



# KLINGER

## TECHNICAL MANUAL

General installation  
& standards



# TECHNICAL MANUAL

## General installation instructions for valves and fittings

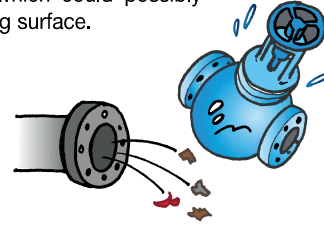
### 1. Storage

Before installation, please store the valves and fittings in a dry place to protect them from harsh weather conditions, wind and sand. Please leave the goods in their original packing and do not remove the flange or end protections. Please handle the products with care. Do not drop or drag them on the floor.



### 2. Cleaning of pipes

Before installing the valves and fittings on the pipes, please clean the pipes with water or compressed air. Please check for welding spatters or metal chips which could possibly damage the valves' sealing surface.



### 3. Deviations of pipes

Before installing the valves and fittings, please check the pipe dimensions with the equipment already in place. Please also verify the correct alignment of the upstream and downstream pipes. Do not count on the valves and fittings to make up for pipe deviations.

This might result in sealing leakages, blockages or mechanical ruptures.



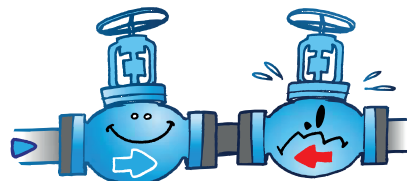
### 4. Expansion joints

For pipes carrying heat transfer fluids, please anticipate the compensation of dilatations with the help of adapted equipment (loops and/or expansion joints). Their absence may lead to mechanical ruptures and a blocking of the valves.



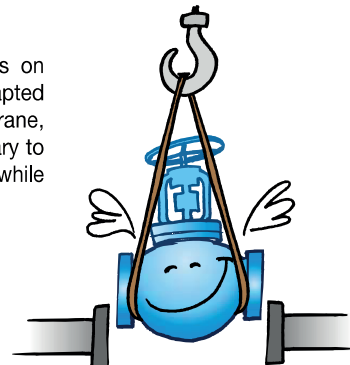
### 5. Mounting direction

A certain number of devices do not necessarily have a symmetrical functioning. It is essential to comply with the mounting direction indicated by the engraved or stamped arrow on the body and adapt it to the direction of the fluid flow.



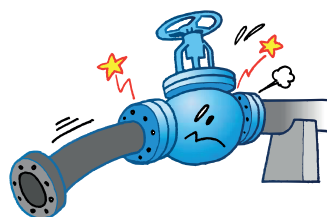
### 6. Slings

When installing the valves on the pipes, please use adapted lifting devices (bridge crane, forklift, hoist). It is necessary to align the valve correctly while installing it.



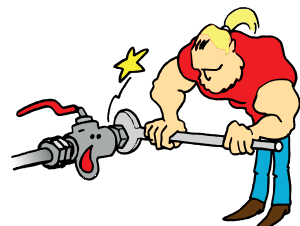
### 7. Support

For valves representing a significant weight in comparison with the pipes' solidity, it is essential to provide an additional support independently from the pipes. Likewise, the valves cannot serve as support for pipes since they have to be supported themselves. The failure to respect these rules can lead to leakages, blockages and breakages.



### 8. Tightening

For threaded and flanged valves and fittings, please use a suitable tightening torque. Insufficient tightening can result in leakages. Overtightening can lead to blocking the valve or mechanical ruptures. The coupling torques are indicated on every product manual.



## SUMMARY OF INSPECTION DOCUMENTS acc. to EN 10204:2004

EN10204 reference	Designation of the document type	Document content	Document validated by
Type 2.1	Declaration of compliance with the order	Statement of compliance with the order	The manufacturer
Type 2.2	Test report	Statement of compliance with the order, with indication of results in non-specific inspection	The manufacturer
Type 3.1	Inspection certificate 3.1	Statement of compliance with the order, with indication of results of specific inspection	The manufacturer's authorized inspection representative independent of the manufacturing department
Type 3.2	Inspection certificate 3.2	Statement of compliance with the order, with indication of results of specific inspection	The manufacturer's authorized inspection representative independent of the manufacturing department and either the purchaser's authorized inspection representative or the inspector designated by the official regulations





# FOREWARD ON THE NEW PRESSURE EQUIPMENT DIRECTIVE (2014/68/EU)

On May 15th, 2014, the new Pressure Equipment Directive (PED) has been adopted by the European Parliament and the Council of the European Union. This recast of the former 97 /23/EC Directive is meant to be transferred and enforced in 2 steps:

**June 1 st, 2015:** Start of application of the Art. 13 of the new PED, introducing a new determination of fluid groups acc.to the Classification, Labelling and Packaging (CLP) Regulation (EG 1272/2008). This article replaces the Art. 9 of the 97 /23/EC Directive.

**July 19'h, 2016:** Start of full application of the new 2014/68/EU Directive.

Some essentials of the former PED remain unchanged such as the scope, the "Essential Safety Requirements" (Annex I), the "Conformity Assessment Tables" (Annex II), and the CE marking requirements.

However, concerning changes, in addition to the classification of fluids, the new PED defines the obligations and responsibilities of importers (Art.8) and distributors (Art. 9), and it reevaluates four of the conformity assessment modules (Annex III) as follows:

97/23/EC	A1	B1	B	C1
2014/68/EU	A2	B(design type)	B(Production type)	C2

It is also quite noticeable that the Art. 3, §3 of the 97 /23/EC Directive, defining the exclusions of the PED's Technical Requirements, becomes the Art. 4, §3 under the 2014/68/EU Directive.

Finally, the Article 48, §3 of the new PED establishes that "certificates and decisions issued by conformity assessment bodies under Directive 97 /23/EC shall be valid under this Directive," therefore all the certificates issued under the former PED by our manufacturers remain valid until their renewal. We decided to present a summary of the 2014/68/EU Directive. The references to the PED corresponding to each item are related to the certifications valid on the date of issue of this catalogue.

## PED - Pressure Equipment Directive (2014/68/EU)

The PED applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure (PS) greater than 0,5 bar such as: vessels, pressurised storage containers, heat exchangers, steam generators, boilers, industrial pipes, safety devices, pressure accessories, valves and fittings.

### Equipment excluded from the PED (CE marking prohibited) :

Equipment with PS< 0,5 bar (Art. 1 §1)  
Valves and fittings < DN32 (Art. 4 §3)

DN: Nominal size  
PS: Maximum allowable pressure  
TS: Maximum/minimum allowable temperature

## 2 - CLASSIFICATION & FLUID GROUPS

The PED applies to the design, manufacture and conformity assessment of pressure equipment and assemblies with a maximum allowable pressure (PS) greater than 0,5 bar such as: vessels, pressurised storage containers, heat exchangers, steam generators, boilers, industrial pipes, safety devices, pressure accessories, valves and fittings.

