

# Environmental Product Declaration



In accordance with ISO 14025:2006 and EN 15804:2012+A2:2019/AC:2021 for:

## Welding Filler Metals – Stainless steel wires and rods

from

**ESAB**

EPD of multiple products, based on the worst-case results of the product group. See list of products on page 10.



Programme:	The International EPD® System, <a href="http://www.environdec.com">www.environdec.com</a>
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An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at <a href="http://www.environdec.com">www.environdec.com</a>	



## General information

### Programme information

<b>Programme:</b>	The International EPD® System
<b>Address:</b>	EPD International AB Box 210 60 SE-100 31 Stockholm Sweden
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### Accountabilities for PCR, LCA and independent, third-party verification

#### Product Category Rules (PCR)

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)

Product Category Rules (PCR): *Construction Products, PCR 2019:14, Version 1.3.4, UN CPC 41264, 41267*

PCR review was conducted by: *The Technical Committee of the International EPD® System. No chair appointed. Contact: [EPD International \(environdec.com\)](http://www.environdec.com)*

#### Life Cycle Assessment (LCA)

LCA accountability: Caroline Montini, ESAB

#### Third-party verification

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

EPD verification by EPD Process Certification\*

Internal auditor: Barry Dambach, Global EHS, ESAB

Third-party verification: Camilla Landén, Bureau Veritas. Approved certification body accountable for third-party verification.

Third-party verifier is accredited by: SWEDAC, accreditation number 1236.

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 registered in different EPD programmes, or not compliant with EN 15804, may not be comparable. For two EPDs to be comparable, they must be based on the same PCR (including the same version number) or be based on fully-aligned PCRs or versions of PCRs; cover products with identical functions, technical performances and use (e.g. identical declared/functional units); have equivalent system boundaries and descriptions of data; apply equivalent data quality requirements, methods of data collection, and allocation methods; apply identical cut-off rules and impact assessment methods (including the same version of characterisation factors); have equivalent content declarations; and be valid at the time of comparison. For further information about comparability, see EN 15804 and ISO 14025.

**Version 2:** Editorial update product list.

## Company information

Owner of the EPD: ESAB

Contact: ESAB AB, Box 8004, 402 77 Göteborg, Sweden. Phone: +46 31 50 90 00, E-mail: [epd@esab.com](mailto:epd@esab.com).

Description of the organisation: ESAB is a world leader in welding and cutting equipment and consumables. We offer a complete line of fabrication solutions for virtually every application.

Product-related or management system-related certifications: ISO 9001, 14001, 45001 in all ESAB sites globally including the manufacturing plant in Vamberk, which is also certified according to ISO 50001.

Name and location of the production site: ESAB CZ S.R.O., Smetanovo náměstí 334, 517 54 Vamberk, Czech Republic.

## Product information

Product name: The product group consists of stainless-steel welding wires and rods. For a full list of product names, please see the last page in this document.

Product identification: Item numbers starting with 16 and S6 are the stainless-steel wires and rods included.

Product description: The Ferritic wires and rods are mainly used in the Automotive industry; Duplexes are typically used when you want to combine high strength and corrosion resistance. Austenites are commonly used for standard applications where average mechanical and corrosion properties are needed. Super austenites are resistant in high-temperature and low-temperature corrosive environments. All products in the group are delivered on spools or MarathonPacs, and tubes for Tigrods.

For reference service life, please see our Storage & Handling Recommendations for Filler Metals. A list of applicable standards for the product groups can be found in the reference section of this document.

UN CPC codes: 41264, 41267

Geographical scope: Our own process is in the Vamberk factory in Czech Republic, and most suppliers are based in Europe. The product group is supplied to customers globally.

## LCA information

Declared unit: 1 kg of wire or rod, worst case scenario

Reference service life: There is no specific maximum time limit before which filler materials should be used. If stored under ideal storage conditions the time limit is extended, and filler materials can be used many years after the date of supply. The reverse is also true i.e. tough and severe storage conditions shorten the durability of the products. See Storage and Handling Recommendations for Filler Metals. The life span of a welded joint depends on several factors.

Time representativeness: Data has been collected for the full year of 2023.

Database and LCA software used: EcolInvent 3.10 and SimaPro 9.6

Environmental Impact Assessment Method: EN15804 reference package EF 3.1

Description of system boundaries:

Cradle to gate, A1–A3. The life cycle inventory includes:

- Upstream production of raw material steel, alloys, electricity, chemical products, packaging materials/parts and felt plugs,
- Inbound transport on road,
- Internal transports,
- Energy and heat consumption, water consumption, emissions to water and generation of waste on site, and
- Downstream handling of waste

The production and maintenance of capital goods, infrastructure, tooling, and facilities have not been included, neither in upstream processes nor own processes, except for electricity production.

