

ENVIRONMENTAL PRODUCT DECLARATION

Forged Steel Products
at Bharat Forge Kilsta

Programme : EPD International AB
Registration Number : S-P-04637
Publication Date : 2021/11/17
Valid Until : 2026/11/16

Programme Information

EPD References

EPD Owner :

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Program Operator:

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PCR and Independent Verification

Product category rules (PCR):2014:10.
*Fabricated Steel Products except Construction
Products, Machinery and Equipment. Version
2.12. Valid until 2022-10-04, Stockholm: EPD
International AB. 2019.*

PCR review was conducted by: The Technical
Committee of the International EPD® System. A full
list of members available on www.environdec.com

Independent third-party verification of the
declaration and data, according to
ISO 14025:2006:

EPD process certification EPD verification

Third party verifier:

Carl-Otto Nevén, NEVÉN Miljökonsult



Approved by: The International EPD® System

Procedure for follow-up of data during EPD
validity involves third party verifier:

Yes No

The EPD owner has the sole ownership,
liability, and responsibility for the EPD. EPDs
within the same product category but from
different programs may not be comparable.



COMPANY PROFILE



Bharat Forge Kilsta AB is a part of Bharat Forge Group. The group is one the world's largest forging supplier with an experience of over 300 years.

Bharat Forge group operates forging facilities in India, Europe and USA.

Bharat Forge Kilsta AB located in Karlskoga, Sweden is a supplier of Heavy diesel crankshafts, front axle beams for trucks and buses using high quality steel. The forging plant is equipped with robust, fully computerised forging presses in order to meet the high demands of the automotive industry, backed up by decades of research and development and quality control experience.

The production processes are certified with Quality management system standard: IATF 16949:2016 and Environmental Management System standard: ISO 14001:2015.

Yearly Forging Output*
70K Tons

Employees
~300*

Turnover*
85 MEUR

*Figures for Bharat Forge Kilsta





Product Information

Product name: Forged steel products.

Product identification: The products are made from Carbon Steels and Micro-Alloyed Steels. They are mainly in the form of Front axle beams, Crankshafts, Steering arms etc. The products are designed in accordance with international standards and customer demands.

Product description: The declared unit is 1 kg of forged steel product at Bharat Forge's gate at the production site in Karlskoga, Sweden. With respect to alloying content, heat treatment and surface treatment, the product represents an average product from the site. The average consists of different steel qualities with alloying content varying according to the Content Declaration below.

UN CPC code: 412.

Geographical scope: Global.



Content Declaration

Materials / chemical substances	gram/kg	%	Environmental / hazardous properties
Iron	Balance	Balance	
Nickel	1.7-6	0.17-0.60	Nickel is classified in EC Directive 67/548/EEC as a suspect carcinogen (category 3 – R40) and as a skin sensitizer (R43)
Chromium	5.5-7.6	0.55-0.76	
Molybdenum	0.8-2.3	0.08-0.23	
Manganese	9.4-11.7	0.94-1.17	
Silicon	2.3-4.6	0.23-0.46	

Standards describing the methods used for chemical composition analysis are: ASTM E 415-17 and ASTM E 1019-18.

Steel products are considered as articles under the European Regulation (EC) 1907/2006, relating to the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). All intentionally added alloying elements, except nickel, are not classified as hazardous. Nevertheless, there are substances covered by European and national chemical legislation and lists (REACH Annex XIV and XVII, RoHS-directive (2011/65/EC and 2015/863/EU) Annex II and Global Automotive Declarable Substance List (“GADSL”)), that cannot physically be measured in steel and others that are difficult to measure because being present in very low levels. The alloying elements in low alloyed steel are firmly bonded in its chemical matrix. Due to this bonding and the presence of a protective oxide film, the release of any of the constituents is negligible when the steel is used appropriately.

