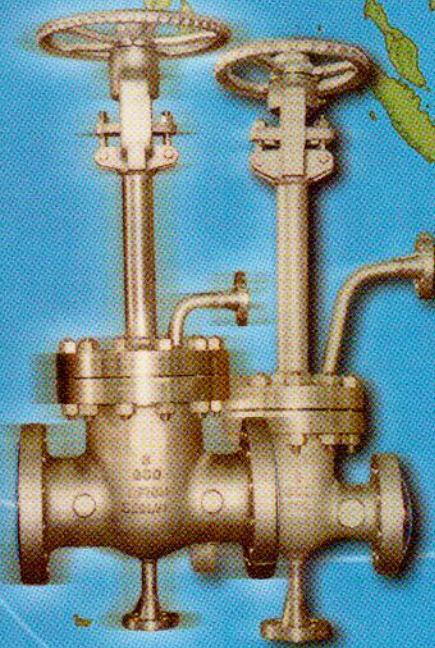


AUTHORIZED COMPANY



# CASTING VALVE

GATE VALVE • GLOBE VALVE • SWICH • BALL • PLUG • VALVE  
CARBON & ALLOY STEEL STAINLESS STEEL VALVE

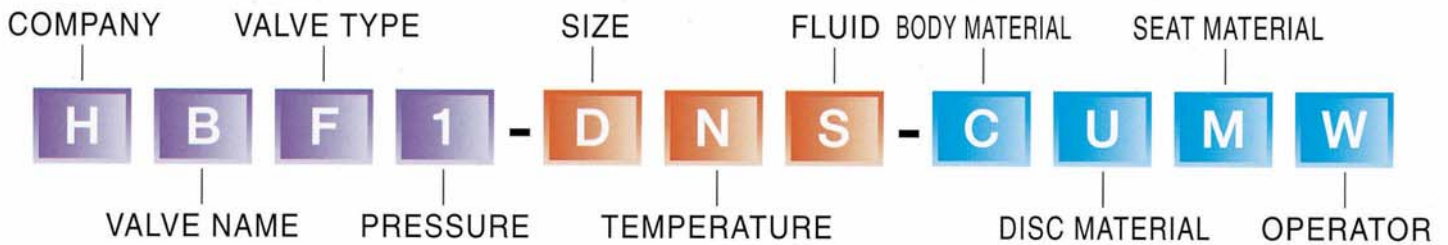


*Hawks Eng'r Co., Ltd.*





# Hawks ENG'R Co., Ltd.



**H-COMPANY**  
HAWKS Co., Ltd.

**B-VALVE NAME**  
B/Butterfly, GA/Gate,  
GL/Globe, BA/Ball,  
CH/Check.

**F-VALVE TYPE**  
F/Flange, L/Lugged,  
W/Wafer, B/Butt  
Weld, S/Special

**1-PRESSURE**  
1/10k(150#), 2/20k(300#),  
3/30k(450#), 4/40k(600#),  
6/60k(900#), 9/90k(1500#), etc...

**D-SIZE**  
Standard -- 2"~24"  
A/2", B/2.5", C/3", D/4", E/5", F/6",  
G/8", H/10", J/12", K/14", L/16", M/18",  
N/20", O/24", P/28", Q/32", R/36", S/40",  
T/44", U/48". etc ... Others is a  
marking of additionally  
dependable by the buyer.

**N-TEMPERATURE**  
1/100°C, 2/200°C, 3/300°C,  
5/500°C, 7/700°C, 9/900°C  
N/20 (normal temp')  
Low temp is a marking of  
additionally dependable by  
the buyer.

**S-FLUID**  
S/Steam, W/Water,  
O/Oil, G/Gas,  
B/Brine, C/Chemical

**C-BODY MATERIAL**  
D : CARBON STEEL  
E : HIGH TEMP ALLOY STEEL  
F : LOW TEMP ALLOY STEEL  
S : STAINLEN STEEL  
Others is a marking of  
additionally dependable  
by the buyer.

**DISC MATERIAL**  
S : 304, 316SS  
F : A217-CA15  
W : A216-WCB  
Others is a marking of  
additionally dependable  
by the buyer.

**SEAT MATERIAL**  
M : 304SS, 316SS  
H : HF STELLITE  
F : FULL STELLITE  
Others is a marking of  
additionally dependable  
by the buyer.

**W-OPERATOR**  
L/Hand wheel  
W/Worm gear  
P/Pneumatic actuator  
H/Hydraulic actuator  
E/Electric actuator

## Plug valve



Sleeve type soft plug valve

Connection lifting plug valve

Inverted pressure balance lubricated plug valve

Double flush plug valve

3-way plug valve

Orbit plug valve

Hawks plug valve has inverted pressure balance lubricated plug valve, connection lifting plug valve, Orbit plug valve, Sleeve type soft sealing plug valve and 3-way 4-way plug valve, Plug valves with Single or double flush. Our only explain there into a rew. If you need other, please to inquire us. Plug valve acc. To ANSI is applicable to the cutting and connection of pipelines medium that are used in various industries such as petroleum, chemical industry, pharmacy, chemical fertilizer, power industry etc. under nominal pressure of Class 150~1500Lbs, and working temperature of -29~550. The end of plug valve: Butt welded end and flange. Diving manner: hand wheel, gear, wrench.

### Plug valve design construction and specifications

Hawks cast plug valve conform to API 599, API 6D and ANSI B16.34, Each is tested according to API 598, API 6D and Marking is per MSS-SP-25.

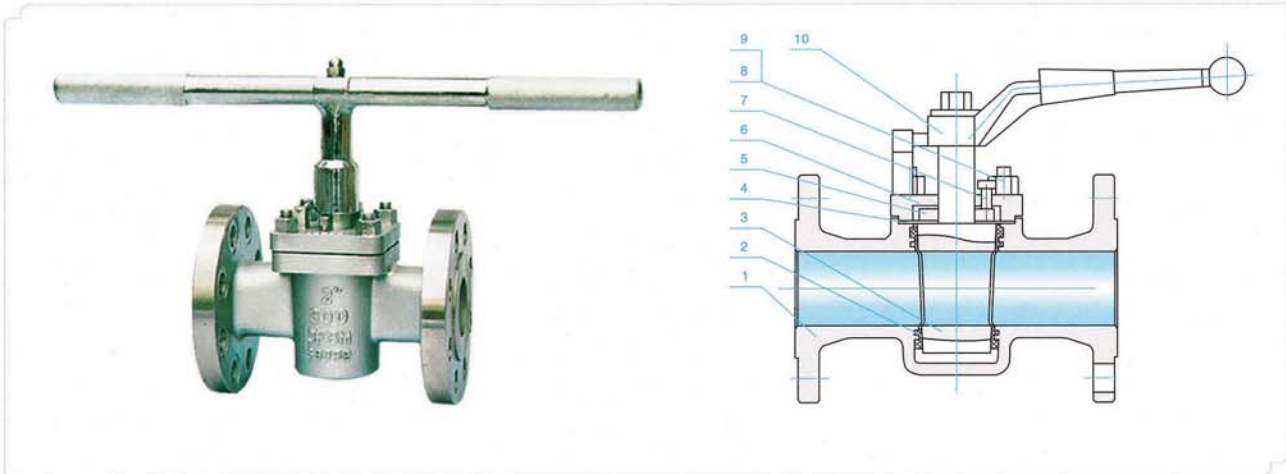
### Products performance specifications

Nominal pressure Lbs	Shell seat (MPa)	Sealing test (MPa)	Suitable temp (°C)	Suitable medium (°C)
150	3.0	2.2	≤180°C	WOG
300	7.5	5.5		
600	15.0	11.0		
900	22.5	16.5		



## Plug valve

### Sleeve type soft sealing plug valve



### Standards compliance

**Design and Manufacture:** API 599, API 6D

**Face to face(end to end):** ANSI B 16.10

**Flanged connection:** ANSI B16.5

**Test and inspection:** API 598, API 6D

### Main structural features

Bolt cover, plug 90 degree around.