The upstream production of steel has been modelled using generic data for steel and alloys.

In the end-of-life, the product cannot be separated from the bearer material it has been welded onto, is no longer identifiable and does not contain biogenic carbon. This means that the scope of the study, A1-A3, has been chosen in accordance with Section 2.2.2 in PCR 2019:14.

Module A5 has been added solely to balance out biogenic carbon in our packaging.

Cut-off criteria: When there have been uncertainties or missing data, conservative assumptions have been made. Cut-offs are never more than 1% of total environmental impacts, and all cut-offs together do not exceed 5%.

Data quality

Collection of data has been carried out in an iterative process in close collaboration with EHS professionals at the manufacturing site. Much of the data stems from records in the management system for ISO 14001 and ISO 50001. Where specific data was not available, generic datasets from EcolInvent have been used. All available data have been included in the LCA Report.

### Electricity mix

The dataset used for residual electricity mix in Czech Republic is from EcolInvent, and is based on figures from AIB, Association of Issuing Bodies. The GWP(GHG)-factor for this electricity mix is 0.76 kg CO<sub>2</sub>-equivalents per kWh.

### Allocation procedures

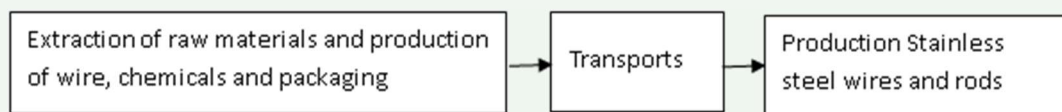
In A3, allocations have been made based on mass of produced products. Average results for the products have been calculated by allocating the share of environmental impact evenly between them.

### Explanation of product group

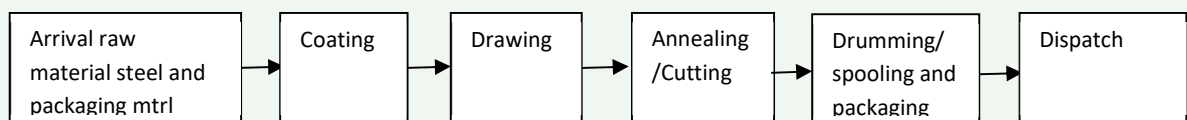
The main difference between the products included is the composition of alloys. The LCA has been carried out with worst case scenario as variations in environmental performance are higher than 10%. The contents of alloys with highest environmental impact, chromium and nickel, varies approximately 9% and 31% between the worst and best product. The majority of the products in the group have a lower impact than presented here.

LCA Practitioners: Deepak Sridharan, EH&S Professional, and Caroline Montini, Sr. QEHS Manager for Non-manufacturing Activities EMEA, both in ESAB.

### System diagram



Picture 1. Cradle to gate



Picture 2. Own process

Modules declared, geographical scope, share of specific data (in GWP-GHG results)

	Product stage			Construction process stage		Use stage							End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-Recycling-potential
Module	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules declared	X	X	X	ND	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Geography	EU27	EU27	CZ	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Specific data used	8.9%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – products	-33%			-	-	-	-	-	-	-	-	-	-	-	-	-	-
Variation – sites	0%			-	-	-	-	-	-	-	-	-	-	-	-	-	-

Module A5 is used solely to balance out biogenic carbon in packaging material.

## Content information

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material, weight-% and kg C/kg
Iron	3,5E-01	0,0%*	0,0E+00
Chromium, nickel and other alloys	6,5E-01	0,0%*	0,0E+00
TOTAL	1,0E+00	0,0%*	0,0E+00
Packaging materials	Weight, kg	Weight-% (versus the product)	Weight biogenic carbon, kg C/kg
Cardboard	1,9E-02	1,9%	8,3E-03
Polyethylene	6,4E-03	0,6%	0,0E+00
Metal	1,3E-02	1,3%	0,0E+00
Wood	1,8E-03	0,2%	8,6E-04
TOTAL	4,0E-02	4,0%	9,1E-03

\* The recycled rate is the conservative assumption without mass balance approach, in accordance with EN 15804. Reported averages from suppliers are higher.

The products do not contain any declarable quantities of substances listed on the Candidate List of Substances of Very High Concern for Authorization (REACH, EC No. 1907:2006).

