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-20210292-CBA1-EN
Issue date	27.07.2023
Valid to	26.07.2028

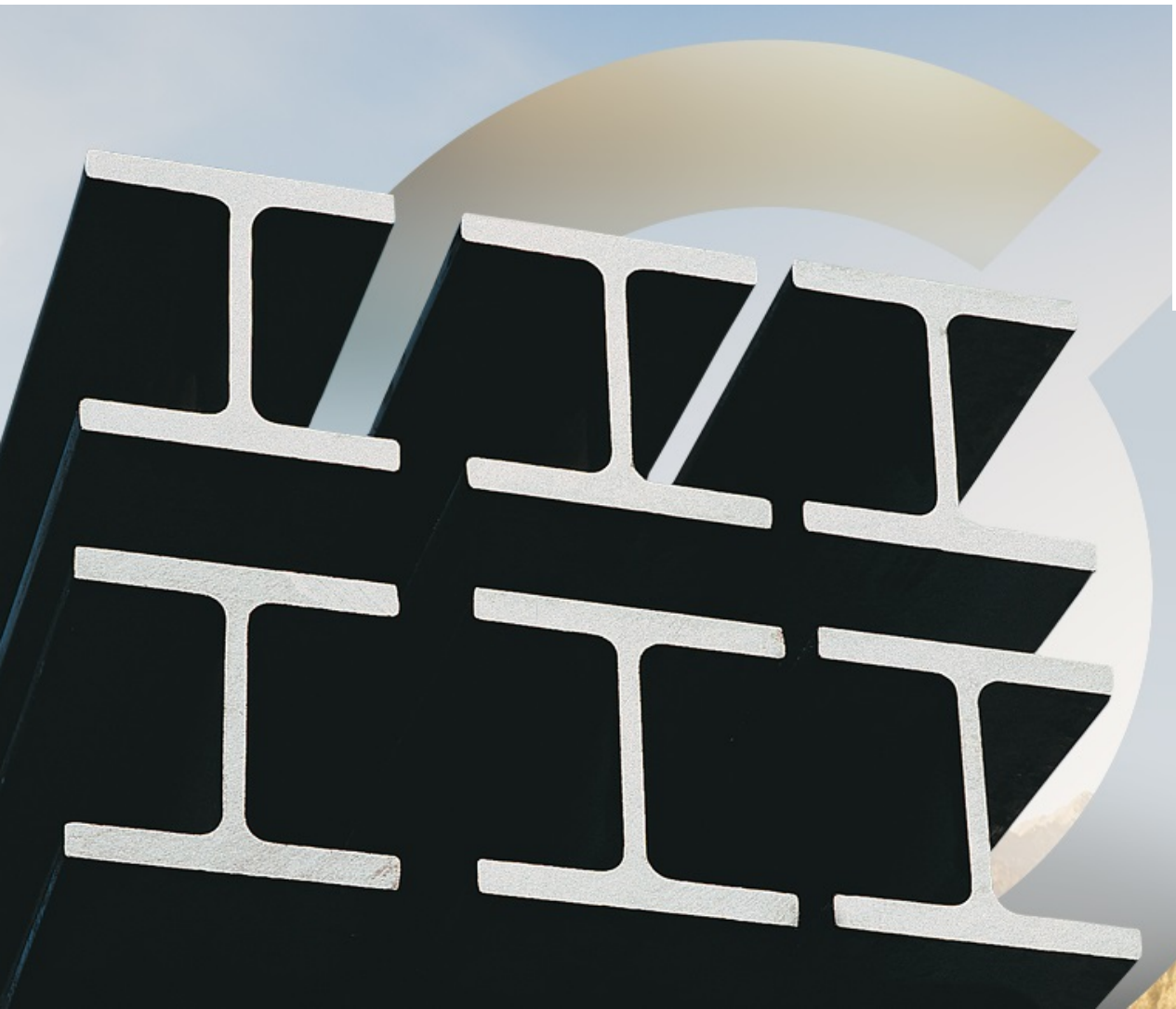
Structural Steel - Beams and Sections

Peiner Träger GmbH

Institut Bauen und Umwelt e.V.

