

# STAINLESS STEEL AND NICKEL ALLOYS TUBES & PIPES FOR FERTILIZER PRODUCTION

## TUBACEX: A GLOBAL PARTNER FOR FERTILIZER APPLICATIONS

The Tubacex Group has become one of the world's main suppliers of Seamless Stainless Steel and Nickel alloy tubes. Founded in 1963, Tubacex brings the experience of a world leader combined with strong R&D effort to fulfill the future needs of the industry.

Nowadays, the Tubacex Group, which exports to over 100 countries worldwide, has approximately a 15% share of the Seamless Stainless Steel tubes and pipes worldwide market, with a total workforce of around 2,300 employees. The headquarters are located in Llodio, 25 Km from the seaport city of Bilbao, in northern Spain.

Schoeller-Bleckmann Edelstahlrohr GmbH (SBER) has been a member of the TUBACEX Group since 1999. With over 100 years experience in the steel industry, it supplies seamless stainless steel tubes in the most common urea grades: austenitic 316L UG (1.4435) and 25.22.2 (1.4466) as well as S32906 duplex grade. Also involved in Nitric Acid production, our range of grades covers all customer needs customers can think of within the application.

The SBER Special Tube Mill in Ternitz, a state-of-the-art plant for the production of special tubes, manufactures seamless tubes for fertilizer production equipment using high purity steels produced in our own melting shop and from our traditional business partners. Our Quality control department supervises every step in the production process. Our quality assurance system complies with the most stringent demands of international codes and standards.





## TUBACEX IN THE WORLD OF FERTILIZER PRODUCTION

Fertilizer production plants need to withstand severe corrosion conditions. For this reason, engineering firms, manufacturers, end-users or any company involved in the process must rely on cutting-edge tube producers. Tubacex supplies materials for the equipment used in the synthesis of the main products in this market:

Urea, ammonia, nitric acid, sulfuric acid, phosphoric acid and melamine.

Tubacex has extensive experience in the fertilizer industry, having supplied HE tubing for any Urea HP equipment over the past 40 years.

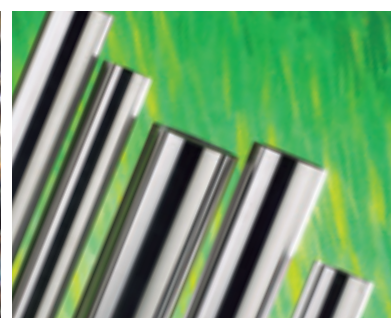
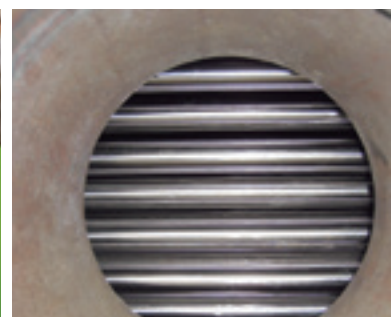
The most typical applications for Tubacex tubes are:

- Strippers • Condensers • Scrubbers • HP Piping

Tubacex is a fully integrated manufacturer; from the need to the solution, from the steel grade to the final tube.



Tubacex has 40 years experience in the production of fertilizer tubing.



## INVESTMENT IN NEW SPECIAL TUBE PRODUCTION FACILITIES

Since 2008, substantial investment has been made in technical support and equipment, incorporating the knowledge of a century's experience in steel production and, in particular, in the manufacture of Hot and Cold Seamless Stainless tubes.

This plant, which was designed to encompass all of the critical features of fertilizer tubing, assures maximum quality, such as:

- Single tube cleaning right after tube rolling allows Tubacex to obtain perfect surface qualities in terms of smoothness and cleanliness.
- Tubes are handled with maximum care during all the production stages to offer the best possible surface condition to the customer.
- The tubes inner and outside surface quality is ensured using a state-of-the-art annealing furnace.
- NDT systems for EC, UT and PMI testing.



