ENVIRONMENTAL PRODUCT DECLARATION

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

Owner of the Declaration	voestalpine AG
Programme holder	Institut Bauen und Umwelt e.V. (IBU)
Publisher	Institut Bauen und Umwelt e.V. (IBU)
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Valid to	21.07.2026

Hot-formed press-hardened steel components ("phs-ultraform")

voestalpine Metal Forming GmbH

Institut Bauen und Umwelt e.V.

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ECO PLATFORM EPD VERIFIED

1. General Information

voestalpine Metal Forming GmbH

Programme holder
IBU – Institut Bauen und Umwelt e.V.
Panoramastr. 1
10178 Berlin
Germany

Declaration number
EPD-VOE-20210174-IBB1-EN

This declaration is based on the product category rules:
Thin walled profiles and profiled panels of metal, 07.2014
(PCR checked and approved by the SVR)

Issue date
01.11.2021

Valid to
21.07.2026

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

Dr. Alexander Röder
(Managing Director Institut Bauen und Umwelt e.V.))

Hot-formed press-hardened steel components ("phs-ultraform")

Owner of the declaration
voestalpine AG
voestalpine-Straße 3
4020 Linz
Austria

Declared product / declared unit
1 t hot-formed press-hardened steel components (phs-components)

Scope:
This EPD applies to voestalpine phs-ultraform components. It is based on the average annual production of the sites considered and relates to 1 t average phs-components.

The results are representative for the following sites:

- voestalpine Automotive Components Schmölln GmbH (DE),
- voestalpine Automotive Components Schwäbisch Gmünd GmbH & Co. KG (DE)
- voestalpine Automotive Components Cartersville Inc. (USA)
- voestalpine Automotive Components Shenyang Co., Ltd. (CN)

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 14025:2010*
☐ internally ☒ externally

Matthias Klingler
(Independent verifier)

2. Product

2.1 Product description/Product definition

The “phs components” product group (phs = press-hardened steel) consists of high-strength finished components. The specific characteristics of this product group are exceptional forming possibilities combined with high strength. This declaration summarizes the different processing variants at various voestalpine Metal Forming Division production sites.

“phs-ultraform” is a registered trademark of voestalpine Stahl GmbH.

phs-ultraform®

phs-ultraform (EUIPO registration numbers 013290044 and 005772165): cold-formed components are heated and then formed in a hot state. The material is hardened in the press with the help of cooled dies (press-hardened).

voestalpine trademarks
/phs-ultraform 2000
/phs-ultraform 1500
/phs-ultraform 490

For the use and application of the product the respective national provisions at the place of use apply and the corresponding national specifications.