ECO PLATFORM EPD VERIFIED

www.ibu-epd.com | https://epd-online.com



PEINER TRÄGER
A Member of the Salzgitter Group

General Information

Peiner Träger GmbH

Programme holder

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

Declaration number

EPD-PTR-20210292-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

27.07.2023

Valid to

26.07.2028

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

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

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 structural steel beams and sections

Scope:

This environmental product declaration (EPD) applies to hot rolled structural steel beams and sections produced by Peiner Träger GmbH, a company of Salzgitter AG, at its only production site at Peine, Germany. Information concerning SALCOS® (Salzgitter Low CO2 Steel) Structural Steel - Beams and Sections are included in the Annex.

The products are intended for the use in bolted, welded or otherwise connected constructions of buildings, bridges and other structures. They are produced via the electric arc furnace (EAF) route.
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)

PEINER TRÄGER
A Member of the Salzgitter Group

Product

Product description/Product definition

This EPD applies to 1 metric ton of hot rolled 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. For the application and use the respective national provisions apply.

Application

Structural steel beams and sections are intended for the 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, residual and office buildings, stadiums, airports, train stations, car parks, convention centers, 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.)

Technical Data

This EPD is valid for 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 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 (depending on the alloy proportions up to)	1536	°C
Shear modulus	81000	N/mm²

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.peiner-traeger.de.

Base materials/Ancillary materials

Structural steels are non-alloyed or low-alloyed iron alloys with a carbon content of typically below 0.3%. The base material for structural steel beams and sections of this EPD is steel scrap, which is recycled by the EAF-steelmaking process.

Alloying elements like manganese, silicon, aluminum and vanadium are added in the form of ferroalloys or metals.
The rates of these additives depend on the steel grade and are on average: 0,9% silico manganese, 0,2% ferro manganese, 0,1% ferro silicon, 0,1% aluminium and < 0,1% other alloys (e. g. ferro vanadium, ferro niobium, ferro 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 authorization contains substances on the ECHA list of substances of very high concern (SVHC) (14 July 2021) above 0.1 % by mass: **No.**

The product contains further carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B that 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.**

Reference service life

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

LCA: Calculation rules

Declared Unit

The reference unit is 1 ton of 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 as per the annual production data of Peiner Träger GmbH at the site Peine.

Background data are taken from the *LCA FE (GaBi) Database*.

Declared unit

Name	Value	Unit
Declared unit	1	t
Density	7850	kg/m^3
Conversion factor to 1 kg	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 the entire calendar year 2020 were taken into account. The calculated results can thus be considered representative for the entire product portfolio structural steels – beams and sections of Peiner Träger GmbH.

The EPD is calculated with residual grid mix.

System boundary

Type of the EPD: cradle-to-gate - with options: Module A1-A3, Modules C1-C4 and Module D were considered.

Modules A1-A3 covers the production stage including the upstream burdens of purchased raw materials (ferro-alloys, lime, dolomite, etc.), their transports and the manufacturing at

the production site in Peine.
Material and energy flows for the electric arc furnace and the hot rolling mills are considered.
Electricity consumption is modelled via residual grid mix (i.e. production in Germany + imports - exports - certified "green" electricity).

Modules C1-C4 consider 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). It is assumed that the product is not connected with other materials and can therefore be dismantled. Associated efforts are negligible, no environmental impacts from the deconstruction of the products are declared (Module C1)

Module D refers to the End-of-Life, including recycling and/or reuse.

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

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 2022.2) was used to calculate the LCA.

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.

