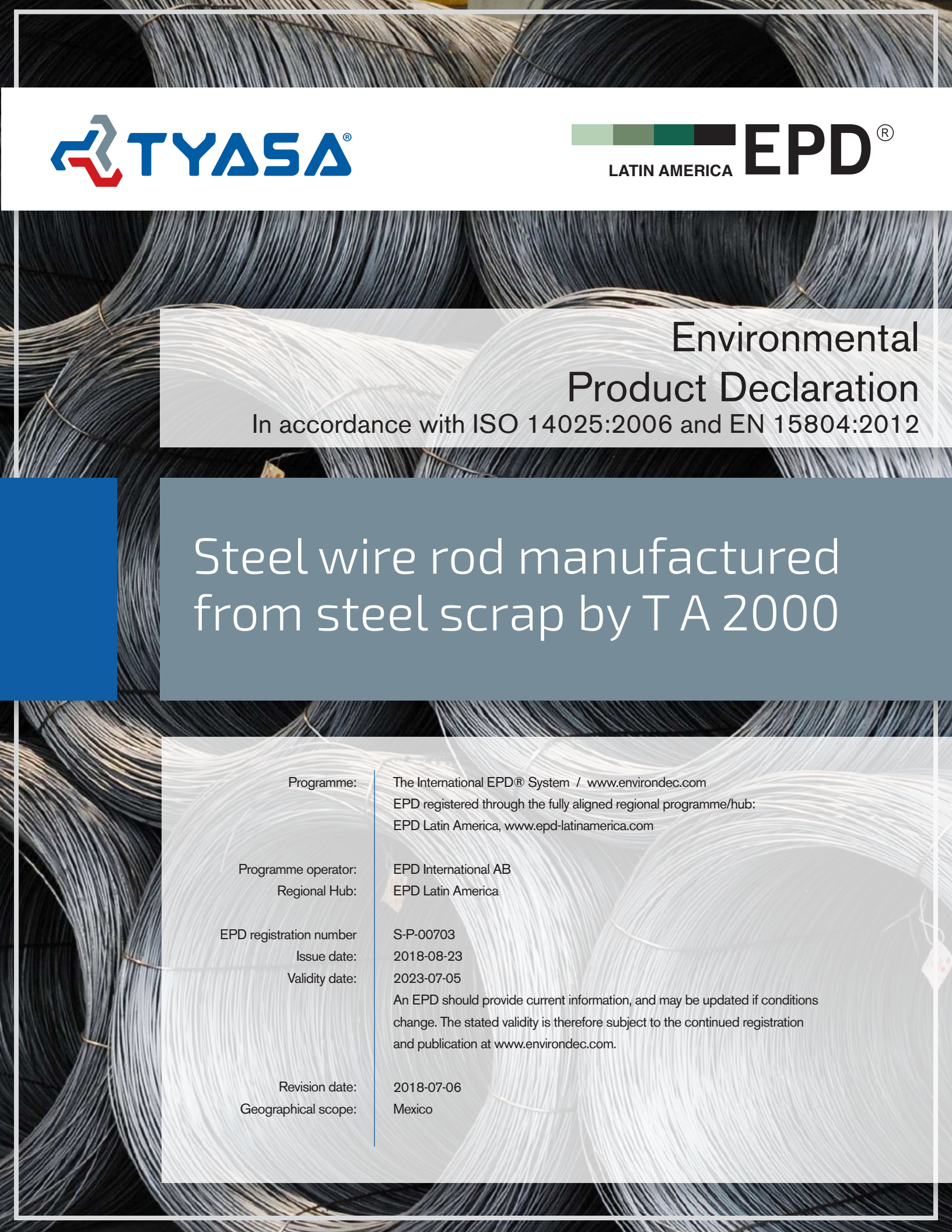


TYASA®

LATIN AMERICA EPD®

Environmental Product Declaration

In accordance with ISO 14025:2006 and EN 15804:2012

Steel wire rod manufactured from steel scrap by T A 2000

Programme:	The International EPD® System / www.environdec.com EPD registered through the fully aligned regional programme/hub: EPD Latin America, www.epd-latinamerica.com
Programme operator:	EPD International AB
Regional Hub:	EPD Latin America
EPD registration number	S-P-00703
Issue date:	2018-08-23
Validity date:	2023-07-05 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.
Revision date:	2018-07-06
Geographical scope:	Mexico

EPD Content

T A 2000 S.A. de C.V. is a 100% Mexican steel company, specializing in the manufacture of steel products for construction, thin steel sheet, special bar quality (SBQ) 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 2014 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 has its main production plant in Orizaba; three distribution centers: Mérida, Arriaga, Silao and a commercial office in Mexico City.