# Results of the environmental performance indicators

## Mandatory impact category indicators according to EN 15804

Results per declared unit			
Indicator	Unit	A1-A3	A5
GWP-fossil	kg CO <sub>2</sub> eq.	9,5E+00	1,7E-02
GWP-biogenic	kg CO <sub>2</sub> eq.	4,5E-02	3,2E-02
GWP-luluc	kg CO <sub>2</sub> eq.	1,5E-02	2,2E-07
GWP-total	kg CO <sub>2</sub> eq.	9,5E+00	4,9E-02
ODP	kg CFC 11 eq.	1,5E-07	1,2E-11
AP	mol H <sup>+</sup> eq.	5,8E-02	7,6E-06
EP-freshwater	kg P eq.	8,6E-04	9,6E-09
EP-marine	kg N eq.	1,2E-02	3,4E-06
EP-terrestrial	mol N eq.	1,4E-01	3,6E-05
POCP	kg NMVOC eq.	4,1E-02	9,1E-06
ADP-minerals&metals*	kg Sb eq.	1,9E-03	1,6E-09
ADP-fossil*	MJ	1,4E+02	6,8E-03
WDP*	m <sup>3</sup>	1,7E+00	7,5E-04
Acronyms	GWP-fossil = Global Warming Potential fossil fuels; GWP-biogenic = Global Warming Potential biogenic; GWP-luluc = Global Warming Potential land use and land use change; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential, Accumulated Exceedance; EP-freshwater = Eutrophication potential, fraction of nutrients reaching freshwater end compartment; EP-marine = Eutrophication potential, fraction of nutrients reaching marine end compartment; EP-terrestrial = Eutrophication potential, Accumulated Exceedance; POCP = Formation potential of tropospheric ozone; ADP-minerals&metals = Abiotic depletion potential for non-fossil resources; ADP-fossil = Abiotic depletion for fossil resources potential; WDP = Water (user) deprivation potential, deprivation-weighted water consumption		

\* Disclaimer: The results of this environmental impact indicator shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

For variance between worst case product and other products in the group, please see last page.

## Additional mandatory and voluntary impact category indicators

Results per declared unit			
Indicator	Unit	A1-A3	A5
GWP-GHG <sup>1</sup>	kg CO <sub>2</sub> eq.	9,5E+00	1,7E-02

The estimated impact results are only relative statements, which do not indicate the endpoints of the impact categories, exceeding threshold values, safety margins and/or risks.

<sup>1</sup> This indicator accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the CF for biogenic CO<sub>2</sub> is set to zero.

## Resource use indicators

Results per declared unit			
Indicator	Unit	A1-A3	A5
PERE	MJ	4,0E+01	2,9E-01
PERM	MJ	2,9E-01	-2,9E-01
PERT	MJ	4,0E+01	2,2E-04
PENRE	MJ	1,4E+02	2,9E-01
PENRM	MJ	2,8E-01	-2,8E-01
PENRT	MJ	1,4E+02	6,8E-03
SM	kg	0,0E+00	0,0E+00
RSF	MJ	0,0E+00	0,0E+00
NRSF	MJ	0,0E+00	0,0E+00
FW	m <sup>3</sup>	1,0E-01	3,6E-05
Acronyms	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 re-sources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water		

## Waste indicators

Results per declared unit			
Indicator	Unit	A1-A3	A5
Hazardous waste disposed	kg	0,0E+00	0,0E+00
Non-hazardous waste disposed	kg	0,0E+00	0,0E+00
Radioactive waste disposed	kg	0,0E+00	0,0E+00

## Output flow indicators

Results per declared unit			
Indicator	Unit	A1-A3	A5
Components for re-use	kg	0,0E+00	0,0E+00
Material for recycling	kg	0,0E+00	0,0E+00
Materials for energy recovery	kg	0,0E+00	0,0E+00
Exported energy, electricity	MJ	0,0E+00	0,0E+00
Exported energy, thermal	MJ	0,0E+00	0,0E+00



## Additional environmental information

The welded product is recyclable together with the material it has been welded on to, given that the bearer material is possible to separate from other, non-metal materials, and that there is infrastructure for recycling available where and when it becomes waste. By choosing material recycling at the end of-life of the welded construction, the end user can contribute to energy savings in the life cycle and re-use of the metals and alloys in the product.

Welding activities give emissions of potentially hazardous fumes. After welding has been finished, there are no emissions from the welded goods (when situated in construction). ESAB is committed to reducing hazardous fumes from welding activities and have instructions for proper use of the product to reduce indoor emissions, as well as a range of Personal Protective Equipment products. More information can be found at [esab.com](https://www.esab.com).

