0	0	0	0	0	0	-9.2E+01	0

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed; CRU = Components for re-use; MFR = Materials for recycling; MER = Materials for energy recovery; EEE = Exported electrical energy; EET = Exported thermal energy

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional:
1 t SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C2/1	C2/2	C3	C3/1	C3/2	C4	C4/1	C4/2	D	D/1	D/2
PM	Disease incidence	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
IR	kBq U235 eq	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
ETP-fw	CTUe	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-c	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
HTP-nc	CTUh	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
SQP	SQP	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND

PM = Potential incidence of disease due to PM emissions; IR = Potential Human exposure efficiency relative to U235; ETP-fw = Potential comparative Toxic Unit for ecosystems; HTP-c = Potential comparative Toxic Unit for humans (cancerogenic); HTP-nc = Potential comparative Toxic Unit for humans (not cancerogenic); SQP = Potential soil quality index

Disclaimer 1 – for the indicator “Potential Human exposure efficiency relative to U235”. 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 or radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, radon and from some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators “abiotic depletion potential for non-fossil resources”, “abiotic depletion potential for fossil resources”, “water (user) deprivation potential, deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans – cancerogenic”, “Potential comparative toxic unit for humans - not cancerogenic”, “potential soil quality index”. The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high as there is limited experience with the indicator.

6. LCA: Interpretation

The following table gives a detailed evaluation of the LCIA results of the production phase (Module A1-A3). Since this is an average-EPD, results may vary to a certain extent for the final product. Main differences arise from varying alloy composition, which can be summarised qualitatively as lower alloy contents may lead to lower environmental impacts and vice versa. The results display that the variance of this average-EPD is low for most impact indicators (e.g. GWP-total ±6 %, AP ±8 % or PERT ±3%) and moderate for ODP (±56 %), EP-freshwater (±54 %) and WDP (±42 %), showcasing the average's suitable representation of PTG's whole product portfolio.

ENVIRONMENTAL IMPACT according to EN 15804+A2					
Parameter	**Parameter**	**EAF & Hot rolling**	**Energy**	**Alloys**	**Other**
GWP-total	Global Warming Potential total	~45 %	~15 %	~20 %	<20 %
GWP-fossil	Global Warming Potential fossil fuels	~50 %	~10 %	~20 %	<20 %
GWP-biogenic	Global Warming Potential biogenic		~95 %	<<5 %	<<5 %
GWP-luluc	Global Warming Potential luluc		~95 %	<<5 %	
ODP	Depletion potential of the stratospheric ozone layer			>95 %	<<5 %
AP	Acidification potential of land and water	~55 %	~5 %	~35 %	<10 %
EP-freshwater	Eutrophication potential aquatic freshwater			>95 %	<<5 %
EP-marine	Eutrophication potential aquatic marine	~60 %	~5 %	~20 %	<15 %
EP-terrestrial	Eutrophication potential terrestrial	~65 %	~5 %	~20 %	<15 %
POCP	Formation potential of tropospheric ozone photochemical oxidants	~65 %	~5 %	~20 %	<10 %
ADPE	Abiotic depletion potential for non fossil resources		~10 %	~90 %	<5 %
ADPF	Abiotic depletion potential for fossil resources		~60 %	~25 %	<20 %
WDP	Water use		~10 %	~90 %	<5 %
INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2					
Parameter	**Parameter**	**EAF & Hot rolling**	**Energy**	**Alloys**	**Other**
PERE	Renewable primary energy as energy carrier		~90 %	~10 %	<5 %
PERT	Total use of renewable primary energy resources		~90 %	~10 %	<5 %
PENRE	Non-renewable primary energy as energy carrier		~60 %	~25 %	<20 %
PENRM	Non-renewable primary energy as material utilization			>95 %	<<5 %
PENRT	Total use of non-renewable primary energy resources		~60 %	~25 %	<20 %
SM	Use of secondary material	>95 %			<<5 %
FW	Use of net fresh water		~80 %	~15 %	<<5 %
WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2					
Parameter	**Parameter**	**EAF & Hot rolling**	**Energy**	**Alloys**	**Other**
HWD	Hazardous waste disposed	>95 %			<<5 %
NHWD	Non-hazardous waste disposed	~70 %	~5 %	<<5 %	<25 %
RWD	Radioactive waste disposed		<<5 %	~40 %	<60 %
MFR	Materials for recycling	~5 %			>95 %
EET	Exported thermal energy	>95 %			<<5 %

Global warming, acidification, and both marine and terrestrial eutrophication potential, along with photochemical ozone creation potential, are largely driven by direct emissions onsite as well as indirect emissions from the extraction and processing of raw materials. Freshwater eutrophication and ozone depletion are primarily influenced by water usage in the production of alloying elements. Resource use (mineral and metals) relates to the use of non-renewable elements in the production of alloying materials, while fossil resource use is dominated by the extraction and processing of natural gas. The total use of renewable primary energy sources (PERT) is mainly due to electricity generation from hydropower. Non-renewable primary energy use (PENRT) is primarily driven by the extraction and processing of natural gas. Radioactive waste is generated from the extraction and processing of raw materials. Hazardous and non-hazardous waste is mainly produced during steelmaking.

7. Requisite evidence

Not relevant for this EPD.

8. References

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https://www.deumu.de/de/geschaeftsbereiche/altmetalle.html

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European Waste Catalogue
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