

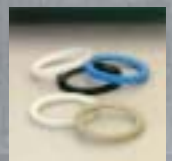
KITZ

— "Jso"[®] —

BRAND

FLOATING and TRUNNION MOUNTED
BALL VALVES
SOFT and METAL SEATED
ASME CLASS 150 ~ 2500

GENERAL CATALOG



KITZ

A PRODUCT OF TECHNOLOGY

CE



ISO Vitrificados E. Vilaseca was founded in 1925. Their original focus was the production and application of chemical coatings for the interior of tanks and vessels.

In 1954, ISO responded to the developing needs of the flow control market and began manufacturing ball valves – the first to do so in Spain and the second in Europe. Since then, the company has become a premier producer in Europe and worldwide with established markets in the Chemical, Hydrocarbon Processing Industry, Pharmaceutical, Gas Transmission and other industries.



KITZ Corporation of Japan purchased ISO in 1991 to strengthen its position globally as a leader in the production of quality valves and to enhance and broaden its offering of quarter-turn product.



Now known as KITZ Corporation of Europe (KCE), the company is located in Barcelona, Spain. Its manufacturing facility is 82,000 square feet and houses some of the most modern production machinery, tooling and testing equipment in the industry.

In-house R&D and staff engineering keep KCE at the forefront of valve development and innovation.



KCE's Quality System is ISO-9001 certified since 1992 and its product meets all ASME, American Petroleum Industry, MSS and British standards as well as other international standards required of its broad customer base. KITZ Iso valves have been assessed by Bureau Veritas S.A. and have been certified to be in accordance to CE Pressure Equipment Directive No. 97/23/EC.



When addressing your valving needs, consider KITZ Iso brand floating and trunnion mounted ball valves. They are part of a broad KITZ family of quality final control elements and are characterized by unparalleled excellence, low operating torque and a very competitive price.

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Why choose a KITZ[®] - "Iso"[®] ball valve?

Our main concern has always been to strike a balance between two situations. On the one hand, we want to give individual treatment to each one of our customers by offering customized solutions. On the other hand, we also want to offer a wide range of products that can provide a global answer to the market. How do we balance these two requirements? Very easily: we take the most demanding quality-related features from each customer and make them standard on all our valves. In this fashion the concept of "special option" becomes a "standard feature". The advantages of presenting an integral concept with a high added value - suitable for multiple applications - are revealed by cost reduction - in the short run - and by a safety guarantee.

- *APPROVALS and CERTIFICATES – KITZ has always believed strongly that its products and services must be backed by the most demanding Industry Standards, Approvals and Certifications as proof of the maximum quality assurance.*
- *ISO 5211 – KITZ Iso Brand ball valves are supplied with ISO 5211 actuator mounting pads/flanges as standard.*
- *STEM O-RING – To supplement the integrity of the packing, KITZ Iso Brand valves provide a secondary o-ring seal for fugitive emissions abatement and positive sealing at low pressures (4 psig) and in vacuum service (0.00013 mbar).*
- *LOW OPERATING TORQUES – Precise machine tolerances and a tight interface between the ball and stem, stem and stuffing box and seats and ball result in perhaps the lowest operating torque across the entire size range of the KITZ Iso Brand ball valves. The low torque can save as much as one (1) actuator size for the user and lower maintenance costs due to less wear on moving parts.*
- *ANTI-STATIC STEMS – Anti-static devices are standard on KITZ Iso Brand ball valves. With a maximum impedance of 10Ω, users are insured of reliable electrical continuity between the ball-stem-body.*
- *FIRE SAFETY – All KITZ Iso Brand ball valves can meet the stringent fire test requirements of API 607, British Standard BS 6755 or API 6D among others.*
- *QUALITY CASTINGS – Captive foundries provide consistent metallurgical quality and surface finish.*
- *LOW EMISSIONS – KITZ Iso Brand ball valves can be certified to the most demanding air quality standards.*
- *PRICE – KITZ Iso Brand ball valves provide unparalleled value from its initial procurement to installation and start-up and in reliable service over time. The total cost of ownership (TCO) of these valves is amongst the lowest in the industry.*
- *CUSTOMER SERVICE – KITZ Iso Brand ball valves are supported by the most knowledgeable sales team in the industry. Our support begins with the initial inquiry and continues through purchasing, installation and start-up.*



Product

KITZ provides its customers with the widest range of valves ensuring the best product for each specific application.

It is our goal to provide you with the proper valve that guarantees the highest performance and safety standards at your facilities.

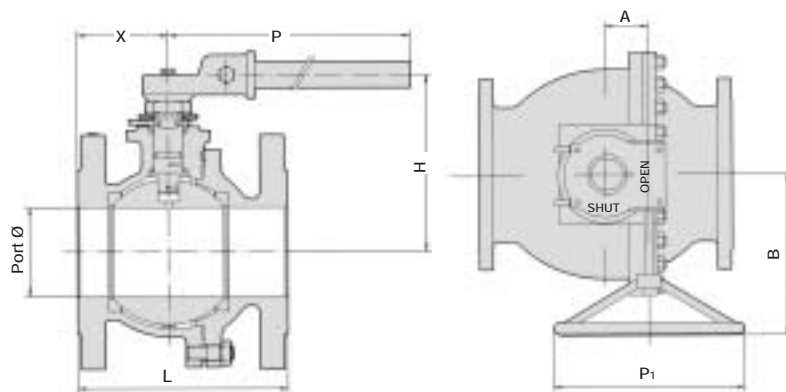
Port
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L

F14A (F18A for 14" - 16")

Full and Regular Port, 2-piece body construction.

Standards: • Design: ASME B16.34 • Wall Thickness: ASME B16.34 • Flanges: ASME B16.5 • Test: API 598 • FSM: API 607
• Top Flange: ISO5211 Face to Face: ASME B16.10 (Short and Long pattern).



Gear Box					
FULL PORT					
VALVE SIZE	Model	Input / Output (max.) (in-lbs.)	A	B	P ₁
4"-6"	RM.551	850/8266	2.8	11.1	12.8
8"	RM.882	1168/14,337	3.39	13.4	16.3
10"-12"	RM.1953	2142/36,816	5.12	14.4	20.3
REGULAR PORT					
VALVE SIZE	Model	Input / Output (max.) (in-lbs.)	A	B	P ₁
12" (150)	RM.882	1168/14,337	3.39	13.4	16.3
12" (300)	RM.1952	2142/36,816	5.12	13.4	20.3
14"-16"	RM.1953	2142/36,816	5.12	14.4	20.3

ASME 150 - ASME 300																	
FULL PORT																	
VALVE SIZE	Port	DIMENSIONS, inches								ISO 5211 Flange	CV	Torque ⁽¹⁾ (in-lbs.)		Weight (lbs.)			
		L			X		P		H			A150	A300	Short	Long	A150	A300
		A150 Short ⁽⁴⁾	A150 Long ⁽⁵⁾	A300 Short ⁽⁴⁾	A150	A300	A150	A300									
1/2"	0.55	4.25	-	5.5	2.1	2.8	5.9	5.9	3.4	F03	18	44	71	3.3	-	4.6	
3/4"	0.75	4.6	-	6	2.2	3	5.9	5.9	3.5		40	53	71	4.6	-	7.3	
1"	1.00	5	-	6.5	2.3	3	5.9	5.9	4.1	F05	65	71	89	6.4	-	10.8	
1 1/2"	1.50	6.5	-	7.5	3.2	3.8	7.9	7.9	4.7		150	177	221	14.6	-	21.8	
2"	2.00	7	8	8.5	3	4.3	9.8	13.8	5	F07	260	221	310	24.7	29.3	32.0	
3"	3.00	8	9.5	11	3.5	5	9.8	13.8	5.8		980	531	797	46.3	56.9	65.1	
4"	4.00	9	12	12	4.5	6	19.7	19.7	7.7	F10	1600	1062	1549	83.8	94	117	
6"	5.98	10.5	15.5	15.9	5.2	7.9	29.5	39.4	8.8		4100	2213	3098	163	193	243	
8"	7.99	18	-	19.5	9	9.9	-	-	13.5 ⁽²⁾	F14	8850	4425	6638	386 ⁽²⁾	-	432 ⁽²⁾	
10"	10.00	21	-	22.4	10.5	11.2	-	-	16.5	F16	14700	12,390	14,160	562 ⁽²⁾	-	650 ⁽²⁾	
12"	12.0	24	-	25.5	12	12.8	-	-	17.3 ⁽²⁾		23200	17,700	-	679 ⁽²⁾	-	878 ⁽²⁾	
REGULAR PORT																	
VALVE SIZE	Port	DIMENSIONS, inches								ISO 5211 Flange	CV	Torque ⁽¹⁾ (in-lbs.)		Weight (in lbs.)			
		L		X		P		H	A150			A300	A150	A300			
		A150	A300	A150	A300	A150	A300										
12"	9.5	14	19.75	7	9.88	-	-	14.88 (150) 15.39 (300)	F14	7500	9735	11,063	419 ⁽²⁾	706 ⁽²⁾			
14"	10.5	15	30	7.5	15	-	-	16.46	F16	10,000	13,275	15,930	596 ⁽²⁾	883 ⁽²⁾			
16"	12	16	33	8	16.5	-	-	17.6	F16	14,500	18,585	18,585	861 ⁽²⁾	1060 ⁽²⁾			

ASME 600									
FULL PORT									
VALVE SIZE	Port	DIMENSIONS, inches				ISO 5211 Flange	Cv	Torque (in lbs.)	Weight (lbs.)
		L	X	P	H			A600	
1/2"	.55	6.5	3.2	5.9	3.4	F03	18	56	6.4
3/4"	.75	7.5	3.7	5.9	3.5		40	86	9.3
1"	1.00	8.5	4.3	5.9	3.9	F05	65	133	13
1 1/2"	1.50	9.5	4	7.9	4.7		150	265	25.4
2"	2	11.5	4.6	13.8	5	F07	260	354	38.6
3"	3	14	5.4	13.8	5.8		980	1062	76.5
4"	4	17	8.5	19.7	7.7	F10	1600	2213 ⁽³⁾	151
REGULAR PORT									
VALVE SIZE	Port	DIMENSIONS, inches				ISO 5211	Cv	Torque (in lbs.)	Weight (lbs.)
		L	X	P	H			A600	
6"	4.38	22	11	39.4	10	F10	1020	2000 ⁽³⁾	243

⁽¹⁾ See page 30.

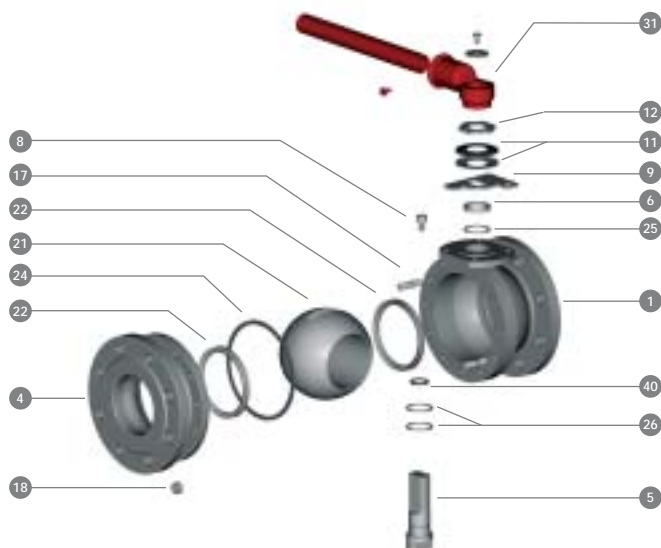
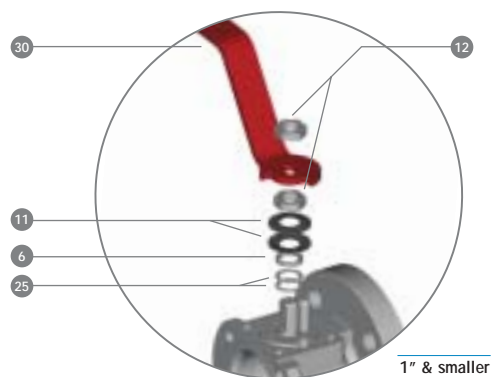
⁽²⁾ Gear Box included.

⁽³⁾ Values according to the pressure limitations of seats. See page 24-25.

⁽⁴⁾ 1/2" - 6": ASME B16.10 Short

⁽⁵⁾ 8" - 12": ASME B16.10 Long

STANDARD MATERIALS



Body Group			
Item	Component	Code SS	Code CS
1	Body	ASTM A351 (CF8M)	ASTM A216 WCC* * WCC = WCB (0.25% C Max.)
4	Cap	ASTM A351 (CF8M)	ASTM A216 WCC* * WCC = WCB (0.25% C Max.)
17	Cap Bolt	ANSI 150:	ASTM A193 B7M + deltatone
18	Cap Nut	ASTM A194 GrB7M + deltatone	ASTM A193 2HM + deltatone
		ANSI 300:	
		A194 GrB7M + deltatone	
		ANSI 600:	
		ASTM A193/A194 B7M/2HM deltatone coat	
11	Belleville Washer	Stainless steel	Carbon Steel
12	Nut	Stainless steel	Carbon Steel
8	Stop Pin	Stainless steel	Stainless Steel
30-31	Handle	≤ 1": SS + Plastic > 1": Cast Iron	≤ 1": SS & Plastic > 1": Cast Iron
9	Stop Plate	Steel nickel plated	Steel zinc plated

Internal Group		
Item	Component	Code 316
21	Ball	≤ 1": ASTM A479 316 ≥ 1 1/2": ASTM A351 (CF8M)
5	Stem	ASTM A479 316
6	Gland Ring	ASTM A479 316

Seal Group			
Item	Component	Code PTFE	Code FSM
22	Seat	PTFE*	PTFE*
24	Body Seal	≤ 1": PTFE ≥ 1 1/2": 316L + Flexite®	316L + Graphite
25	Gland Packing	≤ 1": PTFE ≥ 1 1/2": PTFE	Graphite
26	Stem Seal	PTFE	PTFE + C + Graphite
40	Stem O-Ring	FPM (Viton®)	FPM (Viton®)

Valve Finish: (CS) ≤ 6": phosphate and oil dipped.

≥ 8": base primer 40 µm min.

Operation: ≤ 6": lever. ≥ 8": gear box.

*For alternate materials please contact KCA.

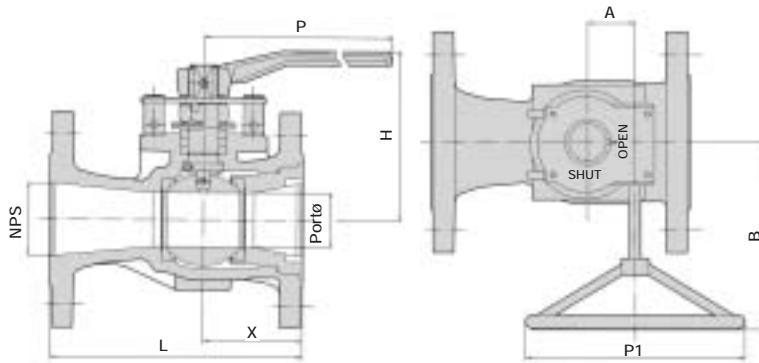
BF6K

Regular Port, 1-piece body construction, end entry.

Standards: • Design: ASME B16.34

- Wall Thickness: ASME B16.34
- Flanges: ASME B16.5 • Test: API 598
- FSM: API 607 • Top Flange: ISO5211
- Face to Face: ASME B16.10.

CHLORINE SERVICE



Gear Box					
VALVE SIZE	Rating	Model Input / Output (max.) (in-lbs)	A	B	P1
6"-8"	A150	RM.551			
	A300	250 / 8266	2.8	11.1	12.8
10"-12"	A150	RM.882	3.39	13.4	16.3
14"-16"		RM.1953	5.12	14.4	20.3
			2142 / 36,816		
10"	A300	RM.882	3.39	13.4	16.3
12"		RM.1952	5.12	14.4	20.3
			2142 / 36,816		
14"-16"		RM.1953			
			2142 / 36,816		

ASME 150 - ASME 300													
VALVE SIZE	Port	DIMENSIONS, inches				P	H	ISO 5211 Flange	CV	Torque ⁽¹⁾ (in-lbs.)		Weight (lbs.)	
		L		X						A150	A300	A150	A300
		A150	A300	A150	A300								
1/2"	0.39	4.25	5.51	2.89	2.05	5.52	4.06	F03	8	44	71	2.9	3.8
3/4"	0.49	4.61	5.98	1.89	2.24	5.52	4.17	F03	12	53	71	3.5	6.4
1"	0.67	5.00	6.50	2.17	2.44	6.30	4.57	F04	24	53	71	6.2	8.2
1 1/2"	1.18	6.50	7.48	2.28	2.56	6.30	5.24	F05	96	133	177	10.6	17.2
2"	1.5	7.01	8.50	2.76	3.54	9.06	4.69	F07	143	177	221	19.7	21.9
3"	2.28	7.99	11.14	2.95	3.86	15.75	6.18	F07	314	319	354	37.4	57.5
4"	3.00	9.02	12.01	3.35	3.94	15.75	6.77	F07	491	496	673	58.6	88.4
6"	4.49	10.51	15.87	4.72	5.43	29.53	10.24	F12	1105	1283	2036	111	177
8"	5.67	11.50	16.5	5.16	6.22	39.37	11.73	F14	1535	1770	2832	181.2	270
10"	7.36	12.99	17.99	6.46	7.44	59.06 ⁽⁴⁾	13.98 ⁽²⁾	F16	2740	2567	4160 ⁽³⁾	342.6 ⁽²⁾	586 ⁽²⁾

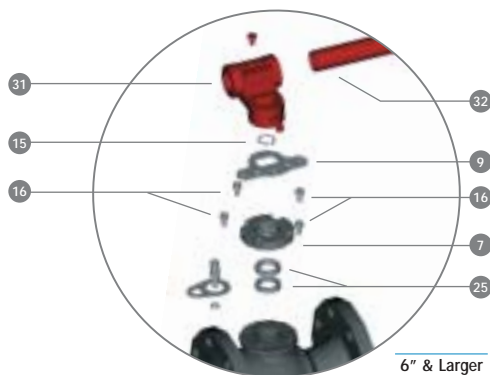
⁽¹⁾ See page 30.

⁽²⁾ Gear Box included.

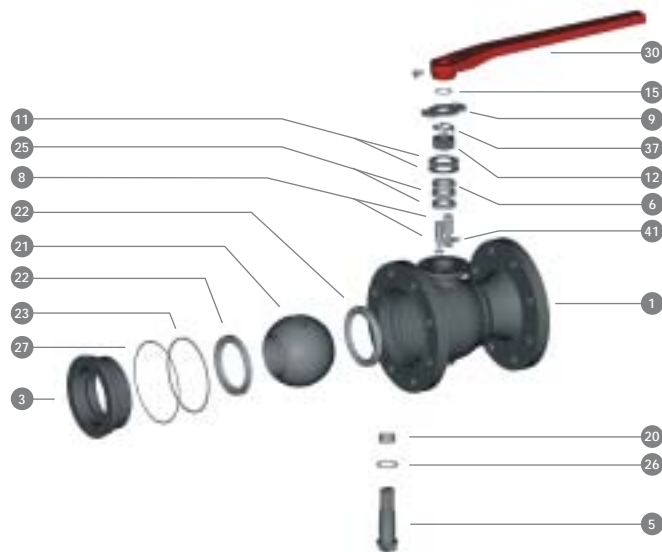
⁽³⁾ Values according to the pressure limitations of seats. See page 24-25.

