



FLOWKS, HOW QUALITY LASTS!
www.flowks.com



FLOWKSTM

FLOWKS VALVE INC.

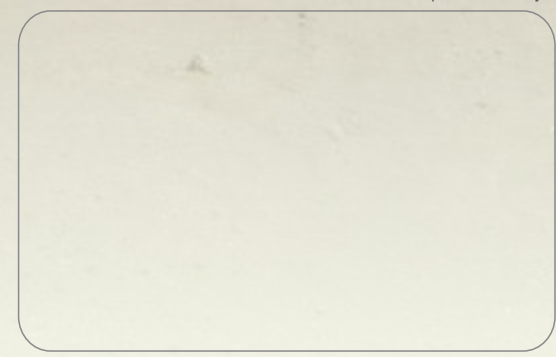
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Represented By:



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FLOWKSTM
GENERAL CATALOGUE



Flowks Valve is a manufacturer specializing in all kinds of industrial valves. After years of experience in supplying valves for distributors and projects, Flowks Valve has been recognized as a skilled and responsible supplier. The reputation relies on our strict inspection procedure from CAD design, material purchasing, machining, assembling, hydraulic & air testing to packing & delivery. Each step is carried out by our experienced and dedicated craftsmen.

We offer various types of valves with different materials, including special materials like MONEL, INCONEL, duplex, copper, bronze, etc. We follow different standards such as API, ANSI, DIN, BS, and JIS.

We are capable of supplying valves with special testings and treatments like radiographic examination (RT), ultrasonic examination (UT), dye penetrant testing, low temperature impact testing, XYLON coating and PTFE coating.

Our valves are widely used in different industries. We could also offer OEM service.

If you find anything interesting, please do not hesitate to contact us. What you will get is quality products with competitive prices. Look forward to having a chance to serve your esteemed company.

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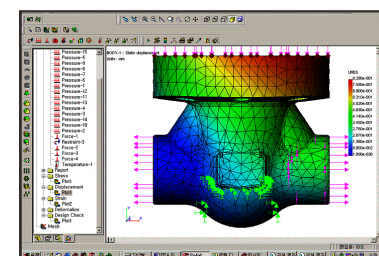
FLOWKS QUALITY CONTROL PROGRAM (API 600/ISO 10434)

Flowks Quality Control Program was implemented to set the quality control standards for pressure boundary castings, and to ensure a consistent supply of quality castings to Flowks.

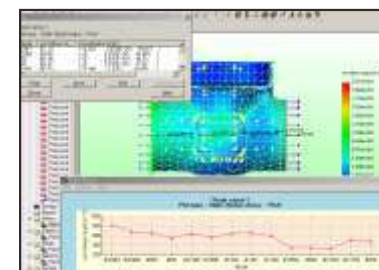
1. X-Ray Sample (pattern) Approval Process;
2. X-Ray Monitoring Program;
3. Casting Monitoring Program.

SAMPLE CASTINGS

Before castings are released for production, Flowks NDE Inspector Level III, evaluates and approves the submitted X-ray films (100% coverage) as per API 600.



Finite Element Analysis of a forged steel globe valve body.

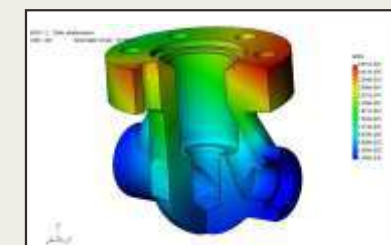


Finite Element Analysis of a forged steel gate valve body.

Finite Element Analysis can be applied to the design of valves with different materials.

X-RAY MONITORING:

Random X-ray monitoring requires that castings taken every six months from each vendor, randomly by size and quantity sets and X-rayed per ASME B16.34 requirement.

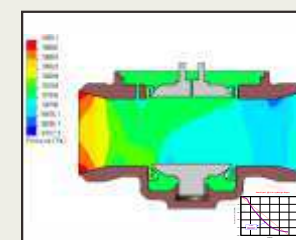


Pro-Engineering model casting simulation program.

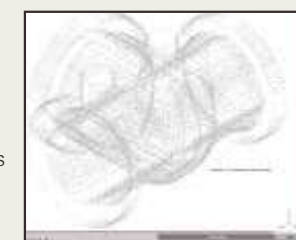
If casting fails to meet the x-ray requirements of B16.34, Flowks Senior Metallurgist will issue a corrective action request to the vendor, including recommendations for detailed motioning change and re-x-ray.

CASTING MONITORING:

Rejected castings due to defects such as hydro-test leakage, porosity, inclusions, shrinkage indication discovered by x-ray or machining, are entered into the computer, as part of the statistical control of each vendor.



Fluid Mechanics Analysis of a top entry ball valve body.



No shrinkage on a forged steel gate valve body simulation.

FINITE ELEMENT ANALYSIS

Flowks applies Finite Element Analysis for assistance. Working together with foundry engineers, we continue improving the internal integrity of castings, to X-Ray Level II or better as a general standard.

Benefits to Flowks customers and to the foundries:

- Shorter delivery time
- Higher quality of commercial castings
- Optimum methoding system
- Elimination of trial at sample approval
- Improves the internal integrity of castings (RT level 2 or better) at pattern approval
- Optimizes the metal flow and solidification pattern
- Predicts internal defects,
- Reduces scrap,
- Optimizes the design of the castings,
- Solves problems such as shrinkage and porosity, without test castings,
- Reduces NDE (X-ray) upgrading.

Flowks serves numerous domestic and foreign enterprises. We have good ability and experience in choosing valves for severe services, designing valves for special applications, quick delivery of spare parts for replacement, etc.



Class 2500 ball valve for a gas pipeline in India



Class 900 ball valve for a long-distance oil transportation pipeline in Iran



High performance slab gate valve for a gas pipeline



Valves for a gas gathering and transportation station

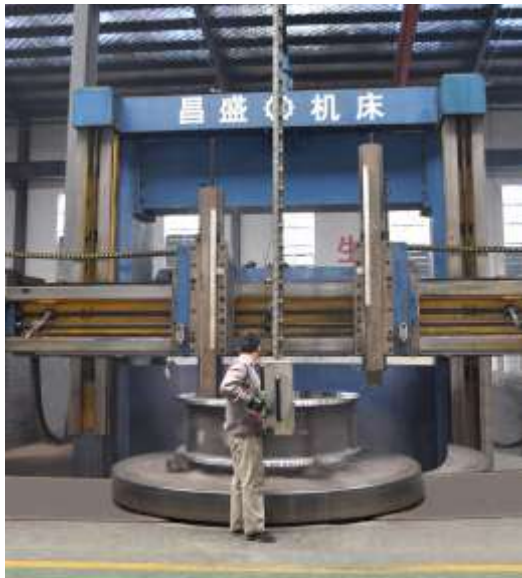


Special slab gate valve for a crude oil storage system



Class 1500 10" gate valve and Class 1500 12" 3-way globe diverter valve for power plant

Flowks has high-precision CNC machines and processing center, advanced valve manufacturing equipments, skilled process, strict quality control system, professional technical and sales team.





PMI

Dye Penetrant Test(LPT)

Modern and advanced testing tools with strict and scientific management, assures that each valve can be in full compliance with customer requirements.



Ultrasonic Test (UT)

Wall Thickness Test



Paint Thickness Test



Stainless Steel Valve Cryogenic Treatment



Spectrographic Analysis



Tensile Test



Salt Spray Test



14"1500Lb Stop Valve Hydro Test



30" Top Entry Shell Test



Various materials offered to meet
different requirements.
Working temperature: -196 ~ ~540 ~
Size range: 1/2"(DN15)~24"(DN600)
Pressure range: 150Lb~2500Lb
Special design available



PHOTOS OF PRODUCTS







1 Monel strainer



2 F51 ball valve casting



3 INCONEL forged steel oxygen valve



4 MONEL gate valve casting



5 Monel diaphragm valve



6 Al-bronze ball valve



7 Monel ball valve



8 Ti ball valve



9 Monel gate valve



10 Bronze gate valve stem

11 ~ 304 overlay C61300 seat ring



With special physical and chemical corrosion resistant, alloy steel valve is widely used in severe service, like reducing hydrochloric acid, sulphuric acid, orthophosphoric acid and ethylic acid, to ensure the safe, stable and long term operation .



12 ~ Monel ball valve



13 Forged steel al-bronze gate valve



14 Hastelloy ball valve



15 Al-bronze globe valve



16 Alloy 20 ball valve

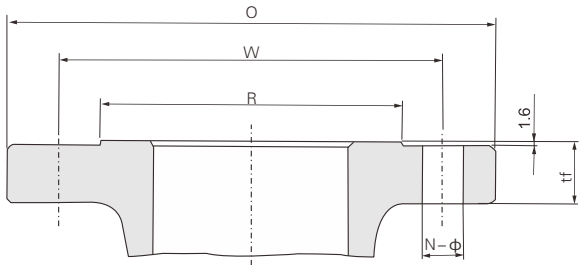


17 MONEL ball valve

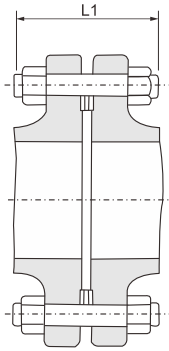




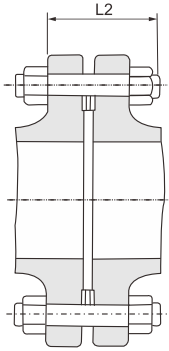
STEEL PIPE FLANGES ASME B 16.5 RF



Class 150 & Class 300 RF Flanges



Length of Stud Bolt



Length of Machine Bolt

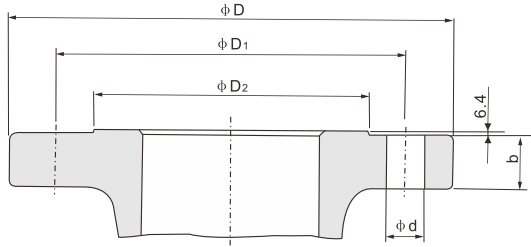
CLASS 150

Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				Stud Bolts 2mm Raised Face	Ring Joint	Machine Bolts 2mm Raised Face
15	1/2	90	3.50	60.3	2.38	34.9	1.38	11.2	0.44	4	5/8	1/2	55	...	50
20	3/4	100	3.88	69.9	2.75	42.9	1.69	12.7	0.50	4	5/8	1/2	65	...	50
25	1	110	4.25	79.4	3.12	50.8	2.00	14.3	0.56	4	5/8	1/2	65	75	55
32	1-1/4	115	4.62	88.9	3.50	63.5	2.50	15.9	0.62	4	5/8	1/2	70	85	55
40	1-1/2	125	5.00	98.4	3.88	73.0	2.88	17.5	0.69	4	5/8	1/2	70	85	65
50	2	150	6.00	120.7	4.75	92.1	3.62	19.1	0.75	4	3/4	5/8	85	95	70
65	2-1/2	180	7.00	139.7	5.50	104.8	4.12	22.3	0.88	4	3/4	5/8	90	100	75
80	3	190	7.50	152.4	6.00	127.0	5.00	23.9	0.94	4	3/4	5/8	90	100	75
100	4	230	9.00	190.5	7.50	157.2	6.19	23.9	0.94	8	3/4	5/8	90	100	75
125	5	255	10.00	215.9	8.50	185.7	7.31	23.9	0.94	8	7/8	3/4	95	110	85
150	6	280	11.00	241.3	9.50	215.9	8.50	25.4	1.00	8	7/8	3/4	100	115	85
200	8	345	13.50	298.5	11.75	269.9	10.62	28.6	1.12	8	7/8	3/4	110	120	90
250	10	405	16.00	362.0	14.25	323.8	12.75	30.2	1.19	12	1	7/8	115	125	100
300	12	485	19.00	431.8	17.00	381.0	15.00	31.8	1.25	12	1	7/8	120	135	100
350	14	535	21.00	476.3	18.75	412.8	16.25	35.0	1.38	12	1-1/8	1	135	145	115
400	16	595	23.50	539.8	21.25	469.9	18.50	36.6	1.44	16	1-1/8	1	135	145	115
450	18	635	25.00	577.9	22.75	533.4	21.00	39.7	1.56	16	1-1/4	1-1/8	145	160	125
500	20	700	27.50	635.0	25.00	584.2	23.00	42.9	1.69	20	1-1/4	1-1/8	160	170	140
600	24	815	32.00	749.3	29.50	692.2	27.25	47.7	1.88	20	1-3/8	1-1/4	170	185	150

