



Quality People. Building Solutions.

Comfort Systems USA (Arkansas), Inc.
P.O. Box 16620
Little Rock, AR 72231
Phone 501-834-3320
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Date: 2/17/2025
Return Request: 2/27/2025
Project: UAMS (CAMID)
Supplier: Comfort Systems USA (Arkansas), Inc.
Manufacturer: Various
Submittal: Steam & Condensate Piping
Submittal Number: 23 22 13-01
Drawing # and Installation: Plumbing Drawings

ARCHITECT

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2020 Baltimore Avenue, Suite 300
Kansas City, MO 64108
816-474-8237

ENGINEER

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GENERAL CONTRACTOR

CDI Contractirs
3000 Cantrell Rd.
Little Rock, AR 72202
501-666-4300

MECHANICAL SUBCONTRACTOR

Comfort Systems USA (Arkansas), Inc.
9924 Landers Rd.
N. Little Rock, AR 72117
501-834-3320

Notes:

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CSUSA PROJECT NO.

22-6069

sean@comfortar.com

9924 Landers Rd.
No. Little Rock, AR 72117

Pipe Valve & Fitting Schedule - UAMS (CAMID)				
System	Spec Section	Pipe	Fittings	Joint
Low Pressure Steam - 2" & Below	23 22 13	Schedule 40 Black Steel; ASTM A53/A53M	Malleable Iron; ASME B16.3/16.5	Threaded
Low Pressure Steam - 2 1/2" and Above	23 22 13	Schedule 40 Black Steel; ASTM A53/A53M	Foreged Steel; ASME B16.3/16.5	Welded
Medium Pressure Steam - 2" & Below	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Malleable Iron; ASME B16.3/16.5	Treaded
Medium Pressure Steam - 2 1/2" and Above	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Foreged Steel; ASME B16.3/16.5	Welded
Steam Condensate - 2" & Below	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Malleable Iron; ASME B16.3/16.5	Treaded
Steam Condensate - 2 1/2" and Above	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Foreged Steel; ASME B16.3/16.5	Welded
Blowdown Piping - 2" & Below	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Malleable Iron; ASME B16.3/16.5	Treaded
Blowdown Piping - 2 1/2" and Above	23 22 13	Schedule 80 Black Steel; ASTM A53/A53M	Foreged Steel; ASME B16.3/16.5	Welded

83A-240 SERIES

CARBON STEEL 3-PIECE FULL PORT
1500 CWP SOCKET WELD BALL VALVE



STANDARD COMPLIANCE

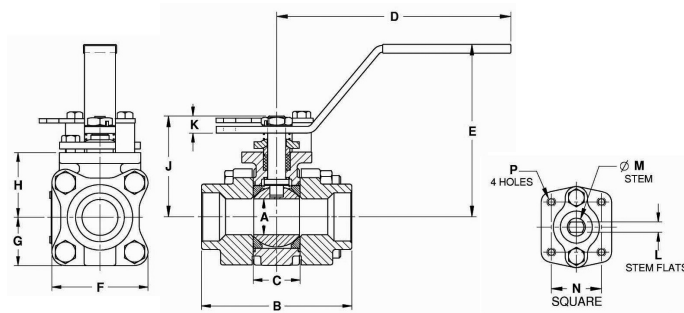
- Valve Design: MSS SP-110, NACE MR0175 (2000) & MR0103 (2012)
- End Connections: Socket-weld per ASME B16.11

- Valve Marking: MSS SP-25
- Production Testing: MSS SP-110

FEATURES

- 3-piece construction w/ enclosed fasteners
- Full port
- Stainless steel trim & hardware
- Swing-out center section
- Pressure balanced solid ball
- Compression controlled RPTFE gaskets

- Anti-blowout one piece bottom entry stem
- Two-position locking
- Adjustable multi-piece PTFE "V" style packing
- Fully machined ISO 5211 mounting
- Cast bosses on the center-section and end caps for bleed & drain ports
- Vacuum service to 29 in of Hg.
- 150 psig saturated steam



STANDARD MATERIAL LIST

PART	MATERIAL
1 Body	ASTM A216-WCB
2 End Caps	ASTM A216-WCB
3 Ball	ASTM A276-316SS
4 Stem	ASTM A276-316SS
5 Seat	Multi-Seal
6 Packing	PTFE
7 Stem Bearing	PEEK/PTFE
8 Body Gasket	RPTFE
9 Body Bolts	18-8 Stainless Steel
10 Body Nuts	18-8 Stainless Steel
11 Stop Bolts	18-8 Stainless Steel
12 Gland Bolts	18-8 Stainless Steel
13 Handle Nut/Screw	300 Series Stainless Steel
14 Packing Gland	ASTM A276-316SS
15 Gland Plate	300 Series Stainless Steel
16 Lever Handle	300 Series Stainless Steel
17 Lock Plate	300 Series Stainless Steel
18 Stops	300 Series Stainless Steel

OPTIONS AVAILABLE

(MORE INFORMATION IN SECTION J)

- Minimum quantities apply
- To specify an option, replace the "01" standard suffix with the suffix of the option.
- To specify multiple options, replace the "01" suffix with the desired suffixes in the numerical order shown below. NOTE: Not all suffixes can be combined together.

