

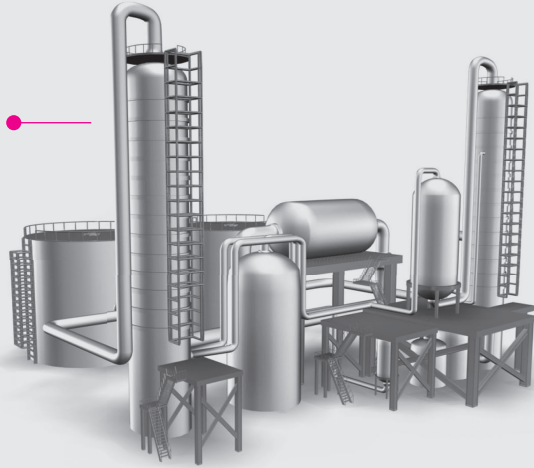
Seamless Steel Pipes for General Applications

Stainless Steel
Duplex, Superduplex Grades
Ni-Alloys

PIPES FOR GENERAL APPLICATIONS

Stainless steel piping is widely used in a range of industries with corrosive atmosphere and critical requirements, such as:

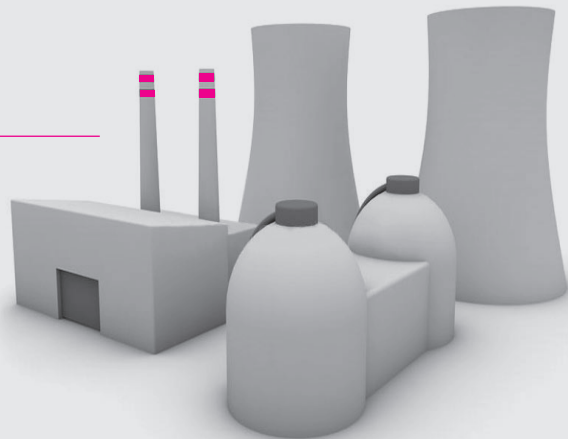
Chemical & Petrochemical ●



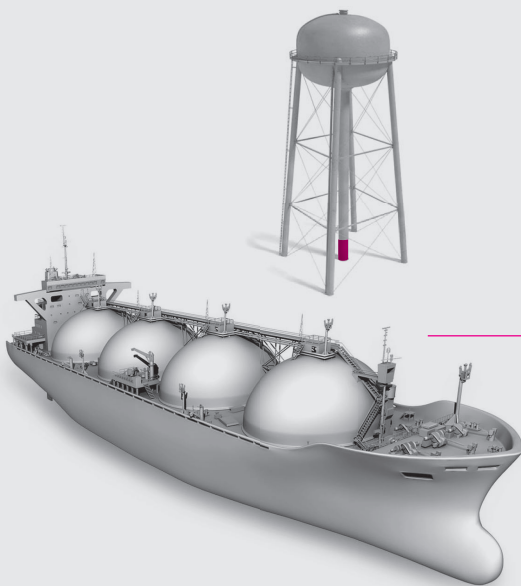
● Oil & Gas Industries



Power Generation ●



● Water Industry, including water exploration and desalination



PIPES FOR GENERAL APPLICATIONS

Standards:

ASTM A312/A312M, ASME SA-312/SA312M

ASTN A376/A376M, ASME SA-376/SA376M

ASTM A789/ASTM A790

EN10216-5 TC1 EN 10297-2

ASTM A999 and EN ISO 1127

Steel grades:

TP304/L - 1.4301/1.4306

TP310/S/H - 1.4845

TP316/L - 1.4401/1.4404

TP316Ti - 1.4571

TP317/L - 1.4438

TP321/H - 1.4541/1.4878

TP347/H - 1.4550

UNS S31803/UNS S32205 - 1.4462

UNS S32750 - 1.4410

UNS S32760 - 1.4501

UNS S31254 - 6Mo-1.4547

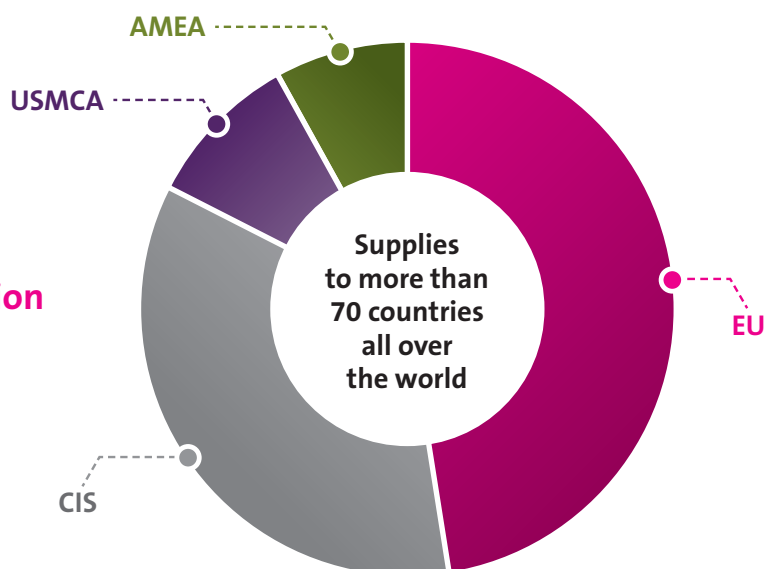
N08904 - 1.4539

Alloy 825

Alloy 20

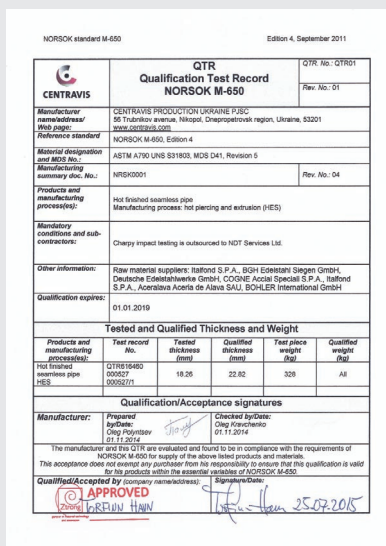
Alloy 625

Distribution of sales by region



The quality management system of CentraVis has been approved by the following certificates:

ISO 9001
ISO 14001
OHSAS 18001
PED 2014/68/EU
AD 2000-Merkblatt WO



QUALITY MANAGEMENT

Focusing on a unique combination of process and service quality

Focusing on customer needs

In the current competitive market, we understand that we can work and develop only together with customers and for the customers. Therefore, implementation of customers' current requirements and striving to exceed their expectations is our primary mission.

CENTRAVIS has created conditions where by customer satisfaction is our priority target and purpose in daily activities. In this work, the Company follows the principles and requirements of international quality standards. The processes of consumers are regarded as a continuation of our processes, both in terms of quality and products added value increases, and in terms of reducing all types of losses.

Investing in quality

Considering the quality of products and processes as a key priority, CENTRAVIS invests heavily in production equipment.

Among them – a new SMS MEER press line and rolling mill, LOI bright annealing furnace, Koerner etching baths and finishing equipment. In addition, advanced instrumentation systems have been introduced – non-destructive testing equipment of MAC, GE, Foerster production, chemical analyzer SpectroLab F, etc.

A modernization process, introduction of new operating procedures is continual and allows CENTRAVIS to meet the requirements and expectations of customers, provide top quality products and strive for greater production efficiency.

Control – at each stage of production

In CENTRAVIS a multilevel system of products and quality control processes is applied, which guarantees high level of produced pipes and serves as a guarantee of customer satisfaction. Quality systems include pipe quality planning at the time of order signing, 100% initial quality control of billets, operational control of manufacturing processes and acceptance control of finished product, including geometrical parameter control, visual inspection of pipe inner and outer surface, nondestructive and laboratory testing.

Customer Benefits

The quality Management System is approved by most key customers in the market and proved by results of international audits and certificates.

CENTRAVIS products conform to customer standards and specifications and satisfy the reliability requirements required by the world's leading end-users and engineering companies operating in oil & gas, chemical, aerospace, automobile, nuclear and other power generating industries. The CENTRAVIS team has extensive technical experience and a deep understanding of the industry, allowing us to provide appropriate solutions for specific customer requirements.

Our business partners can verify actual Quality Certificates online on the company official website:

www.centravis.com

Key customers accept CENTRAVIS

Over the past few years CENTRAVIS has paid special attention to the customers' needs operating in various industries. Our company was successfully certified by: SHELL, NAM, REPSOL, BAYER, BASF, PETROFAC, EXXONMOBIL, WEBCO, SABIC, FOSTER WHEELER, TECHNIP, PETROBRAS, ARAMCO OVERSEAS COMPANY, McJUNKIN RED MAN CORPORATION and other well-known companies.