We have a triple umbrella certificate for ISO 9001, 14001 and 45001 for all our sites globally. Also, our manufacturing site in Vamberk is certified according to ISO 50001.

More information about our Sustainability work can be found here: [Sustainability | Our Approach | ESAB Corporation](#)

The products OK Autrod 16.95 and OK Tigrod 16.95 have a conversion factor of -26,8 % lower impact for calculation of GWP-GHG.

## References

General Program Instructions of the International EPD® System. Version 4.0

Product Category Rules for Construction Products PCR 2019:14, Version 1.3.4

ISO 14025:2006 Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804:2012+A2:2019/AC:2021 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products

EN 14044:2006 + Am 1 + Am 2 Environmental Management – Life Cycle Assessments – Requirements and guidelines

Engineering Report: Life Cycle Assessment for Stainless Steel wires and rods from Vamberk

<https://ecoquery.ecoinvent.org>

<https://www.aib-net.org/facts/european-residual-mix>

<https://phyllis.nl>

### **The following standards apply to the product groups:**

ISO 14343 Welding consumables - Wire electrodes, strip electrodes, wires and rods for arc welding of stainless and heat resisting steels – Classification

ISO 14344 Welding consumables – Procurement of filler materials and fluxes

ISO 544 Welding consumables – Technical delivery conditions for filler materials and fluxes, Type of product, dimensions, tolerances and markings

EN 13479 Welding consumables – General product standard for filler metals and fluxes for fusion welding of metallic materials

## Products included in the EPD

Stainless steel products		
Exaton 19.12.3.L	Exaton 25.22.2.LMn	OK Autrod 430LNb
Exaton 19.12.3.LCRYO	Exaton 27.31.4.LCu	OK Autrod 430LNbTi
Exaton 19.12.3.LQ	Exaton 27.7.5.L	OK Autrod 439Ti
Exaton 19.12.3.LSi	Exaton 29.8.2.L	OK AutrodN 308L
Exaton 19.12.3.LSiHP	Exaton AXT	OK AutrodN 309LSi
Exaton 19.12.3.LSiMo	Exaton SAFUREX	OK AutrodN 316L
Exaton 19.9.L	Exaton SX	OK Tigrod 16.95
Exaton 19.9.LQ	OK Autrod 16.95	OK Tigrod 2209
Exaton 19.9.LSi	OK Autrod 16.97	OK Tigrod 2509
Exaton 19.9.LSiHP	OK Autrod 2209	OK Tigrod 308L
Exaton 19.9.NbQ	OK Autrod 2504	OK Tigrod 308LSi
Exaton 20.5.3.L	OK Autrod 2509	OK Tigrod 309L
Exaton 22.12.HT	OK Autrod 308L	OK Tigrod 309LSi
Exaton 22.15.3.L	OK Autrod 308LSi	OK Tigrod 309MoL
Exaton 22.8.3.L	OK Autrod 309L	OK Tigrod 316L
Exaton 22.8.3.LSi	OK Autrod 309LSi	OK Tigrod 316LSi
Exaton 24.13.LHF	OK Autrod 309MoL	OK Tigrod 318Si
Exaton 24.13.LNb	OK Autrod 309Si	OK Tigrod 347
Exaton 24.13.LNbQ	OK Autrod 316L	OK Tigrod 347Si
Exaton 24.13.LQ	OK Autrod 316LSi	OK Tigrod 430LNbTi
Exaton 24.13.LSi	OK Autrod 318	OK TigrodN 308L
Exaton 25.10.4.L	OK Autrod 318Si	OK TigrodN 309L
Exaton 25.10.4.LQ	OK Autrod 347	OK TigrodN 316L
Exaton 25.20.L	OK Autrod 347Si	

## Variations in results in Environmental Performance Indicators

The table below describes the variation between the best and the worst product.

Indicator	Unit	A1-A5 Variation %
GWP-fossil	kg CO <sub>2</sub> eq.	-33%
GWP-biogenic	kg CO <sub>2</sub> eq.	-24%
GWP-luluc	kg CO <sub>2</sub> eq.	-40%
GWP-total	kg CO <sub>2</sub> eq.	-32%
ODP	kg CFC 11 eq.	-32%
AP	mol H <sup>+</sup> eq.	-53%
EP-freshwater	kg P eq.	-66%
EP-marine	kg N eq.	-59%
EP-terrestrial	mol N eq.	-59%
POCP	kg NMVOC eq.	-53%
ADP-minerals&metals*	kg Sb eq.	-93%
ADP-fossil*	MJ	-30%
WDP*	m <sup>3</sup>	-70%