1. General information

Product:	Steel wire rod of several calibers manufactured from steel scrap
Name of the manufacturer:	T A 2000 S.A. de C.V.
Description of the product:	Wire rod manufactured by TA 2000 is a hot rolled steel product of round cross section that complies with the Mexican Sandard NMX-B-365-CANACERO-2008 and International Standard ASTM-A-510 required by the construction regulations in Mexico. The wire rod T A 2000 is ideal to be used in conjunction with the rebar as concrete reinforcement in construction.
Declared unit:	1 metric ton of steel wire rod 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 steel scrap as source of iron.
Programme:	International EPD® System, www.environdec.com EPD® EPD registered through the fully aligned regional programme/hub: EPD Latin America, www.epdlatinamerica.com LATIN AMERICA EPD®
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden EPD Latin America Chile: Alonso de Arcilla 2996, Ñuñoa, Santiago Chile Mexico: Boulevard de los Continentes No. 66 Colonia Valle Dorado. C.P. 54040 Tlalnepantla de Baz, Estado de México. México
Date of issue:	2018-08-23
Valid to:	2023-07-05
Life cycle stages not considered:	Distribution, use, end of life.
Comparability of EPD of construction products	a. EPD of construction products may not be comparable if they do not comply with EN 15804. b. Environmental product declarations within the same product category from different programs may not be comparable
For more information consult	www.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 Steel Scrap Collection and pre-processing Plant 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 Steel Scrap Collection and pre-processing Plant 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

2. The product

Wire rod is a hot rolled steel product of circular cross section with diameters between 5 mm and 16 mm and smooth shiny surface. Steel wire rod can be used by the construction industry to build stirrups and rings to reinforce concrete.

Wire rod manufactured by T A 2000 complies with the Mexican Standard NMX-B-365-CANACERO-2008 and International Standard ASTM-A-510 required by the construction regulations in Mexico.

T A 2000 produces wire rod with state-of-the-art technology (EAF QUANTUM) in the city of Ixtaczoquitlán, Veracruz. The wire rod TA is ideal to be used in conjunction with steel reinforcing bar produced by T A 2000 as concrete reinforcement in construction industry.

Technical specifications:

Steel grade	
Low carbon	1 005 – 1 025
Medium Carbon	1 026 – 1 045
Higho Carbon	1 046 – 1 095

Mechanical properties:

Characteristic	Value
Diameter (mm)	5.0, 5.5, 6.0, 6.35, 6.5, 7.0, 7.5, 8.0, 8.5, 9.0, 9.5, 10.0, 10.5, 11.0, 11.5, 12.0, 12.5, 13.0, 13.5, 14.0, 14.5, 15.0, 15.5, 16.0
Presentation	• 2 300 kg per coil average. • Internal coil diameter: 0.90m. • External coil diameter: 1.20 m. • Coil height: 1.60 m to 1.75 m.

3 Content declaration

A list of materials and chemical substances including information about their hazardous properties is provided hereafter.

Materials for steel manufacturing			
Material	**Function**	**Weight (%)**	**Health class[1]**
Low Alloyed Steel	Reinforcement of concrete structures	100 %	Non hazardous

1According to EN15804 declaration of material content of the product shall list Substance 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.

4 Declared unit

1 metric ton of steel wire rod manufactured from steel scrap ready to distribution.

5 Flow diagram and system boundary

Environmental potential impacts were calculated according to EN 15804:2012 and PCR 2012:01 Construction products and construction services Version 2.2 (2017-05-30). The declared EPD is a "Cradle-to gate EPD" in line 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 critical review process of the LCA was conducted according to ISO/TS 14071:2014. The following figure describes the scope of the inventory performed in the LCA.

Life cycle environmental information of wire rod manufactured from steel scrap							Other environmental information
Product stage			Construction process stage		Use stage	End of life stage	Reuse recovery stage
A1	A2	A3	A4	A5	B1 - B7	C1 - C4	D
Steel scrap pre-processing, production of ferroalloys, lime, carbon, graphite electrodes, calcium carbide and packaging of raw materials. Electricity generation and natural gas production used during manufacturing.	Transportation of scrap steel to production plant. Transportation of other raw materials. Transportation of ancillary materials. Internal transportation requirements.	Fresh water consumption. Production and consumption of ancillary materials: chemicals for water treatment, textiles, lubricating oils and grease for cleaning and maintenance Waste transportation, waste treatment and direct emissions to air and water.	Product distribution	Construction and installation	Use, maintenance, repair, replacement, refurbishment, operational energy use, operational water use	De-construction, demolition, transport, waste processing, disposal	Re-use-Recovery-Recycling-potential
Included	Included	Included	Not declared	Not declared	Not declared	Not declared	Not declared
Cradle-to-gate Declared unit							

5.1 Description of information modules

Description of information modules included in this EPD.