The EPD covers four End of Life scenarios (*SteelConstruction-info; Sansom, M. / Meijer, J.):*

- Scenario 0: 100% Recycling
- Scenario 1: 100% Reuse
- Scenario 2: 100% Loss / Landfill
- Scenario 3: 88% Recycling, 11% Reuse and 1% Loss

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

End of life (C1 - C4)

Name	Value	Unit
Landfilling - Scenario 0	0	kg
Landfilling - Scenario 1	0	kg
Landfilling - Scenario 2	1000	kg
Landfilling - Scenario 3	10	kg

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

Name	Value	Unit
Recycling - Scenario 0	1000	kg
Recycling - Scenario 1	0	kg
Recycling - Scenario 2	0	kg
Recycling - Scenario 3	880	kg
Reuse - Scenario 0	0	kg
Reuse - Scenario 1	1000	kg
Reuse - Scenario 2	0	kg
Reuse - Scenario 3	110	kg

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; ND = 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 ton structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
GWP-total	kg CO_2 eq	6.88E+02	0	5.41E+00	0	0	0	0	0	0	1.45E+01	1.45E-01	2.36E+02	-6.87E+02	1.97E+03	1.52E+02
GWP-fossil	kg CO_2 eq	6.88E+02	0	5.15E+00	0	0	0	0	0	0	1.49E+01	1.49E-01	2.36E+02	-6.87E+02	1.97E+03	1.52E+02
GWP-biogenic	kg CO_2 eq	6.2E-01	0	2.66E-01	0	0	0	0	0	0	-4.42E-01	-4.42E-03	-1.21E-01	-6.18E-01	-1.01E+00	-1.84E-01
GWP-luluc	kg CO_2 eq	7.38E-02	0	0	0	0	0	0	0	0	2.75E-02	2.75E-04	4.88E-03	-7.05E-02	4.06E-02	-3.06E-03
ODP	kg CFC11 eq	1.07E-09	0	0	0	0	0	0	0	0	3.51E-11	3.51E-13	5.17E-13	-1.07E-09	4.3E-12	-1.17E-10
AP	mol H^+ eq	1.7E+00	0	2.15E-03	0	0	0	0	0	0	1.06E-01	1.06E-03	5.08E-01	-1.7E+00	4.23E+00	3.02E-01
EP-freshwater	kg P eq	1.1E-04	0	0	0	0	0	0	0	0	2.53E-05	2.53E-07	4.29E-05	-1.07E-04	3.57E-04	2.95E-05
EP-marine	kg N eq	4.65E-01	0	1.08E-03	0	0	0	0	0	0	2.71E-02	2.71E-04	8.93E-02	-4.64E-01	7.44E-01	3.5E-02
EP-terrestrial	mol N eq	5.09E+00	0	1.21E-02	0	0	0	0	0	0	2.97E-01	2.97E-03	7.84E-01	-5.07E+00	6.53E+00	1.97E-01
POCP	kg NMVOC eq	1.29E+00	0	2.2E-03	0	0	0	0	0	0	8.22E-02	8.22E-04	3.62E-01	-1.29E+00	3.02E+00	2.07E-01
ADPE	kg Sb eq	1.18E-04	0	0	0	0	0	0	0	0	1.53E-06	1.53E-08	5.89E-04	-1.18E-04	4.91E-03	5.55E-04
ADPF	MJ	9.05E+03	0	0	0	0	0	0	0	0	1.95E+02	1.95E+00	2.17E+03	-9.04E+03	1.81E+04	1.1E+03
WDP	m^3 world eq deprived	7.24E+01	0	0	0	0	0	0	0	0	1.64E+00	1.64E-02	4.39E+01	-7.23E+01	3.66E+02	3.44E+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 ton structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
PERE	MJ	4.32E+02	0	1.89E+00	0	0	0	0	0	0	2.93E+01	2.93E-01	-1.37E+02	-4.29E+02	-1.14E+03	-1.79E+02
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	4.32E+02	0	1.89E+00	0	0	0	0	0	0	2.93E+01	2.93E-01	-1.37E+02	-4.29E+02	-1.14E+03	-1.79E+02
PENRE	MJ	9.05E+03	0	3.33E+01	0	0	0	0	0	0	1.96E+02	1.96E+00	2.17E+03	-9.04E+03	1.81E+04	1.1E+03
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	9.05E+03	0	3.33E+01	0	0	0	0	0	0	1.96E+02	1.96E+00	2.17E+03	-9.04E+03	1.81E+04	1.1E+03
SM	kg	1.14E+03	0	0	0	0	0	0	0	0	0	0	-1.37E+02	0	-1.14E+03	-1.31E+02
RSF	MJ	0	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	0
FW	m^3	2.67E+00	0	2.14E-03	0	0	0	0	0	0	4.97E-02	4.97E-04	9.92E-01	-2.67E+00	8.26E+00	6.63E-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 ton structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
HWD	kg	8.86E-07	0	1.6E-10	0	0	0	0	0	0	1E-08	1E-10	1.68E-08	-8.86E-07	1.4E-07	-8.13E-08
NHWD	kg	7.19E +00	0	4.78E-03	0	0	0	0	0	0	1E+03	1E+01	-3.29E +01	-7.19E +00	-2.74E +02	-3.25E +01
RWD	kg	4.99E-01	0	4.1E-05	0	0	0	0	0	0	2.17E-03	2.17E-05	-2.7E-04	-4.98E-01	-2.25E-03	-5.51E-02
CRU	kg	0	0	0	0	1E+03	0	1.1E+02	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	1E+03	0	0	8.8E+02	0	0	0	0	0	0	0	0
MER	kg	0	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	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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 ton structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
PM	Disease incidence	ND	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	ND
ETP-fw	CTUe	ND	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	ND
HTP-nc	CTUh	ND	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	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.

