

TPS TECHNITUBE[®]

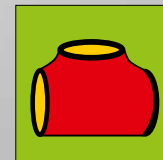
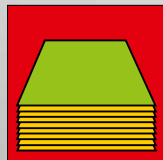
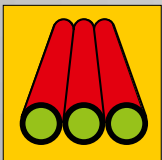
RÖHRENWERKE GMBH

PIPES, FITTINGS AND FLANGES

✓ Your Partner for
Piping Systems

ALLOY STEEL | STAINLESS STEEL

NICKEL AND NICKEL ALLOYS | TITANIUM



TPS-Technitube Röhrenwerke GmbH a privat owned company with head office, production and stock in Daun / Germany is a worldwide renowned, reliable and competent partner in piping, tubing, fitting, flanges, plates and bars. We are in the market with competence and uncompromising commitment to quality since more than 35 years. Our closest price calculation puts our customers in the front of their competition. TPS-Technitube Röhrenwerke GmbH your flexible partner for pipes, fittings, flanges, plates and bars and other accessories for chemical and petrochemical industry, energy- and offshore technology, paper and pharma industry.

With this catalogue we like to introduce you a part of our possibilities for:

Stainless Steel, Nickel and Nickel Alloys and Titanium:

- to ASTM or ASME
- in accordance to DIN/EN
- or other international standards on request

Products:

- seamless and welded tubes and pipes
- forged and buttweld fittings
- flanges and special forged parts acc. to your design
- plates and bars in size range from 1/4" OD – 72" NB

Our service:

- a well assorted stock
- just in time logistics
- mill production

Technical advisory service:

- qualified personal
- quality management system

Material testing and documentation:

- acc. to EN 10204/2.1, EN 10204/2.2, EN 10204/3.1 and EN 10204/3.2

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Partview of our store



Head office



Partial view of the Technitube pipe mill

CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES

Grade	EN	%C	%Mn	%P max.	%S max.	%SI	%Cr	%Mo	Others
P1	16Mo3	0.10-0.20	0.30-0.80	0.025	0.025	0.10-0.050		0.44-0.65	
P5	X11CrMo5	0.15 max.	0.30-0.60	0.025	0.025	0.50 max.	4.00-6.00	0.45-0.65	
P9	X11CrMo9-1	0.15 max.	0.30-0.60	0.025	0.025	0.25-1.00	8.00-10.00	0.90-1.10	
P11	13CrMo4-5	0.05-0.15	0.30-0.60	0.025	0.025	0.50-1.00	1.00-1.50	0.44-0.65	
P22	10CrMo9-10	0.05-0.15	0.30-0.60	0.025	0.025	0.50 max.	1.90-2.60	0.87-1.13	
P91	X10CrMoVNb9-1	0.08-0.12	0.30-0.60	0.020	0.010	0.20-0.50	8.00-9.50	0.85-1.05	V = 0.18-0.25 N = 0.030-0.070 Ni = 0.40 max. Al = 0.02 max. Cb = 0.06-0.10 Ti = 0.01 max. Zr = 0.01 max.
P92	X10CrWMoVNb9-2	0.07-0.13	0.30-0.60	0.020	0.010	0.50 max.	8.50-9.50	0.30-0.60	V = 0.15-0.25 N = 0.03-0.07 Ni = 0.40 max. Al = 0.02 max. Cb = 0.04-0.09 max. W = 1.5-2.00 B = 0.001-0.006 Ti = 0.01 max. Zr = 0.01 max.

Grade	EN	Heat Treat Type	Tensile Strength min.	Yield Strength min.	Elongation (4D) % min.	
					Longitudinal	Transverse
P1	16Mo3	Full or isothermal anneal or normalize & temper subcritical anneal	55 KSI (380 MPa)	30 KSI (205 MPa)	30	20
P5	X11CrMo5	Full or isothermal anneal or normalize & temper	60 KSI (415 Mpa)	30 KSI (205 MPa)	30	20
P9	X11CrMo9-1	Full or isothermal anneal or normalize & temper	60 KSI (415 Mpa)	30 KSI (205 MPa)	30	20
P11	13CrMo4-5	Full or isothermal anneal or normalize & temper	60 KSI (415 Mpa)	30 KSI (205 MPa)	30	20
P22	10CrMo9-10	Full or isothermal anneal or normalize & temper	60 KSI (415 Mpa)	30 KSI (205 MPa)	30	20
P91	X10CrMoVNb9-1	normalize & temper quench & temper	85 KSI (585 MPA)	60 KSI (415 Mpa)	20	20
P92	X10CrWMoVNb9-2	normalize & temper	90 KSI (620 Mpa)	64 KSI (440 Mpa)	20	20

DIN is replaced by EN, however we supply and certify still acc. to DIN if required.

All mechanical properties at room temperature.



