

# STAINLESS STEEL AND HIGH NICKEL ALLOYS TUBULAR SOLUTIONS





# Index



## TUBACEX: GLOBAL SOLUTIONS PROVIDER

Products and Applications	2
Group Companies	4

## PORTFOLIO

Stainless Steel Bars and Billets	6
Seamless Pipes and Tubes - Extrusion/Cold Drawing	8
Mechanical Tubes	10
Big Outside Diameter Seamless Pipes and Tubes	11
Fittings and Special Components	12

## CAPABILITIES

Innovation	14
Service	15
Quality	16

## CONTACT

Worldwide Presence	17
Production and Service Centers	17
Main Offices	18

# A Global Leader in Seamless Stainless and High Nickel Alloys Pipes and Tubes

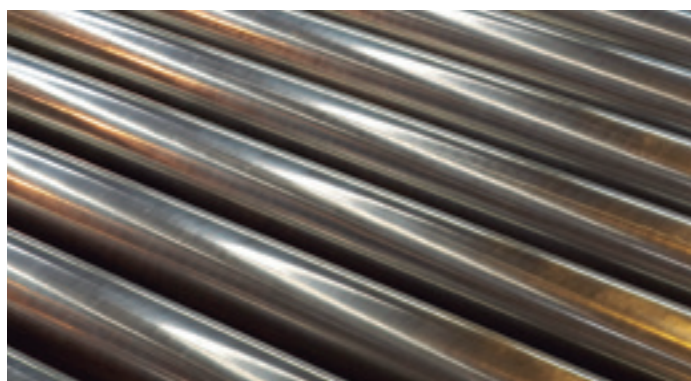
The Tubacex Group has become one of the world's main Seamless Stainless Steel and Nickel Alloy tubular solutions providers.

Founded in 1963, Tubacex brings the experience of a world leader combined with a strong R&D effort which is needed to fulfill the future needs of the industry.

The Tubacex Group, exporting into more than 100 countries worldwide, has a share of around 15% of the world market of Seamless Stainless Steel tubular solutions, with a total workforce of around 2.400 employees. The headquarters are located in Llodio, 25 Km (15 miles) from the seaport city of Bilbao, in northern Spain. The Tubacex Group's integrated production process includes a steel making plant, several extrusion and cold finishing mills, trepanning facilities, fitting and special components producers and wide network of service centers which provide a wide range of added value operations to the group's portfolio.



## Tubacex: a global integrated Group at your Service



### STAINLESS STEEL AND HIGH NICKEL ALLOYS INGOTS, BARS AND BILLETS

Stainless Steel and High Nickel Alloy long products are produced by the Group's subsidiary Acerálava, either rolled or forged up to 20":

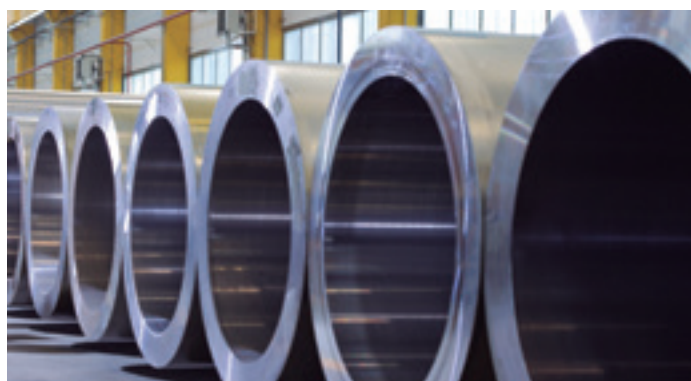
- Round bar
- Round billet
- Square billet
- Ingot



### SEAMLESS PIPES AND TUBES EXTRUSION/COLD DRAWING

Seamless pipes up to 8" are the bulk of Tubacex portfolio, with focus in Stainless Steel and High Nickel Alloys materials. This includes:

- Pipes and tubes for several applications
  - Straight / U-bended tubes
  - Welded and coiled seamless tubes (for umbilical application)
- Mechanical tubing



### BIG OUTSIDE DIAMETER SEAMLESS PIPES AND TUBES

The Tubacex Group completes its seamless portfolio with trepanning/boring technology that expands manufacturing range to 72" OD, in all materials from carbon steel to titanium – with main focus in Stainless Steel and High Nickel alloys.



### FITTINGS AND SPECIAL COMPONENTS

The Tubacex Group's range includes the design and manufacturing of butt welding fittings, tube bends, elbows, tees, reducers and caps (both seamless and welded), complementing the wide offer of tubular solutions, in a complete manufacturing range that goes up to 72" in any thickness.

**IN ADDITION TUBACEX OFFERS NEW SOLUTIONS, VALUE ADDED OPERATIONS AND SERVICES AS MACHINING, REPAIR, DESIGN, SIMULATION, CERAMIC COATING....**



### Worldwide presence

Through our commercial offices

### Competitiveness

Thanks to our lean manufacturing process

### Service

Cooperation with our customers

### Flexibility

In materials chemical composition & deliveries

### Reliability

Of a fully integrated company

Our Customers are the main driver of The Tubacex Group's activity and efforts. Our organization and investments are continuously adapting to fulfill the increasing requirements that companies are facing everyday in high demanding activities in the oil & gas, petrochemical, chemical and power generation industries, amongst others. These new challenging needs are driving us to implement in our mills the most advanced verification equipment and inspection procedures to assure product quality and a high service, guaranteed by a fully integrated company with a worldwide presence.



## OIL AND GAS EXPLORATION AND PRODUCTION

New challenging corrosive environments and applications are driving Tubacex product portfolio of corrosion resistant alloys in both on-shore and off-shore E&P, with a particular focus in:

- Oil Country Tubular Goods (OCTG)
- Umbilical tubes along with a wide range of Seamless Stainless and High Nickel Alloys for subsea application (risers, flowlines, manifolds...)
- Tubes for platforms (piping systems, separators...).



## REFINING, PETROCHEMICAL AND CHEMICAL

Tubacex offers an extensive grade and size portfolio to achieve designers expectations regarding several areas and equipments in the Petrochemical and Chemical industry, particularly:

- Regas Facilities
- Refineries
- Heat exchangers
- Reactors
- Furnaces, Heaters and Re-Heaters
- Other process industries.



## FERTILIZER PRODUCTION

Fertilizer production materials need to bear severe corrosion conditions. Tubacex provides pipes & tubes for the equipment involved in the production of Urea, Ammonia, Nitric acid, Sulphuric acid, Phosphoric acid and Melamine.

- Strippers
- Condensers
- Scrubbers
- Reactors
- Piping



## POWER GENERATION

Tubacex's manufacturing range covers the main stainless steel heat resistant grades used in boiler equipment, in both:

- Critical equipment
- Ultra Super Critical (USC) equipment
- Industrial power plants
- Nuclear power plants.









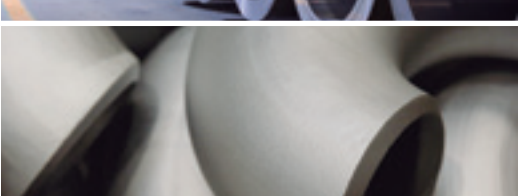















## TRANSPORTATION & NEW INDUSTRIES

Tubacex's portfolio covers a wide range of applications in transportation and new industries:

- Hollow Bars for metal-mechanic industries
- Machined Parts
- Instrumentation and hydraulic tubing for a wide range of high added value industries, including automotive and aerospace
- Tubular Solutions for new energies (Hydrogen, Solar...)

# The Widest Portfolio in Stainless Steel

## A truly global solutions provider at your service

	SOLUTIONS	BUSINESS UNIT
	Stainless Steel and High Nickel alloys bars and billets	<b>ACERALAVA</b> 
	Seamless Pipe and Tubes to 8" (extrusion, piercing, cold finishing)	<b>TTI</b> 
		<b>SCHOELLER BLECKMANN</b> 
		<b>SALEM TUBE</b> 
		<b>TUBACEX DURANT</b> 
	Seamless Pipe and Tubes to 72"	<b>TUBACEX INDIA</b> 
	Fittings and special connections from 1/2" to 72"	<b>IBF</b> 
	Stainless Steel Machined Parts	<b>TTA</b> 
	Value added operations and services	<b>AWAJI STAINLESS</b> 
	Stock, service and trading	<b>NTS</b> <small>Group SENAAT - TUBACEX JV</small>
		<b>TUBACEX UPSTREAM TECHNOLOGIES</b> 
		<b>TUBACEX SERVICES</b> 
		<b>TUBACOAT</b> 
		<b>TSS</b> 

## RANGE

### Round and Square Stainless and Nickel Alloy Billets

Rolled from 120 to 280 mm (4 ¾" - 11")

Forged from 230 to 508 mm (9" - 20")

Acerálava is the main steel supplier of the Tubacex Group's companies. It also supplies its products to the Stainless Steel Market. Acerálava's manufacturing range covers the main stainless steel grades requested by the industry, with exceptions possible on request.