References

Standards

ASTM A6
ASTM A6 / A6M - 19 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

ASTM A36
ASTM A36 / A36M - 19 Standard Specification for Carbon Structural Steel

ASTM A572
ASTM A572 / A572M - 21e1 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

ASTM A992
ASTM A992 / A992M - 20 Standard Specification for Structural Steel Shapes

EN 10025-1
EN 10025-1:2004 Hot rolled products of structural steels – Part 1: General technical delivery conditions

EN 10025-2
EN 10025-2:2019 Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels

EN 10025-3
EN 10025-3:2019 Hot rolled products of structural steels – Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels

EN 10025-4
EN 10025-4:2019 Hot rolled products of structural steels – Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels

EN 10025-5
EN 10025-5:2019 Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance

EN 10034
EN 10034:1993 Structural steel I and H sections; Tolerances on shape and dimensions

EN 10279
EN 10279:2000 Hot rolled steel channels - Tolerances on shape, dimensions and mass

EN 10365
EN 10365:2017 Hot rolled steel channels, I and H sections - Dimensions and masses

EN 15804
EN 15804:2019+A2, Sustainability of construction works —

Environmental Product Declarations — Core rules for the product category of construction products

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

Further References

Candidate List of SVHC
Candidate List of substances of very high concern for Authorisation (published by the European Chemicals Agency (ECHA) in accordance with Article 59(10) of the REGULATION (EC) No 1907/2006 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 18 December 2006 concerning the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH))

LCA FE (GaBi) Software / Database
GaBi, Software and Database for Life Cycle Engineering, Sphera Solution GmbH, Leinfelden-Echterdingen, 2022, http://documentation.gabi-software.com

IBU 2021
IBU 2021, General Instructions for the EPD programme of Institut Bauen und Umwelt e.V. Version 2.0, Berlin: Institut Bauen und Umwelt e.V., 2021, www.ibu-epd.de

PCR, Part A

Product Category Rules for Building-Related Products and Services, Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. Institut Bauen und Umwelt e.V. (IBU), 2021, www.bau-umwelt.de

PCR, Part B
Requirements on the EPD for Structural steels – Institut Bauen und Umwelt e.V., Königswinter (pub.): From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), 2019

Sansom, M. / Meijer, J.
Life-cycle assessment (LCA) for steel construction, Ascot, Culemborg. 2002

SteelConstruction-info
https://www.steelconstruction.info/The_recycling_and_reuse_survey

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Sphera Solutions GmbH
Hauptstraße 111- 113
70771 Leinfelden-Echterdingen
Germany