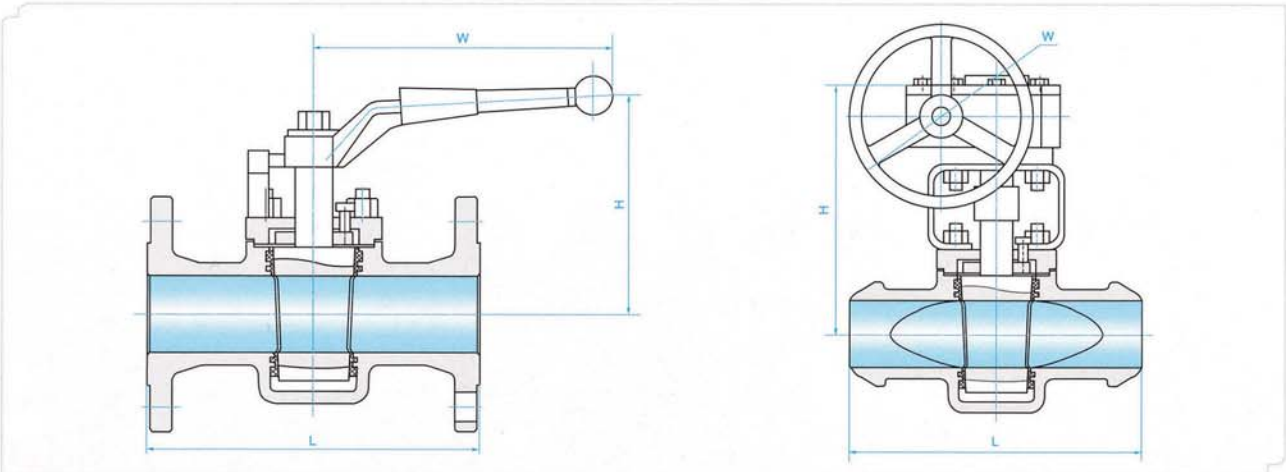
Its sealing is realized by the sealing face around the sleeve. It has unique 360 degree metal edge for protection and fixing of the sleeve. There is no cavity in the valve for accumulation of medium. Metal edge provides the function of self-cleaning when the plug is rotated, applicable to the operation condition that is glutinous and apt to smudge. Double direction.

### Main parts materials

NO.	Part name Body	Material				
		A216 WCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
1	Sleeve	A216 WCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
2	Plug	PTFE/RTFE				
3	Gasket	A182 F6a	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
4	Adjusting gasket	Flexible graphite+stainless steel PTFE				
5	Cover	A182 F6a	A182 F304	A182 F316	A182 F304L	A182 F316L
6	Adjusting bolt	A216 WCB	A351 CF8	A351 CF8	A351 CF3	A351 CF3M
7	Bolt/nut	A193 B7	A193 B8	A193 B8M	A193 B8M	A193 B8M
8、9	Wrench	B7/2H	B8/8	B8M/8M	B8M/8M	B8M/8M
10		ASTM A105/A216 WCB				

# Plug valve

## Sleeve type soft sealing plug valve



		Dimensions														
		Class 150Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF	mm	108	117	127	140	165	178	190	203	229	254	267	292	330	356	381
H	mm	110	115	115	135	140	150	165	180	380	460	520	580	620	680	760
W	mm	175	175	175	220	280	305	350	405	300	300	320	320	350	380	450
Weight	Kg	8.5	9.5	10.5	12	14	18	22	26	40	60	70	130	219	381	570

		Dimensions														
		Class 300Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	140	152	165	178	190	216	241	283	305	381	403	419	457	502	762
H	mm	110	115	115	135	140	150	165	180	380	460	520	580	620	680	760
W	mm	175	175	175	220	280	305	350	405	300	300	320	320	350	380	450
Weight	Kg	9.5	10.5	12	14	16	20	24	29	53	75	85	185	230	390	550

		Dimensions														
		Class 600Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	165	190	216	229	241	292	330	356	432	508	559	660	787	838	889
H	mm	110	115	115	135	140	150	165	180	380	460	520	580	620	680	760
W	mm	175	175	175	220	280	305	350	405	300	300	320	320	350	380	450
Weight	Kg	11	13	17	20	23	27	31	36	72	98	141	245	330	515	710

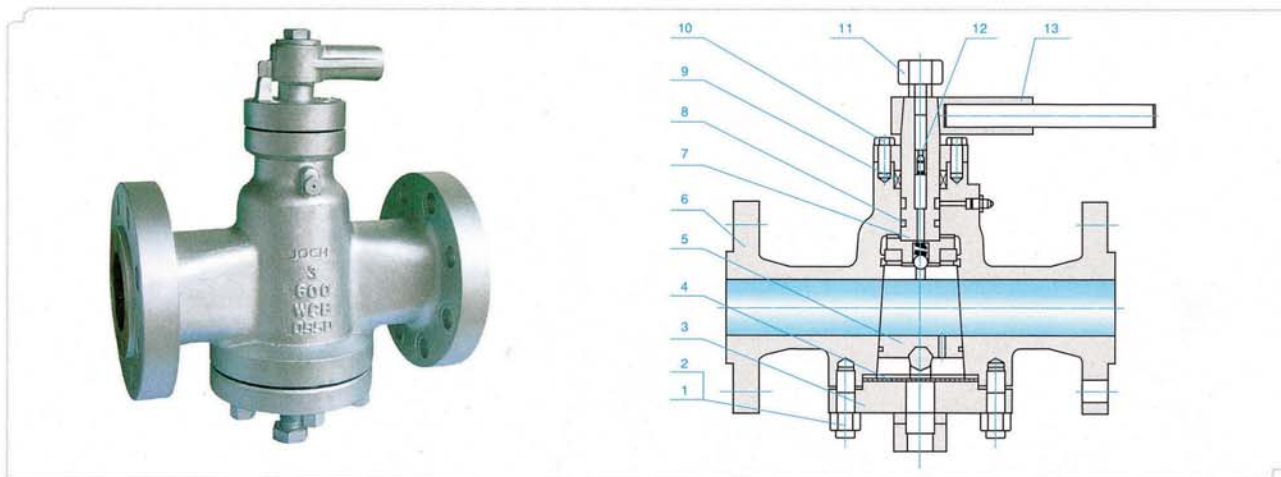
		Dimensions														
		Class 900Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	229	229	254	279	305	368	419	381	457	559	610	737	838	965	1029
H	mm	110	115	115	135	140	150	165	180	380	460	520	580	620	680	760
W	mm	175	175	175	220	280	305	350	405	300	300	320	320	350	380	450
Weight	Kg	13	16	21	24	28	32	40	47	91	117	165	285	420	610	860

4" or above with worm gear



## Plug valve

### Inverted pressure balance lubricated plug valve



### Standards compliance

**Design and Manufacture:** API 599, API 6D  
**Face to face(end to end):** ANSI B 16.10  
**Flanged connection:** ANSI B16.5  
**Butt welded end:** ANSI B16.25  
**Test and inspection:** API 598, API 6D