⁽⁴⁾ Gear Handwheel diameter

STANDARD MATERIALS



6" & Larger



Body Group			
Item	Component	Code SS	Code CS
1	Body	ASTM A351 CF8M	ASTM A216 WCB* *C = 0,25% max.
3	Insert	DN ≤ 2": ASTM A479 316 4" ≤ DN ≤ 6": ASTM A182 F316 8" ≤ DN ≤ 10": ASTM A351 CF8M	6" & Smaller ASTM A105N (C=0,25% max.) 8" & Larger ASTM A216 WCB (C=0,25% max.)
7	Gland Flange	ASTM A351 CF8M	ASTM A351 CF8M
11	Washer	Stainless Steel	Stainless Steel
12	Nut	Stainless Steel	Carbon Steel
16	Gland Bolt	ASTM A193 B8M	ASTM A193 B8M
8	Stop Pin	ASTM A479 304	ASTM A479 304
30-31	Handle	1" & Smaller, SS / 1½" & larger, ductile iron	1" & smaller CS
15	Snap Ring	Stainless Steel	Carbon Steel 1½" & larger ductile iron
32	Handle Bar	Steel	Steel
37	Stop-Washer	ASTM A479 304	ASTM A479 304
41	Key Lock Plate	ASTM A479 304	ASTM A479 304
9	Stop Plate	ASTM A479 304	ASTM A479 304

Internal Group			
Item	Component	Code 316	Chlorine Service*
21	Ball	≤ 1 1/2": ASTM A479 316 ≥ 1/2": ASTM A351 CF8M	Monel & Hastelloy C
5	Antistatic Stem	ASTM A479 316	Monel & Hastelloy C
6	Gland Ring	ASTM A479 316	ASTM A479 316

Seal Group			
Item	Component	Code PTFE	Code FSM
22	Seat	Hypatite® **	Hypatite® **
23-27	Body Seal	PTFE	Item 23: PTFE Item 27: Graphite
25	Gland Packing	PTFE	Graphite
26	Stem Seal	PTFE + 15%G.F.	PTFE + 15%G.F.
20	Stem Bearing	PTFE + 15%G.F.	PTFE + 15%G.F.

* In accordance with Chlorine Institute recommendations.

** For alternate materials please contact KCA.

F14M

Full and Regular Port, 2-piece body construction.

Standards: • Design: API 608 • Test: ASME B16.34 • FSM: API RP6F
• Top Flange: ISO 5211 • Flanges: ASME B16.5 • NPT thread: ASME B1.20.1 • SW: ASME B16.11 • Face to Face: ASME B16.10.

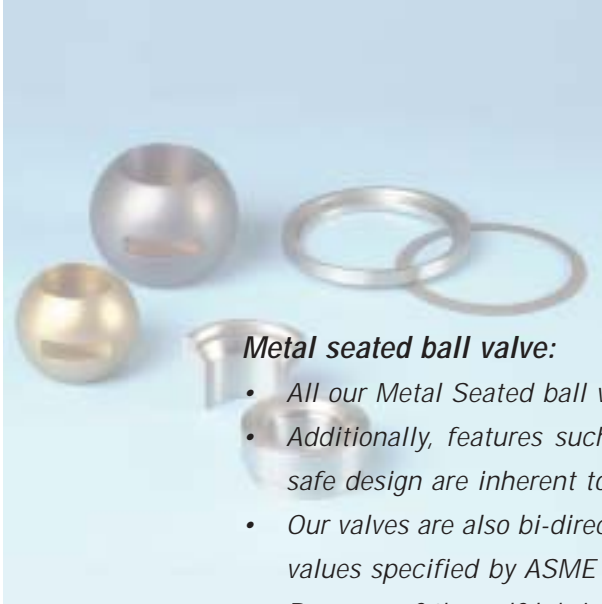


Metal Seats (Ni-G):

The Metal Seat is made on the basis of an intermetallic compound, manufactured by means of an exclusive sintering process. It is made up of a Nickel matrix ($\pm 90\%$) and a thin Graphite dispersion ($\pm 10\%$) as a solid lubricant. Graphite will not separate or leach into process stream.

The resulting seat is quite different from any other type because of following characteristics:

- High temperature: Maximum working temperature = 1300°F.
- High robustness: Maximum specific working pressure = 30 kg/mm².
- Excellent resistance: Against wear and in erosional services.
- Low friction factor: 0.2 against ground surface hardened at 1500 HV.
- Long service life: 5000 operations before maintenance.
- Self adjusting features: Seats adapt automatically to ball.
- Quick maintenance: Because of easy seat interchangeability.



Metal seated ball valve:

- All our Metal Seated ball valves are bi-directional.
- Additionally, features such as a blow out proof stem, anti-static stem and fire safe design are inherent to our product configuration.
- Our valves are also bi-directional bubble tight guaranteed, thus going beyond the values specified by ASME B16.104 Class VI.
- Because of the self-lubricating feature of the solid metal seats, we provide the lowest operating torques in the market. This is especially useful when high pressures are applied. For the same reason, the jamming or friction between seat and ball surface is eliminated, even at high temperatures.



Special configurations are available:

- Stem extensions for high temperature or cryogenic services.
- Locking device.
- Trunnion mounted design, for high pressure.
- Scrapers, used for cleaning ball surface, protecting seats from abrasion, removing dirt and avoiding the collection of solid matter between seat and ball.
- 3-way ball valves, 90° (L or T port) and 120° (L port).
- BW, NPT and SW connections.

SEAT MATERIALS					
	Material	Hardness	Thickness (µm)	Max. temperature (1)	Applications
Standard	Ni-G* Nickel Matrix + Graphite	120 HB	N/A	1290°F / 842°F	Suitable for "clean" services, both liquid and gas. Max. pressure: 10,000 psig
	Cu-G* Copper Matrix + Graphite	100 HB	N/A	932°F / 842°F	Suitable for "clean" services, both liquid and gas. Low friction factor, both in dry gas & steam services. Compatible with: HTC, HTCN, HCR & ST6.
Optional Material (please consult KCA)	WC Tungsten Carbide	1100 HV	20	482°F / 482°F	See BALL table. Compatible with: WC. Max. pressure: 1450 psig (≤ 2"), 580 psig (≥ 3").
	ST6 Stellite 6	1000 HV	20	482°F / 482°F	See BALL table. Compatible with: WC & CRC. Max. pressure: 1450 psig (< 3"), 580 psig (≥ 3").

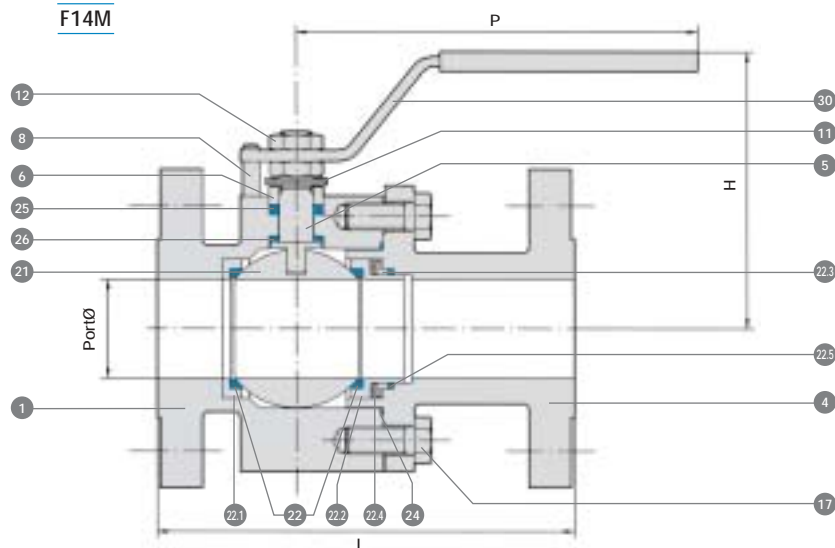


*Graphite will not leach into process stream.

BALL COATINGS					
	Material	Hardness	Thickness (µm)	Max. temperature (1)	Applications
Standard	HTC Titanium Nitride	3200 HV	2-4	1175°F / 482°F	Suitable for "clean" services, both liquid and gas. For gas or steam services, up to 356°F.
	HTCN Carbo-Titanium Nitride	4500 HV	2-4	1454°F / 662°F	Suitable for liquid or gas services with small presence of solids. For gas or steam services, up to 482°F.
Optional Material (please consult KCA)	HCR Chrome Nitride	3000 HV	6-8	1600°F / 1200°F	Suitable for "clean" services, both liquid and gas. Best on oxidizing media.
	WC Tungsten Carbide	1100 HV	20	842°F / 842°F	Suitable for liquid or gas services with high presence of solids. Not recommended in the presence of caustic soda.
	CRC Chrome Carbide	800 HV	20	1292°F / 1200°F	Suitable for liquid or gas services with small presence of solids. Not recommended in the presence of caustic soda.
	ST6 Stellite 6	1000 HV	20	1112°F / 662°F	Suitable for liquid or gas services with small presence of solids. Best on dry gas services or steam.



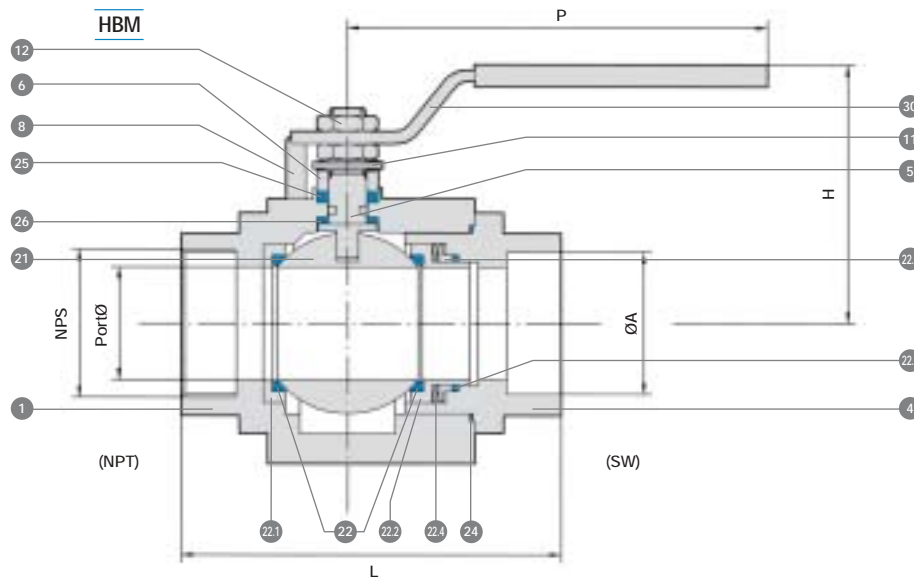
(1) Shown values are applicable to "Non-Oxidizing Media / Oxidizing Media".



F14M														
VALVE SIZE	Port	Dimensions, inches							ISO 5211 Flange	Torque ⁽¹⁾ (in-lbs.)			Weight (lbs.)	
		L			P		H			A150	A300	A600	A150 - A300	A600
		A150	A300	A600	A150 A300	A600	A150 A300	A600						
1/2"	0.55	4.25	5.5	6.5	5.7	5.7	2.5	2.8	F03	88.5	133	177	6.6	15.4
3/4"	0.75	4.6	6	7.5	5.7	5.7	2.6	3	F03	88.5	133	177	8.8	18.7
1"	1.00	5	6.5	8.5	7.1	10.8	3.4	4	F03	142	204	319	13.2	22.1
1 1/4"	1.14	5.5	7.1	-	3.5	-	3.5	-	F03	195	310	-	17.6	-
1 1/2"	1.50	6.5	7.5	9.5	10.8	15	4.7	5.3	F05	310	478	885	30	41
2"	2.00	7	8.5	11.5	10.8	15	5	5.8	F05	708	1089	1991	42	55
3"	3	8	11	14	15	17.3	5.7	7.3	F07	1593	2921	5045	88	110
4"	4	9	12	-	17.3	-	7.9	-	F10	452	6726	-	139	-
6"	5.98	15.5	15.9	-	31.5	-	10.9	-	F14	9293	20,355	-	232	-

⁽¹⁾ See page 30.
Applicable to Full Bore model. Please ask KCA for Regular Bore model.
Consult KCA for higher pressure classes & larger size valves.

Item	Component	Code SS	Code CS
Body Group			
1	Body	ASTM A479 316	ASTM A105
4	Body Cap	ASTM A479 316	ASTM A105
8	Stop Pin	SS	SS
11	Belleville Washer	CS	CS
12	Nut	CS	SS
17	Bolt	ASTM A193 B8	ASTM A193 B7
22.1	Body Seat-holder	ASTM A479 316	ASTM A479 316
22.2	B.C. Seat-holder	ASTM A479 316	ASTM A479 316
22.3	Compression Ring	ASTM A479 316	ASTM A479 316
22.4	Seat Spring	SS	SS
30	Handle	Steel	Steel
Internal Group			
21	Ball	ASTM A479 316 + HTC	ASTM A479 316 + HTC
5	Stem	ASTM A479 316	ASTM A479 420
6	Gland Ring	Steel	Steel
Seal Group			
22	Seat	Ni + G	Ni + G
22.5	Seat Seal	Graphite	Graphite
24	Body Seal	Graphite	Graphite
25	Gland Packing	Graphite	Graphite
26	Stem Seal	Graphite	Graphite



HBM											
VALVE SIZE	Port	Dimensions, Inches					ISO 5211 Flange	Torque ⁽¹⁾ (in.-lbs.)			Weight (lbs.)
		L		P	H	SW Sch ØA		725 psi	1450 psi	2000 psi	
		NPT	SW								
1/2"	0.5	3.15	2.76	2.76	1.77	.86	F03	134	177	212	2.7
3/4"	0.75	3.54	3.35	5.71	9.95	1.07	F03	168	212	257	3.3
1"	1	4.33	4.13	10.83	3.27	1.34	F05	204	319	460	5.5
1 1/2"	1.5	5.12	4.92	14.96	4.84	1.89	F07	478	885	1363	11.7
2"	2.0	5.12	5.51	14.96	5.28	2.41	F07	1089	1991	2478	17.7

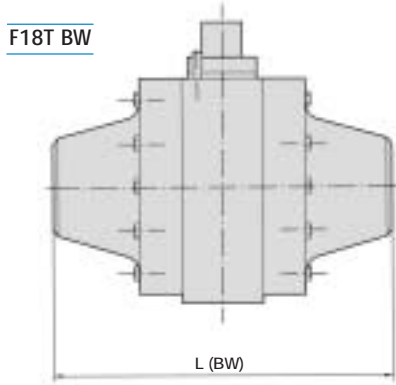
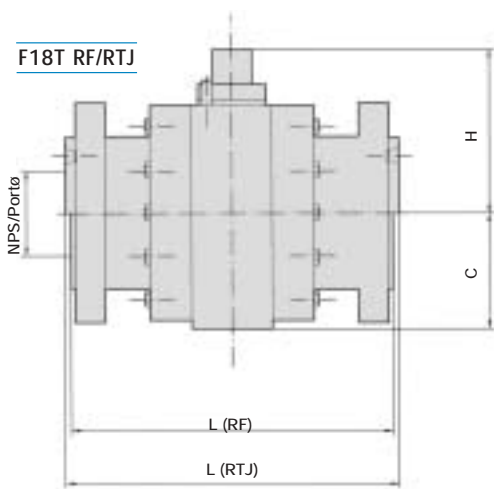
⁽¹⁾See page 30.

Item	Component	Code SS	Code CS
Body Group			
1	Body	ASTM A479 316	ASTM A105
4	Body Connector	ASTM A479 316	ASTM A105
8	Stop Pin	SS	SS
11	Washer	CS	CS
12	Nut	CS	CS
22.1	Body Seat-holder	ASTM A479 316	ASTM A479 316
22.2	B.C. Seat-holder	ASTM A479 316	ASTM A479 316
22.3	Compression Ring	ASTM A479 316	ASTM A479 316
22.4	Seat Spring	SS	SS
30	Handle	Steel	Steel
Internal Group			
21	Ball	ASTM A479 316 + HTC	ASTM A479 316 + HTC
5	Stem	ASTM A479 316	ASTM A479 420
6	Gland Ring	Steel	Steel
Seal Group			
22	Seat	Ni + G	Ni + G
22.5	Seat Seal	Graphite	Graphite
24	Body Seal	Graphite	Graphite
25	Gland Packing	Graphite	Graphite
26	Stem Seal	Graphite	Graphite

F18T

Full and Regular Port, Trunnion Mounted, 3-piece body construction.

- Standards:** • Design: API 6D, ASME B16.34, ASME VIII 1&2 •
 FSM: API 607, API 6 FA • Flanges: ASME B16.5 • BW: ASME B16.25
 • Face to Face: API 6D, ASME B16.10.



Standard operation						
VALVE SIZE	A150	A300	A600	A900	A1500	A2500
1"						
2"						
2"-1"						
3"						
3"-2"						
4"						
4"-3"						
6"						
6"-4"						
8"						
8"-6"						
10"						
10"-8"						
12"						
12"-10"						
14"-12"						
16"-12"						

Using Handle. Using Gear Box.

Note: for Class ASME 2500, consult KCA.
 (1) See page 30.