+49 711 341817-0
info@sphera.com
www.sphera.com

Owner of the Declaration

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

+49 51 71 91-01
peiner.traeger@salzgitter-ag.de
www.peiner-traeger.de

Annex to the
ENVIRONMENTAL PRODUCT DECLARATION
EPD-PTR-20210292-CBA1-EN

Owner of the Annex	Peiner Träger GmbH
Publisher	Institut Bauen und Umwelt e.V. (IBU)
Program holder	Institut Bauen und Umwelt e.V. (IBU)
Annex number	Annex to EPD-PTR-20210292-CBA1-EN
Issue date	27.07.2023
Valid to	26.07.2028

SALCOS®
Structural Steel - Beams and Sections
Peiner Träger GmbH

Institut Bauen und Umwelt e.V.

www.ibu-epd.com | https://epd-online.com

PEINER TRÄGER
A Member of the Salzgitter Group

General Information to this Annex

Peiner Träger GmbH

SALCOS®
Structural Steel - Beams and Sections

Programme holder

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

Owner of the annex

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

Annex number

Annex EPD-PTR-20210292-CBA1-EN

Declared product / declared unit

1 metric ton of SALCOS® structural steel beams and sections

This annex is based on the product category rules:

Structural steels, 01/08/2021
(PCR checked and approved by the SVR)

Issue date

27.07.2023

Valid to

26.07.2028

Scope:
This annex represents an addition to the IBU-EPD for "Structural Steel - Beams and Sections", EPD-No. EPD-PTR-20210292-CBA1-EN. The LCA results presented were subject to an independent verification process by IBU.
SALCOS® (Salzgitter Low CO_2 Steel) structural steel beams and sections produced by Peiner Träger GmbH, a company of Salzgitter AG, at its only production site at Peine, Germany. The products are intended for the use in bolted, welded or otherwise connected constructions of buildings, bridges and other structures. They are produced via the electric arc furnace (EAF) route.
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 annex to the EPD was created orienting towards the specifications of EN 15804+A2.
For the use of the verified annex please see https://ibu-epd.com/en/handling-of-mass-balance-approaches-in-the-calculation-of-a-product-lca-within-the-ibu-epd-program/

Verification

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

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

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

Therese Daxner
(Independent verifier)

PEINER TRÄGER
A Member of the Salzgitter Group

Product

Product description/Product definition

This annex to the EPD applies to 1 metric ton of hot rolled beams and sections in structural steel grades made from SALCOS® structural steel.

SALCOS® structural steel beams and sections are produced from 100 % steel scrap via the electric arc furnace route with the use of 100 % renewable electric energy. The renewable electric energy purchased by Peiner Träger GmbH is exclusively allocated to SALCOS® structural steel. 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. For the application and use the respective national provisions apply.

Application

Beams and sections made from SALCOS® structural steel 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, residual and office buildings, stadiums, airports, train stations, car parks, convention centers, 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.)

Technical Data

This annexe to the EPD is valid for SALCOS® structural steel beams and sections produced in various steel grades and different forms of delivery. Specific information on steel grades, dimensions and tolerances can be found in the relevant 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 (depending on the alloy proportions up to)	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 on SALCOS® structural steel beams and sections can be obtained from www.peiner-traeger.de.

Base materials/Ancillary materials

Structural steels are non-alloyed or low-alloyed iron alloys with a carbon content typically below 0.3 %. The base material for structural steel beams and sections of this annex is steel scrap, which is recycled by the EAF-steelmaking process.

Alloying elements like manganese, silicon, aluminium and vanadium are added in the form of ferroalloys or metals. The rates of these additives depend on the steel grade and are on average: 0,9 % silico manganese, 0,2 % ferro manganese, 0,1 % ferro silicon, 0,1 % aluminium and < 0,1 % other alloys (e. g. ferro vanadium, ferro niobium, ferro 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 authorization contains substances on the *ECHA* list of substances of very high concern (SVHC) (14 July 2021) above 0.1 % by mass: **No.**

The product contains further carcinogenic, mutagenic, reprotoxic (CMR) substances of category 1A or 1B that 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.**

Environment and health during use Reference service life

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

LCA: Calculation rules

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 as per the annual production data of Peiner Träger GmbH at the site Peine.

