



 **PERMASCAND**

PRODUCT  
CATALOGUE



**Permascand**, has the largest store of titanium material in Scandinavia, with a modern, well equipped workshop and invaluable knowledge about titanium material, options and applications.

The main focus at our stock is on sheet, plate and bars, a field in which we can offer our customers material kits adapted to suit their own formats. We also have piping, elbows and other titanium components in stock, as well as fasteners.

You are welcome to contact us regarding conversion to titanium, the manufacture of products to customer drawings and the custom pretreatment of materials. To give our customers customized solutions with the best overall economy, we offer:

- manufacturing in accordance with customer drawings
- customized pre-processing of materials
- design and engineering
- large material stock
- efficient materials handling
- we also provide welding and machining services
- conversion to titanium
- fast service
- specialist skills
- water-jet cutting
- laser welding

Permascand AB, with head office in Ljungaverk, Sweden, is a subsidiary of Eka Chemicals and is a member of the AkzoNobel international chemical group. Operations are conducted within two business areas: Electrochemicals and Fabricated Equipment.



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## ● What is titanium?

### Titanium – the material of today and the future

Titanium, like iron and aluminum, is present in relatively large quantities in the earth's crust.

The world's production of titanium compounds exceeds 1 million tons annually. Of this amount only a small portion is used in the production of pure titanium metal. The production of pure titanium metal is app. 100,000 tons. The major producers are Russia, USA and Japan.

Titanium metal has a promising future as development leads to increasingly high demands for low weight, strength and great resistance to corrosion in aggressive environments. The metal's light weight and strength lead early its use in aviation industry. In recent years titanium's durability in corrosive environments has become increasingly important. At present, these two areas of application are roughly equal. The utilization of titanium and titanium alloys is constantly increasing. There is expertise which claims that titanium is only used in 5% of its commercially viable areas of application.

### Physical and Chemical Properties

With a density of just 4,505 kg/m<sup>3</sup> titanium is sometimes considered to be a light metal. The level of strength attained with titanium alloys is considerably higher than aluminum alloys and places titanium alloys in the same class of materials as the best structural steel. Titanium ductile. Conductivity of heat and electricity is low. Titanium alloys can be employed at temperatures up to app. 400°C.

Thereafter strength diminishes rapidly while oxidization increases.

Titanium does not become brittle at low temperatures, as is the case with steel. It retains its toughness down to -270°C. Titanium is also one of the few materials which becomes superconductive near absolute zero. For this reason superconductive magnets are wound with titanium-niobium alloy at -269°C.

The rate of diffusion of oxygen and hydrogen in titanium is high, which is a factor that limits the range of applications at high temperatures.

Chemically, titanium is distinguished by its high reactivity which is only surpassed by metals such as magnesium, calcium and sodium. In fact, titanium metal is produced thorough reduction with these highly reactive metals. That titanium can be employed under circumstances where most other structural material would be subject to severe corrosion is entirely dependent upon the properties of its oxide, TiO. It is highly resistant and forms a self-healing coating which is normally only about 0.01 mm thick. If the coating is damaged and the environment contains oxygen in some form, e.g. water, the titanium reacts with the oxygen and rebuilds the oxide. On the other hand in deoxidated or reduction environments the oxide protection is weakened and the metal becomes exposed to corrosion. Corrosion resistance can be improved through the introduction of an oxidation agent into the environment or through thickening of the existing oxide coating. Alternatively, an alloy with Mo or Pd can be considered.

The table (next page) presents physical data for titanium and several other materials.

## ● Titanium according to ASTM Standards

### Chemical and mechanical properties

Quality		Gr 1	Gr 2	Gr 4	Gr 5	Gr 7	Gr 9	Gr 11	Gr 12	
Analysis	% Fe	max	0.20	0.30	0.50	0.40	0.30	0.25	0.20	0.30
	O	max	0.18	0.25	0.40	0.20	0.25	0.15	0.18	0.25
	N	max	0.03	0.03	0.05	0.05	0.03	0.02	0.03	0.03
	C	max	0.08	0.08	0.08	0.08	0.08	0.08	0.08	0.08
	H	max	0.015	0.015	0.015	0.015	0.015	0.015	0.015	0.015
	Pd		-	-	-	-	0.12-0.25		0.12-0.25	-
	Al		-	-	-	5.5-6.7	-	2.5-3.5	-	-
	V		-	-	-	3.5-4.5	-	2.0-3.0	-	-
	Mo		-	-	-	-	-	-	-	0.2-0.4
	<b>Yield strength</b>									
N/mm <sup>2</sup>	Rp 0.2		170-310	275-450	483-655	828-	275-450	483-	170-310	345-
<b>Tensile strength</b>										
N/mm <sup>2</sup>	Rm	min	240	345	550	895	345	620	240	483
<b>Hardness</b>										
	Vickers approx.		140	170	310	330	170	250	140	170
<b>Elongation</b>										
5 x d	% min		24	20	15	10	20	15-17	24	18

### Design stress values at 20°C and higher

Even at 20°C, titanium's creep properties must be taken into consideration in the calculation of design strength values. The following values are based on creep-rupture ratings for 100,000 hours.

From a strength perspective the maximum temperature for the usage of unalloyed titanium grades is approximately 350°C. For components not subject to stress oxidation sets a limit at approximately 500°C.

Temp. °C	Rp 0,2
-40 + 20	173
50	173
75	167
100	153
150	126
200	102
250	85

### Comparative Values

Material	Density kg/m <sup>3</sup>	Melting Point °C	Thermal Expansion Coefficient	Thermal Conductivity W/(m.K)	Electrical Resistance Ohm x m	Elasticity Modulus MPa
Titanium	4505	1688	8.4 x 10 <sup>-6</sup>	17	55 x 10 <sup>-8</sup>	106.4 x 10 <sup>-3</sup>
Iron	7900	1530	12 x 10 <sup>-6</sup>	63	9.7 x 10 <sup>-8</sup>	206.0 x 10 <sup>-3</sup>
Aluminium	2700	660	23 x 10 <sup>-6</sup>	205	2.7 x 10 <sup>-8</sup>	69.2 x 10 <sup>-3</sup>
Nickel	8900	1453	15 x 10 <sup>-6</sup>	92	9.5 x 10 <sup>-8</sup>	206.0 x 10 <sup>-3</sup>
Copper	8900	1083	17 x 10 <sup>-6</sup>	385	1.7 x 10 <sup>-8</sup>	107.9 x 10 <sup>-3</sup>
Stainless Steel 18-8	7900	1410	17 x 10 <sup>-6</sup>	16	72 x 10 <sup>-8</sup>	200.1 x 10 <sup>-3</sup>
Brass	8400	970	18.5 x 10 <sup>-6</sup>	100	7.5 x 10 <sup>-8</sup>	107.9 x 10 <sup>-3</sup>
Monel	8800	1325	14 x 10 <sup>-6</sup>	26	48 x 10 <sup>-8</sup>	179.5 x 10 <sup>-3</sup>

## ● Plate ASTM B 265

In addition to standard sizes plates can be delivered cut to size using shear cut, plasma, water or laser cutting.

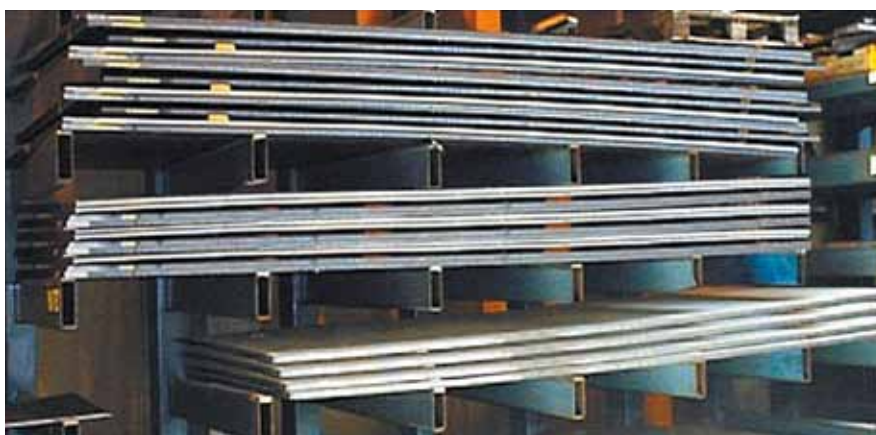
Tolerances on thickness  
 0.5 - 4 mm app. +/- 10%  
 5 - 9.52 mm -0/+1,14 mm  
 9.52 - 19 mm -0/+1,40 mm  
 19 - 25,4 mm -0/+1,52 mm  
 25,4 - 50,8 -0/+1,78 mm  
 50,8 - 76,2 -0/+3,18 mm

Thickness	Format	Gr 1	Gr 2	Gr 5	Gr 7	Weight	Art.no*
						kg/m <sup>2</sup>	
0.5	1250 x 3000	x				2.28	V10xx005
0.7	1005 x 2010			x		3.15	V10xx007
0.8	1250 x 3000	x				3.62	V10xx008
1.0	1250 x 3000	x				4.52	V10xx010
1.2	1250 x 3000	x				5.42	V10xx012
1.5	1250 x 3000	x			x	6.78	V10xx015
2.0	1250 x 3000	x	x	x	x	9.04	V10xx020
2.5	1250 x 3000	x				11.30	V10xx025
3.0	1250 x 3000	x	x	x		13.56	V10xx030
3.18	914 x 2438			x		14.31	V10xx032
4.0	1220 x 3000	x		x		18.08	V10xx040
4.0	1524 x 3000		x			18.08	V10xx040
4.0	2000 x 6000		x			18.08	V10xx040
6.0	2000 x 6000	x	x	x		27.12	V10xx060
8.0	2000 x 6000	x	x	x		36.13	V10xx080
10.0	2000 x 6000	x	x	x		45.20	V10xx100
12.0	2000 x 6000		x	x		54.24	V10xx120
12.5	2000 x 6000	x				56.50	V10xx125
15.0	2000 x 6000		x			67.80	V10xx150
18.0	2000 x 6000		x			81	V10xx180
20.0	2000 x 6000		x	x		90.40	V10xx200
25.0	2000 x 6000		x	x		113.00	V10xx250
30.0	2000 x 6000		x	x		135.60	V10xx300
32.0	2000 x 6000		x			144.00	V10xx320
35.0	2000 x 6000		x	x		158.20	V10xx350
40.0	2000 x 6000		x			180.80	V10xx400
45.0	2000 x 6000		x			203.40	V10xx450
50.0	2000 x 6000		x	x		226.00	V10xx500
60.0	2000 x 6000		x			271.20	V10xx600
70.0	2000 x 6000		x			316.40	V10xx700

\* xx = type of Grade, e.g. Gr2 = 02



Abrasive waterjet.



The largest stock in Scandinavia of titanium sheet and plate.

## ● Bar ASTM B 348

Dimension	Gr 2	F67 Gr 2	Gr 5	Weight	
				kg/m	Art.no*
5.0	x	x		0.088	V23xx0050
6.0	x		x	0.127	V23xx0060
8.0	x	x	x	0.226	V23xx0080
10.0	x		x	0.354	V23xx0100
12.0	x		x	0.510	V23xx0120
14.0	x			0.700	V23xx0140
15.0	x		x	0.790	V23xx0150
16.0	x		x	0.910	V23xx0160
18.0	x			1.15	V23xx0180
20.0	x	x	x	1.420	V23xx0200
22.0	x		x	1.710	V23xx0220
25.0	x		x	2.210	V23xx0250
25.4	x		x	2.250	V23xx0254
30.0	x		x	3.180	V23xx0300
35.0	x		x	4.340	V23xx0350
40.0	x	x	x	5.660	V23xx0400
45.0	x		x	7.160	V23xx0450
50.0	x		x	8.850	V23xx0500
55.0	x		x	10.700	V23xx0550
60.0	x	x	x	12.740	V23xx0600
65.0	x		x	14.950	V23xx0650
70.0	x		x	17.340	V23xx0700
75.0	x		x	19.900	V23xx0750
80.0	x		x	22.650	V23xx0800
90.0	x	x	x	28.660	V23xx0900
100.0	x		x	35.380	V23xx1000
110.0	x		x	42.810	V23xx1100
120.0	x		x	50.950	V23xx1200
130.0	x		x	59.800	V23xx1300
140.0	x		x	69.350	V23xx1400
150.0	x		x	79.610	V23xx1500
160.0	x		x	90.580	V23xx1650
180.0	x		x	114.600	V23xx1800
200.0	x		x	141.500	V23xx2000
250.0	x		x	221.100	V23xx2500
300.0	x		x	318.400	V23xx3000

\* xx = type of Grade, e.g. Gr5 = 05

In addition to the standard lengths bars can be cut to required length.

Tolerances on diameter

Dia 5 - 6 mm +0/-0.012 mm, grinded

Dia 8 mm +0/-0.03 mm, grinded

Dia 10 - 16 mm +0/-0.1 mm, grinded

Dia 18 - 70 mm - 0/+0.2 mm, turned

Dia 75 - 100 mm -0/+0.3 mm, turned

Dia 110 - 150 mm -0/+2 mm, shell turned

Dia >150 mm -0/+3.5 mm, shell turned

Permissible pitch max 2 mm/m

Bar length

Dia 5 - 16 mm, 2 - 3 m

Dia 18 - 100 mm, 3 - 4 m

Dia >100 mm, 2-4 m



Sawcutting.