### Seamless Stainless Steel and Nickel Alloy tubes and pipes

The size manufactured through the extrusion press and the 11 cold rolling machines, goes from ½" up to 8" NPS, or 19 - 250 mm OD, at manufacturing facilities located at Llodio and Amurrio (Spain).

A specific line is fully devoted to OCTG (Oil Country Tubular Goods) manufacturing, in a range that goes to 9 5/8" (currently in trial).

### Seamless Stainless Steel pipes and tubes

Schoeller Bleckmann Edelstahlrohr, located in Ternitz, Austria, manufactures Seamless Stainless Steel in dimensions between 1/8" and 8" NPS, or 6 - 250 mm OD. A specific plant is devoted to special tube manufacturing, with focus in straight and welded tubes for umbilical application and other high demanding applications (Nuclear, Fertilizer).

### Welded and Seamless Stainless Steel and Nickel Alloy tubes.

Located in Greenville, PA (USA) Salem tube's manufacturing range goes from 1/8" to 2" OD.

The company is highly specialized in precision tubing for the most demanding industries such as military and aerospace, with a heavy concentration of high nickel alloy in their product portfolio.

### Straight and coiled cold finished stainless steel and nickel alloy tubes

Tubacex Durant is located in Durant Oklahoma and is dedicated to making standard instrumentation (straight and coiled) tubing and heat exchanger tubing ranging in sizes from 0.250" OD to 1.660" OD. This purpose-built facility, equipped with its own lab, was created to serve the US market's growing demand for precision tubing in corrosion resistant alloys.

### Seamless Stainless Steel tubes and pipes

Located in Umbergaon (Gujarat- India), Tubacex India manufactures cold finished tubes and pipes from 6 mm OD to 273.1 mm OD

The company is able to deliver tubes up to 28 m (length), straight and U-Shape, to a wide range of customers. The company is ISO 9000 and ISO 14000 certified.

### Mechanically bored tubes

Located in Vittuone, Italy, IBF pipes division manufactures mechanically bored tubes up to 72" in any wall thickness.

### Fittings

Located in San Niccolo, Italy, IBF fittings and special parts division manufactures fittings, elbows, and special components in a manufacturing range that goes from ½" to 72" NPS.

### Stainless steel (also carbon and alloy) butt welding fittings

Size range goes from 1 ½" up to 12" NPS, in short and long radius as well as in special radii. Located in Artziniega, Spain, Tubacex Taylor Accesorios (TTA) manufactures fittings (elbows and return bends) mainly for the Petrochemical industry, perfectly complementing the portfolio of the rest of The Group.

### Stainless Fittings

Located in Amphur Muang-Samutprakarn, Thailand, Awaji Stainless manufactures stainless fittings (seamless and welded) in austenitic grades from 1/2" to 12". The company is able to manufacture in both ASTM and JIS standards - for the high quality demanding Japanese market.

### Stainless steel machined parts manufacturing and repair

Boasting over two decades of experience in the oil&gas industry, NTS Group (with plants in UAE, Saudi Arabia, Norway, USA, Canada and Singapore) develops solutions which minimize turnaround times, extend the life and availability of equipment and optimize costs while ensuring adherence to the highest levels of quality: Specialized repairs to extend life and availability of Measuring While Drilling (MWD), Logging while drilling (LWD), non-mag drill collars and other drilling accessories. Manufacture of complex components for drilling, topside, subsea and process systems, using conventional and Additive Manufacturing techniques

### OCTG added value operations

Located in Spain, Tubacex Upstream Technologies provides worldwide OCTG value added operations.

### Value added services applied to tubular products

Tubacex Services is a company devoted to service and customized solutions applied to steel products. The company provides complete project management improving organizational efficiency working collaboratively with key industry stakeholders, cultivating win-win relationships.

### Ceramic coating

Tubacoat is an innovative ceramic coating applicable to long steel and high-nickel alloy products which increases the useful life of petrochemical refinery processing units. In-house developed industrial process allows the application of thin tailor made ceramic coatings to steel tubes, bars or open profiles that result in added-value products with outstanding abrasion resistance (64HRC hardness) and corrosion resistance in different media and thermal conditions, as well as anti-adherent and anti-fouling properties.

### Stainless Steel long products distribution

Service centers located in Spain, France, Austria, the United States, Brazil, China, India, Dubai and Norway.



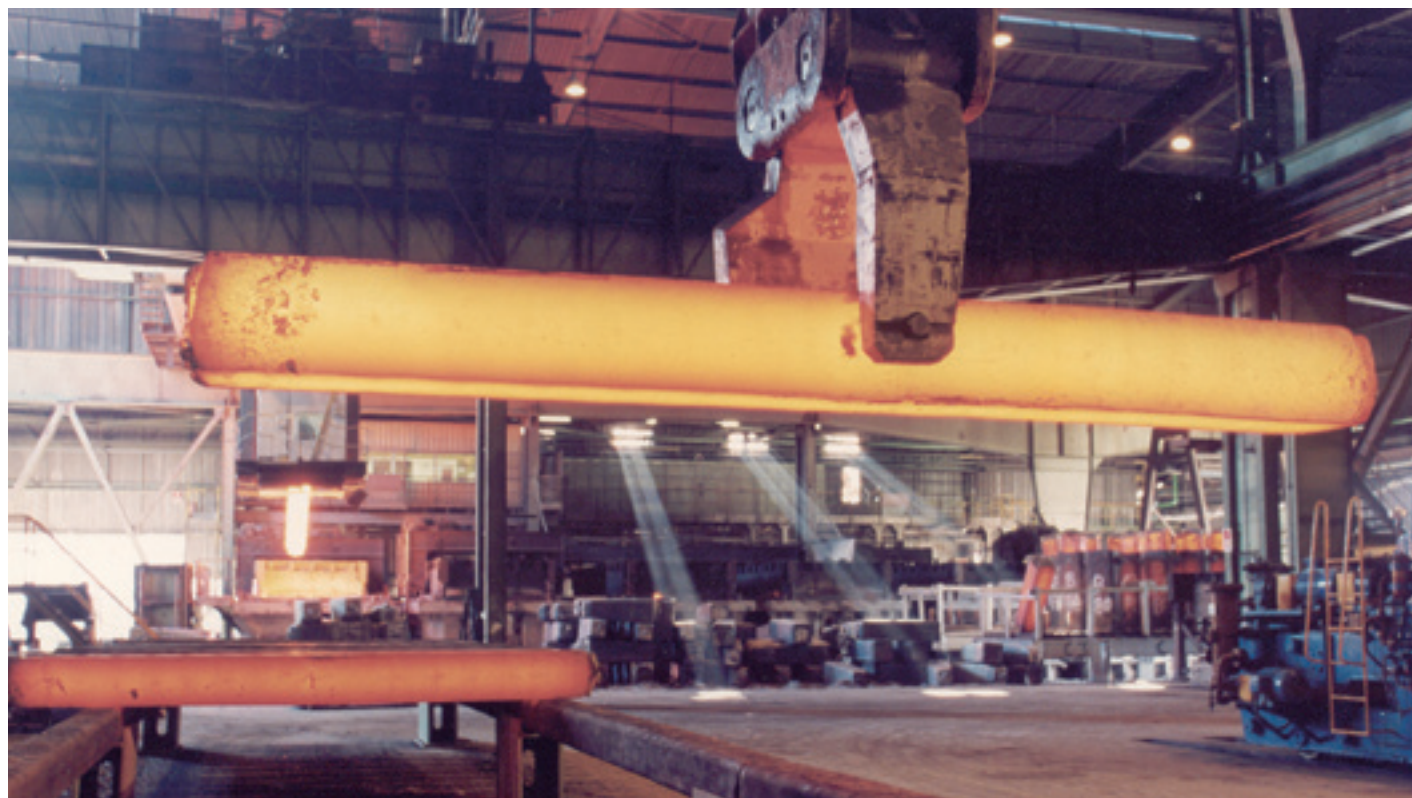
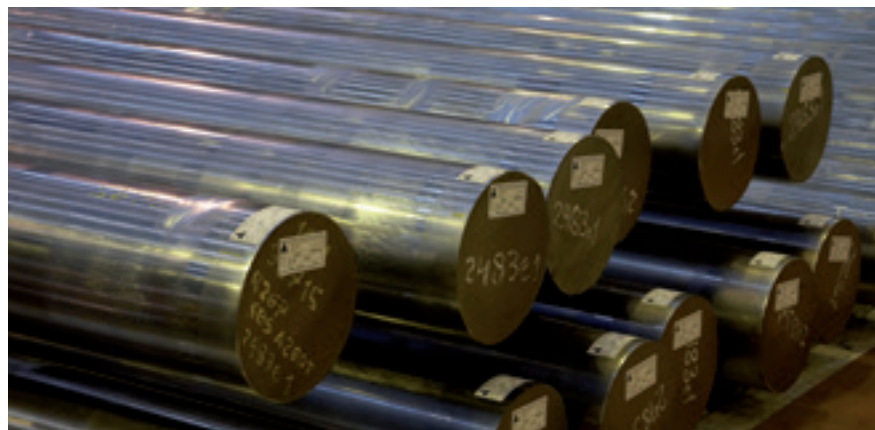
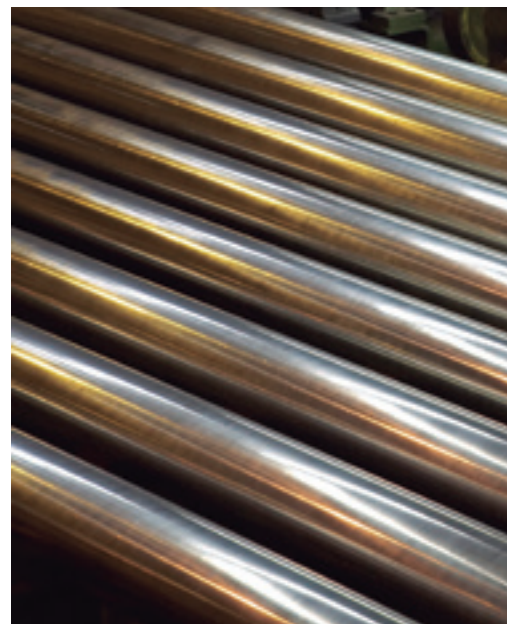
# Stainless Steel Bars and Billets