AUSTENITIC, FERRITIC AND MARTENSITIC STAINLESS STEEL

AUSTENITIC STAINLESS STEEL

Material Standard: Tubes and Pipes: ASTM A 213 / 249 / 269 / 312 / 358 / 688

Fittings: ASTM A 403

Flanges: ASTM A 182

Grade	UNS No	C	Si max.	Mn max.	P max.	S max.
TP 304	S30400	0.08 max	1,00	2.00	0.045	0.030
TP 304 H	S30409	0.04-0.10	1,00	2.00	0.045	0.030
TP 304 N	S30451	0.08 max	1,00	2.00	0.045	0.030
TP 304 LN	S30453	0.035 max	1,00	2.00	0.045	0.030
TP 304 L	S30403	0.035 max	1,00	2.00	0.045	0.030
TP 309 S	S30908	0.08 max	1,00	2.00	0.045	0.030
TP 310 S	S31008	0.08 max	1,00	2.00	0.045	0.030
TP 316	S31600	0.08 max	1,00	2.00	0.045	0.030
TP 316 H	S31609	0.04-0.10	1,00	2.00	0.045	0.030
TP 316 L	S31603	0.035 max	1,00	2.00	0.045	0.030
TP 316 N	S31651	0.08 max	1,00	2.00	0.045	0.030
TP 316 LN	S31653	0.035 max	1,00	2.00	0.045	0.030
TP 317	S31700	0.08 max	1,00	2.00	0.045	0.030
TP 317 L	S31703	0.035 max	1,00	2.00	0.045	0.030
TP 321	S32100	0.08 max	1,00	2.00	0.045	0.030
TP 321 H	S32109	0.04-0.10	1,00	2.00	0.045	0.030
TP 347	S34700	0.08 max	1,00	2.00	0.045	0.030
TP 347 H	S34709	0.04-0.10	1,00	2.00	0.045	0.030
TP 904 L	N08904	0.02 max	1.00	2.00	0.040	0.030

FERRITIC AND MARTENSITIC STAINLESS STEEL

Material Standard: Tubes and Pipes: ASTM A 268 / 312 / 358

Fittings: ASTM A 403 / 815

Flanges: ASTM A 182

Grade	UNS No	C max.	Si max.	Mn max.	P max.	S max.
TP 405	S40500	0.08	1.00	1.00	0.040	0.030
TP 410	S41000	0.15	1.00	1.00	0.040	0.030
TP 429	S42900	0.12	1.00	1.00	0.040	0.030
TP 430	S43000	0.12	1.00	1.00	0.040	0.030
TP 446-1	S44600	0.20	1.00	1.50	0.040	0.030
TP 446-2	S44600	0.12	1.00	1.50	0.040	0.030
TP 409	S40900	0.08	1.00	1.00	0.045	0.030
TP 430 TI	S43036	0.10	1.00	1.00	0.040	0.030

FERRITIC AND MARTENSITIC STAINLESS STEEL

Material Standard Tubes and Pipes: ASTM A 789 / 790
Manufacturing Process Seamless or welded

Fittings: ASTM A 403 / 815

Flanges: ASTM A 182

UNS No	C max.	Si	Mn	P max.	S max.	Ni	Cr	Mo
S31803	0.030	1.00 max	2.00 max	0.030	0.020	4.50-6.50	21.0-23.0	2.50-3.50
S31500	0.030	1.40-2.00	1.20-2.00	0.030	0.030	4.30-5.20	18.0-19.0	2.50-3.00
S32550	0,040	1.00 max	1.50 max	0.040	0.030	4.50-6.50	24.0-27.0	2.90-3.90
S31200	0.030	1.00 max	2.00 max	0.045	0.030	5.50-6.50	24.0-26.0	1.20-2.00
S31260	0.030	0.75 max	1.00 max	0.030	0.030	5.50-7.50	24.0-26.0	2.50-3.50
S32304	0.030	1.00 max	2.50 max	0.040	0.040	3.0-5.5	21.5-24.5	0.05-0.60
OD 1 in (25mm) and Under								
OD over 1 in. (25 mm)								
S32750	0.030	0.80 max	1.20 max	0.035	0.020	6.0-8.0	24.0-26.0	3.0-5.0
S32760	0.030	1.00 max	1.00 max	0.030	0.010	6.00-8.00	24.0-26.0	3.00-4.00

Not mentioned grades on request.

CHEMICAL COMPOSITION AND MECHANICAL PROPERTIES

Plates: ASTM A 167 / 240

Bars: ASTM A 276 / 479

	Ni	Cr	Mo	Others	YS min KSI (MPa)	TS min KSI (MPa)	El. min. %
	8.00-11.00	18.00-20.00	...		30 (205)	75 (515)	35
	8.00-11.00	18.00-20.00	...		30 (205)	75 (515)	35
	8.00-11.00	18.00-20.00	...	N 0.10 - 0.16	35 (240)	80 (550)	35
	8.00-11.00	18.00-20.00	...	N 0.10 - 0.16	30 (205)	75 (515)	35
	8.00-12.00	18.00-20.00	...		25 (170)	70 (485)	35
	12.00 -15.00	22.00-24.00	...		30 (205)	75 (515)	35
	19.00-22.00	24.00-26.00			30 (205)	75 (515)	35
	10.00-14.00	16.00-18.00	2.00-3.00		30 (205)	75 (515)	35
	11.00-14.00	16.00-18.00	2.00-3.00		30 (205)	75 (515)	35
	10.00-14.00	16.00-18.00	2.00-3.00		25 (170)	70 (485)	35
	10.00-13.00	16.00-18.00	2.00-3.00	N 0.10 - 0.16	35 (240)	80 (550)	35
	10.00-13.00	16.00-18.00	2.00-3.00	N 0.10 - 0.16	30 (205)	75 (515)	35
	11.00-15.00	18.00-20.00	3.00-4.00		30 (205)	75 (515)	34
	11.00-15.00	18.00-20.00	3.00-4.00		30 (205)	75 (515)	35
	9.00-12.00	17.00-19.00	...	Ti 5x(C+N), max 0.70%	30 (205)	75 (515)	35
	9.00-12.00	17.00-19.00	...	Ti 4x(C+N), max 0.70%	30 (205)	75 (515)	35
	9.00-13.00	17.00-20.00	...	Nb 10xC, max 1.10%	30 (205)	75 (515)	35
	9.00-13.00	17.00-19.00	...	Nb 8xC, max 1.10%	30 (205)	75 (515)	35
	23.00-28.00	19.00-23.00	4.00-5.00	N max. 0,10; Cu 1.00-2.00	31 (215)	71 (490)	35