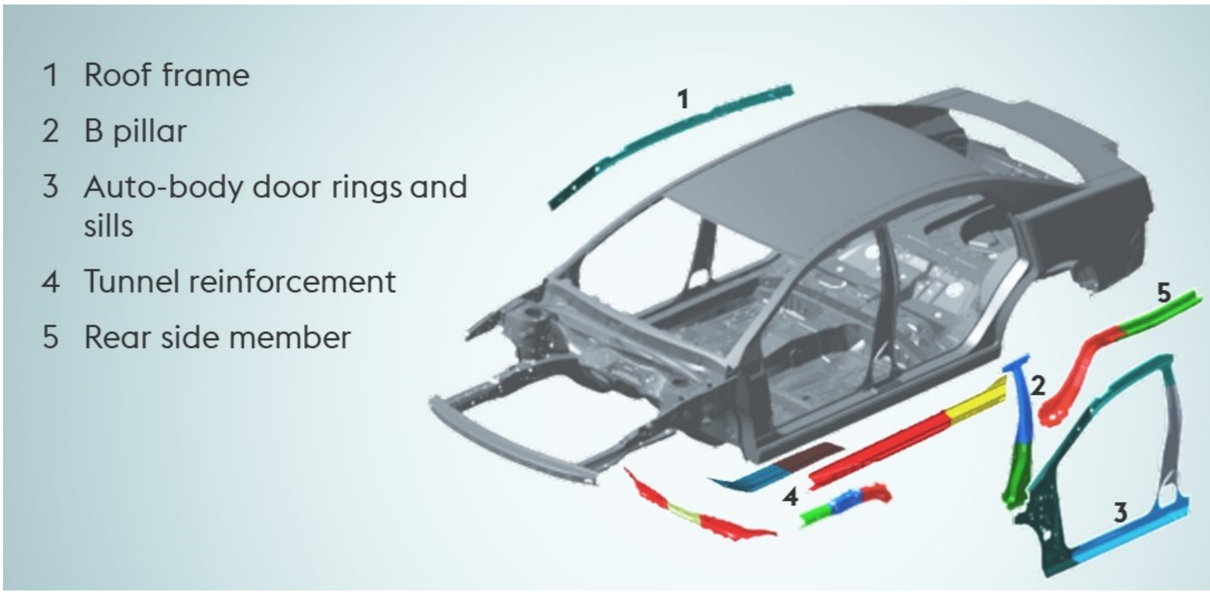
2.2 Application

phs components are used primarily in the automotive industry. They can also be used in other industries where a high degree of formability, low weight, and high strength are required. The analysis presented here was carried out exclusively for phs components in the automotive sector. phs components are predominantly used for structural chassis components:

- Front and rear side members
- Bumper supports
- Sills
- Crossmembers
- A pillars
- B pillars
- Roof frames

Component groups such as side members usually consist of several individual components that are joined together using appropriate joining technologies (welding, bonding, riveting). This makes it possible to optimize applications for load situation in the finished component.

Tailored-property parts (TPP) are used to customize component properties. Very specific characteristics with respect to crash behavior, deformability, occupant protection and energy absorption can be achieved by joining flat steels with different thicknesses and steel grades (“laser-welded blanks”) and by hardening and strengthening sections of component segments.



Use of press-hardened steel (phs) and TPP parts

Variants of tailored-property parts

2.3 Technical Data

The data in the Declaration of Performance apply.

Structural data:
Thickness of the sheet: 0.7 to 3.0 mm
Mass of the component: 2 to 20 kg

Component dimensions:
Component dimensions are defined in a CAD model.

Dimensions of typical phs components for automotive applications:
Width: 70 to 2000 mm
Height: 20 to 400 mm
Length: 200 to 3500 mm

Product standards:
Performance data of the product in accordance with

the declaration of performance with respect to its essential characteristics according to:
EN 10143:2006, *Continuously hot-dip coated steel sheet and strip - Tolerances on dimensions and shape.*
EN 10346:2015, Continuously hot-dip coated steel flat products for cold forming - Technical delivery conditions.
EN 10338:2015, Hot rolled and cold rolled non-coated products of multiphase steels for cold forming - Technical delivery conditions.
SEW 022, 2010, Continuously hot-dip coated steel flat products - Zinc-magnesium coatings - Technical delivery conditions.
VDA material sheet 239-100, 2016, Sheet steel for cold forming.

The voestalpine Group holds numerous patents related to phs-ultraform, including the following:

- Special phs-ultraform manufactured components, e.g. TPP
- Surface conditioning such as cleaning processes and pretreatment
- Process control when heating and cooling (pre-cooling) components during the press-hardening process
- Hot forming tools, including the design of cooling channels

2.4 Delivery status

phs components are attached to product-specific load carriers. The size of the load carrier is based on the size of the component. Load carriers are usually the property of the customer.

2.5 Base materials/Ancillary materials

The starting product for hot-dip galvanized strip is cold-rolled or hot-rolled steel strip produced at the voestalpine Stahl GmbH site. The base material is crude steel made of around 75 % pig iron and 25 % scrap.

Auxiliary materials/additives:
Zinc coating: hot-dip galvanized layer with a zinc content of >99 %
Anti-corrosive oil 0.5 – 2 g/m^2
Passivation agents

This product contains substances listed in the candidate list (date: 19.01.2021) exceeding 0.1 percentage by mass: no.