An up-to-date plant at your service, based on a hundred years of experience.



## STEEL GRADES

Challenging corrosive environments in the fertilizer industry make steel properties more demanding when in use. New standards are being set by Tubacex with regards to quality, fulfilling all of the recognized norms and specifications, whereby Tubacex is known throughout the world for its high standard of quality.

316L UG and 25.22.2 grades are mainly used in Urea plants with high corrosion Stripper, (Pool) Condenser, (Pool) Reactor, Scrubber, HP piping systems...

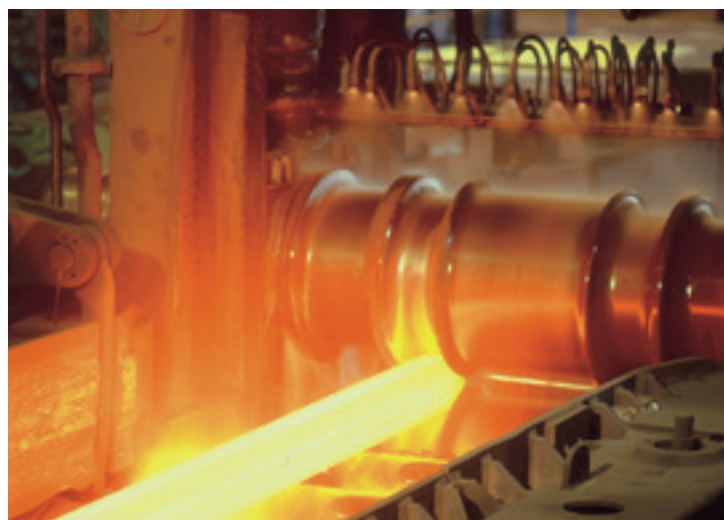
EN TUBE STANDARDS 10216-5 10297-2		ASTM TUBE STANDARDS A213 A312 B668		Gost	Tubacex Code	Main application fields in Fertilizer Production			
WNr	steel name	type	UNS				C	Mn	Si
1.4435	X2 Cr Ni Mo 18 14 3	TP316LUG	S31603	08Cr17Ni14Mo3 08X17H14M3	C26	Urea, Ammonia	≤0,020	1,7	≤0,40
1.4466 1.4465	X1 Cr Ni Mo N 25 22 2 X1 Cr Ni Mo N 25 25 2	TP310 MoLN	S31050	02Cr25Ni22NM02 02X25H20AM2	C35	Urea, Ammonia, Melamine	≤0,020	1,7	≤0,40
-	-	-	S32906	-	D29	Nitric Acid, Urea, Melamine, Caustic Soda	≤0,030	0,8-1,5	≤0,80
1.4335	X1 Cr Ni 25 21	TP 310L NAG	S31002	-	T19	Nitric Acid	≤0,015	0,9	≤0,15
1.4306S	X2 Cr Ni 19 11-5	TP304L	S30403	02Cr18Ni11 02X18H11	C10	Nitric Acid	≤0,015	1,6	≤0,75
1.4361	X1 Cr Ni Si 18 15 4	-	S30600	02Cr8Ni22Si6 EP794	C07	Nitric Acid	≤0,012	0,7	4-4,3
1.4563	X1 Ni Cr Mo Cu N 31 27 4	Alloy28	N08028	CrNi30MoCuNb XH30MDB	K05	Sulphuric Acid, Phosphoric Acid	≤0,020	1,6	≤0,50

## RESISTANCE TO CORROSION

Due to their alloying elements and the melting technique used, the austenitic grades 25.22.2/1.4466, 316L UG/1.4435 and 1.4335 offer very high resistance to intergranular corrosion when tested according to ASTM A262 Practice C (Huey Test). The highest requirements established by the engineerings are widely fulfilled.