Group 1 - Hazardous fluids		Group 2 - Non hazardous fluids	
explosive, extremely flammable, highly flammable, flammable (max allowable temp. above flashpoint), pyrophoric, very toxic, toxic, oxidizing		other fluids not referred to in Group 1	
Liquids ex. Fuel	Gases ex. Gas	Liquids ex. Water	Gases ex. Saturated steam

## 3 - RISK CATEGORIES (Annex)

Risk category IV only applies for safety devices.

3/1 - Dangerous gasses (Group1), example: Natural Gas (Annex II, tales 6)

Class	PN	DN															
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400
2,5																	
6																	
10																	
16																	
150																	
25																	
40	A4 §3																
300																	
63																	
100																	
600																	
1500																	
2500																	

3/2 - Other gasses (Group 2), example: Air (Annex II, table 7)

Class	PN	DN																	
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500
2,5																			
6																			
10																			
16																			
150																			
25																			
40	A4 §3																		
300																			
63																			
100																			
600																			
1500																			
2500																			

3/3 - Dangerous liquieds (Group1), example: Fuel (Annex II, tales 8)

Class	PN	DN																	
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500
2,5																			
6																			
10																			
16																			
150																			
25																			
40	A4 §3																		
300																			
63																			
100																			
600																			
1500																			
2500																			
>500bar																			

3/4 - Other liquids (Group 2), example: Water (Annex II, table 9)

Class	PN	DN																	
		15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500
2,5																			
6																			
10																			
16																			
150																			
25																			
40	A4 §3																		
300																			
63																			
100																			
600																			
1500																			
2500																			
>500bar																			

## 4 - CONFORMIT ASSESSMENT PROCEDURES (Art. 4 + Annex III)

Risk category IV only applies for safety devices.

	Without Quality Assurance		With Quality Assurance	
	type	unit	type	unit
Category I	Module A Internal production control (self certification)		-	
Category II	Module A2 Internal manufacturing control & Random checks + monitoring of final assesment by NB		Module D1 Production process QA by NB	Module E1 Final product inspection QA by NB
Category III	Module B (design type) + C2 EU design-examination + conformity to type by NB & Random checks	Module B (design type) + F EU design-examination + product verification by NB	Module B (production type) + E EU type-examination + product QA by NB	Module H Full QA = Quality system assesment & surveillance by NB
			Module B(design type) + D EU design-examination + production process QA by NB	
Category IV	Module B (production type) + F EU type-examination + product verification by NB	Module G EU unit verification by NB	Module B (production type) + D EU type-examination + production process QA by NB	Module H1 Full QA + design-examination + special surveillance of final assesment by NB



# ATEX DIRECTIVE (2014/34/EU)

Directive on equipment and protective systems intended for use in potentially explosive atmospheres.

## 1 - AREA CLASSIFICATION

Gases	Dusts	Defination of zone
0	20	areas where an explosive atmosphere is expected to exist continuously or for long periods of time or more than 1000 hours per year
1	21	areas where an explosive atmosphere is expected to exist for short periods of time or less than 1000 hours per year
2	22	areas where an explosive atmosphere is not expected and if released, it will only exist for a very short period of time and less than 10 hours per

## 2. ATEX marking - Example & Explanation

II	2	G	Eex	ia	IIC	T6	IP6X																								
<p>IP6x - see table <a href="#">Ingress protection rating for dust group.</a></p> <p>"T6" Max. Surface temperature class</p> <table border="1"> <tr> <td>Gas group</td> <td>T1 450°C</td> <td>Dust group</td> <td>"T 300°C" The max. Surface temperature indicated on the material must be below the ignition temperature (dust layer &lt;5mm). In case of dust cloud, it must not exceed 2/3 of ignition temperature.</td> </tr> <tr> <td></td> <td>T2 300°C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>T3 200°C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>T4 1350°C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>T5 100°C</td> <td></td> <td></td> </tr> <tr> <td></td> <td>T6 85°C</td> <td></td> <td></td> </tr> </table> <p>I Methane(Mining)  <b>"IIC" Explosion group (gas group)</b>            IIA less easily ignited such as propan            IIB easily ignited such as Ethylene            IIC most easily ignited such as Hydrogen &amp; Acetylene  <b>d</b> Flameproof pressure-resistant encapsulation  <b>e</b> Increased safety  <b>i</b> Intrinsic safety: "ia" for zone 0 / "ib" sufficient for zone 1 / "ic" sufficient for zone 2  <b>m</b> Encapsulated: "ma" for zone 0 / "mb" sufficient for zone 1/ "mc" sufficient for zone 2  <b>o</b> Oil immersion  <b>q</b> Powder filling  <b>p</b> Pressurised enclosure  <b>n</b> Protection mode: "nA" non sparking/"nC" Enclosure break/"nR" Restricted /"nL" Limited energy</p> <p><b>"Eex" Explosion protection</b>  <b>G</b> Gas Group  <b>D</b> Dust Group</p> <p><b>"G" Enviroment</b>  <b>1</b> Category 1 - Equipment that is intended for use in zone 0 or 20  <b>2</b> Category 2 - Equipment that is intended for use in zone 1 or 21  <b>3</b> Category 3 - Equipment that is intended for use in zone 2 or 22</p> <p><b>"2" Equipment Category:</b>  <b>M1</b> Mining  <b>M2</b> Mining</p> <p><b>"II" equipment Group</b>            I Mining - Category M1 and M2            II All other places - category 1, Category 2 &amp; Category 3</p> <p>Marking for explosion protection</p>								Gas group	T1 450°C	Dust group	"T 300°C" The max. Surface temperature indicated on the material must be below the ignition temperature (dust layer <5mm). In case of dust cloud, it must not exceed 2/3 of ignition temperature.		T2 300°C				T3 200°C				T4 1350°C				T5 100°C				T6 85°C		
Gas group	T1 450°C	Dust group	"T 300°C" The max. Surface temperature indicated on the material must be below the ignition temperature (dust layer <5mm). In case of dust cloud, it must not exceed 2/3 of ignition temperature.																												
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	T3 200°C																														
	T4 1350°C																														
	T5 100°C																														
	T6 85°C																														

## INGRESS PROTECTION RATING (IP code)

Degree of protection provided by the product enclosure; marked on the product in form of an "IP" code.

