

Environmental Product Declaration

CLOSED-DIE FORGED STEEL MECHANICAL GEAR

BASED ON:

PCR 2014:10 v 2.11,
"Fabricated steel products,
except construction products,
machinery and equipment",
2019-09-06 ISO 14025

CERTIFICATION N°:

S-P-04304

CPC CODE

412

PROGRAMME:

The International EPD System
www.environdec.com

PROGRAMME OPERATOR:

EPD International AB

ISSUE DATE:

2021/09/28

REFERENCE YEAR:

2020

VALID UNTIL:

2026/09/27



Programme Information

EPD REFERENCES

EPD OWNER: Siderforgerossi group, Via Rolando Perino, 37, 10080 Busano (TO), Italy

PROGRAMME OPERATOR: EPD INTERNATIONAL AB, BOX 21060, SE-100 31 STOCKHOLM, SWEDEN;
INFO@ENVIRONDEC.COM

INDEPENDENT VERIFICATION

This declaration has been developed referring to the International EPD System, following the General Programme Instructions v3.01; further information and the document itself are available at: www.environdec.com. EPD document valid within the following geographical area: Italy and other countries worldwide according to sales market conditions.

PCR 2014:10, v2.11 «Fabricated steel products, except construction products, machinery and equipment», 2019-09-06 serves as the core PCR.

PCR review was conducted by: The Technical Committee of the International EPD® System. See www.environdec.com/TC for a list of members. Review chair: Claudia A. Peña, University of Concepción, Chile. The review panel may be contacted via the Secretariat www.environdec.com/contact.

Independent verification of the declaration and data, according to EN ISO 14025 : 2010

☐ EPD process certification
(Internal)

☒ EPD verification
(External)

Third party verifier: Martin Erlandsson

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

☒ YES

☐ NO

Environmental declarations published within the same product category, but from different programmes may not be comparable. In particular, EPDs of construction products may not be comparable if they do not comply with EN 15804. EPD owner has the sole ownership, liability and responsibility of the EPD.