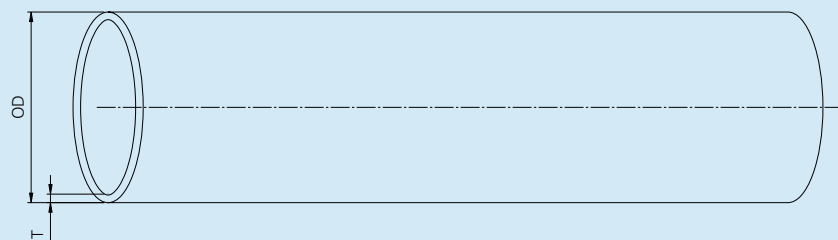


Titanium bars and billets.

## ● Pipes Acc to ANSI B 36.19

Standard grade = Titanium  
ASTM B 861/862 (B337) Gr2.

NB	DN	OD	T		Weight	Art.no
			Sch	mm	kg/m	
1/4"	8	13.7	10 s	1.65	0.28	V330200810
			40 s	2.24	0.36	V330200840
3/8"	10	17.1	10 s	1.65	0.37	V330201010
			40 s	2.31	0.49	V330201040
1/2"	15	21.3	5 s	1.65	0.46	V330201505
			10 s	2.11	0.58	V330201510
			40 s	2.77	0.73	V330201540
3/4"	20	26.7	5 s	1.65	0.54	V330202005
			10 s	2.11	0.79	V330202010
			40 s	2.87	0.97	V330202040
1"	25	33.4	5 s	1.65	0.74	V330202505
			10 s	2.77	1.20	V330202510
			40 s	3.38	1.44	V330202540
1 1/4"	32	42.2	5 s	1.65	0.95	V330203205
			10 s	2.77	1.55	V330203210
			40 s	3.56	1.95	V330203240
1 1/2"	40	48.3	5 s	1.65	1.09	V330204005
			10 s	2.77	1.79	V330204010
			40 s	3.68	2.33	V330204040
2"	50	60.3	5 s	1.65	1.37	V330205005
			10 s	2.77	2.26	V330205010
			40 s	3.91	3.13	V330205040
3"	80	88.9	5 s	2.11	2.60	V330208005
			10 s	3.05	3.72	V330208010
			40 s	5.49	6.50	V330208040
4"	100	114.3	5 s	2.11	3.36	V330210005
			10 s	3.05	4.82	V330210010
			40 s	6.02	9.27	V330210040
6"	150	168.3	5 s	2.77	6.51	V330215005
			10 s	3.40	7.96	V330215010
			40 s	7.11	16.38	V330215040
8"	200	219.1	5 s	2.77	8.4	V330220005
			10 s	3.76	11.35	V330220010



## ● Automatically welded titanium pipes, ISO dimensions

Type testing no. 6834/Psc 1032

NB	DN	OD	T	Pmax	Art.no
2 1/2"	65	76.1	2	39.0	V3202065020
3"	80	88.9	2	33.2	V3202080020
4"	100	114.3	2	25.7	V3202100020
5"	125	139.7	2	21.0	V3202125020
6"	150	168.3	1.5	13.0	V3202150015
	150	168.3	2	17.3	V3202150020
8"	200	219.1	2	13.3	V3202200020
	200	219.1	3	20.0	V3202200030
10"	250	273.0	2	10.6	V3202250020
	250	273.0	3	16.0	V3202250030
12"	300	323.9	2	8.9	V3202300020
	300	323.9	3	13.5	V3202300030

NB	DN	OD	T	Pmax	Art.no
14"	350	355.6	2	8.1	V3202350020
	350	355.6	3	12.3	V3202350030
16"	400	406.4	3	10.7	V3202400030
	400	406.4	4	14.3	V3202400040
18"	450	457.2	3	9.5	V3202450030
	450	457.2	4	12.7	V3202450040
20"	500	508.0	3	8.6	V3202500030
	500	508.0	5	14.3	V3202500050
24"	600	610.0	4	9.5	V3202600040
	600	610.0	5	11.9	V3202600050

Pipe

## ● Automatically welded titanium pipes, ID dimensions

Type testing no. 6832/Psc 1031

DN	OD	T	Pmax	Art.no
50	53	1.5		V3102050015
	54	2	55.5	V3102050020
65	69	2	43.1	V3102065020
	80	83	1.5	26.6
		84	2	35.2
100	103	1.5	21.3	V3102100015
	104	2	28.3	V3102100020
125	128	1.5		V3102125015
	129	2	22.7	V3102125020
150	153	1.5		V3102150015
	154	2	19.0	V3102150020
	156	3		V3102150030
200	204	2	14.3	V3102200020
	206	3	21.3	V3102200030
250	254	2	11.4	V3102250020
	256	3	17.1	V3102250030
300	304	2	9.5	V3102300020
	306	3	14.3	V3102300030
350	354	2	8.2	V3102350020
	356	3	12.3	V3102350030
400	406	3	10.7	V3102400030
	408	4	14.3	V3102400040
500	506	3	8.6	V3102500030
	510	5	14.3	V3102500050
600	608	4	9.5	V3102600040
	610	5	11.9	V3102600050

Standard grade = Titanium Gr2.

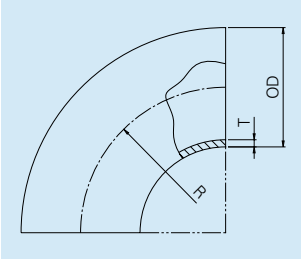
Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

Note: For connections <50 refer to ANSI dimensions, page 23.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.

## ● Elbows ANSI B 16.9 LR

Standard grade =  
Titanium ASTM B 363 Gr2.



Elbows

NB	DN	Sch	T	OD	R	Art.no
			mm	mm	mm	
1/2"	15	10 s	2.11	21.3	38.1	V37020151090
		40 s	2.77	21.3	38.1	V37020154090
3/4"	20	10 s	2.11	26.7	28.6	V37020201090
		40 s	2.87	26.7	28.6	V37020204090
1"	25	5 s	1.65	33.4	38.1	V37020250590
		10 s	2.77	33.4	38.1	V37020251090
		40 s	3.38	33.4	38.1	V37020254090
1 1/4"	32	5 s	1.65	42.2	47.6	V37020320590
		10 s	2.77	42.2	47.6	V37020321090
		40 s	3.56	42.2	47.6	V37020324090
1 1/2"	40	5 s	1.65	48.3	57.2	V37020400590
		10 s	2.77	48.3	57.2	V37020401090
		40 s	3.56	48.3	57.2	V37020404090
2"	50	5 s	1.65	60.3	76.1	V37020500590
		10 s	2.77	60.3	76.1	V37020501090
		40 s	3.91	60.3	76.1	V37020504090
2 1/2"	65	5 s	2.11	73.0	95.2	V37020650590
		10 s	3.05	73.0	95.2	V37020651090
		40 s	5.16	73.0	95.2	V37020654090
3"	80	5 s	2.11	88.9	114.3	V37020800590
		10 s	3.05	88.9	114.3	V37020801090
		40 s	5.49	88.9	114.3	V37020804090
4"	100	5 s	2.11	114.3	152.4	V37021000590
		10 s	3.05	114.3	152.4	V37021001090
		40 s	6.02	114.3	152.4	V37021004090
6"	150	5 s	2.77	168.3	228.6	V37021500590
		10 s	3.40	168.3	228.6	V37021501090
		40 s	7.11	168.3	228.6	V37021504090
8"	200	5 s	2.77	219.1	304.8	V37022000590
		10 s	3.76	219.1	304.8	V37022001090
		40 s	8.18	219.1	304.8	V37022004090
10"	250	5 s	3.40	273.0	381.0	V37022500590
		10 s	4.19	273.0	381.0	V37022501090
		40 s	9.27	273.0	381.0	V37022504090
12"	300	5 s	3.96	323.9	457.2	V37023000590
		10 s	4.57	323.9	457.2	V37023001090
		40 s	9.52	323.9	457.2	V37023004090

## ● Elbows, standard 3D, ISO dimensions

Type testing no. 6834/Psc 1034

NB	DN	OD	T	R	Pmax	Art.no
2 1/2"	65	76.1	2	95	32.4	V360206502090
3"	80	88.9	2	114	28.0	V360208002090
4"	100	114.3	2	152	21.9	V360210002090
5"	125	139.7	2	190	18.0	V360212502090
6"	150	168.3	2	229	14.9	V360215002090
	150	168.3	3	229	22.6	V360215003090
8"	200	219.1	2	305	11.5	V360220002090
	200	219.1	3	305	17.3	V360220003090
10"	250	273.0	2	381	9.2	V360225002090
	250	273.0	3	381	13.9	V360225003090

NB	DN	OD	T	R	Pmax	Art.no
12"	300	323.9	3	457	11.7	V360230003090
14"	350	355.6	3	533	10.9	V360235003090
	350	355.6	4	533	14.6	V360235004090
16"	400	406.4	3	610	9.5	V360240003090
	400	406.4	4	610	12.7	V360240004090
18"	450	457.0	4	686	11.3	V360245004090
20"	500	508.0	5	762	12.7	V360250005090
24"	600	610.0	5	914	10.5	V360260005090

Standard grade = Titanium Gr2.

Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.

## ● Elbows, type D+100, ID dimensions

Type testing no. 6834/Psc 1033

DN	OD	R	T	Pmax	Art.no
50	54	150	2	55.5	V350205002090
65	69	165	2	43.1	V350206502090
80	84	180	2	34.4	V350208002090
100	104	200	2	27.0	V350210002090
125	129	225	2	21.1	V350212502090
	150	154	2	17.3	V350215002090
200	156	250	3	25.8	V350215003090
	204	300	2	12.6	V350220002090
	206	300	3	18.8	V350220003090
250	254	350	2	9.8	V350225002090
	256	350	3	14.8	V350225003090
300	304	400	2		V350230002090
	306	400	3	12.1	V350230003090
350	356	450	3	10.2	V350235003090
	358	450	4		V350235004090
400	406	500	3	8.8	V350240003090
	408	500	4	11.7	V350240004090
500	506	600	3		V350250003090
	508	600	4		V350250004090
600	510	600	5	11.5	V350250005090
	612	700	6	11.4	V350250006090

Standard grade = Titanium Gr2.

Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

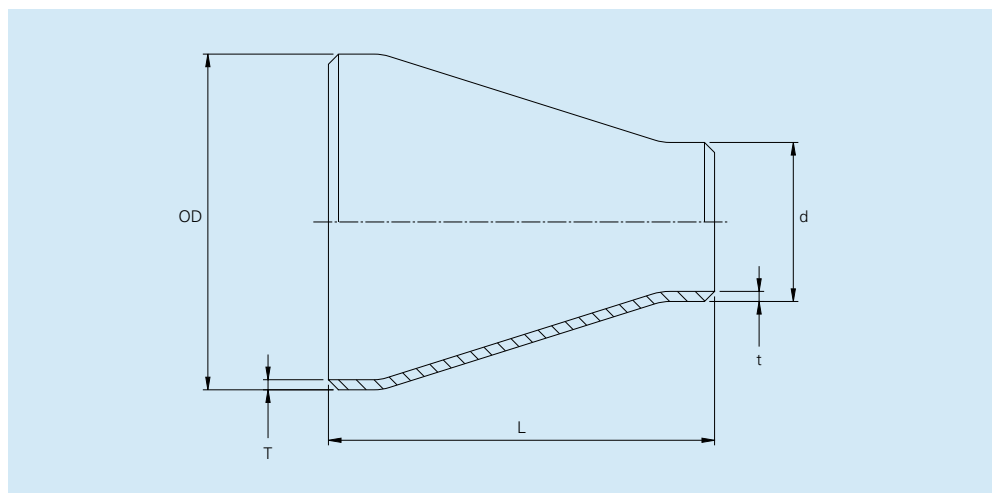
Note: For connections <50 refer to ANSI dimensions, page 19.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.

## ● Reducers concentric ANSI dimensions B 16.9

Standard grade =  
Titanium ASTM B 363 Gr2.