(SUFFIX)	OPTION	SIZES
-01	Standard Configuration	All
-04-	2-1/4" Stem Extension (Carbon Steel, Zinc Plated)	All
-14-	Vented Ball	All
-15-	Stainless Steel Locking Round Handle	All
-49-	No Lubrication. Assembled Dry	All
-60-	Static Grounding	All
-62-	Center Section Only	All
-67-	Cleaned for Industrial Gases	All
-69-	Drilled & Tapped Purge & Drains	All
-70-	4" Extended Bonnet	All
-76-	Live Loaded (Lever Operated)	All
-77-	Live Loaded (Actuated)	All
-90-	Double Packed 4" Extended Bonnet	All
-9P-	Double Packed 4" Extended Bonnet w/ Monitoring Port	All
-EF-	Graphite Packing (API 641 Compliant)	3/4" to 2"
-KF-	PCTFE Stem Bearing	All
-SR-	Spring Return Handle	1/4" to 1"
-UA-	AIS (American Iron & Steel) Compliant	All
-ZP1-	Fugitive Emissions Packing (Viton)	All
-ZP2-	Fugitive Emissions Packing (Buna-N)	All
-ZP3-	Fugitive Emissions Packing (Kalrez)	All

Pressure/Temperature Ratings - Page M-19, Graph No. 23

DIMENSIONS

PART NO.	SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	P	WT.
83A-241-01	1/4"	0.37	2.80	0.89	5.12	3.02	2.02	1.01	1.39	1.97	0.23	0.245	0.375	1.00	10-24	2.3
83A-242-01	3/8"	0.50	2.80	0.89	5.12	3.02	2.02	1.01	1.39	1.97	0.23	0.245	0.375	1.00	10-24	2.3
83A-243-01	1/2"	0.50	2.80	0.89	5.12	3.02	2.02	1.01	1.39	1.97	0.23	0.245	0.375	1.00	10-24	2.3
83A-244-01	3/4"	0.75	3.68	1.10	5.53	3.40	2.40	1.20	1.65	2.35	0.24	0.312	0.500	1.392	1/4-20	4.0
83A-245-01	1"	1.00	4.19	1.31	6.53	4.80	2.67	1.34	1.80	2.80	0.48	0.287	0.500	1.392	1/4-20	5.7
83A-246-01	1-1/4"	1.50	4.50	1.97	6.65	4.70	3.84	1.92	2.49	3.89	0.72	0.412	0.625	1.949	5/16-18	14.2
83A-247-01	1-1/2"	1.50	4.98	1.97	6.65	4.70	3.84	1.92	2.49	3.89	0.72	0.412	0.625	1.949	5/16-18	14.4
83A-248-01	2"	2.00	5.86	2.56	8.40	5.47	4.56	2.46	3.17	4.74	0.80	0.477	0.750	1.949	5/16-18	24.4

REV. 17SEP19

The listed C_v "factors" are derived from actual flow testing, at Apollo's Pageland, South Carolina factory. These tests were completed using standard "off the shelf" valves with no special preparation and utilizing standard schedule 40 pipe. It should be understood that these factors are for the valve only and also include the connection configuration. The flow testing is done utilizing water as a fluid media and is a direct statement of the gallons of water flowed per minute with a 1 psig pressure differential across the valve/connection unit. Line pressure is not a factor. Because the C_v is a factor, the formula can be used to estimate flow of most media for valve sizing.

FLOW OF LIQUID

$$Q = C_v \sqrt{\frac{\Delta P}{\text{SpGr}}}$$

$$\text{or } \Delta P = \frac{(Q)^2 (\text{SpGr})}{(C_v)^2}$$

WHERE:

- Q = Flow in US gpm
- ΔP = Pressure drop (psig)
- SpGr = Specific gravity at flowing temperature
- C_v = Valve constant

FLOW OF GAS

$$Q = 1360 C_v \sqrt{\frac{(\Delta P) (P_2)}{(\text{SpGr}) (T)}}$$

$$\text{or } \Delta P = \frac{5.4 \times 10^{-7} (\text{SpGr}) (T) (Q)^2}{(C_v)^2 (P_2)}$$

WHERE:

- Q = Flow in SCFH
- ΔP = Pressure drop (psig)
- SpGr = Specific gravity (based on air = 1.0)
- P2 = Outlet pressure-psia (psig + 14.7)
- T = (temp. °F + 460)
- C_v = Valve constant

CAUTION: The gas equation shown, is valid at very low pressure drop ratios. The gas equation is NOT valid when the ratio of pressure drop (ΔP) to inlet pressure (P1) exceeds 0.02.

NOTE: Only use the gas equation shown if $(P1-P2)/P1$ is less than 0.02.

CV FACTORS FOR APOLLO VALVES (CONTINUED ON M-4)

VALVE	SIZE (IN.)														
	1/4	3/8	1/2	3/4	1	1.25	1.5	2	2.5	3	4	6	8	10	12
70B-140 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
70-100/200 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
70-300/400 Series	--	--	15	30	43	48	84	108	--	--	--	--	--	--	--
70-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
70-800 Series	8.4	7.2	15	30	43	48	84	--	--	--	--	--	--	--	--
71-AR Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
71-100/200 Series	--	--	--	30	43	48	84	108	190	370	--	--	--	--	--
72-100/900 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
72-1xx-A/72-9xx-A Series	--	--	26	48	65	125	170	245	--	--	--	--	--	--	--
73A-100 Series	8.4	7.2	15	30	43	48	84	108	--	--	--	--	--	--	--
73-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
74-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
75-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76F-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
76FJ-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
76FK-100 Series	8.1	15	15	51	68	125	177	389	--	--	--	--	--	--	--
76-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
76-300/400 Series	--	--	26	48	65	125	170	216	--	--	--	--	--	--	--
76-600 Series	2.3	4.5	5.4	12	14	21	34	47	--	--	--	--	--	--	--
76J-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
76J-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
76K-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
76K-AR Series	8.4	7.2	15	30	43	48	84	108	190	370	670	--	--	--	--
7K-100 Series	--	--	15	51	68	125	177	389	503	--	--	--	--	--	--
77-AR Series	8.1	15	15	51	68	--	177	389	--	--	--	--	--	--	--

