Environmental Product Declaration (EPD)

Steel billet manufactured from steel scrap by T A 2000

In conformity with ISO 14025:2006 and EN15804:2012+A2:2019

TYASA®

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This EPD was prepared in conformity with the international standard ISO 14025 and EN 15804:2012+A2:2019 Sustainability of Construction Works; for the steel billet manufactured from steel scrap.

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPD of construction products may not be comparable if they do not comply with the Product Category Rules (PCR) "Construction Product" and the EN 15804:2012+A2:2019 Sustainability of Construction Works – Environmental Product Declarations - Core rules for Central Product Classification: UN CPC 4124 Bars and rods, hot rolled, of iron or steel; Environmental product declarations within the same product category but from different programs may not be comparable.

1.T A 2000

T A 2000 S.A. de C.V. is a 100% Mexican steel company, specializing in the manufacture of steel products for construction, special bar quality (SBQ) coated flat steels and commercial profiles.

T A 2000 has more than 30 years of experience in the manufacture of steel. Innovation and optimization in production processes, have driven the company to renew and diversify its product catalog. In 2016 a cutting-edge technology has been implemented in T A 2000's steelmaking plant: an electric arc furnace (EAF) QUANTUM. The EAF QUANTUM, based on an optimized preheating and melting concept, delivers minimum conversion costs, maximized output, and environmental compliance.

T A 2000's value proposal is to offer its customers quality steel. T A 2000 has been granted with ISO 9001:2015 certification and above all the company focus on offering an unparalleled service, characterized by competitive delivery times and optimal business conditions for the growth of its clients.

T A 2000 is permanently committed to offer the market a dynamic, competitive, and quality option. So that, the company have distribution centers in: Orizaba, Mérida; Arriaga, Silao and a commercial office in Mexico City.

2.GENERAL INFORMATION

Name of the manufacturer:	T A 2000 S.A. de C.V.
Description of the construction product:	Steel billet used in the steel industry. The main use is for the manufacture of various steel products such as steel reinforcing bar.
Declaration unit:	1000 kg of steel billet manufactured from steel scrap.
Construction product identification:	Central Product Classification: CPC 4124 Bars and rods, hot rolled, of iron or steel
Description of the main product components and or materials:	100% Steel manufactured using scrap steel as source of iron.
Life cycle stages not considered:	The modules: A4, A5, B1, B2, B3, B4, B5, B6, B7.
Statement content:	This environmental product declaration is based on information modules that do not cover aspects of construction stage and use. It contains detailed information on the stage of input materials used for the generation of raw material and central process, modules A1, A2, A3, approximations of scenarios C1, C2, C3, C4 and D based on national statistics. • Definition of the product. • Content declaration. • Declared unit. • System boundary. • Environmental performance. • Evidence and verifications.
Comparability of EPD of construction products:	a. EPD of construction products may not be comparable if they do not comply with EN 15804:2012+A2:2019. b. Environmental product declarations within the same product category from different programs may not be comparable
For more information consult:	https://tyasa.com/
Sites for shich this EPD is representative:	**Manufacturing Plant** ORIZABA: Carretera Federal México-Veracruz Km. 321, s/n, interior 2, Ixtaczoquitlán, Veracruz, C.P. 94450 Tel. 01 (272) 72 4 47 00 Ventas: Ext. 306 **Steel Scrap Collection and pre-processing Plant** **MÉRIDA:** Carretera Federal Mérida- Umán Km. 8.3, s/n, Colonia Ampliación Ciudad Industrial, Umán, Yucatán, C.P. 97390. Tel. 01 (999) 91 9 25 01 Ventas: Ext. 101 **ARRIAGA:** Carretera Arriaga-Tapanatepec Km. 28.5, No. 250, Colonia Emiliano Zapata, Arriaga, Chiapas, C.P. 30462. Tel. (045) 96 61 13 56 88 Ventas: (045) 96 66 64 02 82 **SILAO:** Carretera Silao-León Km. 157, s/n, Colonia Bustamante, Silao, Guanajuato, C.P. 36100. Tel. 01 (472) 72 3 94 32 / 01 (472) 72 3 94 35 Ventas: Ext. 107
Intended public:	**B2B** (Business to Business)

3.THE PRODUCT

Square billet, also known as "billet," is a semi-finished steel product with a cross-section that can range from 130 mm x 130 mm to 200 mm x 200 mm. T A 2000 is the only national plant capable of producing different dimensions according to customer needs.

This product is obtained by passing liquid steel through the continuous casting area and is primarily used for manufacturing rebar, wire rod, and their derivatives, which are made from various grades of steel.

All billets are identified with the casting number and the exit line of the continuous casting process, which allows for precise control of all the materials we produce.

