



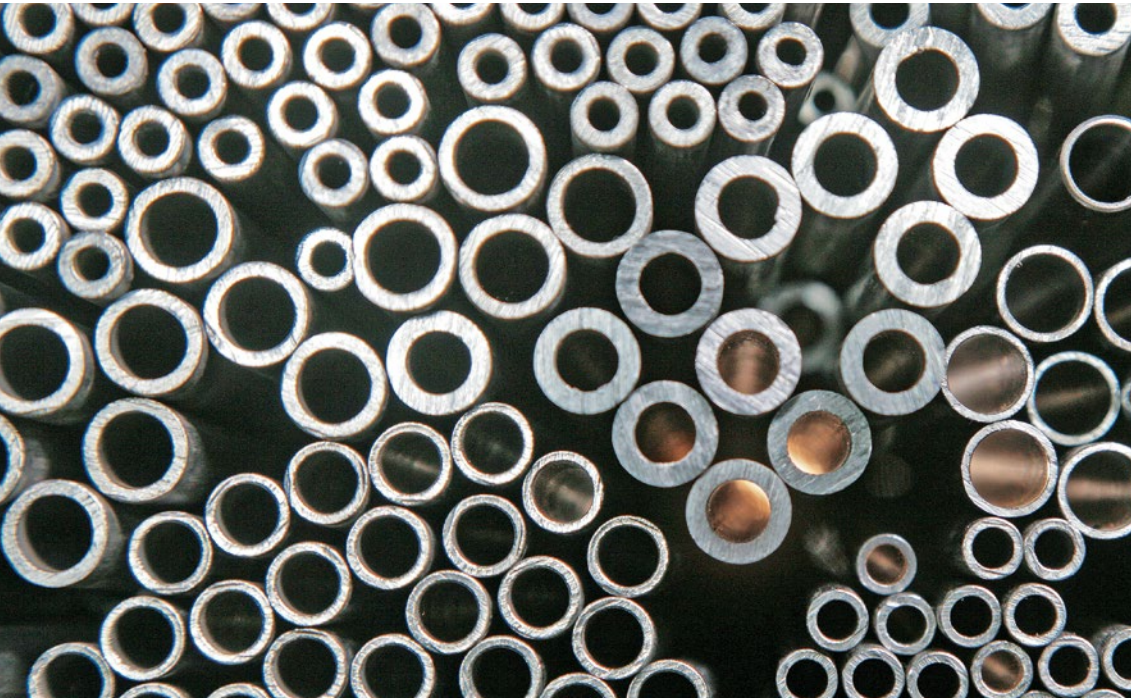
Product Range

Seamless Stainless Steel & Nickel-Based Alloy Tubing and Piping



MANNESMANN
STAINLESS TUBES

A Member of the Salzgitter Group



Seamless stainless steel and nickel-based alloy tubes and pipes are our everyday passion and our history at Mannesmann Stainless Tubes.

Our group integrates the tradition of three seamless stainless steel worlds (Mannesmann, Dalmine and Vallourec). Resulting in “DMV Stainless” from this international merger in 1994, DMV became a part of Salzgitter group in 2003 and adjusted its name to Mannesmann Stainless Tubes in 2017.

With an international network of plants and offices, we are a global top player in our markets and a consistently reliable business partner, ensuring quick and customer focused answers to changing market requirements.

Our customers profit from one of the most comprehensive product ranges in our business:

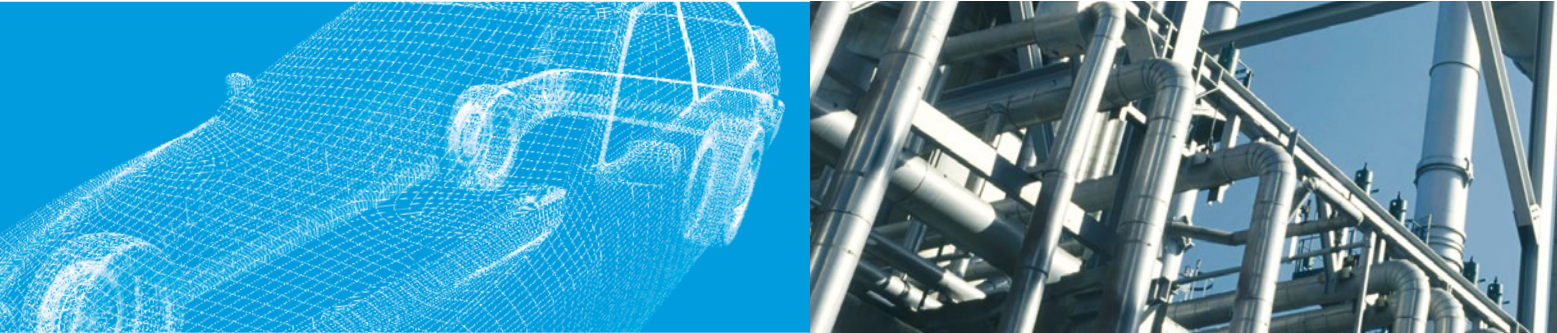
- from small instrumentation tubing to large pipe sizes with outside diameters from 6 to 273 mm (from 0.24 up to 10.752 inches) and with wall thicknesses from 0.5 up to 50 mm (from 0.02 up to 1.97 inches)
- in materials from standard austenitic stainless, duplex and super-duplex steels to highly sophisticated nickel-based alloys – this variety offers highest corrosion resistance, heat resistance and/or high-temperature, high-strength materials.