First digit: Solid particle protection	Second digit: Liquid ingress protection
4 Element $\geq 1$ mm	0 Not protected
5 Dust protected	1 Protected against vertical dripping water
6 Dust tight	2 Protected against dripping water up to 15° from vertical
	3 Protected against spraying water & rain up to 60° from
	4 Protected against splashing water from all directions
	5 Protected against water jets
	6 Protected against heavy seas & high pressure water jets
	7 Protected against the effects of immersion inferior of 1m
	8 Protected against the effects of immersion superior of 1m

Example: IP54: Dust protected and Protected against splashing water from all directions

# SIL - SAFETY INTEGRITY LEVEL CERTIFICATION (IEC EN 61508)

The international Electrotechnical Commission defines the different SIL levels for electric and electronic devices as follows

For low demand operation:

PDF (Probability of Failure on Demand) and RRF (Risk Reduction Factor)

For continius operation:

PFH (Probablility of Failure per Hour) and RRF (Risk Reduction Factor)

SIL	PDF	RRF
1	0,1-0,01	$10^{-1} - 10^{-2}$ 10-100
2	0,01-0,001	$10^{-2} - 10^{-3}$ 100-1.000
3	0,001-0,0001	$10^{-3} - 10^{-4}$ 1.000-10.000
4	0,0001-0,00001	$10^{-4} - 10^{-5}$ 10.000-100.000

SIL	PFH	RRF
1	0,00001-0,000001	$10^{-5} - 10^{-6}$ 100.000-1.000.000
2	0,000001-0,0000001	$10^{-6} - 10^{-7}$ 1.000.000-10.000.000
3	0,0000001-0,00000001	$10^{-7} - 10^{-8}$ 10000000-100.000.000
4	0,00000001-0,000000001	$10^{-8} - 10^{-9}$ 100.000.000-1.000.000.000

## PRESSURE RATINGS

Standard	Pressure*									
Max. allowable pressure	20bar	50bar	63bar	69bar	100bar	138bar	150bar	207bar	250bar	420bar
ISO	PN20	PN50	PN63	-	PN100	-	PN150	-	PN250	PN420
ANSI B16.34	150lbs	300lbs	-	400lbs	600lbs	-	900lbs	-	1500lbs	2500lbs
API602(forged)	-	-	-	-	-	800lbs	-	-	1500lbs	-
API 6A / CWP (Cold Water Pressure)	-	-	-	API 1000	API 1500	API 2000	-	API I3000	-	API 6000
WOG (Water Oil Gas)	-	-	-	1000psi	1500psi	2000psi	-	3000psi	-	6000psi

\*Check Pressure/temperature relation for the actual valve



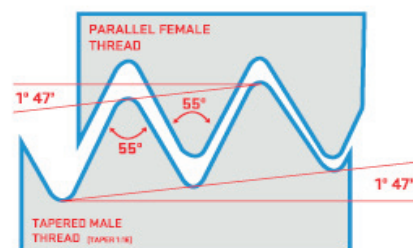


# STEAM TABLE

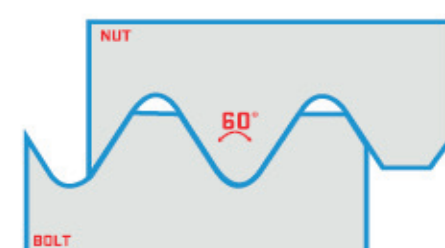
Steam pressure barg	Steam temperatur °C	Spec. volumen m³/kg	Steam density kg/m³	Enthalpy Water (Sensible heat) kJ/kg	Enthalpy Steam (Latent heat) kJ/kg	Total heat kJ/kg
-0,9	45,8	14,67	0,07	191,81	2393,0	2584,8
-0,8	65,0	6,21	0,16	271,99	2346,4	2618,4
-0,3	90,0	2,37	0,42	376,78	2283,3	2660,1
0,0	99,6	1,69	0,59	417,53	2257,9	2675,4
0,1	102,3	1,54	0,64	428,86	2250,7	2679,6
0,2	104,8	1,42	0,70	439,39	2244,0	2683,4
0,3	107,1	1,32	0,75	449,20	2237,7	2686,9
0,4	109,3	1,23	0,80	458,43	2231,8	2690,2
0,5	111,4	1,15	0,86	467,14	2226,2	2693,3
0,6	113,3	1,09	0,91	475,38	2220,8	2696,2
0,8	116,9	0,97	1,00	490,70	2210,8	2701,5
1,0	120,2	0,88	1,12	504,69	2201,6	2706,3
1,2	123,3	0,80	1,23	517,61	2193,0	2710,6
1,4	126,1	0,74	1,33	529,62	2184,9	2714,5
1,6	128,7	0,69	1,44	540,85	2177,3	2718,2
1,8	131,2	0,64	1,54	551,41	2170,1	2721,5
2,0	133,5	0,60	1,65	561,40	2163,3	2724,7
2,2	135,4	0,57	1,75	570,87	2156,7	2727,6
2,4	137,9	0,53	1,85	579,88	2150,5	2730,4
2,6	139,9	0,51	1,95	588,48	2144,4	2732,9
2,8	141,8	0,48	2,06	596,72	2138,6	2735,3
3,0	143,6	0,46	2,16	604,63	2133,0	2737,6
3,4	147,1	0,42	2,36	619,55	2122,4	2742,0
3,8	150,3	0,38	2,56	633,46	2112,3	2745,8
4,0	151,8	0,37	2,66	640,08	2107,5	2747,6
4,5	155,5	0,34	2,91	655,77	2096,0	2751,8
5,0	158,8	0,31	3,16	670,39	2085,1	2755,5
5,5	162,0	0,29	3,41	684,11	2074,8	2758,9
6,0	164,9	0,27	3,66	697,05	2065,0	2762,1
6,5	167,8	0,25	3,91	709,29	2055,6	2764,9
7,0	170,4	0,24	4,16	720,93	2046,5	2767,4
7,5	172,9	0,22	4,40	732,04	2037,9	2769,9
8,0	175,4	0,21	4,65	742,66	2029,5	2772,2
8,5	177,7	0,20	4,9	752,84	2021,4	2774,2
9,0	179,9	0,19	5,14	762,63	2013,5	2776,1
10,0	184,1	0,17	5,63	781,16	1998,5	2779,7
11,0	188,0	0,16	6,12	798,47	1984,2	2782,7
12,0	191,6	0,15	6,61	814,74	1970,6	2785,3
13,0	195,0	0,14	7,10	830,12	1957,6	2787,7
14,0	198,3	0,13	7,59	844,71	1945,1	2789,9
15,0	201,4	0,12	8,08	858,61	1933,1	2791,7
16,0	204,3	0,11	8,57	871,89	1921,4	2793,3
17,0	207,1	0,11	9,06	884,61	1910,2	2794,8
18,0	209,8	0,10	9,56	896,84	1899,2	2796,0
19,0	212,4	0,09	10,04	908,62	1888,6	2797,2
20,0	214,9	0,09	10,53	919,98	1878,2	2798,2
21,0	217,3	0,09	11,03	930,97	1868,0	2799,0
23,0	221,8	0,08	12,02	951,93	1848,5	2800,4
25,0	226,0	0,07	13,01	971,71	1829,7	2801,4
27,0	230,1	0,07	14,00	990,46	1811,6	2802,1
29,0	233,8	0,06	15,01	1008,33	1794,0	2802,3
31,0	237,4	0,06	16,02	1025,42	1777,0	2802,3
33,0	240,9	0,05	17,02	1041,79	1760,5	2802,3
35,0	244,2	0,05	18,04	1057,55	1744,3	2801,7
37,0	247,3	0,05	19,06	1072,73	1728,5	2801,1
39,0	250,3	0,04	20,10	1087,40	1713,1	2800,3
41,0	253,2	0,04	21,13	1101,61	1697,9	2799,4
43,0	256,1	0,04	22,18	1115,39	1683,0	2798,3
45,0	258,7	0,04	22,57	1128,78	1668,4	2797,1