REV. 21APR17

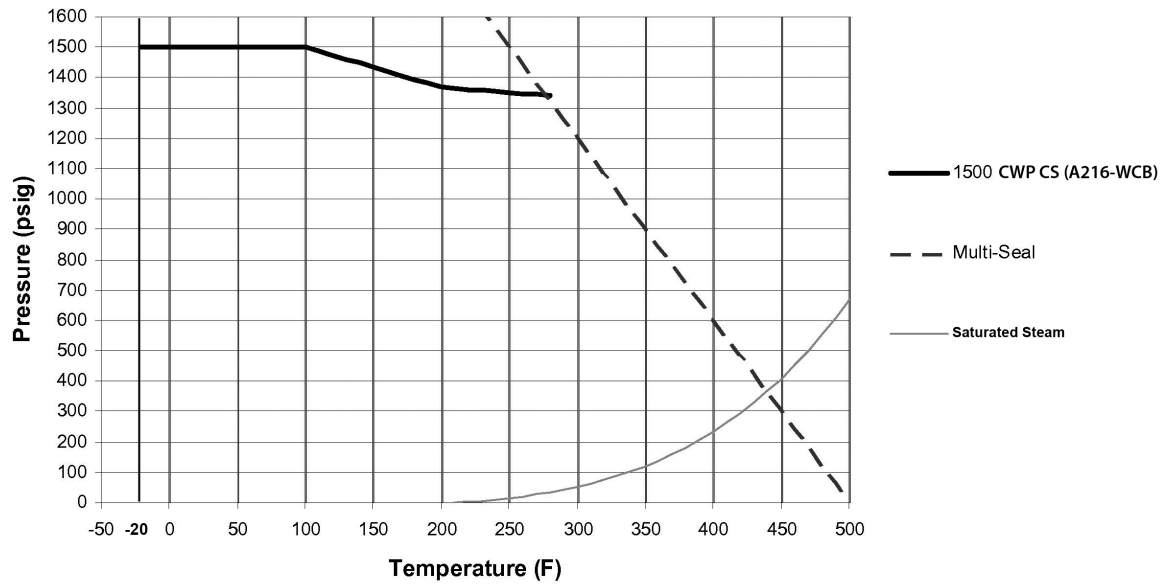
CV FACTORS FOR APOLLO VALVES (CONTINUED FROM M-3)

VALVE	SIZE (IN.)														
	1/4	3/8	1/2	3/4	1	1.25	1.5	2	2.5	3	4	6	8	10	12
77C-100/200 Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77D-140 Series	4.5	7.2	16	36	68	125	177	389	--	--	--	--	--	--	--
77D-640 Series	--	--	--	11	24	35	--	--	--	--	--	--	--	--	--
77G-UL Series	4.5	7.2	16	36	68	125	177	389	503	--	--	--	--	--	--
77W Series	--	--	16	36	68	125	177	389	--	--	--	--	--	--	--
77-100/200 Series	8.1	15	15	51	68	125	177	389	503	--	--	--	--	--	--
79 Series	8.5	8.5	9.8	32	44	66	148	218	440	390	--	--	--	--	--
80 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
82-100/200 Series	8.1	14	26	51	68	120	170	376	510	996	1893	--	--	--	--
83A/83B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
83R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
86A/86B Series	8.1	14	26	51	68	120	170	376	--	--	--	--	--	--	--
86R-100/200 Series	--	--	--	--	--	--	170	376	--	996	1893	--	--	--	--
87A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87A-F00 Series	--	--	--	--	75	--	195	410	545	1021	2016	4837	--	--	--
87B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
87J-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87J-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87J-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87J-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87K-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87K-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
87K-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
87K-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-100 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-200 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-700 Series	--	--	--	--	--	--	86	104	234	375	673	1099	1902	3890	--
88A-900 Series	--	--	15	19	75	--	195	410	545	1021	2016	4837	9250	15170	22390
88A-F00 Series	--	--	--	--	75	--	195	410	545	1021	2016	4837	--	--	--
88B-100 Series	--	--	--	--	--	--	--	--	--	375	673	1099	1902	3890	--
89-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
9A-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
90-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
92-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
93-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
94A-100/200 Series	6	7	19	34	50	104	268	309	629	1018	1622	--	--	--	--
96-100 Series	8.3	6.7	5.7	10	16	25	40	62	--	--	--	--	--	--	--
399-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--
489-100 Series	8.4	7.2	15	30	43	48	84	108	190	370	--	--	--	--	--