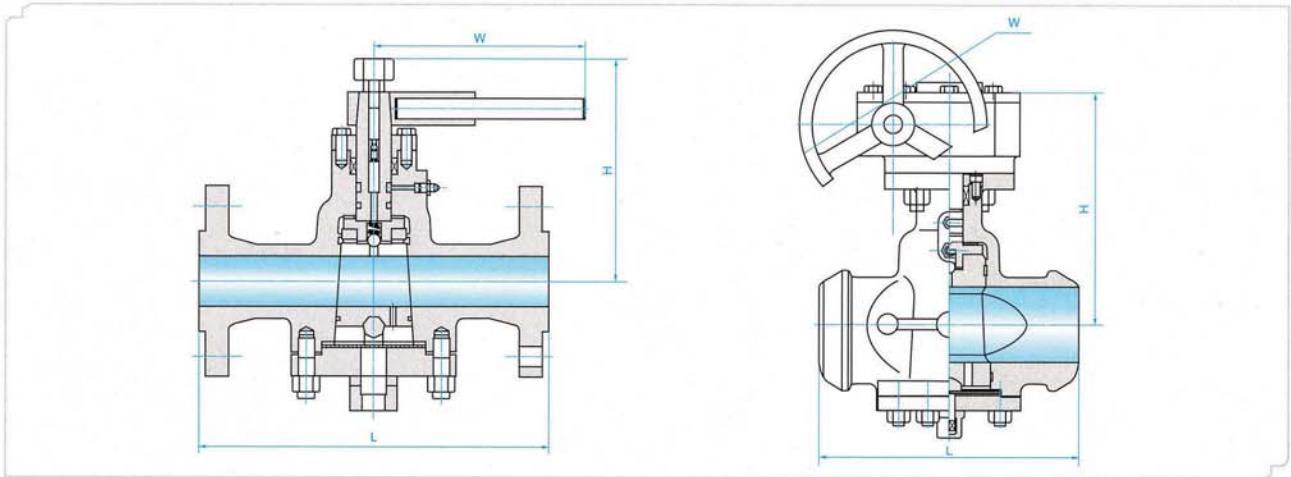
Bolt cover, structure of flip-chip balanceable pressure and light on/off operation. An oil groove is set between valve body and seal surface, which may infuse the seal grease to increase the seal capability.

### Main parts materials

NO.	Part name	Material				
		A216 WCB	A351 Cf8	A351 CF8M	A351 CF3	A351 CF3M
1、 2	Body/Nut	A193 B7/A194 2H	A193 B8/A194 8	A193 B8M		A194 8M
3	Cover	A216 WCB	A351 CF8		A351 CF8M	
4	Gasket	Flexible graphite+stainless steel/PTFE				
5	Plug	A182 F304	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
6	Body	A216 WCB	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
7	stem	A182 F410	A182 F304	A182 F316	A182 F304L	A351 CF3M
8	"O" ring	NBR/FEP/SBR				
9	Packing	Flexible graphite/PTFE				
10	Gland	A216 WCB	A351 CF8		A351 CF8M	
11、 12	Ochozzle/check valve	Material see body				
13	Wrench	ASTM A47-32510 A216 WCB				

## Plug valve

### Inverted pressure balance lubricated plug valve



		Dimensions														
		Class 150Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF	mm	108	117	127	140	165	178	190	203	229	254	267	292	330	356	381
H	mm	180	180	185	200	210	215	250	270	300	340	365	400	450	510	590
W	mm	400	400	500	500	600	600	820	820	300	300	320	320	350	380	380
Weight	Kg	10	12	14	17	19	21	29	33	48	75	98	125	171	230	370

		Dimensions														
		Class 300Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	140	152	165	178	190	216	241	283	305	381	403	419	457	502	762
H	mm	180	180	185	200	210	215	250	270	300	340	365	400	450	510	590
W	mm	400	400	500	500	600	600	820	820	300	300	320	320	350	380	380
Weight	Kg	12	14	16	19	21	24	31	36	61	86	130	190	225	380	560

		Dimensions														
		Class 600Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	165	190	216	229	241	292	330	356	432	508	559	660	787	838	889
H	mm	180	180	185	200	210	215	250	270	300	340	365	400	450	510	590
W	mm	400	400	500	500	600	600	820	820	300	300	320	320	350	380	380
Weight	Kg	14	16	18	20	24	29	35	47	91	129	210	320	660	920	1250

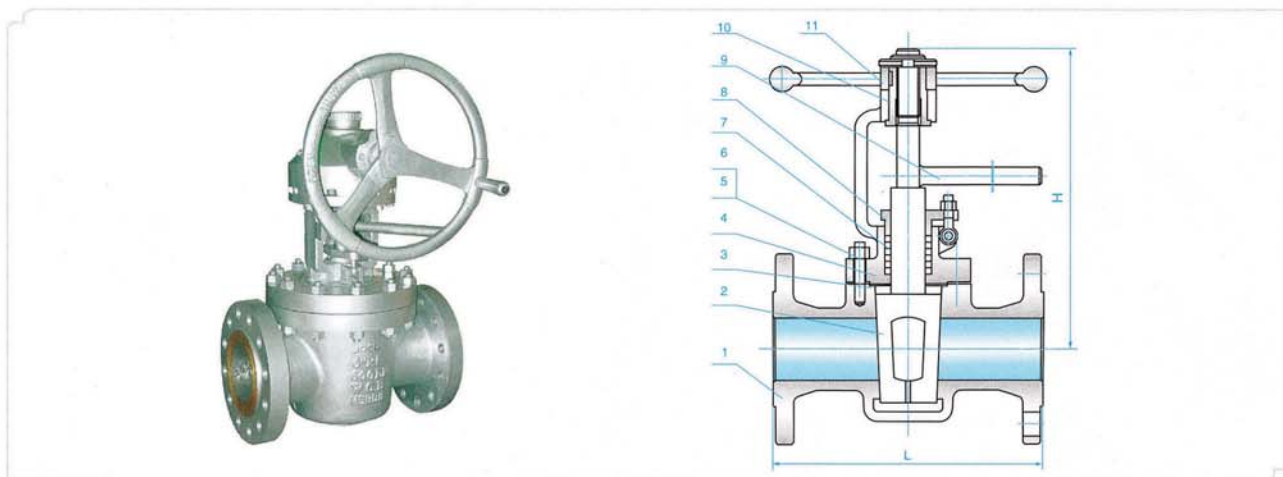
		Dimensions														
		Class 900Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	229	229	254	279	305	368	419	381	457	559	610	737	838	965	1029
H	mm	180	180	185	200	210	215	250	270	300	340	365	400	450	510	590
W	mm	400	400	500	500	600	600	820	820	300	300	320	320	350	380	380
Weight	Kg	17	19	21	24	30	37	44	65	110	160	255	380	810	1050	1460

4" or above with worm gear



## Plug valve

### Connection lift plug valve



### Standards compliance

**Design and Manufacture:** API 599, API 6D  
**Face to face(end to end):** ANSI B 16.10  
**Flanged connection:** ANSI B16.5

**Butt welded end:** ANSI B16.25  
**Test and inspection:** API 598, API 6D

### Main structural features

Bolt bonnet OS & Y lifting–round plug,

Opening and closing of the valve is carried out while the sealed surface is taken off, so it will not cause abrasion on the sealed surface. Double direction.

### Principle of opening and closing of the valve

process of opening and closing of the valve. When opening the valve, first of all, turn the hand wheel to make the plug lifted and separated with the sealed surface, the turn the handle by 90 degree to connect the channel of plug with the channel of valve body. So that the valve is opened. When closing the valve, first of all turn the handle by 90 degree to mark the channel of plug vertical to the channel of valve body, and then the hand wheel to descend the plug. So that the valve is closed.