Acerálava is The Tubacex Group's steel melting shop, which provides the bulk of raw material supply for the rest of the Group's manufacturing units. In addition, Acerálava offers a wide stainless steel portfolio to our customers.

Acerálava's product range includes stainless steel long products such as square and round bars, billets and ingots, rolled and forged. Our standard portfolio can be defined as follows:

ROUNDS BARS & BILLETS			
Products	Size range	Condition	Grades
●	165 mm. up to 230 mm. (6 1/2" - 9")	Rolled	Martensitics Austenitics Ferritic - Austenitics High Nickel Alloys
●	230 mm. up to 500 mm. (9" - 19 3/4")	Forged	

SQUARE BILLETS			
Products	Size range	Condition	Grades
■	120 mm. up to 280 mm. (4 3/4" - 11")	Rolled	Martensitics Austenitics Ferritic - Austenitics High Nickel Alloys
■	280 mm. up to 508 mm. (11" - 20")	Forged	





# Stainless Steel Bars and Billets

Acerálava's manufacturing range covers the main stainless steel grades requested by the industry and a tailor made list of steels. Our metallurgical engineers are devoted to the development of sophisticated steels capable of operating in the demanding environments of the future. Exceptions over the standard steel grades can be met upon request.



## STAINLESS STEEL GRADES

	ASTM	WNr	AFNOR	C max*	Cr	Ni	Mo	Other
AUSTENITIC	304	1.4301	TU Z 6 CN 18-09	0,08	17/20	8/11		
	304 L	1.4306	TU Z 2 CN 18-10	0,03	18/20	10/12		
	304 L	1.4307	TU Z 3 CN 19-09	0,03	17,5/19,5	8/10,5		
	304 H		TU Z 6 CN 19-10	0,04/0,10	18/20	8/11		
	TX304HB**	1.4907		0,07	17/19	7,5/10,5		Nb 0,3/0,6 Cu 2,5/3,5
	321	1.4541	TU Z 6 CNT 18-10	0,08	17/19	9/12		5 C < Ti ≤ 0,60
	321 H		TU Z 6 CNT 18-12 B	0,04/0,10	17/20	9/13		4 C < Ti ≤ 0,60
	347	1.4550	TU Z 6 CNNb 18-10	0,08	17/19	9/12		10 C < Nb ≤ 1,0
	347 H		TU Z 6 CNNb 18-12 B	0,04/0,08	17/20	9/13		8 C < Nb ≤ 1,0
	347 H FG	1.4908		0,07	17/19	9/13		8 C < Nb ≤ 1,1
	316	1.4401	TU Z 6 CND 17-11	0,08	16/18	11/14	2/3	
	316 L	1.4404	TU Z 2 CND 17-12	0,03	16/18	11/14	2/3	
	316 Ti	1.4571	TU Z 6 CNDT 17-12	0,08	16,5/18,5	10,5/13,5	2/2,5	5 C < Ti ≤ 0,80
	(316 L)	1.4435	TU Z 2 CND 17-13	0,03	17/18,5	12,5/15	2,5/3	
	(316)	1.4436	TU Z 6 CND 17-12	0,07	16,5/18,5	11/14	2,5/3	
	316 Nb	1.4580		0,08	16/18	11/13	2/2,5	10 C < Nb < 1,0
	316 N/316 LN			0,03	16/18	11/14	2/3	N 0,10/0,16
	316 L urea			0,03	17/18	13/15	2/3	
	317							
	317 L	1.4438		TU Z 2 CND 19-15	0,08	18/20	11/15	3/4
309 S/309 H	1.4833		TU Z 12 CN 24-12	0,08	22/24	12/15	≤ 0,75	
310 S/310 H	1.4845		TU Z 12 CN 25-20	0,08	24/26	19/22	≤ 0,75	
310 HCbN	1.4952			0,07	24/26	19/22		0,2 < Nb ≤ 0,6
310 MoLN	1.4466			0,02	24/26	21/23	2/2,5	N=0,1/0,15 Si<0,4 P<0,02
	1.4828		TU Z 17 CNS 20-12	0,20	19/21	11/13		Si 1,5/2,5
314	1.4841		TU Z 15 CNS 25-20	0,15	24/26	19/21		Si 1,5/2,5
UNS S31254	1.4547			0,02	19,5/20,5	17,5/18,5	6,0/6,5	Cu 0,50/1,00 N 0,18/0,22
FERRITIC AUSTENITIC	UNS S31803	1.4462	TU Z 2 CND 22-05-03	0,03	21/23	4,5/6,5	2,5/3,5	N 0,12/0,20
	UNS S32750	1.4410			24,0/26,0	6,0/8,0	3,0/5,0	
	UNS S32760	1.4501	TU Z 3 CND 25-06-Az	0,03	24/26	6/8	3/5	N 0,2/0,3 Cu & W 0,5/1,0
HIGH NICKEL	904 L	1.4539	TU Z 1 CNDU 25-20	0,02	19/21	24/26	4/5	Cu 1,20/2,00 N 0,04/0,10
	800-H-HT	1.4876	(TU Z10 NC 32-21)	0,6/0,10	19/23	30/35		Al & Ti 0,15/0,60
	UNS N08020	2.4660		0,07	19/21	32/38	2/3	Cu 3/4 Nb 8xC-1,0 Fe Balance
	UNS N08825	2.4858		0,05	19,5/23,5	38/46	2,5/3,5	Cu 1,5/3,0 Al 0,2 max Ti 0,6/1,2 Fe Balance
	UNS N08028	1.4563	TU Z2 CNDU 31-27	0,03	26/28	30/32	3/4	Cu=0,8/1,4 N=0,04/0,15 Fe Balance
G-3 N06985					21,0/23,5	44,0/52,0	6,5/8,0	Fe: 18,0/21,0

\* Maximum unless otherwise indicated. \*\* Tubacex name.

In addition to these standards, Tubacex's capabilities include a wide range of stainless steel and high nickel alloy grades depending on our customers' requirements.

