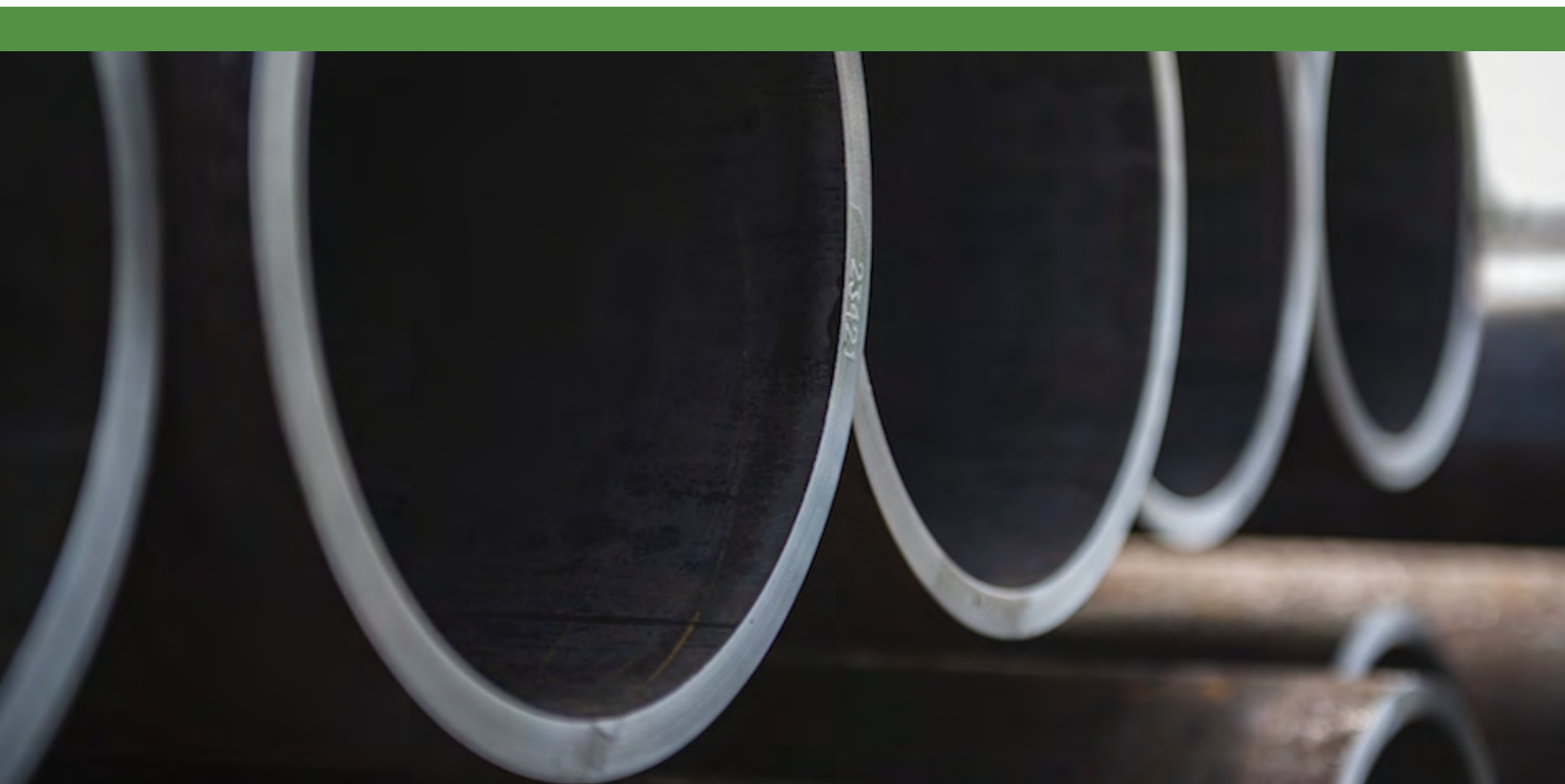


# Environmental Product Declaration

## Seamless Steel Structural Tube

**BASED ON:**

PCR 2012:01  
version 2.3  
Construction products  
and construction services

EN 15804:2012

ISO 14025

**REGISTRATION N°:**

S-P-01239

**DATE OF REVISION:**

2019/02/20

**ISSUE DATE:**

2019/03/11

**VALID UNTIL:**

2024/02/19



# General information

## EPD® REFERENCES

EPD OWNER: TENARIS S.A. -29 AVENUE DE LA PORTE-NEUVE, L2227- LUXEMBOURG

PROGRAMME: THE INTERNATIONAL EPD® SYSTEM, [www.environdec.com](http://www.environdec.com)  
EPD registered thorough the fully aligned regional programme/hub: EPD LATIN AMERICA, [www.epdlatinamerica.com](http://www.epdlatinamerica.com)