A1) Raw materials supply

Pre-processing of steel scrap.

Production of raw materials: ferroalloys, lime, carbon, graphite electrodes, calcium carbide.

Production of packaging materials for raw materials.

Generation and distribution of the electricity consumed in manufacturing.

Production and processing of natural gas used as fuel during the manufacturing process.

A2) Transportation

Transportation of scrap steel.

Transportation of other raw materials.

Transportation of ancillary materials.

Internal transportation requirements.

A3) Manufacturing

Consumption of fresh water.

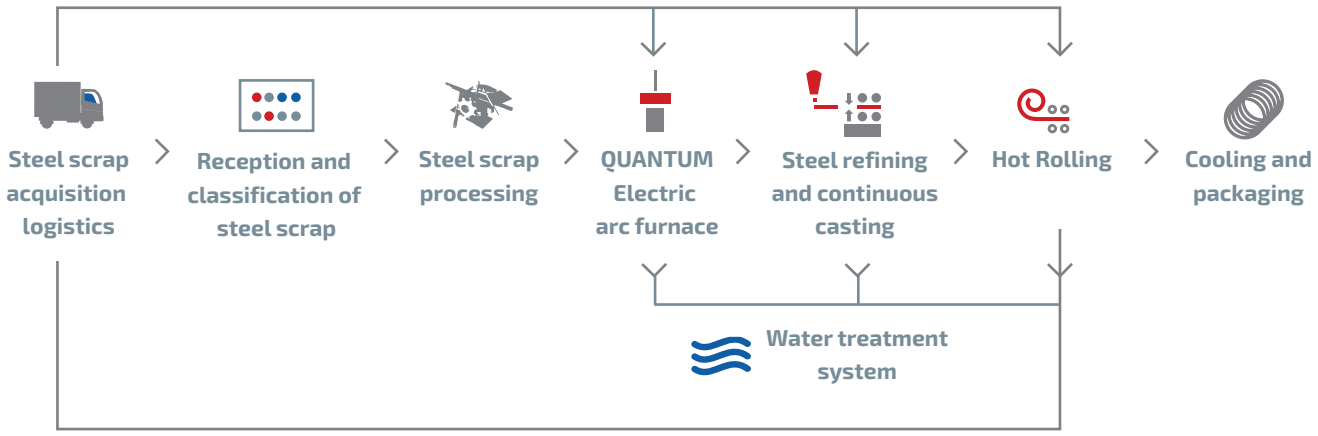
Production and consumption of ancillary materials: oxygen, nitrogen, chemicals for water treatment, textiles for cleaning and maintenance, lubricating oils and grease.

Waste generation and waste management processes.

Emissions to air and water.

Transport of waste to the treatment and final disposal site.

The manufacturing process is described in the following diagram:



5.2 Data quality assessment

T A 2000 collected primary (specific) data from annual internal records of the year 2016 for the following aspects:

- Distance for transportation of raw materials and ancillary materials for steel reinforcing bar manufacturing
- Raw materials consumption for manufacturing.
- Energy consumption for manufacturing
- Production yield and generation of by products
- Consumption of ancillary materials during manufacturing
- Waste generation and waste management
- Emissions to air during manufacturing process
- Distance for transportation of waste to treatment

Secondary (generic) data for upstream processes were used for the following elements:

- Energy and materials consumption and emissions related to the production of raw materials for steelmaking
- Materials and energy consumption, emissions related to transport of raw materials and ancillary materials
- Energy and materials consumption and emissions related to the production of ancillary inputs
- Materials and energy consumption, emissions and waste management related to transport of waste and waste treatment

Electricity generation was modeled considering the technology mix at country level for the year 2016.

The assessment of data quality is provided in the following Tables:

A list of materials and chemical substances including information about their hazardous properties is provided hereafter.