# THREADED CONNECTION STANDARDS (other threads exists)

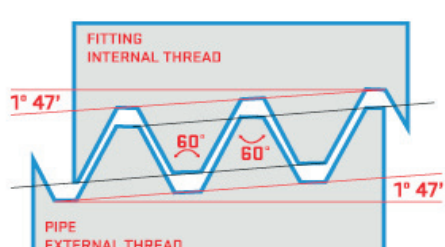
## Whitworth Thread

ISO 228 (DIN 259)	BSPP
ISO7(DIN 2999 replaced by EN10226)	BSPT
	
<p>BSPP: Parallel thread male and female (G)</p> <p>BSPT: Tapered male (R) Tapered female (Rc) Parallel female (Rp) Flank angle 55°</p>	

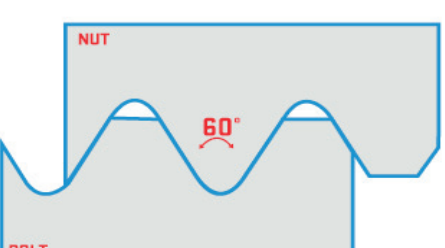
## UNC/UNF - Unified National Thread

ANSI B1.1	UNC - Coarse thread
ANSI B1.1	UNF - Fine thread
	
<p>Male and female both parallel. Flank angle 60°</p>	

## NPT Pipe Thread

ANSI B1.20.1	NPT
ANSI B1.20.3	NPTF
	
<p>NPT: Tapered male and female. Flank angle 60°</p>	

## M - ISO Thread (Metric)

ISO 724 (DIN 13-1)	Coarse thread
ISO 724 (DIN 13-2 to 11)	Fine thread
	
<p>Male and female both parallel. Flank angle 60°</p>	

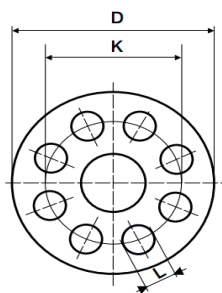
# FLANGES DIMENSIONS

**EN1092-1 flanges**

DN	PN6					PN10					PN16					PN25				
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws		Dimensions			Screws	
	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø
10	75	50	11,5	4	M10	90	60	14	4	M12	90	60	14	4	M12	90	60	14	4	M12
15	80	55	11,5	4	M10	95	65	14	4	M12	95	65	14	4	M12	95	65	14	4	M12
20	90	65	11,5	4	M10	105	75	14	4	M12	105	75	14	4	M12	105	75	14	4	M12
25	100	75	11,5	4	M10	115	85	14	4	M12	115	85	14	4	M12	115	85	14	4	M12
32	120	90	14	4	M12	140	100	18	4	M16	140	100	18	4	M16	140	100	18	4	M16
40	130	100	14	4	M12	150	110	18	4	M16	150	110	18	4	M16	150	110	18	4	M16
50	140	110	14	4	M12	165	125	18	4	M16	165	125	18	4	M16	165	125	18	4	M16
65	160	130	14	4	M12	185	145	18	4	M16	185	145	18	4	M16	185	145	18	8	M16
80	190	150	18	4	M16	200	160	18	8	M16	200	160	18	8	M16	200	160	18	8	M16
100	210	170	18	4	M16	220	180	18	8	M16	220	180	18	8	M16	235	190	22	8	M20
125	240	200	18	8	M16	250	210	18	8	M16	250	210	18	8	M16	270	220	26	8	M24
150	265	225	18	8	M16	285	240	22	8	M20	285	240	22	8	M20	300	250	26	8	M24
200	320	280	18	8	M16	340	295	22	8	M20	340	295	22	12	M20	360	310	26	12	M24
250	375	335	18	12	M16	395	350	22	12	M20	405	355	26	12	M24	425	370	30	12	M27
300	440	395	23	12	M20	445	400	22	12	M20	460	410	26	12	M24	485	430	30	16	M27
350	490	445	23	12	M20	505	460	22	16	M20	520	470	26	16	M24	555	490	33	16	M30
400	540	495	23	16	M20	565	515	26	16	M24	580	525	30	16	M27	620	550	36	16	M33
450	595	550	23	16	M20	615	565	26	20	M24	640	585	30	20	M27	670	600	36	20	M33
500	645	600	23	20	M20	670	620	26	20	M24	715	650	33	20	M30	730	660	36	20	M33
600	755	705	27	20	M24	780	725	30	20	M27	840	770	36	20	M33	845	770	39	20	M36
700	860	810	27	24	M24	895	840	30	24	M27	910	840	36	24	M33	960	875	42	24	M39
800	975	920	30	24	M27	1015	950	33	24	M30	1025	950	39	24	M36	1085	990	48	24	M45
900	1075	1020	30	24	M27	1115	1050	33	28	M30	1125	1050	39	28	M36	1185	1090	48	28	M45
1000	1175	1120	30	28	M27	1230	1160	36	28	M33	1255	1170	42	28	M39	1320	1210	56	28	M52

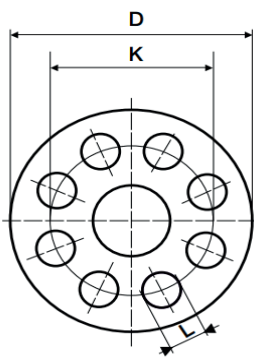
**EN1092-1 flanges**

DN	PN40					PN63					PN100					PN160					
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws		Dimensions			Screws		
	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø	
10	90	60	14	4	M12	100	70	14	4	M12	100	70	14	4	M12	100	70	14	4	M12	
15	95	65	14	4	M12	105	75	14	4	M12	105	75	14	4	M12	105	75	14	4	M12	
20	105	75	14	4	M12																
25	115	85	14	4	M12	140	100	18	4	M16	140	100	18	4	M16	140	100	18	4	M16	
32	140	100	18	4	M16	155	110	22	4	M20	155	110	22	4	M20						
40	150	110	18	4	M16	170	125	22	4	M20	170	125	22	4	M20	170	125	22	4	M20	
50	165	125	18	4	M16	180	135	22	4	M20	195	145	26	4	M24	195	145	26	4	M24	
65	185	145	18	8	M16	205	160	22	8	M20	220	170	26	8	M24	220	170	26	8	M24	
80	200	160	18	8	M16	215	170	22	8	M20	230	180	26	8	M24	230	180	26	8	M24	
100	235	190	22	8	M20	250	200	26	8	M24	265	210	30	8	M27	265	210	30	8	M27	
125	270	220	26	8	M24	295	240	30	8	M27	315	250	33	8	M30	315	250	33	8	M30	
150	300	250	26	8	M24	345	280	33	8	M30	355	290	33	12	M30	355	290	33	12	M30	
200	375	320	30	12	M27	415	345	36	12	M33	430	360	36	12	M33	430	360	36	12	M33	
250	450	385	33	12	M30	470	400	36	12	M33	505	430	39	12	M39	515	430	42	12	M39	
300	515	450	33	16	M30	530	460	36	16	M33	585	500	42	16	M39	585	500	42	16	M39	
350	580	510	36	16	M33	600	525	39	16	M36	655	560	48	16	M45						
400	660	585	39	16	M36	670	585	42	16	M42	715	585	48	16	M45						
450	685	610	39	20	M36																
500	755	670	42	20	M39	800	705	48	20	M45											
600	890	795	48	20	M45	930	820	56	20	M52											
700	995	900	48	24	M45	1045	935	56	24	M52											
800	1140	1030	56	24	M52	1165	1050	62	24	M56											
900	1250	1140	56	28	M52	1285	1170	62	28	M56											
1000	1360	1250	56	28	M52	1415	1290	70	28	M60											