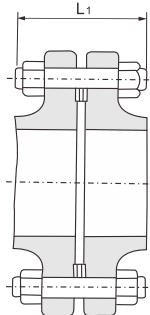
CLASS 300

Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				Stud Bolts 2mm Raised Face	Ring Joint	Machine Bolts 2mm Raised Face
15	1/2	95	3.75	66.7	2.62	34.9	1.38	14.3	0.56	4	5/8	1/2	65	75	55
20	3/4	115	4.62	82.6	3.25	42.9	1.69	15.9	0.62	4	3/4	5/8	75	90	65
25	1	125	4.88	88.9	3.50	50.8	2.00	17.5	0.69	4	3/4	5/8	75	90	65
32	1-1/4	135	5.25	98.4	3.88	63.5	2.50	19.1	0.75	4	3/4	5/8	85	95	70
40	1-1/2	155	6.12	114.3	4.50	73.0	2.88	20.7	0.81	4	7/8	3/4	90	100	75
50	2	165	6.50	127.0	5.00	92.1	3.62	22.3	0.88	8	3/4	5/8	90	100	75
65	2-1/2	190	7.50	149.2	5.88	104.8	4.12	25.4	1.00	8	7/8	3/4	100	115	85
80	3	210	8.25	168.3	6.62	127.0	5.00	28.6	1.12	8	7/8	3/4	110	120	90
100	4	255	10.00	200.0	7.88	157.2	6.19	31.8	1.25	8	7/8	3/4	115	125	95
125	5	280	11.00	235.0	9.25	185.7	7.31	35.0	1.38	8	7/8	3/4	120	135	110
150	6	320	12.50	269.9	10.62	215.9	8.50	36.6	1.44	12	7/8	3/4	120	140	110
200	8	380	15.00	330.2	13.00	269.9	10.62	41.3	1.62	12	1	7/8	140	150	120
250	10	445	17.50	387.4	15.25	323.8	12.75	47.7	1.88	16	1-1/8	1	160	170	140
300	12	520	20.50	450.8	17.75	381.0	15.00	50.8	2.00	16	1-1/4	1-1/8	170	185	145
350	14	585	23.00	514.4	20.25	412.8	16.25	54.0	2.12	20	1-1/4	1-1/8	180	190	160
400	16	650	25.50	571.5	22.50	469.9	18.50	57.2	2.25	20	1-3/8	1-1/4	190	205	165
450	18	710	28.00	628.6	24.75	533.4	21.00	60.4	2.38	24	1-3/8	1-1/4	195	210	170
500	20	775	30.50	685.8	27.00	584.2	23.00	63.5	2.50	24	1-3/8	1-1/4	205	220	185
600	24	915	36.00	812.8	32.00	692.2	27.25	69.9	2.75	24	1-5/8	1-1/2	230	255	205

STEEL PIPE FLANGES ASME B 16.5 RF



Class 600~Class 2500 RF Flanges



Length of Stud Bolt

CLASS 400

Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				7mm Raised Face	Male and Female/Tongue and Groove	Ring Joint
15	1/2	95	3.75	66.7	2.62	34.9	1.38	14.3	0.56	4	5/8	1/2	75	70	75
20	3/4	115	4.62	82.6	3.25	42.9	1.69	15.9	0.62	4	3/4	5/8	90	85	90
25	1	125	4.88	88.9	3.50	50.8	2.00	17.5	0.69	4	3/4	5/8	90	85	90
32	1-1/4	135	5.25	98.4	3.88	63.5	2.50	20.7	0.81	4	3/4	5/8	95	90	95
40	1-1/2	155	6.12	114.3	4.50	73.0	2.88	22.3	0.88	4	7/8	3/4	110	100	110
50	2	165	6.50	127.0	5.00	92.1	3.62	25.4	1.00	8	3/4	5/8	110	100	110
65	2-1/2	190	7.50	149.2	5.88	104.8	4.12	28.6	1.12	8	7/8	3/4	120	115	120
80	3	210	8.25	168.3	6.62	127.0	5.00	31.8	1.25	8	7/8	3/4	125	120	125
100	4	255	10.00	200.0	7.88	157.2	6.19	35.0	1.38	8	1	7/8	140	135	140
125	5	280	11.00	235.0	9.25	185.7	7.31	38.1	1.50	8	1	7/8	145	135	145
150	6	320	12.50	269.9	10.62	215.9	8.50	41.3	1.62	12	1	7/8	150	145	150
200	8	380	15.00	330.0	13.00	269.9	10.62	47.7	1.88	12	1-1/8	1	170	165	170
250	10	445	17.50	387.4	15.25	323.8	12.75	54.0	2.12	16	1-1/4	1-1/8	190	185	190
300	12	520	20.50	450.8	17.75	381.0	15.00	57.2	2.25	16	1-3/8	1-1/4	205	195	205
350	14	585	23.00	514.4	20.25	412.8	16.25	60.4	2.38	20	1-3/8	1-1/4	210	205	210
400	16	650	25.50	571.5	22.50	469.9	18.50	63.5	2.50	20	1-1/2	1-3/8	220	215	220
450	18	710	28.00	628.6	24.75	533.4	21.00	66.7	2.62	24	1-1/2	1-3/8	230	220	230
500	20	775	30.50	685.8	27.00	584.2	23.00	69.9	2.75	24	1-5/8	1-1/2	240	235	250
600	24	915	36.00	812.8	32.00	692.2	27.25	76.2	3.00	24	1-7/8	1-3/4	265	260	280

CLASS 600

Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				7mm Raised Face	Male and Female/Tongue and Groove	Ring Joint
15	1/2	95	3.75	66.7	2.62	34.9	1.38	14.3	0.56	4	5/8	1/2	75	70	75
20	3/4	115	4.62	82.6	3.25	42.9	1.69	15.9	0.62	4	3/4	5/8	90	85	90
25	1	125	4.88	88.9	3.50	50.8	2.00	17.5	0.69	4	3/4	5/8	90	85	90
32	1-1/4	135	5.25	98.4	3.88	63.5	2.50	20.7	0.81	4	3/4	5/8	95	90	95
40	1-1/2	155	6.12	114.3	4.50	73.0	2.88	22.3	0.88	4	7/8	3/4	110	100	110
50	2	165	6.50	127.0	5.00	92.1	3.62	25.4	1.00	8	3/4	5/8	110	100	110
65	2-1/2	190	7.50	149.2	5.88	104.8	4.12	28.6	1.12	8	7/8	3/4	120	115	120
80	3	210	8.25	168.3	6.62	127.0	5.00	31.8	1.25	8	7/8	3/4	125	120	125
100	4	275	10.75	215.9	8.50	157.2	6.19	38.1	1.50	8	1	7/8	145	140	145
125	5	330	13.00	266.7	10.50	185.7	7.31	44.5	1.75	8	1-1/8	1	165	160	165
150	6	355	14.00	292.1	11.50	215.9	8.50	47.7	1.88	12	1-1/8	1	170	165	170
200	8	420	16.50	349.2	13.75	269.9	10.62	55.6	2.19	12	1-1/4	1-1/8	190	185	195
250	10	510	20.00	431.8	17.00	323.8	12.75	63.5	2.50	16	1-3/8	1-1/4	215	210	215
300	12	560	22.00	489.0	19.25	381.0	15.00	66.7	2.62	20	1-3/8	1-1/4	220	215	220
350	14	605	23.75	527.0	20.75	412.8	16.25	69.9	2.75	20	1-1/2	1-3/8	235	230	235
400	16	685	27.00	603.2	23.75	469.9	18.50	76.2	3.00	20	1-5/8	1-1/2	255	250	255
450	18	745	29.25	654.0	25.75	533.4	21.00	82.6	3.25	20	1-3/4	1-5/8	275	265	275
500	20	815	32.00	723.9	28.50	584.2	23.00	88.9	3.50	24	1-3/4	1-5/8	285	280	290
600	24	940	37.00	838.2	33.00	692.2	27.25	101.6	4.00	24	2	1-7/8	330	325	335

CLASS 900

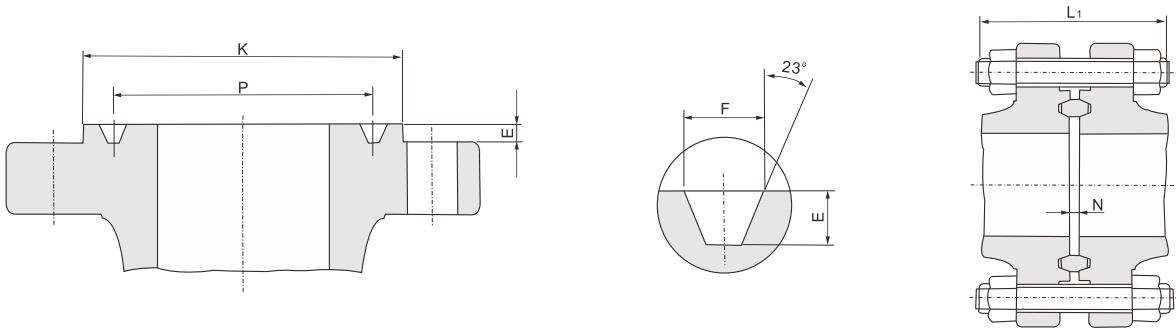
Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				7mm Raised Face	Male and Female/ Tongue and Groove	Ring Joint
15	1/2	120	4.75	82.6	3.25	34.9	1.38	22.3	0.88	4	7/8	3/4	110	100	110
20	3/4	130	5.12	88.9	3.50	42.9	1.69	25.4	1.00	4	7/8	3/4	115	110	115
25	1	150	5.88	101.6	4.00	50.8	2.00	28.6	1.12	4	1	7/8	125	120	125
32	1-1/4	160	6.25	111.1	4.38	63.5	2.50	28.6	1.12	4	1	7/8	125	120	125
40	1-1/2	180	7.00	123.8	4.88	73.0	2.88	31.8	1.25	4	1-1/8	1	140	135	140
50	2	215	8.25	165.1	6.50	92.1	3.62	38.1	1.50	8	1	7/8	145	140	145
65	2-1/2	245	9.26	190.5	7.50	104.8	4.12	41.3	1.62	8	1-1/8	1	160	150	160
80	3	240	9.50	190.5	7.50	127.0	5.00	38.1	1.50	8	1	7/8	145	140	145
100	4	290	11.50	235.0	9.25	157.2	6.19	44.5	1.75	8	1-1/4	1-1/8	170	165	170
125	5	350	13.75	279.4	11.00	185.7	7.31	50.8	2.00	8	1-3/8	1-1/4	190	185	190
150	6	380	15.00	317.5	12.50	215.9	8.50	55.6	2.19	12	1-1/4	1-1/8	190	185	195
200	8	470	18.50	393.7	15.50	269.9	10.62	63.5	2.50	12	1-1/2	1-3/8	220	215	220
250	10	545	21.50	469.9	18.50	323.8	12.75	69.9	2.75	16	1-1/2	1-3/8	235	230	235
300	12	610	24.00	533.4	21.00	381.0	15.00	79.4	3.12	20	1-1/2	1-3/8	255	250	255
350	14	640	25.25	558.8	22.00	412.8	16.25	85.8	3.38	20	1-5/8	1-1/2	275	265	280
400	16	705	27.75	616.0	24.25	469.9	18.50	88.9	3.50	20	1-3/4	1-5/8	285	280	290
450	18	785	31.00	685.8	27.00	533.4	21.00	101.6	4.00	20	2	1-7/8	325	320	335
500	20	855	33.75	749.3	29.50	584.2	23.00	108	4.25	20	2-1/8	2	350	345	360
600	24	1040	41.00	901.7	35.50	692.2	27.25	139.7	5.50	20	2-5/8	2-1/2	440	430	455