- 1.4435, TP316L UG: enhances common 316L, to withstand corrosive environments in many processes, such as Urea synthesis piping.
- 1.4466/1.4465, TP310MoLN (25.22.2): designed to resist the most severe corrosion rates in fertilizer applications, such as Strippers and Condensers.
- UNS 32906: with higher mechanical properties and less corrosion modes, this superduplex grade can be used for any application within the urea plant.

Tubacex will drive the  
development of new  
materials and solutions.



ELEMENTS (typical values in weight %)						Mechanical properties at 20°C				
P	S	Cr	Ni	Mo	N	Hardness HBmax	yield Rp0,2 min [MPa]	yield Rp1,0 min [MPa]	tensile Rm [MPa]	elong.min [%]
<0,015	<0,01	17,5	14	2,7	0,06	192	195	235	490-700	40
<0,020	<0,01	25	22	2,2	0,12	217	270	295	540-740	40
<0,030	<0,030	28,0-30,0	5,8-7,5	1,5-2,6	0,30-0,40	300	600	700	800	25
<0,015	<0,005	25	21	-	0,06	190	180	210	470-670	45
<0,04	<0,01	19	12	-	0,07	192	190	235	500-670	35
<0,018	≤0,005	18	15	-	0,05	210	220	270	540-740	35
<0,020	<0,01	27	31	3,4	0,06	150	215	240	500-750	40

## PRODUCT RANGE

Tubacex has an extensive manufacturing program covering most dimensions requested by the industry.

- Mills located in Europe and USA enable us to produce tubes and pipes from 3mm OD to 72" for Fertilizer Industry.
- Austenitic tubes and pipes are produced in accordance with ASTM Standard, ASME Code and Euronorm Standards, fulfilling the main specifications, such as Saipem, Stamicarbon, Casale and Toyo.
- Tubes can be supplied in random lengths, multiple lengths, fixed lengths as well as U-tubes.
- Tubacex also produces Fittings from ½" (5S) to 72" (no WT limitation).

As lengths or dimensions differ according to grade, size and finish, detailed information can be provided upon request.

Specific needs will also be studied at the customer's request.

ASTM A 312 ASME B.36.10M		Manufacturing range						
OD		WT						
Inch	mm	0,5	1,65	2,5	7,11	25,4	50,0	no limit
0,125	3,2							
0,748	19,05							
0,984	25							
1"1/2	48,3				160			
3"	88,9			5	160			
8"	219,1				10	160		
20"	508				20		160	
42"	1067							

