



CENTRAVIS

PRODUCT CATALOGUE

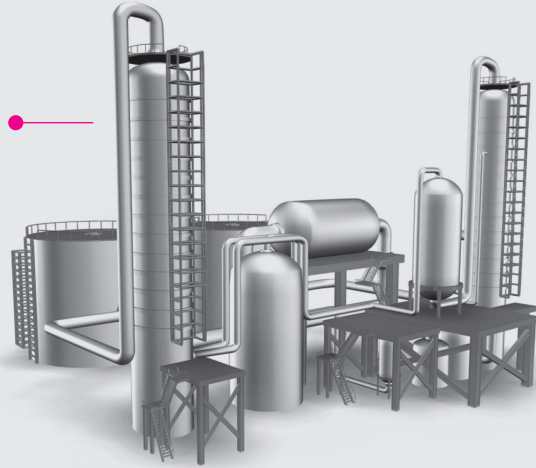
**Seamless Steel Pipes
for General Applications**

- Stainless Steel
- Duplex, Superduplex Grades
- Ni-Alloys

PIPES FOR GENERAL APPLICATIONS

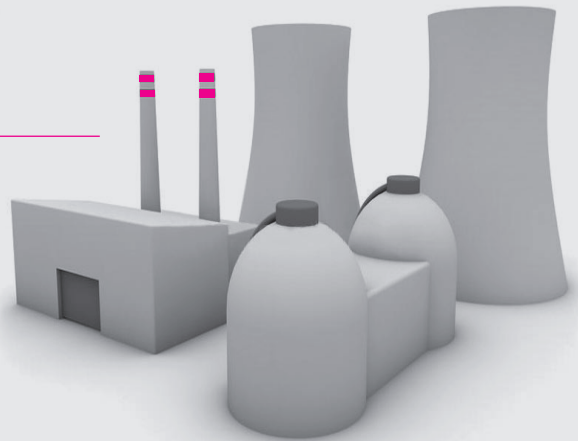
Stainless steel piping is widely used in a range of industries with corrosive atmosphere and critical requirements, such as:

Chemical & Petrochemical ●

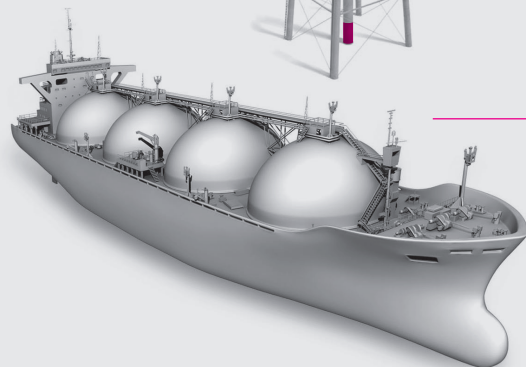


● Oil & Gas Industries

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

CERTIFICATE

The Certification Body of TUV SUD Management Service GmbH certifies that

PRIVATE JOINT-STOCK COMPANY «CENTRAVIS PRODUCTION UKRAINE»
Trubnikov Ave., 56
Nikopol, 53201
Ukraine

has established and applies a Quality Management System for

Design, manufacturing and supply of hot and cold formed seamless tubes in stainless steels and nickel alloys.

An audit was performed. Report No. 707047705.
Proof has been furnished that the requirements according to

ISO 9001:2015

are fulfilled.

The certificate is valid from 2014-12-22 until 2020-12-21.
Certificate Registration No.: 12 100 90466 TMS.

Product Compliance Management
 March, 2015-12-31
 TÜV SÜD Management Service GmbH • Zentralkonzepte • Referenzstr. 61 • 80333 München • Germany
 www.tuv-sud.com/centra-vis-ukraine-ukraine

CERTIFICATE

The Certification Body of TUV SUD Management Service GmbH certifies that

CENTPABIC PRIVATE JOINT-STOCK COMPANY «CENTRAVIS PRODUCTION UKRAINE»
Trubnikov Ave., 56
53201 Nikopol
Ukraine

has established and applies an Environmental Management System for

Design, manufacturing and supply of hot and cold formed seamless tubes in stainless steels and nickel alloys.