4.CONTENT DECLARATION

4.1 Recycled material content

In the Industrial Center of TA 2000 manufactured the steel billet is manufactured from steel scrap with a percentage greater than or equal to 90% of recycled material.

4.2 Distribution packaging

Packaging: The product is sent to the customers in no packaging, only the casting number distinction.

Table 1. Content per ton of steel billet

Homogeneous Material or Chemical Substances	Chemical Substances	Weight (%)	Material weight pre and post consumer (%)	CAS Number	Function of Chemical Substance	Health class[1]
Steel scrap	Not applicable	90 %	90%	Not applicable	Iron content in steel	Not listed
Dolomite	Calcium carbonate magnesium	3 %	0%	16389-88-1	Iron ore sintering agent steel foundry	Not listed
Lime	calcium oxide	<3 %	0%	471-34-1	Iron ore sintering agent steel foundry	Not listed
Ferro silico manganese	Manganese and silicon	<1 %	0%	8029-10-5	Carbon content in steel	Not listed
Anthracite	Anthracite	>2 %	0%	8029-10-5	Carbon content in steel	Not listed
Others	Not applicable	>1 %	0%	Not applicable	Carbon content in steel	Not listed

[1] Conformity to EN15804 declaration of material content of the product shall list Substance of Very High Concern (SVHC) that are listed by European Chemicals Agency.

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5.LCA RULES

Environmental potential impacts were calculated conformity to EN 15804:2012+A2:2019 sustainability of construction works and PCR 2019:14 Construction products Version 1.11 UN CPC 4124 bars and rods, hot rolled, of iron or steel. This EPD is in accordance with ISO 14025:2006.

Environmental potential impacts were calculated through Life Cycle Assessment (LCA) methodology conformity to ISO 14040:2006 and ISO 14044:2006. An external third-party veri-fication process of the EPD was conducted according to General Programme Instructions for the International EPD® System Version 4.0. Verifi¬cation includes a documental review and a validation of both the underlying LCA study and documents describing additional environmental information that justify data provided in the EPD.

5.1 Declared unit

1000 kg of steel billet manufactured from 90% ferrous scrap as raw material, manufactured during the year 2022 by TYASA at the Ixtaczoquitlá plant, Veracruz, used by the construction industry as reinforcement of concrete structures.

5.2 System boundary

The potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology of steel billet to ISO 14040:2006 and ISO 14044:2006. This study went through a critical review process in accordance with ISO / TS 14071: 2014.

According to EN 15804 section 5.2 the following type of EPD is “cradle to gate with modules C1-C4 and module D (A1-A3 +C+D). This EPD is based on information upstream processes and core processes, modules A1 to A3, and approximations of scenarios C1, C2, C3, C4, and D based on construction sector statistics in Mexico (see table 6).

Does not include A4-A5 Construction stage and B Usage stage.

5.LCA RULES

Table 2. System boundary Steel billet

Life cycle stage	Information about the modules contained in the stages	DAP			
		Cradle-to-gate with modules C1-C4 and module D	Cradle-to-gate with modules C1-C4, module D and optional modules	From cradle to grave and module D	EPD construction services: Cradle to door with modules A1-A5 and optional modules
A1-A3 products stage	A1) Raw material procurement	Mandatory	Mandatory	Mandatory	Mandatory
	A2) Transport				
	A3) Manufacture				
A4-A5 Construction stage	A4) Transport	-	Optional for goods Required for services	Mandatory	Mandatory
	A5) Construction / installation				
B Usage stage	B1) Use	-	Optional	Mandatory	Mandatory
	B2) Maintenance				
	B3) Reparation				
	B4) Replacement				
	B5) Remodeling				
	B6) Operational energy use				
	B7) Operational water use				
C End of life stage	C1) Deconstruction, demolition	Mandatory	Mandatory	Mandatory	Optional
	C2) Transport				
	C3) Waste processing				
	C4) Final disposition				
D Benefits and charges beyond the system limit	D) Reuse, recycling or energy recovery potential.	Mandatory	Mandatory	Mandatory	-
Declared unit	Inclusion of reference useful life	Optional	Mandatory	Mandatory	-