Background data are taken from the *LCA FE (GaBi) Database*.

Declared unit

Name	Value	Unit
Declared unit	1	t
Density	7850	kg/m^3
Conversion factor to 1 kg	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 the entire calendar year 2020 were taken into account. The calculated results can thus be considered representative for the entire product portfolio of structural steel beams and sections of Peiner Träger GmbH.

System boundary

Type of the annex: cradle-to-gate - with options: Modules A1-A3, Modules C1-C4 and Module D were considered.

Modules A1-A3 cover the production stage including the upstream burdens of purchased raw materials (ferro alloys, lime, dolomite, etc.), their transports and the manufacturing at the production site in Peine. Material and energy flows for the electric arc furnace and the hot rolling mills are considered. Electricity is sourced via hydropower (Norway, Austria) or windpower (Germany, Denmark, Netherlands) and modelled via hydropower Norway. Approximately 30 % of the site's annual capacity of approximately 1 Mio. metric tons can be produced in accordance with this annex by allocation of renewably produced electrical energy.

Modules C1-C4 consider 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). It is assumed that the product is not connected with other materials and can therefore be dismantled. Associated efforts are negligible, no environmental impacts from the deconstruction of the products are declared (Module C1).

Module D refers to the End-of-Life, including recycling and/or reuse.

Geographic Representativeness

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

Comparability

Basically, a comparison or an evaluation of this annex 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 2022.2) was used to calculate the LCA.

LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic carbon

The declared product does not include biogenic carbon. There is no packaging considered within the given study.

The annex to the EPD covers four End of Life scenarios (*SteelConstruction-info; Sansom, M./ Meijer, J.):*

- Scenario 0: 100 % Recycling
- Scenario 1: 100 % Reuse
- Scenario 2: 100 % Loss / Landfilled
- Scenario 3: 88 % Recycling, 11 % Reuse and 1 % Loss

The following technical information is a basis for the declared modules or can be used for developing specific scenarios in the context of a building assessment if modules are not declared (MND).

A5 is not declared including the disposal of the packaging material on the construction site, the amounts of packaging materials included in the LCA calculations must be declared as technical scenario information for Module A5.

End of life (C1 - C4)

Name	Value	Unit
Landfilling - Scenario 0	0	kg
Landfilling - Scenario 1	0	kg
Landfilling - Scenario 2	1000	kg
Landfilling - Scenario 3	10	kg

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

Name	Value	Unit
Recycling - Scenario 0	1000	kg
Recycling - Scenario 1	0	kg
Recycling - Scenario 2	0	kg
Recycling - Scenario 3	880	kg
Reuse - Scenario 0	0	kg
Reuse - Scenario 1	1000	kg
Reuse - Scenario 2	0	kg
Reuse - Scenario 3	110	kg

