Environmental Product Declaration

Steel reinforcing bar manufactured from steel scrap by T A 2000

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

TYASA®

Programme:

The International EPD® System

EPD registered through the fully aligned regional programme/ hub: Latin American Hub, www.epd-latinamerica.com

EPD® Latin America

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Mexico

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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 **www.environdec.com***

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ENVIRONMENTAL PRODUCT DECLARATION

Content

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 reinforcing bar 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

PRODUCT:	STEEL REINFORCING BAR OF SEVERAL CALIBERS MANUFACTURED FROM STEEL SCRAP
Name of the manufacturer:	T A 2000 S.A. de C.V.
Description of the construction product:	Steel rebar used to reinforce concrete in the construction industry. The surface of the rebar is corrugated to limit the relative longitudinal movement between the steel and the surrounding concrete.
Declared unit:	1000 kg of steel reinforcing bar 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. ▪ System boundary. ▪Content declaration. ▪ Environmental performance. ▪ Declared unit. ▪ 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 which 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)

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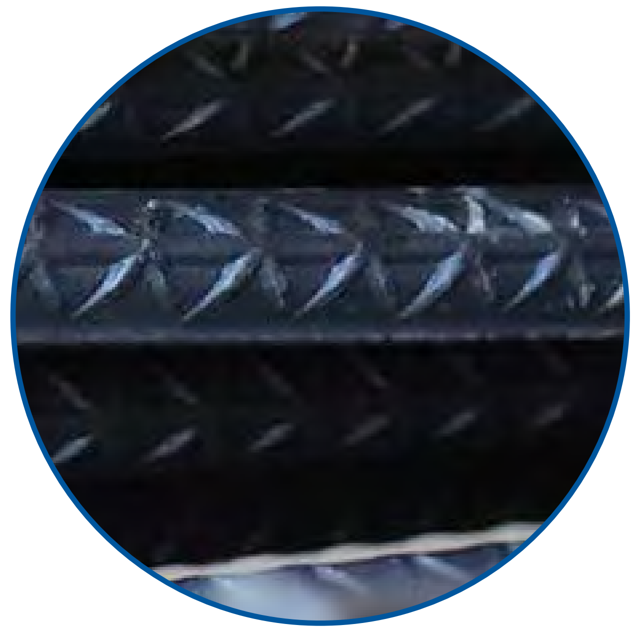
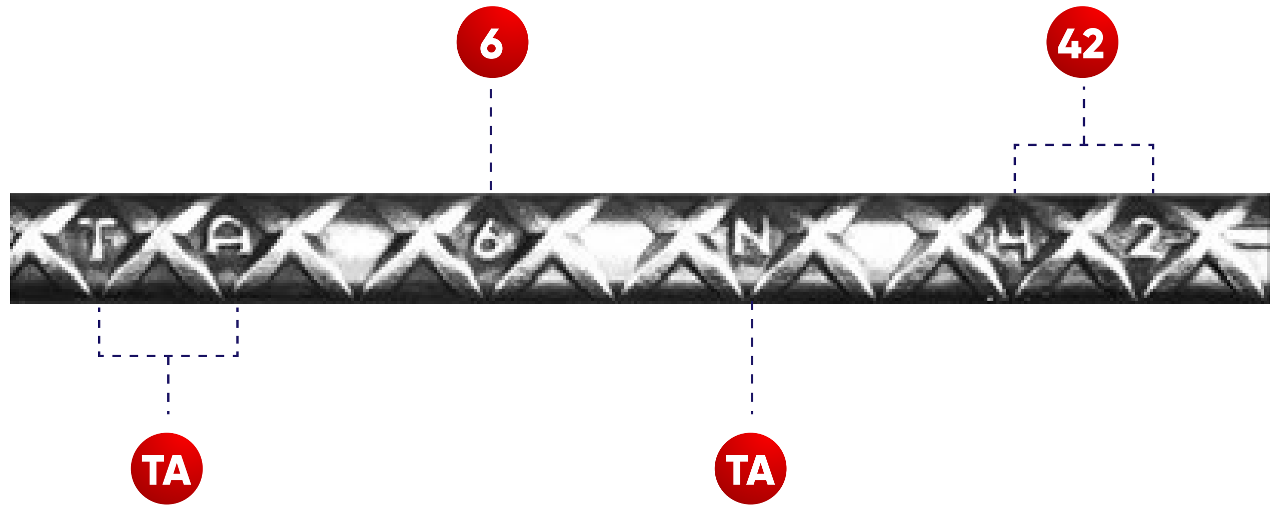
3. THE PRODUCT

The steel reinforcing bar (rebar) manufactured by T A 2000 S.A. de C.V. is used as reinforcement of concrete structures in the construction industry.