Table 3. Description of the modules included in this DAP

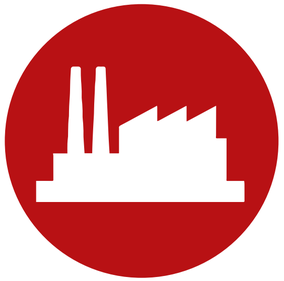
	Product stage			Construction process phase		Usage stage						End of life stage				Resource recovery stage
	Raw material supply	Transport	Manufacturing	Transport	Construction facility	Use	Maintenance	Repair	Restoration	Operational energy use	Operational use of water	Demolition/ Deconstruction	Transport	Waste processing	Disposal	Reuse – Recovery – Recycling - potential
Module	A1	A2	A3	A4	A5	B1	B2	B4	B5	B6	B7	C1	C2	C3	C4	D
Declared modules	X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X
Geography	MX	MX	MX	ND	ND	ND	ND	ND	ND	ND	ND	MX	MX	MX	MX	MX
Specific data used	>99%			-	-	-	-	-	-	-	-	-	-	-	-	-
Product variation	ND			-	-	-	-	-	-	-	-	-	-	-	-	-
Site variation	ND			-	-	-	-	-	-	-	-	-	-	-	-	-

x = Declared module; ND = No declared module; MX= México

5.LCA RULES

5.3 Description of information modules

Table 4. Description of information modules included in this EPD

A1) Raw materials supply	A2) Transportation	A3) Manufacturing	C) End of life	D) Benefits and charges beyond the system limit
				
• Consumption and production of raw materials the billet. • Consumption and production of electrical energy. • Consumption and production of natural gas.	• Transport distance of raw materials and supplies to the manufacturing site. • Fuel consumption and emissions related to transportation requirements. • Transportation distance for waste disposal and treatment.	• Consumption of auxiliary inputs. • Consumption and production of water. • Air emissions. • Waste generation. • Waste treatment processes, consumption of related materials and energy.	• Demolition. • Transport final destination. • What can be recycled. • What goes to fill what is wasted and not recycled.	• The avoided loads, benefits of stopping the production of the mineral billet

5.LCA RULES

5.4 Description of the manufacturing process

Figure 1. Diagram of process T A 2000

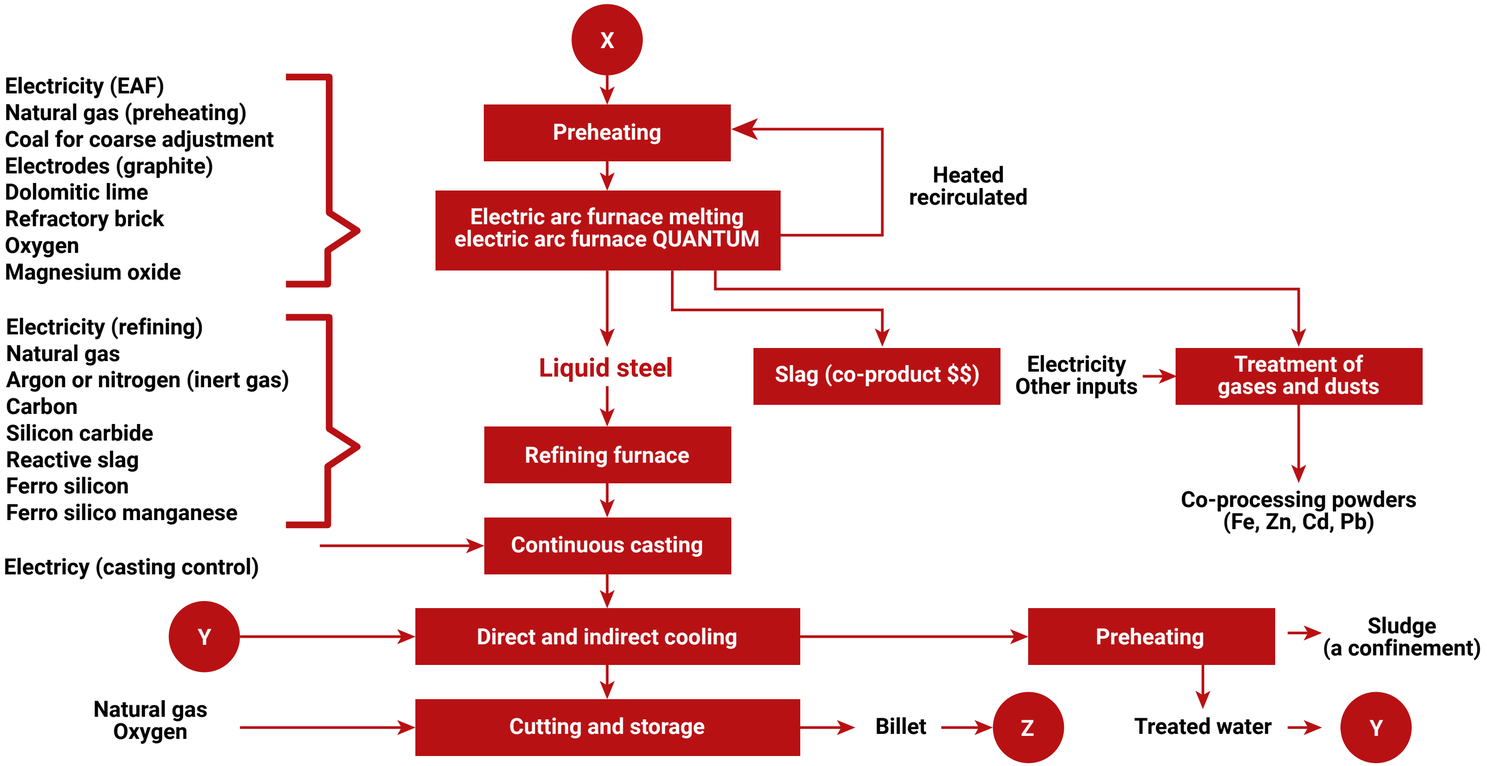
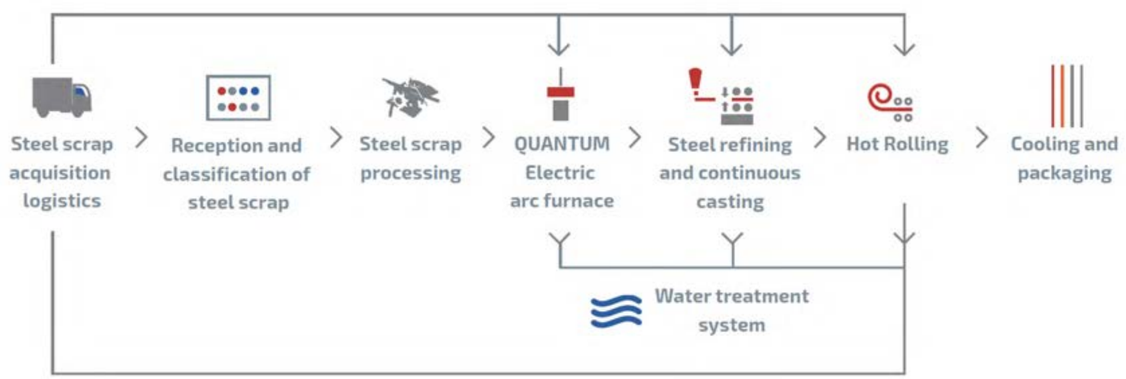