1500 CWP

(CS) ASTM A216-WCB

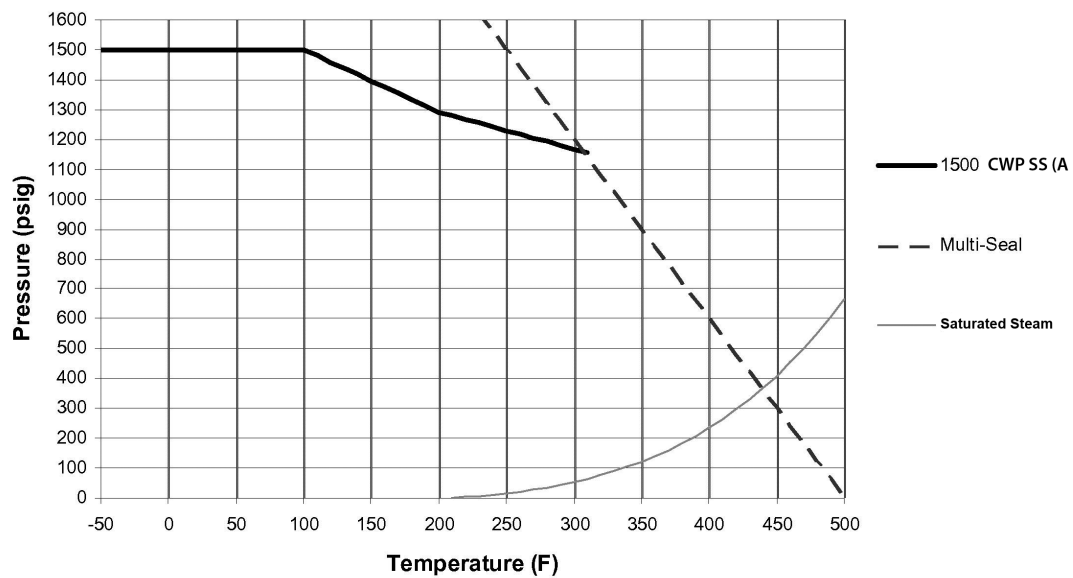
GRAPH 23



1500 CWP

(SS) ASTM A351-CF8M

GRAPH 24



Class 300 Bronze Gate Valves

Block pattern • union bonnet • rising stem • alloy solid wedge

300 PSI/20.7 bar saturated steam to 421°F/216°C

600 PSI/41.4 bar non-shock cold working pressure

CONFORMS TO MSS SP-80

MATERIAL LIST

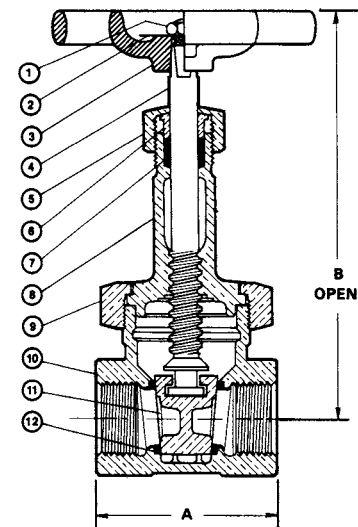
PART	SPECIFICATION
1. Handwheel Nut	300 Series Stainless Steel
2. Identification Plate	Aluminum
3. Handwheel	Malleable Iron ASTM A 47
4. Stem	Silicon Bronze ASTM B 371 Alloy C69400/C69430 or ASTM B 99 Alloy C65100
5. Packing Nut	Bronze ASTM B 62 or ASTM B584 Alloy C84400 or Brass ASTM B16
6. Packing Gland	Bronze ASTM B 62 or ASTM B584 Alloy C84400 or Brass ASTM B16
7. Packing	Aramid Fibers with Graphite
8. Bonnet	Bronze ASTM B 61
9. Union Nut	Bronze ASTM B 61
10. Body	Bronze ASTM B 61
11. Wedge	T-174-SS Bronze ASTM B 61 T-174-A Copper Nickel Alloy
12. Seats	T-174-SS Stainless Steel Type 410 ASTM A 276 Alloy 541000 T-174-A Integral with Body

1/2" thru 2" Steam

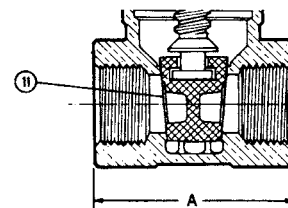
Dezincification
Resistant



~~T-174-SS~~
T-174-A
Threaded



T-174-SS
NPT x NPT
with Stainless Steel Seats



T-174-A
NPT x NPT
with Integral Seats

DIMENSIONS—WEIGHTS—QUANTITIES

Dimensions

Size		T-174-SS				T-174-A				T-174-SS		T-174-A		Master Ctn. Qty
		A		B		A		B						
In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.	Lbs.	Kg.	
¼	8	x	x	x	x	1.88	48	4.81	122	x	x	1.15	0.52	50
⅜	10	x	x	x	x	2.06	53	4.81	122	x	x	1.14	0.52	50
½	15	2.38	60	5.38	137	2.31	59	5.38	137	1.48	0.67	1.49	0.68	40
¾	20	2.69	68	6.31	160	2.44	62	6.31	160	2.23	1.01	2.23	1.01	30
1	25	3.13	79	7.56	192	2.88	73	7.56	192	3.37	1.53	3.37	1.53	20
1 ¼	32	3.44	87	8.88	226	3.13	79	8.75	222	4.74	2.15	4.76	2.16	10
1 ½	40	3.75	95	10.25	260	3.38	86	10.25	260	6.29	2.85	6.32	2.87	10
2	50	4.25	108	12.50	318	3.88	99	12.50	318	10.84	4.92	10.96	4.97	6

x = Not available this size.

FREEZING WEATHER PRECAUTION: Subsequent to testing a piping system, valves should be left in an open position to allow complete drainage.

♦For detailed Operating Pressure, refer to Pressure Temperature Chart on page 114.

Visit our website for the most current information.