Plates: ASTM A 240

Bars: ASTM A 276 / 479

	Ni max.	Cr	Mo	Others	YS min KSI (MPa)	TS min KSI (MPa)	El. min. %
	0.50	11.50-14.50	...	Al 0.10 - 0.30	30 (205)	60 (415)	20
		11.50-13.50	...		30 (215)	60 (415)	20
		14.00-16.00	...		35 (240)	60 (415)	20
		16.00-18.00	...		35 (240)	60 (415)	20
	0.75	23.00-27.00	...	N 0.25 max.	40 (275)	70 (485)	18
	0.50	23.00-27.00	...	N 0.25 max.	40 (275)	65 (450)	20
	0.50	10.50-11.70	...	Ti 6xC min; 0.75 max	25 (170)	55 (380)	20
	0.75	16.00-19.50	...	Ti 5xC min; 0.75 max	35 (240)	60 (415)	20

Plates: ASTM A 240

Bars: ASTM A 276 / 479

	N	Cu	Others	YS KSI (MPa)	TS KSI (MPa)	El. min. %	Brinell max	Rockwell max
	0.08-0.20	...	...	65 (450)	90 (620)	25	290	30
	0.05-0.10	...	...	64 (440)	92 (630)	30	290	30
	0.10-0.25	1.50-2.50	...	80 (550)	110 (760)	15	297	31
	0.14-0.20	...	...	65 (450)	100 (690)	25	280	...
	0.10-0.30	0.20-0.80	W 0.10-0.50	65 (450)	100 (690)	25	290	30
	0.05-0.20	0.05-0.60						
				65 (450)	100 (690)	25	...	...
				58 (400)	87 (600)	25	290	30
	0.24-0.32	0.50 max	...	80 (550)	116 (800)	15	300	32
	0.20-0.30	0.50-1.00	W 0.50-1.00	80 (550)	109 (750)	25	300	...

All mechanical properties at room temperature



PIPES, FITTINGS AND FLANGES NICKEL AND NICKEL ALLOYS GRADES

CHEMICAL COMPOSITION										
Material Grade	Tube / Pipe Standard	Material No.	C max.	Si max.	Mn max.	P max.	S max.	Cr	Ni	Mo
UNSN02200	ASTM B 161 ASTM B 725 ASTM B 730	2.4066	0,150	0,35	0,35	-	0,010	-	99,0 min	-
UNSN02201	ASTM B 161 ASTM B 725 ASTM B 730	2.4063	0,020	0,35	0,35	-	0,010	-	99,0 min	-
UNSN04400	ASTM B 165 ASTM B 725 ASTM B 730	2.4360	0,300	0,50	2,00	-	0,024	-	63,0 min	-
UNSN06600	ASTM B 167 ASTM B 516 ASTM B 517	2.4816	0,150	0,50	1,00	-	0,015	14,0-17,0	72,0 min	-
UNSN06601	ASTM B 167 ASTM B 829 ASTM B 775	2.4851	0,100	0,50	1,00	-	0,015	21,0-25,0	58,0-63,0	-
UNSN06625	ASTM B 444 ASTM B 704 ASTM B 705	2.4856	0,100	0,50	0,50	0,015	0,015	20,0-23,0	58,0 min	8,0-10,0
UNSN08800	ASTM B 407 ASTM B 514 ASTM B 515	1.4876	0,100	1,00	1,50	-	0,015	19,0-23,0	30,0-35,0	-
UNSN08810	ASTM B 407 ASTM B 514 ASTM B 515	1.4876	0,050- 0,100	1,00	1,50	-	0,015	19,0-23,0	30,0-35,0	-
UNSN08811	ASTM B 407 ASTM B 829	1.4876	0,060- 0,100	1,00	1,50	-	0,015	19,0-23,0	30,0-35,0	-
UNSN08825	ASTM B 423 ASTM B 704 ASTM B 705	2.4858	0,050	0,50	1,00	-	0,030	19,5-23,5	38,0-46,0	2,5-3,5
UNSN08020	ASTM B 464 ASTM B 729	2.4660	0,070	1,00	2,00	0,045	0,035	19,0-21,0	32,0-38,0	2,0-3,0
UNSN10276	ASTM B 622 ASTM B 619 ASTM B 626	2.4819	0,010	0,08	1,00	0,040	0,030	14,5-16,5	rem.	15,0-17,0
UNSN06022	ASTM B 622 ASTM B 626	2.4602	0,015	0,08	0,500	0,020	0,020	20,0-22,5	rem.	12,5-14,5

Not mentioned grades on request.