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: Av. Convento de Actopan 24 Int. 7A, Colonia Jardines de Santa Mónica, Tlalnepantla de Baz, Estado de México, México

## INDEPENDENT VERIFICATION

EPD document valid worldwide, according to sales market conditions

CEN standard EN 15804 served as the core PCR (PCR 2012:01, Construction products and construction services, version 2.3, 2018-11-15) PCR review was conducted by the Technical Committee of the International EPD® System.

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

Third party verifier: Claudia A. Peña. ADDERE Research & Technology  
Approved EPD verifier, [cpena@addere.cl](mailto:cpena@addere.cl), [claudia@ped-amricalatina.com](mailto:claudia@ped-amricalatina.com)

EPD process certification  
(Internal)

EPD verification  
(External)

Accredited by: The International EPD® System

Environmental declaration published within the same product category, through originating from different programs, may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804. EPD owner has the sole ownership, liability, and responsibility for the EPD.

## CONTACTS

Tenaris Corporate is available to release an Environmental Product Declaration for one specific product if requested by the customer

For additional information about this EPD® and about Tenaris activities please contact:  
Emireth Hernández- [emhernandez@tamsa.com.mx](mailto:emhernandez@tamsa.com.mx)  
Carolina Bengochea- [cbengochea@tenaris.com](mailto:cbengochea@tenaris.com)



LCA Author:

Center for Life Cycle Assessment and Sustainable Design-CADIS  
Bosques de Bohemia 2 No. 9, Bosques del Lago,  
Cuautitlan Izcalli, Estado de Mexico, Mexico  
[www.centroacv.mx](http://www.centroacv.mx)



# Tenaris Group

Tenaris is a leading supplier of tubes and related services for world energy industry, construction and other industrial applications worldwide.

The mission is to deliver value to customers through product development, manufacturing excellence and supply chain management.