We combine high quality products for critical environments with efficient and reliable services: our customers thus enjoy a supportive personal account management.

Ongoing cycles of investment ensure that we work according to the latest technical standards. This gives us the trustworthiness to equip the so called “critical spots” of customer’s plants, products and processes with the special qualities of our tubes and pipes.

Typically, these “critical” service conditions are defined e.g. by

- high temperatures
- high pressure
- aggressive media (acids or basic)



Our tubes and pipes come into operation mainly in the following sectors:

Instrumentation Tubes

Used in several market segments (e.g. chemical, Oil & Gas, ...) for analyser systems, measurement instruments and hydraulic circuits

Boiler Tubes

In power generation plants in applications such as reheaters and superheaters

Nuclear Tubes

(Power Gen, Waste treatment, Fuel fabrication)
NSSS piping, Heat exchanger tubes (U-bent & straight), In-core instrumentation tubes, Instrumentation tubes for quality class 1, 2, 3 of the nuclear power application

Furnace Tubes

Industrial furnaces and similar applications demand our heat-, high temperature- and corrosion resistant austenitic steel (usually with high carbon contents) and nickel-based alloys

Heat Exchanger Tubes

Serving e.g. refineries, (petro-)chemical and pharmaceutical industries as well as fertilizer production and food industries

Oil and Gas Tubes

- OCTG (Oil Country Tubular Goods)
Onshore and offshore oil and gas exploration and production need special tubular products to cope with high pressure and/or high temperature conditions as well as with highly aggressive substances
- Umbilical Tubes
Subsea applications have to withstand aggressive sea water and must be essentially inert to the commonly used fluids transmitted through the tubes
- Other Upstream and Downstream Applications
These comprise e.g. Subsea Flowlines, Risers and Piping systems, Surface Piping and Line pipes

Hollow Bar and Mechanical Tubes and Pipes

Our tubes as highly efficient quality raw material for radially machined components and a favorable alternative to use of solid bars

Aerospace Tubes and Pipes

Mannesmann SOTEP Stainless Tubes supplies precision tubes for the most demanding applications: The aeronautics, nuclear, healthcare or oil & gas exploration industries

General Tubes and Pipes

Apart from the above mentioned special applications, we also offer tubes for general use and different corrosion and heat resistant applications

Mannesmann Stainless Tubes products are exported worldwide to all continents for use within plants, products and processes, e.g. in:

- Onshore and offshore oil and gas industry
- Chemical and petrochemical industry
- Energy and power generation
- Mechanical- and plant engineering
- Machine tool manufacturing
- Automotive industry
- Aerospace industry
- Medical & healthcare technology
- Environmental engineering
(water treatment and waste incineration)
- Nuclear industry
- Ship-yard industry
- Food processing industry
- Coal gasification
- Oil & gas exploration
- Fertilizer production
- Environmental protection
- Naval engineering
- Biotechnology

Basic Material Classifications

You can find the following materials within the framework of our manufacturing programme:

Stainless Steels

Corrosion resistant stainless steels

Our product range offers our customers two classes of stainless steels that have an excellent resistance to corrosion.

Austenitic-ferritic stainless steels (duplex and super duplex steels) are characterised by their excellent mechanical properties, particularly their high stress corrosion cracking resistance. They are especially well-suited for maritime applications and in the chemical industry. Their excellent resistance to corrosion enables them to withstand concentrated chloride medium, particularly under mechanical stress. This makes them superior to austenitic steels in many cases.

Austenitic corrosion resistant stainless steels primarily include materials with higher alloys (e.g. nickel, chrome and molybdenum). They are resistant to different types of corrosion caused by wet chemical influences, and are still able to maintain an austenitic face centred cubic matrix. This creates a range of highly versatile stainless steels.

High temperature stainless steels

These steels maintain their mechanical properties when exposed to elevated temperatures on either a short- or long-term basis.

Depending on the area of application these temperatures can rise e.g. to

- 500°C (932°F) in chemical processes
- 700°C (1,292°F) in power plant applications
- 1,000°C (1,832°F) for furnace engineering

With their increased concentration of chrome, silicon and aluminium they are especially resistant under the influence of hot gases as well as in salt and metal melting. However, the individual corrosion resistance is always dependent on the surrounding conditions, and can therefore not be precisely determined in a single testing.

Available upon special request are titanium tubes for heat exchangers and bimetallic tubes for strippers in urea application.

Nickel-Based Alloys

Corrosion resistant nickel-based alloys

Nickel's high degree of corrosion resistance is due to the fact that it is a relatively noble metal within the galvanic electrochemical series of metals.