CLASS 1500

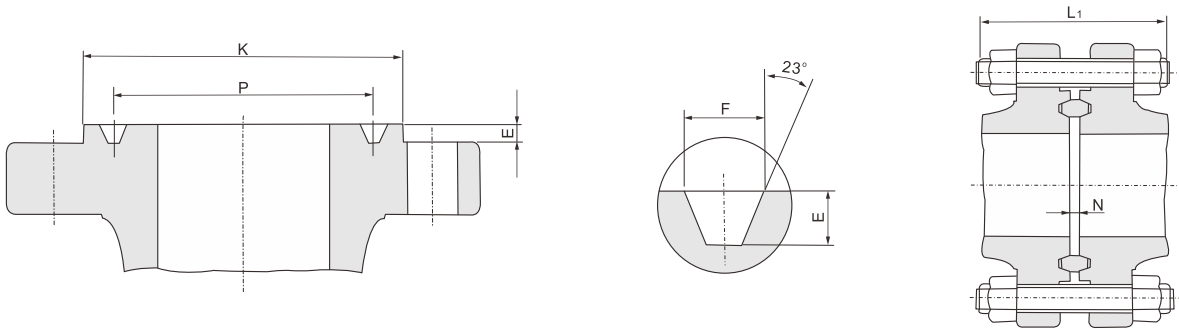
Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				7mm Raised Face	Male and Female/ Tongue and Groove	Ring Joint
15	1/2	120	4.75	82.6	3.25	34.9	1.38	22.3	0.88	4	7/8	3/4	110	100	110
20	3/4	130	5.12	88.9	3.50	42.9	1.69	25.4	1.00	4	7/8	3/4	115	110	115
25	1	150	5.88	101.6	4.00	50.8	2.00	28.6	1.12	4	1	7/8	125	120	125
32	1-1/4	160	6.25	111.1	4.38	63.5	2.50	28.6	1.12	4	1	7/8	125	120	125
40	1-1/2	180	7.00	123.8	4.88	73.0	2.88	31.8	1.25	4	1-1/8	1	140	135	140
50	2	215	8.25	165.1	6.50	92.1	3.62	38.1	1.50	8	1	7/8	145	140	145
65	2-1/2	245	9.26	190.5	7.50	104.8	4.12	41.3	1.62	8	1-1/8	1	160	150	160
80	3	265	10.25	203.2	8.00	127.0	5.00	47.7	1.88	8	1-1/4	1-1/8	180	170	180
100	4	310	12.25	241.3	9.50	157.2	6.19	54	2.12	8	1-3/8	1-1/4	195	190	195
125	5	375	14.75	292.1	11.50	185.7	7.31	73.1	2.88	8	1-5/8	1-1/2	250	240	250
150	6	395	15.50	317.5	12.50	215.9	8.50	82.6	3.25	12	1-1/2	1-3/8	260	255	265
200	8	485	19.00	393.7	15.50	269.9	10.62	92.1	3.62	12	1-3/4	1-5/8	290	285	300
250	10	585	23.00	482.6	19.00	323.8	12.75	108	4.25	12	2	1-7/8	335	330	345
300	12	675	26.50	571.5	22.50	381.0	15.00	123.9	4.88	16	2-1/8	2	375	370	385
350	14	750	29.50	635.0	25.00	412.8	16.25	133.4	5.25	16	2-3/8	2-1/4	405	400	425
400	16	825	32.50	704.8	27.75	469.9	18.50	146.1	5.75	16	2-5/8	2-1/2	445	440	470
450	18	915	36.00	774.7	30.50	533.4	21.00	162	6.38	16	2-7/8	2-3/4	495	490	525
500	20	985	38.75	831.8	32.75	584.2	23.00	177.8	7.00	16	3-1/8	3	540	535	565
600	24	1170	46.00	990.6	39.00	692.2	27.25	203.2	8.00	16	3-5/8	3-1/2	615	610	650

CLASS 2500

Nominal Pipe Size		Outside Diameter of Flange,O		Diameter of Bolt Circle,W		Raised Face Diameter,R		Min. Thickness of Flange.tf		Number of Bolts NO.	Number of Bolts Holes Diam	Diameter of Bolts IN	Length of Bolts,L		
DN	NPS	mm	in	mm	in	mm	in	mm	in				7mm Raised Face	Male and Female/ Tongue and Groove	Ring Joint
15	1/2	135	5.25	88.9	3.50	34.9	1.38	30.2	1.19	4	7/8	3/4	120	115	120
20	3/4	140	5.50	95.2	3.75	42.9	1.69	31.8	1.25	4	7/8	3/4	125	120	125
25	1	160	6.25	108.0	4.25	50.8	2.00	35	1.38	4	1	7/8	140	135	140
32	1-1/4	185	7.25	130.2	5.12	63.5	2.50	38.1	1.50	4	1-1/8	1	150	145	150
40	1-1/2	205	8.00	146.0	5.75	73.0	2.88	44.5	1.75	4	1-1/4	1-1/8	170	165	170
50	2	235	9.25	171.4	6.75	92.1	3.62	50.9	2.00	8	1-1/8	1	180	170	180
65	2-1/2	265	10.25	196.8	7.75	104.8	4.12	57.2	2.25	8	1-1/4	1-1/8	195	190	205
80	3	305	12.00	228.6	9.00	127.0	5.00	66.7	2.62	8	1-3/8	1-1/4	220	215	230
100	4	355	14.00	273.0	10.75	157.2	6.19	76.2	3.00	8	1-5/8	1-1/2	255	250	260
125	5	420	16.50	323.8	12.75	185.7	7.31	92.1	3.62	8	1-7/8	1-3/4	300	290	310
150	6	485	19.00	368.3	14.50	215.9	8.50	108	4.25	8	2-1/8	2	345	335	355
200	8	550	21.75	438.2	17.25	269.9	10.62	127	5.00	12	2-1/8	2	380	375	395
250	10	675	26.50	539.8	21.25	323.8	12.75	165.1	6.50	12	2-5/8	2-1/2	490	485	510
300	12	760	30.00	619.1	24.38	381.0	15.00	184.2	7.25	12	2-7/8	2-3/4	540	535	560

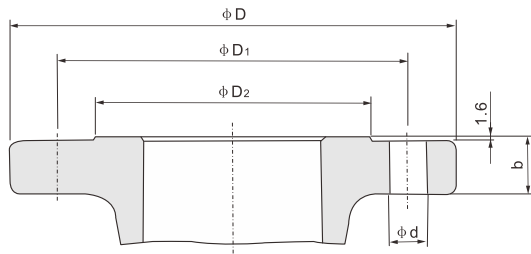


Nominal Size						Groove Dimensions					Diameter of Raised Portion,K					Approximate Distance Between Flanges						
						Groove Number	Pitch Diameter.	Depth	Width	Radius at Bottom	600 400											
150	300	400	600	900	1500	2500	P	E	F	R	150	300	900	1500	2500	150	300	400	600	900	1500	2500
1/2	1/2	1/2	1/2	1/2	1/2	12	39.67	6.35	8.74	0.8	51.0	51.0	51.0	60.5	60.5	3	3	3	3	3	3	3
3/4	3/4	3/4	3/4	3/4	1/2	13	42.88	6.35	8.74	0.8	63.5	63.5	63.5	65.0	65.0	4	4	4	4	4	4	4
1	1	1	1	1	3/4	14	44.45	6.35	8.74	0.8	63.5	63.5	63.5	66.5	66.5	4	4	4	4	4	4	4
1	1	1	1	1	3/4	15	47.63	6.35	8.74	0.8	63.5	63.5	63.5	66.5	66.5	4	4	4	4	4	4	4
1 1/4	1	1	1	1	3/4	16	50.8	6.35	8.74	0.8	70.0	70.0	70.0	71.5	73.0	4	4	4	4	4	4	4
1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1	17	57.15	6.35	8.74	0.8	73.0	73.0	73.0	73.0	73.0	4	4	4	4	4	4	4
1 1/2	1 1/4	1 1/4	1 1/4	1 1/4	1	18	60.33	6.35	8.74	0.8	79.5	79.5	79.5	81.0	82.5	4	4	4	4	4	4	4
1 1/2	1 1/2	1 1/2	1 1/2	1 1/2	20	68.27	6.35	8.74	0.8	82.5	82.5	82.5	82.5	82.5	4	4	4	4	4	4	4	4
2	2	2	2	2	11/4	21	72.23	7.92	11.91	0.8	102	102	102	102	102	4	4	4	4	4	4	3
2	2	2	2	2	11/4	22	82.55	6.35	8.74	0.8	102	102	102	102	102	4	4	4	4	4	4	3
2 1/2	2	2	2	2	11/2	23	82.55	7.92	11.91	0.8	108	108	108	114	114	6	6	5	5	5	5	3
2 1/2	2	2	2	2	11/2	24	95.25	7.92	11.91	0.8	124	124	124	124	124	4	4	4	4	4	4	3
2 1/2	2	2	2	2	11/2	25	101.6	6.35	8.74	0.8	121	121	121	121	121	4	4	4	4	4	4	3
3	2 1/2	2 1/2	2 1/2	2 1/2	2	26	101.6	7.92	11.91	0.8	127	127	127	133	133	6	6	5	5	5	5	3
3	2 1/2	2 1/2	2 1/2	2 1/2	2	27	107.95	7.92	11.91	0.8	137	137	137	137	137	4	4	4	4	4	4	3
3	2 1/2	2 1/2	2 1/2	2 1/2	2	28	111.13	9.52	13.49	0.8	149	149	149	149	149	4	4	4	4	4	4	3
3	(2)	(2)	(2)	(2)	30	117.48	7.92	11.91	0.8	133	133	133	133	133	4	4	4	4	4	4	4	3
3 1/2	(2)	(2)	(2)	3	31	123.83	7.92	11.91	0.8	146	146	146	146	146	6	6	5	5	5	5	4	3
3 1/2	(2)	(2)	(2)	3	32	127	9.53	13.49	1.5	154	154	154	154	168	4	4	4	4	4	4	4	3
4	3 1/2	3 1/2	3 1/2	3	33	131.78	6.35	8.74	0.8	154	154	154	154	154	4	4	4	4	4	4	4	3
4	3 1/2	3 1/2	3 1/2	3	34	131.78	7.92	11.91	0.8	159	159	159	159	159	6	6	5	5	5	5	4	3
4	3	3	3	3	35	136.53	7.92	11.91	0.8	168	168	168	168	168	4	4	4	4	4	4	4	3
5	4	4	4	4	36	149.23	6.35	8.74	0.8	171	171	171	171	171	4	4	4	4	4	4	4	3
5	4	4	4	4	37	149.23	7.92	11.91	0.8	175	175	175	175	175	6	6	5	5	5	5	4	3
5	4	4	4	4	4	38	157.18	11.13	16.66	1.5	203	203	203	203	203	4	4	4	4	4	4	4
6	4	4	4	4	39	161.93	7.92	11.91	0.8	194	194	194	194	194	4	4	4	4	4	4	4	3
6	4	4	4	4	40	171.45	6.35	8.74	0.8	194	194	194	194	194	4	4	4	4	4	4	4	3
6	5	5	5	5	41	180.98	7.92	11.91	0.8	210	210	210	210	210	6	6	5	5	5	5	4	3
6	5	5	5	5	5	42	190.5	12.7	19.84	1.5	241	241	241	241	241	4	4	4	4	4	4	4
6	5	5	5	5	43	193.68	6.35	8.74	0.8	219	219	219	219	219	4	4	4	4	4	4	4	3
6	5	5	5	5	44	193.68	7.92	11.91	0.8	229	229	229	229	229	6	6	5	5	5	5	4	3
6	6	6	6	6	45	211.12	7.92	11.91	0.8	241	241	241	241	241	6	6	5	5	5	5	4	3