Class 250 Iron Body Gate Valves

Bolted bonnet • outside screw and yoke • solid wedge • bronze mounted

500 PSI/34.5 bar non-shock cold working pressure to -20°F to 150°F/-29°C to 66°C*

Maximum working temperature 450°F/232°C at 250 PSI/17.2 bar

250 PSI/17.2 bar saturated steam to 406°F/208°C

CONFORMS TO MSS SP-70 • APPROVED BY THE NEW YORK CITY B.S.A. 143-69-SA AT 350 PSI NON-SHOCK COLD WATER

2 1/2" & Larger Steam

MATERIAL LIST

PART	SPECIFICATION
1. Stem	Brass ASTM B16 Alloy C36000
2. Handwheel Nut	Brass ASTM B584 Alloy C84400
3. Identification Plate	Aluminum
4. Yoke Bushing	Brass ASTM B584 Alloy C84400
5. Handwheel	Cast Iron ASTM A126 Class B
6. Bonnet Cap Nut	Steel ASTM A563
7. Bonnet Cap	Ductile Iron ASTM A536
8. Bonnet ¹	Cast Iron ASTM A126 Class B
9. Bonnet Cap Bolt	Steel ASTM A307/SAE J429
10. Gland Follower Nut	Brass ASTM F467 Alloy C27000
11. Gland Follower	Ductile Iron ASTM A536
12. Packing Gland	Zinc Plated Powdered Iron ASTM B783 or Brass ASTM B16 Alloy C3600
13. Packing	PTFE Braided Synthetic Fiber
14. Gland Follower Bolt	Steel ASTM A307/SAE J429
15. Backseat Bushing	Brass ASTM B584 Alloy C84400
16. Body Nut	Steel ASTM A563
17. Body Gasket	Reinforced Graphite
18. Body Bolt	Steel ASTM A307/SAE J429
19. Body	Cast Iron ASTM A126 Class B
20. Stem Collar	Brass ASTM B16 Alloy C36000
21. Wedge ²	Cast Iron ASTM A126 Class B
22. Wedge Nut ³	Brass ASTM B584 Alloy C84400
23. Wedge Pin	ASTM B140 Alloy C31400
24. Seat Ring	Brass ASTM B584 Alloy C84400
25. Wedge Face Ring ²	Brass ASTM B584 Alloy C84400

¹ Sizes 2" thru 8" made with Yoke Integral with Bonnet. Sizes 8" thru 12" made with separate Yoke Bolted to Bonnet.

² Wedge construction – 2" thru 4" all bronze.

– 5" thru 12" Cast Iron with Bronze Wedge Face Rings.

³ Bronze Wedge Nuts used on sizes 5" thru 12".

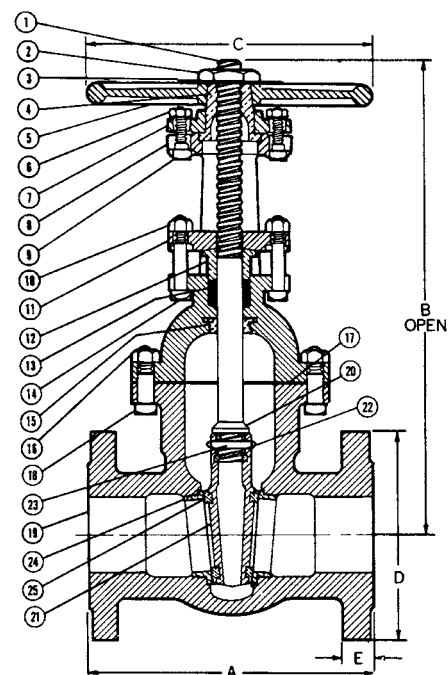
DIMENSIONS—WEIGHTS—QUANTITIES

Dimensions													
Size	A		B		C		D		E		Weight		
In. mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.	
2	50	8.50	216	16.00	406	8	203	6.50	165	.88	22	56	25
2½	65	9.50	241	18.44	468	8	203	7.50	191	1.00	25	74	34
3	80	11.13	283	20.50	521	10	254	8.25	210	1.13	29	122	55
4	100	12.00	305	27.00	686	12	305	10.00	254	1.25	32	193	87
5	125	15.00	381	31.50	800	12	305	11.00	279	1.38	35	297	135
6	150	15.88	403	33.00	838	16	406	12.50	318	1.44	37	411	187
8	200	16.50	419	45.50	1156	16	406	15.00	381	1.63	41	637	289
10	250	18.00	457	56.00	1422	20	508	17.50	445	1.88	48	897	407
12	300	19.75	502	60.00	1524	20	508	20.50	521	2.00	51	1172	532



F-667-0

Flanged



F-667-0

Flg x Flg

FREEZING WEATHER PRECAUTION: Subsequent to testing a piping system, valves should be left in an open position to allow complete drainage.

♦For detailed Operating Pressure, refer to Pressure Temperature Chart on page 114.

VISIT WWW.NIBCO.COM FOR CURRENT CHEM-GUIDE AND GALVANIC POTENTIAL IN PIPING SYSTEMS INFORMATION.

Visit our website for the most current information.