Diagram of the process that was registered in the 2017 life cycle analysis (this diagram is focused on mill 2) but was contemplated for both mills.

The difference is that M1 does not have water treatment (well water without the addition of chemicals), we do not have a dehuller, M1 consists of 15 boxes = 19 lamination passes (Reversible trio mill with 5 passes + 2 ring cantilever modules in cantilever = 2 passes + Intermediate Mill 6 boxes = 6 passes + Finishing Mill 6 boxes = 6 Passes), total 19 passes.

5.LCA RULES

5.5 Assumptions



The assumptions related to the steel billet manufacturing process are presented below.
• The scenarios and distances associated with modules C1) Deconstruction - demolition, C2) Transport, C3) Waste processing, C4) Disposal and D) Potential for reuse, recycling or energy recovery in the future.

• According to the Latin American Steel Association (ALACERO, 2022), in Mexico, 98% of the steel generated during the demolition of construction buildings is recycled, and only 2% reaches the landfill.

• On the other hand, according to Javeriana University (Pontificia Universidad Javeriana, Faculty of Engineering, 2014) the fuel consumption involved during the demolition of buildings corresponds to 960 liters for the use of a backhoe, 1,590 liters for the use of a backhoe loader, 432 liters for the use of a mobile crusher. In this same process, the emissions of particulate matter associated with the demolition were obtained from Ecoinvent 3.9 “Waste concrete, not reinforced {CH}| treatment of, recycling | Cut-off, U”.

• For the transport of waste, an average distance in the State was assumed, corresponding to 250.71 km and one truck (capacity greater than 32 tons).

5.6 Cut-off criteria

All flows of fuel, energy, materials and supplies necessary for the production of the steel billet have been considered; materials that could be used in preventive or corrective maintenance of machinery and equipment were disregarded, as well as the use of uniforms and personal protective equipment or other auxiliary materials, leaving out textile impregnated with oils or plastics and the final disposal of these as hazardous waste.

5.LCA RULES

5.7 Allocation

In TYASA's steel billet production process, the process begins with obtaining the scrap and its processing in the scrap yard, later it goes to the QUANTUM electric arc furnace, then to refining and continuous casting, to finally move on to hot rolling through the processes of "Steel 1" and Steel 2". These processes are developed in parallel and have the same purpose, only that they process different amounts of product. During the information gathering process, TYASA provided data for both "Steel 1" and Steel 2", as well as for "Mill 1" and "Mill 2", inputs calculated for the functional unit.