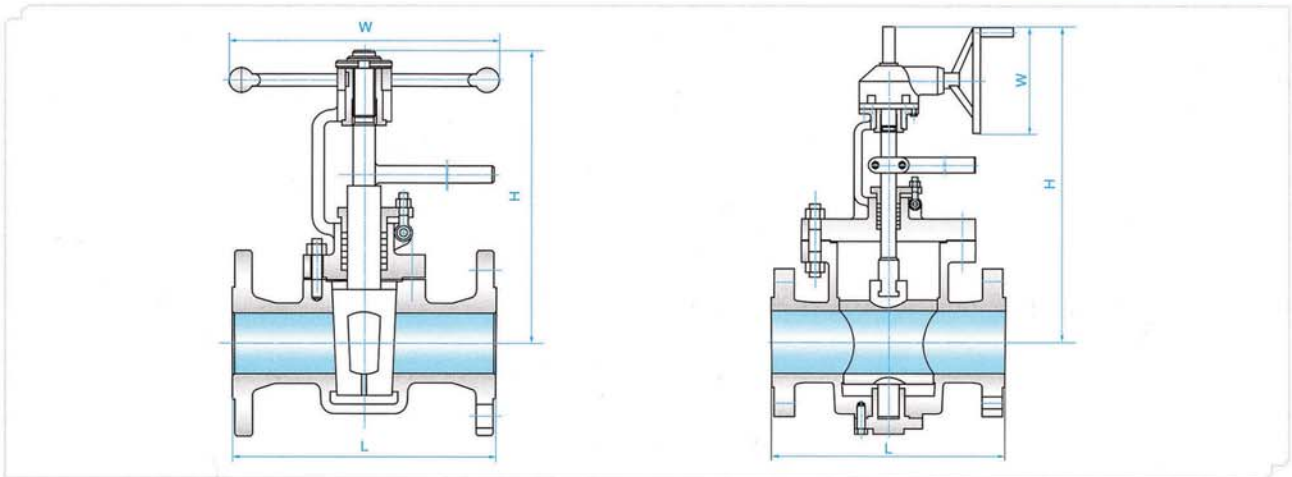
### Main parts materials

NO.	Part name	Material						
		A216 WCB	A217 WC9	A217 C5	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
1	Body	A216 WCB	A217 WCB	A217 C5	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
2	Plug	A351 CF8	A351 CF8	A351 Cf8	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
3	Gasket	Flexible graphite+stainless steel/PTFE						
4	Cover	A216 WCB	A217 WC9	A217 C5	A351 CF8	A351 CF8M	A351 CF3	A351 CF3M
5	Bolt	A193 B7	A193 B16	A193 B16	A193 B8	A193 B8M		
6	Nut	A194 2H	A194 4	A194 4	A194 8	A193 8M		
7	Packing	Flexible graphite/PTFE						
8	Gland	A216 WCB	A216 WC9	A216 C5	A351 CF8		A351 CF8M	
9	Wrench	A216 WCB	A216WC9	A216 C5	A351 CF8		A351 CF8M	
10	Yoke nut	A439–D2/Cu–Allog						
11	Hand wheel	ASTM A536 Gr.60–40–18 A216 WCB						



## Plug valve

### Connection lift plug valve



		Dimensions														
		Class 150Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF	mm	108	117	127	140	165	178	190	203	229	254	267	292	330	356	381
H	mm	190	195	225	260	280	310	340	395	435	470	535	590	630	680	720
W	mm	120	140	140	180	200	220	260	300	300	340	400	450	450	500	500
Weight	Kg	9	10	11	17	19	23	25	32	55	82	98	130	178	250	380

		Dimensions														
		Class 300Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	140	152	165	178	190	216	241	283	305	381	403	419	457	502	762
H	mm	190	195	225	260	280	310	340	395	435	470	535	590	630	680	720
W	mm	120	140	140	180	200	220	260	280	300	340	400	450	450	500	500
Weight	Kg	10	12	14	19	21	28	34	39	75	85	135	200	255	415	650

		Dimensions														
		Class 600Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	165	190	216	229	241	292	330	356	432	508	559	660	787	838	889
H	mm	190	195	225	260	280	310	340	395	435	470	535	590	630	680	720
W	mm	120	140	140	180	200	220	260	280	300	340	400	450	450	500	500
Weight	Kg	13	14	19	23	25	32	40	55	105	139	300	440	730	1150	1570

		Dimensions														
		Class 900Lb														
Size	inch	1/2	3/4	1	1 1/4	1 1/2	2	2 1/2	3	4	5	6	8	10	12	14
L-RF.BW	mm	229	229	254	279	305	368	419	381	457	559	610	737	838	965	1029
H	mm	190	195	225	260	280	310	340	395	435	470	535	590	630	680	720
W	mm	120	140	140	180	200	220	260	280	300	340	400	450	450	500	500
Weight	Kg	16	17	26	30	33	39	50	70	137	181	397	590	860	1470	1880



## Plug valve



Center line butterfly valve



Triple eccentric butterfly valve



Adjust butterfly valve

Hawks butterfly valves have center line, eccentric and triple eccentric types. Classified for stop type, adjust type and vent types, Metal seal and non-metal seal. The liner materials of centerline butterfly valve. Including PTEF, NR, EPDM, NBR, SI, VITON, CR, IIP, suitable for different temperature and medium. Eccentric butterfly valve has flexible seal, multiple-line seal and metal seal. The end connection of butterfly valve has flexible seal, multiple-line seal and metal seal. The end connection of butterfly valve including wafer, double flange, butt weld, lug wafer. There are rich varieties of types for selection, only some types are shown in this book, please contact us for more information.

### Butterfly valve design construction and specifications

Hawks cast butterfly valve conform to API 609, MSS-SP-68, ANSI B16.34. Each is tested according to API 598 and Marking is per MSS-SP-25.

#### Construction is as follows

Triple eccentric butterfly valve, Beveled wedge disc, small friction and torque, self-clean, Manual, electric, pneumatic and gear operation etc  
Applicable for chemical industry, petroleum, water supply and drain of city, heat supply, metallurgy, water treatment etc.  
Close and open smartly, prompt, light weight, small figure.

#### Seat material and working temperature

EPDM	-40~+125°C
NBR	-20~82°C
SI	-70~+150°C
VITON	-23~+150°C
PTFE	23~+150°C
316+Graphite	-46~+350°C
STL/STL	-46~+350°C

#### Pressure test

Class	Shell test(MPa)	Seal test(MPa)	Air test(MPa)
150Lb	3.1	2.3	0.5~0.7
300Lb	7.6	3.6	0.5~0.7
600Lb	16.0	11.0	0.5~0.7



# ENGINEERING DATA

## CONFORMANCE STANDARDS

HAWKS VALVES CONFORM TO THE FOLLOWING STANDARDS AS APPLICABLE TO CUSTOMER REQUIREMENTS.