Adding chrome, molybdenum, copper and other elements forms alloys with even higher resistance to oxidation and corrosion which makes it possible to use them in a wider range of applications. Seamless tubes and pipes made of corrosion resistant nickel-based alloys are the first choice for basic industry manufacturers due to their excellent resistance to various acids (sulphuric acid, hydrochloric acid, phosphoric acid) and alkaline solutions.

High temperature nickel-based alloys

Based on an austenitic structure, high temperature, high strength nickel-based alloys allow further increasing of specific alloying elements, such as chrome, molybdenum, tungsten, titanium, aluminium, niobium, etc. This leads to a very low iron concentration enabling the material to be employed within applications up to 1,100°C (2,012°F) in aggressive atmospheres.

Our production techniques are adapted to the high quality level required by our customers.

Hot Extrusion

... is a production process for manufacturing hot finished tubes, pipes, re-draw hollows and hollow bars in stainless steels and nickel-based alloys. Our range of dimensions includes

- outside diameters from 32 up to 273 mm (1.26 up to 10.752 inches) and
- wall thicknesses from 3.4 up to 50 mm (0.134 up to 1.97 inches)

Cold Pilgering

... is the preferred production process for seamless, cold-finished, high alloyed stainless steel and nickel-based alloy tubes and pipes. This technique provides a high forming rate, close tolerances and good productivity yields.

Our production range covers

- outside diameters from 6 up to 219.1 mm (0.24 up to 8.63 inches) and
- wall thicknesses from 0.5 up to 30 mm (0.02 up to 1.18 inches)

Cold Drawing

... is the ideal process for achieving very close tolerance ranges, especially for outside diameters. Additionally, the cold drawing process is the perfect choice when a low forming ratio is required.



ISO-Dimensions and Tolerances for seamless Tubes and Pipes

Outside Diameter	Hot Extruded	Cold Finished		
EN ISO 1127 tolerance class	D2	D2	D3	D4
Permissible deviation	$\pm 1.0\%$ (min. ± 0.5 mm ($\pm 0.0197''$))	$\pm 1.0\%$ (min. ± 0.5 mm ($\pm 0.0197''$))	$\pm 0.75\%$ (min. ± 0.3 mm ($\pm 0.0012''$))	$\pm 0.5\%$ (min. ± 0.1 mm ($\pm 0.0039''$))

Wall thickness	Hot Extruded	Cold Finished	
	≤ 5 mm (0.1969")	> 5 mm (0.1969")	
EN ISO 1127 tolerance class	T1	T2	T3
Permissible deviation	$\pm 15.0\%$ (min. ± 0.6 mm ($\pm 0.0236''$))	$\pm 12.5\%$ (min. ± 0.4 mm ($\pm 0.0157''$))	$\pm 10\%$ (min. ± 0.2 mm ($\pm 0.0074''$))

Outside Diameter	Wall Thickness (hot extruded)																														
	inch	0.110	0.126	0.134	0.142	0.157	0.197	0.213	0.220	0.232	0.248	0.280	0.315	0.346	0.365	0.394	0.433	0.492	0.559	0.630	0.689	0.787	0.874	0.984	1.102	1.181	1.260	1.417	1.575	2.362	
inch	mm	2.8	3.2	3.4	3.6	4.0	5.0	5.4	5.6	5.9	6.3	7.1	8.0	8.8	9.3	10.0	11.0	12.5	14.2	16.0	17.5	20.0	22.2	25.0	28.0	30.0	32.0	36.0	40.0	60.0	
1.260	32.0																														
1.327	33.7																														
1.378	35.0																														
1.496	38.0																														
1.575	40.0																														
1.669	42.4																														
1.752	44.5																														
1.902	48.3																														
2.008	51.0																														
2.126	54.0																														
2.244	57.0																														
2.374	60.3																														
2.500	63.5																														
2.756	70.0																														
2.874	73.0																														
2.996	76.1																														
3.248	82.5																														
3.500	88.9																														
4.000	101.6																														
4.252	108.0																														
4.500	114.3																														
4.764	121.0																														
5.000	127.0																														
5.236	133.0																														
5.500	139.7																														
5.563	141.3																														
6.039	153.4																														
6.260	159.0																														
6.626	168.3																														
7.000	177.8																														
7.626	193.7																														
8.625	219.1																														
9.626	244.5																														
10.000	254.0																														
10.079	256.0																														
10.752	273.1																														
11.024	280.0																														