Steel rebar is a steel product with semi-circular cross section. The surface of the rebar is corrugated to limit the relative longitudinal movement between the steel and the surrounding concrete.





T A 2000 produces TA42 rebar with state-of-the-art technology (EAF QUANTUM) in the city of Ixtaczoquitlán, Veracruz. The process starts from the steelworks to the final product, which allows the full control on the factors involved in production which guarantees compliance with the international standard ASTM-A-615-G-60 and the Mexican standard NMX-B-506-CANACERO-2011 required by regulations of the construction industry in Mexico.

The characteristics of steel reinforcing bars produced by T A 2000 are provided hereafter:

Caliber*		Designation number	Weight kg/m	Length (m)	Presentation	
mm	Inches				Bent	Straight
9.5	3/8 "	3	0.56	12	▪	
12.7	1/2 "	4	0.994	12	▪	
15.9	5/8 "	5	1.552	12	▪	
19	3/4 "	6	2.235	12	▪	
25.4	1 "	8	3.973	12	▪	
31.8	1 1/4"	10	6.225	12		▪
38.1	1 1/2"	12	8.938	12		▪

* Special calibers (7/8" y 1 1/8" y 1 3/8") may be manufactured under client

Table 1. Technical specifications

Ultimate tensile strength	63 kg/mm2
Minimum yield stress	42 kg/mm2
Minimum elongation in 200 mm	
3/8", 1/2", 5/8", 3/4"	9%
7/8", 1"	8%
1 1/4", 1 1/2"	7%

Table 2. Mechanical properties

Caliber	Mandrel diameter
3/8", 1/2", 5/8"	3.5 d
3/4", 7/8", 1"	5 d
1 1/8", 1 1/4", 1 3/8"	7 d
1 1/2"	8 d

Table 3. Characteristics of tests for mechanical properties determination

Characteristic	Value
Temperature	16 ° C
Steering angle	180°
Other characteristics	• Always keep the mandrel in contact with the rod during bending. • Apply a continuous and uniform force.

Table 4. Characteristics

4. CONTENT DECLARATION

The steel rebar manufactured from steel scrap is produced in an electric arc furnace with a percentage greater than 90% of recycled material, the material contained in this product is found in Table 5. The total raw materials that make up the product were not declared, only the materials with a more representative percentage that make up the billet.

For reasons of confidentiality, a more detailed description of the composition of the Billet is not made, which is the primary raw material of the steel rebar.

4.1 Recycled material content

In the Industrial Center of TA 2000 manufactured the steel rebar 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 5. Content product

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
Anthracite	Anthracite	2 %	0%	8029-10-5	Carbon content in steel	Not listed
Ferro silico manganese	Manganese and silicon	1 %	0%	8029-10-5	Carbon content in steel	Not listed
Lime	calcium oxide	3 %	0%	471-34-1	Iron ore sintering agent steel foundry	Not listed
Dolomite	Calcium carbonate magnesium	3 %	0%	16389-88-1	Iron ore sintering agent steel foundry	Not listed
Others	Not applicable	<1 %	0%	Not applicable	Carbon content in steel	Not listed

1 According to EN15804 declaration of material content of the product shall List of Substances of Very High Concern (SVHC) that are listed by European Chemicals Agency.

*Steel manufactured in the Industrial Center of T A 2000 uses 100% steel scrap as source of iron.

** Packaging: The product transported to customers packed with a steel wire rod and a label detailing the product information, but this is an insignificant quantity, which not included in the previous table

1 According to EN15804 declaration of material content of the product shall List of Substances of Very High Concern (SVHC) that are listed by European Chemicals Agency.

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 according to ISO 14040:2006 and ISO 14044:2006. An external third-party ve-ri¬fication process of the EPD was conducted according to General Programme Instructions for the International EPD® System Version 4.0. Verification includes a documental review and a validation of both the underlying LCA study and documents describing additional en-vironmental information that justify data provided in the EPD.

5.1 Declared unit

1000 kg of steel rebar manufactured from billets that uses 99% ferrous scrap as raw material, manufactured during the year 2022 by TYASA at the Ixtaczoquitlán plant, Veracruz, used by the construction industry as re-inforcement of concrete structures.

5.2 System boundary

The potential environmental impacts were calculated through Life Cycle Assessment (LCA) methodology of steel rebar 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.