NB	Sch	T	OD	od	L	Art.no
		mm	mm	mm	mm	
1 x 3/4	10	2.77/2.11	33.4	26.7	50.8	V420202502010
1 1/2 x 3/4	10	2.77/2.11	48.3	26.7	63.5	V420204002010
1 1/2 x 1	10	2.77/2.11	48.3	33.4	63.5	V420204002510
2 x 3/4	10	2.77/2.11	60.3	26.7	76.2	V420205002010
2 x 1	10	2.77/2.77	60.3	33.4	76.2	V420205002510
2 x 1 1/2	10	2.77/2.77	60.3	48.3	76.2	V420205004010
2 1/2 x 1	10	3.05/2.77	73.0	33.4	88.9	V420206502510
2 1/2 x 1 1/2	10	3.05/2.77	73.0	48.3	88.9	V420206504010
2 1/2 x 2	10	3.05/2.77	73.0	60.3	88.9	V420206505010
3 x 1	10	3.05/2.77	88.9	33.4	88.9	V420200002510
3 x 2	10	3.05/2.77	88.9	60.3	88.9	V420208005010
3 x 2 1/2	10	3.05/3.05	88.9	73.0	88.9	V420208006510
4 x 1 1/2	10	3.05/2.77	114.3	48.3	101.6	V420210004010
4 x 2	10	3.05/2.77	114.3	60.3	101.6	V420210005010
4 x 2 1/2	10	3.05/3.05	114.3	73.0	101.6	V420210006510
4 x 3	10	3.05/3.05	114.3	88.9	101.6	V420210008010
6 x 2 1/2	10	3.40/3.05	168.3	73.0	139.7	V420215006510
6 x 3	10	3.40/3.05	168.3	88.9	139.7	V420215008010
6 x 4	10	3.40/3.05	168.3	114.3	139.7	V420215010010
8 x 4	10	3.76/3.05	219.1	114.3	152.4	V420220010010
8 x 6	10	3.76/3.40	219.1	168.3	152.4	V420220015010
10 x 4	10	4.19/3.05	273.0	114.3	177.8	V420225010010
10 x 6	10	4.19/3.40	273.0	168.3	177.8	V420225015010
10 x 8	10	4.19/3.76	273.0	219.1	177.8	V420225020010
12 x 6	10	4.57/3.40	323.9	168.3	203.3	V420230015010
12 x 8	10	4.57/3.76	323.9	219.1	203.3	V420230020010
12 x 10	10	4.57/4.19	323.9	273.0	203.3	V420230025010



# ● Reducers, concentric ISO dimensions

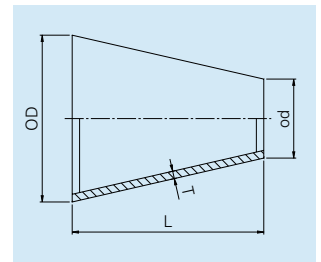
Type testing no. 6835/Psc 1042

NB	DN	OD	od	T	L	Pmax	Art.no
3/4"x1/2"	20/15	26.9	21.3	2	38	122.0	V4102020015020
1"x1/2"	25/15	33.7	21.3	2	51	95.0	V4102025015020
1"x3/4"	25/20	33.7	26.9	2	51	95.0	V4102025020020
1 1/4"x1"	32/25	42.4	33.7	2	51	74.0	V4102032025020
1 1/2"x1 1/4"	40/32	48.3	42.4	2	64	64.5	V4102040032020
1 1/2"x1"	40/25	48.3	33.7	2	64	64.0	V4102040025020
2"x1 1/2"	50/40	60.3	48.3	2	76	51.0	V4102050040020
2"x1"	50/25	60.3	33.7	2	76	51.0	V4102050025020
2 2/1"x2"	65/50	76.1	60.3	2	90	39.9	V4102065050020
2 1/2"x1 1/2"	65/40	76.1	48.3	2	90	39.9	V4102065040020
3"x2 1/2"	80/65	88.9	76.1	2	90	33.9	V4102080065020
3"x2"	80/50	88.9	60.3	2	90	33.9	V4102080050020
4"x3"	100/80	114.3	88.9	2	102	26.1	V4102100080020
4"x2 1/2"	100/65	114.3	76.1	2	102	26.1	V4102100065020
5"x4"	125/100	139.7	114.3	2	127	21.2	V4102125100020
5"x3"	125/80	139.7	88.9	2	127	21.2	V4102125080020
6"x4"	150/100	168.3	114.3	2	140	17.5	V4102150100020
6"x3"	150/80	168.3	88.9	2	140	17.5	V4102150080020
8"x6"	200/150	219.1	168.3	2	152	13.4	V4102200150020
8"x5"	200/125	219.1	139.7	2	152	13.4	V4102200125020
10"x8"	250/200	273.0	219.1	3	178	16.2	V4102250200030
10"x6"	250/150	273.0	168.3	3	178	16.1	V4102250150030
12"x10"	300/250	323.9	273.0	3	203	13.6	V4102300250030
12"x8"	300/200	323.9	219.1	3	203	13.6	V4102300200030
12"x6"	300/150	323.9	168.3	3	203	13.3	V4102300150030
14"x12"	350/300	355.6	323.9	3	330	12.4	V4102350300030
14"x10"	350/250	355.6	273.0	3	330	12.4	V4102350250030
14"x8"	350/200	355.6	219.1	3	330	12.4	V4102350200030
16"x14"	400/350	406.4	355.6	3	356	10.8	V4102400350030
16"x12"	400/300	406.4	323.9	3	356	10.8	V4102400300030
16"x10"	400/250	406.4	273.0	3	356	10.8	V4102400250030
18"x16"	450/400	457.0	406.4	4	381	12.9	V4102450400040
18"x14"	450/350	457.0	355.6	4	381	12.9	V4102450350040
18"x12"	450/300	457.0	323.9	4	381	12.9	V4102450300040
20"x18"	500/450	508.0	457.0	4	508	11.5	V4102500450040
20"x16"	500/400	508.0	406.4	4	508	11.5	V4102500400040
20"x14"	500/350	508.0	355.6	4	508	11.5	V4102500350040
24"x20"	600/500	610.0	508.0	5	508	12.0	V4102600500050
24"x18"	600/450	610.0	457.0	5	508	12.0	V4102600450050
24"x16"	600/400	610.0	406.4	5	508	12.0	V4102600400050

Standard grade =  
Titanium Gr2.

Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.



Reducers

Special dimensions can be offered upon request.

# ● Reducers, concentric ID dimensions

Type testing no. 6835/Psc 1041

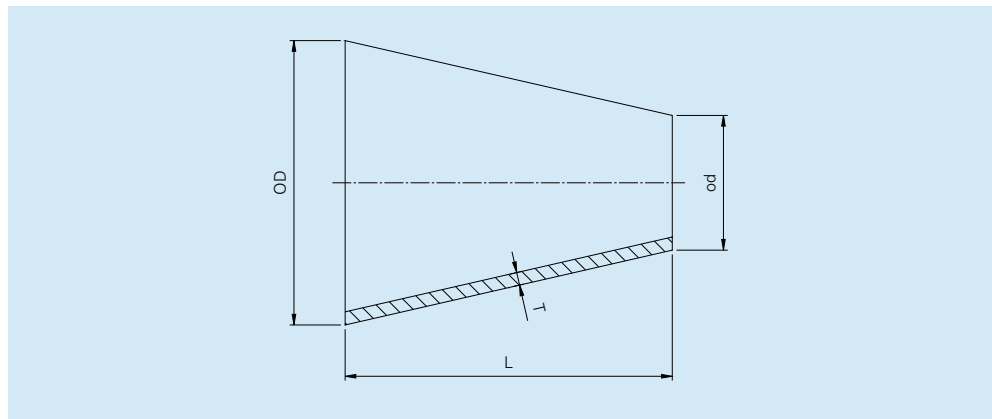
Standard grade =  
Titanium Gr2.

Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

Note: For connections <50 refer to ANSI dimensions, page 20.

For dimensions and tolerances refer to Ti 86100.  
For welding methods/joint types refer to Ti 86101.

DN	OD	od	T	L	Pmax	Art.no
65	69	54	2	45	44.1	V4002065050020
80	84	54	2	90	35.9	V4002080050020
100	104	84	2	60	28.8	V4002100080020
	104	54	2	150	28.8	V4002100050020
125	129	104	2	75	23.0	V4002125100020
	129	84	2	135	23.0	V4002125080020
150	154	129	2	75	19.2	V4002150125020
	154	104	2	150	19.2	V4002150100020
	154	84	2	210	19.2	V4002150080020
200	204	154	2	150	14.4	V4002200150020
	204	129	2	225	14.4	V4002200125020
	204	104	2	300	14.4	V4002200100020
250	254	204	2	150	11.5	V4002250200020
	254	154	2	310	11.5	V4002250150020
	254	129	2	375	11.5	V4002250125020
300	306	256	3	150	14.4	V4002300250030
	306	206	3	300	14.4	V4002300200030
	306	156	3	450	14.4	V4002300150030
350	356	306	3	150	12.4	V4002350300030
	356	256	3	300	12.4	V4002350250030
	356	206	3	450	12.4	V4002350200030
400	406	356	3	150	10.8	V4002400350030
	406	306	3	300	10.8	V4002400300030
	406	256	3	450	10.8	V4002400250030
500	508	408	4	300	11.5	V4002500400040
	508	358	4	450	11.5	V4002500350040
600	610	510	5	300	12.0	V4002600500050
	610	410	5	600	12.0	V4002600400050

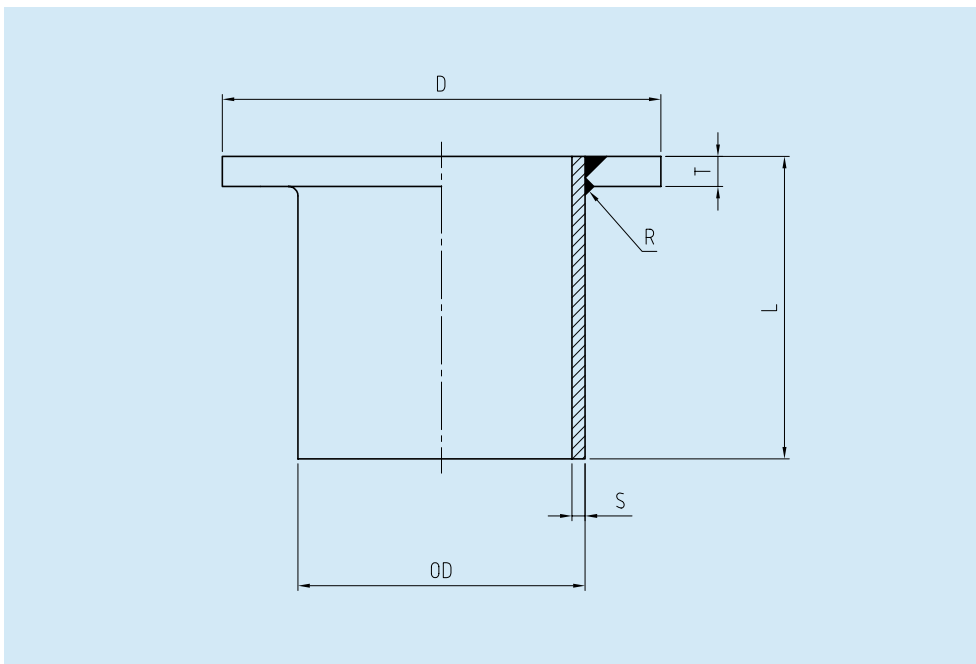


## ● Welded Stub Ends acc. to MSS SP43

NB	DN	Sch	S	Tmin	OD	D	L	R	Art.no
			mm	mm	mm	mm	mm	mm	
3/4"	20	10 s	2.11	2.46	26.7	43.0	50.8	3.0	V5202020010H
1"	25	10 s	2.77	3.05	33.4	51.0	50.8	3.0	V5202025010H
1 1/2"	40	10 s	2.77	3.20	48.3	73.0	50.8	6.0	V5202040010H
2"	50	10 s	2.77	3.30	60.3	92.0	63.5	8.0	V5202050010H
2 1/2"	65	10 s	3.05	3.96	73.0	105.0	63.5	8.0	V5202065010H
3"	80	10 s	3.05	4.19	88.9	127.0	63.5	10.0	V5202080010H
4"	100	10 s	3.05	4.29	114.3	157.0	76.2	11.0	V5202100010H
6"	150	10 s	3.40	4.93	168.3	216.0	88.9	13.0	V5202150010H
8"	200	10 s	3.76	5.54	219.1	270.0	101.6	13.0	V5202200010H
10"	250	10 s	4.19	6.22	273.0	324.0	127.0	13.0	V5202250010H
12"	300	10 s	4.57	6.60	323.9	381.0	152.4	13.0	V5202300010H

Standard grade =  
Titanium ASTM B 363 Gr2.

Type A: Lap Joint Flange  
can be supplied.



# ● Welding ring with neck, PN 10, ISO dimensions

Type testing no. 6831/Psc 1036-1

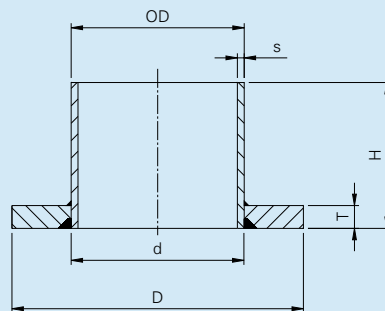
Standard grade = Titanium Gr2.

Loose flange in accordance with SMS 2049 (DIN 2642).

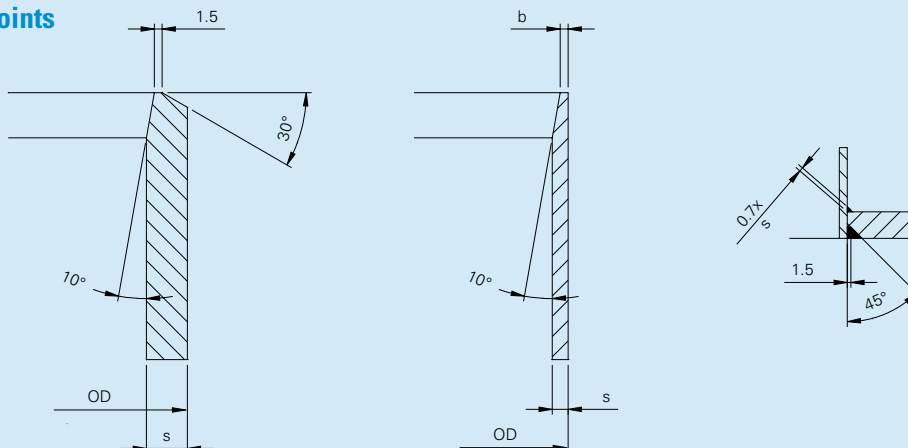
For dimensions and tolerances refer to Ti 86100.