ASME 150 - FB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque (1) (in-lbs.) 290 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
1"	1	5	5.5	4.7	2	2.6	1.5	7.9	177
2"	2	7	7.5	7.1	3.2	4.1	28.7	19.9	443
3"	3	8	8.5	8.3	3.9	4.8	51	33	708
4"	4	9	9.5	9.5	5	6.2	86	69	974
6"	6	15.5	16	12.6	6.9	7.8	252	228	1593
8"	8	18	18.5	15.4	8.5	10.1	422	385	2124
10"	10	21	21.5	18.5	10	12.5	681	581	3629
12"	12	24	24.5	22.4	12	14.6	1039	908	7169

ASME 150 - RB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque (1) (in-lbs.) 290 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
2"-1"	1	7	7.5	6.7	2	2.6	28.7	17.7	177
3"-2"	2	8	8.5	8.3	3.2	4.1	42	26.5	443
4"-3"	3	9	9.5	10.2	3.9	4.8	69	42	708
6"-4"	4	15.5	16	12.2	5	6.2	139	84	974
8"-6"	6	18	18.5	15	6.9	7.8	267	195	1593
10"-8"	8	21	21.5	18.1	8.5	10.1	559	493	2124
12"-10"	10	24	24.5	21.3	10	12.5	749	661	3629
14"-12"	12	27	27.5	22.4	12	14.6	858	721	7169
16"-12"	12	30	30.5	22.6	12	14.6	968	787	7169

ASME 300 - FB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 725 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
1"	1	6.5	7	4.7	2	2.6	14.4	8.8	266
2"	2	8.5	9.1	7.1	3.2	4.1	35.4	20	531
3"	3	11.1	11.7	8.3	3.9	4.8	71	34.3	797
4"	4	12	12.6	9.5	5	6.2	119	71	1239
6"	6	15.9	16.5	12.6	6.9	7.8	301	232	2567
8"	8	19.8	20.4	15.4	8.5	10.1	535	400	3806
10"	10	22.4	23	18.5	10	12.5	816	595	6018
12"	12	25.5	26.1	22.4	12	14.6	1300	1112	12,921

ASME 300 - RB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 725 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
2"-1"	1	8.5	9.1	6.7	2	2.6	31	17.7	266
3"-2"	2	11.1	11.7	8.3	3.2	4.1	53	26.5	531
4"-3"	3	12	12.5	10.4	3.9	4.8	82	42	797
6"-4"	4	15.9	16.5	12.2	5	6.2	179	84	1239
8"-6"	6	19.8	20.4	15	6.9	7.8	334	195	2567
10"-8"	8	22.4	23	18.1	8.5	10.1	654	493	3806
12"-10"	10	25.5	26.1	21.3	10	12.6	1012	661	6018
14"-12"	12	30	30.6	22.4	12	14.6	1196	721	12,921
16"-12"	12	33	33.6	23.6	12	14.6	1317	787	12,921

ASME 600 - FB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 1450 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
1"	1	8.5	8.5	4.7	2	2.6	18.8	11.1	443
2"	2	11.5	11.6	7.1	3.2	4.1	62	37.6	708
3"	3	14	14.1	8.7	4.2	5.4	117	71	1505
4"	4	17	17.1	11.4	5.2	6.4	228	157	2478
6"	6	22	22.1	12.6	7.1	8.7	482	385	6018
8"	8	26	26.1	16.5	8.9	11.4	804	506	12,302
10"	10	31	31.1	19.2	10.9	15	1456	880	16,992
12"	12	33	33.1	23.2	12.9	17.5	2095	1313	32,657

ASME 600 - RB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 1450 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
2"-1"	1	11.5	11.6	6.7	2	2.6	39.9	17.7	443
3"-2"	2	14	14.1	8.3	3.2	4.1	82	42	708
4"-3"	3	17	17.1	10.2	4.2	5.4	161	84	1505
6"-4"	4	22	22.1	13	5.2	6.4	334	164	2478
8"-6"	6	26	26.1	15	7.1	8.7	572	307	6018
10"-8"	8	31	31.1	18.9	8.9	11.4	804	506	12,302
12"-10"	10	33	33.1	21.7	10.9	15	1034	858	16,992
14"-12"	12	35	35.1	23.3	12.9	17.5	2312	1353	32,657
16"-12"	12	39	39.1	24.9	12.9	17.5	2601	1521	32,657

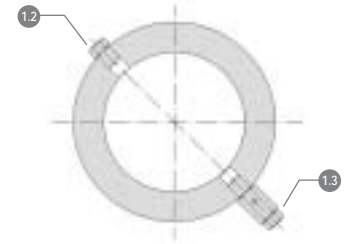
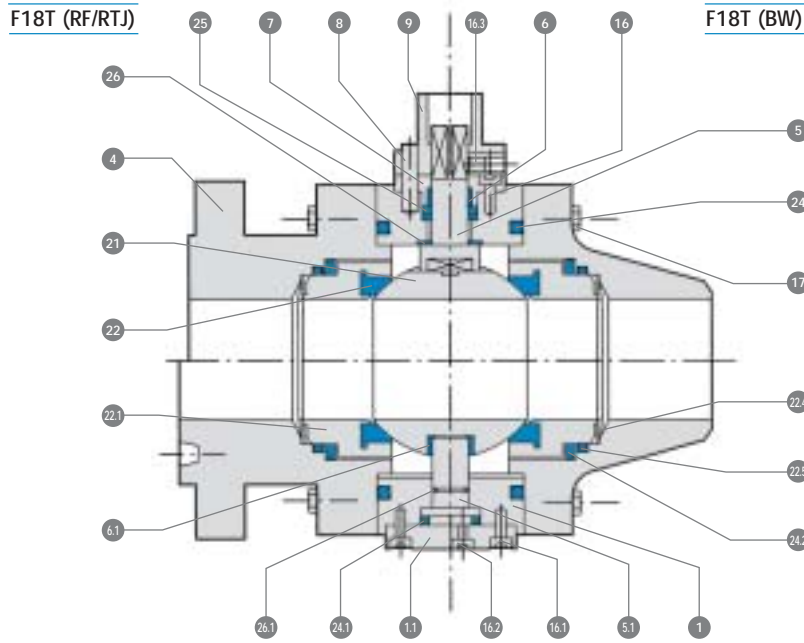
ASME 900 - FB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 2715 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
1"	1	10	10	6.7	2.8	2.9	31	18.8	531
2"	2	14.5	14.6	8.3	3.6	4.5	91	399	974
3"	3	15	15.2	9.5	4.3	5.8	75	75	2124
4"	4	18	18.1	11.8	5.8	7.6	139	161	3629
6"	6	24	24.1	13.8	7.9	9.5	577	389	9204
8"	8	29	29.1	16.5	8.9	11.4	926	513	17,966
10"	10	33	33.1	19.2	10.9	15	1582	891	25,842
12"	12	38	38.1	23.2	12.9	17.5	3090	1328	-

ASME 900 - RB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 2715 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
2"-1"	1	14.5	14.6	8.3	2.8	2.9	66	21	531
3"-2"	2	15.1	15.1	8.3	3.6	4.5	113	42	974
4"-3"	3	18	18.1	9.5	4.3	5.8	188	84	2124
6"-4"	4	24	24.1	11.8	5.8	7.6	396	166	3629
8"-6"	6	29	29.1	13.8	7.9	9.5	732	312	9204
10"-8"	8	33	33.1	18.9	8.9	11.4	1328	572	17,966
12"-10"	10	38	38.1	21.7	10.9	15	2133	820	25,842
14"-12"	12	40.5	40.9	23.3	12.9	17.5	2274	1032	-
16"-12"	12	44.5	44.9	24.9	12.9	17.5	2497	1273	-

ASME 1500 - FB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 3625 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
1"	1	10	10	6.7	2.8	2.9	35.4	18.8	708
2"	2	14.5	14.6	8.4	3.6	4.8	86	39.9	1416
3"	3	18.5	18.6	9.8	4.3	5.8	181	73	3629
4"	4	21.5	21.6	11.9	5.8	7.6	351	157	6903
6"	6	27.8	28	14.1	7.9	9.5	667	378	15,222
8"	8	32.8	33.1	16	10.2	13.7	1401	800	30,887
10"	10	39	39.4	19.4	13.4	16.5	2493	1719	41,720
12"	12	44.5	45	20.9	15.3	19	4411	3068	-

ASME 1500 - RB									
VALVE SIZE	Port	Dimensions, inches					Weight (lbs.)		Torque ⁽¹⁾ (in-lbs.) 3625 psig
		L			C	H	RF/RTJ	BW	
		RF	RTJ	BW					
2"-1"	1	14.5	14.6	9.1	2.8	2.9	64	21	708
3"-2"	2	18.5	18.6	9.8	3.6	4.8	139	42	1416
4"-3"	3	21.5	21.6	11.9	4.3	5.8	267	84	3629
6"-4"	4	27.8	28	14.1	5.8	7.6	513	161	6903
8"-6"	6	32.8	33.1	16.1	7.9	9.5	1037	323	15,222
10"-8"	8	39	39.4	20.5	10.2	13.7	1960	1107	30,887
12"-10"	10	44.5	45.1	22.8	13.4	16.5	2420	1512	41,722
14"-12"	12	49.5	50.2	24.4	15.3	19	2855	1684	-
16"-12"	12	54.5	55.4	26	15.3	19	3224	2071	-

⁽¹⁾ See page 28.



*Double Block and Bleed:
standard from 2" to 12".*

Body Group			
Item	Component	Code SS	Code CS
1	Body	ASTM A 182 316L	ASTM A350 LF2
1.1	Bottom Flange	ASTM A 182 316	ASTM A105
1.2	Body Plug	Steel	Steel
1.3	Decompression Plug	Steel	Steel
4	Body Connector	ASTM A 182 316L	ASTM A350 LF2
7	Gland Flange	ASTM A 182 316	ASTM A105
8	Stop Pin	Steel	Steel
9	Stop Plate	ASTM A 182 316	ASTM A105
16	Gland Bolt	ATSM A 193 B7 Zinc Plated	ATSM A 193 B7 Zinc Plated
16.1	Bottom Flange Bolt	ATSM A 193 B7 Zinc Plated	ATSM A 193 B7 Zinc Plated
16.2	Trunnion Stem Bolt	ATSM A 193 B7 Zinc Plated	ATSM A 193 B7 Zinc Plated
16.3	Pin Stop	ATSM A 193 B7 Zinc Plated	ATSM A 193 B7 Zinc Plated
17	Bolt	ASTM A193 Gr. B7M	ASTM A320 Gr. L7 BI-chrome
22.1	Seat-holder	ASTM A 182 316L	ASTM A182 F6a
22.4	Seat Spring	Inconel® X-750	17-4 PH

Internal Group			
Item	Componente / Component	Code SS	Code CS
21	Ball	ASTM A 182 316L	ASTM A182 F6a
5	Master Stem	ASTM A 182 316L	ASTM A182 F6a
5.1	Trunnion Stem	ASTM A 182 316L	ASTM A182 F6a
6	Gland Ring	Stainless Steel + PTFE	Stainless Steel + PTFE
6.1	Bottom Ring	Stainless Steel + PTFE	Stainless Steel + PTFE

Seal Group			
Item	Component	Code PTFE	Code FSM
22	Seat	PTFE	PTFE
22.5	Seat O-ring Seal	NBR (Nitrile)	FPM (Viton®)
24	Body Seal	NBR (Nitrile)	Graphite
24.1	Bottom Flange Seal	NBR (Nitrile)	Graphite
24.2	FSM Seal	N/A	Graphite
25	Gland Packing	Graphite	Graphite
26	Stem Seal	Stainless Steel + PTFE	Stainless Steel + PTFE
26.1	Trunnion Stem O-ring Seal	NBR (Nitrile)	FPM (Viton®)

CONFIGURATION

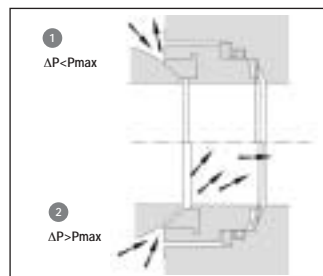
The F18T is based on the principle of assembling three screwed pieces, this provides the advantage of allowing full disassembly on the spot. The master stem is blowout proof, while the trunnion stem insures a perfect axial alignment at any working pressure. Further, the electrical conductivity between ball, stem and body is guaranteed.

BI-DIRECTIONAL SHUT-OFF

The F18T can be operated in any flow direction and can be simultaneously pressurized from both sides. When the differential pressure is low, the shut-off of the seats is obtained through the stainless steel or alloy pre-stretched springs. When the differential pressure is high, the "upstream" seat is gradually pushed against the ball and made to maintain a full shut-off.

PRESSURE RELIEF IN THE BODY CAVITY THROUGH THE SEATS

When pressure in the body's cavity goes up, it can be automatically relieved by separating the seat from the ball. The relief of the overpressurization makes it thereby possible to balance the valve hydraulically. This will happen whenever the cavity's pressure overcomes the pre-stretching of the springs, and in the direction in which the ΔP is greater.



FULL SELF-LUBRICATION

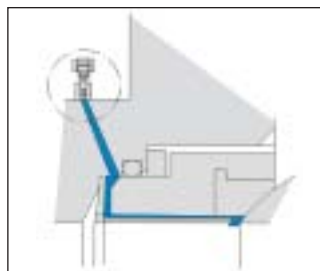
Metal PTFE-covered rings and washers are used in order to sustain the radial effort exerted on the master and trunnion stems. When it comes to seats and seals, the materials that are used are low-friction. All this makes it unnecessary for any additional lubrication when the valve is in operation.

OPERATING TORQUE

In the design of the F18T valve, special care has been given to the components related to the valve's operation torque, such as the seat springs, friction washers, self-lubricated rings, ball, stem, and trunnion. The result of this are low operation torques, even after a long period of inactivity.

SECONDARY SEALANT INJECTION

If required by the customer we can supply a lubricant injection device. In certain cases the seat's surface may be damaged or the seat may be subject to excessive wear. For such situations the injection of a sealant into the seat may temporarily restore its shut-off.



HB

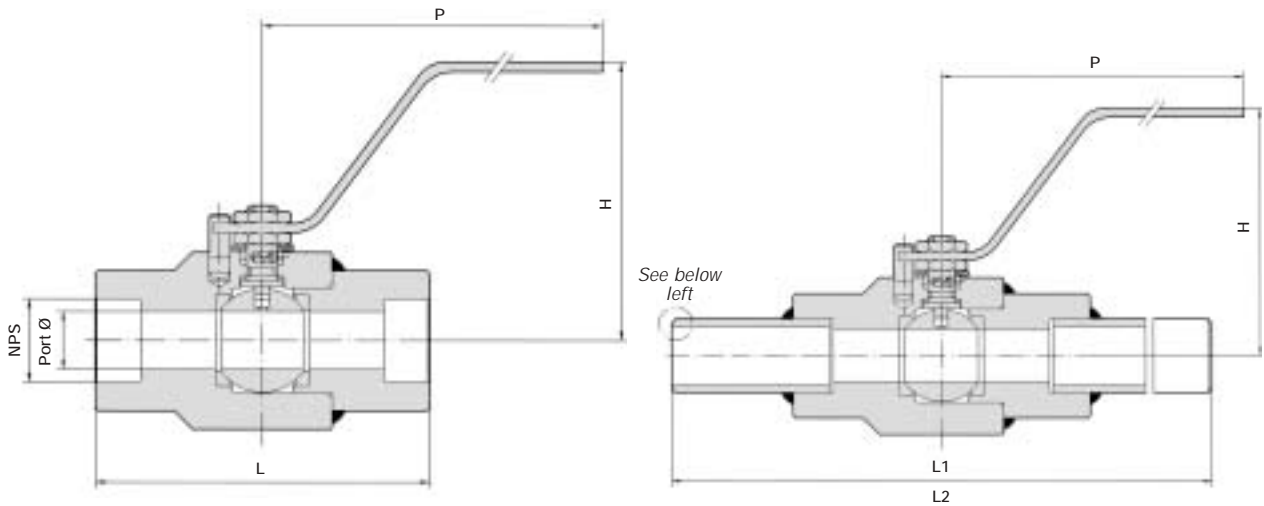
Full or Regular Port, 1-piece body construction.

Standards: • Design: BS5351 • Test: BS6755 P1.

Connections: • NPT thread: ASME B1.20.1 • SW: ASME B16.11

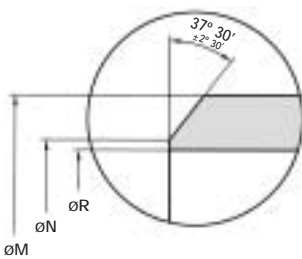
• BW: SW + Nipples Sch 40-80 (ASME B16.25).

CHLORINE SERVICE



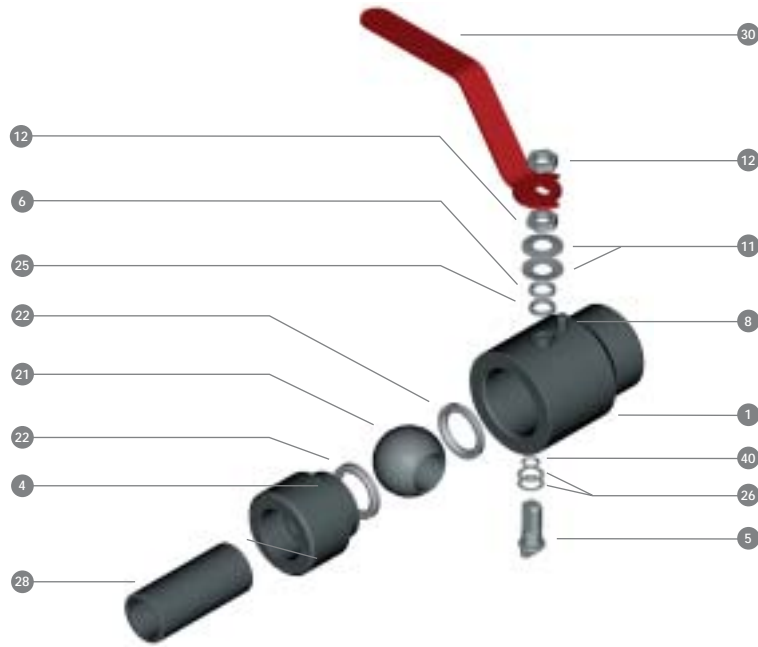
Class 800																	
VALVE SIZE		Port	Dimensions					SW Sch ØA		Cv		Torque (1)			Weight		
RB	FB		L	L1	L2	H	P	RB	FB	RB	FB	725psi	1450psi	2030psi	(L)	(L1)	(L2)
-	1/4"	0.49	3.15	9.45	15.75	2.10	-	-	0.56	-	-	-	-	-	-	-	-
-	3/8"		3.54			3.35		5.9	-	0.70	-	53	71	80	89	2.2	2.7
3/4"	1/2"	0.75	4.33			3.54	1.08	0.86	31	150	89	106	133	3.5	4.2	4.9	
1"	3/4"	1.00	4.72			3.94	-	1.34	-	220	133	177	177	5.3	6.2	7.1	
-	1"	1.26	5.12	4.13	1.93	-	242	-	177	221	-	7.5	8.4	9.5			
1 1/2"	-	1.50	5.91	4.33	2.40	1.93	396	528	221	310	-	12.4	13.7	15.0			
2"	1 1/2"	2.0	7.10	4.57	-	2.40	-	1101	310	442	-	19.5	22.1	24.8			

(1) See page 30.



Execution BW = SW + Nipple									
VALVE SIZE	ØM	Sch 10S		Sch 40S		Sch 80		Sch 160	
		ØN	ØR	ØN	ØR	ØN	ØR	ØN	ØR
1/2"	0.84	-	0.67	-	0.62	-	0.55	.59	0.46
3/4"	1.05	-	0.89	-	0.83	-	0.74	0.74	0.61
1"	1.31	1.22	1.10	1.17	1.05	1.08	0.96	0.94	0.81
1 1/2"	1.90	1.81	1.69	1.74	1.61	1.63	1.50	1.46	1.34
2"	2.37	2.28	2.16	2.19	2.07	2.06	1.94	1.81	1.69
Code SS		Special		Standard		Standard		Special	
Code CS		Special		Standard		Standard		Special	

STANDARD MATERIALS



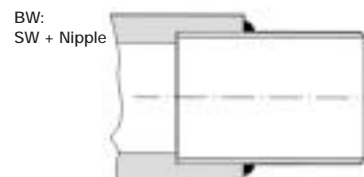
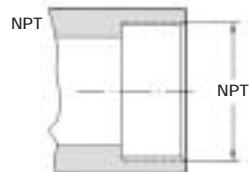
Body Group			
Item	Componente / Component	Code SS	Code CS
1	Body	ASTM A479 316L	ASTM A105
4	Body Connector	ASTM A479 316L	ASTM A105
28	Nipple	ASTM A312 (Type 316L)	ASTM A106 Gr. B
8	Stop Pin	Stainless Steel	Steel
9	Stop Plate (> 1")	Steel	Steel
11	Washer	Stainless Steel	Carbon Steel
12	Nut	Stainless Steel	Carbon Steel
30	Wrench	≤ 1": Coated Steel ≥ 1 1/2": Cast Iron	≤ 1": Coated Steel ≥ 1 1/2": Cast Iron

Internal Group			
Item	Component	Code 316	Chlorine Service*
21	Ball	≤ 1": ASTM A479 316 ≥ 1 1/2": CF8M	Monel & Hastelloy C
5	Antistatic Stem	ASTM A479 316	Monel & Hastelloy C
6	Gland Ring	ASTM A479 316	ASTM A479 316

Seal Group			
Item	Component	Code PTFE	Code FSM
22	Seat	PTFE	PTFE
25	Gland Packing	PTFE	Graphite
26	Stem Seal	≤ 1": PTFE + 25% Graphite > 1": PTFE	≤ 1": PTFE + 25% Graphite > 1": PTFE
40	Stem O-Ring	FPM (Viton®)	FPM (Viton®)

*In accordance with Chlorine Institute recommendations.

END CONNECTIONS





Miscellaneous

With breadth of product and a wide array of options and accessories, KITZ can assure its users that they will get the proper valve for their applications. Whether it be alternate seating materials such as Peek, UHMWPE or filled teflon; alternate body materials such as Alloy 20, Hastelloy, Monel or Duplex; double stuffing boxes; steam jackets or extensions, KITZ Iso brand valves solve problems.

(Please note that the material options and accessories presented in this brochure apply specifically to the Iso Brand series of valves. Contact your Regional Manager or Customer Service Representative for assistance with KITZ TAM and TBZM Series valves.)

Fig. F14A Pg. 4-6

Flanged ends, full and regular port.