This product contains other CMR substances in categories 1A or 1B which are not on the candidate list, exceeding 0.1 percentage by mass: no.

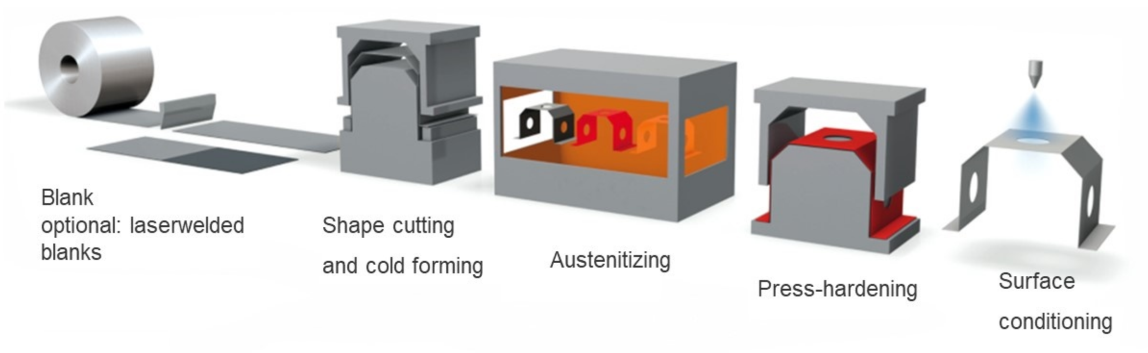
Biocide products were added to this construction product or it has been treated with biocide products (this then concerns a treated product as defined by the (EU) Ordinance on Biocide Products No. 528/2012): no.

2.6 Manufacture

The starting material for the production of hot-dip galvanized strip at voestalpine is crude steel made in the integrated route (blast furnace, LD steelmaking plant) at the Linz site. The liquid crude steel is cast into slabs using a continuous casting method. After cooling, the slabs are reheated in pusher-type or walking beam furnaces to a temperature ranging between 1100 and 1250 °C and rolled in several rolling steps to strips in thicknesses ranging between 1.2 and 4 mm.

A mill scale layer forms on the hot-rolled strip and is removed before further processing in the cold-rolling mill (scale removal). This production step first features a mechanical loosening of the scale layer (leveling line). The steel strip is subsequently pickled with hydrochloric and sulfuric acid. “phs” (press hardened steel) consists of hot forming galvanized flat steel. This meets the objective of achieving maximum formability combined with maximum strength.

The indirect method, **“phs-ultraform”:**



Starting with a steel strip or a laser-welded steel blank, parts are cold-formed in a hydraulic or mechanical press (high dimensional accuracy). The formed parts are then heated to roughly 900 °C and immediately press-hardened again while they are hot. The cooled dies harden the component, and the low degree of forming prevents the zinc layer from being damaged. The component is then cleaned.

2.7 Environment and health during manufacturing

The voestalpine Group (voestalpine AG) is a member of CDP (www.cdp.net), an organization dedicated to disclosing the environmental data of companies, cities, states, and regions. voestalpine AG was given a “B” rating, which is better than the European average (“C”) and comparable companies in the steel manufacturing sector (“C”).

The voestalpine Steel Division production site is certified according to *EMAS 2009, ISO 9001,* and *ISO*

14001. In compliance with Eco Management and Audit Scheme (EMAS) provisions, voestalpine constantly publishes environment-relevant facts and figures of the production site.

Investments are continually being made in the expansion of environmental protection measures at the Linz site in an effort to minimize air and water emissions. Compliance with all statutory emission limit values has been verified. All production systems approved in accordance with applicable environmental impact analyses are inspected on a regular basis as part of environmental audits.

The phs plants in Germany (Schwäbisch Gmünd, Schmölln) have implemented an environmental management system certified according to *ISO 14001* and an energy management system certified according to *ISO 50001*. The site in Cartersville (USA) will have its environmental management system certified according to *ISO 14001* by the end of 2021 and plans are in place to certify the site in China according to *ISO 14001* by 2022.