In order not to duplicate the allocation of resources, in this study allocation processes were applied for production in the two lines of the company, "Steel 1" and Steel 2".

In the case of the billet, the information on the input base, transportation, emissions, residues, etc. they considered an allocation by the weight of annual production in each one.

In the tables presented below, it is possible to identify the assigned percentage that was applied to the life cycle inventory to avoid double counting in the billet.

Table 5. Allocation of billet for Steel 1 and 2

	Total production (tons)	Allocation
Billet – Steel 1	244,957.858	22%
Billet – Steel 2	860,690.110	78%
TOTAL	**1,105,647.968**	**100%**

In the life cycle inventory, the materials necessary for the manufacture of the billet are contemplated, the allocation of materials is made for 81.2% and in the case of the rod for 93.03%, while the rest in each case, corresponds to the generation of by-products. The tables below present the detail.

Table 6. Allocation of by-products Billet

Subproducto	Cantidad	Unidad	Asignación
Billet	1.00E+06	tons	81,18%
Mill scale	3.88E-03	tons	0,31%
Steel slag	2.17E-01	tons	17,59%
Waste Steel for control samples	1.13E-02	tons	0,92%
Total	**1.08E+03**	**tons**	**100,00%**

5.8 Time representativeness

Direct data obtained from T A 2000 is representative for 2022.

6. ENVIRONMENTAL PERFORMANCE

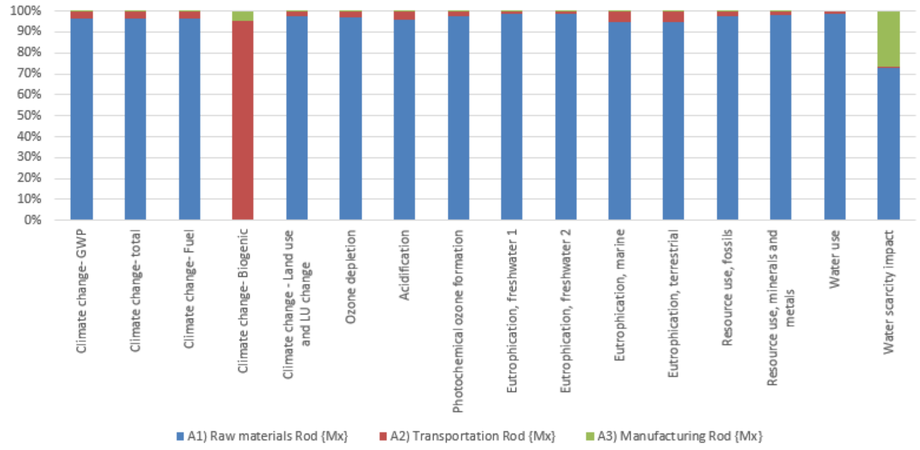
SimaPro 9.3 and Ecoinvent 3.8 was used for Life Cycle Impact Assessment.

6.1 Potential environmental impact

All information modules are reported and valued separately. However, in the present EPD presents itself the total impact across all stage A1-A3.

In the graph that appears below, you can see the contributions to the different categories of environmental impact, for each of the modules that contemplates the life cycle of the steel billet manufactured by T A 2000, which presents the results of the extraction from raw materials to the manufacturing process.

Figure 1. A1-A3 Basic impact categories results



As can be seen, the greatest environmental impacts are generated by module A1, which corresponds to the extraction of the raw material necessary for the manufacture of the product, showing a greater contribution in the category of eutrophication freshwater with a percentage of 98% and the climate change - land use and LU change with a contribution above 96%. The smallest contributions to the impact are found in module A3, which corresponds to the manufacturing module. Additional impact categories are discussed below.