For welding methods/joint types refer to Ti 86101.

NB	DN	Welding Ring			Neck				joint	Art.no
		d	D	T	OD	H	S	b		
1/2"	15	21.5	45	6	21.3	35	2.11	2	I	V5102015010H
3/4"	20	27.1	58	6	26.9	38	2.11	2	I	V5102020010H
1"	25	33.9	68	6	33.7	38	2.77	2	I	V5102025010H
1 1/4"	32	42.6	78	6	42.4	40	2.77	2	I	V5102032010H
1 1/2"	40	48.5	88	6	48.3	42	2.77	2	I	V5102040010H
2"	50	60.5	102	8	60.3	45	2.77	2	I	V5102050010H
2 1/2"	65	76.4	122	10	76.1	45	3.0	2	I	V5102065010H
3"	80	89.2	133	10	88.9	50	4.0	2.6	V	V5102080010H
4"	100	114.6	158	10	114.3	52	4.0	2.6	V	V5102100010H
5"	125	140.0	188	10	139.7	55	4.0	2.6	V	V5102125010H
6"	150	168.6	212	10	168.3	55	5.0	3.2	V	V5102150010H
8"	200	219.5	268	10	219.1	62	6.0	3.2	V	V5102200010H
10"	250	273.4	320	12	273.0	68	6.0	3.2	V	V5102250010H
12"	300	324.3	370	12	323.9	68	8.0	3.6	V	V5102300010H
14"	350	356.0	430	12	355.6	68	8.0	3.6	V	V5102350010H
16"	400	406.9	482	12	406.4	72	8.0	3.6	V	V5102400010H
18"	450	457.7	532	12	457.2	72	8.0	3.6	V	V5102450010H
20"	500	509.0	585	15	508.0	75	10.0	4.0	V	V5102500010H
24"	600	611.0	685	15	610.0	80	10.0	4.0	V	V5102600010H



### Joints



# ● Welding ring with neck, PN 25, ISO dimensions

Type testing no. 6831/Psc 1036-2

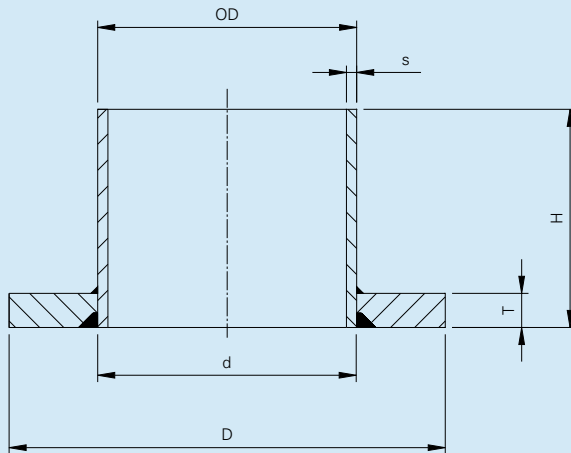
NB	DN	Welding Ring			Neck				joint	Art.no
		d	D	T	OD	H	S	b		
1/2"	15	21.5	45	6	21.3	38	3.2	2.6	I	V5102015025H
3/4"	20	27.1	58	6	26.9	40	3.2	2.6	I	V5102020025H
1"	25	33.9	68	6	33.7	40	3.2	2.6	I	V5102025025H
1 1/4"	32	42.6	78	6	42.4	42	3.6	2.6	I	V5102032025H
1 1/2"	40	48.5	88	8	48.3	45	3.6	2.6	I	V5102040025H
2"	50	60.5	102	8	60.3	48	4.0	3.2	I	V5102050025H
2 1/2"	65	76.4	122	10	76.1	52	4.5	3.2	V	V5102065025H
3"	80	89.2	133	10	88.9	58	4.5	3.2	V	V5102080025H
4"	100	114.6	158	10	114.3	65	5.0	3.6	V	V5102100025H
5"	125	140.0	188	12	139.7	68	5.0	3.6	V	V5102125025H
6"	150	168.6	212	12	168.3	75	6.0	3.6	V	V5102150025H
8"	200	219.5	278	12	219.1	80	8.0	4.0	V	V5102200025H
10"	250	273.4	335	15	273.0	88	10.0	4.0	V	V5102250025H
12"	300	324.3	390	16	323.9	92	10.0	4.0	V	V5102300025H
14"	350	356.0	450	18	355.6	100	12.0	4.0	V	V5102350025H
16"	400	406.9	505	18	406.4	110	14.0	5.0	V	V5102400025H

Standard grade =  
Titanium Gr2.

Loose flange in accordance  
with SMS 2051 (DIN 2655).

For dimensions and tolerances refer to Ti 86100.

For welding methods/joint types refer to Ti 86101.



# ● Welding ring with neck, PN 10, ID dimensions

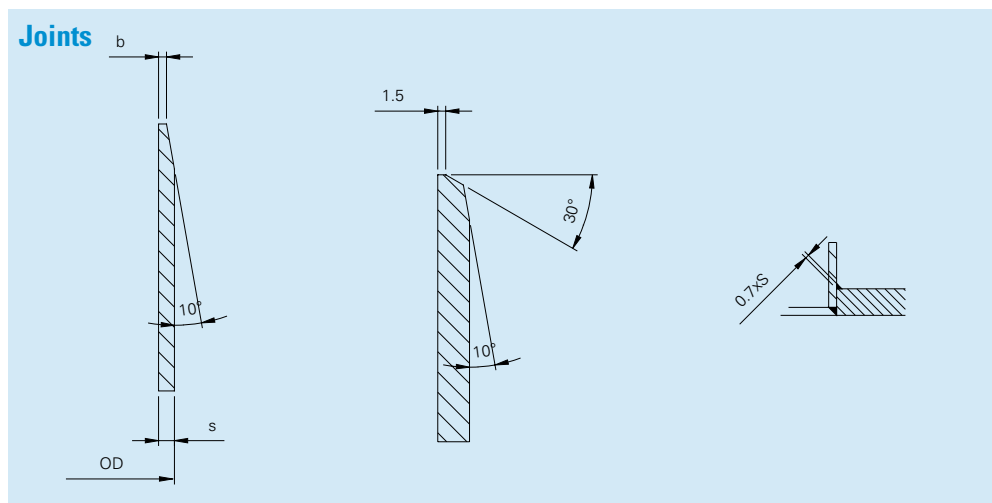
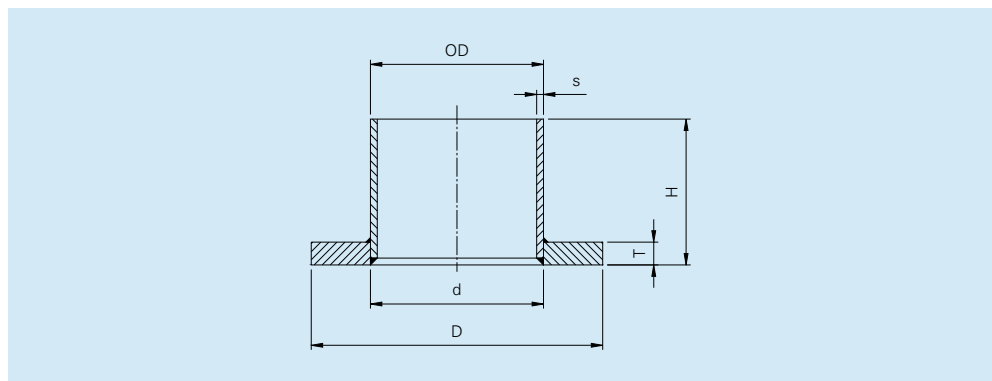
Type testing no. 6830/Psc 1035-1

Standard grade = Titanium Gr2.  
Loose flange in accordance with SMS 2049 (DIN 2642).

For dimensions and tolerances refer to Ti 86100.  
For welding methods/joint types refer to Ti 86101.

Note: DN 15-40, refer to ISO dimensions.

DN	Welding Ring			Neck				Joint	Art.no
	d	D	T	OD	H	S	b		
50	54.2	102	8	54	45	2	-	I	V5002050010H
65	69.2	122	8	69	45	2	-	I	V5002065010H
80	84.3	133	10	84	45	2	-	I	V5002080010H
100	106.3	158	10	106	45	3	2	I	V5002100010H
125	131.3	184	10	131	45	3	2	I	V5002125010H
150	158.3	212	10	158	45	4	2	I	V5002150010H
200	210.4	268	10	210	45	5	3	V	V5002200010H
250	262.4	320	12	262	55	6	3	V	V5002250010H
300	312.4	370	12	312	55	6	3	V	V5002300010H
350	366.4	430	12	366	55	8	3	V	V5002350010H
400	416.5	482	12	416	65	8	4	V	V5002400010H
500	521.0	585	15	520	75	10	4	V	V5002500010H
600	621.0	685	15	620	80	10	4	V	V5002600010H



## ● Welding ring with neck, PN 16, ID dimensions

Type testing no. 6830/Psc 1035-2

DN	Welding Ring			Neck					Art.no
	d	D	T	OD	H	S	b	Joint	
50	54.2	102	8	54	45	2	-	I	V5002050016H
65	71.3	122	8	71	45	3	-	I	V5002065016H
80	86.3	133	10	86	45	3	-	V	V5002080016H
100	108.3	158	10	108	45	4	3	V	V5002100016H
125	135.3	184	10	135	45	5	3	V	V5002125016H
150	160.3	212	10	160	45	5	3	V	V5002150016H
200	214.3	268	10	214	65	7	3	V	V5002200016H
250	266.4	320	12	266	65	8	4	V	V5002250016H
300	320.4	370	12	320	65	10	4	V	V5002300016H
350	374.4	430	15	374	70	12	5	V	V5002350016H
400	424.5	482	15	424	80	12	5	V	V5002400016H
500	525.0	585	18	524	95	12	5	V	V5002500016H
600	632.0	685	18	630	100	15	6	V	V5002600016H

Standard grade = Titanium Gr2.

Loose flange in accordance with SMS 2050 (DIN 2642 DN 150).

Note: DN 15-40, refer to ISO dimensions.

## ● Welding ring with neck, PN 25, ID dimensions

Type testing no. 6830/Psc 1035-3

DN	Welding Ring			Neck					Art.no
	d	D	T	OD	H	S	b	Joint	
50	58.2	102	8	58	45	4	3	I	V5002050025H
65	75.3	122	10	75	45	5	4	I	V5002065025H
80	90.3	133	10	90	55	5	4	V	V5002080025H
100	100.3	158	10	110	55	5	4	V	V5002100025H
125	135.3	184	12	135	55	5	4	V	V5002125025H
150	162.3	212	12	162	65	6	4	V	V5002150025H
200	216.4	278	12	216	65	8	5	V	V5002200025H
250	270.4	335	15	270	75	10	6	V	V5002250025H
300	320.4	390	16	320	80	10	8	V	V5002300025H
350	374.4	450	18	374	85	12	8	V	V5002350025H
400	430.5	505	18	430	95	15	8	V	V5002400025H
500	531.0	615	22	530	115	15	8	V	V5002500025H

Standard grade = Titanium Gr2.

Loose flange in accordance with SMS 2051 (DIN 2655).

For dimensions and tolerances refer to Ti 86100.

For welding methods/joint types refer to Ti 86101.

Note: DN 15-40, refer to ISO dimensions.

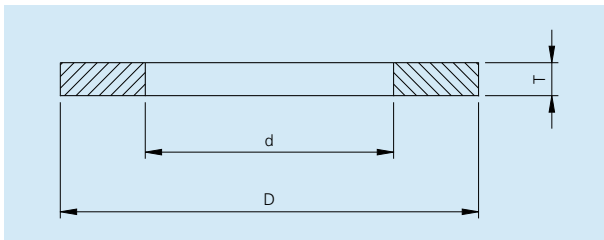
## ● Welding ring ISO-, ID- and ANSI-dimensions

### Welding Ring ISO

NB	DN	d	D	T	Art.no
1/2"	15	21.5	45	6	V5102015010
3/4"	20	27.1	58	6	V5102020010
1"	25	33.9	68	6	V5102025010
1 1/4"	32	42.6	78	6	V5102032010
1 1/2"	40	48.5	88	6	V5102040010
2"	50	60.5	102	8	V5102050010
2 1/2"	65	76.4	122	10	V5102065010
3"	80	89.2	133	10	V5102080010
4"	100	114.6	158	10	V5102100010
5"	125	140.0	188	10	V5102125010
6"	150	168.6	212	10	V5102150010
8"	200	219.5	268	10	V5102200010
10"	250	273.4	320	12	V5102250010
12"	300	324.3	370	12	V5102300010
14"	350	356.0	430	12	V5102350010
16"	400	406.9	482	12	V5102400010
18"	450	457.7	532	12	V5102450010
20"	500	509.0	585	15	V5102500010
24"	600	611.0	685	15	V5102600010

### Welding Ring ANSI

NB	DN	d	D	T	Art.no
1/2"	15	21.5	34.9	3	V5202015010
3/4"	20	27.1	42.2	3	V5202020010
1"	25	33.9	50.8	4	V5202025010
1 1/4"	32	42.6	63.5	4	V5202032010
1 1/2"	40	48.5	73.0	4	V5202040010
2"	50	60.5	92.0	4	V5202050010
2 1/2"	65	73.2	104.8	6	V5202065010
3"	80	89.2	127.0	6	V5202080010
4"	100	114.6	157.2	6	V5202100010
5"	125	140.0	185.7	6	V5202125010
6"	150	168.6	215.9	6	V5202150010
8"	200	219.5	269.9	6	V5202200010
10"	250	273.4	323.8	8	V5202250010
12"	300	324.3	381.0	8	V5202300010
14"	350	356.0	412.7	8	V5202350010
16"	400	406.9	469.9	8	V5202400010
18"	450	457.7	533.4	8	V5202450010
20"	500	509.0	584.2	8	V5202500010
24"	600	611.0	692.2	8	V5202600010



Standard grade =  
Titanium ASTM B 265 Gr2.  
Welding ring for loose flange  
PN 10.