“American Standard” Series

Outside Diameter		Schedule 5S		Schedule 10S		Schedule 40S		Schedule 80S		Schedule 120		Schedule 160		Schedule XXS	
		WT	M	WT	M	WT	M	WT	M	WT	M	WT	M	WT	M
Nominal inches	inch mm	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m	inch mm	lb/ft kg/m
1/4	0.540			0.065	0.334	0.088	0.432	0.119	0.542						
	13.7			1.65	0.498	2.24	0.643	3.02	0.808						
3/8	0.675			0.065	0.429	0.091	0.574	0.126	0.748						
	17.1			1.65	0.638	2.31	0.855	3.20	1.114						
1/2	0.840	0.065	0.546	0.083	0.682	0.109	0.865	0.147	1.104			0.188	1.331	0.294	1.742
	21.34	1.65	0.814	2.11	1.016	2.77	1.288	3.73	1.645			4.78	1.982	7.47	2.594
3/4	1.050	0.065	0.695	0.086	0.872	0.113	1.150	0.154	1.498			0.219	1.976	0.308	2.482
	26.7	1.65	1.035	2.11	1.299	2.87	1.713	3.91	2.231			5.56	2.943	7.82	3.697
1	1.315	0.065	0.881	0.109	1.426	0.133	1.706	0.179	2.207			0.250	2.888	0.358	3.715
	33.4	1.65	1.312	2.77	2.125	3.38	2.541	4.55	3.287			6.35	4.301	9.09	5.533
1 1/4	1.660	0.065	1.125	0.109	1.836	0.140	2.312	0.191	3.045			0.250	3.827	0.382	5.300
	42.2	1.65	1.675	2.77	2.735	3.56	3.444	4.85	4.536			6.35	5.700	9.70	7.894
1 1/2	1.900	0.065	1.294	0.109	2.120	0.145	2.760	0.200	3.691			0.281	4.940	0.400	6.510
	48.3	1.65	1.927	2.77	3.158	3.68	4.112	5.08	5.498			7.14	7.359	10.15	9.696
2	2.375	0.065	1.627	0.109	2.679	0.154	3.707	0.218	5.100			0.344	7.576	0.436	9.162
	60.3	1.65	2.423	2.77	3.990	3.91	5.521	5.54	7.596			8.74	11.284	11.07	13.646
2 1/2	2.875	0.083	2.515	0.120	3.587	0.203	5.885	0.276	7.777			0.375	10.168	0.552	13.901
	73.0	2.11	3.745	3.05	5.342	5.16	8.765	7.01	11.583			9.53	15.146	14.02	20.706
3	3.500	0.083	3.079	0.120	4.402	0.216	7.698	0.300	10.412			0.438	14.551	0.600	18.872
	88.9	2.11	4.585	3.05	6.557	5.49	11.466	7.62	15.509			11.13	21.674	15.24	28.109
3 1/2	4.000	0.083	3.529	0.120	5.053	0.226	9.250	0.318	12.703						
	101.6	2.11	5.256	3.05	7.526	5.74	13.778	8.08	18.921						
4	4.500			0.120	5.704	0.237	10.958	0.337	15.216	0.438	19.304	0.531	22.862	0.674	27.969
	114.3			3.05	8.496	6.02	16.322	8.56	22.665	11.13	28.753	13.49	34.053	17.12	41.660
5	5.563			0.134	7.882	0.258	14.838	0.375	21.111	0.500	27.456	0.625	33.482	0.750	39.151
	141.3			3.40	11.740	6.55	22.101	9.53	31.444	12.70	40.896	15.88	49.871	19.05	58.315
6	6.625			0.134	9.425	0.280	19.266	0.432	29.014	0.562	36.951	0.719	46.058	0.864	54.003
	168.3			3.40	14.039	7.11	28.697	10.97	43.217	14.27	55.038	18.26	68.603	21.95	80.438
8	8.625					0.322	29.004	0.500	44.066	0.719	61.652	0.906	75.852	0.875	73.572
	219.1					8.18	43.202	12.70	65.637	18.26	91.830	23.01	112.981	22.23	109.586
10	10.750					0.365	40.52	0.500	54.79	0.844	89.38	1.125	115.75	1.000	104.23
	273.1					9.27	60.31	12.70	81.56	21.44	133.01	28.58	172.27	25.40	155.10

Stainless steel pipe ANSI B 36-19 M up to and including Schedule 80 S. Above, ANSI B 36-10 M dimensions.

The conventional linear mass are those of austenitic stainless steel calculated from the formula:

$$M = \frac{(D-T)T}{K} \text{ (corresponding to a density of 7.97 with } K = 40)$$

The above values (weight / meter and feet) are those applicable to austenitic stainless steel.

M = mass (weight per length unit)

D = outside diameter

T = wall thickness

ASTM A 213 and A 269

Outside Diameter		Wall Thickness (cold finished)																				
		0.035	0.039	0.047	0.049	0.059	0.063	0.065	0.071	0.079	0.083	0.095	0.098	0.102	0.109	0.114	0.120	0.126	0.134	0.142	0.148	0.157
inch		0.89	1.0	1.2	1.24	1.5	1.6	1.65	1.8	2.0	2.11	2.41	2.5	2.6	2.77	2.9	3.05	3.2	3.4	3.6	3.76	4.0
mm		20			18			16			14	13			12			11	10		9	
BWG																						
inch	mm																					
0.500	12.70																					
0.540	13.72																					
0.551	14.00																					
0.625	15.90																					
0.675	17.20																					
0.750	19.05																					
0.787	20.00																					
0.840	21.30																					
0.984	25.00																					
1.000	25.40																					
1.050	26.90																					
1.181	30.00																					
1.250	31.80																					
1.315	33.70																					
1.500	38.10																					
1.660	42.40																					
1.750	44.50																					
1.900	48.30																					
2.000	50.80																					
2.125	54.00																					

Tolerances according to ASTM A 1016. Tube deliveries according to EN-DIN-AFNOR-UNI requirements as well as intermediate dimensions (diameters, wall thicknesses) on request.