\*Reference table. Ask for details



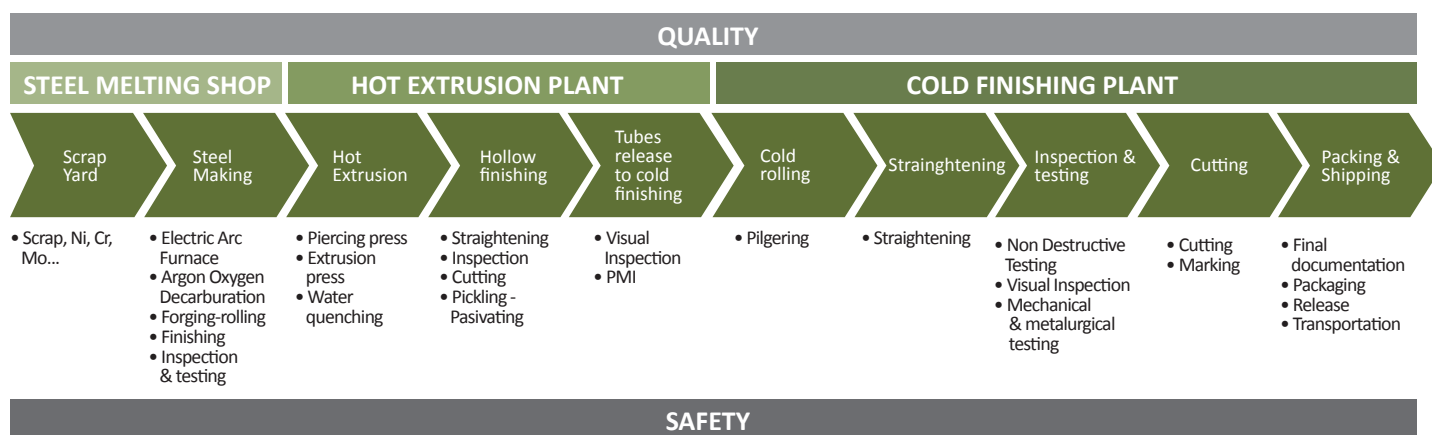


# MANUFACTURING PROCESS & EQUIPMENT

Tubacex is a fully integrated company with 8 manufacturing companies, several stock centers and a wide network of commercial offices around the world. The group is capable of producing seamless steel tubes in hot and cold finishing from 3mm OD to 72" for most of the leading applications in the SSST world.

The Group's melting shop, Aceralava, provides material to the tube manufacturing mills, guaranteeing the best possible quality and lead time. The European plants located in Spain and Austria are equipped with three extrusion presses (up to 4,100tn), several heat treatment furnaces (including bright annealing), 20 pilger cold rolling mills (up to 10" finished tube), draw benches, NDT equipment (UT, EC, HT,  $\sigma$ -phase), etc. for the production of seamless steel tubes and pipes.

We are a leading group worldwide at the service of our customers to meet the industry's most stringent requirements.



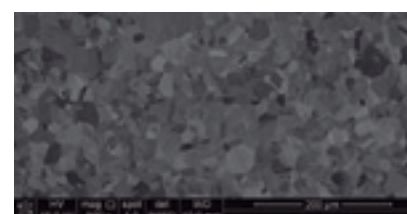
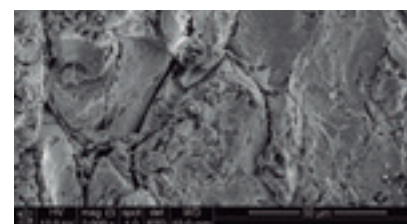
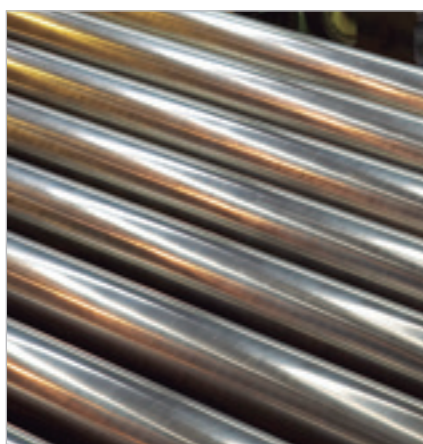
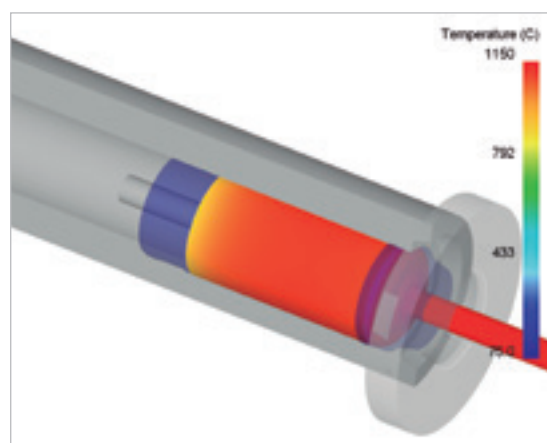
## SAFETY

# RESEARCH & DEVELOPMENT

At Tubacex, we understand that innovation must be focused in order to provide fully functional solutions, combining our best practices and know-how with those of our customers and partners.

Latest research into product development, process improvements and hence updated technology know how is the high added value perceived by our customers when using our materials.

