

For seven generations BUTTING has been representing quality and flexibility in metal processing. Founded in 1777 as a copper-smith, we are today ranking among the most important stainless steel processing companies worldwide. Our business activities focus on the production of longitudinally welded pipes and vessels as well as on their further processing into prefabricated components and the complete erection world wide on site.

Do you have special requirements regarding dimensions, quality or materials? Together with our customers and our suppliers, we develop individual and customer-oriented solutions. Challenge us!

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## STAINLESS STEEL GRADES

EN – ASTM – BS – DIN – NF – SS



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PROGRESS BY TRADITION

## EN Material Standards

- EN 10088-1 Stainless steel grades (general, not for ordering)
- EN 10088-2 Stainless steel flat products for general purposes
- EN 10088-3 Stainless steel long products for general purposes
- EN 10095 Heat resisting steels and Ni alloys
- EN 10302 Creep resisting steels and Ni/Co alloys
- EN 10028-7 Stainless flat products for pressure purposes
- EN 10272 Stainless rolled bar for pressure purposes
- EN 10263-5 Stainless rod, bar and wire for cold heading and cold extrusion

## EN Pipe Standards

- EN 10217-7 New Standard for welded stainless steel pipes
- EN 10296 Welded circular steel tubes for mechanical and general engineering purposes
- EN 10312 Welded stainless steel tubes for the conveyance of aqueous liquids including water for human consumption

## EN Product Conditions

EN		ASTM	DIN	BS
1D	Hot rolled, heat treated, pickled	1	c2(IIa)	1
1G	Hot rolled, ground			
1Q	Hot rolled, quenched and tempered, pickled			
2H	Work hardened	TR	f(IIIa)	
2E	Cold rolled, heat treated, mechanically descaled, pickled			
2D	Cold rolled, heat treated, pickled	2D	h(IIIb)	2D
2B	Cold rolled, heat treated, pickled, skin passed	2B	n(IIIc)	2B
2F	Cold rolled, heat treated, pickled, skin passed on roughened rolls			
2R	Cold rolled, bright annealed	BA	m(IIIId)	2A
2G	Ground		o(IV)	3A
2J	Brushed or dull polished	6	q	3B,4
2K	Satin polished	3,4	p(V)	5
2M	Patterned			
2W	Profile rolled			
2L	Coloured			

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## Dimension Comparison

NW	Inch	ISO OD (mm)	Paper dim. (mm)
10	3/8"	17.2	12 × 1.0
15	1/2"	21.3	18 × 1.5
20	3/4"	26.9	23 × 1.5
25	1"	33.7	28 × 1.5
32	1 1/4"	42.4	35 × 1.5
40	1 1/2"	48.3	43 × 1.5
50	2"	60.3	54 × 2.0
65	2 1/2"	76.1	69 × 2.0
80	3"	88.9	84 × 2.0
100	4"	114.3	104 × 2.0
125	5"	139.7	129 × 2.0
150	6"	168.3	154 × 2.0
200	8"	219.1	204 × 2.0
250	10"	273.0	254 × 2.0
300	12"	323.9	306 × 3.0
350	14"	355.6	356 × 3.0
400	16"	406.4	(406 × 3.0)
450	18"	457.2	(456 × 3.0)
500	20"	508.0	(508 × 4.0)
600	24"	609.6	(608 × 4.0)
700	28"	711.2	
800	32"	812.8	
900	36"	914.4	
1,000	40"	1,016.0	

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## DIN Tower/Vessel Standards

- DIN 4119 part 1–2 above ground cylindrical flat bottom tanks;
- DIN 6616 Horizontal steel tank, single or double walled, for above ground storage of water polluting, inflammable and non-inflammable liquids;
- DIN 6618 part 1–3 vertical steel tanks, single or double walled for the above ground storage of water polluting, inflammable and non-inflammable liquids