Class 300 Bronze Globe Valves

Union bonnet • replaceable seat and full plug disc

300 PSI/20.7 bar saturated steam to 421° F/216° C
600 PSI/41.4 bar non-shock cold working pressure

CONFORMS TO MSS SP-80

1/2" thru 2" Steam

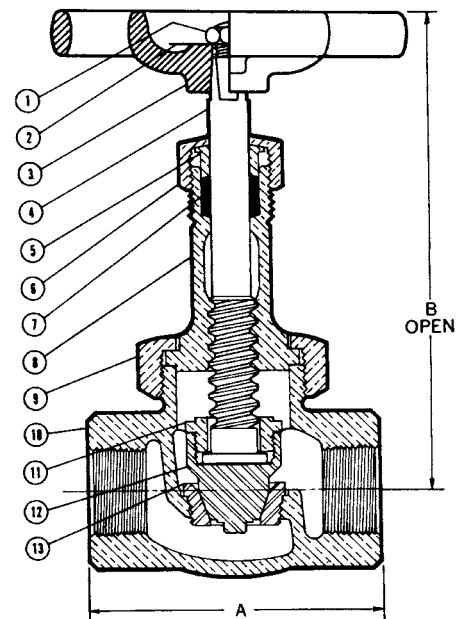
Dezincification
Resistant

MATERIAL LIST

PART	SPECIFICATION
1. Handwheel Nut	300 Series Stainless Steel
2. Identification Plate	Aluminum
3. Handwheel	Malleable Iron ASTM A 47
4. Stem	Silicon Bronze ASTM B 371 Alloy C69400/C69430
5. Packing Gland	Bronze ASTM B 62 or ASTM B584 Alloy C84400 or Brass ASTM B16
6. Packing Nut	Bronze ASTM B 62 or ASTM B584 Alloy C84400 or Brass ASTM B 16
7. Packing	Aramid Fibers with Graphite
8. Bonnet	Bronze ASTM B 61
9. Union Nut	Bronze ASTM B 61
10. Body	Bronze ASTM B 61
11. Disc Holder Nut	Bronze ASTM B 61
12. Plug Disc	S42000 Stainless Steel ASTM A276 Hardened
13. Plug Seat Ring	S42000 Stainless Steel ASTM A276 Hardened



T-276-AP
Threaded



T-276-AP
NPT x NPT
Full Plug

DIMENSIONS—WEIGHTS—QUANTITIES

Size	Dimensions				Weight		Master Ctn. Qty.
	In.	mm.	In.	mm.	Lbs.	Kg.	
† 1/4	8†	2.63	67	4.44	113	1.34 0.61	50
† 3/8	10†	2.63	67	4.44	113	1.35 0.61	50
1/2	15	2.69	68	4.88	124	1.82 0.83	30
3/4	20	3.38	86	5.75	146	2.88 1.30	20
1	25	4.00	102	7.00	178	4.77 2.16	10
1 1/4	32	4.63	118	7.63	194	6.96 3.16	10
1 1/2	40	5.00	127	7.69	195	8.41 3.81	6
2	50	6.00	153	9.25	235	13.41 6.08	4
2 1/2	65	6.63	168	10.19	259	17.59 7.98	2
3	80	7.75	197	11.13	283	24.55 11.13	2

† No packing gland, packing only in these sizes.

FREEZING WEATHER PRECAUTION: Subsequent to testing a piping system, valves should be left in an open position to allow complete drainage.

♦ For detailed Operating Pressure, refer to Pressure Temperature Chart on page 114.

Visit our website for the most current information.

Class 250 Iron Body Globe Valves

2 1/2" & Larger Steam

Bolted bonnet • renewable seat and disc* • bronze mounted

500 PSI/34.5 bar non-shock cold working pressure from -20°F to 150°F/-29°C to 66°C♦

Maximum working temperature 450°F/232°C at 250 PSI/17.2 bar

250 PSI/17.2 bar saturated steam to 406°F/208°C

CONFORMS TO MSS SP-85

MATERIAL LIST

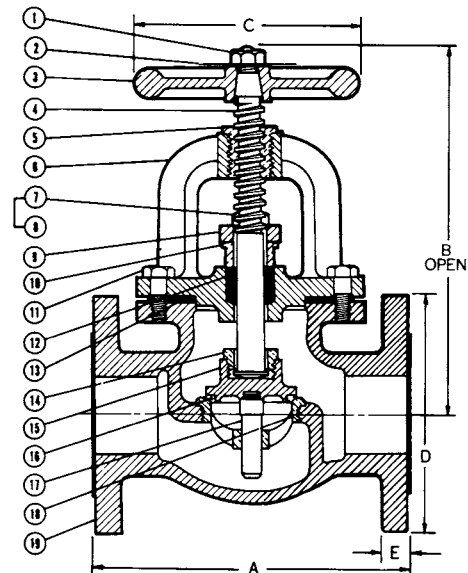
PART	SPECIFICATION
1. Handwheel Nut	Steel ASTM A563
2. Identification Plate	Aluminum
3. Handwheel	Cast Iron ASTM A126 Class B
4. Stem	Brass ASTM B16 Alloy C36000
5. Yoke Bushing	Brass ASTM B584 Alloy C84400
6. Bonnet	Cast Iron ASTM A126 Class B
7. Gland Follower Nut	Brass ASTM F467 Alloy C27000
8. Gland Follower Stud	Steel ASTM A307/SAE J429
9. Gland Follower	Cast Iron ASTM A126 Class B or Ductile Iron ASTM A536
10. Packing Gland	Zinc Plated Powdered Iron ASTM B783 or Brass ASTM B16
11. Hex Head Cap Screw	Steel ASTM A307/SAE J429
12. Packing	PTFE Braided
13. Body Gasket	Reinforced Graphite
14. Swivel Nut	Brass ASTM B584 Alloy C84400 or ASTM B16 Alloy C36000
15. ¹ Disc	Cast Iron ASTM A126 Class B
16. Disc Ring	Brass ASTM B584 Alloy C84400
17. Disc Pilot	Brass ASTM B584 Alloy C84400
18. Seat Ring	Brass ASTM B584 Alloy C84400
19. Body	Cast Iron ASTM A126 Class B

¹Sizes thru 4" have all Bronze Discs

Sizes 6" and 8" have Cast Iron Disc with Bronze Disc Face Rings and Brass Pilots.