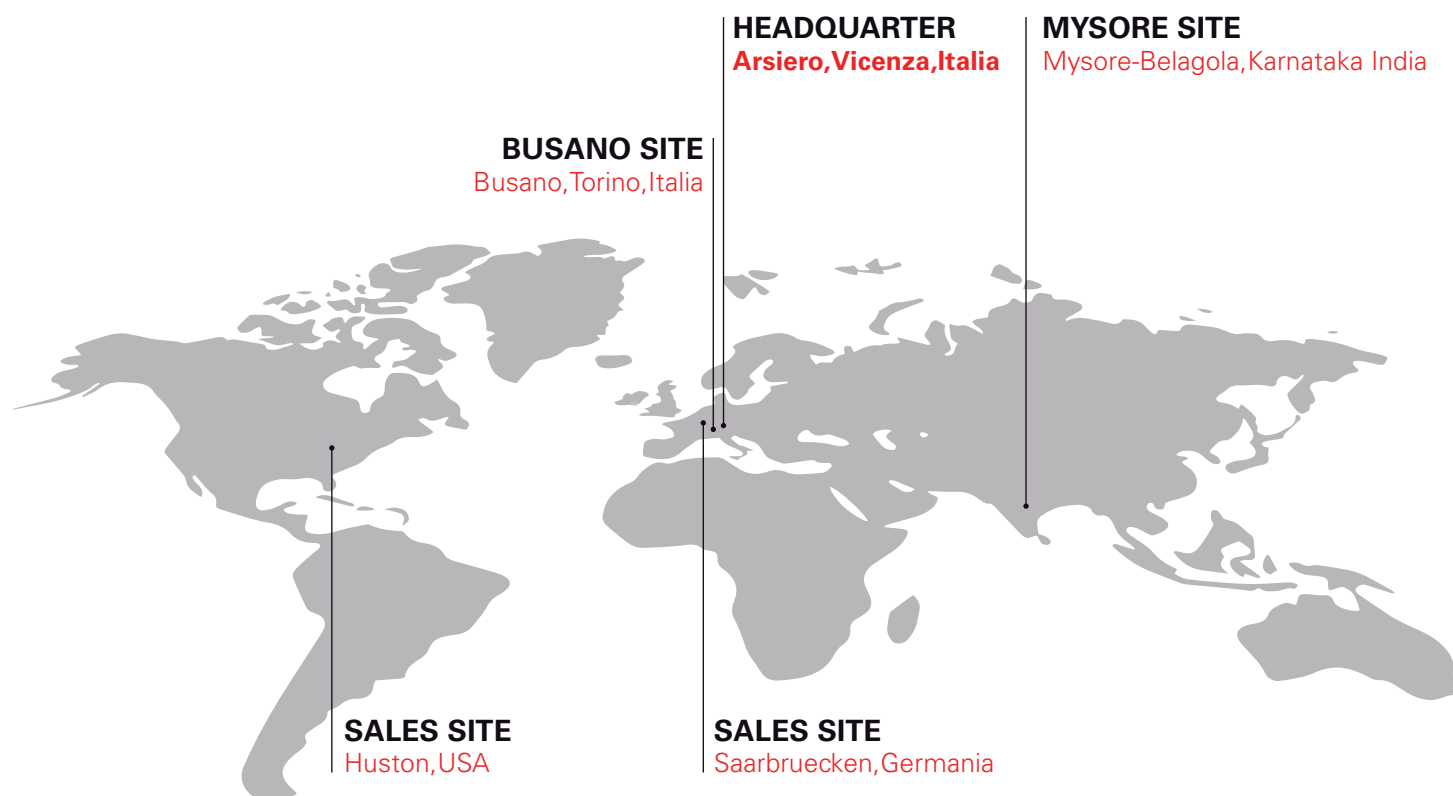
CONTACTS

For additional information relative to the activities of the Siderforgerossi Group SpA or in regards to this environmental declaration, please contact:
HSE Department hse@siderforgerossi.com



Technical support to Siderforgerossi Group SpA was provided by Life Cycle Engineering, Italy.
(info@studiolce.it, www.lceengineering.eu).





Siderforgerossi Group SpA



Siderforgerossi Group Spa is the result of the merger of two leading companies in the Italian forgers market, with over 110 years of history and experience in the sector. The wide range of products and services offered makes Siderforgerossi a top player in hot rolled, forged and molded rings weighing from 10 kg to 30.000 kg in multiple steel grades.

Siderforgerossi Group Spa is a company that boasts 200 million annual turnover (of which 65% overseas),

600 employees in Italy divided between three plants in the upper Vicenza area and a fourth in Busano, in province of Turin.

With over 100 years of experience in forging, the company employs a highly professional staff with a long experience in the Oil & Gas, Wind, Earth Moving, Industrial Applications, Railway, Marine, Machinery and Nuclear industries

Detailed product Description

This EPD refers to steel mechanical gears, manufactured in 2020 at Busano (IT) plant by closed-die forging process, starting from steel ingots acquired from an external supplier. The steel grade is 18CRNIMO7. The products are employed for Green power applications and Railways applications. They can be manufactured in a wide range of sizes, whose minimum/maximum diameters and weights are reported.

CONTENT DECLARATION

MATERIAL	MASS SHARE
Iron	96%
Alloy elements	2%
Other elements	2%

PRODUCT DIMENSIONS AND SPECIFIC STANDARDS

PRODUCT	APPLICATION	DIAMETER RANGE (mm)	WEIGHT RANGE(kg)
Closed-die forged steel mechanical gear	Green power and Railways	300 - 1850	50 - 2500

PRODUCTION PROCESS

The production process involves several steps taking place in different Busano plant units. Both electricity and heat (from natural gas combustion) are employed as energy flows.



Scope and type of EPD®

Geographical Scope: Global

Software: Simapro 9.1.1.1

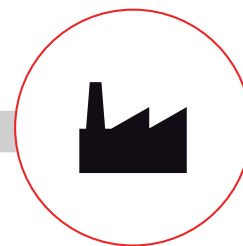
Database: Ecoinvent 3.6

Declared Unit: 1 ton of forged steel product

The LCA study includes all the processes according to PCR 2014:10



UPSTREAM
Process



CORE
Process

LCA METHODOLOGY

The product environmental burden has been processed in accordance with EPD general instructions issued by International EPD® System (GPI v3.01) and PCR 2014:10 v2.11, «Fabricated steel products, except construction products, machinery and equipment».