# Seamless Pipes and Tubes Extrusion / Cold drawing

The Tubacex Group has an extensive manufacturing program for Stainless Steel and Nickel Alloys Seamless pipes and tubes covering most dimensions and grades required by the industry. Seamless Stainless Steel Tubing can be hot or cold finished, covering the following range:

## MANUFACTURING RANGE

OUTSIDE DIAMETER		HOT MANUFACTURING DIMENSIONS																																																															
		WALL THICKNESS																																																															
ASTM A 312 ASME B.36.10		Inch	0,120	0,126	0,133	0,134	0,140	0,145	0,148	0,154	0,179	0,191	0,200	0,203	0,216	0,218	0,226	0,237	0,250	0,258	0,276	0,280	0,281	0,300	0,318	0,322	0,337	0,344	0,375	0,406	0,432	0,438	0,500	0,531	0,562	0,625	0,719	0,906	1,000	Inch																									
		mm	3,05	3,20	3,38	3,40	3,56	3,68	3,76	3,91	4,55	4,85	5,08	5,16	5,49	5,54	5,74	6,02	6,35	6,55	7,01	7,11	7,14	7,62	8,08	8,18	8,56	8,74	9,52	10,31	10,97	11,13	12,7	13,49	14,27	15,88	18,26	23,10	25,40	mm																									
NPS	Inch	mm	DIN mm																															DIN mm																															
	1,496		38,0																															38,0																															
	1,575		40,0																															40,0																															
1 1/4	1,660	42,16	42,4						40						80						160											42,4																																	
	1,752		44,5																															44,5																															
1 1/2	1,900	48,26	48,3						40						80						160											48,3																																	
	2,008		51,0																															51,0																															
	2,126		54,0																															54,0																															
	2,244		57,0																															57,0																															
2,0	2,375	60,33	60,3											40											80											160											60,3																		
	2,500		63,5																															63,5																															
	2,756		70,0																															70,0																															
2 1/2	2,875	73,03	76,1											40											80											160											76,1																		
3,0	3,500	88,9	88,9											40											80											160											88,9																		
3 1/2	4,000	101,60	101,6											40											80											160											101,6																		
	4,252		108,0																															108,0																															
4,0	4,500	114,30	114,3											40											80											160											114,3																		
	5,236		133,0																															133,0																															
	5,500		139,7																															139,7																															
5,0	5,563	141,3	141,3						10											40											80						120						160											141,3											
	6,260		159,0																															159,0																															
6,0	6,625	168,28	168,3						10											40											80						120						160											168,3											
	7,626		193,7																															193,7																															
8,0	8,625	219,08	219,1											10											40											60						80						120						160											219,1
	9,000		228,6																															228,6																															
	9,626		244,5																															244,5																															

Range of Tubacex Tubos Inoxidables and Schoeller Bleckmann Edelstahlrohr for austenitic hot manufactured tubes and pipes. Production according to main manufacturing standards (ASTM/ASME, EN and other international manufacturing standards). Non standard articles available upon request.

OUTSIDE DIAMETER		COLD MANUFACTURING DIMENSIONS																																																									
		WALL THICKNESS																																																									
ASTM A 312 ASME B.36.10		Inch	0,020	0,035	0,049	0,065	0,083	0,091	0,102	0,109	0,113	0,120	0,126	0,133	0,134	0,140	0,145	0,148	0,154	0,179	0,191	0,200	0,203	0,216	0,219	0,226	0,237	0,250	0,258	0,276	0,280	0,300	0,318	0,322	0,337	0,375	0,432	0,500	0,559	Inch																			
		mm	0,50	0,89	1,24	1,65	2,11	2,31	2,59	2,77	2,87	3,05	3,20	3,38	3,40	3,56	3,68	3,76	3,91	4,55	4,85	5,08	5,16	5,49	5,56	5,74	6,02	6,35	6,55	7,01	7,11	7,62	8,08	8,18	8,56	9,53	10,97	12,70	14,20	mm																			
NPS	Inch	mm	DIN mm																															DIN mm																									
	0,125	3,17	3,2																															3,0																									
	0,236		6,0																															6,0																									
	0,315		8,0																															8,0																									
1/8	0,405	10,29	10,2						10											40											80											160											10,2						
	0,472		12,0																															12,0																									
1/4	0,540	13,72	13,5						10											40											80											160											13,5						
	0,630		16,0																															16,0																									
3/8	0,675	17,15	17,2						10						40											80											160											17,2											
	0,748		19,0																															19,0																									
	0,787		20,0																															20,0																									
1/2	0,840	21,34	21,3						5						10											40											80											21,3											
	0,984		25,0																															25,0																									
3/4	1,050	26,67	26,9						5						10											40											80						160											26,9					
	1,181		30,0																															30,0																									
	1,260		32,0																															32,0																									
1,0	1,315	33,40	33,7						5						10											40											80						160											33,7					
	1,378		35,0																															35,0																									
	1,496		38,0																															38,0																									
	1,575		40,0																															40,0																									
1 1/4	1,660	42,16	42,4						5						10											40											80											160											42,4
	1,752		44,5																															44,5																									
1 1/2	1,900	48,26	48,3						5						10											40											80											160											48,3
	2,008		51,0																															51,0																									
	2,244		57,0																															57,0																									
2,0	2,375	60,33	60,3											10											40											80											160											60,3	
	2,500		63,5																															63,5																									
	2,756		70,0																															70,0																									
2 1/2	2,875	73,03	76,1						5						10											40											80						160											76,1					
3,0	3,500	88,90	88,9						5						10											40											80						160											88,9					
3 1/2	4,000	101,60	101,6											10											40											80											160											101,6	
	4,252		108,0																															108,0																									
4,0	4,500	114,30	114,3											10											40											80											160											114,3	
	5,236		133,0																															133,0																									
5,0	5,563	141,30	141,3											10											40											80						120						160											141,3
	6,260		159,0																															159,0																									
6,0	6,625	168,28	168,3											10											40											80						120						160											168,3
	7,626		193,7																															193,7																									
8,0	8,625	219,08	219,1											10											40											20						40						80											219,1

Range of Tubacex Tubos Inoxidables, Schoeller Bleckmann Edelstahlrohr, Salem Tube and Tubacex India for Austenitic cold manufactured tubes and pipes. Production according to main manufacturing standards (ASTM/ASME, EN and other international manufacturing standards). Non standard articles available on request.