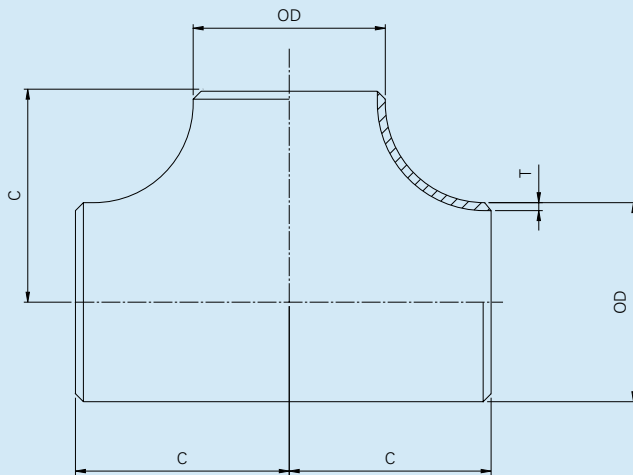
### Welding Ring ID

NB	DN	d	D	T	Art.no
2"	50	53.3	102	8	V5002050010
2 1/2"	65	69.3	117	10	V5002065010
3"	80	83.3	133	10	V5002080010
4"	100	103.3	158	10	V5002100010
5"	125	129.3	184	10	V5002125010
6"	150	153.3	212	10	V5002150010
8"	200	206.4	268	10	V5002200010
10"	250	256.4	320	12	V5002250010
12"	300	306.4	370	12	V5002300010
14"	350	356.4	430	12	V5002350010
16"	400	406.5	482	12	V5002400010
18"	450	456.5	532	15	V5002450010
20"	500	509.0	585	15	V5002500010
24"	600	609.0	685	15	V5002600010

## ● Equal Tee Acc to ANSI B 16.9

NB	Sch	T	OD	Center to end	Art.no
		mm	mm	mm	
3/4"	10 s	2.11	26.7	28.6	V620202002010
1"	10 s	2.77	33.4	38.1	V620202502510
1 1/2"	10 s	2.77	48.3	57.2	V620204004010
2"	10 s	2.77	60.3	63.5	V620205005010
2 1/2"	10 s	3.05	73.0	76.2	V620206506510
3"	10 s	3.05	88.9	85.7	V620208008010
4"	10 s	3.05	114.3	104.8	V620210010010
6"	10 s	3.40	168.3	142.9	V620215015010
8"	10 s	3.76	219.1	177.8	V620220020010
10"	10 s	4.19	273.0	215.9	V620225025010
12"	10 s	4.57	323.9	254.0	V620230030010

Standard grade =  
Titanium ASTM B 363 Gr2.



# ● Tee with welded straight branch connection,\* ISO dimensions

Type testing no. 6833/Psc 1044

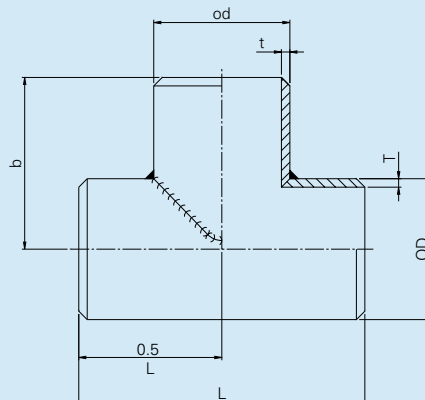
Standard grade = Titanium Gr2.

P<sub>max</sub> is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.

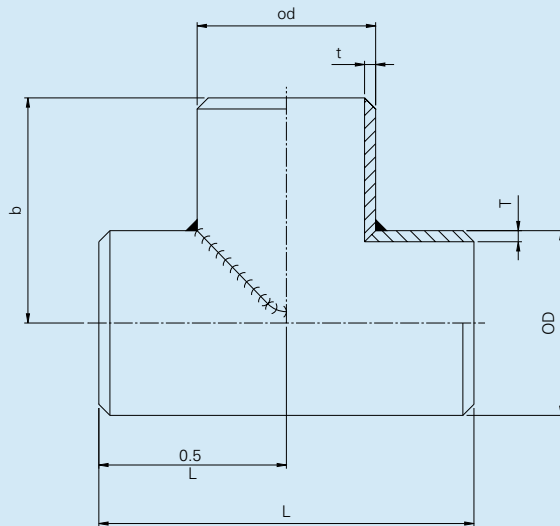
\* Small dimensions may be pressed.

NB	DN	OD	T	L	od	t	b	P <sub>max</sub>	Art.no
1/2"	15	21.3	2.11	50	21.3	2.11	25	114.6	V6102015015021
3/4"	20	26.7	2.11	58	26.7	2.11	29	105.5	V6102020020021
1"	25	33.4	2.77	76	33.4	2.77	38	112.3	V6102025025028
1 1/4"	32	42.4	2.77	96	42.4	2.77	48	82.3	V6102032032028
1 1/2"	40	48.3	2.77	114	48.3	2.77	57	68.9	V6102040040028
2"	50	60.3	2.77	128	60.3	2.77	64	32.3	V6102050050028
2 1/2"	65	76.1	2	152	76.1	2	76	23.4	V6102065065020
3"	80	88.9	2	172	88.9	2	86	18.8	V6102080080020
4"	100	114.3	3	210	114.3	3	105	23.3	V6102100100030
5"	125	139.7	3	248	139.7	3	124	17.6	V6102125125030
6"	150	168.3	3	286	168.3	3	143	13.6	V6102150150040
8"	200	219.1	4	356	219.1	3	178	12.8	V6102200200040
10"	250	273.0	4	432	273.0	4	216	8.46	V6102250250040
12"	300	323.9	5	508	323.9	4	254	10.4	V6102300300050
14"	350	355.6	6	558	355.6	4	279	11.2	V6102350350060
		355.6	5	558	323.9	5	270	10.5	V6102350300050
		355.6	5	558	273.0	4	257	11.0	V6102350250050
16"	400	406.4	6	610	406.4	5	305	10.0	V6102400400060
		406.4	6	610	355.6	4	305	10.2	V6102400350060
		406.4	6	610	323.9	4	295	10.7	V6102400300060
18"	450	457.0	8	686	457.0	5	343	11.6	V6102450450080
		457.0	8	686	406.4	5	330	12.3	V6102450400080
		457.0	6	686	355.6	5	330	10.0	V6102450350060
20"	500	508.0	8	762	508.0	6	381	10.5	V6102500500080
		508.0	8	762	457.0	5	368	10.6	V6102500450080
		508.0	8	762	406.4	5	356	11.4	V6102500400080
24"	600	610.0	10	864	610.0	6	432	11.3	V6102600600100
		610.0	8	864	508.0	6	432	10.2	V6102600500080
		610.0	8	864	457.0	5	419	11.0	V6102600450080



# • Tee with welded straight branch connection, ID dimensions

Type testing no. 6833/Psc 1043



Standard grade = Titanium Gr2.

Pmax is based on calculation values at -40°C to +50°C. For other temperatures refer to diagram Psc 1000.

For dimensions and tolerances refer to Ti 86100. For welding methods/joint types refer to Ti 86101.

Note: For connections <50 refer to ANSI dimensions, page 20.

Other dimensions available on request.

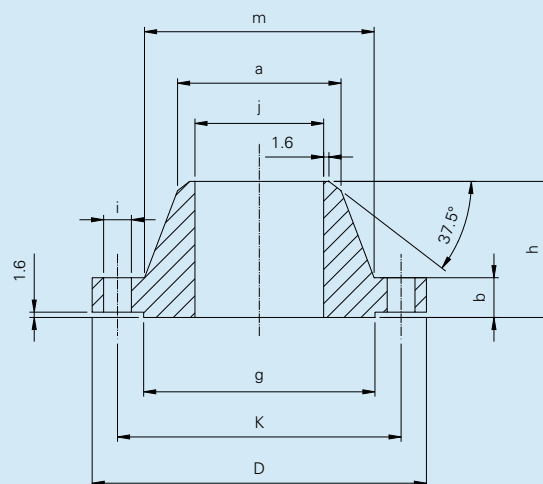
DN	OD	od	T	L	t	b	Pmax	Art.no
50	54	54	2	100	2	50	37.7	V6002050050020
65	69	69	2	130	2	65	26.8	V6002065065020
80	84	84	2	160	2	80	20.4	V6002080080020
100	106	106	3	200	3	100	25.9	V6002100100030
	106	84	3	160	2	80	26.5	V6002100080030
	106	54	3	100	2	75	35.5	V6002100050030
125	131	129	3	250	3	125	19.3	V6002125125030
	131	104	3	200	3	112	22.5	V6002125100030
	131	84	3	160	2	102	23.0	V6002125100030
150	156	156	3	300	3	150	15.1	V6002150150030
	156	103	3	200	3	125	20.2	V6002150100030
	156	86	3	160	3	115	20.4	V6002150080030
200	206	206	3	400	3	200	10.4	V6002200200030
	206	156	3	300	3	175	12.6	V6002200150030
	206	131	3	250	3	162	14.3	V6002100125030
	206	106	3	200	3	150	16.6	V6002200100030
250	258	258	4	500	4	250	11.3	V6002250250040
	258	206	4	400	3	225	11.9	V6002250200040
	258	156	4	300	3	200	14.6	V6002250150040
	258	106	4	200	3	175	18.9	V6002250100040

DN	OD	od	T	L	t	b	Pmax	Art.no
300	308	308	5	600	4	300	10.0	V6002300300050
	308	258	4	500	4	275	10.0	V6002300250040
	308	206	4	400	3	250	10.6	V6002300200040
	308	156	4	300	3	225	13.0	V6002300150040
350	360	360	5	700	5	350	10.0	V6002350350050
	360	308	5	600	4	325	10.1	V6002350300050
	360	258	5	500	4	300	11.3	V6002350250050
	360	206	5	400	3	275	12.1	V6002350200050
400	412	410	6	800	5	400	10.0	V6002400400060
	412	358	6	700	4	375	10.1	V6002400350060
	412	308	6	600	4	350	11.1	V6002400300060
	410	258	5	500	4	325	10.4	V6002400250050
500	516	512	8	1000	6	500	10.4	V6002500500080
	516	410	8	800	5	450	11.2	V6002500400080
	516	358	8	700	4	425	11.4	V6002500350080
	516	308	8	600	4	400	12.7	V6002500300080
600	620	616	10	1200	8	600	11.1	V6002600600100
	616	516	8	1000	8	550	10.0	V6002600500080

## ● Welding Neck Flange 150 lb acc to ANSI B 16.5

Standard grade =  
Titanium ASTM B 381 Gr2.