This declaration is a cradle to gate EPD type, based on the application of Life Cycle Assessment (LCA) methodology.

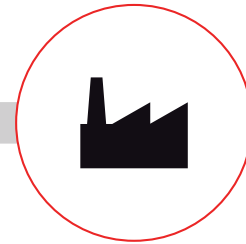
Forged steel product at plant level was described by using specific data from Siderforgerossi manufacturing facility (Busano, IT) for year 2020. The external steel supplier provided evidence of the LCA results referring to 2019, calculated internally and based on primary data. Customized LCA questionnaires give complete picture of the environmental burden of the system from external steel production (Upstream) to manufacturing of the forged steel product (Core). Processes in downstream, use phase and product end of life are out of the scope of the study. The exclusion criteria applied in this study are consistent with those suggested by the reference PCR 2014:10. Data for elementary flows to and from the product system that contribute to a minimum of 99% of the declared impacts must be included.

Upstream process

(Raw material supply)



UPSTREAM
Process



CORE
Process



Production
of packaging
materials



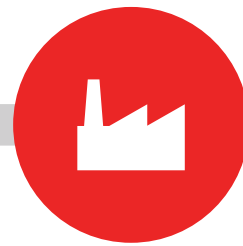
EAF steel 18CrNiMo7
production

Core process

(Transportation + Manufacturing)



UPSTREAM
Process



CORE
Process



Raw materials transportation from suppliers or collection facilities to the production plant and internal transportation



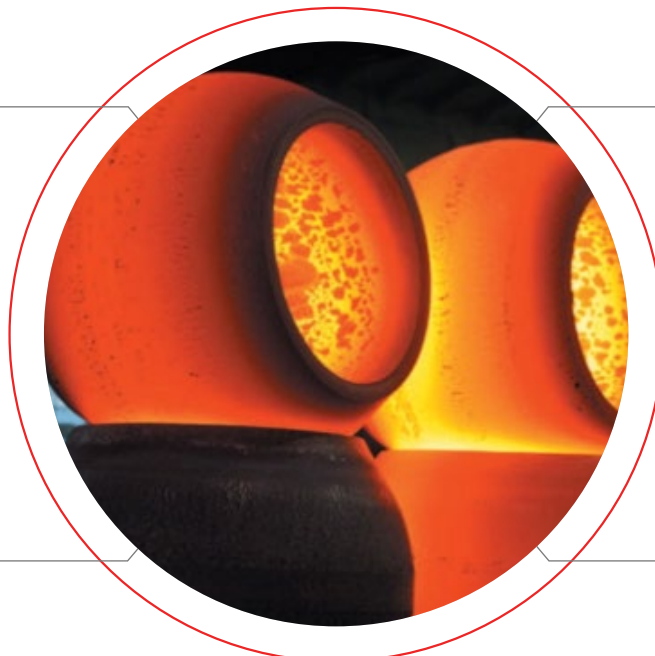
Specific secondary materials pre-treatments, where appropriate



Production process at Busano plant



Treatment of waste generated from the manufacturing processes

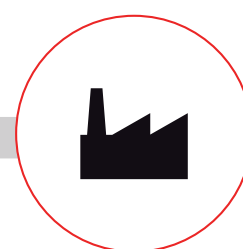


Environmental Performance

The detailed environmental performance (in terms of use of resources, waste generation, potential environmental impacts) is presented for the two phases:



UPSTREAM
Process



CORE
Process

Declared unit (D.U.): 1 ton of forged steel product

ENVIRONMENTAL IMPACTS

IMPACT CATEGORY	UNIT	UPSTREAM	CORE	TOTAL
GWP	kg CO ₂ eq	1,09E+03	1,17E+03	2,26E+03
GWP,f	kg CO ₂ eq	1,06E+03	1,14E+03	2,20E+03
GWP,b	kg CO ₂ eq	2,91E+01	2,49E+00	3,16E+01
GWP,luluc	kg CO ₂ eq	1,18E+00	2,53E+01	2,65E+01
AP	mol H ⁺ eq	5,58E+01	2,73E+00	5,85E+01
EP	kg P eq	2,81E+00	9,21E-01	3,73E+00
POCP	kg NMVOC eq	9,38E+00	2,57E+00	1,20E+01
ADPe	kg Sb eq	1,28E-01	7,40E-04	1,29E-01
ADPf	MJ	1,25E+04	2,16E+04	3,41E+04
WDP	m ³ eq	2,74E+02	1,66E+02	4,40E+02

GWP Global warming potential, total

GWP,f Global warming potential, fossil

GWP,b Global warming potential, biogenic

GWP,luluc Global warming potential, land use & land use change

AP Acidification Potential

EP Eutrophication potential

POCP Photochemical ozone creation potential

ADPe Abiotic depletion potential minerals & metals*

ADPf Abiotic depletion potential fossil fuels*

WDP Water use deprivation potential*

USE OF RESOURCES

IMPACT CATEGORY	UNIT	UPSTREAM	CORE	TOTAL
PERE	MJ	1,78E+03	7,52E+02	2,53E+03
PERM	MJ	1,58E+02	0,00E+00	1,58E+02
PERT	MJ	1,94E+03	7,52E+02	2,69E+03
PENRE	MJ	1,44E+04	2,28E+04	3,72E+04
PENRM	MJ	0,00E+00	1,79E+01	1,79E+01
PENRT	MJ	1,44E+04	2,28E+04	3,72E+04
SM	kg	1,04E+03	0,00E+00	1,04E+03
RSF	MJ	0,00E+00	0,00E+00	0,00E+00
NRSF	MJ	0,00E+00	0,00E+00	0,00E+00
FW	m ³	8,16E+01	5,51E+00	8,71E+01

PERE Renewable energy (carrier)**PERM** Renewable energy (feedstock)**PERT** Renewable energy (total)**PENRE** Non-renewable energy (carrier)**PENRM** Non-renewable energy (feedstock)**PENRT** Non-renewable energy (total)**SM** Use of secondary materials**RSF** Use of renewable secondary fuels**NRSF** Use of non-renewable secondary fuels**FW** Use of Net Fresh Water

OUTPUT FLOWS AND WASTE PRODUCTION

IMPACT CATEGORY	UNIT	UPSTREAM	CORE	TOTAL
HWD	kg	1,52E+01	2,49E+01	4,01E+01
NHWD	kg	4,64E+02	0,00E+00	4,64E+02
RWD	kg	4,21E-02	0,00E+00	4,21E-02
CRU	kg	0,00E+00	0,00E+00	0,00E+00
MFR	kg	1,34E+00	1,80E+02	1,82E+02
MER	kg	0,00E+00	0,00E+00	0,00E+00
EE, electricity	MJ	0,00E+00	0,00E+00	0,00E+00
EE, thermal	MJ	0,00E+00	0,00E+00	0,00E+00

HWD Hazardous waste disposed**NHWD** Non-hazardous waste disposed**RWD** Radioactive waste disposed**CRU** Components for re-use**MFR** Material for recycling**MER** Materials for energy recovery**EE, electricity** Exported energy, electricity**EE, thermal** Exported energy, thermal