API Spec 6D Latest Edition API Standard 598 Latest Edition API Standard 600 Latest Edition API Standard 603 Latest Edition API Standard 605 Latest Edition	: API Specification for Pipeline Valves : Valve Inspection and Test : Steel Gate Valves, Flanged and Butt-welding Ends : Class 150, Cast Corrosion-Resistant Flanged-End Gate Valves : Large-Diameter Carbon Steel Flanges
ANSI B16.5 Latest Edition ANSI B16.10 Latest Edition ANSI B16.25 Latest Edition ANSI B16.34 Latest Edition MSS Standard Practice SP-6 Latest Edition  MSS Standard Practice SP-25 Latest Edition MSS Standard Practice SP-44 Latest Edition MSS Standard Practice SP-45 Latest Edition	: Steel Pipe Flanges and Flanged Fittings : Face-to-Face and End-to-End Dimensions of Ferrous Valves : Butt-welding Ends : Valves-Flanged, Threaded, And Welding End : Standard Finishes for Contact Faces of Pipe Flanges and Connecting-End Flanges of Valves and Fittings : Standard Marking System for Valves, Fittings, Flanges and Unions : Steel Pipe Line Flanges : By-Pass and Drain Connection Standard
BS 1414 Latest Edition BS 1868 Latest Edition BS 1873 Latest Edition BS 5352 Latest Edition BS 6364 Latest Edition	: Steel wedge gate valves(flange and butt-welding ends) : Steel check valves(flange and butt-welding ends) : Steel globe and globe stop and check valves(flange and butt-welding ends) : Steel wedge gate, globe and check valves(50mm & smaller) : Valve for cryogenic service
JIS B2003 Latest Edition JIS B2201 Latest Edition JIS B2203 Latest Edition JIS B2210 Latest Edition JIS B2071 Latest Edition JIS B2073 Latest Edition JIS B2074 Latest Edition JIS B2081 Latest Edition JIS B2083 Latest Edition JIS B2084 Latest Edition JPI 7S-15 Latest Edition JPI 7S-23 Latest Edition JPI 7S-24 Latest Edition JPI 7S-39 Latest Edition JPI 7S-46 Latest Edition JPI 7S-47 Latest Edition	: General Rules for Inspection of Valves : Pressure Ratings for Ferrous Material Pipe Flanges : Tolerances for Pipe Flanges : Basic Dimensions of Ferrous Material Pipe Flanges : 10kgf/cm <sup>2</sup> Cast Steel Flanged Globe Valves : 10kgf/cm <sup>2</sup> Cast Steel Flanged Gate Valves(Outside Screw Type) : 10kgf/cm <sup>2</sup> Cast Steel Flanged Swing Check Valves : 20kgf/cm <sup>2</sup> Cast Steel Flanged Globe Valves : 20kgf/cm <sup>2</sup> Cast Steel Flanged Gate Valves(Outside Screw Type) : 20kgf/cm <sup>2</sup> Cast Steel Flanged Swing Check Valves : Steel Pipe Flanges for The Petroleum Industry : Ring Joint Gaskets and Grooves for Petroleum Industry : Standard Marking System for valves : Valve Inspection and Test : Cast Steel Flanged Valves for the Petroleum Industry(Class 150,300) : Cast Steel Valves for the Petroleum Industry, Flanged or Butt-welding Ends (Class600 to 2500)
API ANSI ASTM ASME ASS BS JIS JPI NACE AWS	: American Petroleum Institute : American National Standards Institute : American Society for Testing and Materials : American Society of Mechanical Engineers : Manufacturers Standardization society of the Valve and Fitting Industry : British Standards Institution : Japanese Industrial Standards : Japan Petroleum Institute : National Association of corrosion Engineers : American welding Society



# ENGINEERING DATA

## VALVE WALL THICKNESS

### (API 603 ANSI B16.34)

#### • LIGHT WALL

NOMINAL SIZE		RATINGS											
		150#		300#		600#		900#		1500#		2500#	
		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
½	15	0.11	3.0	0.12	3.1	0.13	3.4	0.16	4.1	0.19	4.8	0.25	6.3
¾	20	0.12	3.1	0.15	3.8	0.16	4.1	0.18	4.6	0.23	5.8	0.29	7.4
1	25	0.16	4.1	0.19	4.8	0.19	4.8	0.22	5.6	0.26	6.6	0.35	8.9
1¼	32	0.19	4.8	0.19	4.8	0.19	4.8	0.25	6.4	0.31	7.8	0.44	11.2
1½	40	0.19	4.8	0.19	4.8	0.22	5.6	0.28	7.1	0.38	9.6	0.50	12.7
2	50	0.22	5.6	0.25	6.4	0.25	6.4	0.31	7.9	0.44	11.2	0.62	15.8
2½	65	0.22	5.6	0.25	6.4	0.28	7.1	0.34	8.6	0.50	12.7	0.75	19.0
3	80	0.22	5.6	0.28	7.1	0.31	7.9	0.41	10.4	0.62	15.7	0.88	22.4
4	100	0.25	6.4	0.31	7.8	0.38	9.6	0.50	12.7	0.75	19.0	1.09	27.7
5	125	0.28	7.1	0.38	9.6	0.44	11.2	0.59	15.0	0.91	23.1	1.34	34.0
6	150	0.28	7.1	0.38	9.6	0.50	12.7	0.72	18.3	1.09	27.7	1.59	40.4
8	200	0.31	8.1	0.44	11.2	0.62	15.8	0.88	22.4	1.41	35.8	2.06	52.3
10	250	0.34	8.6	0.50	12.7	0.75	19.0	1.06	26.9	1.72	43.7	2.59	65.8
12	300	0.38	9.6	0.56	14.2	0.91	23.1	1.25	31.8	2.00	50.8	3.03	77.0
14	350	0.41	10.4	0.62	15.8	0.97	24.6	1.38	35.0	2.19	55.6	3.34	84.8
16	400	0.44	11.2	0.69	17.5	1.09	27.7	1.56	39.6	2.50	63.5	3.81	96.8
18	450	0.47	11.9	0.75	19.0	1.22	31.0	1.75	44.4	2.81	71.4	4.27	108.5
20	500	0.50	12.7	0.81	20.6	1.34	34.0	1.91	48.5	3.12	79.2	4.69	119.1
24	600	0.57	14.5	0.94	23.9	1.59	40.4	2.28	57.9	3.72	94.5	5.72	145.3