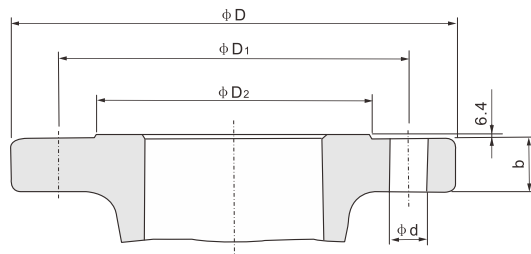


Nominal Size						Groove Dimensions					Diameter of Raised Portion,K					Approximate Distance Between Flanges							
						Groove Number	Pitch Diameter.	Depth	Width	Radius at Bottom	600 400												
150	300	400	600	900	1500	2500	P	E	F	R	150	300	900	1500	2500	150	300	400	600	900	1500	2500	
✓	✓	✓	✓	✓	6	✓	46	211.14	9.53	13.49	1.5	✓	✓	✓	248	✓	✓	✓	✓	✓	✓	3	✓
✓	✓	✓	✓	✓	✓	6	47	228.6	12.7	19.84	1.5	✓	✓	✓	279	✓	✓	✓	✓	✓	✓	4	✓
8	✓	✓	✓	✓	✓	✓	48	247.65	6.35	8.74	0.8	273	✓	✓	✓	4	✓	✓	✓	✓	✓	✓	✓
✓	8	8	8	8	✓	✓	49	269.88	7.92	11.91	0.8	✓	302	308	✓	✓	6	6	5	4	✓	✓	✓
✓	✓	✓	✓	✓	8	✓	50	269.88	11.13	16.66	1.5	✓	✓	✓	318	✓	✓	✓	✓	✓	✓	4	✓
✓	✓	✓	✓	✓	✓	8	51	279.4	14.27	23.01	1.5	✓	✓	✓	✓	340	✓	✓	✓	✓	✓	✓	5
10	✓	✓	✓	✓	✓	✓	52	304.8	6.35	8.74	0.8	330	✓	✓	✓	✓	4	✓	✓	✓	✓	✓	✓
✓	10	10	10	10	✓	✓	53	323.85	7.92	11.91	0.8	✓	356	362	✓	✓	6	6	5	4	✓	✓	✓
✓	✓	✓	✓	✓	10	✓	54	323.85	11.13	16.66	1.5	✓	✓	✓	371	✓	✓	✓	✓	✓	✓	4	✓
✓	✓	✓	✓	✓	✓	10	55	342.9	17.48	30.18	2.4	✓	✓	✓	✓	425	✓	✓	✓	✓	✓	✓	6
12	✓	✓	✓	✓	✓	✓	56	381	6.35	8.74	0.8	406	✓	✓	✓	✓	4	✓	✓	✓	✓	✓	✓
✓	12	12	12	12	✓	✓	57	381	7.92	11.91	0.8	✓	413	419	✓	✓	6	6	5	4	✓	✓	✓
✓	✓	✓	✓	✓	12	✓	58	381	14.27	23.01	1.5	✓	✓	✓	438	✓	✓	✓	✓	✓	✓	5	✓
14	✓	✓	✓	✓	✓	✓	59	396.88	6.35	8.74	0.8	425	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
✓	✓	✓	✓	✓	✓	12	60	406.4	17.48	33.32	2.4	✓	✓	✓	✓	495	✓	✓	✓	✓	✓	✓	8
✓	14	14	14	✓	✓	✓	61	419.1	7.92	11.91	0.8	✓	457	✓	✓	✓	6	6	5	✓	✓	✓	✓
✓	✓	✓	✓	14	✓	✓	62	419.1	11.13	16.66	1.5	✓	✓	✓	467	✓	✓	✓	✓	✓	4	✓	✓
✓	✓	✓	✓	✓	14	✓	63	419.1	15.88	26.97	2.4	✓	✓	✓	489	✓	✓	✓	✓	✓	6	✓	✓
16	✓	✓	✓	✓	✓	✓	64	454.03	6.35	8.74	0.8	483	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
✓	16	16	16	✓	✓	✓	65	469.9	7.92	11.91	0.8	✓	508	✓	✓	✓	✓	6	6	5	✓	✓	✓
✓	✓	✓	✓	16	✓	✓	66	469.9	11.13	16.66	1.5	✓	✓	✓	524	✓	✓	✓	✓	✓	4	✓	✓
✓	✓	✓	✓	✓	16	✓	67	469.9	17.48	30.18	2.4	✓	✓	✓	546	✓	✓	✓	✓	✓	✓	8	✓
18	✓	✓	✓	✓	✓	✓	68	517.53	6.35	8.74	0.8	546	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
✓	18	18	18	✓	✓	✓	69	533.4	7.92	11.91	0.8	✓	575	✓	✓	✓	6	6	5	✓	✓	✓	✓
✓	✓	✓	✓	18	✓	✓	70	533.4	12.7	19.84	1.5	✓	✓	✓	594	✓	✓	✓	✓	✓	5	✓	✓
✓	✓	✓	✓	✓	18	✓	71	533.4	17.48	30.18	2.4	✓	✓	✓	613	✓	✓	✓	✓	✓	✓	8	✓
20	✓	✓	✓	✓	✓	✓	72	558.8	6.35	8.74	0.8	597	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
✓	20	20	20	✓	✓	✓	73	584.2	9.53	13.49	1.5	✓	635	✓	✓	✓	6	6	5	✓	✓	✓	✓
✓	✓	✓	✓	20	✓	✓	74	584.2	12.7	19.84	1.5	✓	✓	✓	648	✓	✓	✓	✓	✓	5	✓	✓
✓	✓	✓	✓	✓	20	✓	75	584.2	17.48	33.32	2.4	✓	✓	✓	673	✓	✓	✓	✓	✓	✓	10	✓
24	✓	✓	✓	✓	✓	✓	76	673.1	6.35	8.74	0.8	711	✓	✓	✓	✓	3	✓	✓	✓	✓	✓	✓
✓	24	24	24	✓	✓	✓	77	692.15	11.13	16.66	1.5	✓	749	✓	✓	✓	6	6	6	✓	✓	✓	✓
✓	✓	✓	✓	24	✓	✓	78	692.15	15.88	26.97	2.4	✓	✓	✓	772	✓	✓	✓	✓	✓	6	✓	✓
✓	✓	✓	✓	✓	24	✓	79	692.15	20.62	36.53	2.4	✓	✓	✓	794	✓	✓	✓	✓	✓	✓	11	✓

STEEL PIPE FLANGES ASME B 16.47 SERIES A & MSS SP 44 THEREFORE



Class150 & Class300 RF Flanges



Class600 & Class2500 RF Flanges

CLASS 150

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	34.25	870	31.75	806.5	29.50	749	2.69	68.5	1.38	35	24	1 1/4
28	700	36.50	927	34.00	863.6	31.50	800	2.81	71.5	1.38	35	28	1 1/4
30	750	38.75	984	36.00	914.4	33.75	857	2.94	75	1.38	35	28	1 1/4
32	800	41.75	1060	38.50	977.9	36.00	914	3.19	81.5	1.62	41	28	1 1/2
34	850	43.75	1111	40.50	1028.7	38.00	965	3.25	83	1.62	41	32	1 1/2
36	900	46.00	1168	42.75	1085.9	40.25	1022	3.56	90.5	1.62	41	32	1 1/2
38	950	48.75	1238	45.25	1149.4	42.25	1073	3.44	87.5	1.62	41	32	1 1/2
40	1000	50.75	1289	47.25	1200.2	44.25	1124	3.56	90.5	1.62	41	36	1 1/2
42	1050	53.00	1346	49.50	1257.3	47.00	1194	3.81	97	1.62	41	36	1 1/2
48	1200	59.50	1511	56.00	1422.4	53.50	1359	4.25	108	1.62	41	44	1 1/2
54	1350	66.25	1683	62.75	1593.9	59.50	1511	4.75	121	1.88	48	44	1 3/4
56	1400	68.75	1746	65.00	1651.0	62.00	1575	4.88	124	1.88	48	48	1 3/4
60	1500	73.00	1854	69.25	1759.0	66.00	1676	5.19	132	1.88	48	52	1 3/4

CLASS 300

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	38.25	972	34.50	876.3	29.50	749	3.12	79.5	1.75	44	28	1 5/8
28	700	40.75	1035	37.00	939.8	31.50	800	3.38	86	1.75	44	28	1 5/8
30	750	43.00	1092	39.25	997.0	33.75	857	3.62	92	1.88	48	28	1 3/4
32	800	45.25	1149	41.50	1054.1	36.00	914	3.88	99	2.00	51	28	1 7/8
34	850	47.50	1207	43.50	1104.9	38.00	965	4.00	102	2.00	51	28	1 7/8
36	900	50.00	1270	46.00	1168.4	40.25	1022	4.12	105	2.12	54	32	2
38	950	46.00	1168	43.00	1092.2	40.50	1029	4.25	108	1.62	41	32	2 1/2
40	1000	48.75	1238	45.50	1155.7	42.75	1086	4.50	114.5	1.75	44	32	1 5/8
42	1050	50.75	1289	47.50	1206.5	44.75	1137	4.69	119.5	1.75	44	32	1 5/8
48	1200	57.75	1467	54.00	1371.6	51.25	1302	5.25	133.5	2.00	51	32	1 7/8