Material	Length	Rating	VALVE SIZE											
			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	3"	4"	6"	8"	10"	12"
SS	Short	ASME150												
		ASME300												
		ASME600												
CS	Short	ASME150												
		ASME300												
		ASME600												
CS	Long	ASME150												
		ASME300												
		ASME600												

Consult KCA for regular port configuration.

Fig. BF6K Pg. 7-8

Flanged ends, regular port.

Material	Class Rating	VALVE SIZE													
		1/2"	3/4"	1"	1 1/2"	2"	3"	4"	6"	8"	10"	12"	14"	16"	
SS	ASME150														
	ASME300														
CS	ASME150														
	ASME300														

Note 1: Figure F14A, used for A150 (12") & A300 (12").

Note 2: Figure F18A, used for A150/300 (14" & 16").

Fig. F14M Pg. 9-13 (Fig. HBM Class 800)

Flanged, threaded or welded ends, full or regular port, metal seats.

Material	Port	Rating	VALVE SIZE											
			1/2"	3/4"	1"	1 1/4"	1 1/2"	2"	2 1/2"	3"	4"	5"	6"	8"
SS	RB	ASME150												
		ASME150												
	FB	ASME300												
		ASME600 Class 800												
CS	RB	ASME150												
		ASME150												
	FB	ASME300												
		ASME600 Class 800												

Please consult KCA for other sizes and ratings.

Fig. F18T Pg. 14-17

Flanged or welded ends, full or regular port, trunnion mounted.

Material	Rating	Bore	VALVE SIZE													
			1"	2"	3"	4"	6"	8"	10"	12"	14"	16"				
SS	ASME150	FB														
		RB														
	ASME300	FB														
		RB														
&	ASME600	FB														
		RB														
	ASME900	FB														
		RB														
CS	ASME1500	FB														
		RB														
	ASME2500	FB														
		RB														

Fig. HB. Pg. 18-19

Threaded or welded ends, Class 800, full or regular port.

Material	Bore	NPS						
		1/4"	3/8"	1/2"	3/4"	1"	1 1/2"	2"
SS	FB							
	RB							
CS	FB							
	RB							

For alternate materials please consult KCA

STEAM JACKET

KCE manufactures **Stainless Steel** Steam Jackets, with screwed or flanged ends. They have been designed to be adapted to Carbon Steel or Stainless Steel valves. The **water-tightness** of the jacket is hydraulically checked at a 145 psig pressure minimum. The **water-tightness** of the valve is verified - according to the Standard - before and after the jacket is welded.



SILICON-FREE VALVES DEGREASED VALVES

In processes such as paints or O₂ Services, valves are often provided with a "special cleaning" feature. KCE offers two solutions: **Degreased** valves for O₂ Service and **Silicon-Free** valves for other applications. Both processes are covered by KCE's Engineering Procedures and are approved by end user customers, the aim being to **prevent the presence of greases and silicones that can foul the process**. For this purpose the product is specially treated in "clean areas", where special attention is given to their components, handling, testing, drying and verification. Finally, the product is labeled, packed in a water-tight bag and individually identified.



OVAL HAND WHEEL

Following safety criteria, it is common practice to fit valves up to 1" with oval hand wheels. This system, because of its design, **prevents unintentional operations**, that might result in accidents.



"T"-STEM EXTENSION. (Ex/S)

It enables the easy operation of valves in a application where **pipng is isolated** or have a **difficult access**. KCE manufactures these extensions - fully in SS- with a standard length of 4" (100 mm) or, under request, with 2" (50-mm) or 6" (150-mm) lengths.

LOW TEMPERATURE EXTENSIONS. (Ex/B & Ex/Cry)

As a general rule, in applications with temperatures below 32°F down to -40°F, it is not necessary to use low temperature extensions; what is used most is the Ex/S extension. From -40°F the extensions used is the Ex/B (-40°F down to -112°F) and Ex/Cry (-112°F down to -320°F) separating the **packing area** from the "cold" area. The length varies depending on temperature and the valve size, ranging between 4" (100mm) and 20" (500 mm). The extension's material is at least the same quality as the body and the mounting flange complies with ISO 5211.



SPECIAL MATERIALS

In some instances, process fluid and working conditions require an **additional resistance** which conventional materials can not provide. To this end, KCE offers a wide range of materials such as Duplex, Superduplex, Monel, Alloy 20, Hastelloy C, LCC, CF3M (316L) and CF8. Please consult KCA for a complete range of materials.



LOCKING DEVICE

Out of safety concerns the requirement may be made to only allow **authorized personnel** to operate the valves. For this reason all Iso Brand ball valves are supplied with a locking plate.



DOUBLE STUFFING BOX

In some types of highly polluting or toxically dangerous fluids, **zero external emissions** is required. KCE provides this using a "Double Packing" solution. This system is made up of two sealing independent groups, with an intermediate leak detector. KCE's "Double Packing" has been approved by our most demanding end customers and tested for correct operation in **up to 433,000 cycles**.



SPRING RETURN HANDLES

With regard to safety, manual fail safe units prevent valve from being left open or closed. Release of lever returns valve to set position.



Pressure – Temperature (P – T) ratings:

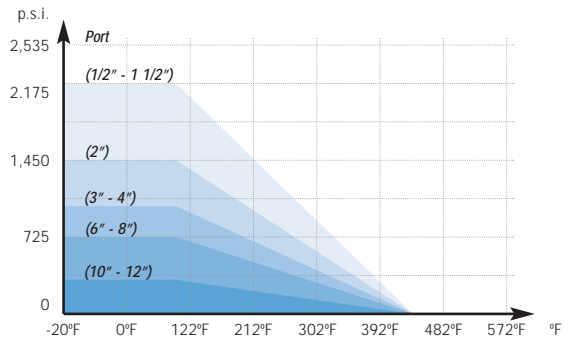
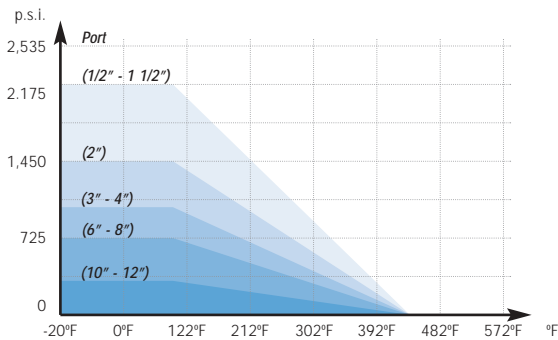
The P – T operating ratings in soft-seated floating ball valves are not only determined by the resistance of the Valve Body, but also by the limitations of their Seats and Seals. It is difficult to pinpoint the accurate P – T limit because of the boundless number of combinations between fluids and conditions. This is why the values that are shown below are an approximation and based on our own past experience.



Virgin PTFE: Inert to most media, low friction coefficient, subject to temperature limitations. Good performance in gas applications.



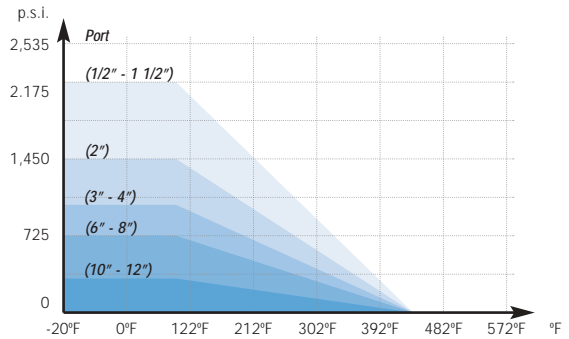
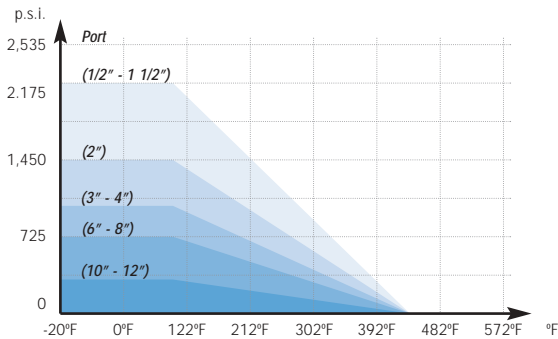
PTFE + Graphite (20% C + 5% Graph): Inert to most media. Higher P-T range than virgin PTFE. Used in steam and thermal oil applications.



PTFE + Glass Fiber (15% G.F.): Good resistance to wear and deformation under load. Longer service life and higher pressure resistance than virgin PTFE. Suitable for foodstuffs, pharmaceutical and cosmetic industry applications.



PTFE + Glass Fiber (25% G.F.): Good resistance to wear and deformation under load. Longer service life and higher pressure resistance than PTFE + 15% G.F. Suitable for foodstuffs, pharmaceutical and cosmetic industry applications.

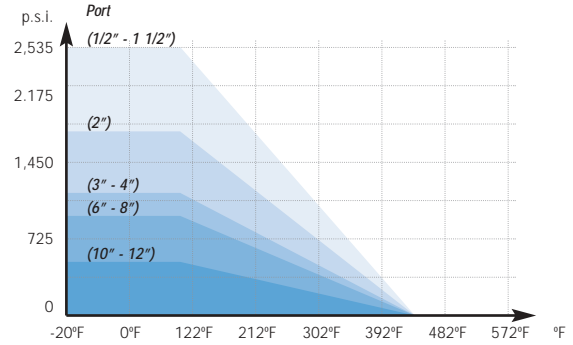
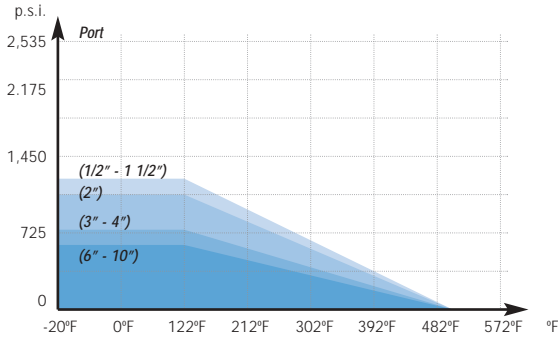




HYPATITE (PTFE + PFA + compound):
Good resistance to wear and under load. Higher chemical resistance than virgin PTFE.



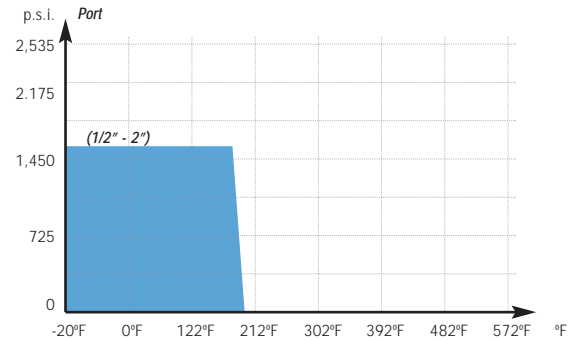
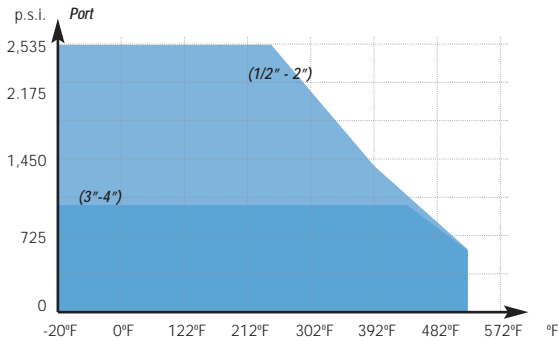
PTFE + 50% SS (Stainless Steel): Good pressure resistance. Used for abrasive fluids or hard particles transportation.



PEEK (Poly-ether-ether-ketone): Suitable for tobacco, nuclear services and high temperatures at high pressure. High friction. Not recommended for concentrated Sulphuric Acid.

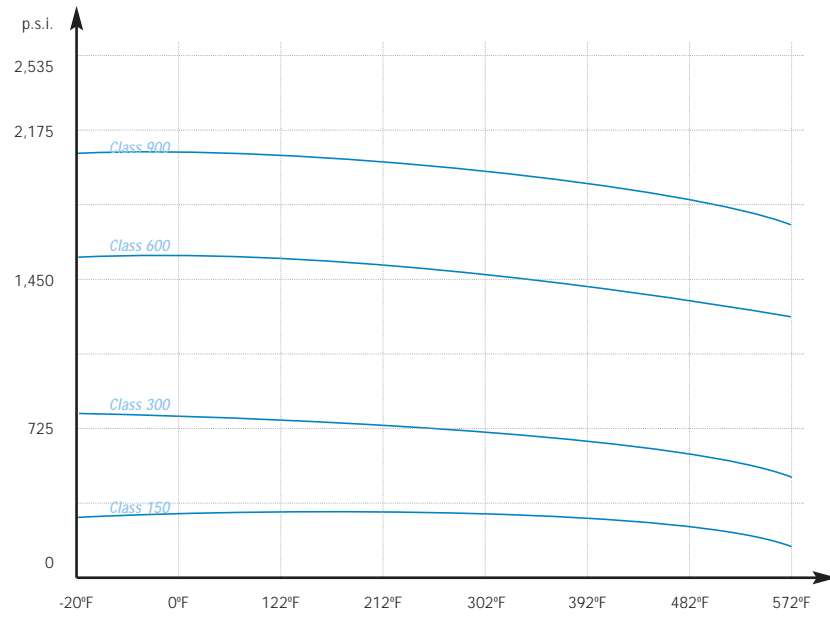


UHMWPE (Ultra High Molecular Weight Polyethylene): Good for nuclear, tobacco, food industry, H₂SO₄, etc. Low friction coefficient.



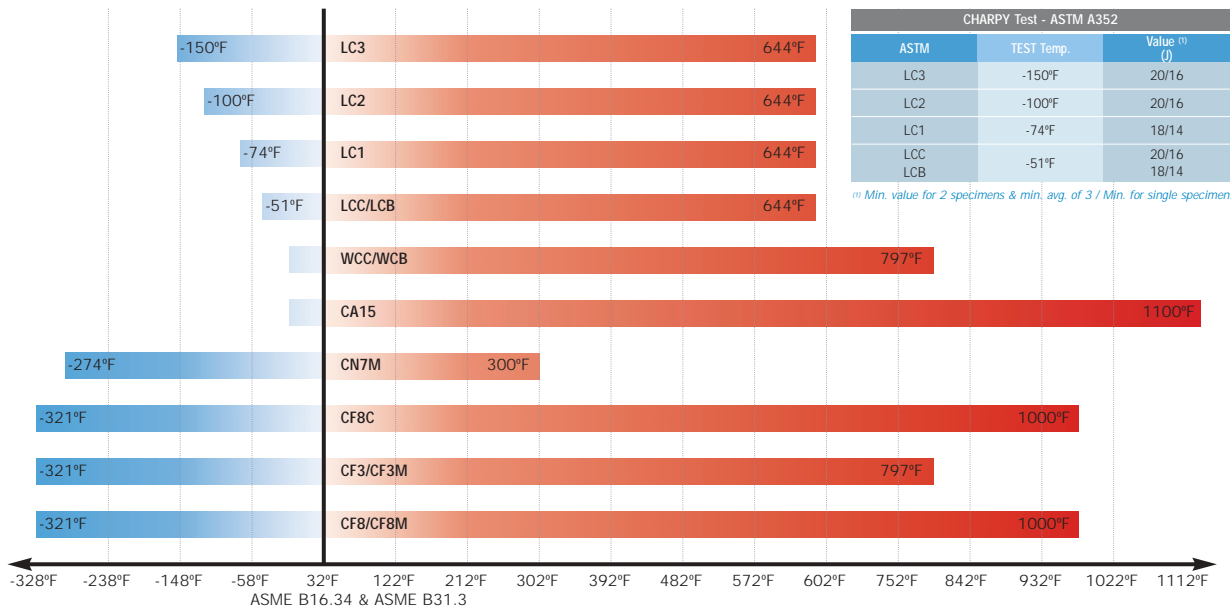
Note: Other sealing materials, like TFM 1600, Polypropylene, PEEK+Graphite, FEP+Silicone, Fluoraz®, Kalrez®, Chemraz®, etc, are available upon request.

O-Ring Materials			
Type	ASTM Designation	Temperature	
		Standard	Low Temp.
Viton®	FPM/FKM Fluorocarbon Rubber	-13 °F / +446 °F	-40 °F / 446 °F
Nitrile	NBR Nitrile Butadiene Rubber	-13 °F / +284 °F	-67 °F / +230 °F



Material Specifications			
Material	Group	Designation	
		ASTM	Type
Cast Iron	Grey Cast Iron	A126 B	GG25
	Nodular Cast Iron	A536 65-45-12	GGG40
Steel Casting	Carbon Steel	A216 WCB	A105
		A216 WCC	
	Carbon & Low Alloy Steel. Low temperature	A352 LCB	
		A352 LCC	LF2
		A352 LC1	
		A352 LC2	
		A352 LC3	LF3
	Martensitic Stainless Steel. High Temperature	A217 CA15	410 / 420
	Austenitic & Duplex Steel	A351 CF3	304L
		A351 CF3M	316L
		A351 CF8	304
		A351 CF8M	316
		A351 CF8C	304+Nb (Ti)
A351 CN7M		Alloy 20, UNS N08020	
A351 D-4 MCu		Duplex, UNS S31803	
A351 CF10-MC		Superduplex, UNS S32760	
Nickel Casting	Nickel Alloy	A494 N-12MV	Hastelloy B
		A494 CW12MW	Hastelloy C, UNS N06455
		A494 M-35-2	Monel, UNS N04400
		B166	Inconel 600, UNS N06600
Forged Steel	Carbon Steel	A105	WCB
	Stainless Steel	A182 F6a	
		A182 F304	CF8
		A182 F304L	CF3
		A182 F316	CF8M
		A182 F316L	CF3M
		A182 F321	
		AISI 904L	UNS N08904
		A182 316 Ti	
	Carbon & Low Alloy Steel. Low Temperature	A350 LF1	
		A350 LF2	LCC
		A350 LF3	LC3