U-bending

Outside Diameter		Wall Thickness								
		0.035	0.039	0.049	0.059	0.065	0.079	0.083	0.095	0.109
inch		0.89	1.0	1.24	1.5	1.65	2.0	2.11	2.41	2.77
mm		20		18		16		14	13	12
BWG										
inch	mm									
0.625	15.90	40.0	32.0	24.0	24.0	24.0	32.0			
0.630	16.00	40.0	32.0	24.0	24.0	24.0	32.0			
0.750	19.05		38.0	28.5	28.5	28.5	28.5	38.0		
0.787	20.00		40.0	30.0	30.0	30.0	30.0	30.5	35.0	
0.839	21.30			42.5	32.0	32.0	32.0	32.0	32.0	
0.984	25.00				50.0	38.0	38.0	38.0	38.0	50.0
1.000	25.40				51.0	38.0	38.0	38.0	38.0	51.0
1.181	30.00				60.0	45.0	45.0	45.0	45.0	60.0
1.252	31.80				65.0	48.0	48.0	48.0	48.0	65.0

Minimum bending radius in mm

Initial length

Maximum lengths of 32 m can be supplied on request.

Bending radius

Maximum 1500 mm

Heat treatment of the bend

U-bends with a bending radius up to maximum of 750 mm can be heat treated on request.

The above sizes are those most frequently used, other sizes can be produced upon request.

The dimensions for heat exchanger tubes in special grades and nickel-based alloys may differ from the above, please contact your nearest Mannesmann Stainless Tubes office for further information.

Specialized precision tubes



Mannesmann SOTEP Stainless Tubes specializes in precision tubes and tubular parts for the most demanding applications in the aerospace, nuclear and other industries.

SOTEP products are highly customized and suited to individual requirements. Providing comprehensive service, we supply tubes as well as tubular parts – even at low quantities.

At SOTEP, we have our own metallurgical laboratory. This laboratory is recognised by a world renowned aerospace engine manufacturer. All of the batches produced are subject to sampling inspecting in accordance with the reference standard or specification.

Tubes and pipes for the most demanding industries:

- Aeronautics
- Nuclear industry
- Medical & healthcare
- Oil & gas exploration

SOTEP service range:

- Precision cutting
- Machining
- Forming
- Bending
- Welding
- Surface treatment
- Electropolishing



Dimensions:

- Outside diameter: from **0.2 mm**
- Wall thickness: from **0.05 mm**
- Lengths: up to 40 m

Materials:

- Austenitic and super austenitic stainless steel grades
- Duplex and super duplex grades
- Nickel-based alloys
- Cobalt-based alloys

Certifications:

- ISO 9001
- AFAQ/EN 9100
- Areva
- Rolls-Royce
- RCC-M



At Mannesmann Stainless Tubes, quality management begins way ahead of any production step.

From the selection of raw material suppliers up to the final quality tests in our own laboratories we thoroughly evaluate, test and control our products and processes, aiming at continuous improvements.

For in-process and acceptance inspection, the quality departments at the individual manufacturing centers have state-of-the-art equipment at their disposal including mechanical workshops, tensile and impact testing machines, chemical laboratories for corrosion tests, equipment for hardness testing and metallographic inspection.

We also have extensive facilities for non-destructive testing, including ultrasonic, eddy current, hydrostatic, positive material identification and dye penetrant testing.

This list gives some examples of approvals & accreditations that Mannesmann Stainless Tubes has received:

- EN ISO 9001
- EN ISO 14001
- AD 2000 - W0 / TRD 100
- PED 2014/68/EU
(Material manufacturer Annex 1, Paragraph 4.3)
- API 5LC
- API 5CRA
- DNV OS F101
- ASME Section III
- RCC-M
- HAF 604 (from NNSA, China)
- KTA 1401
- NORSOK STANDARD M-650
- Framatome KTA 1401
- Germanischer Lloyd W 1201 HH 1
(For construction of ships or installations)