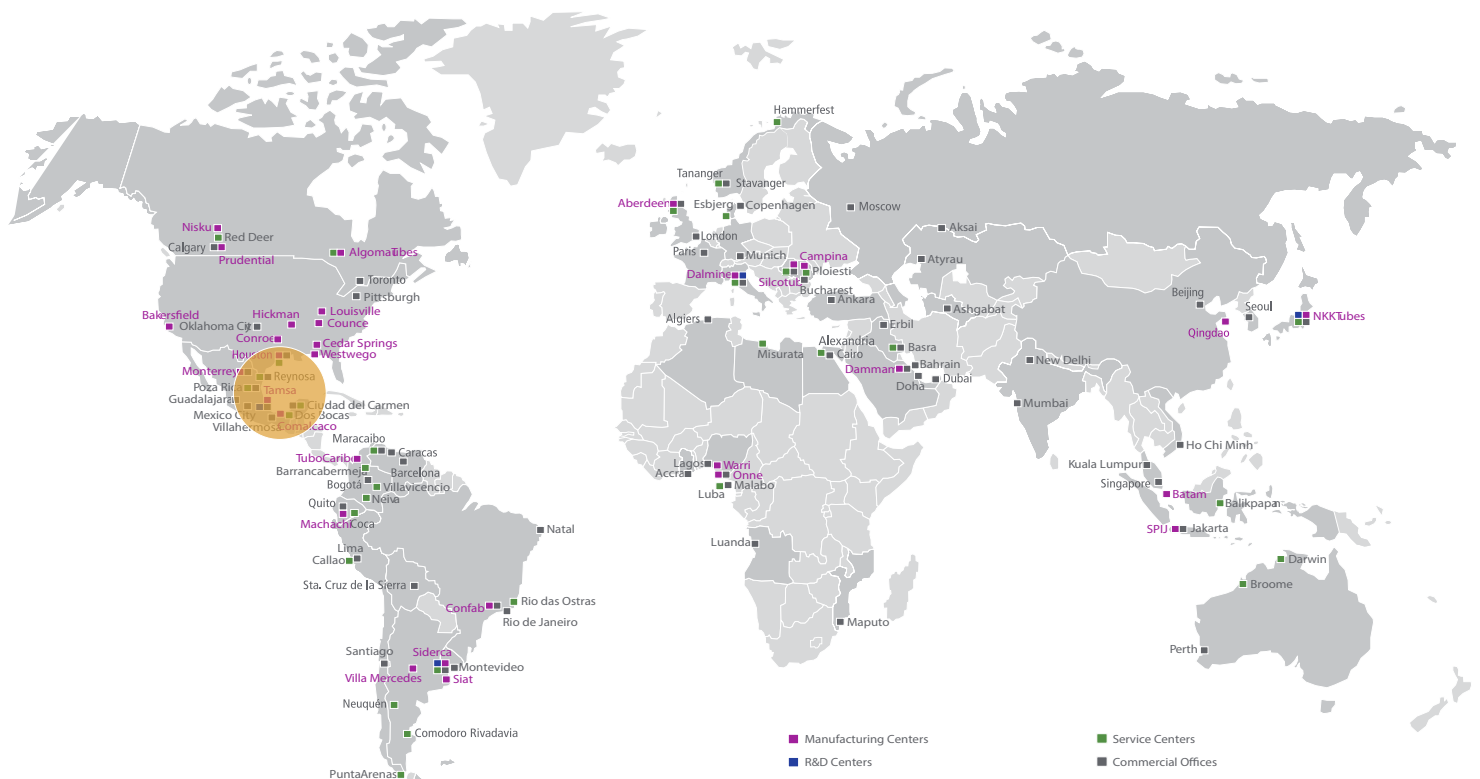
A global leader around the world is committed to continuous improvement by sharing knowledge across a single global organization. All of manufacturing facilities share a unified global quality policy and have QHSE Policy, ISO 9001, ISO 14001 and OHSAS 18001 certifications.

The Tenaris industrial center in Mexico is TenarisTamsa. It is one of the largest in the world in the manufacture of steel tubes for the energy industry and others with an annual global production capacity of 1.2 million tons of seamless steel.

In its segment of mechanical and structural tubes, tubular products produced are used in standard mechanical engineering applications, as well as in civil and industrial installations, and for the manufacture of earthmoving machinery, architectural structures, non-oil drilling systems, among other.

The structural tube, object of this study, is a product for civil structure with characteristics and specific mechanical properties for its final application.

This EPD is representative for seamless steel structural tubes used in the construction industry manufactured in TenarisTamsa (Mexico) during 2017. Primary data come from TenarisTamsa production site and cover a range of outside diameters. Life Cycle Inventory was produced for the reference product produced for year 2017.



## TAMSA-MEXICO

**Core business:** seamless steel tubes for energy industry.  
**Production capacity:** 1 230 000 tons of seamless steel tubes.  
**Main features:** 1 steel shop, 3 rolling mill.  
**Certifications:** Clean Industry, ISO 9001, ISO 14001 and OSHAS 18001

# Tenaris Group

Tenaris produces a large range of dimensions in tubular structural hollow sections. This EPD is representative for Tenaris seamless steel structural tubes in different steel grades, for use in construction with applications in civil structures including stadiums, bridges, airports, hangars, commercial buildings among others that require light structures to sustain high loads. Its properties of compression, traction and buckling capacity, combined with the use of different materials, allow different shapes, colors, uses and sizes, ideal for design. The size of the product is based on the requirements of the project.

Due to excellent mechanical characteristics, very good weldability and geometric tolerances, steel tube for engineering applications are ideal for those types of constructions where light weight, high load-bearing structures with a contained overall weight are required.

Steel can be reused many times without losing its properties. Tenaris structural tube has a high content of recycled material thereby energy efficiency and environmental impact are favored.

The range of dimensions of the structural tube is wide, the measurements of wall thickness fluctuate from 4 to 10 mm and the size of the external diameters from 48.3 to 711 mm, in accordance with the ranges established in the standard EN 10210-2.