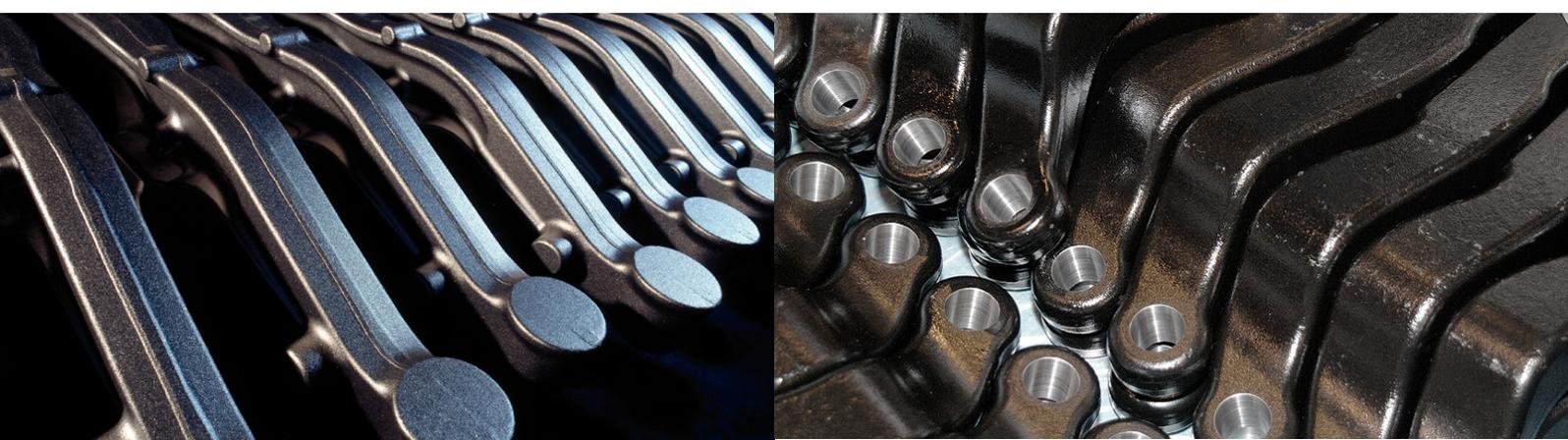
Packaging Material

Distribution packaging: Forged components are packed in rust-inhibiting paper and plastic film on recyclable wooden pallets. However, associated impacts from the packaging materials are not included in the calculations since they are defined as belonging to Downstream by PCR 2014:10.

Consumer packaging: Not applicable.

Recyclable Material

Provenience of recycled materials (pre-consumer or post-consumer) in the product: **80%** of the forged products are made from **100% recycled steel** while 20% are made from steel containing on average 42% recycled steel, in 2020.



LCA Information

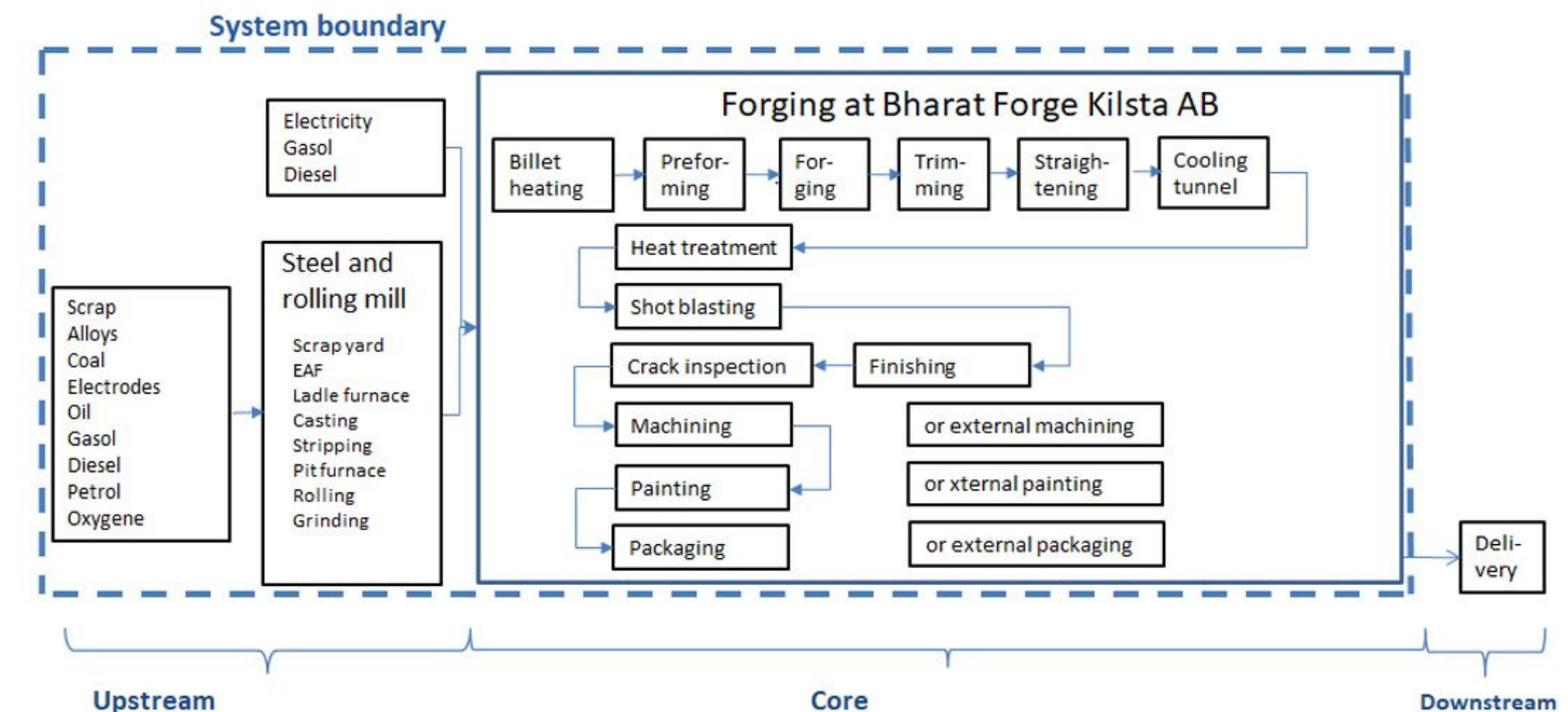
Functional unit / declared unit: 1 kg of forged steel product. The reason for choosing the declared unit as 1 kg of forged product, instead of 1 tonne of product as recommended by PCR 2014:10, is that most forged products are in the range of 5-100 kilogram, which is more easily comprehended than 0,005-0,1 tonne.