Table 7. A1-A3 Basic impact categories results

Basic impact categories	Unit	A1) Raw materials	A2) Transport	A3) Manufacture	A1 – A3
Climate change- GWP	kg CO2 eq	5.23E+02	2.11E+01	1.88E-03	5.44E+02
	%	96%	4%	0%	100%
Climate change- total	kg CO2 eq	5.29E+02	2.14E+01	2.65E-03	5.51E+02
	%	96%	4%	0%	100%
Climate change- Fuel	kg CO2 eq	5.29E+02	2.13E+01	1.93E-03	5.51E+02
	%	96%	4%	0%	100%
Climate change- Biogenic	kg CO2 eq	0.00E+00	1.09E-02	7.10E-04	1.16E-02
	%	0%	94%	6%	100%
Climate change - Land use and LU change	kg CO2 eq	3.17E-01	9.18E-03	3.01E-06	3.26E-01
	%	97%	3%	0%	100%
Deplation potencial of the stratosfperic ozone layer	kg CFC11 eq	7.97E-05	4.62E-06	1.31E-10	8.43E-05
	%	95%	5%	0%	100%
Acidification potencia, accumulated exceedance	mol H+ eq	2.98E+00	1.35E-01	2.02E-05	3.11E+00
	%	96%	4%	0%	100%
Photochemical ozone creation potential	kg NMVOC eq	2.71E+00	1.32E-01	8.69E-06	2.84E+00
	%	95%	5%	0%	100%
Eutrophication, freshwater 1	kg P eq	1.04E-01	1.57E-03	3.71E-06	1.06E-01
	%	99%	1%	0%	100%
Eutrophication, freshwater 2	kg PO4 eq	3.21E-01	4.81E-03	1.14E-05	3.25E-01
	%	99%	1%	0%	100%
Eutrophication, marine	kg N eq	8.81E-01	4.29E-02	6.81E-05	9.24E-01
	%	95%	5%	0%	100%
Eutrophication, terrestrial	mol N eq	9.50E+00	4.70E-01	5.65E-05	9.97E+00
	%	95%	5%	0%	100%
Abiotic depletion potential - fossil resources	MJ	7.77E+03	3.15E+02	2.09E-02	8.08E+03
	%	96%	4%	0%	100%
Abiotic depletion potential - non-fossil resources	kg Sb eq	1.80E-03	7.16E-05	2.18E-08	1.87E-03
	%	96%	4%	0%	100%
Water use	m3 depriv.	8.48E+01	1.07E+00	-1.05E-01	8.58E+01
	%	99%	1%	0%	100%
Water (use) deprivation potential	m3 depriv.	2.43E+01	3.53E-01	7.47E-03	2.46E+01
	%	99%	1%	0%	100%

6. ENVIRONMENTAL PERFORMANCE

The results of stages C1-C4 are presented next as well as stage D.

Table 8. C1-C4, D impact categories results

Impact categories	Unit	C1) Demolition	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary, recycling scenario
Climate change- GWP	kg CO2 eq	1.11E+03	2.24E+01	0.00E+00	6.57E+00	2.30E+03
	%	100%	100%	100%	100%	100%
Climate change- total	kg CO2 eq	1.14E+03	2.26E+01	0.00E+00	6.69E+00	2.35E+03
	%	100%	100%	100%	100%	100%
Climate change- Fuel	kg CO2 eq	1.13E+03	2.26E+01	0.00E+00	6.61E+00	2.34E+03
	%	100%	100%	100%	100%	100%
Climate change- Biogenic	kg CO2 eq	2.37E+00	1.69E-02	0.00E+00	7.09E-02	5.62E+00
	%	100%	100%	100%	100%	100%
Climate change - Land use and LU change	kg CO2 eq	2.98E-01	8.78E-03	0.00E+00	3.79E-03	2.34E+00
	%	100%	100%	100%	100%	100%
Ozone depletion	kg CFC11 eq	2.05E-03	5.31E-06	0.00E+00	3.91E-07	2.50E-04
	%	100%	100%	100%	100%	100%
Acidification	mol H+ eq	1.43E+01	7.36E-02	0.00E+00	2.14E-02	1.18E+01
	%	100%	100%	100%	100%	100%
Photochemical ozone formation	kg NMVOC eq	7.04E-02	1.70E-03	0.00E+00	1.82E-03	7.37E-01
	%	100%	100%	100%	100%	100%
Eutrophication, freshwater 1	kg P eq	2.16E-01	5.22E-03	0.00E+00	5.58E-03	2.26E+00
	%	100%	100%	100%	100%	100%
Eutrophication, freshwater 2	kg PO4 eq	1.70E+00	1.64E-02	0.00E+00	6.19E-03	3.66E+00
	%	100%	100%	100%	100%	100%
Eutrophication, marine	kg N eq	1.86E+01	1.79E-01	0.00E+00	6.94E-02	3.18E+01
	%	100%	100%	100%	100%	100%
Eutrophication, terrestrial	mol N eq	7.84E+00	6.95E-02	0.00E+00	1.81E-02	1.01E+01
	%	100%	100%	100%	100%	100%
Abiotic depletion potential - fossil resources	MJ	1.23E+05	3.60E+02	0.00E+00	4.07E+01	3.21E+04
	%	100%	100%	100%	100%	100%
Abiotic depletion potential - non-fossil resources	kg Sb eq	1.22E-03	5.37E-05	0.00E+00	1.95E-05	1.01E-02
	%	100%	100%	100%	100%	100%
Water deprivation potential	m3 depriv.	1.40E+01	6.52E-01	0.00E+00	3.37E-01	1.84E+04
	%	100%	100%	100%	100%	100%

6.2 Use of resources

Parameters describing resource use were evaluated with the Cumulated Energy Demand method version 1.09 (Frischknecht et al. 2007) except for the indicator of use of net fresh water that was evaluated with Recipe 2016 Midpoint (H) version 1.00 (Huijbregts et al. 2017). The detailed description of the use of resources is provided in Table 9.