This Environmental Product Declaration (EPD) is in accordance with ISO 14025 and EN 15804. EPD of constructions products may not be comparable if they do not comply with EN 15804 Sustainability of constructions works – Environmental product declarations – Core rules for product category of construction products.



# Scope and type of EPD®

The approach of this EPD is from the cradle to gate, as system boundary. Excluded lifecycle stages are construction process, use and end-of-life.

TABLE OF MODULES																
PRODUCT STAGE			CONSTRUCTION PROCESS STAGE		USE STAGE							END OF LIFE STAGE				BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARIES
Raw material supply	Transport	Manufacturing	Transport from the gate to the site	Assembly	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De- construction demolition	Transport	Waste processing	Disposal	Reuse - Recovery - Recycling potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND	MND

**SOFTWARE:** SimaPro ver. 8.3.00

**MAIN DATABASE:** Ecoinvent 3.3

**REPORT LCA:** Life Cycle Assessment applied to seamless steel structural tube for EPD® purposes

**GEOGRAPHICAL SCOPE OF THE EPD:** World according to sales market conditions

**TYPE OF EPD:** Representative for one ton of seamless steel structural tube.

**CAPTION**

MND = Module Not Declared



# Detailed product description

INFORMATION	DESCRIPTION
PRODUCT IDENTIFICATION	Seamless steel structural tube
PRODUCT FEATURES	OD range from 48.3 to 711 mm and WT from 4 to 10 mm.
PRODUCT PROPERTIES	Steel grades and properties according to international standard EN 10210-1 and customer requirements
MANUFACTURING PLANT	TenarisTamsa

## PRODUCT COMPOSITION

**32.5%**  
IRON



**67.4%**  
STEEL SCRAP

None of the content of this product is in the "Candidate List of Substances of Very High Concern".



Derechos reservados por TenarisTamsa 2018 ©

# General Facturing Specification

## Detail Product Description

### STEEL SHOP

Furnaces in steel shop are loaded mostly by pre-selected scrap, pig iron and hot briquetted iron. Metallic charge is melted by an electric arc and by the use of chemical energy coming from natural gas, coal and oxygen.

Once the slag has been removed the liquid steel at a temperature of around 1 650°C is poured into the ladle. In the ladle furnace argon bubbling, addition of ferroalloys and temperature recovering operations are carried out.

Continuous casting transforms liquid steel into round section solid bars for subsequent rolling. All production processes in the steel shop are controlled by an integrated system including the furnace power management, the furnace fumes emissions, the addition of ferroalloys to reach the required chemical composition, and the control of the casting parameters until the cut-to-length of the bars.

### MANDREL ROLLING

After passing through a rotary hearth furnace, the bars are transferred to the hot rolling mill in order to carry out the piercing process, thickness rolling and diameter sizing.

The piercing process transforms the hot bar into a hollow. The bar turns due to the movement of tow skewed opposing rollers.

As a result of the internal tension generated, a hollow is created in the center of the bar. Lamination takes place in order to reach final dimensions in terms of length and thickness according to customer's request.

### HEAT TREATMENTS

In order to obtain the required mechanical properties, heat treatment of normalizing or quenching and tempering are performed depending on tube dimensions.

### FINISHING

Tube is finalized in the finishing lines that include the placement of couplings, calibration, identification, varnishing and packaging with a performing combination of non-destructive testing to guarantee high quality of the product.

Coating may be applied according to customer's request.





# Environmental Performance

Detailed environmental performance (in terms of potential environmental impacts, use of resources and waste generation) is presented for the product stage that includes the modules A1 RAW MATERIALS SUPPLY, A2) TRANSPORT and 3) MANUFACTURING.

## DECLARED UNIT:

The declared unit is one ton of seamless steel structural tube.