An audit was performed. Report No. 707047705.
Proof has been furnished that the requirements according to

ISO 14001:2015

are fulfilled.

The certificate is valid from 2018-08-13 until 2021-08-12.
Certificate Registration No.: 12 104 00495 TMS.

Product Compliance Management
 March, 2015-08-12
 TÜV SUD Management Service GmbH • Zentralkonzepte • Referenzstr. 61 • 80333 München • Germany
 www.tuv-sud.com/centra-vis-ukraine-ukraine

CERTIFICATE

The Certification Body of TUV SUD Management Service GmbH certifies that

CENTPABIC PRIVATE JOINT-STOCK COMPANY «CENTRAVIS PRODUCTION UKRAINE»
Trubnikov Ave., 56
53201 Nikopol
Ukraine

has established and applies an Occupational Health and Safety Management System for

Design, manufacturing and supply of hot and cold formed seamless tubes in stainless steels and nickel alloys.

An audit was performed. Report No. 707047705.
Proof has been furnished that the requirements according to

OHSAS 18001:2007

are fulfilled.

The certificate is valid from 2018-08-13 until 2021-03-31.
Certificate Registration No.: 12 116 50495 TMS.

Product Compliance Management
 March, 2015-03-31
 TÜV SUD Management Service GmbH • Zentralkonzepte • Referenzstr. 61 • 80333 München • Germany
 www.tuv-sud.com/centra-vis-ukraine-ukraine

CERTIFICATE

The TÜV NORD Systems GmbH & Co. KG certifies that the company

CENTRAVIS PRODUCTION UKRAINE PJSC
Prospekt Trubnikov 56
53201 Nikopol
Ukraine

has been verified and recognized as material manufacturer according to

AD 2000-Merkblatt WO

Certificate-No.: 07/203/1326/WP/WP/0613/17

The scope of approval is available in the annex "scope of approval".
File no.: 8114410132.

This certificate is valid until

March 2020

Hamburg, 17.03.2017
 TÜV NORD Systems GmbH & Co. KG • Zentralkonzepte • Referenzstr. 61 • 22623 Hamburg
 Telephone: +49 4302 27-0 • Fax: +49 4302 27-119 • E-Mail: info@tuv-nord.com

APPROVAL OF MANUFACTURER CERTIFICATE

Certificate No.: ANM-2137
File No.: 27
Date Iss.: 2013-11-04-17-42-1

This is to certify:

That **CENTRAVIS PRODUCTION UKRAINE PJSC**
Nikopol, Ukraine

is an approved manufacturer of **Steel Tubes and Pipes**

in accordance with **Det Norske Veritas' Rules for Classification Pt. 2**

and the following particulars:

Steel types	Austenitic stainless
Process	22C duplex stainless
Dimensions	Seamless
Outer diameter	max. 219 mm for austenitic and max. 114.3 mm for 22C duplex.
Wall thickness	max. 24 mm for austenitic and max. 8.56 mm for 22C duplex.
Remarks	1.Including low temperature service for austenitic stainless steel 2.Including automatic eddy current or ultrasonic testing in place of hydrostatic testing according to relevant piping standard

Hevik, 2014-11-27 for DNV GL
 Hans-Erik Wærstedt
 Director of Section
 DNV GL local office: Nikolaevo
 This Certificate is valid until 2018-12-31
 Notified Body (0045) for Pressure Equipment
 Nikolaevo

CERTIFICATE

Certificate No.: M20/137/006/4

CENTRAVIS PRODUCTION UKRAINE PJSC
Nikopol
56 Trubnikov Avenue
Nikopol
Dnipropetrovsk Region, 53201
Ukraine

has been approved as a manufacturer in accordance with the requirements of Lloyd's Register for:

Seamless pipes and tubes in austenitic stainless and duplex stainless steel
(nominal 100 mm diameter, 3 mm wall thickness)

This approval is subject to compliance with the Rules for the Manufacture, Testing and Certification of Materials.

Lloyd's Register is to be notified of any change that may affect the validity of this Certificate.

This Certificate is issued to the above manufacturer and is valid until the date given below.