**EN1092-1 flanges**

DN	PN250					PN320					PN400				
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws	
	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø
15	130	90	18	4		130	90	18	4		145	100	22	4	M20
25	150	105	22	4	M20	160	115	22	4	M20	180	130	26	4	M24
40	185	135	26	4	M24	195	145	26	4	M24	220	165	30	4	M27
50	200	150	26	8	M24	210	160	26	8	M24	235	180	30	8	M27
65	230	180	26	8	M24	255	200	30	8	M27	290	225	33	8	M30
80	255	200	30	8	M27	275	220	30	8	M27	305	240	33	8	M30
100	300	235	33	8	M30	335	265	36	8	M33	370	295	39	8	M36
125	340	275	33	12	M30	380	310	36	12	M33					
150	390	320	36	12	M33	425	350	39	12	M36					



**ANSI B16.5 flanges**

DN	150 lbs (PN20)					300 lbs (PN50)					600 lbs				
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws	
	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø
1/2*(15)	88,9	60,3	15,9	4		95	66,7	15,9	4		95,2	66,7	15,9	4	
3/4*(20)	98,4	69,8	15,9	4		118	82,5	19,0	4		117,5	82,5	19,0	4	
1*(25)	108	79,4	15,9	4		124	88,9	19,0	4		123,8	88,9	19,0	4	
1 1/4*(32)	118	88,9	15,9	4		133	98,4	19,0	4		133,4	98,4	19,0	4	
1 1/2*(40)	127	98,4	15,9	4		156	114,0	22,2	4		155,6	114,0	22,2	4	
2*(50)	152	120,6	19,0	4		165	127,0	19,0	8		165,1	127,0	19,0	8	
2 1/2*(65)	178	139,7	19,0	4		191	149,2	22,2	8		190,5	149,2	22,2	8	
3*(80)	191	152,4	19,0	4		210	168,3	22,2	8		209,6	168,3	22,2	8	
3 1/2*(90)	216	177,8	19,0	8		229	184,2	22,2	8		228,6	184,2	25,4	8	
4*(100)	229	190,5	19,0	8		254	200,0	22,2	8		273	215,9	25,4	8	
5*(125)	254	215,9	22,2	8		279	234,9	22,2	8		330,2	266,7	28,6	8	
6*(150)	279	241,3	22,2	8		318	269,9	22,2	12		355,6	292,1	28,6	12	
8*(200)	343	298,4	22,2	8		381	330,2	25,4	12		419	349,2	31,8	12	
10*(250)	406	362,0	25,4	12		445	387,4	28,6	16		508	431,8	34,9	16	
12*(300)	483	431,8	25,4	12		521	450,9	31,8	16		558,8	488,9	34,9	20	
14*(350)	534	476,2	28,6	12		584	514,4	31,8	20		603	527	38,1	20	
16*(400)	597	539,8	28,6	16		648	571,5	34,9	20		686	603,3	41,3	20	
18*(450)	635	577,9	31,8	16		711	628,7	34,9	24		743	654,1	44,5	20	
20*(500)	699	635,0	31,8	20		775	685,8	34,9	24		813	724	44,5	24	
24*(600)	813	749,3	31,8	20		914	812,8	41,3							



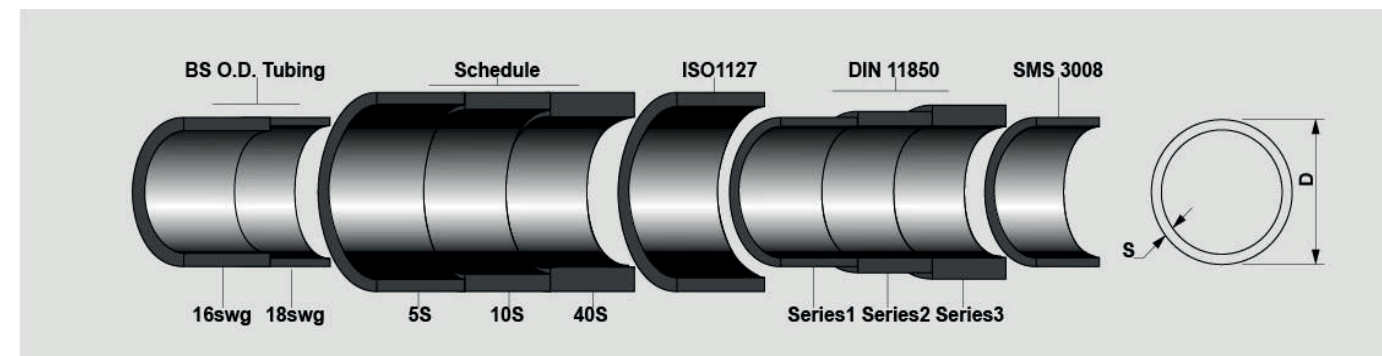
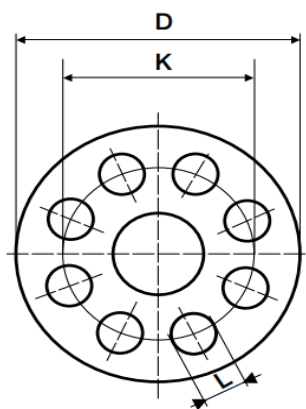
JIS B 2210

Dimensions in mm	JIS 5K					JIS 10K					JIS 16K				
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws	
	DN	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number
10	75	55	12	4	M10	90	65	15	4	M12	90	65	15	4	M12
15	80	60	12	4	M10	95	70	15	4	M12	95	70	15	4	M12
20	85	65	12	4	M10	100	75	15	4	M12	100	75	15	4	M12
25	95	75	12	4	M10	125	90	19	4	M16	125	90	19	4	M16
32	115	90	15	4	M12	135	100	19	4	M16	135	100	19	4	M16
40	120	95	15	4	M12	140	105	19	4	M16	140	105	19	4	M16
50	130	105	15	4	M12	155	120	19	4	M16	155	120	19	8	M16
65	155	130	15	4	M12	175	140	19	4	M16	175	140	19	8	M16
80	180	145	19	4	M16	185	150	19	8	M16	200	160	23	8	M20
100	200	165	19	8	M16	210	175	19	8	M16	225	185	23	8	M20
125	235	200	19	8	M16	250	210	23	8	M20	270	225	25	8	M22
150	265	230	19	8	M16	280	240	23	8	M20	305	260	25	12	M22
200	320	280	23	8	M20	330	290	23	12	M22	350	305	25	12	M22
250	385	345	23	12	M20	400	355	25	12	M22	430	380	27	12	M24
300	430	390	23	12	M20	445	400	25	16	M22	480	430	27	16	M24
350	480	435	25	12	M22	490	445	25	16	M22	540	480	33	16	M30
400	540	495	25	16	M22	560	510	27	16	M24	605	540	33	16	M30