			MECHANICAL PROPERTIES		
	Ti	Others	TS min. KSI (MPa)	YS min. KSI (MPa)	El. min. %
	-	Cu 0,25 max, Fe 0,40 max	55 (379)	15 (103)	40
	-	Cu 0,25 max, Fe 0,40 max	50 (345)	12 (83)	40
	-	Cu 28,0-34,0; Fe 2,5 max.	70 (483)	28 (193)	35
	-	Cu 0,5 max; Fe 6,0-10,0	80 (552)	35 (241)	30
	-	Cu 1,0 max, Al 1,0 - 1,70; Fe rem.	80 (552)	30 (207)	30
	0,40 max.	CB + Ta 3,15 - 4,15, Fe max 5,0; Al max 0,40	120 (827)	60 (414)	30
	0,15-0,60	Cu 0,75 max; Al 0,15-0,6; Fe 39,5 min	75 (517)	30 (207)	30
	0,15-0,60	Cu 0,75 max; Al 0,15-0,6; Fe 39,5 min	65 (448)	25 (172)	30
	0,15-0,60	Cu 0,75 max; Al 0,15-0,6; Fe 39,5 min	65 (448)	25 (172)	30
	0,60-1,20	Cu 1,5-3,0; Al 0,2 max, Fe min 22,0	85 (586)	35 (241)	30
	-	Cu 3,00-4,00; Nb+Ta 8xC max. 1,0; Fe rem.	80 (551)	35 (241)	30
	-	W 3,0 - 4,5, Fe 4,0 - 7,0, Co 2,5 max, V 0,35 max	100 (690)	41 (283)	40
	-	W 2,5-3,5, Fe 2,0 - 6,0, V 0,35 max Co 2,5 max,	100 (690)	45 (310)	45

a. m. values are for annealed condition and for indication only (values may change depending on size required)



THE STANDARDS

UNS-GRADE	TUBES	PIPES	FITTINGS	FLANGES	PLATES	BARS
UNSNO 2200/2201	ASTM B 161 ASTM B 163 ASTM B 730 ASTM B 751	ASTM B 161 ASTM B 725 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 162	ASTM B 160
UNSNO4400	ASTM B 163 ASTM B 165 ASTM B 730 ASTM B 751	ASTM B 165 ASTM B 725 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 127	ASTM B 164
UNSNO6600	ASTM B 163 ASTM B 516 ASTM B 751	ASTM B 167 ASTM B 517 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 168	ASTM B 166
UNSNO6601	ASTM B 163 ASTM B 167 ASTM B 751	ASTM B 167 ASTM B 829 ASTM B 775	ASTM B 366	ASTM B 564	ASTM B 168	ASTM B 166
UNSNO6625	ASTM B 444 ASTM B 705 ASTM B 775 ASTM B 829	ASTM B 444 ASTM B 704 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 443	ASTM B 446
UNSNO8800 UNSNO8810 UNSNO8811	ASTM B 407 ASTM B 515 ASTM B 751 ASTM B 829	ASTM B 407 ASTM B 514 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 409	ASTM B 408
UNSNO8825	ASTM B 163 ASTM B 704 ASTM B 751	ASTM B 423 ASTM B 705 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 424	ASTM B 425
UNSN10276	ASTM B 757 ASTM B 622 ASTM B 626	ASTM B 619 ASTM B 622 ASTM B 829 ASTM B 775	ASTM B 366	ASTM B 564	ASTM B 575	ASTM B 574
UNSN06022	ASTM B 516 ASTM B 622 ASTM B 626 ASTM B 751	ASTM B 619 ASTM B 622 ASTM B 775 ASTM B 829	ASTM B 366	ASTM B 564	ASTM B 575	ASTM B 574
UNSN10665	ASTM B 622 ASTM B 626	ASTM B 619 ASTM B 622	ASTM B 366	ASTM B 564	ASTM B 333	ASTM B 335
UNSNO8020	ASTM B 468 ASTM B 729 ASTM B 751	ASTM B 464 ASTM B 729 ASTM B 829	ASTM B 366	ASTM B 462	ASTM B 464	ASTM B 473

Not mentioned grades on request.