Valid Until: 13 September 2019
 Date of Issue: 30 December 2016
 Clive Arnold
 Senior Mechanical Specialist in Lloyd's Register EMEA
 A member of the Lloyd's Register Group

NORSOK standard M-650 Edition 4, September 2011

CENTRAVIS	QTR Qualification Test Record NORSOK M-650	QTR No.: QTR01 Rev. No.: 01			
Manufacturer name/address/ Web page:	CENTRAVIS PRODUCTION UKRAINE PJSC 56 Trubnikov Avenue, Nikopol, Dnipropetrovsk region, Ukraine, 53201 www.centra-vis.com				
Reference standard	NORSOK M-650, Edition 4				
Material designation and MSB No.:	ASTM A790 UNS S31803, MSB DA1, Revision 5				
Manufacturing summary doc. No.:	NRESK0001	Rev. No.: 04			
Products and manufacturing process(es):	Hot finished seamless pipe Manufacturing process: hot piercing and extrusion (HIES)				
Mandatory conditions and sub-contractors:	Charpy impact testing is outsourced to NDT Services Ltd.				
Other information:	Raw material supplier: Italfond S.P.A., BSH Ecolabtech Sengen GmbH, Deutsche Edelstahlwerke GmbH, COGNIE Acciai Speciali S.P.A., Italfond S.P.A., Aceralvas Acerías de Alava SAL, BOHLER International GmbH				
Qualification expires:	01.01.2019				
Tested and Qualified Thickness and Weight					
Products and manufacturing process(es):	Test record No.	Tested thickness (mm)	Qualified thickness (mm)	Fast place weight (kg)	Qualified weight (kg)
Hot finished seamless pipe HIES	QTR0216460 000027	19.26	22.82	328	All
Qualification/Acceptance signatures					
Manufacturer:	Prepared by/Date: Oleg Polynov 01.11.2014	Checked by/Date: Oleg Polynov 01.11.2014			
The manufacturer and the QTR are evaluated and found to be in compliance with the requirements of NORSOK M-650 for supply of the above listed products and materials. This acceptance does not exempt any purchaser from his responsibility to ensure that this qualification is valid for his products within the essential variables of NORSOK M-650.					
Qualified/Accepted by (company name/address):	Signature/Date: 25.07.2015				

Hamburg, 17.03.2017
 TÜV NORD Systems GmbH & Co. KG • Zentralkonzepte • Referenzstr. 61 • 22623 Hamburg
 Notified Body (0045) for Pressure Equipment
 Nikolaevo

CERTIFICATE

Quality-Assurance System for material manufacturer according to directive 2014/68/EU

Certificate No.: 07/202/1326/WP/WP/0613/17

Name and address of the manufacturer: **CENTRAVIS PRODUCTION UKRAINE PJSC**
Prospekt Trubnikov 56
53201 Nikopol
Ukraine

Herewith we certify that the manufacturer has established and applies a quality-assurance system related to the material. This QA System has been subjected to a specific assessment according to directive 2014/68/EU, annex 1, point 4.3 with regard to the materials mentioned in the scope of approval.

Approved acc. to directive 2014/68/EU: **QA-System in relation to materials, EN 764-5, section 4.2 and AD2000-Merkblatt WO**

Certification file no.: 8114410132
Audit report file no.: 1320V6105370
Scope of approval: **Seamless tubes of stainless steels (product / material)**

Production site: **53201 Nikopol, Ukraine**

The certificate is valid until: **March 2020**
Only valid with a certificate in force acc. to EN ISO 9001

Hamburg, 17.03.2017
 TÜV NORD Systems GmbH & Co. KG • Zentralkonzepte • Referenzstr. 61 • 22623 Hamburg
 Notified Body (0045) for Pressure Equipment
 Nikolaevo

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.centraavis.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
10*	10.750	273.05						
12*	12.750	323.85						

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.

* Pipes are offered as machined on external surface and with random length.