Module A1) Raw materials supply					
Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Raw materials consumption for steel wire rod manufacturing	2016	Mexico	Modern	T A 2000	M
Transport distance of Steel scrap to pre-processing plants	2016	Mexico	Modern	T A 2000	M
Energy and materials consumption, waste and emissions generation from pre-processing steel scrap	2016	Mexico	Modern	T A 2000	M
Energy and materials consumption, waste and emissions generation from pre-processing steel scrap by independent providers	2016	Mexico	Modern	T A 2000	E
Energy consumption for steel wire rod manufacturing	2016	Mexico	Modern	T A 2000	M
Consumption of fuels and emissions related to electricity production in Mexico at country level	2016	Mexico	Technological mix at country level	Mexicaniuh	M&E
Energy and materials consumption and emissions related to natural gas production in Mexico	2016	Mexico	Modern	Mexicaniuh	M&E
Energy and materials consumption and emissions related to the production of other raw materials for steelmaking	1990-2016	World average based on Europe	World average based on Europe	Ecoinvent 3.3	M&E

Module A2) Transportation					
Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Distance for transportation of raw materials	2016	Mexico	Not applicable	T A 2000	M
Distance for transportation of ancillary inputs	2016	Mexico	Not applicable	T A 2000	M
Distance for transportation of natural gas	2016	Mexico	Not applicable	Google Maps	E
Materials and energy consumption, emissions and waste management related to transport of raw materials and ancillary materials.	1992-2014	World average based on Europe	World average based on Europe	Ecoinvent 3.3	M&E

Module A3) Manufacturing					
Data	Time related coverage	Geographic coverage	Technological coverage	Data source	Measured or estimated
Production yield and by-product generation	2016	Mexico	Modern	T A 2000	M
Consumption of ancillary materials during manufacturing	2016	Mexico	Modern	T A 2000	M
Energy and materials consumption and emissions related to the production of ancillary inputs	1990 - 2016	World average based on Europe	World average based on Europe	Ecoinvent 3.3	M&E
Waste generation during manufacturing process and management strategies	2016	Mexico	Modern	T A 2000	M
Energy and materials consumption and emissions related to waste treatment process	1990 - 2016	World average based on Europe	World average based on Europe	Ecoinvent 3.3	M&E
Emissions to air during manufacturing process	2016	Mexico	Modern	T A 2000 EPA AP42	M
Distance for transportation of waste to treatment	2016	Mexico	Modern	T A 2000 & Google Maps	E
Materials and energy consumption, emissions and waste management related to transport of waste.	1992-2014	World average based on Europe	World average based on Europe	Ecoinvent 3.3	M&E

6 Environmental performance-related information

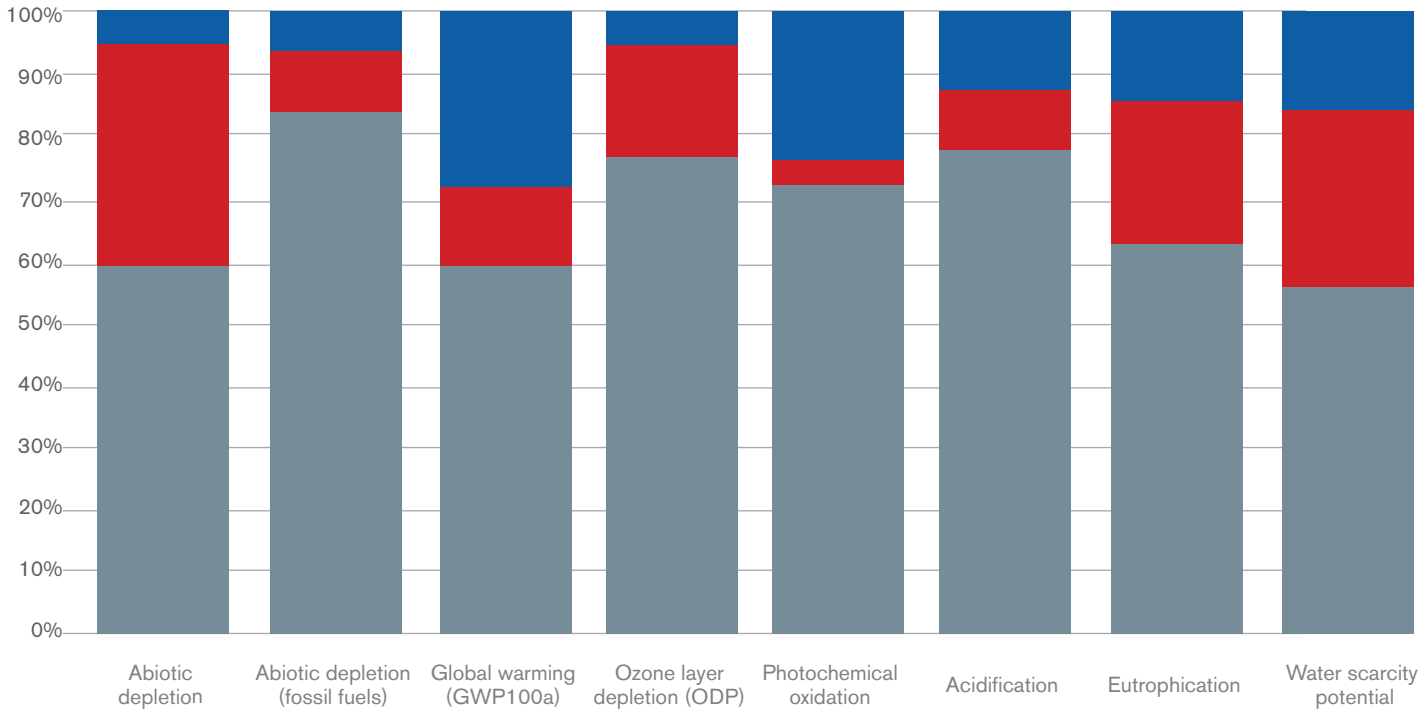
Since this is a Cradle to Gate EPD, reference service life is not specified.