### (API 600)

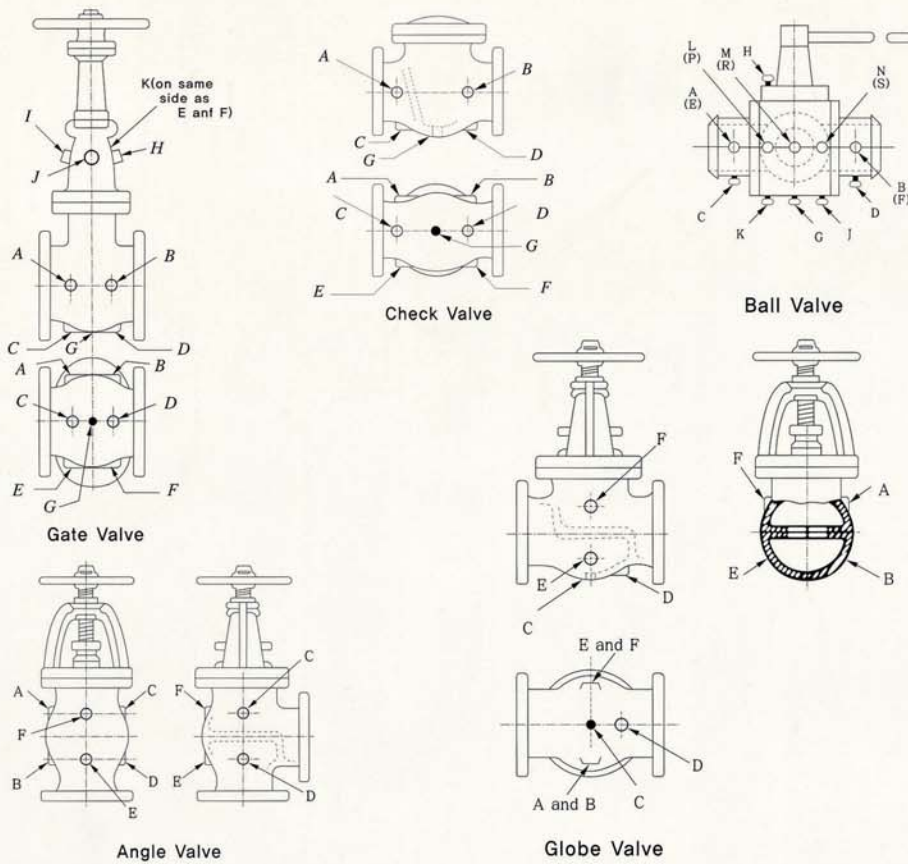
#### • HEAVY WALL

NOMINAL SIZE		RATINGS											
		150#		300#		600#		900#		1500#		2500#	
		INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM	INCH	MM
½	15	-	-	-	-	-	-	-	-	-	-	-	-
¾	20	-	-	-	-	-	-	-	-	-	-	-	-
1	25	0.25	6.4	0.25	6.4	0.31	7.9	0.50	12.7	0.50	12.7	0.59	15.0
1¼	32	0.25	6.4	0.25	6.4	0.34	8.6	0.56	14.2	0.56	14.2	0.69	17.5
1½	40	0.25	6.4	0.31	7.9	0.37	9.4	0.59	15.0	0.59	15.0	0.75	19.1
2	50	0.34	8.6	0.38	9.7	0.44	11.2	0.75	19.1	0.75	19.1	0.88	22.4
2½	65	0.38	9.7	0.44	11.2	0.47	11.9	0.88	22.4	0.88	22.4	1.00	25.4
3	80	0.41	10.4	0.47	11.9	0.50	12.7	0.75	19.1	0.94	23.9	1.19	30.2
4	100	0.44	11.2	0.50	12.7	0.63	16.0	0.84	21.3	1.13	28.7	1.41	35.8
5	125	-	-	-	-	-	-	-	-	-	-	-	-
6	150	0.47	11.9	0.63	16.0	0.75	19.1	1.03	26.2	1.50	38.1	1.91	48.5
8	200	0.50	12.7	0.69	17.5	1.00	25.4	1.25	31.8	1.88	47.8	2.44	62.0
10	250	0.56	14.2	0.75	19.1	1.13	28.7	1.44	36.6	2.25	57.2	2.66	67.6
12	300	0.63	16.0	0.81	20.6	1.25	31.8	1.66	42.2	2.63	66.8	3.41	86.6
14	350	0.66	16.8	0.88	22.4	1.38	35.1	1.81	46.0	2.75	69.9	-	-
16	400	0.69	17.5	0.94	23.9	1.50	38.1	2.06	52.3	3.13	79.5	-	-
18	450	0.72	18.3	1.00	25.4	1.63	41.4	2.25	57.2	3.50	88.9	-	-
20	500	0.75	19.1	1.06	26.9	1.75	44.5	2.50	63.5	3.88	98.6	-	-
24	600	0.81	20.6	1.19	30.2	2.00	50.8	2.88	73.2	4.50	114.3	-	-



# ENGINEERING DATA

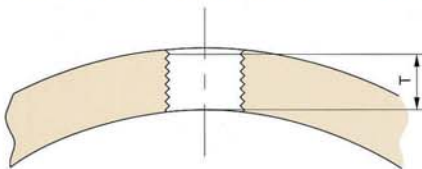
## Auxiliary Connection to ANSI B16.34



**GENERAL NOTE**

The above sketches represent valves with symmetrical shapes. Sketches are illustrative only and do not imply design.

### METHOD OF DESIGNATING LOCATION OF AUXILIARY CONNECTIONS WHEN SPECIFIED

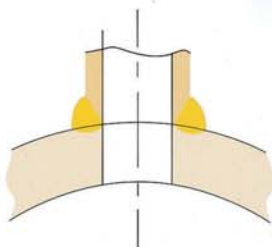


Conn Size NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Length of Thread, T, [Note(1)]							
in	0.41	0.53	0.55	0.68	0.71	0.72	0.76
mm	11	14	14	18	18	19	20

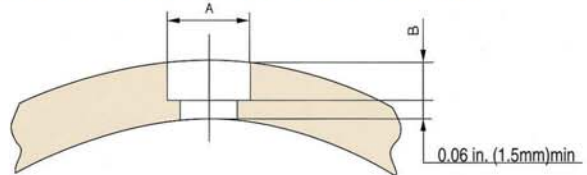
**NOTE :**

(1) In no case shall the effective length, T, be less than shown in table above. These lengths are equal to the effective thread lengths of American National External Pipe Threads (ANSI B1.1).

### THREAD LENGTH FOR AUXILIARY CONNECTIONS

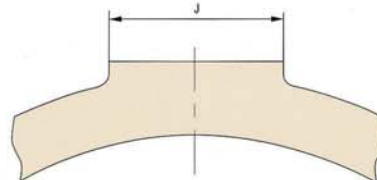


### BUTTWELDING FOR AUXILIARY CONNECTIONS



Conn. Size, NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Min. Dia of Socket, A							
in	0.690	0.855	1.065	1.330	1.675	1.915	2.406
mm	17.5	22	27	34	43	49	61
Min. Dia of Socket, B							
in	0.19	0.19	0.25	0.25	0.25	0.25	0.31
mm	5	5	6.5	6.5	6.5	6.5	8

### SOCKET WELDING FOR AUXILIARY CONNECTIONS



Conn Size NPS	3/8	1/2	3/4	1	1 1/4	1 1/2	2
Length of Thread, T, [Note(1)]							
in	0.41	0.53	0.55	0.68	0.71	0.72	0.76
mm	11	14	14	18	18	19	20