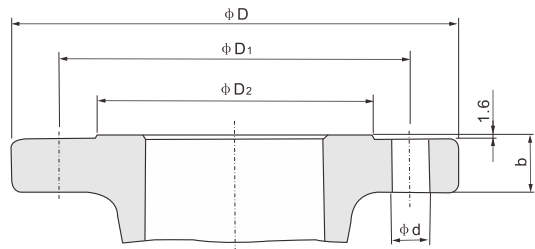
CLASS 600

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	40.00	1016	36.00	914.4	29.50	749	4.25	108	2.00	51	28	1 7/8
28	700	42.25	1073	38.00	965.2	31.50	800	4.38	111.5	2.12	54	28	2
30	750	44.50	1130	40.25	1022.4	33.75	857	4.50	114.5	2.12	54	28	2
32	800	47.00	1194	42.50	1079.5	36.00	914	4.62	117.5	2.38	60	28	2 1/4
34	850	49.00	1245	44.50	1130.3	38.00	965	4.75	121	2.38	60	28	2 1/4
36	900	51.75	1314	47.00	1193.8	40.25	1022	4.88	124	2.62	67	28	2 1/2

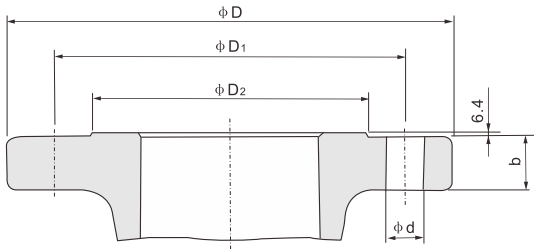
CLASS 900

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	42.75	1086	37.50	925.5	29.50	749	5.50	140	2.88	73	20	2 3/4
28	700	46.00	1168	40.25	1022.4	31.50	800	5.62	143	3.12	79	20	3

STEEL PIPE FLANGES ASME B 16.47 SERIES B & API 605 RF



Class 150 & Class 300 RF Flanges



Class 600 & Class 2500 RF Flanges

CLASS 150

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	30.94	786	29.31	744.5	28.00	711	1.62	41.5	0.88	22	36	3/4
28	700	32.94	837	31.31	795.3	30.00	762	1.75	44.5	0.88	22	40	3/4
30	750	34.94	887	33.31	846.1	32.00	813	1.75	44.5	0.88	22	44	3/4
32	800	37.06	941	35.44	900.2	34.00	864	1.81	46	0.88	22	48	3/4
34	850	39.56	1005	37.69	957.3	36.25	921	1.94	49.5	1.00	25	40	7/8
36	900	41.62	1057	39.75	1009.7	38.25	972	2.06	52.5	1.00	25	44	7/8
38	950	44.25	1124	42.12	1069.8	40.25	1022	2.12	54	1.12	28	40	1
40	1000	46.25	1175	44.12	1120.6	42.50	1080	2.19	56	1.12	28	44	1
42	1050	48.25	1226	46.12	1171.4	44.50	1130	2.31	59	1.12	28	48	1
48	1200	54.81	1392	52.56	1335.0	50.75	1289	2.56	65.5	1.25	32	44	1 1/8
54	1350	61.00	1549	58.75	1492.3	56.75	1441	2.81	71.5	1.25	32	56	1 1/8
56	1400	63.00	1600	60.75	1543.1	58.75	1492	2.88	73.5	1.25	32	60	1 1/8
60	1500	67.94	1726	65.44	1662.2	63.00	1600	3.00	76.5	1.38	35	52	1 1/4

CLASS 300

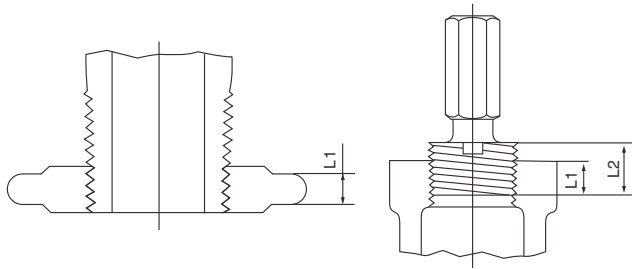
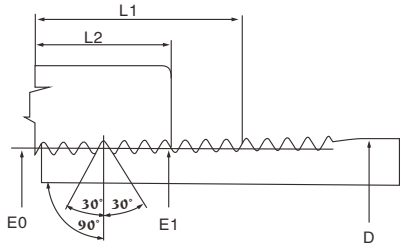
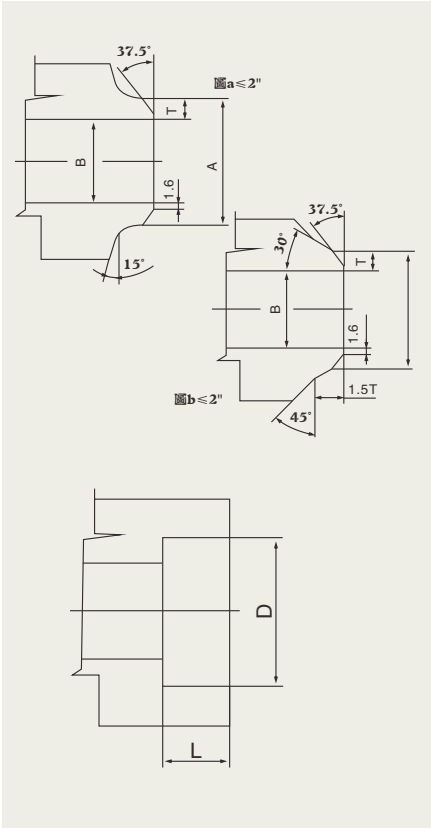
Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	34.12	867	31.62	803.1	29.00	737	3.50	89	1.38	35	32	1 1/4
28	700	36.25	921	33.75	857.3	31.00	787	3.50	89	1.38	35	36	1 1/4
30	750	39.00	991	36.25	920.8	33.25	845	3.69	94	1.50	38	36	1 3/8
32	800	41.50	1054	38.50	977.9	35.50	902	4.06	103.5	1.62	41	32	1 1/2
34	850	43.62	1108	40.62	1031.7	37.50	953	4.06	103.5	1.62	41	36	1 1/2
36	900	46.12	1171	42.88	1098.2	39.75	1010	4.6	103.5	1.75	44	32	1 5/8
38	950	48.12	1222	44.88	1140.0	41.75	1060	4.38	111.5	1.75	44	36	1 5/8
40	1000	50.12	1273	46.88	1190.8	43.88	1115	4.56	116	1.75	44	40	1 5/8
42	1050	52.50	1334	49.00	1244.6	46.00	1168	4.69	119.5	1.88	48	36	1 3/4
48	1200	59.50	1511	55.75	1416.1	52.25	1327	5.06	129	2.00	51	40	1 7/8

CLASS 600

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
26	650	35.00	889	31.75	806.5	28.62	727	4.38	111.5	1.75	44	28	1 5/8
28	700	37.50	953	34.00	863.6	30.88	784	4.56	116	1.88	48	28	1 3/4
30	750	40.25	1022	36.50	927.1	33.12	841	4.94	125.5	2.00	51	28	1 7/8
32	800	42.75	1086	38.75	984.3	35.25	895	5.12	130.5	2.12	54	28	2
34	850	45.75	1162	41.50	1054.1	37.5	965	5.56	141.5	2.38	60	24	2 1/4
36	900	47.75	1213	43.50	1104.9	39.75	1010	5.75	146.5	2.38	60	28	2 1/4

CLASS 900

Nominal Size		D		D1		D2		b		d		Bolt	
NPS	DN	In	mm	In	mm	In	mm	In	mm	In	mm	Number	Diam
	650	40.25	1022	35.50	901.7	30.00	762	5.31	135	2.62	67	20	2 1/2
26	700	43.50	1105	38.25	971.6	32.25	819	5.81	148	2.88	73	20	2 3/4
28													



BW ENDS AS PER ASME B16.25

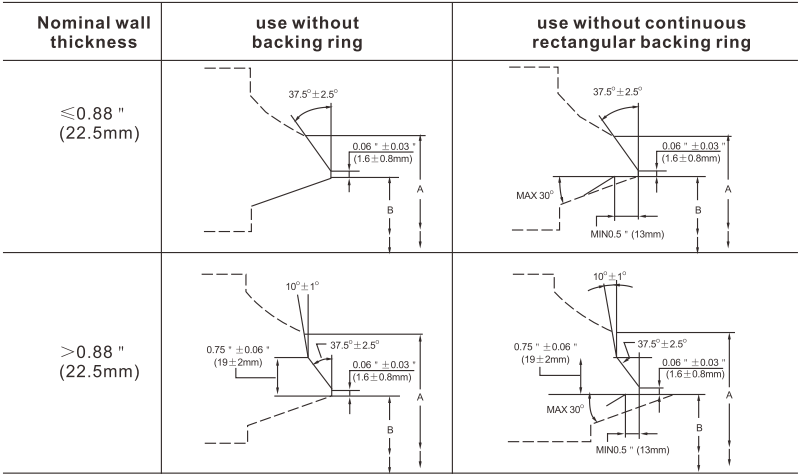
mm

NPS in	SCH.40			SCH.80			SCH.160			SCH.XXS		
	A	B	T	A	B	T	A	B	T	A	B	T
1/2	21.3	15.8	2.77	21.3	13.8	3.73	21.3	11.7	4.78	21.3	6.4	7.47
3/4	26.7	25.0	2.87	26.7	18.9	3.91	26.7	15.6	5.56	26.7	11.1	7.82
1	33.4	26.6	3.38	33.4	24.3	4.55	33.4	20.7	6.35	33.4	15.2	9.09
1 1/4	42.2	35.1	3.55	42.2	32.5	4.85	42.2	29.5	6.35	42.2	22.8	9.70
1 1/2	48.3	41.0	3.68	48.3	38.1	5.08	48.3	33.5	7.41	48.3	28.0	10.15
2	60.3	52.5	3.91	60.3	49.2	5.54	60.3	42.9	8.74	60.3	38.2	11.07
2 1/2	73.3	62.7	5.15	73.0	59.0	7.01	73.0	54.0	9.53	73.0	45.0	14.02
3	88.9	78.8	5.48	88.9	73.7	7.62	88.9	66.6	11.13	88.9	58.4	15.24
4	114.3	102.3	6.02	114.3	97.2	8.56	114.3	85.3	13.49	114.3	80.1	17.12

SW ENDS AS PER JB-ANSI-JIS

mm

NPS in	JB		ANSI		JIS	
	D	L	D	L	D	L
1/4	14.5	10.0	14.1	9.6	14.1	9.6
3/8	18.0	10.0	17.6	9.6	17.9	9.6
1/2	22.5	10.0	21.8	9.6	22.2	9.6
3/4	28.5	11.0	27.1	12.7	27.7	12.7
1	34.5	12.0	33.8	12.7	34.5	12.7
1 1/4	43.0	14	42.6	12.7	43.2	12.7
1 1/2	49.0	15	48.7	12.7	49.1	12.7
2	61.2	16	61.2	15.9	61.2	15.9



Class 150 and 300 valve which size equal to 12 inch and smaller and 12 inch valves which contract with standard wall pipe(0.375 ~ thick-ness)are regularly machined. Unless have other requirement.