F-768-B
Flanged



F-768-B
Flg x Flg

DIMENSIONS—WEIGHTS—QUANTITIES

Dimensions												Weight	
Size	A		B		C		D		E			Lbs.	Kg.
In. mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.			
2 50	10.50	267	10.31	262	7	178	6.50	165	.88	22		42	19
2½ 65	11.50	292	13.56	344	8	203	7.50	191	1.00	25		78	35
3 80	12.50	318	14.00	356	10	254	8.25	210	1.13	29		96	44
4 100	14.00	356	16.50	419	11	279	10.00	254	1.25	32		154	70
6 150	17.50	445	23.50	597	14	356	12.50	318	1.44	37		360	163
8 200	21.00	533	26.50	673	16	406	15.00	381	1.63	41		546	248

*With proper machining facilities available.

FREEZING WEATHER PRECAUTION: Subsequent to testing a piping system, valves should be left in an open position to allow complete drainage.

♦For detailed Operating Pressure, refer to Pressure Temperature Chart on page 114.

VISIT WWW.NIBCO.COM FOR CURRENT CHEM-GUIDE AND GALVANIC POTENTIAL IN PIPING SYSTEMS INFORMATION.

Visit our website for the most current information.

Job Name _____
 Job Location _____
 Engineer _____
 Approval _____

Contractor _____
 Approval _____
 Contractor's P.O. No. _____
 Representative _____

Series 600-Z3 Bronze Silent Steam Check Valves

Sizes: 3/4" and 1 1/2"

Series 600-Z3 Bronze Silent Steam Check Valves efficiently perform in high cycle steam applications. They feature a heavier internal construction for longer life and a Super Teflon® seat for higher temperatures.

Features

- Heavier internal construction for longer life in saturated steam
- Conical 316 stainless steel disc for full fluid flow
- Super Teflon seat for higher temperature rating
- Heavy duty stainless steel guide rod to enhance disc guidance
- Stainless steel spring
- Install in horizontal or vertical position
- Low pressure drop equivalent to a swing check
- Silent operation
- For use on cyclical steam applications

Specifications

A bronze silent check valve shall be installed as indicated on the plans. The valve shall have a 316 stainless steel disc, Super Teflon seat and silent operation. Pressure rating no less than 400psi (27.6 bar) WOG non-shock and 150psi (10 bar) WSP. Valve shall be a Watts Series 600-Z3.

Teflon is a registered trademark of E.I. DuPont de Nemours & Company, Incorporated.

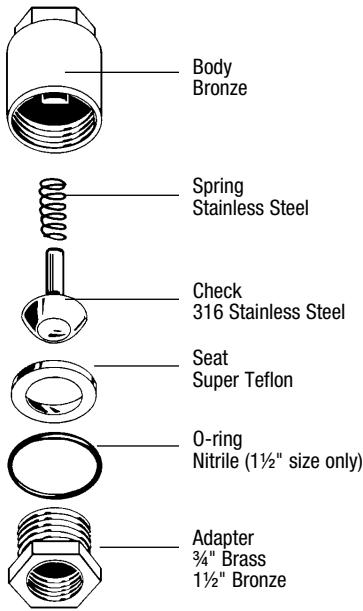
Application Notes

These valves are not suggested for installation in sewage ejector piping.



600-Z3

Materials



WARNING

Do not use for reciprocating air compressor service.

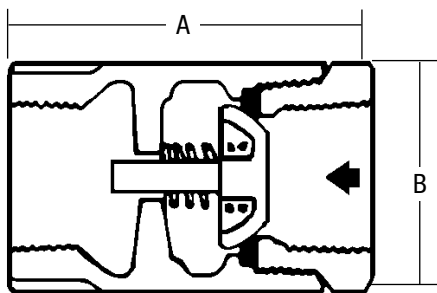
NOTICE

The information contained herein is not intended to replace the full product installation and safety information available or the experience of a trained product installer. You are required to thoroughly read all installation instructions and product safety information before beginning the installation of this product.

NOTICE

Inquire with governing authorities for local installation requirements

Dimensions-Weights



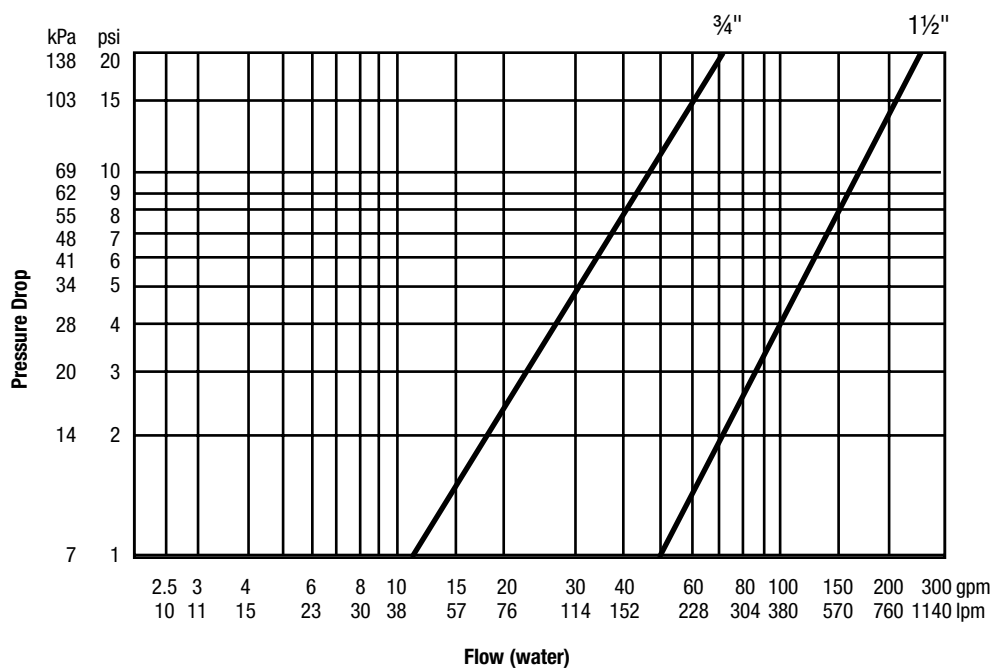
SIZE	DIMENSIONS				WEIGHT	
	A		B			
<i>in.</i>	<i>in.</i>	<i>mm</i>	<i>in.</i>	<i>mm</i>	<i>lbs.</i>	<i>kgs.</i>
¾	2½	64	1½	38	.8	.4
1½	4	102	2¾	70	3.0	1.4