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)



NPS	Outside diameter	
	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
10	10.750	273.05
12	12.750	323.85

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:

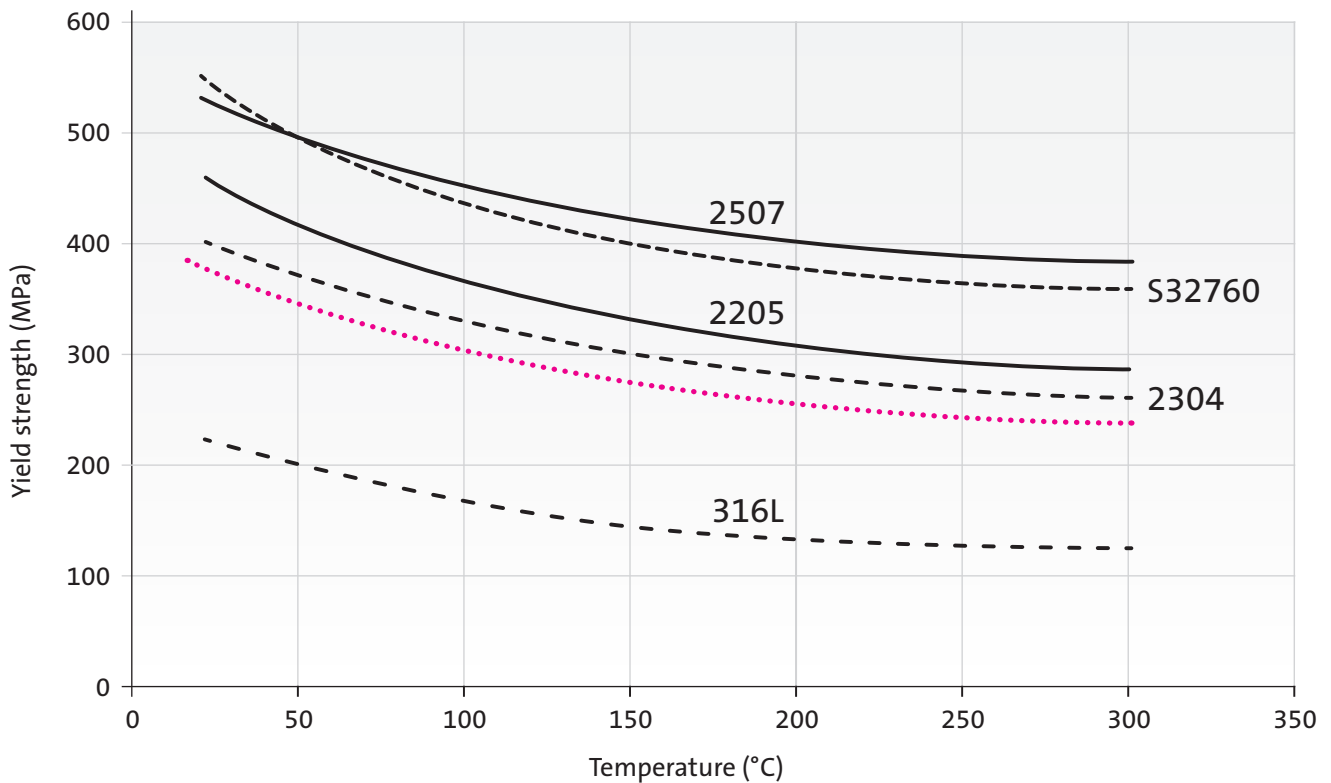
Grade	CENTRAVIS's suggestion with the using of special heat treatment technology		
	Tensile strength, MPa	Yield strength 0.2, MPa	Elongation at break, %
TP304L/1.4306	Minimum 600*	Minimum 300*	Min 30*
TP316L/1.4404			

* 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:

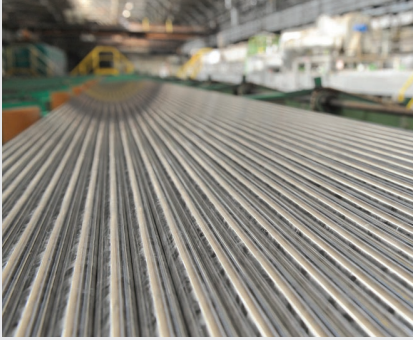
Red dots – Minimum values of yield strength 0.2 for tubes (austenitic grades TP304L/1.4306 and TP316L/1.4404) of Centravis made by using the developed heat treatment technology;

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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