PEINER TRÄGER
A Member of the Salzgitter Group

LCA: Results

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

DESCRIPTION OF THE SYSTEM BOUNDARY (X = INCLUDED IN LCA; ND = 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 ton SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
GWP-total	kg CO_2 eq	3.66E+02	0	2.51E+00	0	0	0	0	0	0	1.45E+01	1.45E-01	2.36E+02	-3.65E+02	1.97E+03	1.88E+02
GWP-fossil	kg CO_2 eq	3.65E+02	0	2.49E+00	0	0	0	0	0	0	1.49E+01	1.49E-01	2.36E+02	-3.64E+02	1.97E+03	1.88E+02
GWP-biogenic	kg CO_2 eq	4.61E-01	0	-3.44E-03	0	0	0	0	0	0	-4.42E-01	-4.42E-03	-1.21E-01	-4.59E-01	-1.01E+00	-1.67E-01
GWP-luluc	kg CO_2 eq	4.56E-02	0	1.39E-02	0	0	0	0	0	0	2.75E-02	2.75E-04	4.88E-03	-4.23E-02	4.06E-02	4.53E-05
ODP	kg CFC11 eq	3.37E-10	0	1.49E-13	0	0	0	0	0	0	3.51E-11	3.51E-13	5.17E-13	-3.32E-10	4.3E-12	-3.6E-11
AP	mol H^+ eq	1.33E+00	0	2.25E-03	0	0	0	0	0	0	1.06E-01	1.06E-03	5.08E-01	-1.33E+00	4.23E+00	3.43E-01
EP-freshwater	kg P eq	8.08E-05	0	7.43E-06	0	0	0	0	0	0	2.53E-05	2.53E-07	4.29E-05	-7.81E-05	3.57E-04	3.27E-05
EP-marine	kg N eq	3.41E-01	0	6.75E-04	0	0	0	0	0	0	2.71E-02	2.71E-04	8.93E-02	-3.4E-01	7.44E-01	4.87E-02
EP-terrestrial	mol N eq	3.73E+00	0	8.17E-03	0	0	0	0	0	0	2.97E-01	2.97E-03	7.84E-01	-3.72E+00	6.53E+00	3.46E-01
POCP	kg NMVOC eq	9.5E-01	0	1.94E-03	0	0	0	0	0	0	8.22E-02	8.22E-04	3.62E-01	-9.47E-01	3.02E+00	2.45E-01
ADPE	kg Sb eq	1.11E-04	0	2.08E-07	0	0	0	0	0	0	1.53E-06	1.53E-08	5.89E-04	-1.11E-04	4.91E-03	5.55E-04
ADPF	MJ	4.18E+03	0	3.32E+01	0	0	0	0	0	0	1.95E+02	1.95E+00	2.17E+03	-4.17E+03	1.81E+04	1.63E+03
WDP	m^3 world eq deprived	7.27E+01	0	2.23E-02	0	0	0	0	0	0	1.64E+00	1.64E-02	4.39E+01	-7.26E+01	3.66E+02	3.43E+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 ton SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
PERE	MJ	2.52E +03	0	1.89E +00	0	0	0	0	0	0	2.93E +01	2.93E-01	-1.37E +02	-2.51E +03	-1.14E +03	-4.08E +02
PERM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PERT	MJ	2.52E +03	0	1.89E +00	0	0	0	0	0	0	2.93E +01	2.93E-01	-1.37E +02	-2.51E +03	-1.14E +03	-4.08E +02
PENRE	MJ	4.18E +03	0	3.33E +01	0	0	0	0	0	0	1.96E +02	1.96E +00	2.17E +03	-4.17E +03	1.81E +04	1.63E +03
PENRM	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
PENRT	MJ	4.18E +03	0	3.33E +01	0	0	0	0	0	0	1.96E +02	1.96E +00	2.17E +03	-4.17E +03	1.81E +04	1.63E +03
SM	kg	1.14E +03	0	0	0	0	0	0	0	0	0	0	-1.37E +02	0	-1.14E +03	-1.31E +02
RSF	MJ	0	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	0
FW	m^3	5.42E +00	0	2.14E-03	0	0	0	0	0	0	4.97E-02	4.97E-04	9.92E-01	-5.41E +00	8.26E +00	3.6E-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 ton SALCOS® structural steel beams and sections

Parameter	Unit	A1-A3	C1	C2	C3	C3/1	C3/2	C3/3	C4	C4/1	C4/2	C4/3	D	D/1	D/2	D/3
HWD	kg	5.9E-07	0	1.6E-10	0	0	0	0	0	0	1E-08	1E-10	1.68E-08	-5.89E-07	1.4E-07	-4.86E-08
NHWD	kg	6.33E +00	0	4.78E-03	0	0	0	0	0	0	1E+03	1E+01	-3.29E +01	-6.32E +00	-2.74E +02	-3.24E +01
RWD	kg	4.37E-02	0	4.1E-05	0	0	0	0	0	0	2.17E-03	2.17E-05	-2.7E-04	-4.28E-02	-2.25E-03	-4.96E-03
CRU	kg	0	0	0	0	1E+03	0	1.1E+02	0	0	0	0	0	0	0	0
MFR	kg	0	0	0	1E+03	0	0	8.8E+02	0	0	0	0	0	0	0	0
MER	kg	0	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	0
EET	MJ	0	0	0	0	0	0	0	0	0	0	0	0	0	0	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

The additional and optional impact categories according to EN15804+A2 are not declared as this is not required according to PCR Part A.