NB	DN	Flange				Hub		Raised Face	Drilling Template			Art.no
		D	j	b	h	m	a	g	No	K	i	
1/2"	15	88.9	15.75	11.1	47.6	30.2	21.3	34.9	4	60.3	15.9	V7202015150WNRF
3/4"	20	98.4	20.8	12.7	52.4	38.1	26.7	42.9	4	29.8	15.9	V7202020150WNRF
1"	25	107.9	26.7	14.3	55.6	49.2	33.5	50.8	4	79.4	15.9	V7202025150WNRF
1 1/4"	32	117.5	35.05	15.9	57.1	58.7	42.4	63.5	4	88.9	15.9	V7202032150WNRF
1 1/2"	40	127.0	40.9	17.5	61.9	65.1	48.3	73.0	4	98.4	15.9	V7202040150WNRF
2"	50	152.4	52.6	19.0	63.5	77.8	60.4	92.1	4	120.6	19.0	V7202050150WNRF
2 1/2"	65	117.8	62.7	22.2	69.8	90.5	73.1	104.8	4	139.7	19.0	V7202065150WNRF
3"	80	190.5	78.0	23.8	69.8	107.9	88.9	127.0	4	152.4	19.0	V7202080150WNRF
4"	100	228.6	102.4	23.8	76.2	134.9	114.3	157.2	8	190.5	19.0	V7202100150WNRF
5"	125	254.0	128.3	23.8	88.9	163.5	141.2	185.7	8	215.9	22.2	V7202125150WNRF
6"	150	279.4	154.2	25.4	88.9	192.1	168.4	215.9	8	241.3	22.2	V7202150150WNRF
8"	200	342.9	202.7	28.6	101.6	246.1	219.2	269.9	8	298.4	22.2	V7202200150WNRF
10"	250	406.4	254.5	30.2	101.6	304.8	273.0	323.8	12	361.9	25.4	V7202250150WNRF
12"	300	482.6	304.8	31.8	114.3	365.1	323.8	381.0	12	431.8	25.4	V7202300150WNRF
14"	350	533.4		34.9	127.0	400.0	355.6	412.7	12	476.2	28.6	V7202350150WNRF
16"	400	569.9		36.5	127.0	457.2	406.4	469.9	16	539.7	28.6	V7202400150WNRF
18"	450	635.0		39.7	139.7	504.8	457.2	533.4	16	577.8	31.7	V7202450150WNRF
20"	500	698.5		42.9	144.5	558.8	508.0	584.2	20	635.0	31.7	V7202500150WNRF
24"	600	812.8		47.6	152.4	663.6	609.6	692.1	20	749.3	34.9	V7202600150WNRF

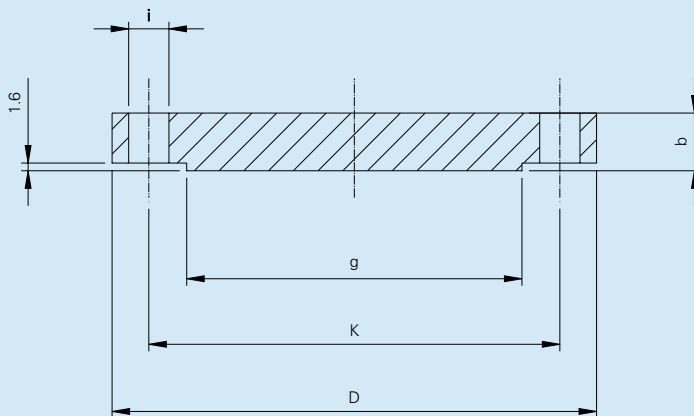


# ● Blind Flange

## 150 lb acc to ANSI B 16.5

NB	DN	Flange		Raised Face	Drilling Template			Art.no
		D	b	g	No	K	i	
1/2"	15	88.9	11.1	34.9	4	60.3	15.9	V7202015150BFRF
3/4"	20	98.4	12.7	42.9	4	69.8	15.9	V7202020150BFRF
1"	25	107.9	14.3	50.8	4	79.4	15.9	V7202025150BFRF
1 1/4"	32	117.5	15.9	63.5	4	88,9	15.9	V7202032150BFRF
1 1/2"	40	127.0	17.5	73.0	4	98.4	15.9	V7202040150BFRF
2"	50	152.4	19.0	92.1	4	120.6	19.0	V7202050150BFRF
2 1/2"	65	177.8	22.2	104.8	4	139.7	19.0	V7202065150BFRF
3"	80	190.5	23.8	130.2	4	152.4	19.0	V7202080150BFRF
4"	100	228.6	23.8	157.2	8	190.5	19.0	V7202100150BFRF
5"	125	254.0	23.8	185.7	8	215.9	22.2	V7202125150BFRF
6"	150	279.4	25.4	215.9	8	241.3	22.2	V7202150150BFRF
8"	200	342.9	28.6	269.9	8	298.4	22.2	V7202200150BFRF
10"	250	406.4	30.2	323.8	12	361.9	25.4	V7202250150BFRF
12"	300	482.6	31.8	381.0	12	431.8	25.4	V7202300150BFRF
14"	350	533.4	34.9	412.7	12	476.2	28.6	V7202350150BFRF
16"	400	596.9	36.5	469.9	16	539.7	28.6	V7202400150BFRF
18"	450	635.0	39.7	533.4	16	577.8	31.7	V7202450150BFRF
20"	500	698.5	42.9	584.2	20	635.0	31.7	V7202500150BFRF
24"	600	812.8	47.6	692.1	20	749.3	34.9	V7202600150BFRF

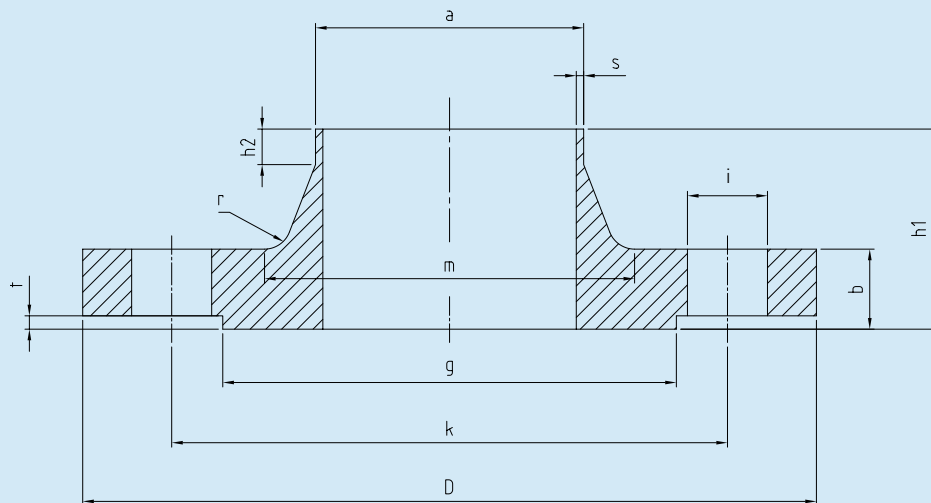
Standard grade =  
Titanium Gr2.



# ● Welding Neck Flange DIN 2633 PN 16

Standard grade =  
Titanium Gr2.

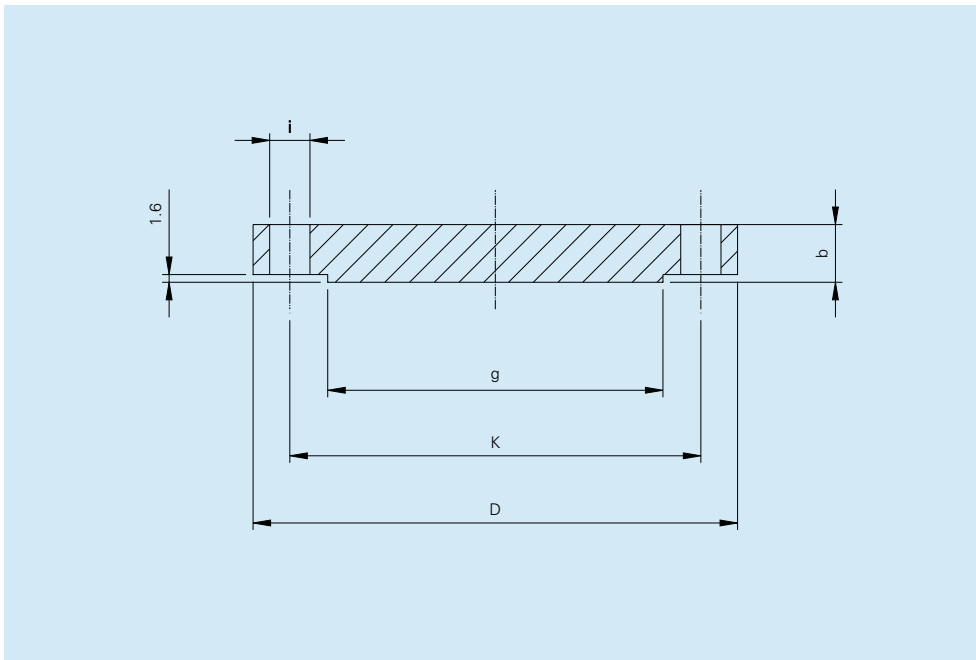
DN	Flange				Hub				Raised Face		Drilling Template			Art.no
	a	D	b	h1	m	r	s	h2	g	f	No	K	i	
15	21.3	95	14	35	32	4	2	6	45	2	4	65	14	V7302015016WNRF
20	29.9	105	16	38	40	4	2.3	6	58	2	4	75	14	V7302020016WNRF
25	33.7	115	16	38	45	4	2.6	6	68	2	4	85	14	V7302025016WNRF
32	42.4	140	16	40	56	6	2.6	6	78	2	4	100	18	V7302032016WNRF
40	48.3	150	16	42	64	6	2.6	7	88	3	4	110	18	V7302040016WNRF
50	60.3	165	18	45	75	6	2.9	8	102	3	4	125	18	V7302050016WNRF
65	76.1	185	18	45	90	6	2.9	10	122	3	4	145	18	V7302065016WNRF
80	88.9	200	20	50	105	8	3.2	10	138	3	8	160	18	V7302080016WNRF
100	114.3	220	20	52	131	8	3.6	12	158	3	8	180	18	V7302100016WNRF
125	139.7	250	22	55	156	8	4	12	188	3	8	210	18	V7302125016WNRF
150	168.3	285	22	55	184	10	4.5	12	212	3	8	240	22	V7302150016WNRF
200	219.1	340	24	62	235	10	5.9	16	268	3	12	295	22	V7302200016WNRF
250	273.0	405	26	70	292	12	6.3	16	250	3	12	355	26	V7302250016WNRF
300	323.9	460	28	78	344	12	7.1	16	378	4	12	410	26	V7302300016WNRF
350	355.6	520	30	82	390	12	8	16	438	4	16	470	26	V7302350016WNRF
400	406.4	580	32	85	445	12	8	16	490	4	16	525	30	V7302400016WNRF
500	508.0	715	34	90	548	12	8	16	610	4	20	650	33	V7302500016WNRF
600	609.6	840	36	95	652	12	8.8	18	725	5	20	770	36	V7302600016WNRF



## ● Blind Flange DIN 2527 PN 16

DN	Flange		Raised Face	Drilling Template			Art.no
	D	b	g	No	K	i	
10	90	14	40	4	60	14	V7302010016BFRF
15	95	14	45	4	65	14	V7302015016BFRF
20	105	16	58	4	75	14	V7302020016BFRF
25	115	16	68	4	85	14	V7302025016BFRF
32	140	16	78	4	100	18	V7302032016BFRF
40	150	16	88	4	110	18	V7302040016BFRF
50	165	18	102	4	125	18	V7302050016BFRF
65	185	18	122	4	145	18	V7302065016BFRF
80	200	20	138	8	160	18	V7302080016BFRF
100	220	20	158	8	180	18	V7302100016BFRF
125	250	22	188	8	210	18	V7302125016BFRF
150	285	22	212	8	240	22	V7302150016BFRF
200	340	24	268	12	295	22	V7302200016BFRF
250	405	26	320	12	355	26	V7302250016BFRF
300	460	28	378	12	410	26	V7302300016BFRF
350	520	30	438	16	470	26	V7302350016BFRF
400	580	32	490	16	525	30	V7302400016BFRF
500	715	34	610	20	650	33	V7302500016BFRF
600	840	36	725	20	770	36	V7302600016BFRF

Standard grade =  
Titanium Gr2.



## ● Loose Flanges EN 1092 Type 02 PN 10

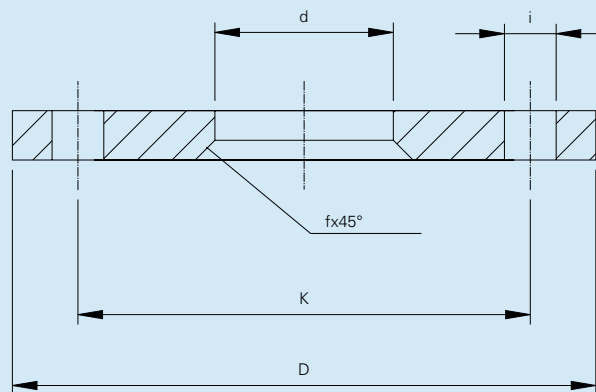
Material Carbon Steel,  
galvanized.

Use PN 40 flanges  
for DN 15 - DN 40.

Use PN 16  
for DN 50 - DN 150.

Drilling Templates

DN	D	d	b	f	No	i	K	Bolt dia	Art.no
15	95	24	14	3	4	14	65	M12	V7135015010LF
20	105	30	14	3	4	14	75	M12	V7135020010LF
25	115	36	16	4	4	14	85	M12	V7135025010LF
32	140	46	16	4	4	18	100	M16	V7135032010LF
40	150	54	16	4	4	18	110	M16	V7135040010LF
50	165	65	16	5	4	18	125	M16	V7135050010LF
65	185	81	16	5	4	18	145	M16	V7135065010LF
80	200	94	18	5	8	18	160	M16	V7135080010LF
100	220	119	18	5	8	18	180	M16	V7135100010LF
125	250	145	18	5	8	18	210	M16	V7135125010LF
150	285	173	18	5	8	22	240	M20	V7135150010LF
200	340	226	24	6	8	22	295	M20	V7135200010LF
250	395	281	26	8	12	22	350	M20	V7135250010LF
300	445	333	26	8	12	22	400	M20	V7135300010LF
350	505	365	30	8	16	22	460	M20	V7135350010LF
400	565	416	32	8	16	26	515	M24	V7135400010LF
500	670	519	38	8	20	26	620	M24	V7135500010LF
600	780	622	42	8	20	30	725	M27	V7135600010LF
700	895	721	50	8	24	30	840	M27	V7135700010LF
800	1015	824	56	8	24	33	950	M30	V7135800010LF
900	1115	926	62	8	28	33	1050	M30	V7135900010LF



## ● Loose Flanges EN 1092 Type 02 PN 16

Drilling Templates

DN	D	d	b	f	No	i	K	Bolt dia	Art.no
65	185	81	20	6	4	18	145	M16	V7135065016LF
100	220	120	22	6	8	18	180	M16	V7135200016LF
125	250	145	22	6	8	18	210	M16	V7135125016LF
150	285	174	24	6	8	22	240	M20	V7135150016LF
200	340	226	26	6	12	22	295	M20	V7135200016LF
250	405	281	29	8	12	26	355	M24	V7135250016LF
300	460	333	32	8	12	26	410	M24	V7135300016LF
350	520	365	35	8	16	26	470	M24	V7135350016LF
400	580	416	38	8	16	30	525	M27	V7135400016LF
500	715	519	46	8	20	33	650	M30	V7135500016LF

Material Carbon Steel, galvanized.