Moreover, the process of obtaining official certification continues and in the near future CENTRAVIS expects to receive certification from the majority of key companies from different industries, proving the Company's ability to meet the highest standards of customer requirements from all over the world.

RANGE OF SIZES: tubes and pipes sizes in NPS according to ASME B36.10

Outside diameter			Wall thickness					
			Sch 55		Sch 10S		Sch 30S	
NPS	inch	mm	inch	mm	inch	mm	inch	mm
1/8	0.405	10.29			0.049	1.24	0.057	1.45
1/4	0.540	13.72			0.065	1.65	0.073	1.85
3/8	0.675	17.15			0.065	1.65	0.073	1.85
1/2	0.840	21.34	0.065	1.65	0.083	2.11	0.095	2.41
3/4	1.050	26.67	0.065	1.65	0.083	2.11	0.095	2.41
1	1.315	33.40	0.065	1.65	0.109	2.77	0.114	2.90
2 3/4	1.660	42.16	0.065	1.65	0.109	2.77	0.117	2.97
1 1/2	1.900	48.26	0.065	1.65	0.109	2.77	0.125	3.18
2	2.375	60.33	0.065	1.65	0.109	2.77	0.125	3.18
2 1/2	2.875	73.03	0.083	2.11	0.120	3.05	0.188	4.78
3	3.500	88.90	0.083	2.11	0.120	3.05	0.188	4.78
3 1/2	4.000	101.60			0.120	3.05	0.188	4.78
4	4.500	114.30			0.120	3.05	0.188	4.78
5	5.563	141.30						
6	6.625	168.28						
8	8.625	219.08					0.277	7.04

CF tubes
 HF abd CF tubes
 HF tubes

Wall thickness									
Sch 40S		Sch 80S		Sch 120S		Sch 160S		Sch XXS	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm
0.068	1.73	0.095	2.41						
0.088	2.24	0.019	3.02						
0.091	2.31	0.126	3.20						
0.109	2.77	0.147	3.73			0.188	4.78		
0.113	2.87	0.154	3.91			0.219	5.56		
0.133	3.38	0.179	4.55			0.250	6.35	0.358	9.09
0.140	3.56	0.191	4.85			0.250	6.35	0.382	9.70
0.145	3.68	0.200	5.08			0.281	7.14	0.400	10.15
0.154	3.91	0.218	5.54			0.344	8.74	0.436	11.07
0.203	5.16	0.276	7.01			0.375	9.53	0.552	14.02
0.216	5.49	0.300	7.62			0.438	11.13	0.600	15.24
0.226	5.74	0.318	8.08			0.500	12.70	0.636	16.15
0.237	6.02	0.337	8.56	0.380	11.13	0.531	13.49	0.674	17.12
0.258	6.55	0.375	9.52	0.500	12.70	0.625	15.88	0.750	19.05
0.280	7.11	0.432	10.97	0.562	14.27	0.719	18.26	0.864	21.95
0.322	8.18	0.500	12.70	0.719	18.26	0.906	23.01	0.875	22.23
0.365	9.27	0.549	15.09	0.844	21.44				
0.406	10.31	0.688	17.48						

Non-standard pipes are available on request.

CHEMICAL COMPOSITION

Steel grade	Tube Specification	Chemical composition, %					
		C	Mn	P	S	Si	Cr
TP304	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	18.0 - 20.0
TP304L	ASTM A312	≤0.035	≤2.00	≤0.045	≤0.030	≤1.00	18.0 - 20.0
TP310S	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	24.0 - 26.0
TP310H	ASTM A312	0.04 - 0.10	≤2.00	≤0.045	≤0.030	≤1.00	24.0 - 26.0
TP316	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	16.0 - 18.0
TP316L	ASTM A312	≤0.035	≤2.00	≤0.045	≤0.030	≤1.00	16.0 - 18.0
TP316Ti	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤0.75	16.0 - 18.0
TP317	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	18.0 - 20.0
TP317L	ASTM A312	≤0.035	≤2.00	≤0.045	≤0.030	≤1.00	18.0 - 20.0
TP321	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	17.0 - 19.0
TP321H	ASTM A312	0.04 - 0.10	≤2.00	≤0.045	≤0.030	≤1.00	17.0 - 19.0
TP347	ASTM A312	≤0.08	≤2.00	≤0.045	≤0.030	≤1.00	17.0 - 19.0
TP347H	ASTM A312	0.04 - 0.10	≤2.00	≤0.045	≤0.030	≤1.00	17.0 - 19.0
S31803	ASTM A789	≤0.03	≤2.00	≤0.030	≤0.020	≤1.00	21.0 - 23.0
S32205	ASTM A789	≤0.03	≤2.00	≤0.030	≤0.020	≤1.00	22.0 - 23.0
S32750	ASTM A789	≤0.03	≤1.20	≤0.035	≤0.020	≤0.80	24.0 - 26.0
S32760	ASTM A789	≤0.05	≤1.00	≤0.030	≤0.010	≤1.00	24.0 - 26.0
S31254 - 6Mo	ASTM A312	0.18 - 0.25	≤1.00	≤0.030	≤0.010	≤0.80	19.5 - 20.5
N08904	ASTM A312	≤0.02	≤2.00	≤0.040	≤0.030	≤1.00	19.0 - 23.0