Reference service life: Not applicable.

Time representativeness: Production data is from 2020.

Database(s) and LCA software used: Ecoinvent 3.6 as applied in SimaPro 9.1.0.11, 2020. For calculation of environmental impacts, the method EPD (2018) Version 1.01 in SimaPro was used.

System Boundary



Description of system boundaries: **Cradle-to-gate.**

Excluded lifecycle stages: The use and end-of-life stages are excluded since forged steel products can be used in many different applications which also affect end-of-life.

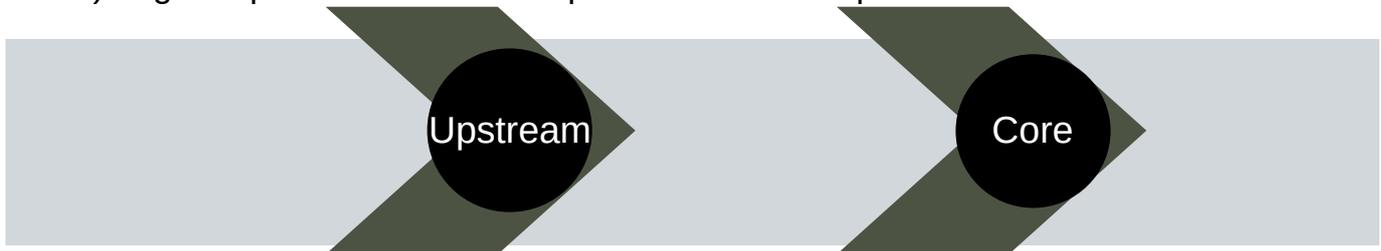
More information: For more information on Bharat Forge Kilsta forged steel products, see www.bfkilsta.com.

Name and contact information of LCA practitioner: Mats Zackrisson at RISE IVF AB has carried out the underlying LCA study. Mats.Zackrisson@ri.se

Additional information: Vattenfall's unspecified electricity mix (16 gram CO₂ eq/kWh) is used for forging operations. Liquefied petroleum gas (LPG) are used for some heating operations.

Environmental Performance

Detailed Environmental performance (potential environmental impacts use of resources, waste generation). Figures presented for both Upstream and Core phases.



Declared Unit : 1kg of Forged product.