Stainless Steel Grades

Austenitic Ferritic															
MST Designation	Nearest equivalent standard			Typical chemical composition ¹⁾						Density		Min. mechanical prop. at RT			
	UNS	EN	JIS	C _{max}	Cr	Ni	Mo	Cu	others	g/cm ³	lb/in ³	R _{p0.2} MPa	Yield St. ksi	R _m MPa	Tensile St. ksi
DMV 18.5	S31500	1.4424		0.03	18.5	4.8	2.7		Si1.7; N 0.1	7.8	0.28	440	64	630	92
DMV 22.5	S31803	1.4462		0.03	22.0	5.5	3.0		N 0.17 ²⁾	7.8	0.28	450	65	620	90
DMV 25.7	S31260			0.03	25.0	6.5	3.0	0.5	N 0.20; W 0.5	7.8	0.28	450	65	690	100
DMV 25.7 Cu	S32550	1.4507		0.03	25.0	7.0	3.5	1.5	N 0.22 ²⁾	7.8	0.28	550	80	760	110
DMV 25.7 N	S32760	1.4501		0.03	25.0	7.0	4.0	0.5	N 0.25; W 0.5 ²⁾	7.8	0.28	550	80	750	109

¹⁾ All figures in weight percentage. In case of order, the limits of the order specification will apply.

²⁾ Min PRE value controlled.

Austenitic															
MST Designation	Nearest equivalent standard			Typical chemical composition ¹⁾						Density		Min. mechanical prop. at RT			
	UNS	EN	JIS	C _{max}	Cr	Ni	Mo	Cu	others	g/cm ³	lb/in ³	R _{p0.2} MPa	Yield St. ksi	R _m MPa	Tensile St. ksi
<i>Corrosion resistant:</i>															
DMV 304	S30400	1.4301	SUS 304	0.06	18.5	9.5				7.9	0.29	205	30	515	75
DMV 304 L	S30403	1.4306	SUS 304L	0.03	19.0	11.0				7.9	0.29	170	25	485	70
DMV 304 LN	S30453	1.4311		0.03	18.0	10.0				7.9	0.29	205	30	515	75
DMV 321	S32100	1.4541	SUS 321	0.08	18.5	10.5			Ti > 5 x C < 0.6%	7.9	0.29	170	25	485	70
DMV 347	S34700	1.4550	SUS 347	0.08	18.5	11.0			Nb > 10 x C < 1.0%	7.9	0.29	205	30	515	75
DMV 316	S31600	1.4401	SUS 316	0.06	17.0	11.5	2.25			8.0	0.29	205	30	515	75
DMV 316 L	S31603	1.4404		0.03	17.0	12.0	2.25			8.0	0.29	170	25	485	70
DMV 316 LMoS	S31603	1.4435	SUS 316L	0.03	17.0	12.5	2.75			8.0	0.29	170	25	485	70
DMV 316 LN	S31653	1.4429		0.03	17.0	12.5	2.75		N > 0.06 < 0.08	8.0	0.29	205	30	515	75
DMV 316 Ti	S31635	1.4571		0.08	17.0	11.5	2.25			8.0	0.29	205	30	515	75
DMV 317 L	S31703	1.4438	SUS 317L	0.03	18.0	14.5	3.5			8.0	0.29	205	30	515	75
DMV 316 LUG	S31603	1.4435		0.02	17.0	13.5	4.5			8.0	0.29	170	25	485	70
DMV 309	S30900	1.4828	SUS 309 TB	0.07	25.0	14.0				7.9	0.29	205	30	515	75
DMV 306 Si	S30600	1.4361		0.015	18.0	15.0			Si 4	7.9	0.29	240	35	540	78
DMV 4439	(S31726)	1.4439		0.03	17.5	13.5	4.5		N 0.16	8.0	0.29	240	35	550	80
DMV 25.22.2	S31050	1.4466		0.02	25.0	22.0	2.0		N 0.12	7.9	0.29	255	37	540	78
DMV 310 S	S31008	1.4335		0.015	25.0	21.0				7.9	0.29	205	30	515	75
DMV 904	N08904	1.4539		0.02	20.5	25.5	4.5	1.5		8.0	0.29	215	31	490	71
DMV 926	N08926	1.4529		0.02	20.0	25.0	6.5	0.8	N 0.20	8.0	0.29	295	43	650	94
DMV 954	S31254	1.4547		0.02	20.0	18.0	6.2		N 0.20	8.0	0.29	310	45	655	95
<i>Heat resistant:</i>															
DMV 304 H	S30409	1.4948		0.08 ²⁾	18.5	9.5				7.9	0.29	205	30	515	75
DMV 304 HCu	S30432	1.4907		0.13 ²⁾	18.5	9.5		3.0	N 0.10; Nb 0.5	7.9	0.29	235	34	590	85
DMV 321 H	S32109	1.4940		0.08 ²⁾	18.5	11.0			Ti > 4 x C < 0.6	7.9	0.29	170	25	480	70
DMV 347 H	S34709	1.4912		0.08 ²⁾	18.5	11.0			Nb > 8 x C < 1.0	7.9	0.29	205	30	515	75
DMV 347 HFG		1.4908		0.10 ²⁾	18.5	11.0			Ti+Nb > 8xC < 1.0	7.9	0.29	205	30	550	80
DMV 310 H	S31009	1.4845	SUS 310 TB	0.10 ²⁾	25.0	20.0				8.0	0.29	205	30	515	75
DMV 310 N	S31042	1.4952		0.10 ²⁾	25.0	20.0			N 0.20; Nb 0.40	8.0	0.29	295	43	655	95
DMV 4841		1.4841		0.10	25.0	20.5			Si 2.0	8.0	0.29	205	30	515	75

¹⁾ All figures in weight percentage. In case of order, the limits of the order specification will apply.