ASA PIPE SCHEDULE ACC. TO. ANSI B 36.19

	OD mm	STD 5s	XS 5	10s	10	20	30	40s	40	60	80s	80	100	120	140	160	XXS
1/8	10.3							1.73			2.41						
								0.37			0.47						
1/4	13.7							2.24			3.02						
								0.64			0.82						
3/8	17.2							2.31			3.20						
								0.87			1.12						
1/2	21.3	1.65	1.65	2.11	2.11			2.77			3.73					4.75	7.47
		0.81	0.81	1.02	1.02			1.29			1.64					1.97	2.59
3/4	26.7	1.65	1.65	2.11	2.11			2.87			3.91					5.54	7.82
		1.03	1.03	1.30	1.30			1.71			2.23					2.93	3.69
1	33.4	1.65	1.65	2.77	2.77			3.38			4.55					6.35	9.09
		1.31	1.31	2.13	2.13			2.54			3.29					4.30	5.53
1 1/4	42.2	1.65	1.65	2.77	2.77			3.56			4.85					6.35	9.70
		1.67	1.67	2.73	2.73			3.44			4.53					5.69	7.88
1 1/2	48.3	1.65	1.65	2.77	2.77			3.68			5.08					7.14	10.16
		1.93	1.93	3.16	3.16			4.11			5.49					7.35	9.69
2	60.3	1.65	1.65	2.77	2.77			3.91			5.54					8.71	11.07
		2.42	2.42	3.99	3.99			5.52			7.60					11.26	13.65
2 1/2	73.0	2.11	2.11	3.05	3.05			5.16			7.01					9.53	14.02
		3.75	3.75	5.34	5.34			8.77			11.59					15.15	20.72
3	88.9	2.11	2.11	3.05	3.05			5.49			7.62					11.13	15.24
		4.59	4.59	6.56	6.56			11.47			15.51					21.67	28.11
3 1/2	101.6	2.11	2.11	3.05	3.05			5.74			8.08						16.15
		5.25	5.25	7.53	7.53			13.78			18.92						34.56
4	114.3	2.11	2.11	3.05	3.05			6.02			8.56		11.13			13.49	17.12
		5.93	5.93	8.50	8.50			16.32			22.66		28.75			34.05	41.66
5	141.3	2.77	2.77	3.40	3.40			6.55			9.53		12.70			15.88	19.05
		9.61	9.61	11.74	11.74			22.10			31.44		40.90			49.87	58.31
6	168.3	2.77	2.77	3.40	3.40			7.11			10.97		14.27			18.24	21.95
		11.47	11.47	14.04	14.04			28.69			43.21		55.03			68.53	80.43
8	219.1	2.77	2.77	3.76	3.76	6.35	7.04	8.18		10.81	12.70		15.06	18.24	20.62	23.01	22.23
		15.00	15.00	20.27	20.27	33.82	37.38	43.20		53.90	65.63		76.93	91.73	102.47	112.97	109.57
10	273.1	3.40	3.40	4.19	4.19	6.35	7.80	9.27		12.70	12.70	15.06	18.24	21.41	25.40	28.58	25.40
		22.95	22.95	28.20	28.20	42.41	51.81	61.22		82.80	82.80	97.27	116.38	134.90	157.51	174.95	157.51
12	323.9	3.96	4.19	4.57	4.57	6.35	8.38	9.53	10.31	14.27	12.70	17.45	21.41	25.40	28.58	33.32	25.40
		31.72	33.60	36.54	36.54	50.48	66.20	75.01	80.94	110.62	98.95	133.88	162.14	189.82	211.31	242.40	189.82
14	355.6	3.96		4.78	6.35	7.92	9.53	9.53	11.13	15.06	12.70	19.05	23.80	27.76	31.75	35.71	
		34.86		41.99	55.53	68.95	82.58	82.58	96.00	128.42	109.04	160.54	197.74	227.88	257.47	286.04	
16	406.4	4.19		4.78	6.35	7.92	9.53	9.53	12.70	16.66	12.70	21.41	26.19	30.94	36.53	40.46	
		42.20		48.07	63.61	79.03	94.70	94.70	125.20	206.40	249.34	290.88	338.32	370.74			
18	457.2	4.19		4.78	6.35	7.92	11.13	9.53	14.27	19.05	12.70	23.80	29.36	34.93	39.67	45.24	
		47.46		54.15	71.69	89.10	124.32	106.83	158.27	209.00	141.35	258.29	314.54	369.34	414.75	466.67	
20	508.0	4.78		5.54	6.35	9.53	12.70	9.53	15.06	20.62	12.70	26.19	32.54	38.10	44.45	49.99	
		60.23		69.70	79.76	118.93	157.51	118.93	185.89	251.65	157.51	315.97	387.41	448.30	515.94	573.31	
22	558.8	4.78		5.54	6.35	9.53	12.70	9.53	15.88	22.23	12.70	28.57	34.92	41.27	47.62	53.97	
		65.95		76.75	87.84	131.07	173.66	131.07	216.04	298.55	173.66	379.70	457.83	535.17	609.30	682.57	
24	609.6	5.54		6.35	6.35	9.53	14.27	9.53	17.45	24.59	12.70	30.94	38.89	46.02	52.37	59.51	
		83.80		95.92	95.92	143.20	212.72	143.20	258.74	360.21	189.82	448.30	555.76	649.44	730.72	819.70	
26	660.4				7.92	12.70		9.53			12.70						
					129.40	205.97		155.32			205.97						
28	711.2				7.92	12.70	15.88	9.53			12.70						
					139.47	222.13	276.48	167.44			222.13						
30	762.0	6.35		7.92	7.92	12.70	15.88	9.53			12.70						
		120.15		149.55	149.55	238.28	296.68	179.56			238.28						
32	812.8				7.92	12.70	15.88	9.53	17.48		12.70						
					159.62	254.44	316.88	191.69	348.11		254.44						
34	863.6				7.92	12.70	15.88	9.53	17.48		12.70						
					169.64	270.50	336.96	203.74	370.22		270.50						
36	914.4				7.92	12.70	15.88	9.53	19.05		12.70						
					179.77	286.75	357.28	215.93	427.09		286.75						

1.65 = Wall thickness in mm

0.81 = kg/m



TITANIUM ALLOYS

Materialstandard: Tubes and Pipes: ASTM B 337 / 338 / 861 / 862 Fittings: ASTM B 363 Flanges: ASTM B 348