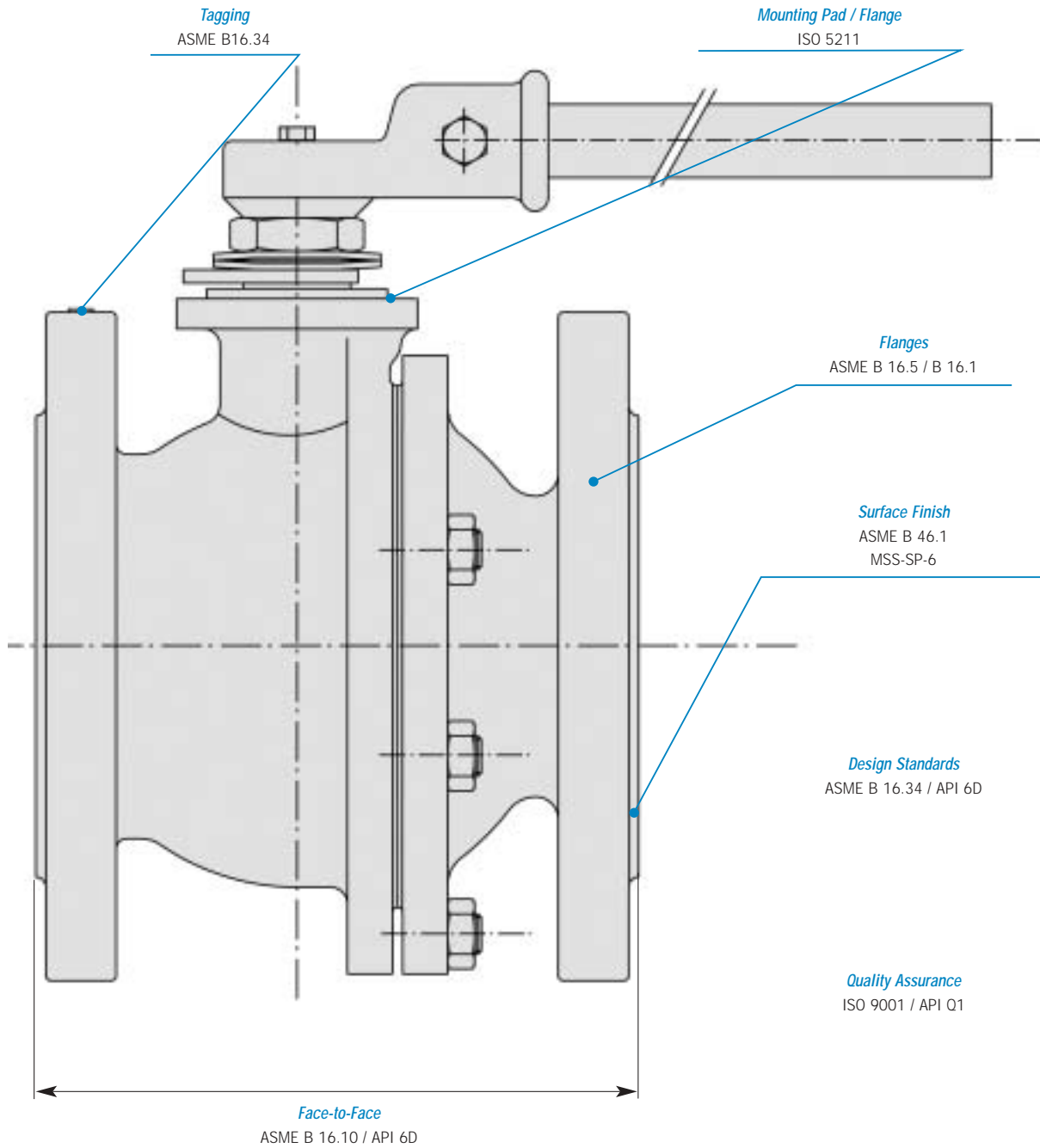
Temperature Ranges



Material Properties												
Material Type	Chemical Properties									Mechanical Properties		
	%C max.	%Si max.	%Mn max.	%P max.	%S max.	%Cr	%Ni	%Mo	Misc	Tensile strength (N/mm ²)	Yield strength (N/mm ²)	Elongation (%)
CF8M	0.08	1.50	1.50	0.04	0.04	18-21	9-12	2-3		0.07	0.03	30
316	0.08	1.00	2.00	0.045	0.03	16-18	10-14	2-3	N≤1%	0.07	0.03	30
CF8	0.08	2.00	1.5	0.04	0.04	18-21	8-11	0.5max.		0.07	0.03	35
304	0.08	1.00	2.00	0.045	0.03	18-20	8-11		N≤1%	0.07	0.03	30
CF8C	0.08	2.00	1.50	0.04	0.04	18-21	9-12	0.5max.	8•%C≤Nb≤1%	0.07	0.03	30
CF3	0.03	2.00	1.5	0.04	0.04	17-21	8-12	0.5max.		0.07	0.03	35
304L	0.035	1.00	2.00	0.045	0.03	18-20	8-13		N≤1%	0.07	0.02	30
CF3M	0.03	1.50	1.50	0.04	0.04	17-21	9-13	2-3		0.07	0.03	30
316L	0.08	1.00	2.00	0.045	0.03	16-18	10-15	2-3	N≤1%	0.07	0.02	30
CN7M	0.07	1.50	1.50	0.04	0.04	19-22	27,5-30,5	2-3	Cu = 3-4%	0.07	0.02	35
WCB	0.03	0.60	1.00	0.04	0.045	0.5max.	0.5max.	0.2max.	Cu≤0,3%,V≤0,03%	0.07 - 0.09	0.04	22
A105	0.35	0.1-0.35	0.6-1.05	0.035	0.04	0.3max.	0.4max.	0.12max.	Cu≤0,4%,V≤0,05%	0.07	0.04	30
LCC	0.25	0.60	1.20	0.04	0.045	0.50	0.50	0.2max.	V≤0,03%	0.07 - 0.09	0.04	22
LF2	0.30	0.15-0.3	0.6-1.35	0.035	0.04	0.3max.	0.4max.	0.12max.	Cu≤0,4%,V≤0,05%	0.07 - 0.09	0.04	22

Conversion Chart					
Length			Volumetric Flow Rates		
METERS	x 39.7 =	INCHES	GPM	x 8.021 =	FT ³ /HR
INCHES	x 25.4 =	MILLIMETERS	LITERS/SECOND	x 3.60 =	M ³ /HR
FEET	x 0.3048 =	METERS	M ³ /HOUR	x 4.403 =	GPM
MILLIMETERS	x 0.0033 =	FEET	GPM	x 34.29 =	BARRELS/DAY
MILES	x 1.609 =	KILOMETERS	Temperature		
FEET	x 12 =	INCHES	°F	1.8°C + 32	
Area			°C	(°F-32) / 1.8	
SQUARE METERS	x 10.764 =	SQUARE FEET	°R	°F + 459.69	
SQUARE INCHES	x 0.000645 =	SQUARE METERS	Pressure		
SQUARE FEET	x 144 =	SQUARE INCHES	IN-LBS	x 0.113 =	NEWTON METERS
Pressure			IN-LBS	x 0.01152 =	KG-METERS
PSI	x 0.06895 =	BAR	KG-METERS	x 7.233 =	FT-LBS
BAR	x 100 =	KILOPASCALS	NEWTON METERS	x 8.851 =	IN-LBS
ATMOSPHERE	x 1.0333 =	Kg/CM ²	KGf-CM	x 0.87 =	IN-LBS
BAR	x 14.5 =	PSI	Force		
Kg/CM ²	x 14.22 =	PSI	POUND FORCE	x 0.4536 =	KILOGRAM FORCE
Volume			KILOGRAM FORCE	x 9.81 =	NEWTON
IN ³	x 0.0164 =	LITERS	KILONEWTONS	x 7233 =	POUNDS
LITERS	x 0.2642 =	U.S. GALLONS	Miscellaneous		
U.S. GALLONS	x 0.833 =	IMPERIAL GALLONS	BAR	x 750 =	TORR
U.S. QUART	x 0.25 =	U.S. GALLONS	ATMOSPHERE	x 760 =	mm Hg
FT ³	x 0.178 =	U.S. BARREL	TORR	x 0.54 =	inches H ₂ O

All tables and data shown in these pages are meant to be reference average values.
For a more accurate product description, we recommend that the related Standards be looked up.



Fire Safety Standards

API 607
API 6FA

Pressure Test

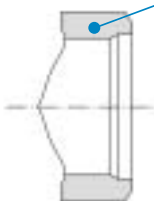
API 598
ASME B16.104 Class VI

Material Specification

NACE MR0175

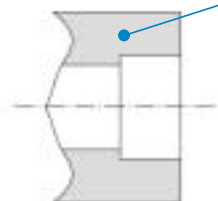
Butt Weld Ends

ASME B 16.25 / ASME B 36.10



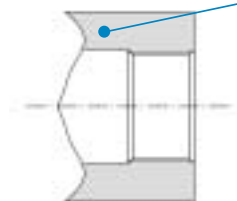
Socket Weld Ends

ASME B 16.11



Threaded/Screwed Ends (NPT)

ASME B1.20.1



<u>12"</u>	<u>A150</u>	<u>F-</u>	<u>F14A/G-</u>	<u>CS/316-</u>	<u>FSM</u>	<u>3"</u>	<u>A300</u>	<u>F-</u>	<u>F14M-</u>	<u>SS/316-</u>	<u>WC</u>	<u>Q</u>
(P)	1	2	3 7	4 5	6	(P)	1	2	3	4 5	6	9
				<u>1/2"</u>	<u>C800-</u>	<u>NPT-</u>	<u>HBM-</u>	<u>CS/316-</u>	<u>Ni+G</u>			
				(P)	1	8	3	4 5	6			

PREFIX (P)

Size, in inches

1 - PRESSURE CLASS

ASME Class 150# through 600# (Flanged)
(for higher pressure classes please consult KCA)
C800 (Threaded & SW)

2 - PORT TYPE

F Full Port
R Regular Port

3 - SERIES

F14A . . . ISO 5211 Mounting Flange, Floating Split Body, Soft Seat
(Full & Regular port)
F18A . . . ISO 5211 Mounting Flange, Floating Split Body, Soft Seat
(Regular port)
BF6K . . . ISO 5211 Mounting Flange, Floating End Entry, Soft Seat
(Regular port)
F14M . . . ISO 5211 Mounting Flange, Floating & Trunnion, Metal Seats
(Full & Regular port)
F18T . . . Trunnion Mounted
(Full & Regular port)
HBM . . . ISO 5211 Mounting Flange, Floating, Metal Seats, SW & NPT
(Full Port)
HB Floating 1-piece, NPT, SW & BW
(Full & Regular Port)

4 - BODY MATERIAL

CS Cast Carbon Steel and Low Alloys
SS Cast Stainless Steel and High Alloys
(Contact KCA for special materials such as LCC, 316L, Alloy 20, Duplex and others.)

5 - TRIM MATERIAL

316 Stainless Steel
(For chlorine service please consult KCA)

6 - SEAL GROUP (Seat/Packing/Body Seals)

T Standard (PTFE/PTFE/SS + PTFE (Spiral Wound))
(Peek, UHMWPE, G/F PTFE, PTFE + SS & Graphite filled PTFE available)
FSM . . . Firesafe (PTFE/Graphite/SS + Graphite (Spiral Wound))
Metal . . . Refer to page 11.

7 - OPERATOR

G Gear

8 - ENDS

None . . . Flanged
NPT Threaded
SW Socket Weld

9 - SPECIAL

Special configurations, requirements or testing.

Design and Inspection Standards			
Item	American Standards		British Standards
	Body	KITZ Standard	
Pressure Temperature Rating	ASME B16.34	BS 5351	
	Non-Metal Sealing Parts		
Shell Wall Thickness	ASME B16.34	BS 5351	
Face-to Face Dimensions	ASME B16.10	BS 2080	
End Flange Dimensions and Flange Gasket Facing	ASME B16.5	BS 1560	
Pressure Test	API 598 or API 6D*2	BS 5146	
Fire Test	API 607	BS 6755	

Torque values and NACE

Torque Values

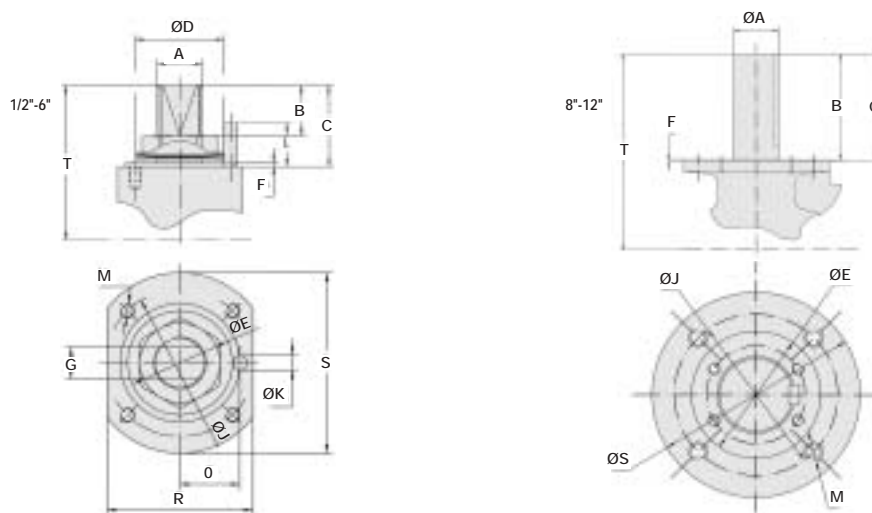
The values shown throughout this catalog are an average of real values. These values have been taken under ideal conditions of clean water, room temperature, unfilled PTFE, daily handling and without safety factors. For different types of services and conditions, we suggest that the following corrective factors be used:

Filled PTFE seats	1.2 - 1.4
Low temperature (-50°F)	1.5
Low temperature (-150°F)	2
Long inactivity	2 (min.)
Wet gases	1.5
Dry gases (Natural Gas)	1.7
Powder	1.3
Drying-out fluids	1.2

NACE in accordance with MR0175

Metallic material requirements for resistance to sulfide stress cracking (SSC) for petroleum production, drilling, gathering and flowline equipment, and field processing facilities to be used in hydrogen sulfide (H₂S)-bearing hydrocarbon service.

ISO 5211 Mounting Pad Dimensions



ASME 150 - ASME 300 - ASME 600

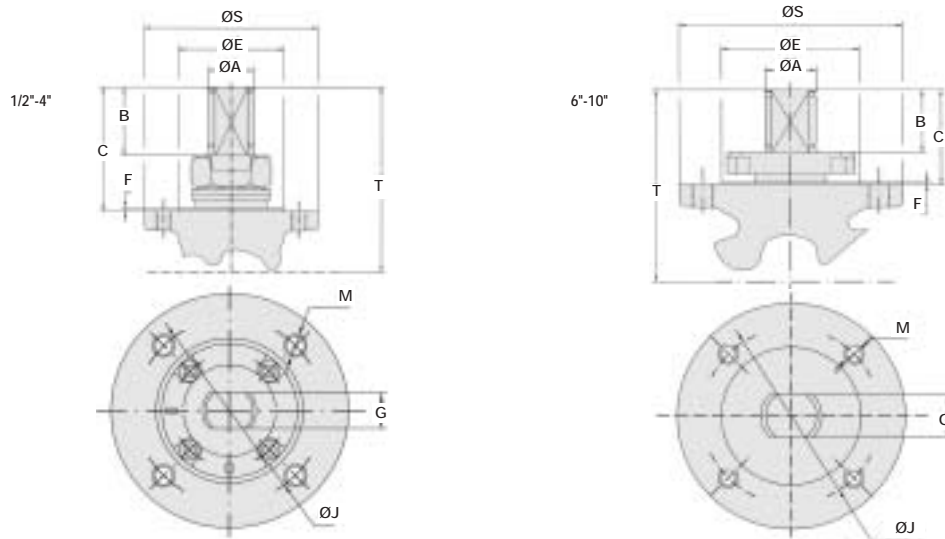
FULL PORT

F14A	VALVE SIZE	ISO FLANGE	DIMENSIONS, inches														
			T	A	B min.	C	D	E	F	G	J	K	L	M(unc)	O	R	S
	1/2"	F03	1.63	M10	0.31	0.65	0.79	0.98	0.06	0.24	1.42	0.28	0.551	3/16"-24	0.55	1.57	1.57
	3/4"	F03	1.79	M10	0.31	0.65	0.79	0.98	0.06	0.24	1.42	0.28	0.55	3/16"-24	0.55	1.57	1.57
	1"	F05	2.68	M14	0.55	1.18	1.10	1.38	0.12	0.35	1.97	--	--	1/4"-20	--	2.05	2.05
	1-1/2"	F05	3.54	M14	0.57	1.14	1.10	1.38	0.08	0.35	1.97	--	--	1/4"-20	--	1.89	2.56
	2"	F07	5.12	M24	1.12	1.98	1.97	2.17	0.12	0.67	2.76	--	--	5/16"-18	--	2.83	3.54
	3"	F07	5.91	M24	1.22	2.07	1.97	2.17	0.12	0.67	2.76	--	--	5/16"-18	--	2.83	3.54
	4"	F10	7.72	M36	1.52	2.57	2.80	2.76	0.12	0.87	4.02	--	--	3/8"-16	--	3.94	4.92
	6"	F10	8.66	M36	1.52	2.62	2.80	2.76	0.12	0.87	4.02	--	--	3/8"-16	--	3.94	4.92
	8"	F14	14.98	0.197	5.73	5.85	--	3.94	0.12	--	5.51	--	--	5/8"-11	--	--	6.89
	10"	F16	18.15	02.56	6.75	6.87	--	5.12	0.12	--	6.50	--	--	3/4"-10	--	--	8.27
	12"	F16	19.29	02.56	6.75	6.87	--	5.12	0.12	--	6.50	--	--	3/4"-10	--	--	8.27

REGULAR PORT

	6"	F10	8.66	M36	1.52	2.62	2.80	2.76	0.12	0.87	4.02	--	--	3/8"-16	--	3.94	4.92
	12"	F14	15.96	01.97	5.73	5.85	--	3.94	0.12	--	5.51	--	--	5/8"-11	--	--	6.89
	14"	F16	18.11	02.56	6.75	6.87	--	5.12	0.12	--	6.50	--	--	3/4"-10	--	--	8.27
	16"	F16	19.25	02.56	6.75	6.87	--	5.12	0.12	--	6.50	--	--	3/4"-10	--	--	8.27

ISO 5211 Mounting Pad Dimensions



ASME 150 - ASME 300

REGULAR PORT

BF6K	VALVE SIZE	ISO5211	T	A	B	C	E	F	G	J	M ₀	S	
	1/2"	F03	1.32	0.31	0.30	0.59	0.98	0.06	0.20	1.42	--	1/4"-20 UNC	1.89
	3/4"	F03	1.42	0.31	0.30	0.59	0.98	0.06	0.20	1.42	--	1/4"-20 UNC	1.89
	1"	F04	1.85	0.39	0.39	0.79	1.18	0.06	0.24	1.65	--	1/4"-20 UNC	2.17
	1 1/2"	F05	3.44	0.55	0.81	1.56	2.17	0.06	0.39	2.00	--	1/4"-20 UNC	2.56
	2"	F05	4.29	0.79	1.04	1.97	2.17	0.08	0.67	2.76	--	5/16"-18 UNC	3.54
	3"	F07	5.89	0.94	1.42	2.58	2.17	0.08	0.67	2.76	--	5/16"-18 UNC	3.54
	4"	F07	6.48	0.94	1.42	2.58	2.17	0.08	0.67	2.76	--	5/16"-18 UNC	3.54
	6"	F12	7.99	1.38	1.71	2.58	3.35	0.08	0.91	4.92	--	1/2"-13 UNC	5.91
	8"	F14	9.55	1.57	1.97	3.0	3.94	0.08	1.06	5.51	--	5/8"-11 UNC	6.89
	10"	F16	11.52	1.89	2.30	3.56	5.12	0.08	1.26	6.50	--	3/4"-10 UNC	8.27