Life cycle stage	Information about the modules contained in the stages	EPD			
		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 A2) Transport A3) Manufacture	Mandatory	Mandatory	Mandatory	Mandatory
A4-A5 Construction stage	A4) Transport A5) Construction / installation	-	Optional for goods Required for services	Mandatory	Mandatory
B Usage stage	B1) Use B2) Maintenance B3) Reparation B4) Replacement B5) Remodeling B6) Operational energy use B7) Operational water use	-	Optional	Mandatory	Mandatory
C End of life stage	C1) Deconstruction, demolition C2) Transport C3) Waste processing C4) Final disposition	Mandatory	Mandatory	Mandatory	Optional
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 6. System boundary

5. LCA RULES

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

Table 7. Description of the modules included in this DAP.

5.3 Description of information modules

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

Table 8. Description of information modules included in this EPD.

5. LCA RULES

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5.4 Description of the manufacturing process

The manufacturing process is described in Figure 1

Figure 1 Flow diagram of scrap yard processing by T A 2000

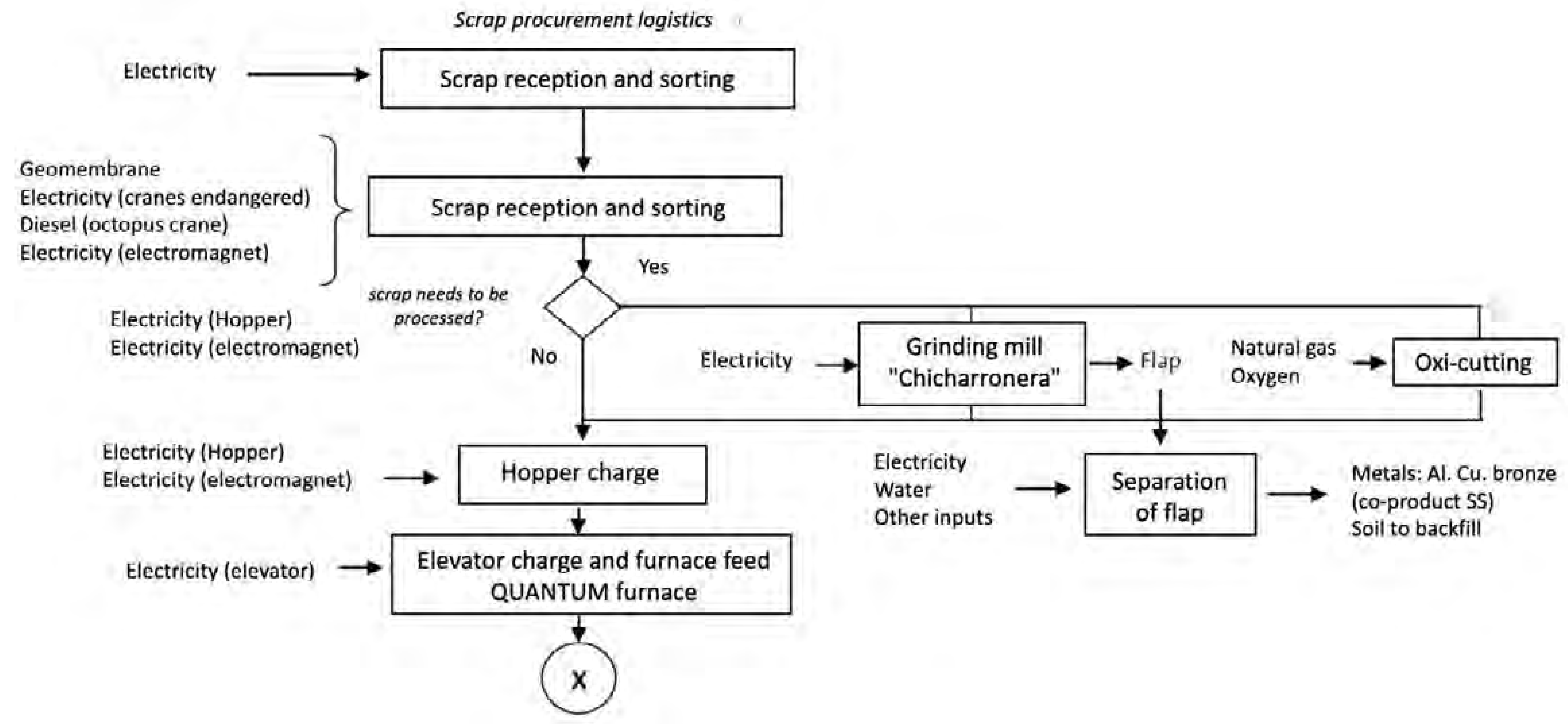
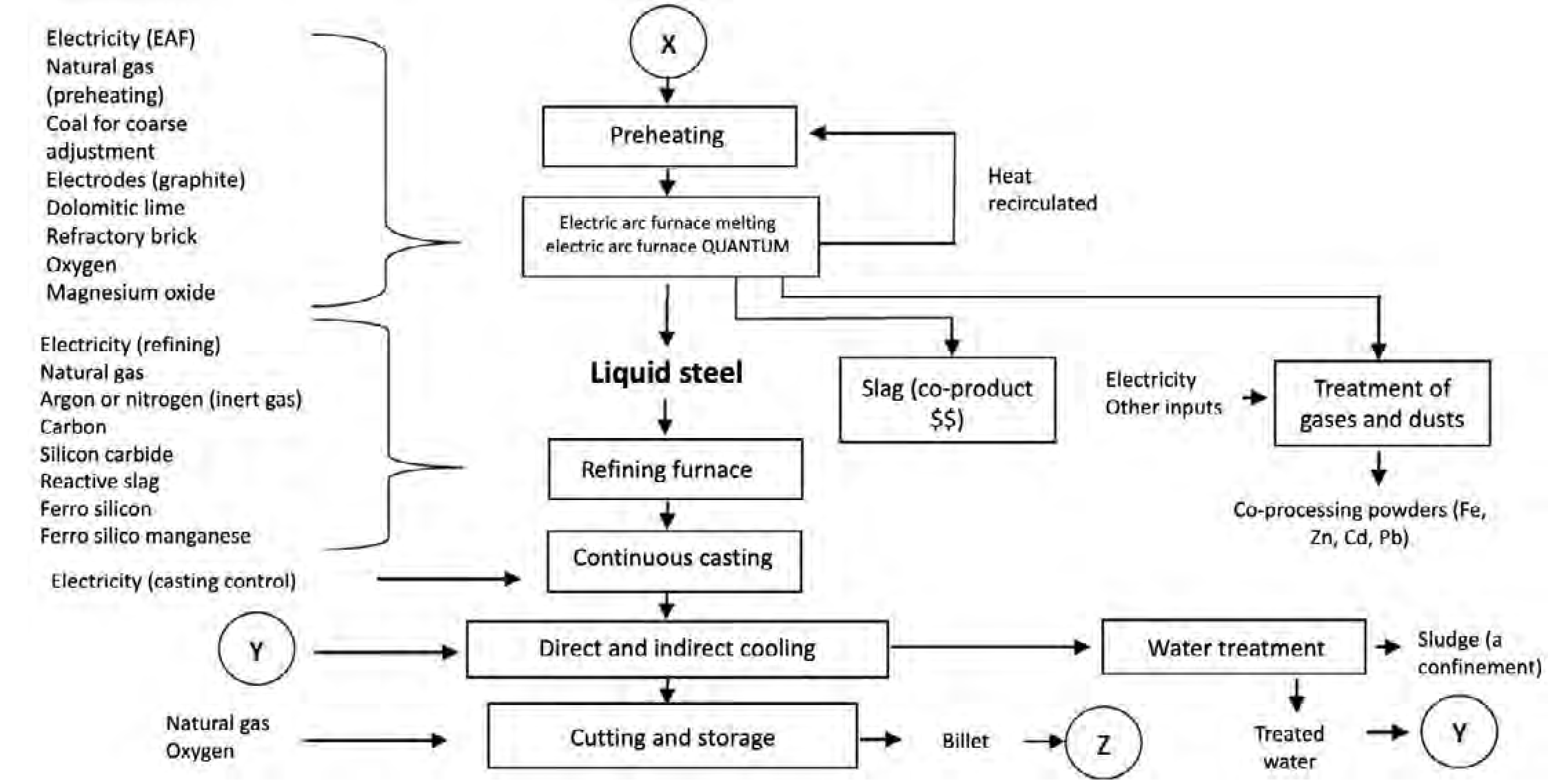


Figure 2 Flow chart of steel manufacturing by T A 2000 (BILLET)