JIS B 2210

Dimensions in mm	JIS 20K					JIS 30K					JIS 40K					
	Dimensions			Screws		Dimensions			Screws		Dimensions			Screws		
	DN	D	K	L	Number	Ø	D	K	L	Number	Ø	D	K	L	Number	Ø
10	90	65	15	4	M12	110	75	19	4	M16	110	75	19	4	M16	
15	95	70	15	4	M12	115	80	19	4	M16	115	80	19	4	M16	
20	100	75	15	4	M12	120	85	19	4	M16	120	85	19	4	M16	
25	125	90	19	4	M16	130	95	19	4	M16	130	95	19	4	M16	
32	135	100	19	4	M16	140	105	19	4	M16	140	105	19	4	M16	
40	140	105	19	4	M16	160	120	23	4	M20	160	120	23	4	M20	
50	155	120	19	8	M16	165	130	19	8	M16	165	130	19	8	M16	
65	175	140	19	8	M16	200	160	23	8	M20	200	160	23	8	M20	
80	200	160	23	8	M20	210	170	23	8	M20	210	170	23	8	M20	
100	225	185	23	8	M20	240	195	25	8	M22	250	205	25	8	M22	
125	270	225	25	8	M22	275	230	25	8	M22	300	250	27	8	M24	
150	305	260	25	12	M22	325	275	27	12	M24	355	295	33	12	M30	
200	350	305	25	12	M22	370	320	27	12	M24	405	345	33	12	M30	
250	430	380	27	12	M24	450	390	33	12	M30	475	410	33	12	M30	
300	480	430	27	16	M24	515	450	33	16	M30	540	470	39	16	M36	
350	540	480	33	16	M30											
400	605	540	33	16	M30											

JIS 16K =JIS 20K bortset fra flangetykkelse



Example shown as Size DN25

### BUTTWELD ENDS STAINLESS STEEL PIPES

Dim.'s in mm	ISO 1127 serie 1*		SMS3008		BS O.D. tubing Asme BPE				DIN 11850				Schedule				
	D	S	D	S	D	16swg S	18swg S	S	D	S	D	S	D	S	D	5S S	10S S
8	13,5	1,6	10	1,0	6,35	1,65	1,22	-	-	-	-	-	-	13,72	-	1,65	2,24
10	17,2	1,6	12	1,0	9,53	1,65	1,22	12	1,0	13	1,5	14	2	17,15	-	1,65	2,31
15	21,3	1,6	18	1,0	12,70	1,65	1,22	18	1,0	19	1,5	20	2	21,34	1,65	2,11	2,77
20	26,9	1,6	25	1,2	19,05	1,65	1,22	22	1,0	23	1,5	24	2	26,67	1,65	2,11	2,87
25	33,7	2,0	25	1,2	25,40	1,65	1,22	28	1,0	29	1,5	30	2	33,40	1,65	2,77	3,38
32	42,4	2,0	32	1,2	31,75	1,65	1,22	34	1,0	35	1,5	36	2	42,16	1,65	2,77	3,56
40	48,3	2,0	38	1,2	38,10	1,65	1,22	40	1,0	41	1,5	42	2	48,26	1,65	2,77	3,68
50	60,3	2,6	51	1,2	50,80	1,65	1,22	52	1,0	53	1,5	54	2	60,33	1,65	2,77	3,91
65	76,1	2,6	63,5	1,6	63,50	1,65	1,22	70	2,0	-	-	-	-	73,03	2,11	3,05	5,16
80	88,9	2,6	76,1	1,6	72,20	1,65	1,22	85	2,0	-	-	-	-	88,90	2,11	3,05	5,49
100	114,3	2,6	101,6	2	101,6	2,11 (swg14)	-	104	2,0	-	-	-	-	114,30	2,11	3,05	6,02



# FACE TO FACE DIMENSIONS EN558 (Flanged Valves)

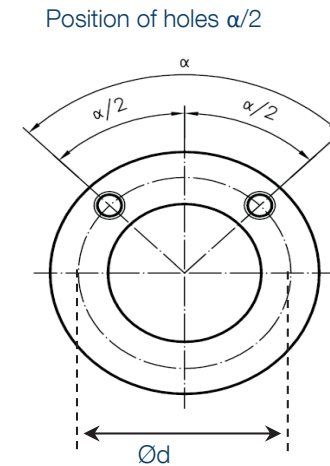
Main Basic series (dimensions mm)