Disclaimer 1 – for the indicator IRP

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 some construction materials is also not measured by this indicator.

Disclaimer 2 – for the indicators ADPE, ADPF, WDP, ETP-fw, HTP-c, HTP-nc, SQP

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.

References

Standards

ASTM A6
ASTM A6 / A6M - 19 Standard Specification for General Requirements for Rolled Structural Steel Bars, Plates, Shapes, and Sheet Piling

ASTM A36
ASTM A36 / A36M - 19 Standard Specification for Carbon Structural Steel

ASTM A572
ASTM A572 / A572M - 21e1 Standard Specification for High-Strength Low-Alloy Columbium-Vanadium Structural Steel

ASTM A992
ASTM A992 / A992M - 20 Standard Specification for Structural Steel Shapes

EN 10025-1
EN 10025-1:2004 Hot rolled products of structural steels – Part 1: General technical delivery conditions

EN 10025-2
EN 10025-2:2019 Hot rolled products of structural steels – Part 2: Technical delivery conditions for non-alloy structural steels

EN 10025-3
EN 10025-3:2019 Hot rolled products of structural steels – Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels

EN 10025-4
EN 10025-4:2019 Hot rolled products of structural steels – Part 4: Technical delivery conditions for thermomechanical rolled weldable fine grain structural steels

EN 10025-5
EN 10025-5:2019 Hot rolled products of structural steels – Part 5: Technical delivery conditions for structural steels with improved atmospheric corrosion resistance

EN 10034
EN 10034:1993 Structural steel I and H sections; Tolerances on shape and dimensions

EN 10279
EN 10279:2000 Hot rolled steel channels – Tolerances on shape, dimensions and mass

EN 10365
EN 10365:2017 Hot rolled steel channels, I and H sections - Dimensions and masses

EN 15804
EN 15804:2019+A2 (in press), Sustainability of construction works — Environmental Product Declarations — Core rules for the product category of construction products

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

Further References

Candidate List of SVHC
Candidate List of substances of very high concern for Authorisation (published by the European Chemicals Agency (ECHA) in accordance with Article 59(10) of the REGULATION (EC) No 1907/2006 OF THE Evaluation, Authorisation and Restriction of Chemicals (REACH))

GaBi Software / Database
GaBi, Software and Database for Life Cycle Engineering, Sphera Solution GmbH, Leinfelden Echterdingen, 2022, ttp://documentation.gabi-software.com

IBU 2022
IBU 2021, General Instructions for the EPD program of Institut Bauen und Umwelt e.V. Version 2.0 Berlin: Institut Bauen und Umwelt e.V., 2022, www.ibu-epd.de

PCR, Part A
Product Category Rules for Building-Related Products and Services, Calculation Rules for the Life Cycle Assessment and Requirements on the Project Report. Institut Bauen und Umwelt e.V. (IBU), 2021, www.bau-umwelt.de

PCR, Part B

Requirements on the EPD for Structural steels – Institut Bauen und Umwelt e.V., Königswinter (pub.): From the range of Environmental Product Declarations of Institute Construction and Environment e.V. (IBU), 2021

Sansom, M. / Meijer, J.

Life-cycle assessment (LCA) for steel construction,

Ascot, Culemborg. 2002

SteelConstruction-info

https://www.steelconstruction.info/The_recycling_and_reuse_survey

EPD-PTR-20210292-CBA1-EN

Structural Steel - Beams and Sections

Peiner Träger GmbH

Publisher

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Programme holder

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

+49 (0)30 3087748- 0
info@ibu-epd.com
www.ibu-epd.com

Author of the Life Cycle Assessment

Sphera Solutions GmbH
Hauptstraße 111- 113
70771 Leinfelden-Echterdingen
Germany

+49 711 341817-0
info@sphera.com
www.sphera.com

Owner of the Annex

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

+49 51 71 91-01
peiner.traeger@salzgitter-ag.de
www.peiner-traeger.de