Use PN 40 flanges for DN 10 - DN 40.

## ● Loose Flanges EN 1092 Type 02 PN 25

Drilling Templates

DN	D	d	b	f	No	i	K	Bolt dia	Art.no
200	360	226	32	8	12	26	310	M24	V7135200025LF
250	425	281	35	8	12	30	370	M27	V7135250025LF
300	485	333	38	8	16	30	430	M27	V7135300025LF
350	555	365	42	8	16	33	490	M30	V7135350025LF
400	620	416	48	8	16	36	550	M33	V7135400025LF
500	730	519	58	8	20	36	660	M33	V7135500025LF

Material Carbon Steel, galvanized.

Use PN 40 flanges for DN 10 - DN 150.

## ● Loose Flanges EN 1092 Type 02 PN 40

Drilling Templates

DN	D	d	b	f	No	i	K	Bolt dia	Art.no
15	95	25	14	3	4	14	65	M12	V7135015040LF
20	105	31	16	4	4	14	75	M12	V7135020040LF
25	115	38	16	4	4	14	85	M12	V7135025040LF
32	140	47	18	5	4	18	100	M16	V7135032040LF
40	150	53	18	5	4	18	110	M16	V7135040040LF
50	165	65	20	5	4	18	125	M16	V7135050040LF
65	185	81	22	6	8	18	146	M16	V7135065040LF
80	200	94	24	6	8	18	160	M16	V7135080040LF
100	235	120	26	6	8	22	190	M20	V7135100040LF
125	270	145	28	6	8	26	220	M24	V7135125040LF
150	300	174	30	6	8	26	250	M24	V7135150040LF

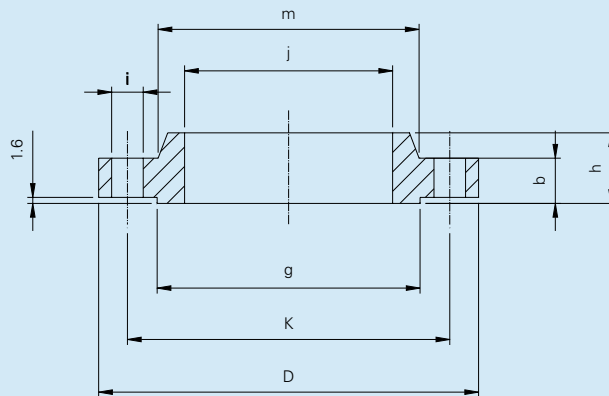
Material Carbon Steel, galvanized.

# ● Slip-on Flange

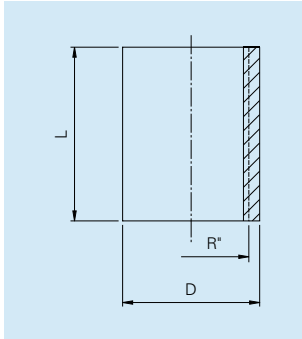
## 150 lb acc to ANSI B 16.5

Standard grade =  
Titanium Gr2.

NB	DN	Flange				Hub	Raised Face	Drilling Template			Art.no
		D	j	b	h	m	g	No	K	i	
1/2"	15	88.9	22.3	11.1	15.9	30.2	34.9	4	60.3	15.9	V7202015150SORF
3/4"	20	98.4	27.7	12.7	15.9	38.1	42.9	4	69.8	15.9	V7202020150SORF
1"	25	107.9	34.5	14.3	17.5	49.2	50.8	4	79.4	15.9	V7202025150SORF
1 1/4"	32	117.5	43.2	15.9	20.6	58.7	63.5	4	88.9	15.9	V7202032150SORF
1 1/2"	40	127.0	49.5	17.5	22.2	65.1	73.0	4	98.4	15.9	V7202040150SORF
2"	50	152.4	62.0	19.0	25.4	77.8	92.1	4	120.6	19.0	V7202050150SORF
2 1/2"	65	177.8	74.7	22.2	28.6	90.5	104.8	4	139.7	19.0	V7202065150SORF
3"	80	190.5	90.7	23.8	30.2	107.9	127.0	4	152.4	19.0	V7202080150SORF
4"	100	228.6	116.1	23.8	33.3	134.9	157.2	8	190.5	19.0	V7202100150SORF
5"	125	254.0	143.8	23.8	36.5	163.5	185.7	8	215.9	22.2	V7202125150SORF
6"	150	279.4	170.7	25.4	39.7	192.1	215.9	8	241.3	22.2	V7202150150SORF
8"	200	342.9	221.5	28.6	44.4	246.1	269.9	8	298.4	22.2	V7202200150SORF
10"	250	406.4	276.35	30.2	49.2	304.8	323.8	12	361.9	25.4	V7202250150SORF
12"	300	482.6	327.15	31.8	55.6	365.1	381.0	12	431.8	25.4	V7202300150SORF
14"	350	533.4	359.15	34.9	57.1	400.0	412.7	12	476.2	28.6	V7202350150SORF
16"	400	596.9	410.5	36.5	63.5	457.2	469.9	16	539.7	28.6	V7202400150SORF
18"	450	635.0	461.8	39.7	68.3	504.8	533.4	16	577.8	31.7	V7202450150SORF
20"	500	698.5	513.1	42.9	73.0	558.8	584.2	20	635.0	31.7	V7202500150SORF
24"	600	812.8	615.9	47.6	82.5	663.6	692.1	20	749.3	34.9	V7202600150SORF



# • Threaded Titanium Fittings



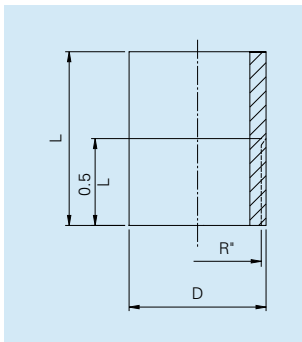
## Coupling R-201

Psc 10395

NB	DN	L	OD	Art.no
1/4"	8	25	18.5	V8502008M
3/8"	10	26	21.3	V8502010M
1/2"	15	34	26.5	V8502015M
3/4"	20	36	32.5	V8502020M
1"	25	43	39.5	V8502025M
1 1/4"	32	48	48.3	V8502032M
1 1/2"	40	48	55.5	V8502040M
2"	50	56	68.0	V8502050M

Standard grade =  
Titanium Gr2.

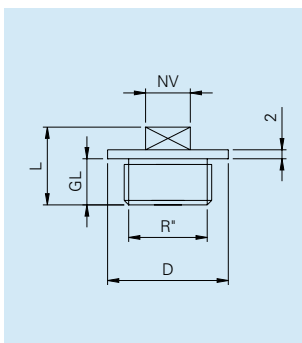
NPT threaded pipe fittings  
manufactured on request.  
Art.no 8602XXXX



## Welding Nipple R-208

Psc 10396

NB	DN	L	Pipe din. ANSI	Art.no
1/4"	8	25	13.7 x 2.24	V8502008N
3/8"	10	26	17.1 x 2.31	V8502010N
1/2"	15	34	21.3 x 2.77	V8502015N
3/4"	20	36	26.9 x 2.87	V8502020N
1"	25	43	33.4 x 3.38	V8502025N
1 1/4"	32	48	42.2 x 3.56	V8502032N
1 1/2"	40	48	48.3 x 3.68	V8502040N
2"	50	56	60.3 x 3.91	V8502050N



## Square-head Plug R-237

Psc 10397

NB	DN	L	GL	NV	OD	Art.no
1/4"	8	18	10	9	18.5	V8502008P
3/8"	10	19	11	10	21.3	V8502010P
1/2"	15	23	14	11	26.5	V8502015P
3/4"	20	25	14	16	32.5	V8502020P
1"	25	27	14	20	39.5	V8502025P
1 1/4"	32	33	19	22	48.3	V8502032P
1 1/2"	40	35	20	25	55.5	V8502040P
2"	50	36	21	30	68.0	V8502050P

## ● Fasteners and Wire in Titanium

### Fasteners

**Bolt**, metric in accordance with DIN 931, 933 ASTM B 348 Gr 2 ..... M5 - M12

**Nut**, metric in accordance with DIN 934 ASTM B 348 Gr 2 ..... M5 - M24

**Washer**, metric in accordance with DIN 125 ASTM B 265 Gr 2 ..... M5 - M24

**Threaded rod**, metric in accordance with DIN 975 ASTM B 348 Gr 2 ..... M6 - M24

**Bolt**, inches, ASTM B 348 Gr 2 ..... 1/4" - 1/2"

**Nut**, inches, ASTM B 348 Gr 2 ..... 1/4" - 1/2"

**Wascher**, inches, ASTM B 265 Gr 2 ..... 1/4" - 1/2"

### Wire ASTM B 348 Coil

Dimension	Gr 1	Art.no *
0.5		V21xx005
1.2	x	V21xx012
2.0	x	V21xx020
3.0	x	V21xx030
4.0	x	V21xx040

### Wire AWS A 5.16 Erti Bobin

Dimension	Gr 1	Art.no *
0.5	x	V22xx005
0.8	x	V22xx008
1.0	x	V22xx010
1.2	x	V22xx012
1.5	x	V22xx015
1.6	x	V22xx016
2.0	x	V22xx020

### Wire AWS A 5.16 Erti 1 Aligned Lengths

Dimension	Gr 1	Gr 2	Art.no *
1.5	x	x	V20xx015
2.0	x	x	V20xx020
2.4	x	x	V20xx024
3.0	x	x	V20xx030
3.6			V20xx036
4.0	x	x	V20xx040

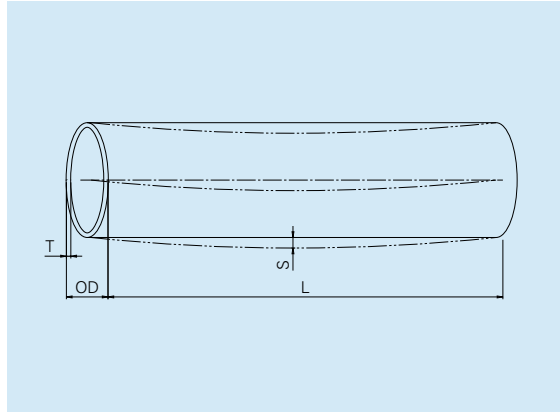
\* xx = type of Grade, e.g. Gr2 = 02

# • Dimensions and tolerances for titanium pipe and fittings

Ti 86100 Type testing no. 6830

## Tolerances for angles and planes

DN	α-mm		
	Elbow	Tee	β-mm
<100	1.6	1.6	0.8
125	3.2	3.2	1.6
150	3.2	3.2	1.6
200	3.2	3.2	3.2
250	3.2	4.8	2.4
300	4.8	4.8	2.4
350	4.8	6.4	2.4
400	4.8	6.4	2.4
500	6.4	9.6	3.2
600	9.5	9.6	3.2



## Material Thickness T

maximum  $\pm 12\%$   
straightness =  
max 3 mm/1000 mm

## Cylindricity

OD max. - OD min.  
- max. 1% OD nom.

## Outer Diameter OD

OD < 50  $\pm 0.5$  mm  
OD > 50  $\pm 1\%$

## Edge Displacement

Round joint, RJ  
 $T \leq 5$  mm 0.5T max. 1 mm  
 $T < 5$  mm 0.05 (t-5) + 1 mm

## Dimensions

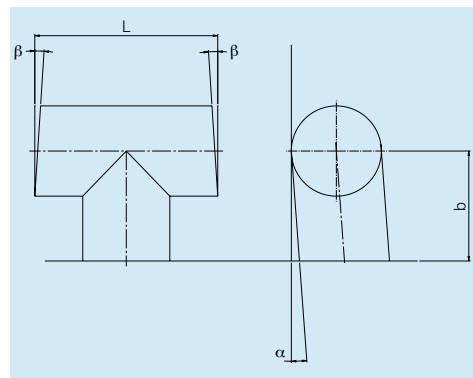
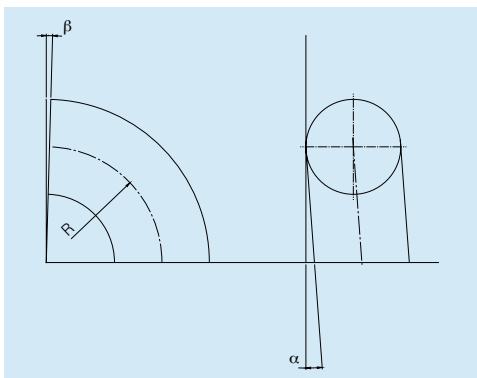
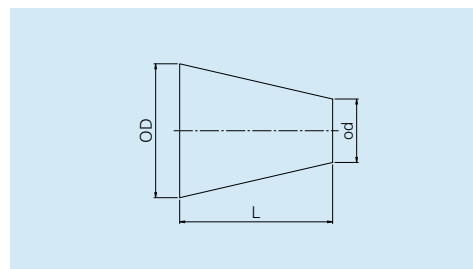
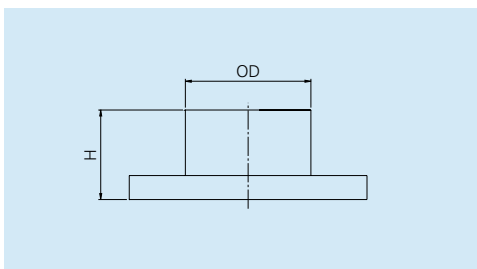
Applicable dimensions are specified in the product data sheets.