PARAMETER		UNIT	Upstream	Core	Downstream	Total
Global warming potential (GWP)	Fossil	g CO ₂ eq.	812	74	INA ¹	886
	Biogenic	g CO ₂ eq.	0	0	INA	0
	Land use and land transformation	g CO ₂ eq.	0	0	INA	0
	TOTAL	g CO ₂ eq.	812	74	INA	886
Depletion potential of the stratospheric ozone layer (ODP)		mg CFC 11 eq.	0,105	0,081	INA	0,186
Acidification potential (AP)		g SO ₂ eq.	3,8	0,32	INA	4,1
Eutrophication potential (EP)		g PO ₄ ³⁻ eq.	1,6	0,13	INA	1,7
Photochemical oxidant formation potential (POFP)		g NMVOC eq.	3,5	0,34	INA	3,9
Abiotic depletion potential – Elements		mg Sb eq.	14,2	0,61	INA	14,8
Abiotic depletion potential – Fossil resources		MJ, net calorific value	8,8	0,69	INA	9,5
Water scarcity potential		Litre eq.	3,6	-0,08	INA	3,5

INA - Indicator Not Assesed.



Use of Resources

Declared Unit : 1kg of Forged product.

PARAMETER		UNIT/kg	Upstream	Core	Downstream	TOTAL
Primary energy resources – Renewable	Use as energy carrier	MJ, net calorific value	2,32	2,95	INA	5,27
	Used as raw materials	MJ, net calorific value	0	0	INA	0
	TOTAL	MJ, net calorific value	2,32	2,95	INA	5,27
Primary energy resources – Non-renewable	Use as energy carrier	MJ, net calorific value	14,8	10,5	INA	25,3
	Used as raw materials	MJ, net calorific value	0	0	INA	0
	TOTAL	MJ, net calorific value	14,8	10,5	INA	25,3
Secondary material		kg	0,88	0	INA	0,88
Renewable secondary fuels		MJ, net calorific value	0	0	INA	0
Non-renewable secondary fuels		MJ, net calorific value	0	0,07	INA	0,07
Net use of fresh water		Litre	INA	5,2	INA	INA

Waste Production and Output Flows

Declared Unit : 1kg of Forged product.

PARAMETER	UNIT	Upstream	Core	Downstream	Total
Hazardous waste disposed	g	INA	2,54	INA	INA
Non-hazardous waste disposed	kg	INA	18,5	INA	INA
Radioactive waste disposed	kg	INA	0	INA	INA
Components for reuse	kg	INA	0	INA	INA
Material for recycling	kg	INA	0,25	INA	INA
Materials for energy recovery	g	INA	0,72	INA	INA
Exported energy, electricity	MJ	INA	0	INA	INA
Exported energy, thermal	MJ	INA	0	INA	INA

INA - Indicator Not Assesed.



Variance of environmental impact due to steel origin

The results above are presented for an average forged steel product. More than 90% of the climate impact emanates from the steel raw material which is sourced from different locations. In 2020, 80% was sourced from Ovako Steel’s scrap based electric arc furnace in Smedjebacken and 20% was sourced from Europe and assumed to have average European market scrap/virgin content. The influence of the input steel quality on the environmental impact of the forged product is shown in the table below. The climate impact for a specific forged product, can be provided through a “footprint calculator” on request to Bharat Forge Kilsta.

Steel from	kg CO2 eq	kg SO2 eq	kg PO4-eq	kg NMVOC
Smedjebacken	0,546	0,00256	0,000596	0,00167
Average: 80% from Smedjebacken; 20% from Europe	0,89	0,00414	0,0017	0,0039
Europe	2,26	0,0105	0,00614	0,0114

Additional Information

Information on recycling: Steel is 100% recyclable as a raw material for the production of new steel products.

References

General Programme Instructions of the International EPD® System. Version 4.0. Dated 2021-03-29. Stockholm: © EPD INTERNATIONAL AB. <http://www.environdec.com/>.

PCR 2014:10. FABRICATED STEEL PRODUCTS , EXCEPT CONSTRUCTION PRODUCTS , MACHINERY AND EQUIPMENT. Version 2.12 valid until 2022-10-04, Stockholm: EPD International AB. 2019.

Ovako. 2020. “Environmental Product Declaration: HOT-ROLLED BAR STEEL PRODUCT IN SMEDJEBACKEN & BOXHOLM, OVAKO.” The International EPD® System.

Zackrisson, Mats, and Mohit Digamber Sakore. 2021. “Life Cycle Assessment for EPD of Forged Products at Bharat Forge Kilsta AB.” Stockholm, Sweden. RISE Research Institutes of Sweden. RISE Project Report P108389/1.



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