### BOSSES FOR AUXILIARY CONNECTIONS



# ENGINEERING DATA

## JIS-ASTM Material Comparison List

UNS DESIGNATION	GRADE	BAR		CASTING		FORGING	
		JIS	ASTM	JIS	ASTM	JIS	ASTM
		G 4303	A276	G 5121	A 351	G 3214	A 182
<b>AUSTENITIC STEELS</b>							
S20910	22Cr-12Ni5Mn-2Mo-Cb-V-N-0.04C		XM-19		CG6MMN		F XM-19
S21800	17Cr-8.5Mo-8Mn-4Si-N-0.08C		—		CF102MnN		
S21904	20Cr-6.5Ni-9Mn-N-0.08C		XM-11				F XM-11
S24000	18Cr-3Ni-13Mn-N-0.06C		XM-29				
S24100	18Cr-1.5Ni-13Mn-N-0.1C		XM-28				
JIS	17Cr-7Ni-0.1C		SUS 301				
S30200	18Cr-8Ni-0.1C	SUS 302	302	SCS 12	(A743 CF-20)		(A473 302)
JIS	18Cr-8Ni-0.06C	SUS 304		SCS 13		SUS F 304	
S30400	18Cr-8Ni-0.06C	SUS 304	304	SCS 13A	CF8, 8A	SUS F 304	F304
JIS	18Cr-9Ni-Lo, C	SUS 304L		SCS 19		SUS F 304L	
S30403	18Cr-9Ni-Lo, C	SUS 304L	304L	SC519A	CF3, 3A	SUS F 304L	F304L
S30409	18Cr-8Ni-0.07C		(A479 304H)		CF10	SUS F 304H	F304H
S30430	18Cr-9Ni-3.5Cu-0.06C	SUS XM7	XM-7				
S30451	18Cr-8Ni-0.15N-0.06C	SUS 304N1	304N				F304N
S30452	18Cr-8Ni-0.25N-0.06C	SUS 304N2	XM-21				
S30453	18Cr-9Ni-0.15N-0Lo, C	SUS 304LN	304LN				F304LN
—	18Cr-13Ni-0.06C	SUS 305J1					
S30600	18Cr-15Ni-4Si-0.009C						F46
S30800	20Cr-11Ni-0.06C		308		(A743 CG12)		(A473 308)
S30815	20Cr-10Ni-1.5Si-N-Ce-0.08C		—				F45
S30880	21Cr-10Ni-2Mn-Si-0.06C		ER308				
S30900	22Cr-12Ni-0.1C		309	SCS 17	CH20		(A473 309)
S30908	22Cr-12Ni-0.06C	SUS 309S	309S		CH8		(A473 309S)
S30909	22Cr-12Ni-0.07C				CH10		(A336 F 309H)
S30940	22Cr-12Ni-Cb-0.06C		309Cb				
S31000	25Cr-20Ni-0.1C		310	SCS 18	CK20	SUS F 310	F310
S31008	25Cr-20Ni-0.06C	SUS 310S	310S				(A473 310S)
S31040	25Cr-20Ni-Cb-0.06C		310Cb				
S31254	20Cr-18Ni-6.5Mo-N-Cu-0.01C		—		CK3MCuN		F44
S31400	25Cr-20Ni-2Si-0.15C		314				(A473 314)
JIS	18Cr-12Ni-2.5Mo-0.06C	SUS 316		SCS 14		SUS F 316	
S31600	18Cr-12Ni-2.5Mo-0.06C	SUS 316	316	SCS 14A	CF8M	SUS F 316	F316
JIS	18Cr-12Ni-2.5Mo-Lo, C	SUS 316L		SCS 16		SUS F 316L	
S31603	18Cr-12Ni-2.5Mo-Lo, C	SUS 316L	316L	SCS 16A	CF3M, 3MA	SUS F 316L	F316L
S31609	18Cr-12Ni-2.5Mo-0.07C		(A479 316H)		CF10M	SUS F 316H	F316H
S31635	18Cr-12Ni-2.5Mo-Ti-0.06C		316Ti				
S31640	18Cr-13Ni-2Mo-Cb-0.06C		316Cb	SCS 22	CF10MC		
S31651	18Cr-12Ni-2.5Mo-0.15N-0.06C	SUS 316N	316N				F316N
S31653	18Cr-12Ni-2.5Mo-0.15N-Lo, C	SUS 316LN	316LN		(A743 CF-3MN)		F316LN
S31654	18Cr-12Ni-2.5Mo-0.2N-Lo, C		—		(A-743 CF-3MN)		
JIS	18Cr-12Ni-2Mo-2Cu-0.06C	SUS 316J1		BCS 15			
JIS	18Cr-12Ni-2Mo-2Cu-Lo, C	SUS 316J1L		SCS 20			
S31700	18Cr-12Ni-3.5Mo-0.06C	SUS 317	317		CG8M		F317
S31703	18Cr-12Ni-3.5Mo-Lo, C	SUS 317L					F317L
S31725	18Cr-16Ni-5Mo-Lo, C	SUS 317L	—				
S32100	18Cr-9Ni-Ti-0.06C	SUS 321	321			SUS F 321	F321
S32109	18Cr-9Ni-Ti-0.07C		(A479 321H)			SUS F 321H	F321H
S33100	8Cr-20Ni-1Si-Mn-0.15C						F10
S34700	18Cr-9Ni-Cb-0.06C	SUS 347	347	SCS 21	CF8C	SUS F 347	F347
S34709	18Cr-9Ni-Cb-0.07C		(A479 347H)			SUS F 347H	F347H
S34800	18Cr-9Ni-Cb-0.06C		318				F348
JIS	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-Mn-Si-Cb-0.01C				CT15C		
—	21Cr-24Ni-5Mo-Lo, C				(A743 CN-3M)		
—	25Cr-20Ni-0.3C				HK30		
—	25Cr-20Ni-0.4C				HK40		
<b>FERRITIC-AUSTENITIC STEELS</b>							
S31100	25Cr-6Ni-0.04C		XM-26				
S31200	25Cr-6Ni-2Mo-N-Lo, C						F50
S31803	23Cr-6Ni-3Mo-N-Lo, C		—	SCS10			F51
—	25Cr-5Ni-2Mo-3Cu-0.02C				CD4MCu		
S32900	25Cr-4.5Ni-2Mo-0.06C	SUS 329J1		SCS11			



# ENGINEERING DATA

## SPECIAL ALLOY STEEL

TAPE OF STEEL	GRADE	BAR		CASTING		FORGING	
		JIS	ASTM	JIS	ASTM	JIS	ASTM
<b>Carpenter 20</b>	Cr-Ni-Fe-Mo-Cu-Cb						
Alloy 20Cb-3	35Ni-20Cr-2.5Mo-39Fe-35Cu-Cb-0.05C		B 473 NO8020				B 462 NO8020
CN7M, SCS 23	29Ni-20Cr-2.5Mo-45Fe-35Cu-0.05C			G 5121 SCS 23	A 351 CN7N		
CN-7MS	24Ni-19Cr-2.5Mo-49Fe-2Cu-3Si-0.05C				A 743 CM-7MS		
<b>Carpenter 20 Mod</b>	Ni-Fe-Cr-Mo						
Alloy 20 Mod	26Ni-22Cr-5Mo-47Fe-Ti-0.03C		B 621 NO8320				B 621 NO8320
CN-3M	25Ni-21Cr-5Mo-49Fe-Lo, C				A 743 CM-3M		
<b>Nickel</b>	Ni						
Alloy 200	99Ni-0.1C	H 4562 NNCB	B 160 NO2200				B 160 NO2200
Alloy 201	99Ni-0.01C	H 4562 NLCB	B 160 NO2201				B 160 NO2201
CZ-100	97Ni-0.8C				A 494 CZ-100		
Duranickel 301	95Ni-4.5Al-Ti-0.2C	H 4562 NDB					
<b>Monel</b>	Ni-Cu						
Alloy 400	69Ni-31Cu-0.2C(Si<0.5) (S<0.024)	H4553 NCuB	B 164 NO4400				B 164 NO4400
Alloy 405	69Ni-31Cu-0.2C(Si<0.5) (S:0.025-0.06)		B 164 NO4405				B 164 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		
<b>Inconel</b>	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-1.5Al-0.08C	G 4901 NCF 601					
Inconel 690	62Ni-23Cr-9Fe-0.03C	B166 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		
<b>Incoloy</b>	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
<b>Hastelloy B</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		
<b>Hastelloy C</b>	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-V-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-2M		
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		
<b>Hastelloy G</b>	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-0.008C		B 581 NO6985				B 581 NO6985
<b>Hastelloy N</b>	Ni-Mo-Cr-Fe						
Alloy N	76Ni-7Cr-17Mo-0.06C		B 573 N10003				B 573 N10003
<b>Hastelloy X</b>	Ni-Cr-Mo-Fe						
Alloy X	48Ni-22Cr-9Mo-19Fe-1.5Co-W-0.1C		B 572 NO6002				B 572 NO6002
<b>Js 700</b>	Ni-Fe-Cr-9Mo-Cb						
Alloy 700	25Ni-21Cr-4.5Mo-49Fe-Cb-0.02C		B 581 NO8700				B 672 NO8700
CN-3M	25Ni-21Cr-5Mo-49Fe-Lo, C				A 743 CN-3M		
<b>904L</b>	Ni-Fe-Cr-Mo-Cu-Lo, C						
Alloy 904L	26Ni-21Cr-4.5Mo-47Fe-1.5Cu-0.01C		B 649 NO8904				B 649 NO8904
<b>RA-330</b>	Ni-Fe-Cr-Si						
Alloy 330	36Ni-19Cr-44Mo-1Si-0.06C		B 511 NO8330				B 511 NO8330
<b>Nimonic 80A</b>	Ni-Cr						
Nimonic 80A	76Ni-20Cr-2Ti-1.5Al-0.08C	G 4901 NCF 80A	B 637 NO7080				B 637 NO7080
<b>IN-102</b>	Ni-Cr-Fe-Cb-Mo-W						
IN-102	68Ni-15Cr-3Mo-7Fe-3Cb-3W-A1-TiMg-B-Z-0.06C		B 518 NO6102				
<b>Aflcorr</b>	Ni-Cr-Mo-W						
ftcorr	55Ni-31Cr-10.5Mo-2.5W-Cb-0.1C		B 756 NO6110				B 564 NO6110
<b>RA-333</b>	Ni-Cr-Mo-Co-W-Fa-Si						
Alloy 333	46Ni-26Cr-3Mo-19Fe-3Co-3W-0.08C		B 719 NO6333				
<b>AL-6X</b>	Cr-Ni-Mo-Fe						
AL-6X	25Ni-21Cr-6.5Mo-47Fe-Lo, C		B 691 NO8366				
CN-3M	25Ni-21Cr-5Mo-49Fe-Lo, C						
AL-6XN	25Ni-21Cr-6.5Mo-47Fe-0.2N-o, C		B 691 NO8367				B 462 NO8357