Ordf for class 150 and 300 butt-welding valves which size euqal to 14 and larger and class 400 and higher valve for all sizes, it should specified the diameter of the pipe that contract with valves. If need backing ring, indicate specification.

Other types of weld end preparation would be furnished of specified.

ASME B16.25-BUTT-WELDING ENDS

1		2	3		4		5		6		7	
Nominal Pipe Diamete		Wall Thickness of Pipe Number	Outside Diameter of Welding End Steel Valve		Nominal Inside Diameter of Pipe		Machined Inside Diameter of Pipe		Nominal Wall Thickness			
NPS in.	DN mm		A		B		C		t			
			in.	mm	in.	mm	in.	mm	in.	mm		
2 1/2	65	40	2.96	75	2.88	73.0	2.469	62.5	2.479	62.93	0.203	5.16
		80	2.96	75	2.88	73.0	2.323	59	2.351	59.69	0.276	7.01
		160	2.96	75	2.88	73.0	2.125	54	2.178	55.28	0.375	9.53
3	80	XXS	2.96	75	2.88	73.0	1.771	45	1.868	47.43	0.552	14.02
		40	3.59	91	3.50	88.9	3.068	78	3.081	78.25	0.216	5.49
		80	3.59	91	3.50	88.9	2.900	73.5	2.934	74.53	0.300	7.62
		160	3.59	91	3.50	88.9	2.624	66.5	2.692	68.38	0.438	11.13
		XXS	3.59	91	3.50	88.9	2.300	58.5	2.409	61.19	0.600	15.24
3 1/2	90	40	4.12	105	4.00	101.6	3.548	90	3.564	90.52	0.226	25.74
		80	4.12	105	4.00	101.6	3.364	85.5	3.402	86.42	0.318	8.08
		XXS	4.12	105	4.00	101.6	3.068	78	3.081	78.25	0.216	5.49
4	100	40	4.62	117	4.50	114.3	4.026	102	4.044	102.73	0.237	6.02
		80	4.62	117	4.50	114.3	3.926	97	3.869	98.28	0.337	8.56
		120	4.62	117	4.50	114.3	3.624	92	3.692	93.78	0.438	11.13
		160	4.62	117	4.50	114.3	3.438	87.5	3.530	89.65	0.531	13.49
5	125	XXS	4.62	117	4.50	114.3	3.152	80	3.279	83.30	0.674	17.12
		40	5.69	144	5.56	141.3	5.047	128	5.070	128.80	0.258	6.55
		80	5.69	144	5.56	141.3	4.813	122	4.866	123.58	0.375	9.53
		120	5.69	144	5.56	141.3	4.563	116	4.647	118.04	0.500	12.70
		160	5.69	144	5.56	141.3	4.313	109.5	4.428	112.47	0.625	15.88
6	150	XXS	5.69	144	5.56	141.3	4.063	103	4.209	106.92	0.750	19.05
		40	6.78	172	6.62	168.3	6.065	154	6.094	154.82	0.280	7.11
		80	6.78	172	6.62	168.3	5.761	146.5	5.828	148.06	0.432	10.97
		120	6.78	172	6.62	168.3	5.501	140	5.600	142.29	0.562	14.27
		160	6.78	172	6.62	168.3	5.187	132	5.326	135.31	0.719	18.26
		XXS	6.78	172	6.62	168.3	4.897	124.5	5.072	128.85	0.864	21.95
8	200	40	8.78	223	8.62	219.1	7.981	203	8.020	203.75	0.322	8.18
		60	8.78	223	8.62	219.1	7.813	198.5	7.873	200.02	0.406	10.31
		80	8.78	223	8.62	219.1	7.625	193.5	7.709	195.84	0.500	12.70
		100	8.78	223	8.62	219.1	7.437	189	7.544	191.65	0.594	15.09
		120	8.78	223	8.62	219.1	7.187	182.5	7.326	186.11	0.719	18.26
		140	8.78	223	8.62	219.1	7.001	178	7.163	181.98	0.812	20.62
		XXS	8.78	223	8.62	219.1	6.875	174.5	7.053	179.16	0.875	22.23
		160	8.78	223	8.62	219.1	6.813	173	6.998	177.79	0.906	23.01
		40	10.94	278	10.75	273.0	10.020	254.5	10.070	255.74	0.365	9.27
		60	10.94	278	10.75	273.0	9.750	247.5	9.834	249.74	0.500	12.70
10	250	80	10.94	278	10.75	273.0	9.562	243	9.670	245.55	0.594	15.09
		100	10.94	278	10.75	273.0	9.312	236.5	9.451	240.01	0.719	18.26
		120	10.94	278	10.75	273.0	9.062	230	9.232	234.44	0.844	21.44
		140	10.94	278	10.75	273.0	8.750	222	8.959	227.51	1.000	25.40
		160	10.94	278	10.75	273.0	8.500	216	8.740	221.95	1.125	28.58
		STD	12.97	329	12.75	323.8	12.000	305	12.053	306.08	0.375	9.53
		40	12.97	329	12.75	323.8	11.938	303	11.999	304.72	0.406	10.31
		XS	12.97	329	12.75	323.8	11.750	298.5	11.834	300.54	0.500	12.70
12	300	60	12.97	329	12.75	323.8	11.626	295	11.725	297.79	0.562	14.27
		80	12.97	329	12.75	323.8	11.374	289	11.505	292.17	0.688	17.48
		100	12.97	329	12.75	323.8	11.062	281	11.232	285.24	0.844	21.44
		120	12.97	329	12.75	323.8	10.750	273	10.959	278.31	1.000	25.40
		140	12.97	329	12.75	323.8	10.500	266.5	10.740	272.75	1.125	28.58
		160	12.97	329	12.75	323.8	10.126	257	10.413	264.45	1.312	33.32
		STD	12.97	329	12.75	323.8	12.000	305	12.053	306.08	0.375	9.53
		40	12.97	329	12.75	323.8	11.938	303	11.999	304.72	0.406	10.31

1		2	3		4		5		6		7	
Nominal Pipe Diamete		Wall Thickness of Pipe Number	Outside Diameter of Welding End Steel Valve		Nominal Inside Diameter of Pipe		Machined Inside Diameter of Pipe		Nominal Wall Thickness			
NPS in.	DN mm		A		A1		B		C		t	
			in.	mm	in.	mm	in.	mm	in.	mm	in.	mm
14	350	STD	14.25	362	14.00	355.6	13.250	336.5	13.303	337.88	0.375	9.63
		40	14.25	362	14.00	355.6	13.124	333.5	13.192	335.08	0.438	11.13
		XS	14.25	362	14.00	355.6	13.000	330	13.084	332.34	0.500	12.70
		60	14.25	362	14.00	355.6	12.812	325.5	12.920	328.15	0.594	15.09
		80	14.25	362	14.00	355.6	12.500	317.5	12.646	321.22	0.750	19.05
		100	14.25	362	14.00	355.6	12.124	308	12.318	312.86	0.938	23.83
		120	14.25	362	14.00	355.6	11.812	300	12.044	305.93	1.094	27.79
		140	14.25	362	14.00	355.6	11.500	292	11.771	299.00	1.250	31.75
16	400	160	14.25	362	14.00	355.6	11.188	284	11.498	292.07	1.406	35.71
		STD	16.25	413	16.00	406.4	15.250	387.5	15.303	388.68	0.375	9.63
		40	16.25	413	16.00	406.4	15.000	381	15.084	383.14	0.500	12.70
		60	16.25	413	16.00	406.4	14.688	373	14.811	376.21	0.656	16.66
		80	16.25	413	16.00	406.4	14.312	363.6	14.482	367.84	0.844	21.44
		100	16.25	413	16.00	406.4	13.938	354	14.155	359.53	1.031	26.19
		120	16.25	413	16.00	406.4	13.562	344.5	13.826	351.18	1.219	30.96
		140	16.25	413	16.00	406.4	13.124	333.5	13.442	341.43	1.438	36.53
18	450	160	16.25	413	16.00	406.4	12.812	325.5	13.170	334.50	1.594	40.49
		STD	18.28	464	18.00	457.2	17.250	438	17.303	439.48	0.375	9.53
		XS	18.28	464	18.00	457.2	17.000	432	17.084	433.94	0.500	12.70
		40	18.28	464	18.00	457.2	16.876	428.5	16.975	431.19	0.562	14.27
		60	18.28	464	18.00	457.2	16.500	419	16.646	422.82	0.750	19.05
		80	18.28	464	18.00	457.2	16.124	409.5	16.318	414.46	0.938	23.83
		100	18.28	464	18.00	457.2	15.688	398.5	15.936	404.78	1.156	29.36
		120	18.28	464	18.00	457.2	15.250	387.5	15.553	395.03	1.375	34.93
20	500	140	18.28	464	18.00	457.2	14.876	378	15.225	386.77	1.162	39.67
		160	18.28	464	18.00	457.2	14.438	366.5	14.842	376.99	1.781	45.24
		STD	20.31	516	20.00	508.0	19.250	489	19.303	490.28	0.375	9.53
		XS	20.31	516	20.00	508.0	19.000	482.5	19.084	484.74	0.500	12.70
		40	20.31	516	20.00	508.0	18.812	478	18.920	480.55	0.594	15.09
		60	20.31	516	20.00	508.0	18.376	467	18.538	470.88	0.812	20.62
		80	20.31	516	20.00	508.0	17.938	455.5	18.155	461.13	1.031	26.19