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			Typical chemical compositions (%)							Mechanical and physical properties				National steel designations superseded by EN		Special qualifications and applications	Typical welding consumables for standard applications
			C	N	Cr	Ni	Mo	Other elements	0.2%-yield strength (MPa)	1%-yield strength (MPa)	Tensile strength (MPa)	Density (g/cm <sup>3</sup> )	NF/France	SS/Schweden			
EN	ASTM	Other common names															
1.4301	304	V2A	0.04		18.1	8.3				≥195	≥235	520 750	7.9	Z7CN18-09	2333	Pipelines of food and beverage industry, medical technology, chemical industry and to be used as heat resisting steel	308L
1.4306	304L	V2A	0.02		18.2	10.1				≥185	≥225	500 670	7.9	Z3 CN18-10	2352	Higher IC resistance than 1.4301, food and beverage industry, medical engineering, chemical and pharmaceutical industry	308L
1.4307	304L	V2A	0.02		18.1	8.3				≥185	≥225	500 670	7.9	Z3CN18-10	2352	Higher IC resistance than 1.4301, food and beverage industry, medical engineering, chemical and pharmaceutical industry	308L
1.4541	321	V2A	0.04		17.3	9.1		Ti		≥185	≥225	500 720	7.9	Z6CNT18-10	2337	Chemical industry, waste water treatment, food and beverage industry, medical technology	308L, 347
1.4550	347	V2A	0.05		17.5	9.5		Nb		≥185	≥225	500 720	7.9	Z6CNNb 18-10	2338	IC resistance by Nb additive up to 400 °C, applications in nuclear power plants	347
1.4401	316	V4A	0.04		17.2	10.2	2.1			≥205	≥245	520 680	8.0	Z7CND17-11-02	2347	Higher resistance to chlorides than stainless steels of type 304, chemical and textile industry, paper and pulp industry, transport of corrosive media containing chloride	316L
1.4404	316L	V4A	0.02		17.2	10.2	2.1			≥205	≥245	520 680	8.0	Z3CND17-11-02	2348	Higher resistance to chlorides than stainless steels of type 304, chemical and textile industry, paper and pulp industry, transport of corrosive media containing chloride	316L
1.4406	316LN	V4A	0.02	0.14	17.2	10.3	2.1			≥265	≥305	580 780	8.0	Z3CND17-11Az		Higher resistance than group 1.4436 to 1.4438 in oxidising media, high stability of microstructure, high strength	316L
1.4432	316L	V4A	0.02		16.9	10.7	2.6			≥205	≥245	520 700	8.0	Z3CND18-04-03	2353	Higher resistance to chlorides than stainless steels of type 304, chemical and textile industry, paper and pulp industry, transport of corrosive media containing chloride	316L
1.4436	316	V4A	0.04		16.9	10.7	2.6			≥205	≥245	530 730	8.0	Z7CND18-12-03	2343	Higher resistance to chlorides than stainless steels of type 304, chemical and textile industry, paper and pulp industry, transport of corrosive media containing chloride	316L
1.4571	316Ti	V4A	0.04		16.8	10.9	2.1	Ti		≥205	≥245	520 690	8.0	Z6 CNDT 17-12	2350	Chemical and petrochemical industries, textile industry, paper and pulp industry, waste water treatment	316L
1.4438	317L	V18A	0.02		18.2	13.7	3.1			≥205	≥245	520 720	8.0	Z3CND19-15-04	2367	Textile industry, paper and pulp industry, nautical applications	317L
1.4435	316L	V44A	0.02		17.3	12.6	2.6			≥205	≥215	520 700	8.0	Z3CND18-14-03	2353	Higher resistance to chlorides than stainless steels of type 304, chemical and textile industry, paper and pulp industry, transport of corrosive media containing chloride	316L
1.4439	317LMN	ASN5W Novonox AS157h UranusB6 Uddeholm 904L	0.02	0.14	17.8	12.7	4.1			≥225	≥295	580 780	8.0	Z3CND18-14-05Az		High resistance to non-oxidising acids and media containing chloride, e.g. sea water, hypochlorite solutions	317L
1.4539	904L	6% Mo. steel	0.01		20	25	4.3	1.5Cu		≥205	≥245	520 730	8.0	Z0NCUDU25-20	2562	Chemical industry, production of phosphoric acid and processes where sulphuric acid is added, paper and pulp industry, fertilizers industry, flue gas desulphurisation plants	385
1.4529	N08926	6% Mo. steel	0.01	0.20	20	25	6.1	0.8Cu		≥300	≥340	650 850	8.1			Very good stress, pitting, crevice and general corrosion resistance, chemical and petrochemical industries, offshore applications, flue gas desulphurisation plants, fertilizers industry, paper and pulp industry	NiCrMo-3
1.4547	S31254	SMO 254	0.01	0.20	20	18	6.1	0.7Cu		≥285	≥325	650 850	8.0		2378		NiCrMo-3
1.4565	S34566	Remnit 4565S	0.02	0.45	24	17	4.5	5.5Mn		≥420	≥460	800 950	8.0			High strength and very good local and general corrosion resistance, offshore applications, flue gas desulphurisation plants	NiCrMo-7 (mod.)
1.4311	304LN		0.02	0.14	18.5	10.5				≥270	≥305	550 750	7.95	Z3CN18-10Az	2371	Very high IC resistance up to 400 °C and higher strength than 1.4306	308L
1.4372	201		0.05	0.15	17	5		6.5Mn						712 CMN 17-07 Az			307 or 309L
1.4429	S31653		0.02	0.14	17.3	12.5	2.6			≥265	≥305	580 780	8.0	Z3CND17-12Az	2375	High resistance to non-oxidising acids and media containing chloride, e.g. sea water, hypochlorite solutions	317L
1.4828		NCT 1A/10A	0.04		20	12		2Si		≥230	≥270	550 750	7.9	Z17CNS20-12		For nitrogen containing gases with low oxygen content	309
1.4878	321	NCT E/8A	0.05		17.3	9.1		Ti		≥190	≥230	500 720	7.9	Z6CNT18-10	2337		347
1.4948	304H	304 H	0.05		18.1	8.3				≥190	≥230	490 740	7.9	Z6CN18-09	2333	Application also as heat resisting steel	308/308H
1.4162	S32101	LDX	0.03	0.22	21.5	1.5	0.3	5Mn		≥450		≥650	7.7			Higher general corrosion resistance than group 1.4301 up to 1.4550, combined with the high strength of standard duplex steels proper to chemical, paper and pulp industries	2101 or 2209
1.4362	S32304	Lean duplex	0.02	0.10	23	4.0	0.3			≥385		600 850	7.8	Z3 CN 23-04 Az	2327	Also to be used as heat resisting steel	2209 or 2304
1.4410	S32750	Super duplex	0.02	0.27	25	7	4			≥515		730 1,000	7.8	Z CND 25-06 Az	2328	Higher strength and corrosion resistance than 1.4462 at least in media containing chloride	2507
1.4462	S32205 S31803		0.02	0.17	22	5.0	3.1			≥445		640 950	7.8	Z3 CND 22-05 Az	2377	Chemical and petrochemical industries, sea water desalination, shipbuilding, offshore and sour-gas applications	2209
1.4501	S32760	Zeron 100, Super duplex	0.02	0.24	25	7	3.5	0.7W		≥515		730 930	7.8				

Wet corrosion and general services

Austenitic

Heat and creep

Austenitic

Duplex

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