ENVIRONMENTAL IMPACTS					
POTENTIAL ENVIRONMENTAL IMPACTS	UNITS / D.U.	PRODUCT PHASE			TOTAL
		A1 RAW MATERIALS 1 SUPPLY	A2 TRANSPORT	A3 MANUFACTURING	
GWP	kg CO <sub>2</sub> eq	1 085	167	464	1 716
ODP	g CFC 11eq	0.18	0.03	0.01	0.22
AP	g SO <sub>2</sub> eq	5 662	1 626	815	8 103
EP	g PO <sub>4</sub> <sup>3-</sup> eq	1 180	216	288	1 684
POCP	g C <sub>2</sub> H <sub>4</sub> eq	572	66	79	717
ADPE	g Sb eq	5.98	0.19	0.16	6.33
ADPF	MJ	21 462	2 551	1 463	25 476
WS	m <sup>3</sup> eq	9.20	4.70	19.0	32.9

**GWP** Global warming potential

**ODP** Depletion potential of the stratospheric ozone layer

**AP** Acidification potential of land and water

**EP** Eutrophication potential

**POCP** Formation potential of tropospheric ozone photochemical oxidants

**ADPE** Abiotic depletion potential for non-fossil resources

**ADPF** Abiotic depletion potential for fossil resources

**WS** Water scarcity

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. 2018).

Impact categories declared in this EPD are mandatory according PCR 2012-01 v2.3 Construction products and construction services demands. Water scarcity was included as an additional indicator because Mexican steel sector is measuring this impact.



RESOURCE USE PER DECLARED UNIT					
USE OF RENEWABLE AND NON-RENEWABLE RESOURCES	UNITS / D.U.	PRODUCT PHASE			TOTAL
		A1 RAW MATERIALS 1 SUPPLY	A2 TRANSPORT	A3 MANUFACTURING	
PERE	MJ	364	51	154	569
PERM	MJ	0	0	0	0
PERT	MJ	364	51	154	569
PENRE	MJ	21 778	2 619	1 843	26 239
PENRM	MJ	0	0	0	0
PENRT	MJ	21 778	2 619	1 843	26 239
SM	kg	0	0	764	764
RSF	MJ	0	0	0	0
NRSF	MJ	0	0	0	0
FW	m <sup>3</sup>	2.70	0.50	5.40	8.60

**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 resources

**SM** Use of secondary raw materials

**RSF** Use of renewable secondary fuels

**NRSF** Use of non-renewable secondary fuels

**FW** Use of net fresh water

Resource use indicator were calculated with Cumulated Energy Demand method version 1.08 (Frischknecht et al. 2003) and ReCiPe Midpoint version 2016 (Huijbregts et al. 2016) for use of net fresh water.

OUTPUT FLOWS AND WASTE CATEGORIES PER DECLARED UNIT					
WASTE GENERATION AND TREATMENT	UNITS / D.U.	PRODUCT PHASE			TOTAL
		A1 RAW MATERIALS 1 SUPPLY	A2 TRANSPORT	A3 MANUFACTURING	
HWD	kg	0.08	1.46E-03	0.05	0.13
NHWD	kg	31	119	19	169
RWD	kg	0.01	0.02	0.01*	0.04
CRU	kg	0	0	0	0
MFR	kg	0	0	19.5	19.5
MER	kg	0	0	15.0	15.0
EET	MJ	0	0	0	0

\*They relate only to the generation of waste during the procurement of auxiliary supplies such as gases, packaging, transport and waste treatment and others.

**HWD** Hazardous waste disposed

**NHWD** Non-hazardous waste disposed

**RWD** Radioactive waste disposed

**CRU** Components for re-use

**MFR** Materials for recycling

**MER** Materials for energy recovery

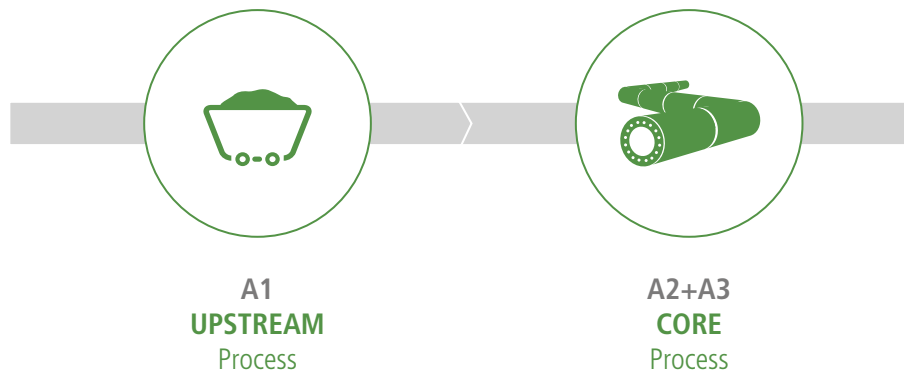
**EEE** Exported electrical energy

**EET** Exported thermal energy

Output flows and waste categories were calculated with EDIP 2003 version 1.06 method (Hauschild and Potting, 2005) and from TenarisTamsa information.