²⁾ Minimum level of carbon content is mandatory.

Nickel and Nickel-based alloys

MST Designation	Nearest equivalent standard		Typical chemical composition ¹⁾							Density		Min. mechanical prop. at RT			
	UNS	DIN	C _{max}	Cr	Ni	Mo	Cu	others	g/cm ³	lb/in ³	R _{p0.2} MPa	Yield St. ksi	R _m MPa	Tensile St. ksi	
Corrosion resistant:															
DMV 920	N08020	2.4660	0.02	20.0	37.0	2.5	3.5	Nb + Ta	8.1	0.29	240	35	550	80	
DMV 8020	N08020		0.02	20.0	34.0	2.5	3.5	Nb + Ta	8.1	0.29	240	35	550	80	
DMV 928	N08028	1.4563	0.02	27.0	31.0	3.5	1.2	N 0.10	8.0	0.29	210	31	500	73	
DMV 931	N08031	1.4562	0.015	27.0	31.0	6.5	1.2	N 0.20	8.1	0.29	280	41	650	94	
DMV 800 L	(N08800)	1.4558	0.025	21.0	32.0			Ti 0.30; Al 0.30	8.0	0.29	180	26	450	65	
DMV 800	N08800	1.4876	0.08	21.0	32.0			Ti < 0.40	8.0	0.29	210	31	500	73	
DMV 825	N08825	2.4858	0.03	22.0	42.0	3.0	2.0	Ti 0.80; Al 0.10	8.1	0.29	180	26	530	75	
DMV 600 L	N06600	2.4817	0.025	16.0	76.0			Fe 8	8.4	0.30	180	26	550	80	
DMV 690	N06690	2.4642	0.02	29.0	60.0			Fe 9	8.2	0.29	205	30	585	85	
DMV 625	N06625 Gr.1	2.4856	0.025	22.0	63.0	9.0		Nb 3.5	8.5	0.31	414	60	827	120	
DMV G3	N06985	2.4619	0.015	22.0	48.0	7.0	2.0	Co, W	8.3	0.30	205	30	585	85	
DMV C 22	N06022	2.4602	0.01	22.0	57.0	13.0		W	8.7	0.31	310	45	690	100	
DMV 59	N06059	2.4605	0.01	23.0	59.0	16.0		Al	8.6	0.31	340	50	690	100	
DMV C 4	N06455	2.4610	0.01	16.0	66.0	16.0		Ti	8.6	0.31	280	41	700	102	
DMV C 276	N10276	2.4819	0.01	16.0	57.0	16.0		W	8.4	0.30	350	51	750	109	
Heat resistant:															
DMV 800 H	N08810	1.4958	0.10 ²⁾	21.0	32.0			(Al, Ti) 0.15 - 0.60	8.0	0.29	170	25	500	73	
DMV 811	N08811	1.4959	0.10 ²⁾	21.0	32.0			0.85 < Ti + Al < 1.20	8.0	0.29	170	25	500	73	
DMV AC 66	S33224	1.4877	0.06	27.0	32.0			Ce 0.07; Nb 0.8	8.0	0.29	185	27	500	73	
DMV 600 H	N06600	2.4816	0.07	16.0	76.0			Fe 8	8.4	0.30	240	35	550	80	
DMV 625	N06625 Gr.2	2.4856	0.025	22.0	63.0	9.0		Nb 3.5	8.4	0.30	276	40	690	100	
DMV 601	N06601	2.4851	0.08	23.0	62.0			Al 1.2; Ti 0.3	8.1	0.29	240	35	600	87	
DMV 617	N06617	2.4663	0.08	22.0	55.0	9.0		Co 12; Al; Ti	8.4	0.30	300	44	700	102	
Nickel-Copper:															
DMV 400	N04400	2.4360	0.15		65.0		30.0	Fe 2; Mn 1.5	8.8	0.32	180	26	450	65	
Pure Nickel:															
DMV 200	N02200	2.4066	0.05		99.4				8.9	0.32	103	15	379	55	
DMV 201	N02201	2.4068	0.02		99.4				8.9	0.32	83	12	345	50	

¹⁾ All figures in weight percentage. In case of order, the limits of the order specification will apply.

²⁾ Minimum level of carbon content is mandatory.

ASTM-Standards

Iron and Steel Products Steel - Piping, Tubing, Fittings

ASTM Volume 01.01	A 213 / A 213M	Seamless ferritic and austenitic alloy steel boiler, superheater and heat exchanger tubes
	A 269 / A 269M	Seamless and welded austenitic stainless steel tubing for general service
	A 312 / A 312M	Seamless and welded austenitic stainless steel pipes
	A 376 / A 376M	Seamless austenitic steel pipe for high-temperature service
	A 511	Seamless stainless steel mechanical tubing
	A 789 / A 789M	Seamless and welded ferritic-austenitic stainless steel tubing for general service
	A 790 / A 790M	Seamless and welded ferritic-austenitic stainless steel pipe

Nonferrous Metal Products - Nickel....