# Seamless Pipes and Tubes Extrusion / Cold drawing

## WEIGHT PER METER CONVERSION

SEAMLESS PIPE															Wall thickness: Average	
APPROXIMATE WEIGHTS ACC. TO. ANSI / ASME B36.19 AND ASME B36.10 DIMENSIONS																
NPS	OD	Sch 5S		Sch 10S		Sch 40S		Sch 80S		Sch 120S		Sch 160S		XXS		
		Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	Wall	Wt	
	mm	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	mm	kg/m	
inch	inches	inch.	lb/ft	inch.	lb/ft	inch.	lb/ft	inch.	lb/ft	inch.	lb/ft	inch.	lb/ft	inch.	lb/ft	
1/8"	10.29	0.89	0.21	1.24	0.28	1.73	0.37	2.41	0.48							
	0.405	0.035	0.14	0.049	0.19	0.068	0.25	0.095	0.32							
1/4"	13.72	1.24	0.39	1.65	0.50	2.24	0.64	3.02	0.81							
	0.540	0.049	0.26	0.065	0.34	0.088	0.43	0.119	0.54							
3/8"	17.15	1.24	0.49	1.65	0.64	2.31	0.86	3.20	1.12							
	0.675	0.049	0.33	0.065	0.43	0.091	0.58	0.126	0.75							
1/2"	21.34	1.65	0.81	2.11	1.02	2.77	1.29	3.73	1.64			4.78	1.98			
	0.840	0.065	0.54	0.083	0.68	0.109	0.87	0.147	1.10			0.188	1.33			
3/4"	26.67	1.65	1.03	2.11	1.30	2.87	1.71	3.91	2.23			5.56	2.94			
	1.050	0.065	0.69	0.083	0.87	0.113	1.15	0.154	1.50			0.219	1.97			
1"	33.40	1.65	1.31	2.77	2.12	3.38	2.54	4.55	3.29			6.35	4.30	9.09	5.53	
	1.315	0.065	0.88	0.109	1.43	0.133	1.71	0.179	2.21			0.250	2.89	0.358	3.71	
1 1/4"	42.16	1.65	1.67	2.77	2.73	3.56	3.44	4.85	4.53			6.35	5.69	9.70	7.88	
	1.660	0.065	1.12	0.109	1.83	0.140	2.31	0.191	3.04			0.250	3.82	0.382	5.29	
1 1/2"	48.26	1.65	1.93	2.77	3.15	3.68	4.11	5.08	5.49			7.14	7.35	10.16	9.69	
	1.900	0.065	1.30	0.109	2.12	0.145	2.76	0.200	3.69			0.281	4.93	0.400	6.51	
2"	60.32	1.65	2.42	2.77	3.99	3.91	5.52	5.54	7.60			8.74	11.29	11.07	13.65	
	2.375	0.065	1.62	0.109	2.68	0.154	3.71	0.218	5.10			0.344	7.58	0.436	9.16	
2 1/2"	73.02	2.11	3.75	3.05	5.34	5.16	8.77	7.01	11.58			9.52	15.14	14.02	20.71	
	2.875	0.083	2.52	0.120	3.59	0.203	5.89	0.276	7.78			0.375	10.16	0.552	13.90	
3"	88.90	2.11	4.59	3.05	6.56	5.49	11.46	7.62	15.50			11.13	21.67	15.24	28.10	
	3.500	0.083	3.08	0.120	4.40	0.216	7.70	0.300	10.41			0.438	14.55	0.600	18.87	
3 1/2"	101.60			3.05	7.52	5.74	13.77	8.08	18.92			12.70	28.26	16.15	34.55	
	4.000			0.120	5.05	0.226	9.25	0.318	12.70			0.500	18.97	0.636	23.19	
4"	114.30			3.05	8.49	6.02	16.32	8.56	22.66	11.13	28.74	13.49	34.04	17.12	41.66	
	4.500			0.120	5.70	0.237	10.96	0.337	15.21	0.438	19.30	0.531	22.85	0.674	27.97	
5"	141.30			3.40	11.74	6.55	22.09	9.52	31.41	12.70	40.88	15.88	49.87	19.05	58.32	
	5.563			0.134	7.88	0.258	14.83	0.375	21.09	0.500	27.45	0.625	33.48	0.750	39.15	
6"	168.28			3.40	14.03	7.11	28.69	10.97	43.20	14.27	55.02	18.26	68.59	21.95	80.43	
	6.625			0.134	9.42	0.280	19.26	0.432	29.00	0.562	36.94	0.719	46.05	0.864	54.00	
8"	219.08			3.76	20.27	8.18	43.19	12.70	65.61	18.26	91.79	23.04	112.94	22.22	109.53	
	8.625			0.148	13.61	0.322	28.99	0.500	44.05	0.719	61.63	0.906	75.82	0.875	73.53	

For minimum wall according to ASTM A 213 add 10%

SEAMLESS TUBE																	Wall thickness: Average	
APPROXIMATE WEIGHTS ACC. TO. BIRMINGHAM WIRE GAUGE - BWG																		
inch	mm	mm inch	Birmingham Wire Gauge (BWG)															
			20	18	16	15	14	13	12	11	10	9	8	7	6	5	4	
			0,890 0,035	1,245 0,049	1,650 0,065	1,830 0,072	2,110 0,083	2,410 0,095	2,770 0,109	3,050 0,120	3,400 0,134	3,760 0,148	4,190 0,165	4,570 0,180	5,160 0,203	5,590 0,220	6,040 0,238	
1/4"	0,250	6,35	kg/m	0,12	0,16	0,19												
			lb/ft	0,08	0,11	0,13												
3/8"	0,375	9,53	kg/m	0,19	0,26	0,33	0,35	0,39										
			lb/ft	0,13	0,17	0,22	0,24	0,26										
1/2"	0,500	12,70	kg/m	0,26	0,36	0,46	0,50	0,56	0,62	0,69	0,74							
			lb/ft	0,18	0,24	0,31	0,33	0,38	0,42	0,46	0,50							
5/8"	0,625	15,88	kg/m	0,33	0,46	0,59	0,64	0,73	0,81	0,91	0,98	1,05	1,13					
			lb/ft	0,22	0,31	0,40	0,43	0,49	0,55	0,61	0,66	0,70	0,76					
3/4"	0,750	19,05	kg/m	0,40	0,55	0,72	0,79	0,89	1,01	1,13	1,22	1,33	1,40	1,52	1,61	1,73		
			lb/ft	0,27	0,37	0,48	0,53	0,60	0,68	0,76	0,82	0,90	0,94	1,02	1,08	1,16		
1"	1,000	25,40	kg/m	0,75	0,98	1,08	1,23	1,39	1,57	1,71	1,87	2,00	2,18	2,33	2,56			
			lb/ft	0,51	0,66	0,73	0,83	0,93	1,05	1,15	1,26	1,35	1,45	1,56	1,73			
1 1/4"	1,250	31,75	kg/m	0,95	1,24	1,37	1,56	1,77	2,01	2,19	2,42	2,60	2,85	3,05	3,37	3,58	3,80	
			lb/ft	0,64	0,84	0,92	1,05	1,19	1,35	1,47	1,62	1,75	1,91	2,05	2,26	2,41	2,55	
1 1/2"	1,500	38,10	kg/m	1,15	1,51	1,66	1,90	2,16	2,45	2,68	2,96	3,20	3,51	3,78	4,19	4,47	4,75	
			lb/ft	0,77	1,01	1,12	1,28	1,45	1,65	1,80	1,99	2,15	2,35	2,55	2,82	3,01	3,19	
1 3/4"	1,750	44,45	kg/m	1,35	1,77	1,95	2,24	2,54	2,89	3,16	3,50	3,83	4,21	4,55	5,05	5,40	5,76	
			lb/ft	0,90	1,19	1,31	1,50	1,71	1,94	2,12	2,35	2,57	2,83	3,05	3,39	3,63	3,87	
2"	2,000	50,80	kg/m		2,03	2,24	2,57	2,92	3,33	3,64	4,04	4,43	4,88	5,28	5,87	6,30	6,73	
			lb/ft		1,37	1,51	1,73	1,96	2,24	2,45	2,71	2,97	3,28	3,55	3,95	4,24	4,52	
2 1/4"	2,250	57,15	kg/m			2,53	2,91	3,31	3,77	4,13	4,58	5,04	5,55	6,01	6,70	7,20	7,70	
			lb/ft			1,70	1,95	2,22	2,53	2,77	3,08	3,38	3,74	4,04	4,50	4,84	5,17	
2 1/2"	2,500	63,50	kg/m			2,82	3,24	3,69	4,23	4,61	5,13	5,64	6,23	6,74	7,54	8,09	8,66	
			lb/ft			1,90	2,18	2,48	2,84	3,12	3,44	3,79	4,18	4,54	5,06	5,44	5,82	
3"	3,000	76,20	kg/m				3,91	4,46	5,14	5,58	6,20	6,82	7,57	8,25	9,19	9,91	10,62	
			lb/ft				2,63	3,00	3,42	3,75	4,17	4,58	5,08	5,54	6,18	6,66	7,14	
3 1/2"	3,500	88,90	kg/m				4,58	5,23	5,97	6,55	7,29	8,02	8,91	9,70	10,85	11,71	12,55	
			lb/ft				3,08	3,51	4,01	4,40	4,90	5,38	5,97	6,52	7,28	7,85	8,44	

For minimum wall according to ASTM A 213 add 10%





The Tubacex Group supplies mechanically bored tubes through IBF. Located in Vittuone, Italy, IBF pipes division manufactures mechanically bored tubes up to 72" in any wall thickness.