5. LCA RULES

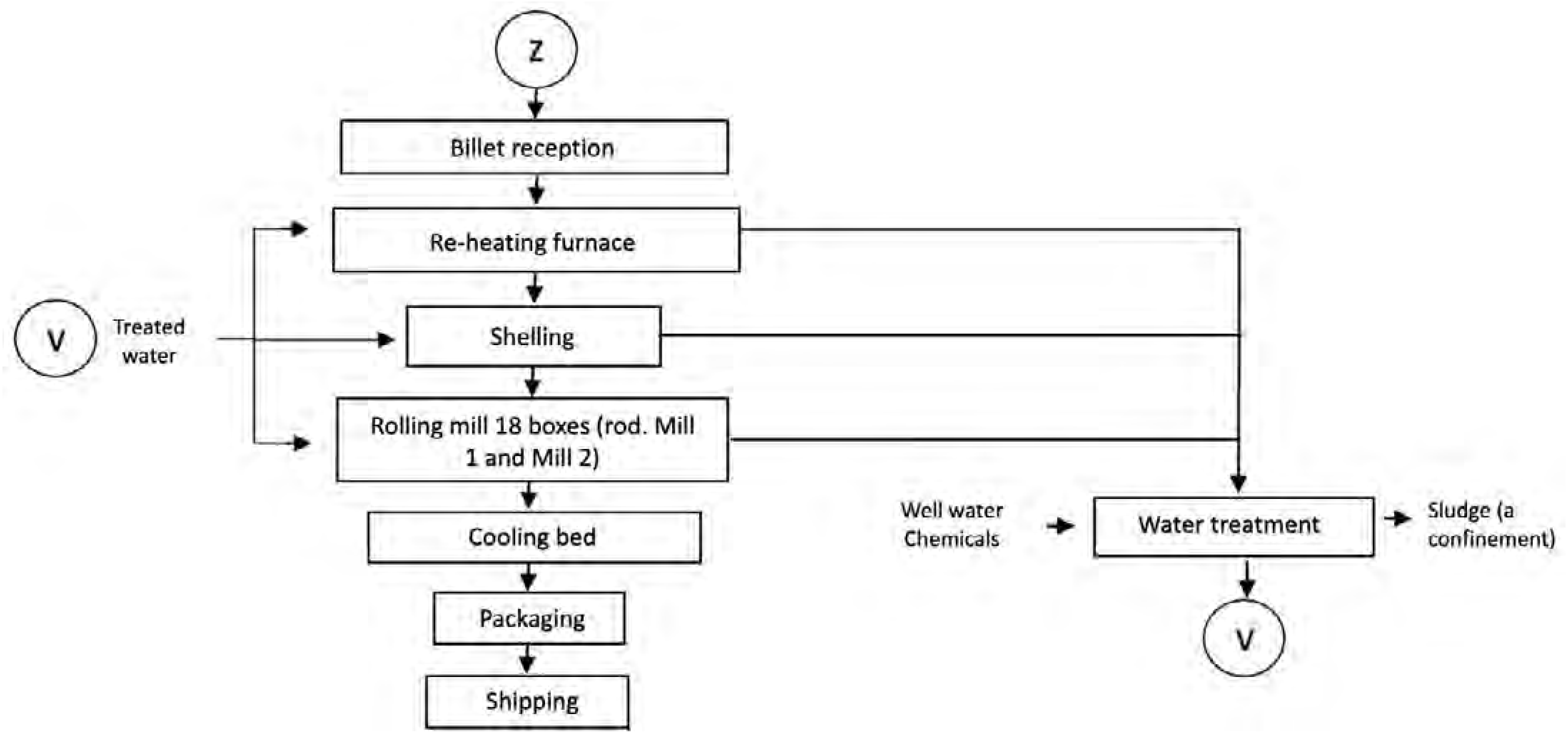
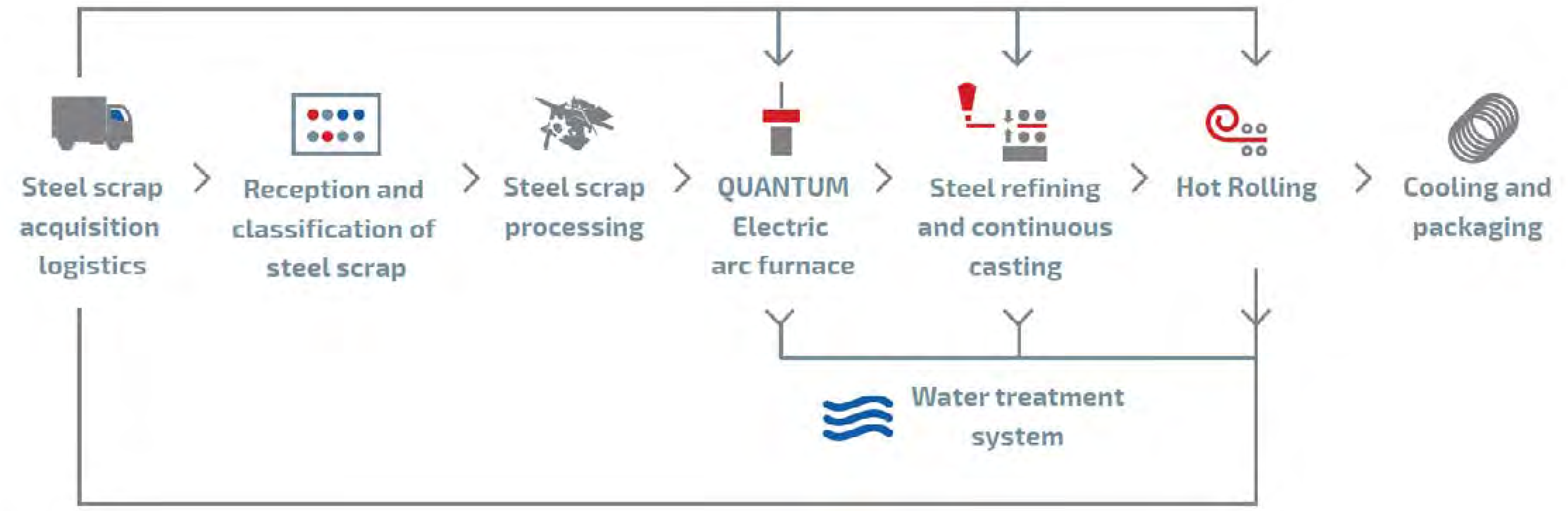