Additional information

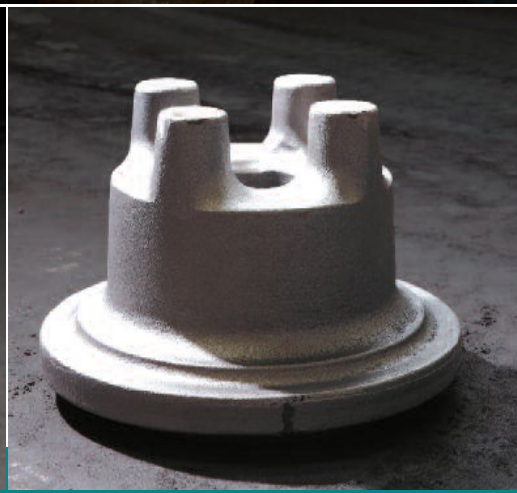
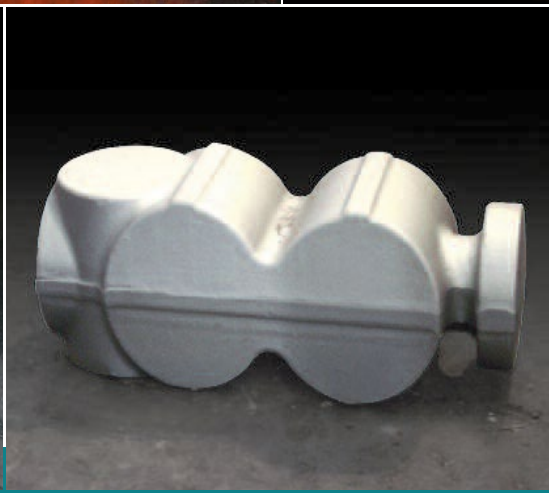
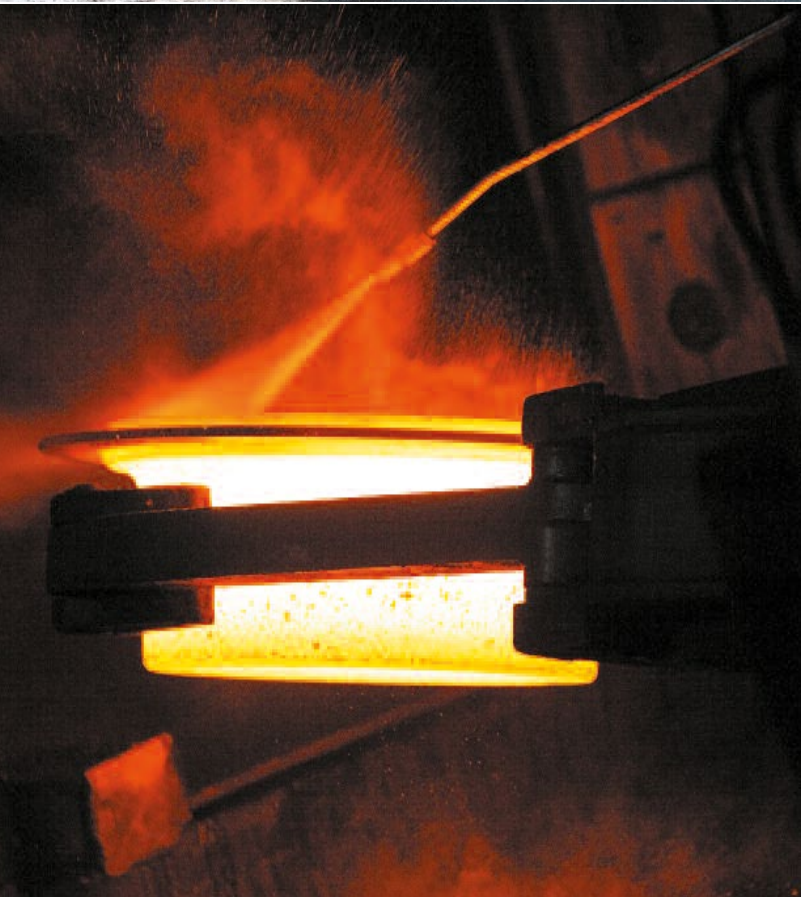
Siderforgerossi plants located in Busano hold the following Certifications:

- ISO 9001:2015
- AS/EN 9100D
- 14001:2015
- ISO 45001:2018
- RCC-M NUCLEAR
- ABS, DNV, BV & LLOYD'S
- NORSOK M-650
- NADCAP
- ISO EN17025:2005
- ISO 50001:2018 (WIP)
- HAF - 604 NUCLEAR



REFERENCES

- General Programme Instructions for the International EPD® System v. 3.01, 2019
- Product Category Rules PCR 2014:10, v2.11 "Fabricated steel products, except construction products, machinery and equipment", 2019-09-06
- Lca Report "Life cycle assessment applicata a prodotti stampati in acciaio a scopo EPD"
- ISO 14040:2006
- ISO 14044:2006
- ISO 14025:2010





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