2.8 Product processing/Installation

phs components or phs component groups are supplied directly to the OEM (car manufacturer), where they are assembled (welded, bonded, riveted) into the body in white. The body is then painted (cathodic dip painting, wet painting). The painted body is assembled into a complete vehicle (engine, powertrain, interior, etc.) using different levels of automation depending on the size of the series.

2.9 Packaging

The finished phs components or component groups are placed in and attached to component-specific load carriers. These load carriers are made of steel or plastic. They are the property of the customer and are reusable. The exact design of the load carriers and how the components are attached is specified in a customer/part-specific regulation.

2.10 Condition of use

phs components consist of galvanized steel strip that has been formed while cold and hardened while hot. The declaration covers an average zinc-coated steel strip product with an average coating thickness of 80 to 180 g/m² (80 g/m²/scale protection; 140 g/m² for OEM 1; 180 g/m² for OEM 2).

2.11 Environment and health during use

No effects on the health of humans or animals, nor harmful air, soil and water emissions are expected during the use of the declared product.
Compared with conventionally formed components, the use of phs components can reduce the component weight by up to 25 % while retaining the same or superior strength properties. This reduces the overall weight of the vehicle and thus fuel consumption during service life.

2.12 Reference service life

The service life depends on the type of use and is usually somewhere between 12 and 20 years.

2.13 Extraordinary effects

Fire
Not relevant.

Fire protection
Building material class: A1
Burning droplets: not relevant
Smoke gas development: not relevant

Water
No negative consequences are expected for the environment when phs components come into contact with water.

Mechanical destruction
Unforeseeable mechanical effects on the declared product would have no environmental impact because of the plasticity of steel.

2.14 Re-use phase

phs components from voestalpine consist of a steel core and a metallic refining layer. The declared product can therefore be re-used either in the construction industry or as valuable secondary raw material in the steel-making industry.

2.15 Disposal

The declared product can be entirely recycled. The waste code is in accordance with the *European Waste Catalog (EWC)* 17 04 05 (iron and steel). The type of waste is to be equated with waste catalog code 35103 pursuant to the *Waste Catalog Ordinance* applicable in Austria.

2.16 Further information

Please find more information about the product at www.voestalpine.com/ultralights/en/Products/Hot-forming/phs-ultraform-R

3. LCA: Calculation rules

3.1 Declared Unit

This environmental product declaration for voestalpine phs-components refers to a declared unit of 1 t press-hardened steel components.

Declared unit

Name	Value	Unit
Declared unit	1	t
Conversion factor to 1 kg	0.001	-

phs-components are based on hot-dip galvanized steel strips (coils or blanks) supplied by voestalpine's integrated steel mill in Linz and voestalpine Automotive Components Linz GmbH. The cold and hot-forming of components takes place at the following sites of voestalpine Metal Forming Group:

- voestalpine Automotive Components Schmölln GmbH (DE),
- voestalpine Automotive Components Schwäbisch Gmünd GmbH & Co. KG (DE),
- voestalpine Automotive Components Cartersville Inc. (USA),

- voestalpine Automotive Components Shenyang Co., Ltd. (CN)

The study refers to the average annual production of the sites considered with respect to one tonne of average phs-component. Thus, the study declares weighted average products representing the total annual production of voestalpine Metal Forming GmbH. Component weight, stroke rates, dwell times in the furnaces, offcut and scrap quantities can vary significantly between different components. As a result, the environmental performance associated to specific components may vary.

3.2 System boundary

The life cycle assessment of phs-components produced by voestalpine refers to a cradle-to-gate analysis with modules C1-C4 and D (A1-A3 + C + D). The following life cycle phases are taken into consideration in the analysis:

Module A1-A3 | Production stage
The production stage includes the manufacturing process of the phs- components at the sites in Schwäbisch-Gmünd, Schmölln, Shenyang and Cartersville. Indirect press-hardening for the production of highly corrosion-resistant lightweight components is assessed based on data collected for the Group's plants. The raw material is delivered from the integrated steelworks of voestalpine Linz and voestalpine Automotive Components Linz. Electrical energy is provided by the national power grid and thermal energy provision is based on natural gas. Load carriers vary according to customer requirements and is not included in the declaration.