6.1 Environmental potential impact

All individual information modules are reported separately. However, as supplement information a figure for the total impact across all phases is provided. Parameters describing environmental potential impacts were calculated using CML-IA method version 3.04 (Guinee et al. 2001; Huijbregts et al. 2003; Wegener et al. 2008) as implemented in SimaPro 8.4. Water scarcity potential was calculated using AWARE method (Boulay et al. 2016).

Steel wire rod manufactured from steel scrap						
Impact Category	Unit	A1) Raw materials	A2) Transportation	A3) Manufacture	Total A1 - A3	A4 - A5, B1-B7, C1-C4, D
Abiotic depletion	kg Sb equiv %	2.19E-04 60.3%	1.27E-04 34.9%	1.76E-05 4.8%	3.63E-04 100%	Modules not declared
Abiotic depletion (fossil fuels)	MJ %	8 737 83.5%	1 105 10.6%	625 6.0%	10 467 100%	
Global warming (GWP100a)	kg CO_2 equiv %	358 59.5%	70 11.7%	173 28.8%	602 100%	
Ozone layer depletion (ODP)	kg CFC-11 equiv %	6.21E-05 78.7%	1.25E-05 15.9%	4.29E-06 5.4%	7.90E-05 100%	
Photochemical oxidation	kg C_2H_4 eq %	4.56E-01 74.1%	1.95E-02 3.2%	1.40E-01 22.7%	6.15E-01 100%	
Acidification	kg SO_2 equiv %	4.23E+00 77.2%	5.27E-01 9.6%	7.24E-01 13.2%	5.48E+00 100%	
Eutrophication	kg PO_4--- eq %	2.73E-01 59.5%	8.56E-02 18.6%	1.00E-01 21.8%	4.59E-01 100%	
Water scarcity potential	m^3eq %	9.9 56.5%	4.7 26.7%	3.0 16.8%	17.6 100.0%	

The graphical representation of the environmental potential impact of the Steel wire rod manufactured by T A 2000 is showed in the following Figure:



A1) Raw materials supply

A2) Transportation

A3) Manufacturing

6.2 Use of resources

Environmental parameters describing the use of renewable and non-renewable material resources, renewable and non-renewable primary energy as well as the generation of materials for recycling or energy recovery are presented below.

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 (Huijbregts et al. 2017).

Parameter	Unit	Total	A1) Raw materials supply	A2) Transportation	A3) Manufacturing
Use of renewable primary energy excluding renewable primary energy resources used as raw materials	MJ	575	507	17	50
Use of renewable primary energy as raw materials	MJ	0	0	0	0
Total use of renewable primary energy resources	MJ	575	507	17	50
Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials	MJ	10 941	9 148	1 127	666
Use of non-renewable primary energy used as raw materials	MJ	0	0	0	0
Total use of non-renewable primary energy resources	MJ	10 941	9 148	1 127	666
Use of secondary material	kg	1 134	0	0	1 134
Use of renewable secondary fuels	MJ	0	0	0	0
Use of non-renewable secondary fuels	MJ	0	0	0	0
Use of net fresh water	m^3	3.40	1.00	0.23	2.18