DN	10	15	20	25	32	40	50	65	80	100	125	150	200	250	300	350	400	450	500	600
Series 1	130	130	150	160	180	200	230	290	310	350	400	480	600	730	850	980	1100	1200	1250	1450
Series 2	210	210	230	230	260	260	300	340	380	430	500	550	650	775	900	1025	1150	1275	1400	1600
Series 3	102	108	117	127	140	165	178	190	203	229	254	267	292	330	356	381	406	432	457	508
Series 4	-	140	152	165	178	190	216	241	283	305	381	403	419	457	502	562	638	714	791	1143
Series 5	-	165	190	216	229	241	292	330	356	432	508	559	660	787	838	889	991	1092	1194	1397
Series 7	108	108	117	127	146	159	190	216	254	305	356	406	521	635	749	-	-	-	-	-
Series 10	-	108	117	127	140	165	203	216	241	292	330	356	495	622	698	787	914	978	978	1295
Series 12	130	130	130	140	165	165	203	222	241	305	356	394	457	533	610	686	762	864	914	1067
Series 13	-	-	-	-	-	106	108	112	114	127	140	140	152	165	178	190	216	222	229	267
Series 14	115	115	120	125	130	140	150	170	180	190	200	210	230	250	270	290	310	330	350	267
Series 15	-	-	-	120	140	240	250	270	280	300	325	350	400	450	500	550	600	650	700	800
Series 16	-	-	-	-	-	33	43	46	64	64	70	76	89	114	114	127	140	152	152	178
Series 18	80	80	90	100	110	120	135	165	185	229	-	-	-	-	-	-	-	-	-	-
Series 19	-	140	152	165	178	190	216	241	283	305	381	403	419	457	502	572	610	660	711	787
Series 20	-	-	-	-	-	33	43	46	46	52	56	60	68	78	78	102	114	127	127	154
Series 21	-	152	178	216	229	241	267	292	318	356	400	444	533	622	711	838	864	978	1016	1346
Series 25	-	-	-	-	-	-	-	-	49	56	64	70	71	76	83	92	102	114	127	154
Series 26	-	-	-	-	-	240	250	290	310	350	400	450	550	650	750	850	950	1050	1150	1350
Series 27	115	115	120	125	130	140	150	170	180	190	325	350	400	450	500	550	762	-	914	-
Series 28	130	130	150	160	180	200	230	290	310	350	400	450	550	650	750	850	950	-	1150	-
Series 29	108	108	117,5	127	127	136	142	154	160	172	186	200	228	255	285	315	340	360	380	425
Series 33	-	-	-	-	-	152	178	216	254	305	381	457	584	711	813	889	991	1092	1194	1397
Series 47	-	-	75	80	90	100	110	130	150	160	200	210	-	-	-	-	-	-	-	-
Series 48	-	-	-	-	-	180	200	240	260	300	350	400	500	600	700	800	900	1000	1100	1300
Series 49	-	16	19	22	28	31,5	40	46	50	60	90	106	140	-	-	-	-	-	-	-
Series 52	25	31,5	35,5	40	45	56	63	71	80	110	125	160	200	250	280	-	-	-	-	-
Series 54	-	-	229	254	279	305	368	419	381	457	551	610	737	838	965	1029	1130	1219	1321	1549
Series 55	-	216	229	254	279	305	368	419	470	546	673	705	832	991	1130	1257	1384	1537	1664	1943
Series 56	-	264	273	308	349	384	451	508	578	673	794	914	1022	1270	1422	-	-	-	-	-
Series 69	-	-	-	140	165	178	216	254	305	356	432	508	660	787	914	991	1092	-	-	-
Series 70	-	-	-	140	165	178	216	254	305	406	483	559	711	864	991	1067	1194	1346	1473	-
Series 71	-	-	-	186	232	232	279	330	368	457	533	610	762	914	1041	1118	1245	1397	-	-
Series 77	-	318	318	318	-	381	400	441	660	737	-	864	1022	1372	1575	1803	-	-	-	-
Series 91	-	-	-	-	-	310	350	425	470	550	650	750	950	1150	1350	1550	1750	1950	2150	-
Series 92	230	230	260	260	300	300	350	400	450	520	600	700	800	900	1050	-	-	-	-	-
Series 99	-	-	-	-	-	270	300	360	390	450	525	600	750	900	1050	1200	1350	1500	1650	-
Series 105	-	292	292	292	-	333	375	410	441	511	-	714	914	991	1130	1257	1422	1727	-	-
Series 106	-	292	292	292	-	333	375	410	460	530	-	768	972	1067	1219	1257	1422	1727	-	-
Series 107	-	50	50	60	65	80	95	110	145	170	-	-	-	-	-	-	-	-	-	-
Series 108	-	-	-	-	-	-	-	-	48	54	-	57	64	71	81	92	102	114	127	154
Series 109	-	-	-	-	-	-	-	-	48	54	-	59	73	83	92	117	133	149	159	181
Series 110	-	-	-	-	-	-	-	-	54	64	-	78	102	117	140	155	178	200	216	232

## Origin of basic series

1	DIN 3202-1, Series F1	19	ANSI B16.10, Table 2, Column 1	55	ANSI B16.10, Table 6, Column 5
2	DIN 3202-1, Series F2	20	ANSI B16.10, Table 9, Column 3 & 4	56	ANSI B16.10, Table 7, Column 1 & 2
3	ANSI B16.10, Table 1, Column 8 & 9	21	ANSI B16.10, Table 10, Column 16 & 18	69	ANSI B16.10, Table 5, Column 2 & 6
4	ANSI B16.10, Table 2, Column 11	25	BS 2080, Table 1, Series 64	70	ANSI B16.10, Table 6, Column 2 & 6
5	ANSI B16.10, Table 4, Column 5	26	ANSI B16.10, Table 9, Column 4	71	ANSI B16.10, Table 7, Column 2 & 5
7	BS 2080, Table 1, Series 7	27	DIN 3357-2 ff	77	ANSI/ISA S75.16-1994 Table 1
10	ANSI B16.10, Table 1, Column 16	28	DIN 3357-2 ff	91	DIN 3202-1, Series F9
12	ANSI B16.10, Table 1, Column 3	29	NFE 29 - 377	92	DIN 3202-1, Series F3
	BS 2080, Table 1, Series 12	33	ANSI B16.10, Table 4, Column 6	99	DIN 3202-1, Series F8
13	BS 2080, Table 1, Series 13	47	DIN 3202-1, Series F19	105	ANSI/ISA S75.16 Table 1
14	DIN 3202-1, Series F4	48	DIN 3202-1, Series F6	106	ANSI/ISA S75.16 Table 1
15	DIN 3202-1, Series F5	49	DIN 3202-3, Series F4	108	API 609, Table 2 - Class 150
16	BS 2080, Table 1, Series 16	52	DIN 3202-3, Series F5	109	API 609, Table 2 - Class 300
18	BS 2080, Table 1, Series 18	54	ANSI B16.10, Table 5, Column 5	110	API 609, Table 2 - Class 600

# ISO 5211 ACTUATOR FLANGE



Flange type	Ød(mm)	Screw	No of Screw	α/2	Max Nm*
F03	36	M5	4	45°	32
F04	42	M5	4	45°	63
F05	50	M6	4	45°	125
F07	70	M8	4	45°	250
F10	102	M10	4	45°	500
F12	125	M12	4	45°	1.000
F14	140	M16	4	45°	2.000
F16	165	M20	4	45°	4.000
F25	254	M16	8	22,5°	8.000
F30	298	M20	8	22,5°	16.000
F35	356	M30	8	22,5°	32.000
F40	406	M36	8	22,5°	63.000
F48	483	M36	12	15°	125.000
F60	603	M36	20	9°	250.000

\*The values specified in Table have been defined on the basis of bolts in tension only at a stress of 290MPa (1N/mm²) and a coefficient of friction between the mounting interface. All variations in these defined parameters lead to variations of the transmittable torque values

## Designation

Flange type as per Table

F--

A capital letter for spigot identification

Y with spigot

N without spigot

Drive designation

V Single Key drive

W Two key drive

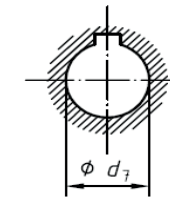
L Parallel Square drive

D Diagonal Square drive

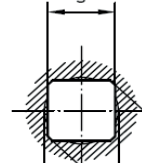
H Flat head drive

Dimension of the drive (mm)