Module C1 | Deconstruction and demolition
phs-components are used in the automotive sector. The phs-components are disposed of by the waste management company.

Module C2 | Transport
The transport to the disposal of the material is estimated declaring a 50 km radius to waste processing.

Module C3 | Waste treatment
The vehicle is dismantled into its basic components at the disposal company and shredded. After shredding and sorting, the scrap reaches the end-of-waste status in C3 and reaches module D for recycling. Environmental impacts from shredding and sorting of the steel scrap are not included due to the insignificance of the expected impact.

Module C4 | Disposal
Module C4 refers to the emissions from the disposal of the losses from waste processing. The chosen scenario, therefore, includes the environmental burdens of landfilling of 5 % of the material.

Module D | Credits and loads beyond the system boundary
Module D declares the recycling of the recovered steel (95 % of the product). It includes the potential for substituting primary steel.

3.3 Estimates and assumptions

Assumptions and approximations are applied in case of a lack of representative data. All assumptions are documented precisely and represent a best-guess representation of reality based on the available data.

3.4 Cut-off criteria

The LCA model covers all available input and output flows, which can be represented based on robust data. Data gaps are filled with conservative assumptions from average data (when available) or with generic data and are documented accordingly. Only data with a contribution lower than 1 % were cut off. Thus, no data were neglected, of which a substantial impact is to be expected. All relevant data were collected comprehensively. Cut-off material and energy flows were chosen carefully based on their expected quantitative contribution as well as potential environmental impacts. Thus, it can be assumed that the sum of all neglected input flows does not account for more than 5 % of the total material, water and energy flows. Environmental impacts from the production of machines and infrastructure were not taken into account.

3.5 Background data

This study uses generic background data for the evaluation of upstream environmental impacts from *GaBi*-database 2021.1.

3.6 Data quality

For the foreground data collection, the life cycle inventory of the voestalpine Metal Forming sites was collected based on the following production years: Schmölln 2018, Schwäbisch-Gmünd and Shenyang 2019 as well as Cartersville 2020. The data are based on the quantities used and volumes produced annually.

Data were collected in compliance with *worldsteel 2017* provisions and were subjected to a supplementary plausibility check. For the evaluation of the individual production steps, collected data were supplemented by specific information from the controlling systems of the companies, and evaluated and checked with regard to their completeness and representativeness for the declared average.

Questions were clarified in an iterative process via e-mail, telephone calls or in web-meetings. Intensive discussions between voestalpine and Daxner & Merl result in an accurate mapping of product-related material and energy flows. This leadsto a high quality of foreground data collected. Data collection relies on a consistent process according to *ISO 14044.*

The technological, geographical and time-related representativeness of the database was kept in mind when selecting background data. Whenever specific data were missing, either generic datasets or representative average data were used instead. The implemented *GaBi* background datasets are not more than ten years old.

3.7 Period under review

The data collected refer to primary data of the voestalpine Metal Forming sites in the following production years:

- Schwäbisch-Gmünd: reference year 2019
- Schmölln: reference year 2018
- Cartersville: reference year 2020

- Shenyang: reference year 2019

3.8 Allocation

The allocation of hot-dip galvanized steel strip produced at the Linz site follows the method documented in *IBU-EPD, 2019* for calculating the life cycle inventory of co-products in steel production based on the requirements of *EN 15804*. The so-called partitioning approach suggests the allocation of environmental effects of the steelmaking process and the emerging co-products based on physical relations. Material-inherent flow properties are thus taken into account. Result of this developments are published allocation rules for co-products produced in blast furnaces and steelworks. The published allocation approach was subjected to a critical review (*PwC, s.a.*).

All material and energy flows in the production of phs-components are allocated to the processed throughput on a mass basis over the production year under consideration. In Schwäbisch-Gmünd and Schmölln, cold-forming takes place in the plant in addition to hot-forming. The annual specific energy input of cold-forming and the associated scrap rate were determined in relation to the total annual throughput and taken into account for the quantities processed further. A more specific allocation approach is not available.