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 (direct)**	A3) Manufacturing (indirect)**
Hazardous waste	kg	25.0	1.7	6.38E-04	12.8	10.5
Non hazardous waste	kg	219.6	67.3	57.9	89.9	4.6
Radioactive waste*	kg	2.05E-02	1.23E-02	7.12E-03	0	1.06E-03
Components for reuse	kg	0	0	0	0	0
Materials for recycling	kg	114	0	0	114	0
Materials for energy recovery	kg	0.02	0	0	0.02	0
Exported electricity	MJ	0	0	0	0	0
Exported heat	MJ	0.71	0	0	0.71	0

*No radioactive waste is produced during T A 2000 operations.

**The column "A3) Manufacturing (direct) refers to direct data from T A 2000 operations. The column "A3) Manufacturing (indirect) refers to background data regarding production of ancillary materials and other processes outside T A 2000's facilities".

6.4 Specific statements about the EPD

a) Geographical coverage: México.

b) Scope of the EPD: This EPD only covers the Cradle to Gate life cycle stages because other stages are very dependent on particular scenarios and are better developed for specific building or construction works.

c) EPD Comparison:
a. EPD of construction products may not be comparable if they do not comply with EN 15804.
b. Environmental product declarations within the same product category from different programs may not be comparable.

d) Additional information can be provided on the request of the costumer.

e) Allocation rules:
a. Allocation for co-products: The first allocation procedure was performed so that it reflects the way in which the inputs and outputs change by cuantitative changes in the products (or functions) delivered by the system. In this case, a mass-basis allocation procedure was applied when co-products are present in a process.

Process	By-product
Steel scrap processing yard	Metals contained in flap: aluminium, copper, bronze, etc.
Steelmaking	Slag and steel husk
Hot rolling	Steel husk

b. Allocation for recycling: Allocation of recycled material known as open loop recycling, is reported in the inventory under the Polluters Pay (PP) allocation method. In the PP allocation method, the exact boundary settings between the first and the next product systems are defined by the willingness to pay for the recycled material.

This implies that for inflow of recycled material to the product system, the recycling process and the transportation from the recycling process to where the material is used were included. If an outflow of material to recycling was reported, the transportation of the material to a sorting facility or recycling process was included.

f) Cut off criteria applied in the EPD:
a. Environmental impact from construction, production equipment, and tools that are not directly consumed in the production process are not accounted for in the LCI.
b. Personnel-related impacts, such as transportation to and from work, are also not accounted for in the LCI.

g) Key assumptions of the LCA:
a. Slag, as well as plastic, wood and paper waste are transported to their treatment or recycling site within the same municipality (34 km).

b. Natural gas is obtained from gas processing complex Matapionche-Veracruz, located 80.9 km from T A 2000 production plant (Ixtaczoquitlán).

c. Pre-processing by independent national and foreign suppliers is similar to that reported by the pre-processing plants of T A 2000.

7 Verification and registration

CEN standard EN 150804 served as the core PCR	
Programme:	International EPD® System, www.environdec.com EPD® EPD registered through the fully aligned regional programme/hub: EPD Latin America, www.epdlatinamerica.com LATIN AMERICA EPD®
Programme operator:	EPD International AB, Box 210 60, SE-100 31 Stockholm, Sweden EPD Latin America Chile: Alonso de Arcilla 2996, Ñuñoa, Santiago Chile Mexico: Boulevard de los Continentes No. 66 Colonia Valle Dorado. C.P. 54040 Tlalnepantla de Baz, Estado de México. México.
EPD registration number:	S-P-00703
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Reference year of data:	2016
Geographical scope:	Mexico
Product group classification:	UN CPC 4219
PCR:	PCR 2012:01 construction products and construction services, Version 2.2 (2017-05-03).
PCR review was conducted by:	The Technical Committee of the International EPD® System. Chair: Massimo Marino. Contact via info@environdec.com
Independent verification of the declaration data, according to ISO 14025:2006	EPD verification
External third-party verifier and critical reviewer of the LCA:	Claudia A. Peña
Accredited or approved by:	The International EPD® System

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www.epd-latinamerica.com

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ISO 14040:2006 Environmental management -- Life cycle assessment -- Principles and framework.

ISO 14044:2006 Environmental management -- Life cycle assessment -- Requirements and guidelines.

ISO 21930:2017 Sustainability in buildings and civil engineering works -- Core rules for environmental product declarations of construction products and services.
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