ASTM Volume 02.04	B 161	Nickel seamless pipe and tube (UNS N02200; N02201)
	B 163	Seamless nickel and nickel alloy condenser and heat exchanger tubes (e.g. UNS N02200; N04400; N06600; N08800)
	B 165	Nickel-copper alloy (UNS N04400), seamless nickel pipe and tube
	B 167	Nickel-chromium-iron alloys (UNS N06600, N06601 and N06690), seamless pipe and tube
	B 407	Nickel-iron-chromium alloys (UNS N08800; N08810; N08811), seamless pipe and tube
	B 423	Nickel-iron-chromium-molybdenum-copper alloys (UNS N08825), pipe and tube
	B 444	Nickel-chromium-molybdenum-columbium alloys (UNS N06625), pipe and tube
	B 622	Seamless nickel and nickel-cobalt alloy pipe and tube (e.g. UNS N06455; N06059; N10276, N06002)
	B 668	Seamless tubes (UNS N08028)
B 677	Seamless pipe and tube (UNS N08904; N08925; N08926)	
B 729	Seamless pipe and tube (UNS N08020; N08026; N08024)	

Nonferrous Metal Products - Titanium....

ASTM Volume 02.04

B 338	Seamless and welded Titanium and Titanium alloy tubes for condensers and heat exchangers
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ASME-Standards

ASME Boiler Pressure Code Section II Part A - Ferrous Material Specification

ASME	SA 213 / SA 213M	Seamless ferritic and austenitic alloy steel boiler, superheater and heat exchanger tubes
	SA 312 / SA 312M	Seamless and welded austenitic stainless steel pipes
	SA 376 / SA 376M	Seamless austenitic steel pipe for high-temperature central-station service
	SA 511	Seamless stainless steel mechanical tubing
	SA 789 / SA 789M	Seamless and welded ferritic-austenitic stainless steel tubing for general service
	SA 790 / SA 790M	Seamless and welded ferritic-austenitic stainless steel pipe

ASME Boiler Pressure Code Section II Part B - Non-Ferrous Material Specification

ASME	SB 161	Nickel seamless pipe and tube (UNS N02200; N02201)
	SB 163	Seamless nickel and nickel-based alloy condenser and heat exchanger tubes (e.g. UNS N02200; N04400; N06600; N08800)
	SB 165	Nickel-copper alloy (UNS N04400), seamless nickel pipe and tube
	SB 167	Nickel-chromium-iron alloys (UNS N06600, N06601 and N06690), seamless pipe and tube
	SB 407	Nickel-iron-chromium alloys (UNS N08800; N08810; N08811), seamless pipe and tube
	SB 423	Nickel-iron-chromium-molybdenum-copper alloys (UNS N08825), pipe and tube
	SB 444	Nickel-chromium-molybdenum-columbium alloys (UNS N06625), pipe and tube
	SB 622	Seamless nickel and nickel-cobalt alloy pipe and tube (e.g. UNS N06455; N06059; N10276, N06002)
	SB 668	Seamless tubes (UNS N08028)
SB 677	Seamless pipe and tube (UNS N08904; N08925; N08926)	
SB 729	Seamless pipe and tube (UNS N08020; N08026; N08024)	

API-Standards

API 5CRA	Specification for Casing and Tubing
API 5LC	Specification for CRA Line Pipe

EN-Standards

EN 10216-5	Seamless steel tubes for pressure purposes
EN 10297-2	Seamless steel tubes for mechanical and general engineering purposes incl. DIN, NFA,....; VdTÜV data sheets on request

ISO-Standards

ISO 13680	Petroleum and natural gas industries – Corrosion-Resistant alloy Seamless tubulars for use as casing, tubing and coupling stock – Technical delivery condition
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GOST Standards

Stainless Steels

GOST 9940	Seamless stainless steel tubes, hot finished
GOST 9941	Seamless stainless steel tubes, cold and hot finished
on request:	in accordance with various TU 14-3 series

BS-Standards

Stainless and high-strength high-temperature steels

BS 3059	Steel boiler and superheater tubes
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JIS-Standards

JIS G 3446	Stainless steel pipes
JIS G 3459	Stainless steel pipes
JIS G 3463	Stainless steel boiler and heat exchanger tubes
JIS G 3467	Steel tubes for fired heater

DNV-Standards

OS F101	Submarine Pipeline Systems
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RCC-M-Standards

RCC-M M 3303	Cold finished seamless austenitic stainless steel tubes for class 1, 2 and 3 heat exchangers
RCC-M M 3304	Class 1, 2 and 3 austenitic stainless steel pipes and tubes (not intended for use in heat exchangers)

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