Diameter tolerances (OD, ID) shall correspond with ISO 1127, OD ( $\pm 2\%$  or minimum  $\pm 1.0$  mm) at weld end (+1% or minimum +0.5 mm).

Material thickness tolerances shall correspond with ISO 1127 -0.4 and +1.5.

Deviation from theoretical inner diameter  $\pm 1\%$ .

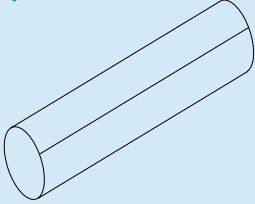
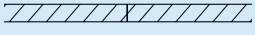

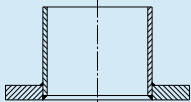
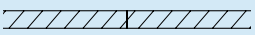
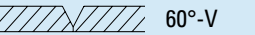
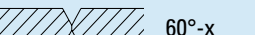


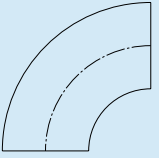
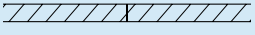

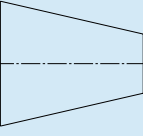
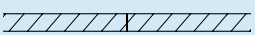

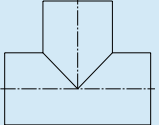
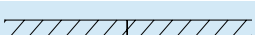

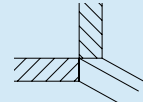
For dimension tolerances (H, b, L, R) refer to appropriate product data sheet.



# ● Welding methods/types of joints for titanium pipe and fittings, ID/ISO and ANSI

Ti 86100 Type testing no. 6830

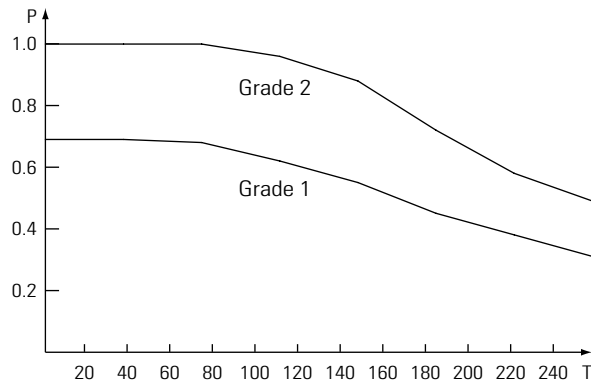
Filler material in accordance with AWS ERT i-1.  
Welded joint strength,  $Z = 0.7$

Product	Thickness	Joint Type	Welding Method
<b>Pipe</b> 	1.5 - 3		Automatic TIG/GTAW (without filler)
	4 - 8		Automatic PLASMA/PAW (with filler)
<b>Stub ends</b> 	1.5 - 3		Manual TIG/GTAW
	4 - 8	 60°-V	
	10 - 15	 60°-x	
	-	ID  ISO 	
<b>Elbow</b> 	1.5 - 2		Manual TIG/GTAW
	3 - 6	 60°-V	
<b>Reducers</b> 	1.5 - 2		Manual TIG/GTAW
	3 - 6	 60°-V	
<b>Tees</b> 	1.5 - 3		Automatic TIG/GTAW
	4 - 8		Automatic PLASMA/PAW
			Manual TIG/GTAW

# Diagrams

Type testing no. 6830/Psc 1000

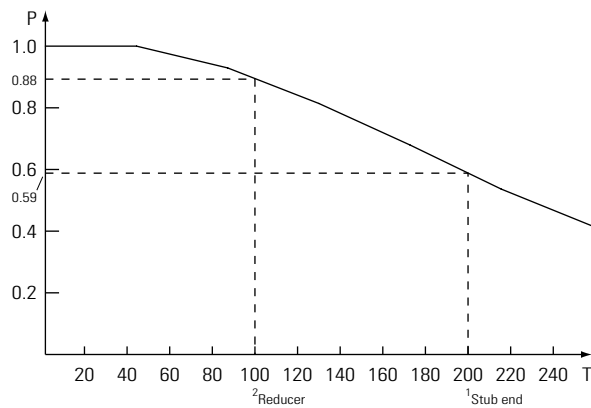
P = f(T)		
T °C	Grade 1	Grade 2
-40	0.69	1.0
20	0.69	1.0
50	0.68	1.0
75	0.62	0.96
100	0.55	0.88
150	0.45	0.72
200	0.38	0.58
250	0.31	0.49



P = f(T)

## Example:

T °C	P = (T)
-40	1.0
50	1.0
75	0.96
100	0.88
150	0.72
200	0.58
250	0.49



### Valid for:

- Stub ends, ID and ISO dimensions.
- Tee with welded straight branch connection, ID and ISO dimensions.
- Reducers (concentric) with fillet, ID and ISO dimensions.
- Elbows, type D + 100, ID dimensions; Standard 3D, ISO dimensions.
- Automatically welded titanium pipes, ID and ISO dimensions.

**Example 1:** A stub end with fillet, PN 10, ID dimensions, is to be dimensioned for an operating temperature of 200°C. Reference pressure for the fitting is 10 bar. Draw a line from the stated temperature to the curve and the figure on the P-axis is 0.59. Allowed pressure level:  $0.59 \times 10 = 5.9$  bar.

**Example 2:** A reducer with an OD of 76.1 x 60.3, 3 x 2, ISO dimensions, is to be dimensioned for an operating temperature of 100°C. According to the product data sheet the maximum pressure must not exceed 39.9 bar. Draw a line from the stated temperature to the curve and the figure on the P-axis is 0.88. Allowed pressure level:  $0.88 \times 39.9 = 35.1$  bar.

## ● Titanium pipe – welded or seamless

Dimensions acc. to The American National Standards Institute (ANSI B 36.19)  
Manufactured and certified acc. to ASTM B 861 or 862 Grade 2.  
Schedule 5-10-40-80-160 XL

Nominal diameter (NB)	Outside diameter	Wall thickness and Weight															
		Schedule 5 s			Schedule 10 s			Schedule 40			Schedule 80			Schedule 160			XL
		tum	mm	kg/m	tum	mm	kg/m	tum	mm	kg/m	tum	mm	kg/m	tum	mm	kg/m	
1/8	10.3	-	-	-	0.049	1.24	0.16	0.068	1.73	0.21	0.095	2.41	0.27	-	-	-	-
1/4	13.7	-	-	-	0.065	1.65	0.28	0.088	2.24	0.37	0.119	3.02	0.46	-	-	-	-
3/8	17.1	-	-	-	0.065	1.65	0.37	0.091	2.31	0.49	0.126	3.20	0.64	-	-	-	-
1/2	21.3	0.065	1.65	0.46	0.083	2.11	0.58	0.109	2.77	0.73	0.147	3.73	0.94	-	-	-	-
3/4	26.7	0.065	1.65	0.60	0.083	2.11	0.74	0.113	2.87	0.98	0.154	3.91	1.27	-	-	-	1.42
1	33.4	0.065	1.65	0.77	0.109	2.77	1.21	0.133	3.38	1.45	0.179	4.55	1.87	-	-	-	1.42
1 1/4	42.2	0.065	1.65	0.96	0.109	2.77	1.56	0.140	3.56	1.96	0.191	4.85	2.59	-	-	-	1.42
1 1/2	48.3	0.065	1.65	1.10	0.109	2.77	1.80	0.145	3.68	2.34	0.200	5.08	3.13	0.281	7.14	4.20	1.42
2	60.3	0.065	1.65	1.39	0.109	2.77	2.28	0.154	3.91	3.15	0.218	5.54	4.33	0.343	8.71	6.44	1.42
2 1/2	73.0	0.083	2.11	2.14	0.120	3.05	3.05	0.203	5.16	5.00	0.276	7.01	6.61	0.375	9.52	8.64	1.88
3	88.9	0.083	2.11	2.62	0.120	3.05	3.74	0.216	5.49	6.53	0.300	7.62	8.85	0.438	11.13	12.36	1.88
3 1/2	101.6	0.083	2.11	3.00	0.120	3.05	4.27	0.226	5.74	7.86	0.318	8.08	10.80	-	-	-	-
4	114.3	0.083	2.11	3.38	0.120	3.05	4.84	0.237	6.02	9.30	0.337	8.56	12.93	0.531	13.49	19.35	1.88
5	141.3	0.109	2.77	5.49	0.134	3.40	6.70	0.258	6.55	12.62	0.375	9.52	17.93	0.625	15.88	28.44	-
6	168.3	0.109	2.77	7.60	0.134	3.40	8.02	0.280	7.11	16.38	0.432	10.97	24.66	0.781	19.84	39.14	2.18
8	219.1	0.109	2.77	8.57	0.148	3.76	11.56	0.322	8.18	24.64	0.500	12.70	37.45	-	-	-	-
10	273.0	0.134	3.40	13.15	0.165	4.19	16.10	0.365	9.27	34.94	0.500	12.70	47.23	-	-	-	-
12	323.9	0.156	3.96	19.18	0.180	4.57	20.85	0.375	9.52	42.77	0.500	12.70	56.50	-	-	-	-
14	355.6	0.156	3.96	19.90	0.188	4.78	23.90	0.375	13.35	47.10	-	-	-	-	-	-	-
16	406.4	0.165	4.19	24.10	0.188	4.78	27.40	0.375	17.40	53.10	-	-	-	-	-	-	-
18	457.2	0.165	4.19	27.13	0.188	4.78	30.50	0.375	23.10	61.00	-	-	-	-	-	-	-

## ● Permascand – Fabricated Equipment

Permascand fabricates customised products in titanium, where corrosion resistance and high strength/low weight ratio is crucial.

We provide designs and manufactured solutions in titanium, especially:

- prefabricated piping systems (for marine exhaust systems)
- piping for firefighting systems and process industry
- pressure vessels
- nitrided hydraulic piston rods

Permascand's manufacturing solutions include cold and hot forming, laser, plasma-, and TIG welding, nitriding of titanium, assembling and testing of a range of alloyed and unalloyed products. Our customers operate within offshore, marine, process and defence industries.

In addition we offer design work and finite element analysis calculation (FEA) of:

- load bearing structures to subsea vehicles
- pressure vessels with external or internal pressures







## Electrochemical systems

Permascand offers an extensive range of anode and cathode models with various types of catalyst coatings suited to a variety of electrochemical processes.

For many years, we have played an important role as maintenance workshop and manufacturer of electrochemical monopolar/bipolar cells for chlorate production and membrane cells for chlorine production.

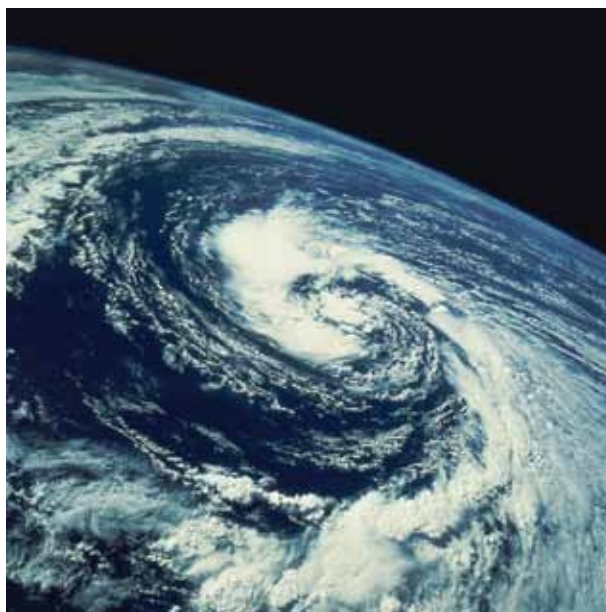
## Titanium Business

With experience in titanium products reaching up to 10,000 metre heights and down to 3,000 metre depths, Permascand meets the highest demands for material strength, weight and resistance.

We have developed a very high level of know-how, and apply our expertise to serve customers in the offshore, marine, process and defence industries in Scandinavia, Europe and worldwide.

Starting from a problem or a need, we design customized solutions based on structural analysis. Permascand has the resources needed for complete project management, from research, development and planning to prototype evaluation and manufacturing.


Permascand has the largest stock of titanium material in the Nordic countries, and possesses invaluable knowledge about the material, its potential and its areas of application.



Certified according to:



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