Figure 3. Flow diagram of the rolling mill for the manufacture of steel rod from scrap by T A 2000.

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.



5.5 Assumptions

The assumptions related to the steel wire rod 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).

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5. LCA RULES

5.6 Cut-off criteria

All flows of fuel, energy, materials and supplies necessary for the production of the steel rebar 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,

5.7 Allocation

In TYASA's steel rod 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 steel rebar, 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.

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

Table 9. Allotaction of billet for Steel 1 and 2.

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.

By-product	Total production	Units	Allocation
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%**

Table 11. Allocation of by-products Billet.

By-product	Total production	Units	Allocation
Steel rebar	1.00E+04	tons	93,03%
Husk sold to third parties	0,0293	tons	2,73%
Scrap and control samples	0,0456	tons	4,25%
Total	1.08E+04	tons	100,00%

Table 12. Allocation of by-products Steel rod.

5.8 Time representativeness

Direct data obtained from T A 2000 S.A. de C.V. 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.

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

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 con-tribution in the category of formation of ozone layer depletion with a percentage of 96.05% and the formation of photochemical ozone with a contribution above 90.95%. The smallest contributions to the impact are found in module A2, which corresponds to the transportation module. Additional impact categories are discussed below.

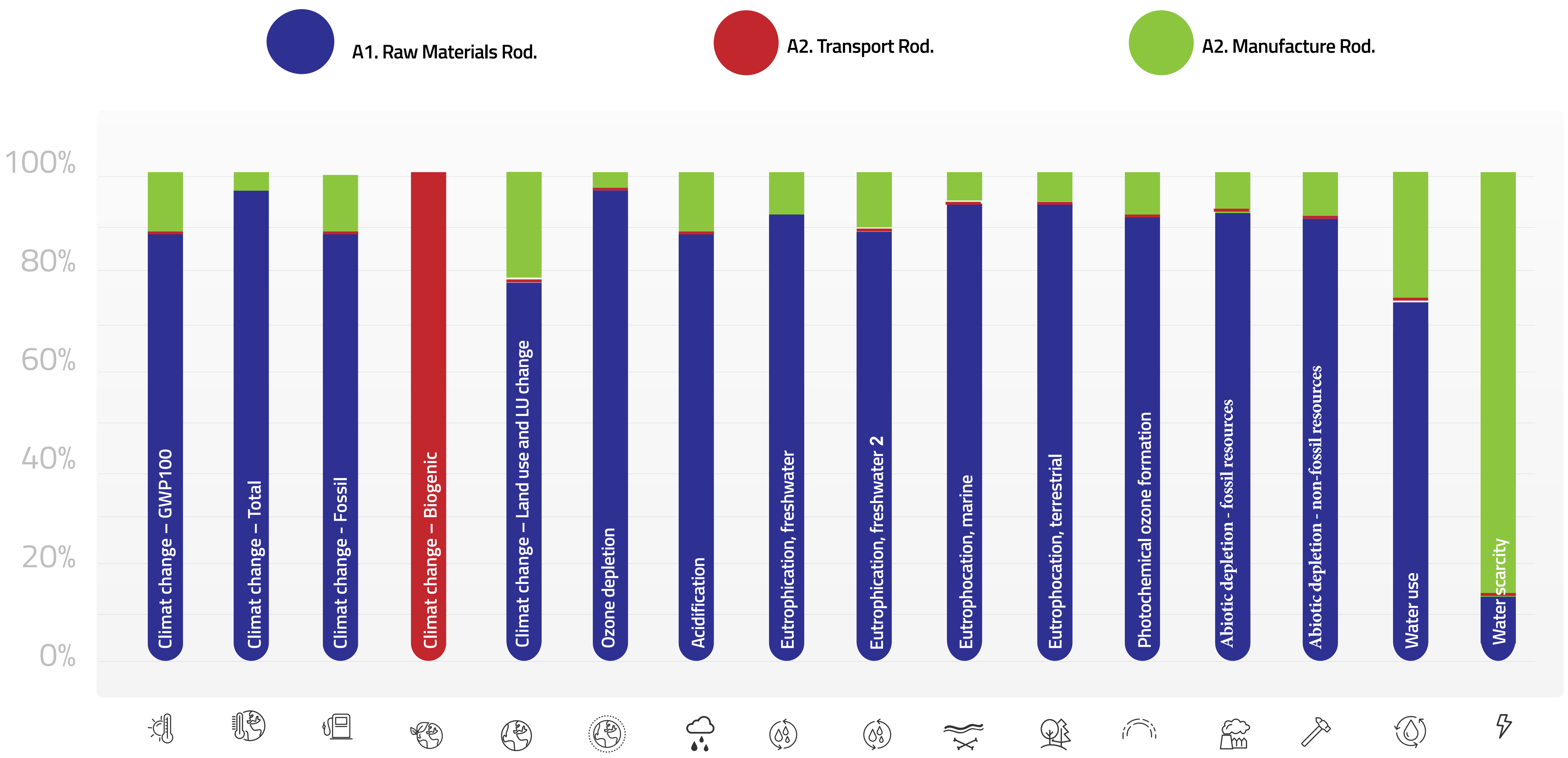

Figure 4. A1-A3 Basic impact categories results.

6. ENVIRONMENTAL PERFORMANCE

IMPACT BASIC CATEGORY	UNIT	A1) RAW MATERIALS	A2) TRANSPORT	A3) MANUFACTURE	A1 – A3
Climat change- GWP100	kg CO_2 eq	6.75E+02	1.05E+01	4.00E+01	7.25E+02
	%	93%	1%	6%	100%
Climat change - Total	kg CO_2 eq	6.85E+02	1.06E+01	1.36E+01	7.09E+02
	%	96.59%	1.49%	1.92%	100.00%
Climate change - Fossil	kg CO_2 eq	6.85E+02	1.06E+01	4.09E+01	7.36E+02
	%	93.01%	1.43%	5.56%	100.00%
Climate change - Biogenic	kg CO_2 eq	0.00E+00	5.69E-03	0.00E+00	5.69E-03
	%	0.00%	100.00%	0.00%	100.00%
Climate change - Land use and LU change	kg CO_2 eq	3.77E-01	4.38E-03	6.90E-02	4.50E-01
	%	83.7%	1.0%	15.3%	100.0%
Ozone depletion	kg CFC11 eq	1.09E-04	2.29E-06	1.65E-06	1.13E-04
	%	96.52%	2.03%	1.46%	100.00%
Acidification	mol H+ eq	3.83E+00	5.36E-02	2.24E-01	4.11E+00
	%	93.24%	1.30%	5.45%	100.00%
Eutrophication, freshwater	Kg PO eq	1.36E-01	7.94E-04	1.70E-02	1.53E-01
	%	88.42%	0.52%	11.07%	100.00%
Eutrophication, freshwater 2	kg PO_4 eq	4.17E-01	2.44E-03	5.21E-02	4.1E-01
	%	88.42%	0.52%	11.07%	100.00%
Eutrophication, marine	kg N eq	1.10E+00	1.81E-02	4.45E-02	1.16E+00
	%	94.59%	1.57%	3.84%	100.00%
Eutrophication, terrestrial	kg N eq	1.18E+01	1.98E-01	4.52E-01	1.24E+01
	%	94.77%	1.57%	3.84%	100.00%
Photochemical ozone formation	kg NMVOC eq	3.39E+01	5.64E-02	1.31E-01	3.58E+00
	%	94.75%	1.58%	3.67%	100.00%
Abiotic depletion - fossil resources	MJ	1.11E+04	1.57E+02	4.89E+02	1.18E+04
	%	94.52%	1.33%	4.15%	100.00%
Abiotic depletion - non-fossil resources	kg Sb eq	2.16E-03	3.63E-05	1.58E-04	2.36E-03
	%	91.77%	1.54%	6.70%	100.00%
Water use	m3 depriv.	1.02E+02	5.42E-01	2.72E+01	1.30E+02
	%	78.63%	0.42%	20.95%	100.00%
Water scarcity	m3 depriv.	2.36E+00	7.03E-02	1.04E+01	1.28E+01
	%	18.44%	0.55%	81.01%	100.00%