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
CI	CS	SS	H.C	A.20	M					
A										
Acetaldehyde	■	■	●●	*	*	*	▼	▼	●●	
Acetamine	●●	■	●	*	*	*	■	●	●●	
Acetat Solvent	●	●●	●●	*	*	*	▼	▼	●●	
Acetic Acid (10%)	▼	■	●●	●●	●●	●	▼	▼	●●	CH ₃ COOH
Acetic Acid (30%)	■	■	●●	●●	●●	●	▼	▼	●●	CH ₃ COOH
Acetic Acid (80%)	■	■	●●	●●	●●	●	▼	▼	●●	CH ₃ COOH
Acetic Acid (Aerated)	▼	▼	●●	*	*	*	■	▼	●●	CH ₃ COOH
Acetic Acid (Air free)	▼	▼	●●	●●	●●	●	■	▼	●●	CH ₃ COOH
Acetic Acid (Crude)	▼	■	●●	*	*	*	▼	▼	●●	CH ₃ COOH
Acetic Acid (Pure)	▼	▼	●●	*	*	*	▼	▼	●●	CH ₃ COOH
Acetic Acid (Vapor)	▼	▼	▼	●●	●●	●	▼	▼	●●	CH ₃ COOH
Acetic Anhydride	▼	▼	●	●●	●●	▼	▼	▼	●●	(CH ₃ CO) ₂ O
Acetone	●●	●●	●●	●●	●●	●●	▼	▼	●●	CH ₃ COCH ₃
Acetyl Chloride	*	■	■	*	■	●	▼	■	●●	
Acetylene (Dry)	●●	●●	●●	*	*	*	●	●●	●●	C ₂ H ₂
Acid Fume	*	▼	●	*	*	*	■	*	●●	
Acrylonitrile	■	●●	●●	*	*	*	▼	▼	●●	H ₂ C=CHCN
Air	●●	●●	●●	*	*	*	●●	●●	●●	78%N ₂ +21%O ₂ +0,8%Ar+...
Alcohol-Amyl	■	●	●●	*	*	*	●	●	●●	C ₅ H ₁₁ - OH
Alcohol-Buthyl	■	●	●●	●●	●●	●●	●	●●	●●	CH ₃ (CH ₂) ₂ CH ₂ OH
Alcohol-Diacetona	●●	●●	●●	*	*	*	▼	▼	●●	
Alcohol-Ethyl	●	●	●●	●●	●●	●●	●	●	●●	C ₂ H ₅ - OH
Alcohol-Fatty	*	●	●●	*	*	*	●	●	●●	
Alcohol-Isopropyl	●	●	●●	*	*	*	■	●●	●●	(CH ₃) ₂ CH - OH
Alcohol-Methyl	●	●	●●	●●	●●	●●	●	■	●●	CH ₃ - OH
Alcohol-Propyl	●	●	●●	●●	●●	●●	●	●	●●	CH ₃ -CH ₂ -CH ₂ -OH
Aliphatic Ester	*	*	*	*	*	*	▼	*	●●	
Alkyl Chloride	▼	▼	▼	*	*	*	▼	*	●●	
Alum	▼	▼	●●	*	●●	*	●	●	●●	KAl(SO ₄) ₂
Alumina	*	*	*	*	*	*	●●	*	●●	
Aluminum Acetate	▼	▼	●●	●●	●●	●	▼	▼	●●	(CH ₃ COO) ₃ Al
Aluminum Chloride (Dry)	*	■	■	*	*	*	●	●●	●●	AlCl ₃
Aluminum Chloride (Solu)	*	▼	■	●●	●●	●	●	●●	●●	AlCl ₃
Aluminum Fluoride	*	▼	■	●●	●●	●	●●	●●	●●	AlF ₃
Aluminum Hydroxide	*	▼	●●	*	●●	●	●●	●●	●●	
Aluminum Nitrate	▼	▼	●	*	*	*	●	▼	●●	
Aluminum Oxide	*	*	*	*	*	*	●●	*	●●	Al ₂ O ₃
Alum. Potassium Sulfate	▼	▼	●●	*	*	*	●	●	●●	
Aluminum Sulfate	▼	▼	●●	●●	●●	■	●	●●	●●	Al ₂ (SO ₄) ₃ -18H ₂ O
Amine	■	●	●●	*	*	*	■	▼	●●	NH(C ₂ H ₅ O) ₂
Ammonia Anhydrous Liquide	●	●●	●●	●●	●●	●	■	▼	●●	
Ammonia (Aqueous)	●	●●	●●	*	*	*	●	■	●●	NH ₃
Ammonia Gas (Hot)	*	*	●●	*	*	*	■	▼	●●	NH ₃
Ammonia Liquor	*	*	●●	*	*	*	*	*	●●	
Ammonia Solution	●	●	●●	*	*	*	●	▼	●●	
Ammonium Acetate	●	●	●	*	*	*	●	●●	●●	
Ammonium Bicarbonate	●	■	●	*	●●	●	●	●●	●●	(NH ₄)HCO ₃
Ammonium Bromide (5%)	*	▼	●	●●	●●	●	*	*	●●	
Ammonium Carbonate	●	●	●	●●	●●	●●	■	●	●●	(NH ₄) ₂ CO ₃
Ammonium Chloride	▼	▼	■	●●	●●	●	●	●●	●●	NH ₄ Cl
Ammonium Hydroxide (28%)	■	■	●	●●	●●	▼	●	●	●●	NH ₄ OH
Ammonium Hydroxide (Conc.)	■	■	●	*	*	*	■	●	●●	NH ₄ OH
Ammonium Nitrate	▼	▼	●●	●●	●●	*	●●	●●	●●	NH ₄ NO ₃
Ammonium Oxalate (5%)	*	▼	●	●●	●●	●	*	*	●●	
Ammonium Persulfate	▼	▼	●●	●●	●●	▼	■	■	●●	
Ammonium Phosphate (Mono Basic)	▼	▼	●	●●	●●	●	●	●●	●●	
Ammonium Phosphate (Bi-Basic)	▼	▼	●	●●	●●	●	●●	●●	●●	(NH ₄) ₂ HPO ₄
Ammonium Phosphate (Tri-Basic)	▼	▼	●	●●	●●	●	●●	●●	●●	(NH ₄) ₃ PO ₄
Ammonium Sulfate	■	■	●	■	●●	●	●●	●	●●	(NH ₄) ₂ SO ₄
Ammonium Sulfide	▼	▼	●	*	*	*	●	■	●●	
Ammonium Sulfite	■	■	●●	*	●●	▼	●	●	●●	
Amyl Acetate	●	■	●●	●●	●●	●	▼	▼	●●	C ₅ H ₁₁ -O-CO-CH ₃
Amyl Alcohol	■	●	●●	*	*	*	●	●	●●	C ₅ H ₁₁ -OH

Note: ●● Excellent ● Good ■ Poor ▼ Very Poor * Data Unavailable

CI = Cast Iron CS = Carbon Steel SS = Stainless Steel CF8M, 316 H.C = Hastelloy C A.20 = Alloy 20 M = Monel N = Nitrlite V = Viton T = PTFE, Teflon

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
Cl	CS	SS	H.C	A.20	M					
Amyl Chloride	●	●	●●	●●	●●	*	▼	▼	●●	
Aniline	■	■	●	●●	●●	*	▼	■	●●	C ₆ H ₅ NH ₂
Aniline Dye	▼	■	●●	*	*	*	■	●	●●	
Animal Oil	●●	●●	●●	*	*	*	●●	●	●●	
Antimony Trichloride	▼	▼	▼	*	*	●	■	●●	●●	SbCl ₃
Apple Juice	▼	▼	●	*	*	*	●●	●●	●●	
Aqua Regia	▼	▼	▼	*	*	*	▼	▼	●●	
Aromatic Solvent	*	■	●●	*	*	*	▼	*	●●	
Arsenic Acid	▼	▼	●	*	*	*	●●	●●	●●	
Asphalt Emulsion	■	■	●●	*	*	*	▼	●●	●●	H ₃ AsO ₄
Asphalt Liquid	■	■	●●	*	*	*	▼	●●	●●	
B										
Barium Carbonate	●	●	●	●●	●●	●	●●	●●	●●	
Barium Chloride	■	■	●	*	●●	●	●●	●●	●●	BaCl ₂
Barium Cyanide	*	●	●	*	*	*	●	●	●●	
Barium Hydrate	*	*	●●	*	*	*	*	*	●●	
Barium Hydroxide	●	■	●	●●	●●	●	●●	●●	●●	Ba(OH) ₂ + 8H ₂ O
Barium Nitrate	*	■	●●	*	●●	*	●	*	●●	
Barium Sulfate	■	■	●	*	●●	●	●●	●●	●●	SO ₄ Ba
Barium Sulfide	■	■	●	*	*	*	●●	●●	●●	BaSO ₃
Beer	■	■	●●	●●	●●	●	■	●●	●●	
Beet Sugar Liquid	●	●	●●	*	*	*	●●	●●	●●	
Bentonite	●	*	●	*	*	*	●	●	●●	
Benzaldehyde	●	●●	●●	*	*	*	▼	▼	●●	C ₆ H ₅ CHO
Benzene	●	●	●	●●	●●	●	▼	●	●●	C ₆ H ₆
Benzoic Acid	▼	▼	●	●●	●●	●	●	●	●●	HC ₆ H ₅ - COO
Benzol	●	●	●	●●	●●	●	▼	●	●●	C ₆ H ₆
Beryllium Sulfate	*	*	●	*	*	*	●	●	●●	
Bitumen	■	■	●●	*	*	*	■	*	●●	
Black Liquor	■	■	●	*	*	*	■	■	●●	
Black Sulfate Liquor	■	■	●	*	*	*	■	■	●●	
Bleaching Powder (Wet)	*	*	●	●●	●	▼	▼	●	●●	
Blood	*	▼	●●	●●	●●	●●	●	●	●●	
Borax	*	■	●	●●	*	●	●	●●	●●	Na ₂ B ₄ O ₇ ·10H ₂ O
Borax Liquor	■	■	●	*	*	*	●	●●	●●	
Boric Acid	▼	▼	●	●●	●●	●	●●	●●	●●	H ₃ BO ₃
Brake Fluid	■	■	●	*	*	*	▼	▼	●●	
Brine (Saturated)	■	▼	●	*	*	*	●	●●	●●	NaCl
Bromine (Dry)	▼	▼	▼	●●	●●	●●	▼	●	●●	
Bromine (Wet)	▼	▼	▼	●●	●	▼	▼	●	●●	
Bunker Oil	●	●	●●	*	*	*	●	●●	●●	
Butadine	●	●	●●	*	*	*	■	●	●●	H ₂ C=CHHC=CH ₂
Butane	●	●	●●	*	*	*	●	●	●●	C ₄ H ₁₀
Butanol	■	●	●●	*	*	*	●	●●	●●	
Buttermilk	▼	▼	●●	●●	*	*	●●	●●	●●	
Butyl Acetate	●	●	●●	●●	●●	●	▼	▼	●●	CH ₃ COOC ₄ H ₉
Butyl Alcohol	■	●	●●	*	*	*	●	●●	●●	C ₄ H ₉ OH
Butyl Amine	●	●	●●	*	*	*	▼	▼	●●	
Butylene	●●	●●	●●	*	*		▼	■	●●	
Butyric Acid	▼	▼	●	●●	●●	*	■	■	●●	CH ₃ -(CH ₂) ₂ -COOH
C										
Calcium Bisulfite	▼	▼	●	*	*	*	●●	●●	●●	Ca(HSO ₃) ₂
Calcium Carbonate	▼	▼	●	●●	●●	●●	●●	●●	●●	CO ₃ Ca
Calcium Chlorate	*	■	●●	*	*	*	●	●	●●	
Calcium Chloride	■	■	●	●●	●●	●	●●	●●	●●	CaCl ₂
Calcium Hydroxide	■	■	●	●●	●●	●●	●	●●	●●	Ca(OH) ₂
Calcium Hypochloride	▼	▼	■	*	*	*	■	●●	●●	Ca(ClO) ₂
Calcium Nitrate	*	*	*	*	*	*	●	*	●●	
Calcium Phosphate	*	*	●	*	*	*	●	●	●●	
Calcium Silicate	*	*	●	*	*	*	●	●	●●	
Calcium Sulfate	■	■	●●	*	●●	●	●●	●●	●●	CaSO ₄
Camphor	*	*	●	●●	●●	*	●	●	●●	
Cane Sugar Liquor	●	●	●●	*	*	*	●	●	●●	
Carbolic Acid	▼	▼	●	*	*		▼	●	●●	
Carbon Bisulfide	●	●	●	*	●●	●	▼	●●	●●	CS ₂

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
	CI	CS	SS	H.C	A.20	M	N	V	T	
Carbon Dioxide (Dry)	●	●●	●●	●●	●●	●●	■	●	●●	CO ₂
Carbon Dioxide (Wet)	■	■	●●	*	*	*	*	*	*	CO ₂
Carbon Monoxide	●	●	●●	*	*	*	●	●	●●	
Carbon Tetrachloride (Dry)	■	■	●●	●●	●●	●●	▼	●	●●	CCl ₄
Carbon Tetrachloride (Wet)	▼	▼	●	●●	●●	●●	▼	●	●●	CCl ₄
Carbonate Beverage	▼	▼	●	●●	●●	●	●	●	●●	
Carbonated Water	*	●	●●	*	*	*	●●	●●	●●	
Carbonic Acid	▼	▼	●	●●	●●	●	●	●●	●●	
Casein	*	*	●	*	*	*	●	●	●●	
Castor Oil	●	●	●●	*	*	*	●●	●●	●●	
Catsup	▼	▼	●●	*	*	*	●●	●●	●●	
Caustic Potash (70%, Cold)	●	●●	●●	*	*	*	●	▼	●●	
Caustic Potash (70%, Hot)	●	●●	●●	*	*	*	●	▼	●●	
Caustic Potash (Dilute, Cold)	●	●●	●●	*	*	*	●●	▼	●●	
Caustic Potash (Dilute, Hot)	●	●	●●	*	*	*	●	▼	●●	
Caustic Soda (20%, Cold)	●●	●●	●●	*	*	*	●●	●	●●	
Caustic Soda (20%, Hot)	●	●	●●	*	*	*	●	■	●●	
Caustic Soda (50%, Cold)	●	●●	●●	*	*	*	●●	■	●●	
Caustic Soda (50%, Hot)	●	●	●●	*	*	*	●	■	●●	
Caustic Soda (70%, Cold)	●	●	●●	●●	●●	●●	●	■	●●	
Caustic Soda (70%, Hot)	■	●	●	●	●	●●	▼	■	●●	
Cellulose Acetate	●	●	●	*	*	*	▼	▼	●●	
China Wood Oil	■	■	●●	●●	●●	*	●●	●●	●●	
Chlorinated Solvent	■	■	●	*	*	*	▼	■	●●	
Chlorinated Water	*	*	■	*	*	*	●	●●	●●	
Chlorine (Dry)	■	■	●	●●	●●	●●	■	●	●●	Cl ₂
Chlorine (Wet)	▼	▼	▼	▼	▼	▼	▼	*	●●	Cl ₂
Chloroacetic Acid	▼	▼	▼	●●	▼	●	▼	■	●●	
Chlorobenzene (Dry)	●	●	●●	*	■	●●	▼	●●	●●	
Chloroform (Dry)	●	●	●●	●●	●●	●●	▼	●	●●	CHCl ₃
Chlorophyll (Dry)	●	*	●	*	*	*	●	●	●●	
Chlorosulfonic Acid (Dry)	●	●	●	●●	▼	●	▼	▼	●●	HOSO ₂ Cl
Chlorosulfonic Acid (Wet)	▼	▼	▼	*	*	*	▼	▼	●●	HOSO ₂ Cl
Chrome Alum	●	●	●●	*	*	*	●	●	●●	
Chromic Acid (<50%)	▼	▼	■	●●	▼	▼	▼	■	●●	H ₂ CrO ₄
Chromic Acid (>50%)	▼	▼	■	■	▼	▼	▼	■	●●	H ₂ CrO ₄
Chromium Sulfate	*	*	●	*	*	*	●	●	●●	
Cider	*	*	●	●●	●●	●●	●	●	●●	
Citric Acid	▼	▼	●●	●●	●●	*	●	●●	●●	(CH ₂ -COOH) ₂ C(OH)COOH
Citrus Juice	▼	▼	●	*	*	*	●●	●●	●●	
Coca-Cola Syrup	*	*	●●	*	*	*	●	●	●●	
Coconut Oil	■	■	●	*	*	*	●●	●●	●●	
Coffe	*	■	●●	●●	●●	●	●●	●●	●●	C ₈ H ₁₀ N ₄ O ₄ ·H ₂ O
Coke Oven Gas	●●	●	●●	*	*	*	■	●	●●	
Cooking Oil	●	●	●●	*	*	*	●●	●●	●●	
Copper Acetate	▼	▼	●●	●●	●●	*	■	▼	●●	(CH ₃ COO) ₂ Cu
Copper Carbonate	*	*	●●	●●	●●	*	*	*	●●	
Copper Chloride	▼	▼	■	●●	*	▼	●	●●	●●	
Copper Cyanide	*	*	●●	●●	■	▼	●●	●●	●●	
Copper Nitrate	▼	▼	●	●●	●●	▼	●●	●●	●●	
Copper Sulfate	▼	▼	●	*	●●	■	●●	●●	●●	CuSO ₄
Corn Oil	▼	■	●	*	*	*	●●	●●	●●	
Cottonseed Oil	*	■	●	*	*	*	●●	●●	●●	
Creosote Oil	●	●	●	*	*	*	▼	●●	●●	
Cresol	*	■	●	*	*	*	▼	▼	●●	
Cresylic Acid	▼	■	●	*	*	*	▼	●	●●	CH ₃ OH
Crude Oil (Sour)	■	●	●●	*	*	*	●	●●	●●	
Crude Oil	●	●	●●	●●	●●	●	●●	●●	●●	
Cupric Nitrate	*	*	●●	●●	●●	▼	*	*	●●	
Cutting Oil (Water Emulsion)	●	●	●●	*	*	*	●●	●●	●●	
Cyanide Plating Solution	*	*	●	*	*	*	●	●	●●	
Cyclohexane	●●	●●	●●	*	*	*	■	●●	●●	
Cyclohexanone	*	*	*	*	*	*	▼	*	●●	

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CI = Cast Iron CS = Carbon Steel SS = Stainless Steel CF8M, 316 H.C = Hastelloy C A.20 = Alloy 20 M = Monel N = Nitrile V = Viton® T = PTFE, Teflon®

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
Cl	CS	SS	H.C	A.20	M					
D										
Detergent (Synthetic)	●	●	●	*	*	*	●	●	●●	
Dextrin	*	*	●	*	*	*	●	●	●●	
Diacetone Alcohol	●●	●●	●●	*	*	*	▼	▼	●●	
Dichloroethane	*	*	■	*	*	*	▼	*	●●	(CH ₂ Cl) ₂
Dichloroethyl Ether	*	*	●	*	*	*	▼	▼	●●	
Dichloropentane	*	●●	●●	*	*	*	■	*	●●	
Diesel Oil	●	●●	●●	*	*	*	●	●●	●●	
Diethyl Sulfate	*	*	●	*	*	*	■	●	●●	
Diethylamine	●●	●●	●●	*	*	*	■	▼	●●	
Diethylene Glycol	●●	●●	●●	*	*	*	●●	●	●●	
Dioxane	●	●	●	*	*	*	*	▼	●●	
Dipentene	●●	●●	●●	*	*	*	●●	●	●●	
Distilled Water	▼	▼	●●	*	*	*	●	●●	●●	
Dowtherm	●	●	●●	*	*	*	▼	●●	●●	
Drilling Mud	●	●	●●	*	*	*	●●	●●	●●	
Dry Claning Fluid	●	●	●●	*	*	*	▼	●	●●	
Drying Oil	●	■	●	*	*	*	●●	●●	●●	
E										
Enamel	*	*	*	*	*	*	●	*	●●	
Epson Salt	■	■	●	*	*	*	●●	●●	●●	
Essential Oil	*	●	●	*	*	*	●	*	●●	
Ethane	●	●	●	*	*	*	●●	●●	●●	C ₂ H ₆
Ethanolamine	●	●	●●	*	*	*	●	■	●●	
Ether	●	●●	●●	●●	●●	●	▼	■	●●	
Ethyl Acetate	■	●	●	●●	●●	●●	▼	▼	●●	CH ₃ COOC ₂ H ₅
Ethyl Acrylate	■	■	●●	*	*	*	▼	▼	●●	CH ₂ =CHCOOC ₂ H ₅
Ethyl Alcohol	●	●	●●	*	*	*	●	●	●●	C ₂ H ₅ -OH
Ethyl Benzene	*	●●	●●	*	*	*	■	●	●●	
Ethyl Bromide	*	●	●	*	*	*	●	●	●●	
Ethyl Chloride (Dry)	●	●	●●	*	●●	●	■	●	●	
Ethyl Chloride (Wet)	▼	▼	●	*	●●	●	■	●	●●	
Ethyl Ether	■	■	●●	*	*	*	▼	▼	●●	C ₂ H ₅ OC ₂ H ₅
Ethyl Silicate	●	*	●	*	*	*	●	●	●●	
Ethylene	●●	●●	●●	*	*	*	●●	●●	●●	C ₂ H ₄
Ethylene Dichloride	*	*	●	*	*	*	▼	■	●●	
Ethylene Glycol	●	●	●	*	*	*	●●	●●	●●	C ₂ H ₄ (OH) ₂
Ethylene Oxide	▼	●	●	*	*	*	▼	▼	●●	C ₂ H ₄ O=CH ₂ -O-CH ₂
F										
Fatty Acid	▼	▼	●●	●●	●●	●	●	●●	●●	
Fatty Alcohol	*	●	●●	*	*	*	●	●	●●	
Ferric Chloride	▼	▼	▼	●●	▼	▼	●	●●	●●	FeCl ₃
Ferric Nitrate	▼	▼	■	●●	●●	▼	●	●●	●●	
Ferric Sulfate	▼	▼	●	●●	●●	▼	●●	●●	●●	
Ferrous Chloride	▼	▼	▼	●●	▼	▼	●	●●	●●	FeCl ₂
Ferrous Sulfate	*	▼	●	●●	●●	▼	■	●	●●	SO ₄ Fe+7H ₂ O
Fertilizer Solution	●	●	●	*	*	*	●	*	●●	
Fish Oil	●	●	●●	*	*	*	●●	●●	●●	
Flue Gas	●●	■	●●	●●	●	*	■	●	●●	
Fluoboric Acid	*	*	●●	*	*	*	●	*	●●	
Fluorine (Dry)	▼	▼	■	*	■	●●	●	■	●●	
Fluosilicic Acid	▼	▼	●	*	*	*	■	●	●●	
Food (Fluid & Paste)	■	■	●●	*	*	*	●	*	●●	
Formaldehyde (Cold)	●	●	●●	●●	●●	■	●	▼	●●	HCHO
Formaldehyde (Hot)	▼	▼	■	*	*	*	●	▼	●●	HCHO
Formic Acid (Cold)	▼	▼	●	●●	●●	●	■	●	●●	HCOOH
Formic Acid (Hot)	▼	▼	●	*	*	*	▼	●	●●	HCOOH
Freon, 11, MF, 112, BF	■	*	●●	*	*	*	■	▼	●●	
Freon, 12, 12, 32, 114, 115	●	●	●●	*	*	*	●	■	●●	
Freon, 21, 31	■	■	●●	*	*	*	▼	▼	●●	
Freon, 22	●	■	●●	*	*	*	▼	▼	●●	
Freon, 113 TF	■	*	●●	*	*	*	●	■	●●	
Freon Gas (Dry)	■	●	●●	*	*	*	●	■	●●	
Freon Gas (Wet)	*	*	■	*	*	*	●	▼	●●	
Fresh Water	■	■	●●	*	*	*	●	●●	●●	