Chemical composition, in % by mass

Norm	Grade	N	C	H	Fe	O	Al	V	Pd	Mo
		max	max	max	max	max				
DIN 17850/17861	Ti 1 - 3.7025	0,05	0,06	0,013*	0,15	0,12				
VD-TÜV WB 230/2	Ti 1 - 3.7025	0,05	0,06	0,013*	0,15	0,12				
ASME SB/ASTM B 338	Grade 1	0,03	0,08	0,015	0,20	0,18				
DIN 17850/17861	Ti 2 - 3.7035	0,05	0,06	0,013*	0,20	0,18				
VD-TÜV WB 230/2	Ti 2 - 3.7035	0,05	0,06	0,013*	0,20	0,18				
ASME SB/ASTM B 338	Grade 2	0,03	0,08	0,015	0,30	0,25				
DIN 17850/17861	Ti 3 - 3.7055	0,05	0,06	0,013*	0,25	0,25				
VD-TÜV WB 230/2	Ti 3 - 3.7055	0,05	0,06	0,013*	0,25	0,25				
ASME SB/ASTM B 338	Grade 3	0,05	0,08	0,015	0,30	0,35				
DIN 17851/17861	Ti 2 Pd - 3.7235	0,05	0,06	0,013*	0,20	0,18			0,15 - 0,25	
VD-TÜV WB 230/2	Ti 2 Pd - 3.7235	0,05	0,06	0,013*	0,20	0,18			0,15 - 0,25	
ASME SB/ASTM B 338	Grade 7	0,03	0,08	0,015	0,30	0,25			0,12 - 0,25	
DIN 17851/17861	Ti Al 3 V 2,5 - 3.7195	0,04	0,05	0,015	0,30	0,12	2,5 - 3,5	2,0 - 3,0		
ASME SB/ASTM B 338	Grade 9	0,03	0,08	0,015	0,25	0,15	2,5 - 3,5	2,0 - 3,0		
DIN 17851/17861	Ti 1 Pd -3.7225	0,05	0,06	0,013*	0,15	0,12			0,15 - 0,25	
VD-TÜV WB 230/2	Ti 1 Pd -3.7225	0,05	0,06	0,013*	0,15	0,12			0,15 - 0,25	
ASME SB/ASTM B 338	Grade 11	0,03	0,08	0,015	0,20	0,18			0,12 - 0,25	
DiN 17851/17861	Ti Ni 0,8 Mo 0,3 - 3.7105	0,03	0,06	0,013*	0,25	0,25				0,2 - 0,4
ASME SB/ASTM B 338	Grade 12	0,03	0,08	0,015	0,30	0,25				0,2 - 0,4

* In case wallthickness is under 2 mm, the Hydrogenium-content up to 0,015 % is allowed



Plates: ASTM B 265 Bars: B 348

Mechanical properties and heat treatment

	Ni	Sonstige		Titan	Rp 0,2 MPa		Rp 1,0 MPa	Rm MPa		A	Heat treatment
		Einzeln	Zusammen		min.	max.	min.	min.	max.	min. %	
		0,1	0,4	Rest	180		200	290 - 410	30		soft annealed
		0,1	0,4	Rest	180		200	290 - 410	30		soft annealed
		0,1	0,4	Rest	138 - 310			240	24		annealed
		0,1	0,4	Rest	250		270	390 - 540	22		soft annealed
		0,1	0,4	Rest	250		250	390 - 540	22		soft annealed
		0,1	0,4	Rest	275 - 450			345	20		annealed
		0,1	0,4	Rest	320		350	460 - 590	18		soft annealed
		0,1	0,4	Rest	320		320	460 - 590	18		soft annealed
		0,1	0,4	Rest	380 - 550			450	18		annealed
		0,1	0,4	Rest	250		270	390 - 540	22		soft annealed
		0,1	0,4	Rest	250		270	390 - 540	22		soft annealed
		0,1	0,4	Rest	275 - 450			345	20		annealed
		0,1	0,4	Rest	520			620	15		soft annealed
		0,1	0,4	Rest	725			860	10		annealed
		0,1	0,4	Rest	180		200	209 - 410	30		soft annealed
		0,1	0,4	Rest	180		200	209 - 410	30		soft annealed
		0,1	0,4	Rest	138 - 310			240	24		annealed
	0,6 - 0,9	0,1	0,4	Rest	345		370	480	18		soft annealed
	0,6 - 0,9	0,1	0,4	Rest	345			483	18		annealed

Rp 0,2 = Yield Strength

Rp 1,0 = Yield Strength

Rm = Tensile Strength

A = Elongation

View of pilger process area



FITTINGS

Buttweld fittings, either seamless or welded, acc. to ANSI B 16.9 or MSS SP 43 or DIN in size range 1/2" NB – 60" NB

- Elbows, 45°, 90° and 180°, long or short radius
- Tees, equal and unequal
- Reducers, concentric and eccentric
- Caps