UNS/ ASTM-JIS COMPARISON LIST							
UNS		BAR		CASTING		FORGING	
DESIGNATION	GRADE	JIS	ASTM	JIS	ASTM	JIS	ASTM
		G4303	A276	G5121	A351	G3214	A182
S20910	AUSTENITIC STEELS						
S21800	22Cr-12Ni5Mn-2Mo-V-N-0.04C		XM-19		CG6MMN		F XM-19
S21904	17Cr-8.5Mo-8Mn-4Si-N-0.08C		—		CF102MnN		
S24000	20Cr-6.5Ni-9Mn-N-0.08C		XM-11				F XM-11
S24100	18Cr-3Ni-13Mn-N-0.06C		XM-29				
JIS	18Cr-1.5Ni-13Mn-N-0.1C		XM-28				
S30200	17Cr-7Ni-0.1C		SUS 301				
JIS	18Cr-8Ni-0.1C	SUS 302	302	SCS 12	(A743 CF-20)	SUS F 304	(A473 302)
S30400	18Cr-8Ni-0.06C	SUS 304		SCS 13		SUS F 304	
JIS	18Cr-8Ni-0.06C	SUS 304	304	SCS 13A	CF8, 8A	SUS F 304L	F 304
S30403	18Cr-9Ni-Lo,C	SUS 304L		SCS 19		SUS F 304L	
S30409	18Cr-9Ni-Lo,C	SUS 304L	304L	SCS 19A	CF3, 3A	SUS F 304H	F 304L
S30430	18Cr-8Ni-0.07C		(A479 304H)		CF 10		F 304H
S30451	18Cr-9Ni-3.5Cu-0.06C	SUSXM7	XM-7				
S30452	18Cr-8Ni-0.15N-0.06C	SUS 304N1	304N				F 304N
S30453	18Cr-8Ni-0.25N-0.06C	SUS 304N2	XM-21				
—	18Cr-9Ni-0.15N-0Lo,C	SUS 304LN	304LN				F 304LN
S30600	18Cr-13Ni-0.06C	SUS 305J1					
S30800	18Cr-15Ni-4Si-0.009C						F 46
S30815	20Cr-11Ni-0.06C		308		(A743 CG12)		(A473 308)
S30880	20Cr-10Ni-1.15Si-N-Ce-0.08C		—				F45
S30900	21Cr-10Ni-2Mn-Si-0.06C		ER308				
S30908	22Cr-12Ni-0.1C		309	SCS 17	CH20		(A473 309)
S30909	22Cr-12Ni-0.06C	SUS 309S	309S		CH8		(A473 309S)
S30940	22Cr-12Ni-0.07C				CH10		(A336 F 309H)
S31000	22Cr-12Ni-Cb-0.06C		309Cb			SUS F 310	
S31008	25Cr-20Ni-0.1C		310	SCS18	CK20		F310
S31040	25Cr-20Ni-0.06C	SUS 310S	310S				(A473 310S)
S31254	25Cr-20Ni-Cb-0.06C		310Cb				
S31400	20Cr-18Ni-6.5Mo-N-Cu-0.01C		—		CK3MCuN		F44
JIS	25Cr-20Ni-2Si-0.15C		314			SUS F 316	(A473 314)
S31600	18Cr-12Ni-2.5Mo-0.06C	SUS 316		SCS 14		SUS F 316	
JIS	18Cr-12Ni-2.5Mo-0.06C	SUS 316	316	SCS 14A	CF8M	SUS F 316L	F316
S31603	18Cr-12Ni-2.5Mo-Lo,C	SUS 316L		SCS 16		SUS F 316L	
S31609	18Cr-12Ni-2.5Mo-Lo,C	SUS 316L	316L	SCS 16A	CF3M, 3MA	SUS F 316H	F316L
S31635	18Cr-12Ni-2.5Mo-0.07C		(A479 316H)		CF10M		F316H
S31640	18Cr-12Ni-2.5Mo-Ti-0.06C		316Ti				
S31651	18Cr-13Ni-2Mo-Cb-0.06C		316Cb	SCS 22	CF10MC		
S31653	18Cr-12Ni-2.5Mo-0.15N-0.06C	SUS 316N	316N				F316N
S31654	18Cr-12Ni-2.5Mo-0.15N-Lo, C	SUS 316LN	316LN		(A743 CF-3MN)		F316LN
JIS	18Cr-12Ni-2.5Mo-0.2N-Lo, C		—		(A743 CF-3MN)		
JIS	18Cr-12Ni-2Mo-2Cu-0.06C	SUS 316J1		BCS 15			
S31700	18Cr-12Ni-2Mo-2Cu-Lo, C	SUS 316J1L		BCS 20			
S31703	18Cr-12Ni-3.5Mo-0.06C	SUS 317	317		CGBM		F317
S31725	18Cr-12Ni-3.5Mo-Lo, C	SUS 317L					F317L
S32100	18Cr-16Ni-5Mo-Lo, C	SUS 317L	—			SUS F 321	
S32109	18Cr-9Ni-Ti-0.06C	SUS 321	321			SUS F 321H	F321
S33100	18Cr-9Ni-Ti-0.07C		(A479 321H)				F321H
S34700	8Cr-20Ni-1Si-Mn-0.15C					SUS F 347	F10
S34709	18Cr-9Ni-Cb-0.06C	SUS 347	347	SCS 21	CFBC	SUS F 347H	F347
S34800	18Cr-9Ni-Cb-0.07C		(A479 347H)				F347H
JIS	18Cr-9Ni-Cb-0.06C		318				F348
—	18Cr-13Ni-4Si-0.06C	SUS XM15J1					
—	20Cr-24Ni-3Mo-2Cu-3Si-0.05C				(A743 CN-7MS)		
—	20Cr-29Ni-2.5Mo-3.5Cu-0.05C			SCS 23	CN7M		
—	20Cr-33Ni-Min-Si-Cb-0.01C				CT15C		
—	21Cr-24Ni-5Mo-Lo, C				(A743 CN-3M)		
—	25Cr-20Ni-0.03C				HK30		
—	25Cr-20Ni-0.04C				HK40		
FERRITIC-AUSTENTIC STEELS							
S31100	25Cr-6Ni-0.04C		XM-26				
S31200	25Cr-6Ni-2Mo-N-Lo,C						F50
S31803	25Cr-6Ni-3Mo-N-Lo,C		—	SCS 10			F51
—	25Cr-5Ni-2Mo-3Cu-0.02C				CD4MCu		
S32900	25Cr-4.5Ni-2Mo-0.06C			SCS 11			

SPECIAL ALLOY STEEL							
TYPE OF STEEL	GRADE	BAR		CASTING	FORGING		
		JIS	ASTM	ASTM	ASTM		
Carpenter 20	Cr-Ni-Fe-Mo-Cu-Cb		B473 NO8020		B462 NO8020		
Alloy 20 Cb-3	35Ni-20Cr-2.5Mo-39Fe-35Cu-Cb-0.05C			A 351 CN7N			
CN7M, SCS 23	29Ni-20Cr-2.5Mo-45Fe-35Cu-0.05C			A 743 CM-7MS			
CN-7MS	24Ni-19Cr-2.5Mo-49Fe-2Cu-3Si-0.05C						
Carpenter 20 Mod	Ni-Fe-Cr-Mo				B621 NO8320		
Alloy 20 Mod	26Ni-22Cr-5Mo-47Fe-Ti-0.03C		B621 NO8320		B621 NO8320		
CN-3M	25Ni-21Cr-5Mo-49Fe-Lo, C			A 743 CM-3M			
Nickel	Ni						
Alloy 200	99Ni-0.1C	H 4562 NNCB	B160 NO2200		B160 NO2200		
Alloy 201	99Ni-0.01C	H 4562 NNCB	B160 NO2201		B160 NO2201		
CZ-100	97Ni-0.8C			A 494 CZ-100			
Duranickel 301	95Ni-4.5A1-Ti-0.2C	H 4562 NDB					
Monel	Ni-Cu						
Alloy 400	69Ni-31Cu-0.2C(Si<0.5) (S<0.024)	H 4553 NCuB	B164 NO4400		B164 NO4400		
Alloy 405	69Ni-31Cu-0.2C(Si<0.5) (S:0025 - 0.06)		B164 NO4405		B164 NO4405		
M-35-1	70Ni-30Cu-0.25C(Si<1.25)			A 494 M-351			
M-35-2	70Ni-30Cu-0.25C(Si<2.00)			A 494 M-35-2			
N-30H	67Ni-31Cu-3Si-0.2C			A 494 M-30H			
M-25S	66Ni-30Cu-4Si-0.15C			A 494 M-25S			
M-30C	66Ni-30Cu-1.5Si-2Cb-0.2C			A 494 M-30C			
Inconel	Ni-Cr-Fe(Ni-Cr-Mo-Cb)						
Alloy 600	77Ni-15Cr-8Fe-0.1C	G 4901 NCF 600	B 166 NO6600		B 564 NO6600		
CY 40	77Ni-15Cr-(8Fe)-0.3C			A 494 CY-40			
Alloy 625	65Ni-22Cr-9Mo-4Cb-0.08C		B 446 NO6625		B 564 NO6625		
CW-6MC	65Ni-22Cr-9Mo-4Cb-0.04C			A 494 CW-6MC			
Inconel 601	61Ni-23Cr-14Mo-1.5A1-0.08C	G 4901 NCF 601					
Inconel 609	62Ni-23Cr-9Fe-0.03C	B 166 NO6690					
Inconel X-750	73Ni-16Cr-7Fe-1Cb-2.5Ti-A1-0.06C	G 4901 NCF 750	B 637 NO7750		B 637 NO7750		
Inconel 751	73Ni-16Cr-7Fe-1Ni-2.5Ti-A1-0.08C	G 4901 NCF 751					
CY5SnBIM	76Ni-13Cr-3Mo-4Bi-4Sn-0.03C			A 494 CY5SnSim			
Incoloy	Ni-Fe-Cr(Ni-Fe-Cr-Mo-Cu)						
Alloy 800	33Ni-21Cr-46Fe-A1-Ti-0.08C	G 4901 NCF 800	B 408 NO8800		B 564 NO8800		
Alloy 800H	33Ni-21Cr-46Fe-A1-Ti-0.075C	G 4901 NCF 800H	B 406 NO8810		B 564 NO8810		
Alloy 825	42Ni-22Cr-3Mo-30Fe-2Cu-1Ti-0.03C	G 4901 NCF 825	B 425 NO8825		B 425 NO8825		
Hastelloy B	Ni-Mo						
Alloy B	67Ni-28Mo-5Fe-V-0.03C		B 335 N10001		B 335 N10001		
A-12MV	67Ni-28Mo-5Fe-V-0.1C			A 494 N-12MV			
Alloy B-2	72Ni-28Mo-0.01C		B 335 N10665		B 335 N10665		
N-7M	68Ni-32Mo-0.05C			A 494 N-7M			
Hastelloy C	Ni-Mo-Cr						
Alloy C-276	58Ni-16Cr-16Mo-6Fe-4W-0.005C		B 574 N10276		B 335 N10276		
CW-12MW	58Ni-16Cr-16Mo-6Fe-4W-0.01C			A 494 CW-12MW			
Alloy C-4	68Ni-16Cr-16Mo-0.008C		B 574 NO6455		B 574 NO6455		
CW-2M	68Ni-16Cr-16Mo-0.01C			A 494 CW-12M			
Alloy C-22	58Ni-21Cr-14Mo-4Fe-3W-0.008C		B 574 NO6022		B 574 NO6022		
CW-6M	62Ni-19Cr-19Mo-0.05C			A 494 CW-6M			
Hastelloy G	Ni-Cr-Fe-Mo-Cu						
Alloy G	46Ni-22Cr-6.5Mo-20Fe-5Mn-2Cu-0.03C		B 581 NO6007		B 581 NO6007		
Alloy G-2	50Ni-25Cr-6Mo-17Fe-1Cu-1Ti-Lo, C		B 581 NO6975		B 581 NO6975		
Alloy G-30	44Ni-30Cr-5Mo-15Fe-2Cu-1Cb-3W-Lo, C		B 581 NO6030		B 581 NO6030		
Alloy G-3	49Ni-22Cr-7Mo-20Fe-2Cu-0.08C		B 581 NO6985		B 581 NO6985		
Hastelloy N	Ni-Mo-Cr-Fe						
Alloy N	76Ni-7Cr-17Mo-0.06C		B 573 N10003		B 573 N10003		
Hastelloy X	Ni-Cr-Mo-Fe						
Alloy X	48Ni-22Cr-9Mo-19Fe-1.5Co-W-0.1C		B 572 NO6002		B 572 NO6002		
Js 700	Ni-Fe-Cr-9Mo-Cb						
Alloy 700	25Ni-21Cr-4.5Mo-49Fe-Cb-0.02C		B 581 NO_700 ₈	A 743 CN-3M	B 672 NO8700		
CN-3M	25Ni-21Cr-5Mo-49Fe-Lo, C						
904L	Ni-Fe-Cr-9Mo-Cb						
Alloy 904L	26Ni-21Cr-4.5Mo-47Fe-1.5Cu-0.01C		B 649 NO8904		B 649 NO8904		
RA-330	Ni-Fe-Cr-Si						
Alloy 330	36Ni-19Cr-44Mo-1Si-0.06C		B 511NO8330		B 511NO8330		
Nimonic 80A	Ni-Cr						
Nimonic 80A	76Ni-20Cr-2Ti-1.5A1-0.08C	G 4901 NCF 80A	B 637 NO7080		B 637 NO7080		
IN-102	Ni-Cr-Fe-Cb-Mo-W						
IN-102	66Ni-15Cr-3Mo-7Fe-3Cb-3W-A1-Ti-MgB-Zr-0.06C		B518 NO6102				
Affcorr	Ni-Cr-Mo-W						
Affcorr	55Ni-31Cr-10.5Mo-2.5W-Cb-0.1C		B 756 NO6110		B 564 NO6110		