Ni alloys (% by weight)

Steel grade	Specification	Chemical composition, %					
		C	Si	Mn	Cr	Ni	Ti
N08825	ASTM B423	<0.05	≤0.50	≤1.00	19.5 - 23.5	38.0 - 46.0	0.6 - 1.2
N08020	ASTM B729	<0.07	≤1.00	≤2.00	19.0 - 21.0	32.0 - 38.0	—
N06625	ASTM B444	<0.10	≤0.50	≤0.50	20.0 - 23.0	>58	≤0.40

Chemical composition, %					
Ni	Mo	N	Nb	Ti	Others
8.0 - 11.0	—	—	—	—	—
8.0 - 12.0	—	—	—	—	—
19.0 - 22.0	—	—	—	—	—
19.0 - 22.0	—	—	—	—	—
11.0 - 14.0	2.00 - 3.00	—	—	—	—
10.0 - 14.0	2.00 - 3.00	—	—	—	—
10.0 - 14.0	2.00 - 3.00	≤0.10	—	5*(C+N)-0.70	—
11.0 - 14.0	3.00 - 4.00	—	—	—	—
11.0 - 15.0	3.00 - 4.00	—	—	—	—
9.0 - 12.0	—	—	—	5*C-0.70	—
9.0 - 12.0	—	—	—	4*C-0.60	—
9.0 - 13.0	—	—	10*C-1.00	—	—
9.0 - 13.0	—	—	8*C-1.00	—	—
4.50 - 6.5	2.5 - 3.5	0.08 - 0.20	—	—	—
4.50 - 6.5	3.0 - 3.5	0.14 - 0.20	—	—	—
6.0 - 8.0	3.0 - 5.0	0.24 - 0.32	—	—	Cu ≤ 0.50
6.0 - 8.0	3.0 - 4.0	0.20 - 0.23	—	—	W 0.50 - 1.00
17.5 - 18.5	6.0 - 6.5	0.18 - 0.25	—	—	Cu 0.50 - 1.00
23.0 - 28.0	4.0 - 5.0	≤0.10	—	—	Cu 1.00 - 2.00

Chemical composition, %								
Al	Mo	Cu	Fe	Zr	Y	S	P	Others
≤0.20	2.5 - 3.5	1.5 - 3.0	balance	—	—	≤0.030	—	—
—	2.0 - 3.0	3.0 - 4.0	balance	—	—	≤0.035	≤0.045	8*C-1.00
≤0.40	8.00 - 10.0	—	balance	—	—	≤0.015	≤0.015	Cb+Ta=3.15-4.15; Co=1

Correlation between inch (NPS) and metric pipe dimensions

(for ASTM A312, ASTM A376, ASTM A790)



Outside diameter		
NPS	inch	mm
1/8	0.405	10.29
1/4	0.540	13.72
3/8	0.675	17.15
1/2	0.840	21.34
1	1.315	33.40
1 1/4	1.660	42.16
1 1/2	1.900	48.26
2	2.375	60.33
2 1/2	2.875	70.03
3	3.500	88.90
3 1/2	4.000	101.60
4	4.500	114.30
5	5.563	141.30
6	6.625	168.28
8	8.625	219.08

HF sizes in NPS

permitted variations in outside diameter and wall thickness (acc. to ASTM A999)

Outside diameter, inch (mm)	Permitted variations in OD, mm	
	over	under
10.29 - 42.16	0.4	0.8
60.33 - 114.3	0.8	0.8
114.4 - 219.8	1.6	0.8
219.8 - 323.85	2.4	0.8

Outside diameter, inch (mm)	Permitted variations in WT, mm	
	over	under
10.29 - 73.03	20	12.5
88.9 - 323.85 WT/OD ≤ 5%	22.5	12.5
88.9 - 323.85 WT/OD > 5%	15	12.5

More stringent tolerances can be confirmed on request depending on range of sizes and steel grade.