# Calculation Rules

According to the PCR 2012:01 v.2.3, the main activities from the product stage are listed and divided in three modules: UPSTREAM process (A1 RAW MATERIALS SUPPLY) and CORE process (A2 TRANSPORT and A3 MANUFACTURING)



## LCA METHODOLOGY

The environmental burden of the product has been processed according to the general rules of the EPD (Environmental Product Declaration) International Programme and the N.PCR 2012:01 (versions 2.3), construction products and construction services - Multiple UN CPC codes (Cradle to gate with options). This declaration is based on the application of Life Cycle Assessment (LCA) methodology to the whole life-cycle system. Seamless steel structural tube at plant level, was described by using specific data from Tenaris Tamsa manufacturing facility for year 2017.

Customized LCA questionnaires were used to gather in-depth information about all aspects of the production system (for example, raw materials specifications, pre-treatments, process efficiencies, air emissions, waste management), ultimately providing a complete picture of the environmental burden of the system: Raw materials supply (A1), Transport (A2) and Manufacturing (A3).

### CUT-OFF CRITERIA

A minimum of 95% of the total flows (matter and energy) in modules A1 and A3 modules were included. Company infrastructure, employee's transportation and administrative activities were kept out of the scope of this study.

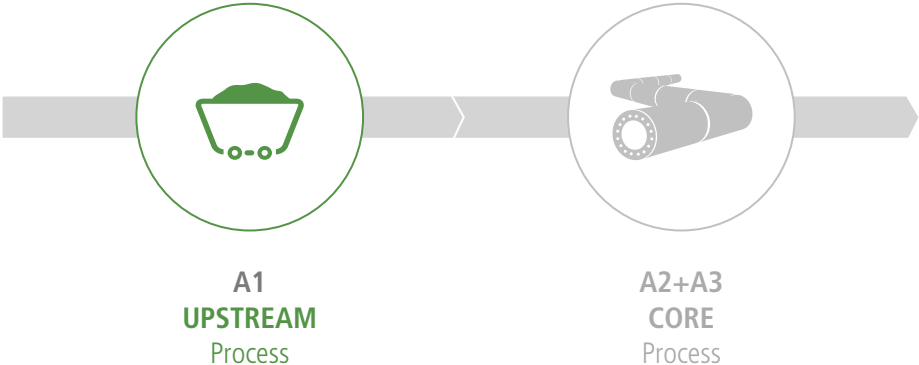
### ALLOCATION

Allocation of inputs and outputs of the system between product and coproducts was based on a mass relation, considering the quantity produced per year of each product and coproduct at the level of unit process. This procedure was used in the same way for material flows as for the energy flows along the modules evaluated for the structural tube.

# Upstream Process

## (A1 RAW MATERIALS SUPPLY)

According to the PCR 2012:01 v.2.3. the main activities from the product stage are listed and divided in three modules: UPSTREAM process (A1 RAW MATERIALS SUPPLY) and CORE process (A2 TRANSPORT and A3 MANUFACTURING)