or acc. to your special design

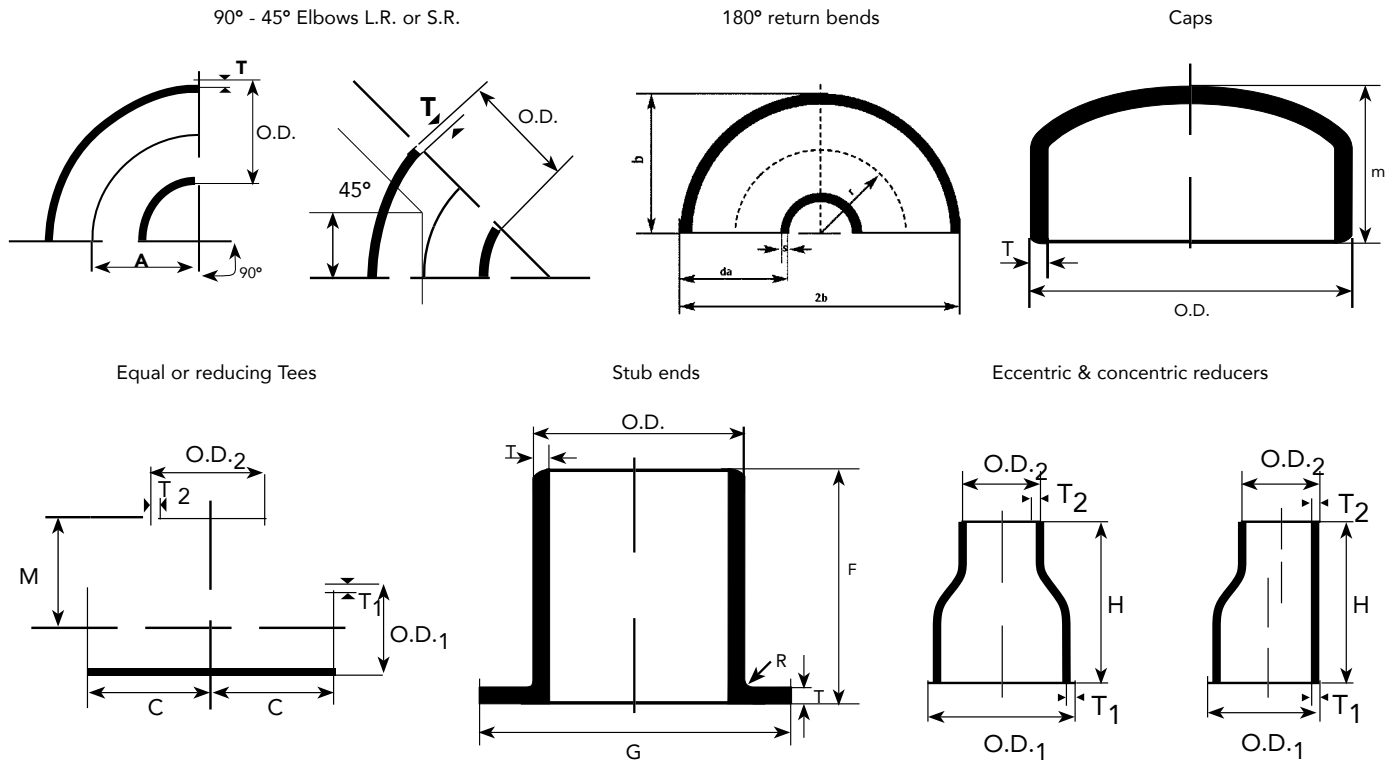


Forged fittings acc. to ANSI B 16.11, in size range from 1/4" NB – 12"NB, in 3000 LBS, 6000 LBS and 9000 LBS

- socket weld
- threaded (NPT)
- butt weld



DIMENSIONAL TOLERANCES FOR BUTTWELD FITTINGS



ANSI B16-9

All Fittings				90° and 45° Elbows and Tees	Reducers and Lap Joint Stub Ends	Caps	180° Returns	Lap-Joint Stub Ends					
Nominal Pipe Size	Outside Diameter at Bevel	Inside Diameter at End	Wall Thickness	Center-to-End Dimension				Overall Length	Back-to-Face Dimension	Alignment of End	Outside Diameter of Lap	Thickness of Lap	Fillet Radius of Lap
				A	B	C	M							F	H	K	U	G	T	R
1/2 to 2 1/2	+1.52	±0.76	Not less than 87.5% of nominal thickness	±1.52	±1.52	±3.05	±6.35	±6.35	±0.76	+0	+1.52	+0	
	-0.76									-0.76	-0	-0.76	
3 to 3 1/2	±1.52	±1.52		±1.52	±1.52	±3.05	±6.35	±6.35	±0.76	+0	+1.52	+0	
										-0.76	-0	-0.76	
4	+1.52	±1.52		±1.52	±1.52	±3.05	±6.35	±6.35	±0.76	+0	+1.52	+0	
5 to 8	+2.29	±1.52		±1.52	±1.52	±1.52	±6.35	±6.35	±6.35	±0.76	+0	+1.52	+0
	-1.52									-0.76	-0	-1.52	
10 to 18	+4.06	±3.05		±2.29	±2.29	±6.35	±9.65	±6.35	±1.52	+0	+1.52	+0	
	-3.05									-1.52	-0	-1.52	
20 to 24	+6.35	±4.83		±2.29	±2.29	±6.35	±9.65	±6.35	±1.52	+0	+1.52	+0	
	-4.83									-1.52	-0	-1.52	
26 to 30	+6.35	±4.83		±3.05	±4.83	±9.65							
32 to 48	+6.35	±4.83		±4.83	±4.83	±9.65							
	-4.83												



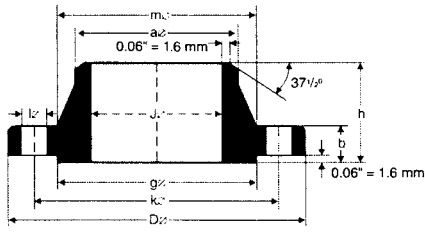
PRODUCTION RANGE

Size:
1/4" NB to 72" NB.

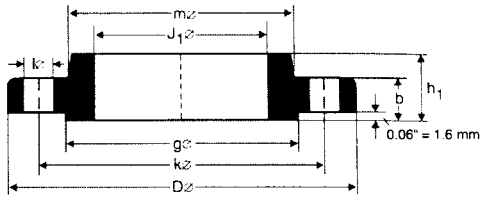
Pressure Ratings:
ANSI B 16.5: 150 lb. to 2500 lb.
DIN: PN 10 - PN 100

Dimensional Standards:
ANSI B 16.5, BS 1560, API 605, BS 3293, BS 10, BS 4504, MSS SP44,
DIN/EN, API 6A, AWWA

Types:
Welding Neck, Slip-On, Socket-Weld, Blind, Spectacle,
Spades, Spacers, Slip-Blinds, TEMA, Nozzle Flanges, Long
Welding-Necks, Orifice, Swivel-ring, Anchor Flanges,
'SPECIAL' to customers drawings.