ⓘ Table 14. A1-A3 Basic impact categories results

ⓘ Table 15. A1-A3 Basic 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 CO_2 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 CO_2 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 CO_2 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 CO_2 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 CO_2 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 NM-VOC 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 PO_4 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 - 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 - 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. ENVIRONMENTAL PERFORMANCE

Use of resources parameters	Unit	A1) Raw materials	A2) Transport	A3) Manufacture	A1 – A3
Use of renewable primary energy excluding renewable primary energy resources used as feedstock	MJ	4.71E+02	1.81E+00	4.50E+02	9.22E+02
Use of renewable primary energy as raw material	MJ	9.05E+01	2.62E-01	8.23E+00	9.90E+01
Total use of renewable primary energy (primary energy and primary energy resources used as feedstock)	MJ	4.71E+02	1.81E+00	4.50E+02	9.22E+02
Non-renewable primary energy use excluding renewable primary energy resources used as feedstock	MJ	1.20E+04	1.66E+02	5.20E+02	1.26E+04
Use of non-renewable primary energy as raw material	MJ	1.15E+04	1.65E+01	4.68E+02	1.21E+04
Total use of non-renewable primary energy (primary energy and primary energy resources used as raw materials)	MJ	1.20E+04	1.66E+02	5.20E+02	1.26E+04
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	m^3	2.86E+00	1.79E-02	7.17E-01	3.59E+00

Table 16. A1-A3 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

Table 17. C1-C4, D use of resources parameters.

6. ENVIRONMENTAL PERFORMANCE

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:

Output parameter	Unit	Total	1) Raw materials supply	A2) Transportation	A3) Manufacturing
Hazardous waste	kg	1.97E-02	4.14E-04	4.76E-03	2.49E-02
Non hazardous waste	kg	3.27E+02	7.98E+00	4.99E+00	3.40E+02
Radioactive waste*	kg	4.84E-02	1.02E-02	1.18E-03	5.06E-02
Components for reuse	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Materials for recycling	kg	9.08E-01	0.0E+00	0.00E+00	0.00E+00
Materials for energy recovery	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00
Exported electricity	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

Table 18. A1-A3 Other indicators describing waste categories.

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

Table 19. C1-C4, D Other indicators describing waste categories.

*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".

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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% sodium hydroxide and a nitrite-based corrosion inhibitor.

7. VERIFICATION AND REGISTRATION

CEN STANDARD EN 15804 SERVED AS THE CORE PCR	
Programme	International EPD® System www.environdec.com DAP registrada en el programa regional/hub: EPD Latin America www.epdlatinamerica.com
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:	S-P-00704
Date of validity:	2028-07-12
Revision date:	2023-07-13
Date of publication (issue):	2018-08-23
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
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® Systemz
Procedure for follow-up of data during EPD validity involves third-party veri¬fier:	☐ Yes ☒ No

8. CERTIFICATIONS

EPD® THE INTERNATIONAL EPD® SYSTEM

LATIN AMERICA EPD®

ISO 9001:2015

TÜVRheinland® CERTIFICADO
Sistema de Gestión
ISO 9001:2015
www.tuv.com
ID 9108633832

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
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 Expandable Polystyrene (EPS) insulation board LCA Authors: Luque Claudia, Ochoa Gabriel, Sojo Amalia. 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 Chile: Alonso de Ercilla 2996, Ñuñoa, Santiago Chile. México: 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.