3.9 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 *GaBi* background database was used to calculatethe LCA (GaBi 10; 2021.1)

4. LCA: Scenarios and additional technical information

Characteristic product properties
Information on biogenic Carbon
The declared product does not contain any biogenic carbon.

No packaging is considered in this study.

End of life (C1-C4)

Name	Value	Unit
Collected separately (steel)	1000	kg
Recycling 95 %	950	kg
Landfilling 5 %	50	kg

Reuse-, recovery- and recycling potential (D), relevant scenario information

Name	Value	Unit
Net flow steel scrap	1361	kg

This scenario contains a recycling rate of 95 %. Since voestalpine externally purchases scrap for steel production, this is offset against the steel scrap for recycling (net flow).

The amount of external steel scrap used on the input side for production is subtracted from the amount of steel scrap (= 95 % of the declared unit + scrap output from modules A1 and A3) that reaches module D at the end of its life. The high net scrap flow results from the high quantities of scrap from the cutting and forming processes.

5. LCA: Results

The following table contains the LCA results for voestalpine phs-components with a declared unit of 1 t average press-hardened steel components.

Disclaimer:
EP-freshwater: This indicator has been calculated as "kg P eq" as required in the characterization model (EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe; http://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml).

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	ND	ND	ND	ND	MNR	MNR	MNR	ND	ND	X	X	X	X	X

RESULTS OF THE LCA - ENVIRONMENTAL IMPACT according to EN 15804+A2: 1 t phs-components

Core Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Global warming potential - total	[kg CO_2-Eq.]	4.89E+3	0.00E+0	3.02E+0	0.00E+0	2.42E+0	-2.31E+3
Global warming potential - fossil fuels	[kg CO_2-Eq.]	4.87E+3	0.00E+0	3.00E+0	0.00E+0	2.44E+0	-2.31E+3
Global warming potential - biogenic	[kg CO_2-Eq.]	1.21E+1	0.00E+0	-3.56E-3	0.00E+0	-2.50E-2	-1.50E+0
GWP from land use and land use change	[kg CO_2-Eq.]	2.47E+0	0.00E+0	2.44E-2	0.00E+0	2.44E-3	3.35E-1
Depletion potential of the stratospheric ozone layer	[kg CFC11-Eq.]	8.02E-11	0.00E+0	5.90E-16	0.00E+0	5.77E-15	-3.86E-12
Acidification potential, accumulated exceedance	[mol H^+-Eq.]	1.36E+1	0.00E+0	9.92E-3	0.00E+0	7.78E-3	-4.15E+0
Eutrophication, fraction of nutrients reaching freshwater end compartment	[kg P-Eq.]	6.26E-3	0.00E+0	8.88E-6	0.00E+0	1.86E-6	-4.73E-4
Eutrophication, fraction of nutrients reaching marine end compartment	[kg N-Eq.]	3.23E+0	0.00E+0	4.55E-3	0.00E+0	1.93E-3	-6.19E-1
Eutrophication, accumulated exceedance	[mol N-Eq.]	3.51E+1	0.00E+0	5.08E-2	0.00E+0	2.12E-2	-6.03E+0
Formation potential of tropospheric ozone photochemical oxidants	[kg NMVOC-Eq.]	1.01E+1	0.00E+0	8.94E-3	0.00E+0	6.08E-3	-3.17E+0
Abiotic depletion potential for non-fossil resources	[kg Sb-Eq.]	1.07E-1	0.00E+0	2.65E-7	0.00E+0	1.68E-7	-5.03E-3
Abiotic depletion potential for fossil resources	[MJ]	4.87E+4	0.00E+0	3.98E+1	0.00E+0	3.56E+1	-2.01E+4
Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	[m^3 world-Eq deprived]	2.27E+2	0.00E+0	2.77E-2	0.00E+0	-2.89E-2	-4.54E+2