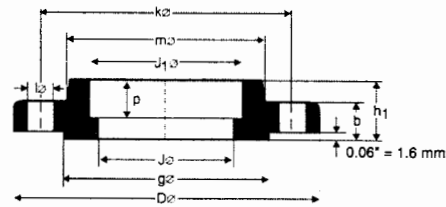
WELDING-NECK



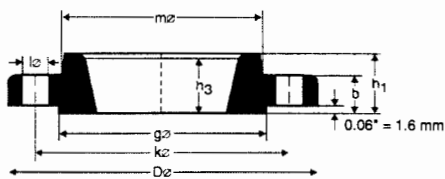
SLIP-ON



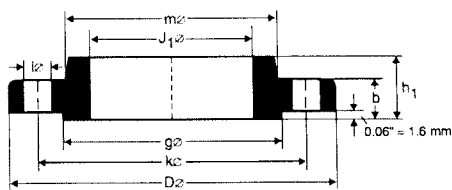
BLIND



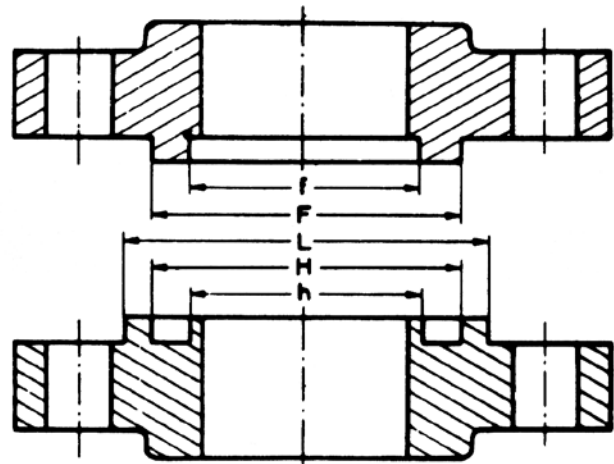
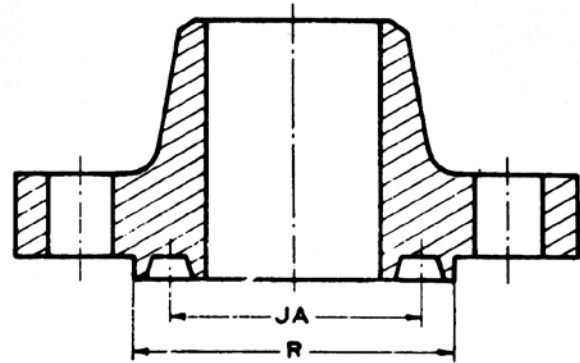
SOCKET-WELD



THREADED



LAP-JOINT



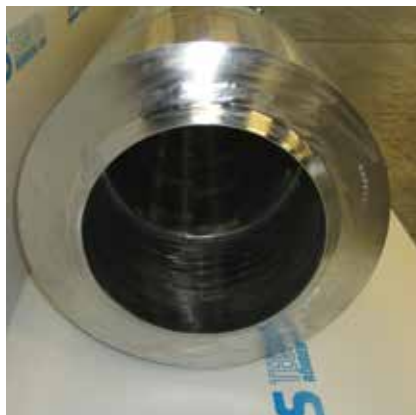
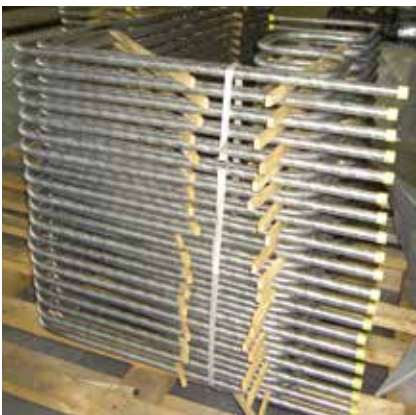
SPECIAL EXECUTIONS ON REQUEST

PIPE ASSEMBLY/SEMI ASSEMBLIES LIKE

- Headers
- Pigtails
- Flanged Pipes
- Longitudinal finned Pipes and Tubes
- Finned Tubes
- Special Forgings
- Special designed parts acc. to drawing
- Welding together possible

IN ALL KIND OF MATERIAL AND COMBINATIONS POSSIBLE:

- Carbon Steel
- Alloy Steel
- Stainless Steel
- Duplex and Superduplex
- Nickel and Nickel Alloys
- Titanium
- Copper Nickel
- Admiralty Brass
- Aluminium Brass





Headquarter

Project Office



Mill 1

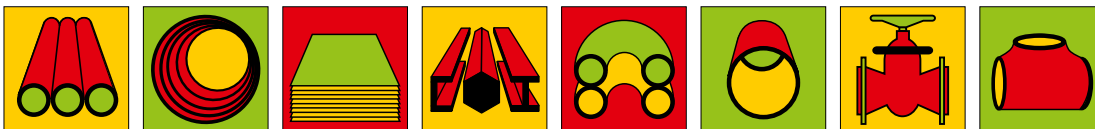
Mill 2

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