# Big Outside Diameter Seamless Pipes and Tubes

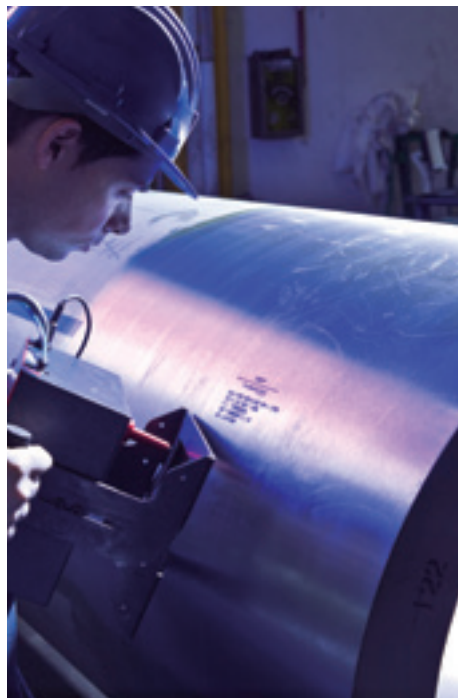
Growing sizes in both outside diameter and wall thickness are a clear trend in almost all seamless pipe demanding industries (oil and gas, refining and petrochemical, power generation). Starting either from forged round bars (rough or machined) or from hollow forging (heat treated or as forged) Tubacex offers a wide manufacturing range through trepanning technology:

MANUFACTURING RANGE	
Trepanned Pipes	Outside Diameter
From round bar	1/2" - 26"
From hollow bar	22" - 72"
Seamless heavy wall pipes	
Any thickness	
Lengths up to 20 meter	



Materials covered include a wide range of grades, from carbon steel to titanium, with focus in stainless steel and high nickel alloys:

GRADE RANGE - BIG OUTSIDE DIAMETER SEAMLESS PIPES AND TUBES	
Carbon steels	ASTM A105, A106, A333...
Carbon steels with high yield limit	X52- X60-X65 in conformity with the standards A864, A860, MSS-SP-75, API 5L...
Low alloy steels	ASTM A182, A234, A335 grade F/WP/P1, 5, 11,12, 22, 91, 92, 122...
Austenitic stainless steels	Standard austenitic (304,316,321, 347 series...) and superaustenitic steels (UNS S31254,UNS S34565...)
Martensitic and ferritic stainless steels	400 Series: 410...
Ferritic-austenitic stainless steels	22% Cr Duplex ( UNS S31803, S32205); 25% Cr Super Duplex (UNS S32760, S32750, S32550)
Nickel and nickel alloys	Inconel (N06625, N06600...); Incoloy (N08825, N0800H)
Titanium alloys	



# Fittings and Special Components



The Tubacex range includes the design and manufacturing of butt welding fittings, tube bends, elbows, tees, reducers and caps (both seamless and welded), complementing the wide offer of tubular solutions, by IBF and TTA companies. In addition, IBF offers a wide range of special parts (manifolds, laterals, special reducers...)

- TTA size range goes from 1 ½" to 14" NPS, in short and long radius as well as special radii. Located in Artziniega, Spain, Tubacex Taylor Accesorios (TTA) manufactures fittings (elbows and return bends) mainly for the petrochemical industry, perfectly complementing the portfolio of the rest of the Group and particularly the seamless tubes for furnace applications, heaters and re-heaters.
- Located in San Niccolo, Italy, IBF fittings and special parts division manufactures fittings, elbows, and special components in a manufacturing range that goes from ½" to 72" NPS for a wide range of end users (Oil and Gas, Power Gen, Nuclear...). Specialized in special and big size pieces, cold drawn dimensions are mainly sourced from its participated company CFF.
- Located in Amphur Muang-Samutprakarn, Thailand, Awaji Stainless manufactures stainless fittings (seamless and welded) in austenitic grades from 1/2" to 12" in both ASTM and JIS standards.

The Tubacex Group's fitting and special components extensive production program is suitable for all kinds of projects. The range offered is one of the widest in the industry:

## MANUFACTURING RANGE - FITTINGS AND SPECIAL PARTS

Seamless	1/2" to 44"
Welded	1/2" to 72"

Hot drawing, bending and cold drawing processes  
Any thickness  
Lengths from 0,5 to 20 meter

Materials covered include a wide range of grades, from carbon steel to titanium, with focus in Stainless Steel and High Nickel Alloys – same as described regarding trepanned pipes. The Tubacex Group maintains a very high stock level in finished and semifinished products, as well as base materials, to provide full flexibility and a extremely competitive lead time.

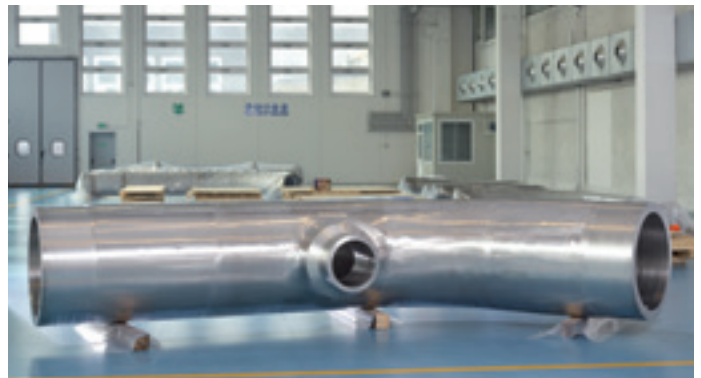




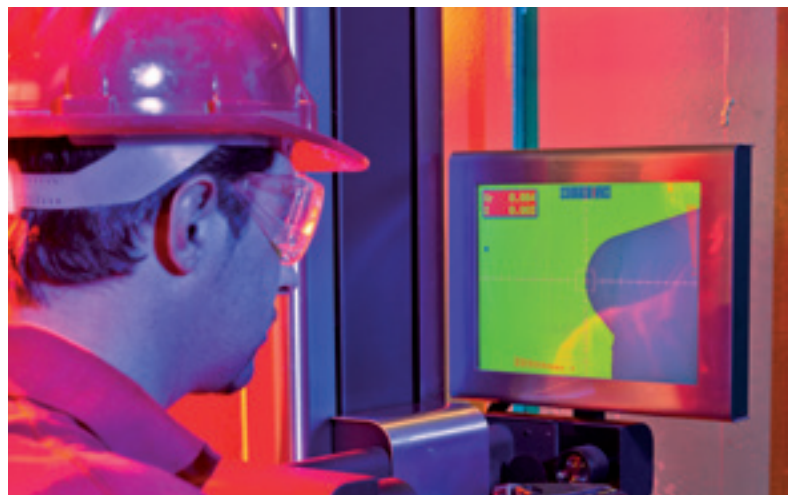
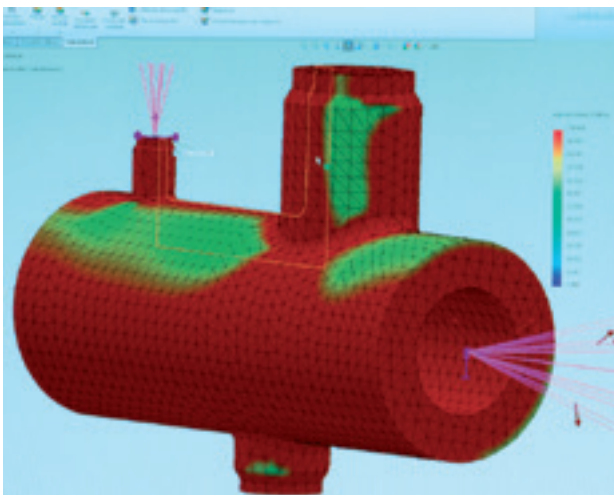
## Product portfolio

- The Tubacex Group's Fittings program covers all kind of fittings (Butt welding fittings & elbows, tees, reducers, caps) from standard to special products, manufactured by hot drawing, bending or cold drawing.
- In addition to fittings, special components such as laterals, manifolds, tees, stress joints, weldolets are manufactured at IBF fittings and special parts division, with a clear trend to a more particularized design.

FITTINGS	SPECIAL PARTS
Butt Welding fittings & elbows	Special components
Tees	Manifolds
Reducers	Laterals
3D / 5D Bends / Stress Joints	Special Reducers



- Flexible production processes allow The Tubacex Group's products to be manufactured by a variety of production methods, to reach a wide range in a specialized market, where particularized designs are growingly demanded – designs defined and calculated by our engineering departments.
- IBF has a technical department equipped with CAD systems for design and calculation. This department designs fittings and special items in compliance with all applicable standards and specifications and in conjunction with the client's specific requirements. In addition, the department offers support to the development of all necessary production equipment, machinery and technical processes.



The Tubacex Group's Vision remarks the aspiration of becoming a global supplier, benchmark in the development of innovative tubular solutions in advanced materials. Creativity and Innovation, along with customer satisfaction, are the values behind this vision.