RESULTS OF THE LCA - INDICATORS TO DESCRIBE RESOURCE USE according to EN 15804+A2: 1 t phs-components

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Renewable primary energy as energy carrier	[MJ]	4.34E+3	0.00E+0	2.29E+0	0.00E+0	2.57E+0	1.85E+3
Renewable primary energy resources as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of renewable primary energy resources	[MJ]	4.34E+3	0.00E+0	2.29E+0	0.00E+0	2.57E+0	1.85E+3
Non-renewable primary energy as energy carrier	[MJ]	4.90E+4	0.00E+0	4.00E+1	0.00E+0	3.56E+1	-2.01E+4
Non-renewable primary energy as material utilization	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Total use of non-renewable primary energy resources	[MJ]	4.90E+4	0.00E+0	4.00E+1	0.00E+0	3.56E+1	-2.01E+4
Use of secondary material	[kg]	2.22E+2	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.36E+3
Use of renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of non-renewable secondary fuels	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Use of net fresh water	[m^3]	1.15E+1	0.00E+0	2.62E-3	0.00E+0	3.67E-4	-1.02E+1

RESULTS OF THE LCA – WASTE CATEGORIES AND OUTPUT FLOWS according to EN 15804+A2: 1 t phs-components

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Hazardous waste disposed	[kg]	1.23E-5	0.00E+0	2.11E-9	0.00E+0	6.30E-9	5.62E-6
Non-hazardous waste disposed	[kg]	5.16E+1	0.00E+0	6.27E-3	0.00E+0	5.01E+1	2.42E+2
Radioactive waste disposed	[kg]	7.15E-1	0.00E+0	7.25E-5	0.00E+0	4.05E-4	7.29E-4
Components for re-use	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Materials for recycling	[kg]	6.33E+2	0.00E+0	0.00E+0	9.50E+2	0.00E+0	0.00E+0
Materials for energy recovery	[kg]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported electrical energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
Exported thermal energy	[MJ]	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0

RESULTS OF THE LCA – additional impact categories according to EN 15804+A2-optional: 1 t phs-components

Indicator	Unit	A1-A3	C1	C2	C3	C4	D
Potential incidence of disease due to PM emissions	[Disease Incidence]	ND	ND	ND	ND	ND	ND
Potential Human exposure efficiency relative to U235	[kBq U235-Eq.]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for ecosystems	[CTUe]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential comparative toxic unit for humans - not cancerogenic	[CTUh]	ND	ND	ND	ND	ND	ND
Potential soil quality index	[-]	ND	ND	ND	ND	ND	ND

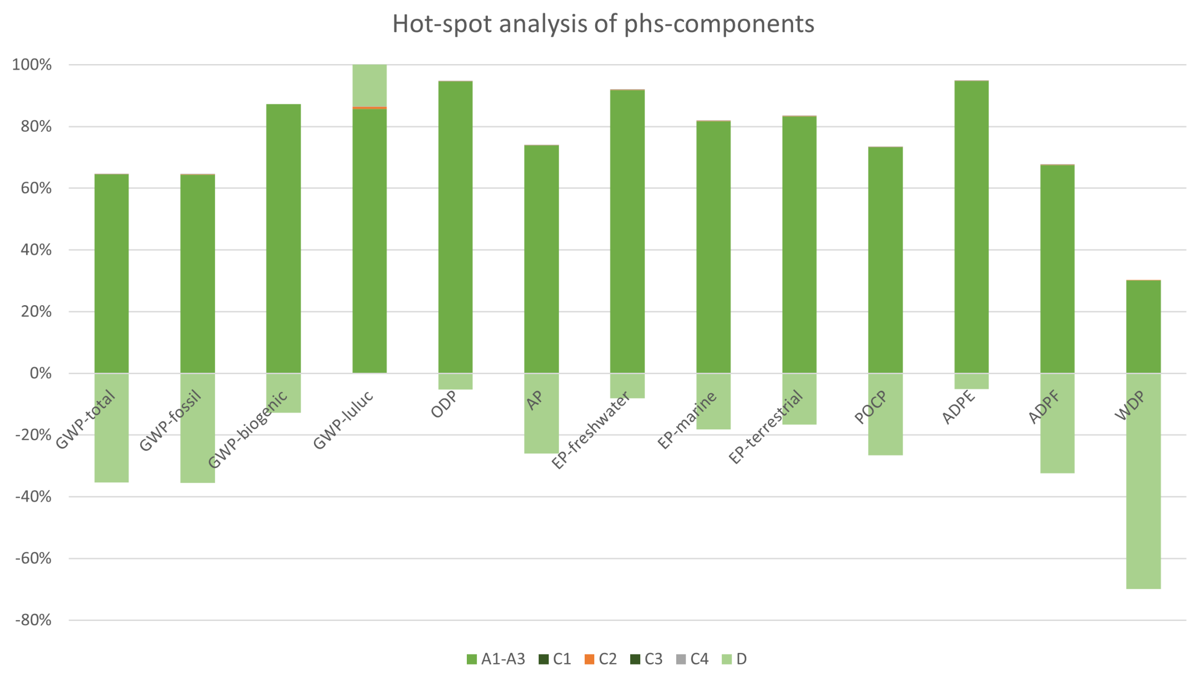
The additional and optional impact categories according to *EN 15804+A2* are not declared, as this is not required according to *PCR Part A*.