# ENGINEERING DATA

## Chemical & Physical Properties

### CASTING MATERIALS CHEMICAL PROPERTIES

	Carbon Steel	CA-15	High Temp.	High Temp.	HIGH	TEMP	304-S.S.	316-S.S.	HASTEL LOY-B	HASTEL LOY-C	304-L.S.S.	316L-S.S.	Low Temp	NICKEL	INCONEL	MONEL	A-20
ASTM Std	A-216	A-217	A-217	A-217	A-217	A-217	A-351	A-351	A-494	A-494	A-351	A-351	A-352	A-494	A-494	A-494	A-351
Grade	WCB	CA-48	WC6	WC9	C-5	C-12	CF8	CF8M	N-12M-1	CW-12M-1	CF3	CF3M	LCB	CZ-100	CY-40	M-35	CN-7M
C% MaX.	0.30	0.15	0.20	0.18	0.20	0.20	0.08	0.08	0.12	0.12	0.03	0.03	0.30	1.0	0.4	0.35	0.07
Min%	1.00 MAX.	1.00	0.05-0.08	0.40-0.70	0.40-0.70	0.35-0.65	1.50	1.50	1.00	1.0	1.50	1.50	1.00	1.5	1.5	1.5	1.5
P% MAX.	0.04	0.040	0.04	0.04	0.040	0.040	0.04	0.04	0.040	0.040	0.04	0.04	0.05	0.03	0.03	0.03	0.04
S% MAX.	0.045	0.040	0.045	0.045	0.045	0.045	0.04	0.04	0.030	0.030	0.04	0.04	0.06	0.03	0.03	0.03	0.04
Ni%	0.50	1.00	-	-	-	-	8.00	9.00	Balance	Balance	8.00-12.0	9.00-13.0	-	95.0 Min	Balance	Balance	27.5-30.5
Cr%	0.40	11.5-14.0	1.00-1.50	2.00-2.75	4.0-6.50	8.00-10.00	18.0-21.0	18.0-21.0	1.00	15.7-17.5	17.0-21.0	17.0-21.0	-	-	14-17.0	-	19.22
Mo%	0.25	-	0.45-0.65	0.90-1.20	0.45-0.65	0.90-1.20	-	2.00-3.00	26.0-30.0	16-18.0	-	2.00-3.00	-	-	-	-	2-3
Cu	0.0	-	-	-	-	-	-	-	0	-	-	-	-	1.25	-	26-33	3.4
Si	0.30	1.50	0.60	0.60	0.75	1.00	2.00	2.00	1.00	1.0	2.0	1.50	0.60	2.0	3.0	1.25	1.5
Fe	-	-	-	-	-	-	-	-4.0-6.0	4.5-6.0	-	-	-	-	3.0	11.0	3.5	-
V	-	-	-	-	-	-	-	-	0.20-0.60	0.2-0.4	-	-	-	-	-	-	-

### PHYSICAL PROPERTIES

Tensile Strength	70	90-115	70	70	90-115	90-115	70	70	76	70	70	65	72	50	70	65	62
Min, Kis	485	621-493	485	485	621-793	621-793	485	185	525	485	485	450	495	345	485	450	425
Mpa																	
Yield point	30	65	40	40	60	60	28	30	40	30	30	35	40	18	28	25	25
Min, Kis	205	448	275	275	414	414	195	205	275	205	205	240	275	125	195	170	170
Mpa																	
Elongation in 2 inch (50mm) %Min	22	18	20	20	18	18	35	30	6	35	30	20	40	10.0	30.0	25.0	35.0
Reduction of Area % min	35	30	35	35	35	35	-	-	-	-	-	35	-	-	-	-	-

### WROUGHT MATERIALS CHEMICAL PROPERTIES

	11-13% Cr	Ductile	Carbon Steel	B-8F	321-S.S	304L-S.S	316L-S.S	304-L-S.S	316L-S.S	Hard Facing	Bolts	Nuts
ASTM Std	A-182	A-439	ASTM	A-320	A-182	A-182	A-182	A-182	A-182	KLS	A-193	A194
Grade	F6a	D2C	A-105	B-8F	F-321	F-304	F-316	F-304L	F-316L	HF-6R	B7	2H
C% MaX.	0.15	0.29	0.22-0.35	0.15	0.08	0.08	0.08	0.035	0.035	11.05	0.38-0.48	0.40
Si% MAX.	1.00	100.3.00	0.35	1.00	1.00	1.00	1.00	1.00	1.00	1.11	0.15-0.35	-
Min% MAX.	1.00	1.80-2.40	0.60-1.05	2.00	2.00	2.00	2.00	2.00	2.00	-	0.75-1.00	-
P% MAX.	0.04	0.08	0.04	0.20	0.030	0.04	0.04	0.040	0.040	-	0.04	0.04
S% MAX.	0.03	-	0.05	0.150-0.350	0.030	0.03	0.03	0.030	0.030	-	0.04	0.05
Ni%	0.05	21.0-24.0	-	8.00-10.00	9.00-12.00	8.0-11.0	10.0-14.0	8.00-13.00	10.00-15.00	-	-	-
Cr%	11.5-14.5	0.05	-	17.00-19.00	17.00Min	18.0-20.0	16.0-18.0	18.00-20.00	16.00-18.00	28.3	0.80-1.10	-
Mo%	-	-	-	-	-	-	2.00-3.00	-	2.00-3.00	-	0.15-0.25	-
Ti%	-	-	-	-	C% x 5-0.60	-	-	-	-	-	-	-
Fe%	Bal	-	-	-	-	-	-	-	-	0.30	Bal	Bal
W%	-	-	-	-	-	-	-	-	-	4.20	-	-
Co%	-	-	-	-	-	-	-	-	-	Bal	-	-

### PHYSICAL PROPERTIES

Tensile Strength	85	58	70	75	75	75	75	70	70	-	125	175
Min, Kis	586	400	483	517	517	517	517	483	483	-	862	-
Mpa												
Yield point	55	28	35	30	30	30	30	25	25	-	105	-
Min, Kis	379	193	248	207	207	207	207	172	172	-	724	-
Mpa												
Elongation in 2 inch (50mm) %Min	18	20	22	35	45	30	30	30	30	-	16	-
Reduction of Area % min	35	45	30	50	50	50	50	50	50	-	50	-



*Memo*