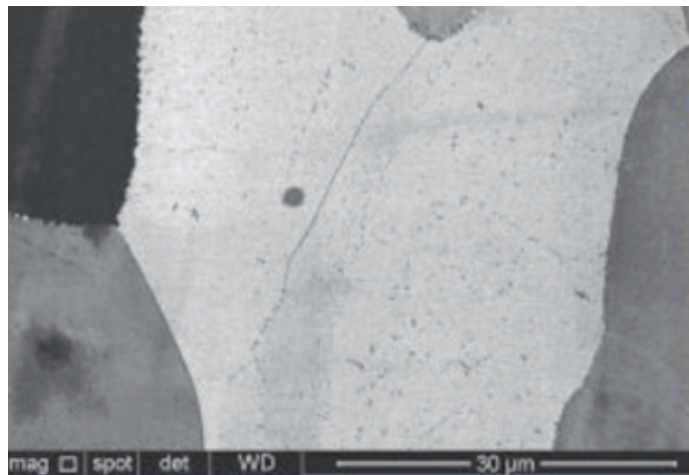
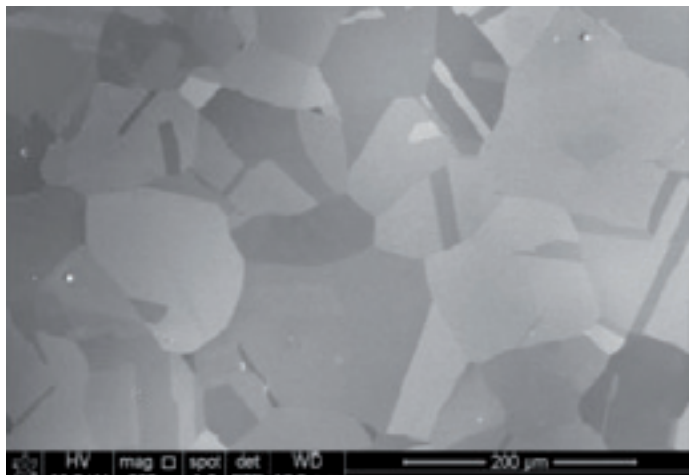


The Tubacex Group has made a significant effort in innovation in recent years, which is constantly being reflected in results and in the sales figure.

The Group has a corporate innovation unit called Tubacex Innovación, with human and technical resources devoted exclusively to innovation activities, consisting of product R&D projects and development projects for the different industrial plans of the Group's companies, in which technological development is required.

## Tubacex Innovation

- Steel Portfolio Management
- R&D Projects Management
- New Products Development
- Known grades. Performance Improvement. New requirements
- Participation in Industrialization Projects
- Participation in Continuous Improvement Projects
- Investigation and analysis of Metallurgical claims
- Heat treatments design
- Group Laboratories Standardization
- Technical support to Sales and Engineering
- Customers Assistance



Important approvals with potential customers have also been obtained, which will enable sales of high value-added products to increase in the future. Since 2008, and more notably in the past two years, we have entered all of the strategic sectors that were defined as targets, namely: OCTG, umbilical offshore tubes, ultra supercritical boilers and recently, fertilizers. This has been possible thanks not only to R&D activities, but also to significant investment in recent years, in excess of €150M, and the improved processes in all of the Group's plants.

A milestone in 2014 was the opening of a new laboratory specifically devoted to R&D, which is located in the Zamudio Scientific and Technology Park (Bizkaia). This new laboratory will accelerate the development of the R&D unit, in skills such as metallurgical and metallographic knowledge, which is key for the development of new materials and processes. The creation of the new laboratory will act as a base for the future growth of the R&D capacities of the Tubacex Group, enabling closer collaboration with customers in the development of new solutions for the energy sector.



Service is the other main driver of the Tubacex Group's vision. This means excellent service in the existing portfolio, along with the development of new value added services that can complement and enrich the Tubacex Group's product portfolio.

# Service

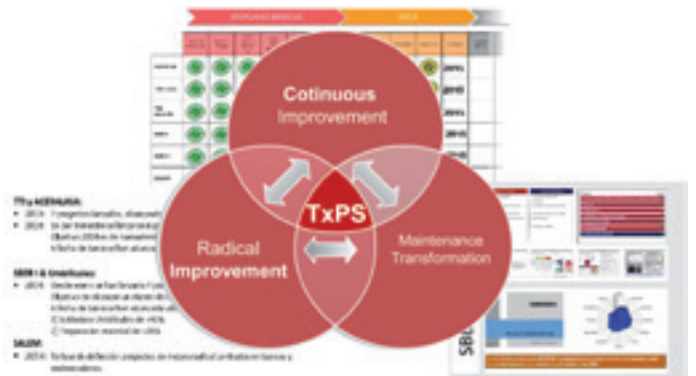


## Excellent service in the existing portfolio - Tubacex Production System

TxPS, the acronym of Tubacex Production System, is the standard Management System for the entire Tubacex Group focused on:

- Implementing an continuous improvement system in all areas
- Involving all personnel from all areas
- Ensuring that the improvements are sustained over time

TxPS is based on action on three levels: yearly management plan, daily management and specific action for radical improvement.



## New Services to develop and complete our offer - Tubacex Services

To further increase our service capabilities we are developing final added value operations for small niches:

- Final treatments
- Special packages
- Others

The Group has developed a new unit called Tubacex Services, with resources devoted exclusively to the development of those added value operations to the Group's portfolio. This unit is already developing specialized process as Shot peening in a new mill in Santander (north of Spain).



## Global Service Center Network - Tubacex Service Solutions

In addition, the group network of service centers in Europe, America and Asia offers availability and proximity service to our customers through Tubacex Service Solutions service centers (Spain, France, Austria, the United States, Brazil, China, India, Dubai and Iran).



# Quality and Approvals

The Tubacex Group holds several approvals as a manufacturer of seamless tube and pipe, and can deliver tubular products in accordance with most international standards.

## MANUFACTURING STANDARDS

Apart from standards mentioned in the catalogue we also manufacture according to UNE, BS, SIS, GOST, JIS and other international standards and steel grades.

## MANAGEMENT SYSTEM CERTIFICATES

ISO 9001.  
API Q1.

## ENVIRONMENTAL RESPONSABILITY

The Tubacex Group is highly engaged with the environment and it is ISO 14001 certified.

## SAFETY

Occupational Health and Safety is also a key element of our culture. The company is OHSAS 18.001 certified.

## APPROVALS

Tubacex is approved to manufacture according to TÜV, Lloyd's register, DNV, Germanischer Lloyd's, BV, Norsok etc. Complete list of approvals is available upon request.

## OTHER CERTIFICATIONS

Tüv Süddeutschland (Ad - Merkblatt Wo / Trd 100)  
Lloyd's Register of Shipping (rules for the manufacture, testing and certification of materials)  
Qualification as Manufacturer of Special Materials to Norsok M-650  
ASME Quality System Certificate as Material Organization for Ferrous and Nonferrous Material  
Tüv Süddeutschland (Pressure Equipment Directive 97/23Ec)  
Det Norske Veritas (Dnv's Rules for Classification Pt.2)  
Germanischer Lloyd (Austenitic Stainless Steel Pipes and Tubes According to En 10216-5 or Equivalent Standards)  
PED 97/23/EC.  
AD2000, werkblatt W0.  
JIS Mark scheme

Complete list of approvals and certifications is available on request.