Disclaimer 1 – for the indicator “potential Human exposure efficiency relative to U235“:
This impact category deals mainly with the eventual impact of low dose ionizingradiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor 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 fossil resources”, “abiotic depletion potential for non-fossil resources”, “water (user) deprivation potential”, “deprivation-weighted water consumption”, “potential comparative toxic unit for ecosystems”, “potential comparative toxic unit for humans - cancer effects”, “potential comparative toxic unit for humans – non-cancer effects”, “potential soil quality index”:
The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experience with the indicator.

6. LCA: Interpretation

The following interpretation contains a summary of the LCA results referenced to a declared unit of 1 t phs-ultraform-components.



The comparison of the products’ life cycle phases shows a clear dominance of the production phase (modules A1-A3). The environmental impact in the production phase is mainly dominated by the direct process emissions of steel production and the supply chain of purchased raw materials and energy sources.

As a result of product recyclability, the material removed at the end of life can substitute primary steel. Module D shows the recycling potential of steel at the end of its product life. Potentials arise from the substitution of primary steel (credits). The high potentials at the end of the product life result from the high net scrap flow into module D due to the scrap quantities from the shape cutting and the forming process.

The environmental impacts of the transports to recycling (C2) and of landfill disposal (C4) represent a minor contribution to the overall environmental impact of the product.

The variation in the results of the sites is within a stable range of ± 7 % for the potential contribution to climate change. For environmental indicators that are more strongly influenced by transports (acidification, marine and terrestrial eutrophication) a higher fluctuation of -35 % to +70 % is to be observed. Due to the consideration of the weighted average of the Group's total production, a representative representation of the product-related environmental impacts can be assumed.

In summary, raw material and energy input for the provision of the hot-dip galvanized steel strip as a raw-material for the production of the phs-components can be identified as a significant factor. The production of 1 t phs-components is associated with a potential contribution to global warming of 4,89 t CO_2e. This must be compared with the scrap credit from Module D of 2,31 t CO_2e regarding the very good material recyclability. Due to the process-related output losses of in total more than 60 % during punching, cold-forming and hot-forming, the emissions from the material input of the hot-dip galvanized strip, including the compensation of the losses, account for around 80 % of the carbon footprint. In relation to the emissions from the processing steps of the products, hot-forming represents the most significant factor (60 %;no consideration of input material). With regard to greenhouse gas emissions from process- and geometry-related output losses per processing step, cold-forming takes on a dominant role due to the high cutoffs.

In addition, overseas shipments to Cartersville (US) and Shenyang (CN) are a key driver of potential acidification, eutrophication (marine and terrestrial) and summer smog formation.

7. Requisite evidence

Not relevant for this EPD.

8. References

Standards

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