MECHANICAL PROPERTIES

Grade	Yield strength, min. N/mm ² (MPa)	Tensile strength, min. N/mm ² (MPa)	Elongation, min. %	Hardness, max. HRB
TP304	205	515	35	90
TP304L	170	485	35	90
TP310S	205	515	35	90
TP310H	205	515	35	90
TP316	205	515	35	90
TP316L	170	485	35	90
TP316Ti	205	515	35	90
TP317	205	515	35	90
TP317L	205	515	35	90
TP321	205	515	35	90
TP321H	205	515	35	90
TP347	205	515	35	90
TP347H	205	515	35	90
S31803	450	620	25	HRC30
S31205	485	655	25	HRC30
S32750	550	800	15	HRC30
S32760	550	750	25	300
S31254-6Mo	310	675	35	96
N08904	215	490	35	90
N08825	172* 241**	517* 586**	30	100
N08020	240	550	30	100
N06625				
Grade 1	827	414	30	—
Grade 2	630	276	30	—

* Hot finished pipes

** Cold finished pipes

IMPROVED MECHANICAL PROPERTIES BASED ON UNIQUE CENTRAVIS TECHNOLOGY

Chemical composition (% by weight*)

Grade	C	Mn	P	S
TP316L/1.4404	0.035	2.00	0.045	0.030
TP304L/1.4306	0.035	2.00	0.045	0.030
S31803/1.4462	0.030	2.00	0.030	0.020
S32304/1.4362	0.030	2.00	0.040	0.040

Grade	Si	Cr	Ni	Mo
TP316L/1.4404	1.00	16.0 - 18.00	10.0-14.0	2.0 - 3.0
TP304L/1.4306	1.00	18.0 - 20.00	8.0 - 12.0	—
S31803/1.4462	1.00	21.0 - 23.0	4.5 - 6.5	2.5-3.5
S32304/1.4362	1.00	21.5 - 24.5	3.0 - 5.5	0.05-0.6

Grade	N	Cu	Ti
TP316L/1.4404	—	—	—
TP304L/1.4306	—	—	—
S31803/1.4462	0.08-0.20	—	—
S32304/1.4362	0.05-0.20	0.05-0.60	—

* Chemistry maximum, unless average or min is indicated

IMPROVED MECHANICAL PROPERTIES BASED ON UNIQUE CENTRAVIS TECHNOLOGY

Grade	Standard EN and ASTM requirements		
	Tensile strength, MPa min.	Yield strength 0.2, MPa, min.	Elongation at break, % min.
TP304L/1.4306	485	170	40
TP316L/1.4404	490	190	35
S31803/1.4462	640	450	25
S32304/1.4362	690	400	25

For special cases, when resistance to high pressure is required CENTRAVIS is able to guarantee the improved mechanical properties with simultaneously high ductility and high formability:

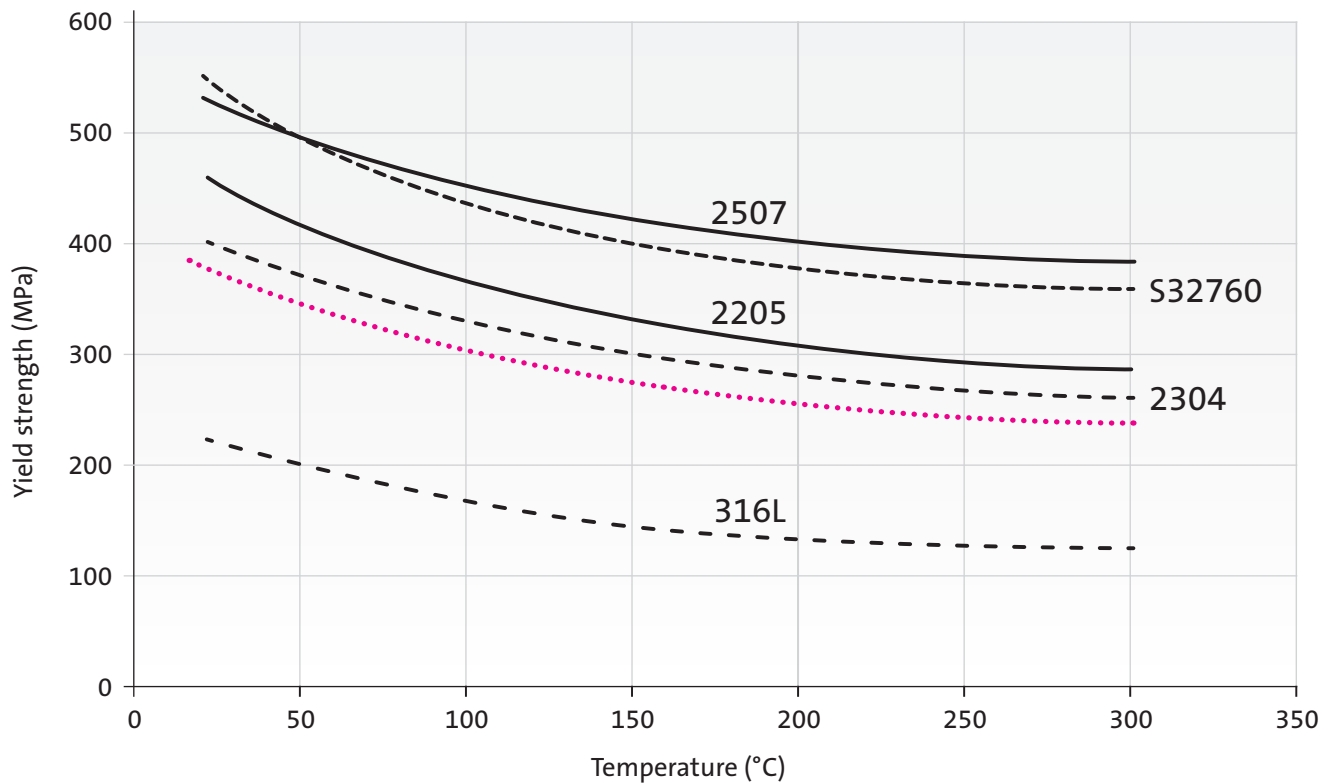
Grade	CENTRAVIS's suggestion with the using of special heat treatment technology		
	Tensile strength, MPa	Yield strength 0.2, MPa	Elongation at break, %
TP304L/1.4306	Minimum 600*	Minimum 300*	Min 30*
TP316L/1.4404			

* Actual values depend on the OD-WT ratio.

IMPROVED MECHANICAL PROPERTIES BASED ON UNIQUE CENTRAVIS TECHNOLOGY

Tubes are delivered in the annealed condition.

In order to ensure increased strength properties for austenitic grades, Centravis has developed the innovative heat treatment technology which is based on the actual chemistry and deformation rates.



Notes:

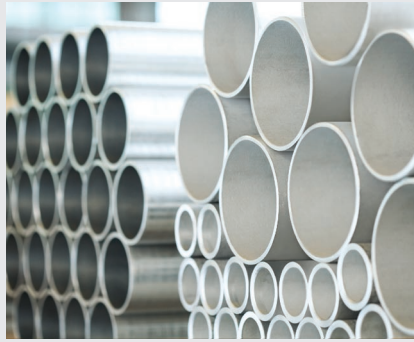
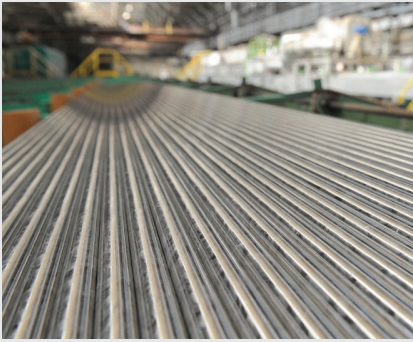
Red dots – Minimum values of yield strength 0.2 for tubes (austenitic grades TP304L/1.4306 and TP316L/1.4404) of Centravis made by using the developed heat treatment technology;

Black dots and lines – Typical yield strength 0.2 for tubes made by using the common standard technology.

Advantages of using austenitic grades with the improved yield and tensile strength at the level lean duplex stainless steel family with the better ductility than duplex and lean duplex grades are:

- cost saving;
- resistance to high pressure;
- improved formability, weldability.

In case of using low carbon austenitic grades instead of duplex and lean duplex, there is no risk to get harmful intermetallic sigma phase formation, carbide precipitation, 475°C embrittlement and poor formability which are typical problems for lean duplex and duplex grades during bending and preparatory operations as well as in-service.



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