## MANAGEMENT SYSTEM CERTIFICATES

UNE - EN - ISO 9001:2000  
ER-0006/1991



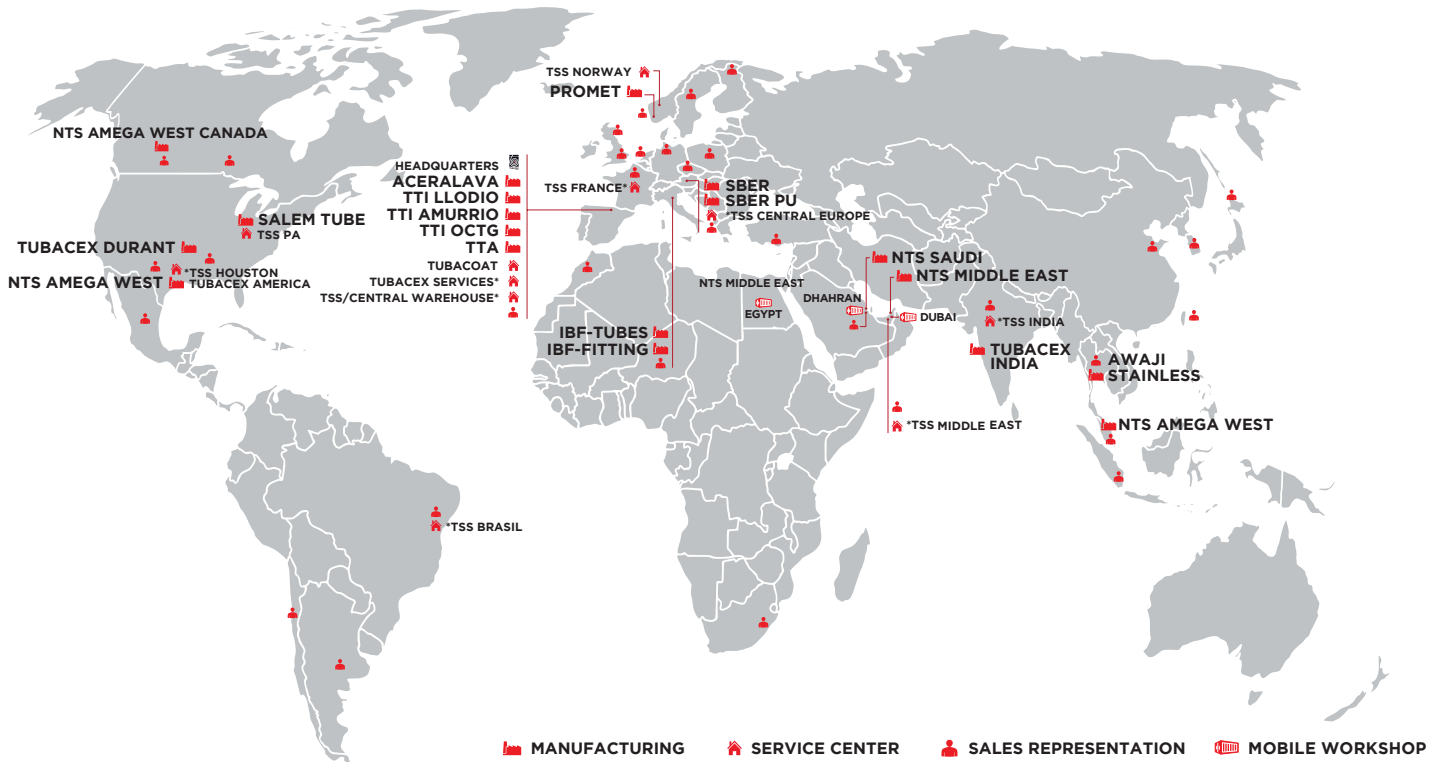
OHSAS 18001:1999



UNE - EN - ISO  
14001:1996  
GA-2001/0127







Currently the Tubacex Group is exporting into more than 100 countries worldwide from its manufacturing sites and warehouses.

The company has 15 commercial offices and a wide network of agents in several countries that lead to a global presence.

## MANUFACTURING COMPANIES

**Acería de Álava, S.A.**  
STEEL MELTING SHOP  
Amurrio. SPAIN

**Tubacex Tubos Inoxidables, S.A.**  
HOT EXTRUSION PLANT  
Llodio. SPAIN

COLD FINISHING PLANT  
OCTG FINISHING PLANT  
Amurrio. SPAIN

**Schoeller Bleckmann Edelstahlrohr, GmbH**  
COLD FINISHING PLANT  
HOT EXTRUSION PLANT  
SPECIAL TUBE PLANT  
Ternitz. AUSTRIA

**Salem Tube, Inc.**  
COLD FINISHING PLANT  
Greenville. PA. USA

**Tubacex Durant**  
COLD FINISHING PLANT  
Durant.OK.USA

**IBF, S.p.a.**  
TUBES DIVISION  
Vituone - Milano. ITALY  
FITINGS DIVISION  
San Nicolò - Piacenza. ITALY

**Tubacex Prakash**  
COLD FINISHING PLANT  
Umbergaon. INDIA

**Tubacex Awaji**  
STAINLESS FITTINGS  
Amphur Muang-Samutprakarn.  
THAILAND

**Tubacex Taylor Accesorios, S.A.**  
BUTT WELDING FITTINGS  
Arzeniega. SPAIN

**Tubacex Services, S.L.**  
TUBE FINISHING SERVICES  
Santander. SPAIN

**Tubacoat**  
CERAMIC TUBE COATING  
Santander. SPAIN

**NTS Group**  
MACHINED PARTS  
MANUFACTURING & REPAIR  
UAE  
USA  
CANADA  
SINGAPORE  
NORWAY  
SAUDI ARABIA

## SERVICE & DISTRIBUTION COMPANIES

**Tubacex Service Solutions, S.A.**  
STAINLESS STEEL LONG PRODUCTS  
DISTRIBUTION  
Amurrio. SPAIN

**Tubacex America, Inc. / TSS Houston**  
STAINLESS STEEL LONG PRODUCTS  
DISTRIBUTION  
Houston. UNITED STATES

**Metaux Inox Services, S.A.S. / TSS France**  
STAINLESS STEEL LONG PRODUCTS  
DISTRIBUTION  
Satolas & Bonce. FRANCE

**TSS Central Europe**  
STAINLESS STEEL LONG PRODUCTS  
DISTRIBUTION  
Ternitz. AUSTRIA

**TSS Brasil**  
STAINLESS STEEL LONG PRODUCTS  
DISTRIBUTION  
Sao Paulo. BRAZIL

**TSS India**  
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**HEAD OFFICE:  
TUBACEX GROUP.**

Tres Cruces, 8. P.O. Box nº 22  
01400 LLODIO (ÁLAVA) SPAIN  
Phone: +(34) 94 671 93 00  
Fax: +(34) 94 671 93 14  
+(34) 94 672 50 62/74  
e-mail: sales@tubacex.com

## MAIN SALES OFFICES AROUND THE WORLD

**NETHERLANDS:**

**TUBACEX NORTH EUROPE**  
Phone: + 31 (0) 162 690 430  
Fax: + 31 (0) 162 690 435  
e-mail: salesnetherlands@tubacex.com

**SPAIN:**

**TUBACEX SERVICE SOLUTIONS S.A.**  
Phone: + (34) 945 39 36 00  
Fax: + (34) 945 39 34 22  
e-mail: tss@tubacex.com

**GERMANY:**

**TUBACEX GERMANY**  
Phone: + (49) 2150 70 567-0  
Fax: + (49) 2150 70 567-20  
e-mail: salesgermany@tubacex.com

**UNITED STATES OF AMERICA & CANADA:**

**TUBACEX AMERICA**  
Phone: + (1) 713 856 2700/13  
Fax: + (1) 713 856 2799  
e-mail: sales@tubacex-usa.com

**ITALY:**

**TUBACEX ITALIA**  
Phone: + (39) 02 669 5505  
Fax: + (39) 02 673 845 92  
e-mail: salesitaly@tubacex.com

**UAE - DUBAI:**

**TUBACEX MIDDLE EAST**  
Phone: + (971) 4 701 72 12  
Fax: + (971) 4 701 72 13  
e-mail: salesmiddle-east@tubacex.com

**AUSTRIA:**

**TUBACEX CENTRAL & EAST EUROPE**  
Phone: + (43) 2630 3160  
Fax: + (43) 2630 369 47  
e-mail: salesaustria@tubacex.com

**INDIA:**

**TUBACEX INDIA**  
Phone: + (91) 22 40015324  
Fax: + (91) 22 40015350  
e-mail: sales@tubacexindia.com

**CZECH REPUBLIC:**

**TUBACEX CZECHIA**  
Phone: + (42) 06 03 817 985  
e-mail: salesczechia@tubacex.com

**CHINA:**

**TUBACEX NORTH EAST ASIA**  
Phone: + (86) 21 5298 0242  
Fax: + (86) 21 5298 0241  
e-mail: tubacexasia@tubacex.com.cn

**POLAND:**

**TUBACEX POLAND**  
Phone: + (48) 32 253 99 67  
Fax: + (48) 32 206 82 48  
e-mail: salespoland@tubacex.com

**SINGAPORE:**

**TUBACEX SOUTH EAST ASIA**  
Phone: + (65) 6100 6126  
e-mail: sales-sg@tubacex.com

**FRANCE:**

**TUBACEX FRANCE**  
Phone: + (33) 1 48 79 30 50  
Fax: + (33) 1 48 79 18 06  
e-mail: salesfrance@tubacex.com

**KOREA:**

**TUBACEX KOREA**  
Phone: + (82) 10 4800 5080  
Fax: + (82) 2 6021 4180  
e-mail: saleskorea@tubacex.com