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
CI	CS	SS	H.C	A.20	M					
Fruit Juice	▼	▼	●●	●●	●●	●	●●	●●	●●	
Fuel Oil	●	●	●●	●●	●●	●	●●	●●	●●	
Fuel RP-1	●●	●●	●●	*	*	*	●	●●	●●	
Furfural	●	●●	●●	●●	●●	●	▼	▼	●●	
G										
Gallic Acid (5%)	▼	●	●	●●	●●	*	●	●●	●●	
Gas (Manufactured)	●	●	●	*	*	*	●●	●●	●●	
Gas (Natural)	●	●●	●●	*	*	*	●	●●	●●	
Gas Odorizer	●	●	●	*	*	*	●	●●	●●	
Gasoline (Aviation)	●	●●	●●	*	*	*	■	●●	●●	
Gasoline (Leaded)	●●	●●	●●	*	*	*	■	●●	●●	
Gasoline (Motor)	●	●●	●●	*	*	*	■	●●	●●	
Gasoline (Refined)	●	●	●●	*	*	*	■	●●	●●	
Gasoline (Sour)	●	●	●●	*	*	*	■	●	●●	
Gasoline (Unleaded)	●	●●	●●	*	*	*	■	●●	●●	
Gelatine	▼	▼	●●	*	*	*	●●	●●	●●	CH ₂ -NH ₂ -COOH
Glucose	●	●	●●	*	*	*	●●	●●	●●	CH ₂ OH-(CHOH) ₄ -COH
Glue	●●	●●	●●	●●	●●	*	●●	●●	●●	
Glycerine	●	●	●●	●●	●●	●	●●	●●	●●	(CH ₂ OH) ₂ CHOH
Glycerol	●	●	●●	*	*	*	●●	●●	●●	
Glycol	●	●	●	*	*	*	●	●●	●●	HO-CH ₂ -CH ₂ -OH
Alycol Amine	*	*	●	*	*	*	▼	▼	●●	
Glyoxal	*	▼	●	*	*	*	▼	▼	●●	
Graphite	*	*	●	*	*	*	●	●	●●	
Grease	●●	●●	●●	*	*	*	●●	●●	●●	
Green Liquor	■	■	●	*	*	*	■	■	●●	
Green Sulfate Liquor	■	■	●	*	*	*	■	■	●●	
H										
Hard Water	*	●	●●	*	*	*	●	*	●●	
Helium Gas	●	*	●	*	*	*	●	●	●●	
Heptane	●	●	●●	*	*	*	●●	●●	●●	
Hexamethylenetetramine	*	●	●●	*	*	*	*	*	●●	
Hexamine	*	●	●●	*	*	*	*	*	●●	
Hexane	●	●	●	*	*	*	●●	●●	●●	
Hexanol	●	■	●●	*	*	*	▼	●●	●●	
Hexanol (Tertiary)	●●	●●	●●	*	*	*	●●	●	●●	
Hexanol (Secondary)	*	●	●	*	*	*	*	*	●●	
Hexyl Alcohol	●	■	●●	*	*	*	▼	●●	●●	
Hydraulic Oil (Petroleum Base)	●	●●	●●	*	*	*	●●	●●	●●	
Hydraulic Oil (Phosphate Base)	*	●●	●●	*	*	*	▼	●●	●●	
Hydraulic Oil (Synthetic Base)	*	●●	●●	*	*	*	▼	■	●●	
Hydrazine	*	*	●	*	*	*	●	▼	●●	
Hydrazine (Hydrate)	*	*	●	*	*	*	■	▼	●●	
Hydrobromic Acid	▼	▼	▼	■	▼	▼	■	●●	●●	
Hydrochloric Acid	▼	▼	▼	*	▼	*	■	●●	●●	HCl
Hydrocyanic Acid	■	■	●●	●●	●●	●	●	●●	●●	
Hydrofluoric Acid	▼	▼	▼	●●	▼	●	▼	▼	●	
Hydrofluosilicic Acid	▼	▼	■	●●	●●	●	●	●●	●●	H ₂ SF ₆
Hydrogen Gas (Cold)	●	●	●●	*	*	*	●	●●	●●	H ₂
Hydrogen Gas (Hot)	*	●	●	*	*	*	●	●●	●●	H ₂
Hydrogen Peroxide (Concentrated)	▼	▼	●	●●	●●	*	▼	●	●●	H ₂ O ₂
Hydrogen Peroxide (Dilute)	▼	▼	●	●●	●●	*	●●	●●	●●	H ₂ O ₂
Hydrogen Sulfide (Dry)	●	●	●●	●●	●●	●	■	●	●●	H ₂ S
Hydrogen Sulfide (Wet)	▼	■	●	●●	●●	●	■	●	●●	H ₂ S
Hypo	■	▼	●●	*	*	*	●●	●●	●●	
Hypochlorous Acid	▼	▼	■	*	*	*	●	▼	●●	
I										
Illuminating Gas	●●	●●	●●	*	*	*	●	●●	●●	
Ink (Newsprint)	▼	▼	●●	●●	●●	●	●	●●	●●	
Iodine (Wet)	▼	▼	▼	●●	▼	▼	●	●●	●●	
Iodoform	■	●	●●	*	*	*	*	●●	●●	

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Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
CI	CS	SS	H.C	A.20	M					
Isobutane	*	*	•	*	*	*	•	*	••	
Isooctane	•	••	••	*	*	*	•	••	••	
Isopropyl Acetate	*	*	•	*	*	*	▼	▼	••	
Isopropyl Alcohol	•	•	••	*	*	*	■	••	••	(CH ₃) ₂ CH-OH
Isopropyl Ether	•	••	••	*	*	*	■	▼	••	
J										
Jet Fuel	••	••	••	*	*	*	•	••	••	
JP-4 Fuel	•	••	••	*	*	*	•	••	••	
JP-5 Fuel	••	••	••	*	*	*	•	••	••	
JP-6 Fuel	••	••	••	*	*	*	••	••	••	
K										
Kerosene	•	•	••	••	••	•	••	••	••	
Ketchup	▼	▼	••	••	••	•	••	••	••	
Ketone	••	••	••	*	*	*	▼	▼	••	
L										
Lacquer Solvent	■	■	••	*	*	*	▼	▼	••	
Lactic Acid (Concentrated, Cold)	▼	▼	••	••	••	*	•	••	••	
Lactic Acid (Concentrated, Hot)	▼	▼	•	••	••	*	■	•	••	CH ₃ -CH ₂ OH-(OOH)
Lactid Acid (Dilute, Cold)	▼	▼	••	••	••	*	•	••	••	
Lactic Acid (Dilute, Hot)	▼	▼	•	••	••	*	■	■	••	
Lactose	*	*	•	*	*	*	•	•	••	
Lard	*	*	••	••	••	*	•	•	••	
Lard Oil	■	■	•	*	*	*	••	••	••	
Lead Acetate	▼	▼	•	••	••	•	•	•	••	Pb(CH ₃ COO) ₂
Lead Sulfate	*	*	•	*	*	*	•	•	••	
Lecithin	*	*	•	*	*	*	▼	•	••	
Lemon Juice	▼	▼	•	*	*	*	••	••	••	
Lime	*	•	*	*	*	*	•	*	••	
Lime (Slurry)	*	•	•	*	*	*	•	•	••	
Lime Mixture	*	*	••	*	*	*	••	*	••	
Linilic Acid	•	•	••	*	*	*	•	•	••	
Linseed Oil	••	••	••	••	••	•	••	••	••	
Lithium Chloride	*	•	•	*	*	*	•	•	••	
LPG	▼	•	•	*	*	*	••	••	••	
Lubricating Oil (Petroleum Base)	••	••	••	*	*	*	••	••	••	
Lubricating Oil (Synthetic Base)	••	••	••	*	*	*	■	■	••	
M										
Magnesium Bisulfate	•	•	••	*	*	*	•	•	••	
Magnesium Bisulfide	▼	*	•	*	*	*	•	•	••	
Magnesium Carbonate	•	•	••	••	••	•	•	•	••	
Magnesium Chloride	▼	■	•	••	••	•	•	••	••	
Magnesium Hydroxide (Cold)	•	•	••	••	••	••	•	••	••	
Magnesium Hydroxide (Hot)	•	•	••	••	••	••	•	••	••	
Magnesium Nitrate	*	*	••	••	••	*	•	•	••	
Magnesium Sulfate	•	•	••	••	••	••	••	••	••	MgSO ₄
Maleic Acid	■	•	•	*	*	*	•	••	••	C ₄ H ₄ O ₂ =CO ₂ H-CH ₂ -CH-CO ₂ H
Maleic Anhydride	*	*	•	*	*	*	▼	•	••	
Malic Acid	▼	▼	•	••	••	•	••	••	••	CO ₂ H-CH(OH)-CH ₂ CO ₂ H
Malt Beverage	*	*	••	*	*	*	••	••	••	
Manganese Carbonate	*	*	•	*	••	•	•	*	••	
Manganese Chloride	▼	▼	•	*	■	•	••	••	••	
Manganese Sulfate	*	*	•	*	*	*	•	•	••	SO ₄ Mg+7H ₂ O
Mannitol Solution	*	*	•	*	*	*	*	*	••	
Mayonnaise	▼	▼	••	••	*	•	••	••	••	
Meat Juice	*	*	••	••	••	*	•	*	••	
Melamine Resin	*	*	■	*	*	*	•	*	••	
Menthol	•	•	•	*	*	*	•	•	••	
Mercaptane	*	•	•	*	*	*	▼	••	••	
Mercuric Chloride	▼	▼	■	▼	*	*	•	••	••	HgCl ₂
Mercuric Cyanide	▼	▼	••	*	*	*	•	•	••	
Mercuric Nitrate	▼	▼	•	*	*	*	*	*	••	Hg(NO ₃) ₂
Mercurous Nitrate	*	*	••	••	••	*	■	•	••	
Mercury	••	••	••	••	••	•	••	••	••	Hg

Media	Materials									Formula
	Metallic						Soft			
	Standard		Special				N	V	T	
CI	CS	SS	H.C	A.20	M					
Mercury Salt	▼	▼	*	*	*	*	●	●●	●●	
Methane	●	●	●	*	*	*	●●	●●	●●	Na ₂ HPO ₄ +12H ₂ O
Methanol	●	●	●●	*	*	*	●	■	●●	
Methyl Acetate	●	●	●●	*	*	*	▼	▼	●●	CH ₃ – CO ₂ – CH ₃
Methyl Acetone	●●	●●	●●	*	*	*	▼	▼	●●	
Methyl Alcohol	●	●	●●	*	*	*	●	■	●●	CH ₃ OH
Methyl Amine	●	●	●●	*	*	*	▼	▼	●●	CH ₃ NH ₂
Methyl Bromine (100%)	*	*	●	*	*	*	■	■	●●	
Methyl Cellosolve	●	●	●●	*	*	*	▼	▼	●●	
Methyl Cellulose	*	*	●●	*	*	*	▼	*	●●	
Methyl Chloride	●	●	●●	*	*	*	▼	●	●●	CH ₃ Cl
Methyl Ethyl Ketone	●	●●	●●	*	*	*	▼	▼	●●	
Methyl Formate	■	■	●	*	*	*	▼	▼	●●	
Methyl Isobutyl Ketone	*	*	●	*	*	*	▼	*	●●	
Methylene Chloride	●	●	●●	●●	●●	●	▼	■	●●	CH ₂ Cl ₂
Milk	▼	▼	●●	●●	*	*	●●	●●	●●	
Milk (Cow)	▼	▼	●●	*	*	*	●●	●●	●●	
Milk Product	▼	▼	●●	*	*	*	●●	●●	●●	
Mine Water (Acid)	*	▼	●●	●●	●●	▼	●	●●	●●	
Mineral Oil	●	●	●●	*	*	*	●●	●●	●●	
Mineral Spirit	●	●	●	*	*	*	●●	●●	●●	
Mixed Acid (Cold)	■	■	●	*	*	*	▼	●●	●●	
Molasses (Crude)	●●	●●	●●	●●	*	●●	●●	●●	●●	
Molasses (Edible)	■	■	●●	*	*	*	●●	●●	●●	
Molybdic Acid	*	▼	●●	●●	●●	*	*	*	●●	
Monochloro Benzene (Dry)	*	*	●	*	*	*	▼	*	●●	
Monochloroacetic	*	*	■	*	*	*	■	*	●●	
Morpholine	●	*	●	*	*	*	▼	▼	●●	
Mustard	●	●	●●	●●	*	●	●●	●●	●●	
N										
Naphta	●	●	●	*	*	*	●	●●	●●	
Naphthalene	●	●	●	*	*	*	▼	●●	●●	C ₁₀ H ₈
Natural Gas	●	●●	●●	*	*	*	●	●●	●●	
Natural Gas (Sour)	*	●	■	*	*	*	●●	●●	■	
Nickel Ammonium Sulfate	▼	▼	●●	*	*	*	●●	▼	●●	
Nickel Chloride	▼	▼	●	●●	●●	●	●	●●	●●	NiCl ₂
Nickel Nitrate	▼	▼	●	●●	●●	▼	●●	●●	●●	Ni(NO ₃) ₂ +6H ₂ O
Nickel Sulfate	▼	▼	●	●●	●●	●	●●	●●	●●	NiSO ₄
Nicotinic Acid	●	●	●●	*	*	*	▼	●	●●	C ₆ H ₅ O ₂ N
Nitric Acid	▼	▼	●●	●●	●●	▼	▼	●	●●	HNO ₃
Nitric Acid (10%)	▼	▼	●●	●●	●●	▼	▼	●●	●●	HNO ₃
Nitric Acid (30%)	▼	▼	●●	●●	●●	▼	▼	●●	●●	HNO ₃
Nitric Acid (80%)	▼	▼	●	●●	●●	*	▼	●	●●	HNO ₃
Nitric Acid (100%)	▼	▼	●	●●	●●	*	▼	●	●●	HNO ₃
Nitric Acid (Anhydrous)	▼	■	●	*	*	*	▼	●	●●	
Nitrobenzene	●	●	●●	*	*	*	▼	■	●●	C ₆ H ₅ -NO ₂
Nitrogen	●●	●●	●●	*	*	*	●●	●●	●●	N ₂
Nitrous Acid (10%)	▼	▼	●	*	●●	*	■	●●	●●	N ₂ O ₃
Nitrous Gas	■	●	●●	*	*	*	●	●●	●●	
Nitrous Oxide	■	●	●	●●	●●	▼	●	●●	●●	N ₂ O
O										
Oil (Animal)	●●	●●	●●	*	*	*	●●	●	●●	
Oil (Cottonseed)	■	■	●	*	*	*	●●	●●	●●	
Oil (Essential)	*	●	●	*	*	*	●	*	●●	
Oil & Fat	*	●	●	*	*	*	●	●	●●	
Oil (Fish)	●	●	●●	*	*	*	●●	●●	●●	
Oil (Fuel)	●	●	●●	*	*	*	●●	●●	●●	
Oil (Lube)	●●	●●	●●	*	*	*	●●	●●	●●	
Oil (Mineral)	●	●	●●	●●	●●	●	●●	●●	●●	
Oil (Petroleum, Refined)	●	●●	●●	*	*	*	●●	●●	●●	
Oil (Petroleum, Sour)	■	●	●●	*	*	*	●	●●	●●	
Oil (Water Mixture)	●	●	●●	*	*	*	●	●●	●●	