Table 9. Use of resources parameters

Use of resources parameters	Unit	A1) Raw material supply	A2) Transportation	A3) Manufacturing	A1 - A3
Use of renovable primary energy excluding renewable primary energy resources used as feedstock	MJ	3.60E+02	3.57E+00	1.89E-03	3.64E+02
Use of renovable primary energy as raw material	MJ	6.59E+01	5.17E-01	3.32E-04	6.64E+01
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock)	MJ	3.60E+02	3.57E+00	1.89E-03	3.64E+02
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock	MJ	8.30E+03	3.34E+02	2.23E-02	8.64E+03
Use of non-renewable primary energy as raw material	MJ	7.96E+03	3.31E+02	2.03E-02	8.29E+03
Total use of non-renewable primary energy (primary energy and primary energy resources used as raw material)	MJ	8.30E+03	3.34E+02	2.23E-02	8.64E+03
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary non-renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of fresh water	m3	2.39E+00	3.54E-02	-2.44E-03	2.42E+00

6. ENVIRONMENTAL PERFORMANCE

Table 10. C1-C4, D use of resources parameters

Use of resources parameters	Unit	C1) Demolition	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond the system boundary, recycling scenario
Use of renewable primary energy excluding renewable primary energy resources used as feedstock	MJ	2.49E+02	3.98E+00	0.00E+00	1.81E+00	1.74E+03
Use of renewable primary energy as raw material	MJ	2.91E+01	6.39E-01	0.00E+00	2.43E-01	3.02E+02
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock)	MJ	2.49E+02	3.98E+00	0.00E+00	1.81E+00	1.74E+03
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock	MJ	1.30E+05	3.83E+02	0.00E+00	4.32E+01	3.43E+04
Use of non-renewable primary energy as raw material	MJ	1.30E+05	3.78E+02	0.00E+00	4.17E+01	3.25E+04
Total use of non-renewable primary energy (primary energy and primary energy resources used as raw materials)	MJ	1.30E+05	3.83E+02	0.00E+00	4.32E+01	3.43E+04
Use of secondary materials	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of secondary non-renewable fuels	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Use of fresh water	m^3	9.70E-01	4.51E-02	0.00E+00	2.33E-02	2.54E+01

6.3 Other indicators describing waste categories

Environmental indicators describing waste generation were obtained from LCI except for background information which has been calculated using EDIP 2003 method (Hauschild and Potting, 2005). Environmental parameters describing waste generation are provided below:

Table 11. A1-A3 Other indicators describing waste categories

Output parameter	Unit	A1) Raw material supply	A2) Transportation	A3) Manufacturing	Total
Hazardous waste	kg	1.50E-02	8.17E-04	4.55E-07	1.58E-02
Non hazardous waste	kg	2.58E+02	1.54E+01	1.29E+01	2.86E+02
Radioactive waste*	kg	3.86E-02	2.06E-03	5.76E-08	4.06E-02
Components of reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	9.08E-01	0.00E+00	0.00E+00	9.08E-01
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00

6. ENVIRONMENTAL PERFORMANCE

Table 12. C1-C4, D Other indicators describing waste categories

Output parameter	Unit	C1) Demolition	C2) Waste transport	C3) Waste treatment	C4) Waste disposal	D) Benefits and charges beyond thsystem boundary, recycling scenario
Hazardous waste	kg	3.26E-01	8.85E-04	0.00E+00	4.21E-05	7.19E-02
Non hazardous waste	kg	3.08E+01	3.33E+01	0.00E+00	4.04E+01	1.13E+03
Radioactive waste*	kg	8.73E-01	2.38E-03	0.00E+00	1.90E-04	1.26E-01
Components of reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electrical energy	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported heat	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

*No radioactive waste is produced during T A 2000 operations.
**The column “A3) Manufacturing direct and indirect, refers to direct data and background data regarding production of ancillary materials and other processes outside T A 2000’s facilities”.

6.4 Additional environmental information

In Steelworks II the production of the billet is carried out, the water plant is in charge of cooling the furnace system and other equipment that is important for the manufacture of the billet. There are two types of systems, the open system that is from cooling towers where the water quality is a combination of soft water and raw water, and the closed system where the water is cooled from heat exchangers. considering only soft water. To preserve the quality of the water and the equipment, we take care of extremely important factors such as corrosion, scale and microbiological presence.