POST AND PRE-CONSUMER  
STEEL SCRAP COLLECTION



GENERATION OF ELECTRICITY



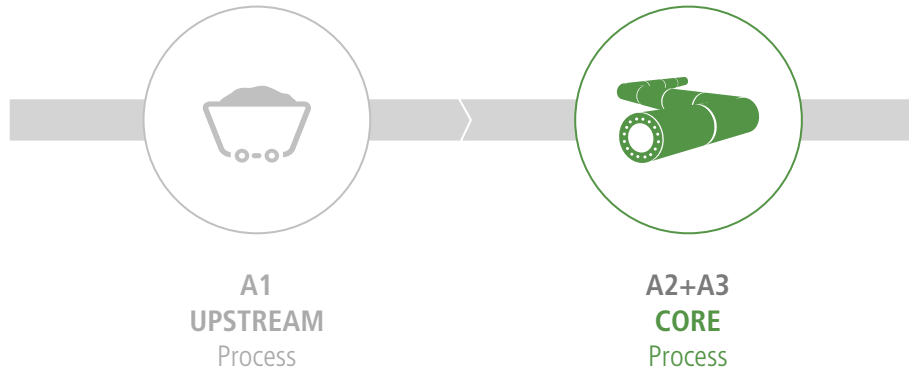
EXTRACTION AND PROCESSING  
OF RAW MATERIALS

EXTRACTION AND PROCESSING OF  
NATURAL GAS FOR CORE ENERGY DEMAND

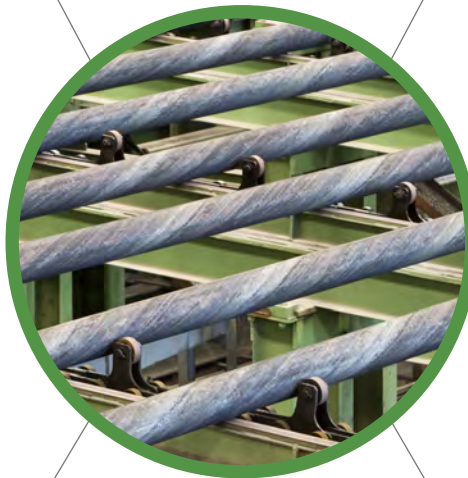


# Core Process

(A2 TRANSPORTATION + A3 MANUFACTURING)



RAW AND ANCILLARY  
MATERIALS TRANSPORT AND  
INTERNAL TRANSPORT



TREATMENT PROCESS  
OF WASTE GENERATED BY THE  
MANUFACTURING PROCESS



EMISSIONS TO  
AIR AND WATER



MANUFACTURING PROCESS  
INCLUDING STEEL MILL,  
ROLLING MILL, THERMAL  
TREATMENT AND  
FINISHING PROCESS

ANCILLARY  
PRODUCTION



# Additional Information

Tenaris is committed to minimizing the environmental footprint of its operations and products.

The company has obtained a multisite certification of its environmental management system according to ISO 14001 standards. Tenaris is committed to building a culture of transparency and integrity based on ethical behavior and compliance with the law. The company believes that this is essential for the sustainability of the activities.

## TENARIS

Applies Best Available Technologies on the design of new lines and the steel making production technology is 100% Electric Arc Furnace.

## SCRAP RECYCLING

Is one way to minimize the environmental footprint of Tenaris operations, and an important opportunity for the steel industry to contribute to the emission reduction. Scrap is the main prime material used in Tenaris steel making process, all scrap from steel and downstream pipe production is collected and reused, as well as post-consumer scrap. Scrap used is classified in different types to allow the most efficient charge bucket preparation.

## TENARIS STEEL MILLS

Have continuous emission monitoring systems for particulate material emissions in order to efficiently control emission levels and filters performance. Tenaris plants capture systems are under an investment to improve its efficiency. Besides that, the particulate material limits defined in Tenaris procedures are stricter than those in the local regulation.

## DIOXINS EMISSIONS

Are monitored in the steel mill.

## SLAGS AND SCALE MILL

Are co-product for steel operation sold as inert material for construction applications, cement production and other operations.

## MANY OF TENARIS FURNACES

Have low-NOx high efficiency burners, which allow lower emission levels, better combustion and improved gas consumption efficiency.

## WATER RECYCLING

Tenaris sites have water recycling systems.

## TENARIS PROCESSES

Are energy intensive, that is why production sites have in place programs in order to control and maximize energy efficiency both in terms of electricity and natural gas, the two energy sources Tenaris uses.

## TENARISTAMSA PLANT

The last rolling mill, heat treatment and finishing lines built that started to operate in 2012 obtained the LEED certification.

## REFERENCES

- ISO 14025:2010
- ISO 14040:2006
- ISO 14044:2006
- EN15804:2014

- PCR 2012:01, "Construction products and construction services", v.2.3, 2018

- "Life Cycle Assessment applied to seamless steel structural tube"