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Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
Cl	CS	SS	H.C	A.20	M					
Oleic Acid	■	■	●	●●	●●	●	●	●	●●	C ₁₇ H ₃₃ COOH
Oleum	▼	●	●	*	*	*	▼	●	●●	
Olive Oil	●	●	●●	*	*	*	●●	●●	●●	
Oxalic Acid	■	▼	●	●●	●●	●	■	●●	●●	COOHCOOH
Oxigen (Cold)	●	●	●●	*	*	*	●	●●	●●	
Oxigen (Hot)	*	●	●●	*	*	*	▼	*	▼	O ₂
Ozone (Dry)	●●	●●	●●	*	*	*	▼	●	●●	O ₃
Ozone (Wet)	■	■	●●	*	*	*	▼	●	●●	
P										
Paint & Solvent	●●	●●	●●	*	*	*	▼	●	●●	CH ₃ -(CH ₂) ₁₄ -(CO ₂ H)
Palm Oil	■	■	●	*	*	*	●	●●	●●	
Palmitic Acid	■	■	●	*	*	*	●	●●	●●	
Paper Pulp	●	*	●	*	*	*	●	●	*	C ₅ H ₁₂
Paraffin	●	●	●●	●●	●●	●	●●	●●	●●	
Paraformaldehyde	●	●	●	*	*	*	●	●●	●●	
Pentane	●	●	●●	*	*	*	●	●●	●●	C ₆ H ₆
Perchlorethylene	●	●	●●	*	*	*	■	●●	●●	
Petrolatum	■	■	●	*	*	*	●	●●	●●	
Petroleum Oil (Crude)	■	●	●●	*	*	*	●	●	●●	C ₆ H ₅ OH
Petroleum Oil (High Aniline)	■	■	●●	*	*	*	●●	●●	●●	
Petroleum Oil (Low Aniline)	●	■	●●	*	*	*	●	●●	●●	
Petroleum Oil (Refined)	●●	●●	*	*	*	*	●	●	●●	H ₃ PO ₄
Phenol	▼	▼	●	●●	●●	●●	▼	●	●●	
Phosphate Ester (10%)	●	●	●	*	*	*	▼	*	●●	
Phosphoric Acid (10%, Cold)	▼	▼	●	●●	●●	●	●	●●	●●	H ₃ PO ₄
Phosphoric Acid (10%, Hot)	▼	▼	▼	*	*	*	●	●●	●●	
Phosphoric Acid (50%, Cold)	▼	▼	●	*	*	*	●	●●	●●	
Phosphoric Acid (50%, Hot)	▼	▼	▼	*	*	*	●	●●	●●	H ₃ PO ₄
Phosphoric Acid (80%, Cold)	*	■	●	*	*	*	■	●	●●	
Phosphoric Acid (80%, Hot)	*	■	●	*	*	*	■	●	●●	
Phosphoric Acid (100%)	*	*	●	*	*	*	▼	*	*	H ₃ PO ₄
Phosphorus Pentoxide	*	●	●●	*	●●	*	▼	●	●●	
Phosphorus Trichloride	▼	▼	●●	●●	●●	*	▼	●	●●	
Photographic Solution	▼	*	●●	*	*	*	■	●	●●	(NO ₂) ₃ OH
Phthalic Acid	■	■	●	*	*	*	■	●●	●●	
Phthalic Anhydride	■	■	●	*	*	*	■	●●	●●	
Picric Acid	▼	▼	●	●●	●●	●	■	●	●●	K ₂ CO ₃
Pine Oil	●	●	●●	*	*	*	●●	●●	●●	
Pineapple Juice	■	■	●●	*	*	*	●●	●●	●●	
Pinene	●●	●●	●●	*	*	*	●●	●	●●	KClO ₃
Pitch (Roof)	●●	●●	●●	*	*	*	●	●●	●●	
Polysulfide Liquor	●	*	●	*	*	*	●	●	●●	
Polyvinyl Acetate	*	*	●	*	*	*	■	*	●●	KCl
Polyvinyl Chloride	*	*	●	*	*	*	*	*	●●	
Potassium Alum	▼	▼	●●	●●	●●	●	●	●	●●	
Potassium Bicarbonate	*	*	●●	*	*	*	●	*	●●	K ₂ Cr ₂ O ₇
Potassium Bisulfate	*	*	●●	*	*	*	●	●●	●●	
Potassium Bisulfite	▼	▼	●	*	*	*	●●	●●	●●	
Potassium Bromide	▼	▼	●	●●	●●	●	●●	●●	●●	K ₃ Fe(CN) ₆
Potassium Carbonate	●	●	●	●●	●●	●	●●	●●	●●	
Potassium Chlorate	●	●	●	●●	●●	●	●●	●●	●●	
Potassium Chloride	●	■	■	●●	●●	●	●●	●●	●●	K ₄ Fe(CN) ₆
Potassium Chromate	●	●	●	*	*	*	●	●	●●	
Potassium Cyanide	●	●	●	●●	●●	●	●●	●●	●●	
Potassium Dichromate	■	■	●	●●	●●	*	●●	●●	●●	KOH
Potassium Diphosphate	●●	●●	●●	*	*	*	●●	●●	●●	
Potassium Ferricyanide	■	■	●	●●	●●	●	●	●●	●●	
Potassium Ferrocyanide	■	■	●	●●	●●	●●	●●	●●	●●	KNO ₃
Potassium Hydroxide (Dilute, Cold)	●	●●	●●	●●	●●	●●	●●	▼	●●	
Potassium Hydroxide (Dilute, Hot)	●	●	●●	●●	●●	●●	●	▼	●●	
Potassium Hydroxide (70%, Cold)	●	●●	●●	●●	●●	●●	●	▼	●●	KJ
Potassium Hydroxide (70%, Hot)	●	●●	●●	●●	●●	●●	●	▼	●●	
Potassium Iodide	■	■	●	●●	●●	●	●●	●●	●●	
Potassium Nitrate	●	●	●	●●	●●	●	●●	●●	●●	KMnO ₄
Potassium Oxalate	*	*	●	●●	●●	*	*	*	●●	
Potassium Permanganate	●	●	●	*	*	*	●	●●	●●	

Medium	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
	CI	CS	SS	H.C	A.20	M	N	V	T	
Potassium Phosphate	*	*	●	*	*	*	●	●●	●●	
Potassium Phosphate (Di-Basic)	*	●●	●●	*	*	*	●●	●●	●●	
Potassium Phosphate (Tri-Basic)	*	●●	●	*	*	*	●	●●	●●	
Potassium Sulfate	■	●	●●	*	●●	●	●●	●●	●●	K ₂ SO ₄
Potassium Sulfide	●	●	●●	*	●●	*	●●	●	●●	K ₂ S
Potassium Sulfite	●	●	●	*	*	*	●	●	●●	K ₂ SO ₃ +2H ₂ O
Potassium Triphosphate	*	●●	●●	*	*	*	●	*	●●	
Producer Gas	●	●	●	*	*	*	●	●●	●●	
Propane Gas	●	●	●●	*	*	*	●●	●●	●●	C ₃ H ₈
Propyl Alcohol	●	●	●●	*	*	*	●	●	●●	CH ₃ -CH ₂ -CH ₂ OH
Propyl Bromide	*	●	●	*	*	*	●	●	●●	
Propylene Glycol	●	●	●	*	*	*	●●	●●	●●	
Pyridine	*	*	●	*	*	*	▼	▼	●●	
Pyrogallol Acid	●	●	●	●●	●●	*	●	●●	●●	OH-OH-OH=H ₃ O ₃
Pyrogallol	●	●	●	*	*	*	●	●●	●●	
Pyroligneous Acid	*	*	●●	*	*	*	▼	▼	●●	
Pyrosulfuric Acid. Oleum	▼	●	●	*	*	*	▼	●	●●	
Q										
Quenching Oil	●	●	●●	*	*	*	●●	●●	●●	
Quinine Bisulfate (Dry)	*	*	●●	●●	●●	●	●	●	●●	
Quinine Sulfate (Dry)	*	*	●●	●●	●●	●	●	●	●●	
R										
Resin	■	■	●●	●●	●●	*	■	●●	●●	
Road Tar	●●	●●	●●	*	*	*	●	●●	●●	
Roof Pitch	●●	●●	●●	*	*	*	●	●●	●●	
Rosin	■	■	●●	●●	●●	*	■	●●	●●	
Rosin Emulsion	■	■	●●	*	*	*	▼	●	●●	
Rubber Latex Emulsion	*	●	●●	*	*	*	*	●●	●●	
Rubber Solvent	●●	●●	●●	*	*	*	▼	▼	●●	
S										
Salad Oil	■	■	●	*	*	*	●●	●●	●●	
Salicylic Acid	▼	▼	●●	●●	●●	●	●	●●	●●	C ₆ H ₄ OHCOOH
Salt Brine	●	*	●	●●	●●	●	●	●	●●	
Salt (NaCl)	■	■	●	●●	●●	●●	●●	●●	●●	NaCl
Sea Water	■	▼	●	●●	●●	●	●●	●●	●●	
Sewage	●	■	●	*	*	*	●●	●	●●	
Shellac (Bleached)	●	●●	●●	*	*	*	●	▼	●●	
Shellac (Orange)	●	●●	●●	*	*	*	●●	*	●●	
Silicon (Fluid)	●	●	●	*	*	*	●	●	●●	
Silver Bromide	*	▼	●●	●●	●●	●	*	*	●●	
Silver Cyanide	▼	*	●●	●●	●●	●	●	●	●●	
Silver Nitrate	▼	▼	●	●	●●	*	■	●●	●●	AgNO ₃
Silver Plating Solution	*	*	●●	*	*	*	*	*	●●	
Soap Solution	●	●●	●●	●●	●●	●	●●	●●	●●	
Soda Ash	●	●	●●	*	*	*	●●	●●	●●	
Sodium Acetate	●	■	●	●●	●●	●	●	●	●●	NaC ₂ H ₃ O ₂ +3H ₂ O
Sodium Aluminate	■	■	●	*	*	*	●●	●●	●●	NaAlO ₂
Sodium Bicarbonate	*	■	●	●●	●●	●●	●●	●●	●●	NaHCO ₃
Sodium Bisulfate (10%)	▼	▼	●●	●●	●●	●	●●	●●	●●	NaHSO ₄
Sodium Bisulfite (10%)	▼	▼	●●	*	*	*	●●	●●	●●	NaHSO ₃
Sodium Borate	*	■	●	●●	●●	●	●	●●	●●	NaBO ₂
Sodium Bromide (10%)	*	■	●	●●	●●	●	●	●●	●●	
Sodium Carbonate	●	●	●●	●●	●●	●●	●●	●●	●●	Na ₂ CO ₃
Sodium Chlorate	■	■	●	●●	●●	*	●	●●	●●	ClO ₃ Na
Sodium Chloride	■	■	●	*	*	*	●●	●●	●●	NaCl
Sodium Chromate	●	●	●●	*	*	*	●●	●●	●●	NaCrO ₄ +10H ₂ O
Sodium Citrate	*	*	●●	●●	●●	*	*	*	●●	
Sodium Cyanide	●	●	●	*	*	*	●●	●●	●●	
Sodium Dichromate	*	●	●●	●●	●●	*	▼	*	●●	
Sodium Fluoride	▼	▼	●	●●	*	●	●●	●●	●●	NaF
Sodium Hydroxide (20%, Cold)	●●	●●	●●	*	*	*	●●	●	●●	NaOH

Note: ●● Excellent ● Good ■ Poor ▼ Very Poor * Data Unavailable

CI = Cast Iron CS = Carbon Steel SS = Stainless Steel CF8M, 316 H.C = Hastelloy C A.20 = Alloy 20 M = Monel N = Nitrite V = Viton T = PTFE, Teflon

Medium	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
	Cl	CS	SS	H.C	A.20	M	N	V	T	
Sodium Hydroxide (20%, Hot)	●	●	●●	*	*	*	●	■	●●	NaOH
Sodium Hydroxide (50%, Cold)	●	●●	●●	*	*	*	●●	■	●●	NaOH
Sodium Hydroxide (50%, Hot)	●	●	●●	*	*	*	●	■	●●	NaOH
Sodium Hydroxide (70%, Cold)	●	●	●●	*	*	*	●	■	●●	NaOH
Sodium Hydroxide (70%, Hot)	■	●	●	*	*	*	▼	■	●●	NaOH
Sodium Hypochloride	*	▼	▼	*	*	*	*	*	●●	
Sodium Hypochlorite	▼	▼	■	●●	■	▼	■	●●	●●	
Sodium Hypochlorite (Dilute)	▼	▼	●	●●	■	▼	■	●	●●	
Sodium Lactate	*	*	●●	●●	●●	●	*	*	●●	
Sodium Metaphosphate	■	●	●●	*	*	*	●●	●	●●	Na ₄ P ₂ O ₇ +10H ₂ O
Sodium Metasilicate (Cold)	■	■	●●	*	*	*	●	●	●●	NaO-SiO ₃
Sodium Metasilicate (Hot)	▼	▼	●●	*	*	*	*	*	●●	
Sodium Nitrate	●	●	●●	●●	●●	●	■	●●	●●	
Sodium Nitrite	*	*	●●	*	*	*	■	●	●●	
Sodium Perborate	●	●	●	*	*	*	■	●●	●●	NaBO ₃ + H ₂ O
Sodium Peroxide	■	■	●	●●	●●	●	■	●●	●●	Na ₂ O ₂
Sodium Phosphate	*	■	●●	●●	●●	●	●	●●	●●	
Sodium Phosphate (Di-Basic)	■	■	●	*	*	*	●●	●●	●●	Na ₂ HPO ₄
Sodium Phosphate (Tri-Basic)	■	■	●	*	*	*	●	●●	●●	Na ₃ PO ₄
Sodium Polyphosphate	*	*	●	*	*	*	●	●●	●●	
Sodium Salicylate	●	●	●●	*	*	*	●	●	●●	
Sodium Silicate	●	●	●	*	*	*	●●	●●	●●	Na ₂ O-SiO ₂ -(Na ₂ O-SiO ₂ +H ₂ O)
Sodium Silicate (Hot)	■	■	●	*	*	*	●●	●●	●●	
Sodium Sulfate	●	●	●●	●●	●●	●	●●	●●	●●	Na ₂ SO ₄
Sodium Sulfide	●	●	●	●●	●●	*	●●	●●	●●	Na ₂ S
Sodium Sulfide (Hot)	■	■	●	*	*	*	●●	●●	●●	
Sodium Sulfite	■	■	●●	●●	●●	■	●	●	●●	
Sodium Tetraborate	*	■	●	*	*	*	●	●●	●●	
Sodium Thiosulfate	■	▼	●●	*	*	●	●●	●●	●●	
Sodium Triphosphate	*	●●	●●	*	*	*	●	*	●●	
Soft Water	*	●	●●	*	*	*	●	*	●●	
Solvent (Lacquer)	■	■	●●	*	*	*	▼	▼	●●	
Solvent (Paint)	●●	●●	●●	*	*	*	▼	●	●●	
Soybean Oil	■	■	●●	●●	●●	●	●●	●●	●●	
Stannic Chloride	▼	▼	▼	●●	●●	▼	●●	●●	●●	
Stannous Chloride	▼	▼	●	●●	●●	●	●	●●	●●	
Starch	■	■	●	*	*	*	●●	●●	●●	
Steam (212°F)	●●	●●	●●	*	*	●●	▼	■	●●	
Stearate	*	●	●	*	*	*	●●	●●	●●	
Stearic Acid	■	■	●	●●	●●	●	●	●●	●●	C ₁₇ H ₃₅ COOH
Styrene	●	●●	●●	*	*	*	▼	●	●●	C ₆ H ₅ CH=CH ₂
Succinic Acid	*	■	●●	■	*	*	*	*	●●	
Sugar (Liquid)	●	●	●●	*	*	*	●●	●●	●●	C ₁₂ H ₂₂ O ₁₁
Sugar (Syrup & Jam)	■	●	●●	*	*	*	●●	●●	●●	
Sulfate (Black Liquor)	■	■	●	*	*	*	■	■	●●	
Sulfate (Green Liquor)	■	■	●	*	*	*	■	■	●●	
Sulfate (White Liquor)	■	■	●	*	*	*	■	■	●●	
Sulfonic Acid	*	*	●	*	*	*	▼	●	●●	
Sulfur	■	■	●	*	*	▼	▼	●	●●	S
Sulfur Chloride (Dry)	▼	▼	▼	●●	●●	●	▼	●●	●●	
Sulfur Dioxide (Dry)	●	●	●●	▼	●●	●●	▼	●	●●	SO ₂
Sulfur Dioxide (Wet)	*	*	●●	●●	●●	▼	▼	*	●●	SO ₂
Sulfur Hexafluoride	*	*	●●	*	*	*	●	*	●●	
Sulfur (Molten)	■	■	●	*	*	*	▼	●	●●	
Sulfur Trioxide	*	●	*	*	*	*	▼	●	●●	SO ₃
Sulfur Trioxide (Dry)	●	●	●●	*	*	*	▼	●●	●●	
Sulfuric Acid (0-7%)	▼	▼	●	●●	●●	●	●	●●	●●	H ₂ SO ₄
Sulfuric Acid (20%)	▼	▼	▼	●●	●●	●	▼	●●	●●	H ₂ SO ₄
Sulfuric Acid (50%)	▼	▼	▼	●●	●●	●	▼	●●	●●	H ₂ SO ₄
Sulfuric Acid (100%)	●	●	●●	*	*	*	▼	●	●●	H ₂ SO ₄
Sulfurous Acid	▼	▼	●	●●	●●	▼	■	●●	●●	H ₂ SO ₃
Synthesis Gas	●	●	●	*	*	*	●●	●●	●●	
Synthetic Detergent	●	●	●	*	*	*	●	●	●●	
T										
Tall Oil	●	●	●	*	*	*	●	●●	●●	
Tallow (Molten)	*	*	●	*	*	*	●●	●●	●●	

Media	Materials									Formula
	Metallic						Soft			
	Standard			Special			N	V	T	
CI	CS	SS	H.C	A.20	M					
Tannic Acid	■	■	●	●●	●●	*	●	●●	●●	C ₇₆ H ₅₂ O ₄₆
Tannin	■	■	●	*	*	*	●	●●	●●	
Tanning Liquor	*	*	●	*	*	*	●	●●	●●	
Tar & Tar Oil	●●	●●	●●	*	*	*	■	●●	●●	(CHOHCOOH) ₂
Tartaric Acid	▼	▼	●●	●●	●●	*	■	●●	●●	
Tetraethyl Lead	■	■	●	*	*	*	■	●●	●●	
Toluene	●●	●●	●●	*	*	*	▼	▼	●●	C ₆ H ₅ CH ₃
Toluol	●●	●●	●●	*	*	*	▼	▼	●●	
Tolyl Acid	▼	■	●	*	*	*	▼	●	●●	
Tomato Juice	■	■	●●	●●	●●	●	●●	●●	●●	
Transformer Oil	●	●●	●●	*	*	*	●●	●●	●●	
Tributyl Phosphate	*	●●	●●	*	*	*	▼	▼	●●	C ₂ HCl ₃
Trichloroacetic Acid	*	▼	■	*	*	*	■	▼	●●	
Trichloroethylene	■	●	●	*	*	*	▼	●	●●	
Triethanolamine	*	*	●●	*	*	*	●	*	●●	
Triethylamine	*	*	●	*	*	*	●	●	●●	
Trisodium Phosphate	*	*	*	*	*	*	●	●	●●	
Tung Oil	■	■	●●	*	*	*	●●	●●	●●	
Turpentine	●	●	●●	●●	●●	●	●	●●	●●	
U										
Urea	■	■	●	*	*	*	■	▼	●●	(NH ₂) ₂ CO
Uric Acid	*	*	●●	●●	●●	*	*	*	●●	
V										
Varmish	■	■	●●	●●	*	●	■	●	●●	
Vaseline	■	■	●	*	*	*	●	●●	●●	
Vegetable Oil	*	●	●●	*	*	*	●●	●●	●●	
Vinegar	▼	▼	●●	●●	●●	●	■	▼	●●	
Vinyl Acetate	●	●	●	*	*	*	*	*	●●	
W										
Water (Acid Mine)	*	▼	●●	*	*	*	●	●●	●●	
Water (Cold)	*	●●	●●	*	*	*	●	●●	●●	H ₂ O
Water (Distilled)	▼	▼	●●	*	*	*	●	●●	●●	
Water (Fresh)	■	■	●●	*	*	*	●	●●	●●	H ₂ O
Water (Hard)	*	●	●●	*	*	*	●	*	●●	HNO ₃
Water (Hot, 150°F)	■	■	●●	*	*	*	●	●●	●●	H ₂ O
Water (Salt Sea)	▼	▼	●	*	*	*	●	●●	●●	H ₂ O+NaCl+K ₂ SO ₄ +MgCl
Water (Soft)	*	●	●●	*	*	*	●	*	●●	
Wax	●●	●●	●●	*	*	*	●●	●●	●●	
Whiskey	▼	▼	●●	*	*	●●	●	●●	●●	
White Liquor	■	■	●	*	*	*	■	■	●●	
White Sulfate Liquor	■	■	●	*	*	*	■	■	●●	
Wine	▼	▼	●●	*	*	*	●	●●	●●	
X										
Xylene (Dry)	●	●	●●	*	*	*	▼	●	●●	C ₆ H ₄ (CH ₃) ₂
Xylole (Dry)	●	●	●●	*	*	*	▼	●	●●	
Z										
Zinc Bromide	*	*	●	*	*	*	●	●	●●	
Zinc Chloride	■	▼	▼	●	●●	●	●	●●	●●	Cl ₂ Zn
Zinc Hydrosulfite	●	●●	●●	*	*	*	●●	●●	●●	ZnS ₂ O ₄ +2H ₂ O
Zinc Sulfate	▼	▼	●●	●●	●●	●	●●	●●	●●	SO ₂ Zn+7H ₂ O

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