Tubacex offers customers focused innovation, providing the best quality and cutting-edge technology to users of our products.



Tubacex will innovate alongside you.

Proactive search for opportunities in conjunction with the customer.

# QUALITY & APPROVALS

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.

## ENVIRONMENTAL RESPONSABILITY

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 upon request.**



## MANAGEMENT SYSTEM CERTIFICATES

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

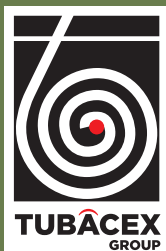


OHSAS 18001:1999



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





## HEAD OFFICE: TUBACEX GROUP.

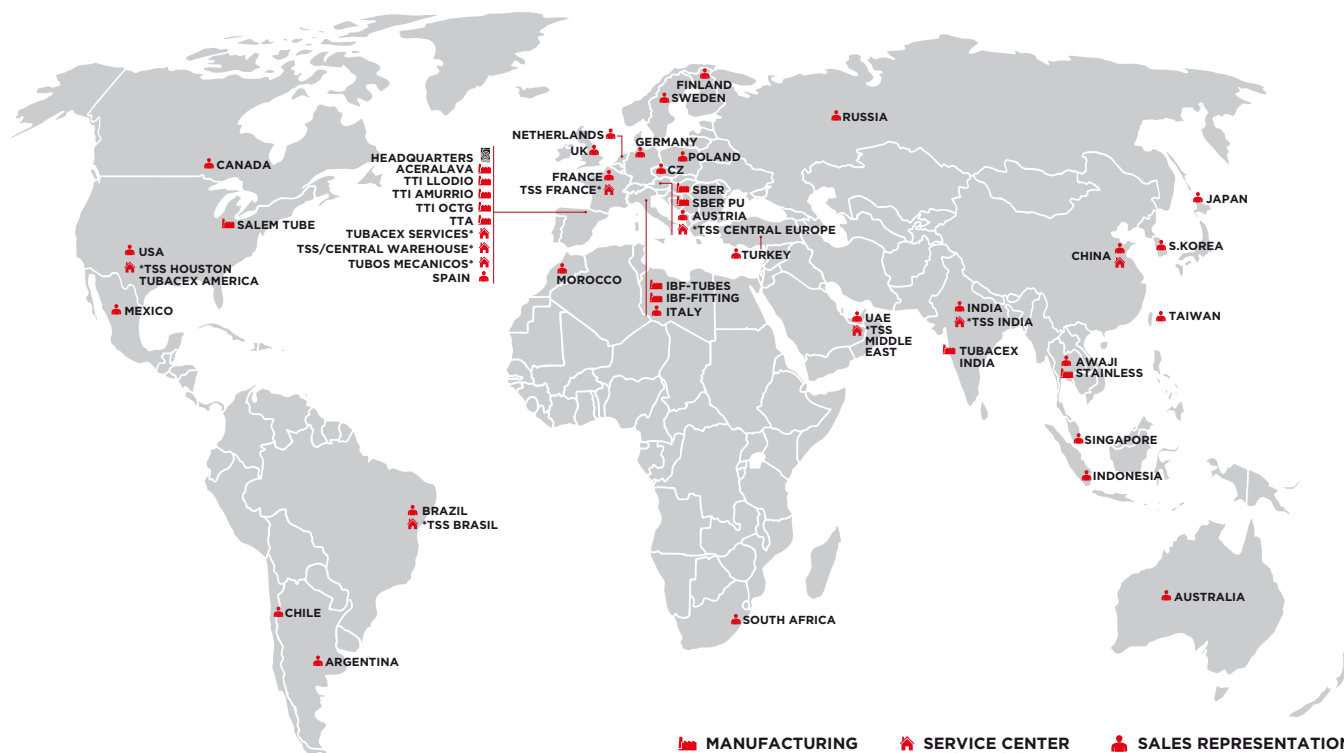
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