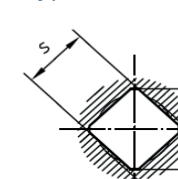
V-type



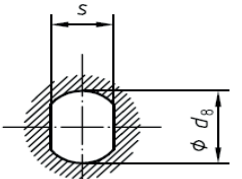
L-type



D-type



H-type



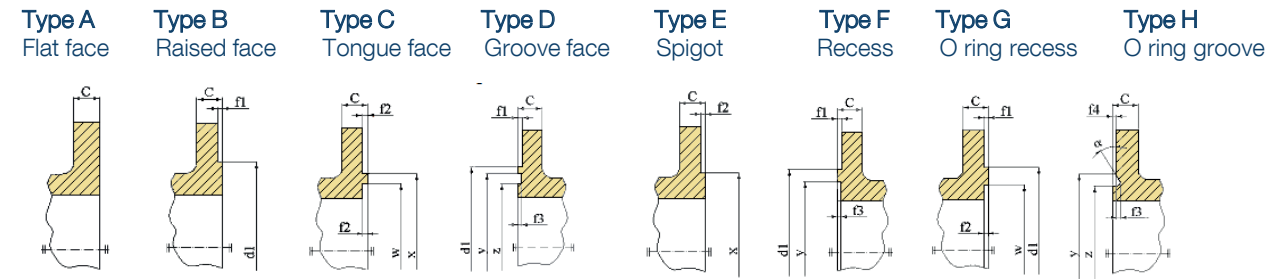
Example: EN ISO 5211-F05 - N - D - 11mm



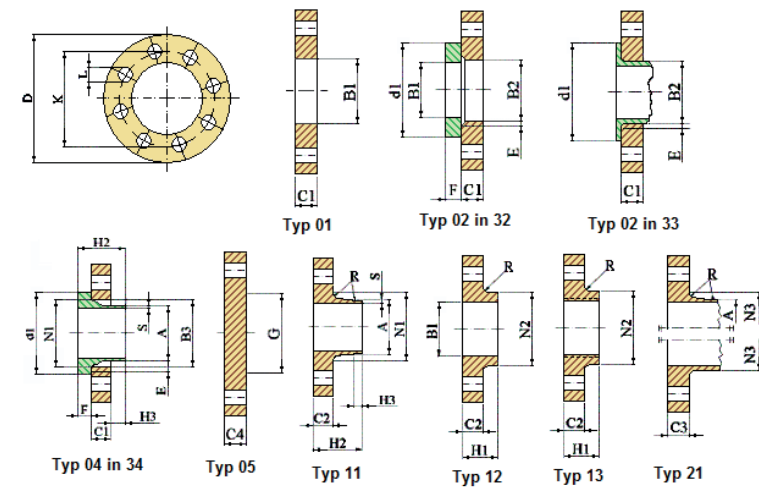


# FLANGE FACING TYPES ACCORDING TO EN1092-1

## Flange facing types according to EN1092-1

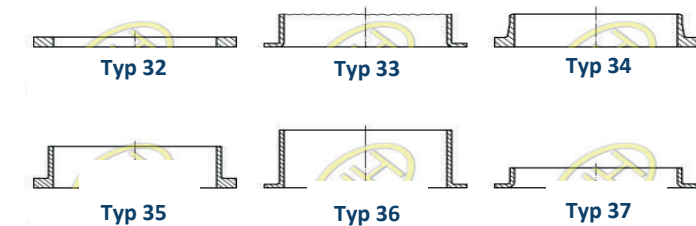


## Flange types according to EN1092-1



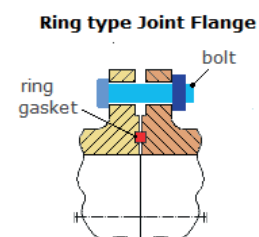
- Type 01: Plate (slip on) flanges for welding
- Type 02: Loose plate flanges with weld-on plate collar
- Type 04: Loose plate flanges with weld-neck collar
- Type 05: Blank (blind) flanges
- Type 11: Weld-neck flanges
- Type 12: Hubbed slip-on flanges for welding
- Type 13: Hubbed threaded flanges
- Type 21: Integral flanges

## Collars types according to EN1092-1



- Type 32: Weld-on collar plate
- Type 33: Lapped pipe ends
- Type 34: Weld-neck collars
- Type 35: Weld ring neck
- Type 36: Pressed collar with long neck
- Type 37: Pressed collar

## Ring Type Joint Flanges (RTJ) or Ring Joint Facing Flanges (R-JF):



RTJ flanges have grooves cut into their faces which accept steel Ring Gaskets.

RTJ flanges seal when tightened bolts compress the gasket between the flanges into the grooves, deforming (or "Coining") the gasket to make intimate contact inside the grooves, creating a metal to metal seal.

# MATERIAL STANDARDS ( Typical grades)

		EN 10222-2	DIN 2528	WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.	Comments						
Steel	Forged	P245N	C22.8	1.0460	A105	-20°C	+425°C							
					A350 LF2	-46°C	+425°C							
	Cast	GP240GH	GSC25	1.0619	A216 WCB	-29°C	+425°C							
					A352 LCB	-45°C	+345°C							
Stainless Steel	Forged				DIN 17-440	WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.	Comments				
					X5 CrNi 18-10	1.4301	A182 F 304	-196°C	+815°C					
					X2 CrNi 19-11	1.4306	A182 F 304L	-196°C	+425°C					
					X5 CrNiMo17-12-2	1.4401	A182 F 316	-196°C	+815°C					
					X2 CrNiMo17-12-2	1.4404	A182 F 316L	-196°C	+455°C					
					X2 CrNiMo18-14-3	1.4435	A182 F 316L	-196°C	+455°C					
	Cast					DIN 17-445	WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.	Comments			
						GX6 CrNi 18-9	1.4308	A351 CF8	-196°	+815°C				
						GX2 CrNi 19-11	1.4309	A351 CF3	-196°	+425°C				
						GX6 CrNiMo19-11-2	1.4408	A351 CF8M	-196°	+815°C				
						GX2 CrNiMo19-11-2	1.4409	A351 CF3M	-196°	+425°C				
						Duplex steel					WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.
X2CrNiMoN25-7-4	1.4410 (SAF2507)	A182 F53 - UNS S32750 CE3MN			Superduplex									
					X2CrNiMoN25-5-3	1.4462 (SAF2205)	A182 F51 - UNS S31803			Duplex				
					Cast Iron	Cast	EN-GJL 250	GG25	0.6020	A 48 class 308	-10°C	+200°C		
EN-GJL 250	GG20	0.6023	A 48 class 358	-10°C										+200°C
Ductile iron	Cast	EN-GJS 500-7	GGG50	0.7050	A 536 Gr 80-55-06	-15°C	+350°C							
									EN-GJS 400-15	GGG40	0.7040	A 536 Gr 65-45-12	-15°C	+350°C
									EN-GJS 400-18	GGG40.3	0.7043	A 536 Gr 60-40-18	-20°C	+350°C
Brass		EN12420	DIN	WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.	Comments						
									CW 617N	CuZn40Pb2	2.0402	B124 C37800	-10°C	+200°C
									CW 614N	CuZn39Pb3	2.0372	B124 C38500	-10°C	+200°C
									CW 612N	CuZn39Pb2	2.0380	B124 C37700	-10°C	+200°C
		CW 602N	CuZn36Pb2As	n.a.	B124 C35330	-10°C	+200°C							
Bronze	Cast	EN1982	DIN	WN (Werkstoff Nr.)	ASTM	Min temp.	Max temp.	Comments						
									CC491K	CuSn5ZnPb5-C	2.1096	B62 C83600	-10°C	+260°C
									CB491K	CuSn5ZnPb5-B	2.1097	B30 C83600	-10°C	+260°C
									CC33G	CuAl10Fe5Ni5	2.0975.04	B148 C95500	-10°C	+260°C
		CC331G	CuAl11Fe4	2.0940.02	B148 C95400	-10°C	+260°C	BS: AB2						

Temperatures are guidelines. Always use pressure temperature relation for the actual valve





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