MATERIALS																			
ASTM		Chemical Compositions %										Mechanical			Hardness Charpy				
Code	C V	Mn V	P V	S V	Si V	Cr V	Mo V	Ni V	Cu V	V V	Nb V	Tensile MPa, Δ	Yield MPa, Δ	Elongation %, Δ	Reduce %, Δ	Brinell HB, Δ	J, Δ		
A105	0.35	0.60~ 1.05	0.035	0.040	0.010~ 0.35	0.30	0.12	0.4	0.40	0.08	0.02	485	250	30	30	187			
A182F11	0.05~ 0.15	0.30~ 0.60	0.030	0.030	0.50~ 1.00	1.00~ 1.50	0.44~ 0.65					415	205	20	45	121~ 174			
A182F22	0.05~ 0.15	0.30~ 0.60	0.040	0.040	0.50	2.00~ 2.50	0.87~ 14.13					415	205	20	35	170			
A182F304	0.08	2.00	0.045	0.030	1.00	18.0~ 20.0		8.0~ 11.0				515	205	30	50				
A182F304L	0.030	2.00	0.045	0.030	1.00	18.0~ 20.0		8.0~ 13.0				485	170	30	50				
A182F316	0.08	2.00	0.045	0.030	1.00	16.0~ 18.0	2.00~ 3.00	10.0~ 14.0				515	205	30	50				
A182F316L	0.030	2.00	0.045	0.030	1.00	16.0~ 18.0	2.00~ 3.00	10.0~ 15.0				485	170	30	50				
A182F51	0.030	2.00	0.030	0.020	1.00	21.0~ 23.0	2.5~ 3.5	4.5~ 6.5				620	450	25	45				
A182F6a	0.15	1.00	0.040	0.030	1.00	11.5~ 13.5		0.50				585	380	18	35	167~ 229			
A193B7	0.37~ 0.49	0.65~ 1.10	0.035	0.040	0.15~ 0.35	0.75~ 1.20	0.15~ 0.25					860	720	16	50	321			
A193B7M	0.37~ 0.49	0.65~ 1.10	0.035	0.040	0.15~ 0.35	0.75~ 1.20	0.15~ 0.25	8.0~ 11.0				690	550	18	50	235			
A193B8	0.08	2.00	0.045	0.030	1.00	18.0~ 20.0		10.0~ 14.0		0.25~ 0.35		515	205	30	50	223			
A193B8M	0.08	2.00	0.045	0.030	1.00	16.0~ 18.0	2.00~ 3.00					515	205	30	50	223			
A193B16	0.36~ 0.47	0.45~ 0.70	0.035	0.040	0.15~ 0.35	0.80~ 1.15	0.50~ 0.65					860	720	18	50	321			
A1942H	Δ 0.40	1.00	0.040	0.050	0.04											248~ 352			
A1942HM	Δ 0.40	1.00	0.040	0.050	0.04			8.0~ 11.0								159~ 237			
A1948	0.08	2.00	0.045	0.030	1.00	18.0~ 20.0		10.0~ 14.0								126~ 300			
A1948M	0.08	2.00	0.045	0.030	1.00	16.0~ 18.0	2.00~ 3.00									126~ 300			
A216WCB	0.30	1.00	0.04	0.045	0.60	0.50	0.20	0.50	0.30	0.03		485~ 655	250	22	35				
A216WCC	0.25	1.20	0.04	0.045	0.60	0.50	0.2	0.50	0.30	0.03		485~ 655	275	22	35				
A217C5	0.20	0.40~ 0.70	0.04	0.045	0.75	4.00~ 6.50	0.45~ 0.65	0.50	0.50			620~ 795	415	18	35				
A217CA15	0.15	1.00	0.040	0.040	1.50	11.5~ 14.0	0.50	1.00				620~ 795	450	18	30				
A217WC6	0.05~ 0.20	0.50~ 0.80	0.04	0.045	0.60	1.00~ 1.50	0.45~ 0.65	0.50	0.50			485~ 655	275	20	35				
A217WC9	0.05~ 0.18	0.40~ 0.70	0.04	0.045	0.60	2.00~ 2.75	0.90~ 1.250		0.50			485~ 655	275	20	35				
A276410	0.08~ 0.15	1.00	0.040	0.030	1.00	11.5~ 13.5						480	275	20	45				
A276420	Δ 0.15	1.00	0.040	0.030	1.00	12.0~ 14.0										241			
A320L7	0.38~ 0.048	0.75~ 1.00	0.035	0.040	0.15~ 0.35	0.80~ 1.10	0.15~ 0.25					860	725	16	50		Avg:27; min:20		
A320L7M	0.38~ 0.048	0.75~ 1.00	0.035	0.040	0.15~ 0.358	0.80~ 1.10	0.15~ 0.25					690	550	18	50	235	Avg:27; min:20		
A336F22	0.05~ 0.15	0.30~ 0.60	0.025	0.025	0.50	2.00~ 2.50	0.90~ 1.10					515~ 690	310	19	40				
A350LF1	0.30	0.60~ 1.35	0.035	0.040	0.15~ 0.30	0.30	0.12	0.40	0.40	0.08	0.02	415~ 585	205	28	38		Avg:18; min:14		
A350LF2	0.30	0.60~ 1.35	0.035	0.040	0.15~ 0.30	0.30	0.12	0.40	0.40	0.08	0.02	485~ 655	250	30	30		Avg:20; min:16		
A351CF3	0.03	1.50	0.040	0.040	2.00	1.70~ 21.0	0.50	8.0~ 12.0				485	205	35.0					
A351CF3M	0.03	1.50	0.040	0.040	1.50	17.0~ 21.0	2.0~ 3.00	9.0~ 13.0				485	205	30.0					
A351CF8	0.08	1.50	0.040	0.040	2.00	18.0~ 21.0	0.50	8.0~ 11.0				485	205	35.0					
A351CF8M	0.08	1.50	0.040	0.040	1.50	18.0~ 21.0	2.0~ 3.00	9.0~ 12.0				485	205	30.0					
A351CF8C	0.08	1.50	0.040	0.040	2.00	18.0~ 21.0	0.50	9.0~ 12.0	03.0~4.0			485	2085	30.0					
A351CN7M	0.07	1.50	0.040	0.040	1.50	19.0~ 22.0	2.0~ 3.00	27.5~ 30.5				425	170	35					
A352LC1	0.25	0.50~ 0.80	0.04	0.045	0.60		0.45~ 0.65					450~ 620	240	24	35				
A352LC2	0.25	0.50~ 0.80	0.04	0.045	0.60			2.00~ 3.00				485~ 655	275	24	35		Avg:18; min:14		
A352LC3	0.15	0.50~ 0.80	0.04	0.045	0.60			3.00~ 4.00				485~ 655	275	24	35		Avg:20; min:16		
A352LCB	0.30	1.00	0.04	0.045	0.60	0.50	0.20	0.50	0.30	0.03		450~ 620	240	24	35		Avg:20; min:16		
A352LCC	0.25	1.20	0.04	0.045	0.60	0.50	0.20	0.50		0.03		485~ 655	275	22	35	139~ 202	Avg:18; min:14		
A439D2	3.00	0.70~ 14.25	0.08		1.50~ 3.00	1.75~ 2.75		18.00~ 22.00				400	207	8.0			Avg:20; min:16		

ral 1000	ral 1001	ral 1002	ral 1003	ral 1004	ral 1005	ral 1006	ral 1007
ral 1011	ral 1012	ral 1013	ral 1014	ral 1015	ral 1016	ral 1017	ral 1018
ral 1019	ral 1020	ral 1021	ral 1023	ral 1024	ral 1027	ral 1028	ral 1032
ral 1033	ral 1034	ral 2000	ral 2001	ral 2002	ral 2003	ral 2004	ral 2008
ral 2009	ral 2010	ral 2011	ral 2012	ral 3000	ral 3001	ral 3002	ral 3003
ral 3004	ral 3005	ral 3007	ral 3009	ral 3011	ral 3012	ral 3013	ral 3014
ral 3015	ral 3016	ral 3017	ral 3018	ral 3020	ral 3022	ral 3027	ral 3031
ral 4001	ral 4002	ral 4003	ral 4004	ral 4005	ral 4006	ral 4007	ral 4008
ral 4009	ral 5000	ral 5001	ral 5002	ral 5003	ral 5004	ral 5005	ral 5007
ral 5008	ral 5009	ral 5010	ral 5011	ral 5012	ral 5013	ral 5014	ral 5015
ral 5017	ral 5018	ral 5019	ral 5020	ral 5021	ral 5022	ral 5023	ral 5024
ral 6000	ral 6001	ral 6002	ral 6003	ral 6004	ral 6005	ral 6006	ral 6007
ral 6008	ral 6009	ral 6010	ral 6011	ral 6012	ral 6013	ral 6014	ral 6015
ral 6016	ral 6017	ral 6018	ral 6019	ral 6020	ral 6021	ral 6022	ral 6024
ral 6025	ral 6026	ral 6027	ral 6028	ral 6029	ral 6032	ral 6033	ral 6034
ral 7000	ral 7001	ral 7001	ral 7002	ral 7003	ral 7004	ral 7005	ral 7006
ral 7008	ral 7009	ral 7010	ral 7011	ral 7012	ral 7013	ral 7015	ral 7016
ral 7021	ral 7022	ral 7023	ral 7024	ral 7026	ral 7030	ral 7031	ral 7032
ral 7033	ral 7034	ral 7035	ral 7036	ral 7037	ral 7038	ral 7039	ral 7040
ral 7042	ral 7043	ral 7044	ral 8000	ral 8001	ral 8002	ral 8003	ral 8004
ral 8007	ral 8008	ral 8011	ral 8012	ral 8014	ral 8015	ral 8016	ral 8017
ral 8019	ral 8022	ral 8023	ral 8024	ral 8025	ral 8028	ral 9001	ral 9002
ral 9003	ral 9004	ral 9005	ral 9010	ral 9011	ral9016	ral 9017	ral 9018

Note: For an exact reproduction of the colors it is advisable to doing refer a original RAL card.