ICW system
The ICW system or also known as 8211 is an open system in which the water cooling is from cooling towers, the equipment that this system provides cooling is to hydraulic power plants and compressors. To care for the quality of the water, chemical treatment is used, such as 98% sulfuric acid and sodium hypochlorite, a phosphate-based corrosion inhibitor and a polymer-based scale inhibitor.

CWS system
The CWS system or also known as 8232 is an open system which cools the water from a cooling tower, this system cools the raw material that is the billet. To care for the quality of the water, chemical treatment is used, such as 98% sulfuric acid and sodium hypochlorite, a phosphate-based corrosion inhibitor and a polymer-based scale inhibitor.
The CWC system is a closed system, the cooling of the water is from heat exchangers, this system cools the casting molds, rotary valves and rollers. To care for the quality of the water, chemical treatment is used, such as 50% sodium hydroxide and a nitrite-based corrosion inhibitor.

WFC system
The CWF system is a closed system, the water cooling is from heat exchangers, this system is responsible for cooling the furnace. To care for the quality of the water, chemical treatment is used, such as 50% sodiumO hydroxide and a nitrite-based corrosion inhibitor.

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7. VERIFICATION AND REGISTRATION

CEN standard EN 15804 served as the core PCR	
Programme	International EPD® System www.environdec.com EPD registered through the fully aligned programme/hub: EPD Latin America www.epdlatinamerica.com regional
Programme operator	EPD International AB Box 210 60 SE-100 31 Stockholm, Sweden EPD Latin America Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. Mexico: Bosques De Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de México, México.
EPD registration number:	SP-08533
Date of validity:	2028-07-23
Date of publication (issue):	2023-07-24
Reference year of data:	2022
Geographical scope:	Mexico
Production Plant:	Carretera Federal México-Veracruz Km. 321, s/n, interior 2, Ixtaczoquitlán, Veracruz, C.P. 94450
Central product classification:	UN CPC 4124 Bars and rods, hot rolled, of iron or steel
Product category rules:	PCR 2019:14 construction products, Version 1.11 (EN15804:2012+A2:2019)
PCR review was conducted by:	Martin Erlandsson, IVL Swedish Environmental Research Institute, martin.erlandsson@ivl.se
Independent verification of the declaration data, according to ISO 14025:2006.	☐ EPD process certification (Internal) ☒ EPD verification (External)
Third-party verifier: Approved by:	Francisco J. Campo Approved EPD verifier f.campo@ik-ingenieria.com The International EPD® System
Procedure for follow-up of data during EPD validity involves third-party verifier:	☐ Yes ☒ No

8. CERTIFICATION

ISO 9001:2015

ISO 14001

We have an Implementation Plan for the Environmental Management System for ISO 14001 with a progress of 45%, led by the Management Systems Department, according to the progress of the project, we are planning the certification in June 2024.

9. CONTACT INFORMATION

EPD OWNER	LCA AUTOR	PROGRAMME OPERATOR	PROGRAMME OPERATOR
TA 2000 S.A. de C.V. ORIZABA: Carretera Federal México-Veracruz Km. 321, s/n, interior 2, Ixtaczoquitlán, Veracruz, C.P. 94450 https://tyasa.com/ Contact: Guadalupe Román Hernández	Center for Life Cycle Assessment and Sustainable Design – CADIS Bosques De Bohemia 2 No. 9, Bosques del Lago. Cuautitlan Izcalli, Estado de México, México. C.P. 54766 www.centroacv.mx LCA Study: Life Cycle Assessment (LCA) methodology of steel rebar manufactured from steel scrap. LCA Authors: Díaz Leandra, García Rene, Luque Claudia. Contact person: Juan Pablo Chargoy jpchargoy@centroacv.mx	EPD International AB Box 210 60, SE-100 31, Stockholm, Sweden. www.environdec.com info@environdec.com	EPD registered through the fully aligned regional programme/hub: EPD Latin America www.epd-latinamerica.com Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. Mexico: Av. Convento de Actopan 24 Int. 7A, Colonia Jardines de Santa Mónica, Tlalnepantla de Baz, Estado de México, México, C.P. 54050

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APPENDIX 1

From 2017 up to the present, there have been no technological changes in the manufacturing of steel rebars. However, there have been shifts in suppliers and the installation of a larger number of energy and fuel consumption meters. This has enabled the current report to include more precise data and to rely on fewer assumptions regarding the information. Similarly, the same applies to raw materials, as there is an accounting system in place that tracks the quantities of materials purchased.

The primary changes are linked to the update of the Product Category Rule (PCR) and the Intergovernmental Panel on Climate Change (IPCC) emission factor.


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