Pressure – Temperature

Maximum Working Pressure: 400psi (27.6 bar) WOG
 non-shock @ -20°F to 100°F
 (-29°C to 38°C); 150psi (10 bar)
 WSP @ 366°F (186°C)

TEMPERATURE		STEAM PRESSURE	
°F	°C	psi	bar
353	178	125	8.6
338	170	100	6.9
324	162	80	5.5
307	153	60	4.1
287	142	40	2.8
267	131	25	1.7
250	121	15	1.0

Pressure Drop vs. Flow



Class 150 Bronze Check Valves

Horizontal Swing • Regrinding Type • Y-Pattern • Renewable Seat and Disc

150 PSI/10.3 bar saturated steam to 366° F/185° C
300 PSI/20.7 bar non-shock cold working pressure

CONFORMS TO MSS SP-80

MATERIAL LIST

PART	SPECIFICATION
1. Bonnet	Bronze ASTM B 62
2. Body	Bronze ASTM B 62
3. Hinge Pin	316 SS or 304 SS
4. Disc Hanger	Bronze ASTM B 62 or MPIF SS-316NI-25
5. Hanger Nut	Bronze ASTM B16
6. Disc Holder	Bronze ASTM B 62
7. Seat Disc	Steam (PTFE) (Y) Bronze ASTM B 62 C83600 (B)
8. Seat Disc Nut	Bronze ASTM B16
9. Hinge Pin Plug	Bronze ASTM B 140 Alloy C31400 (not shown)
*10. Seat Disc Washer	Stainless Steel S30400

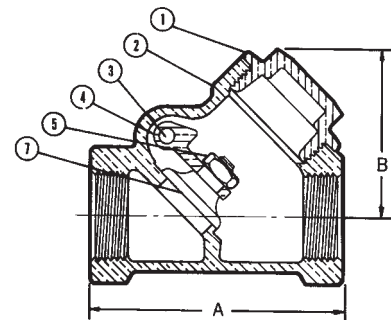
* Sizes 1", 1¼", 1½" and 2" only. No Seat Disc Washers on 1/2" and 3/4" with PTFE (Y) discs.



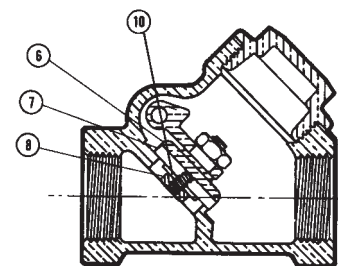
T-433
Threaded



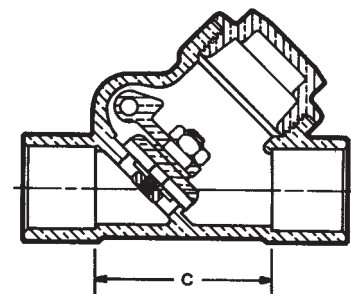
S-433
Solder



T-433-B
NPT x NPT



T-433-Y
NPT x NPT



S-433-Y
C x C

DIMENSIONS—WEIGHTS—QUANTITIES

Size		Dimensions								T-433		S-433		Master Ctn. Qty.
		A		B		C		D						
In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.	Lbs.	Kg.	
¼	8	2.13	54	1.63	41	1.63	41	1.38	35	0.54	0.24	0.54	0.24	50
⅜	10	2.13	54	1.63	41	1.63	41	1.31	33	0.54	0.24	0.53	0.24	50
½	15	2.44	62	1.69	43	1.69	43	1.50	38	0.60	0.27	0.60	0.27	50
¾	20	2.94	75	1.88	48	1.88	48	1.88	48	0.98	0.44	0.99	0.45	50
1	25	3.56	90	2.31	59	2.31	59	2.25	57	1.58	0.72	1.57	0.71	30
1 ¼	32	4.19	106	2.69	68	2.69	68	2.75	70	2.39	1.08	2.34	1.06	20
1 ½	40	4.50	114	2.94	75	2.94	75	3.13	79	3.16	1.43	3.11	1.41	10
2	50	5.25	133	3.94	100	3.94	100	3.75	95	5.41	2.45	5.34	2.42	10
2 ½	65	8.00	203	5.06	129	5.06	129	5.31	135	11.48	5.21	11.20	5.08	5
3	80	9.25	235	6.25	159	6.25	159	6.25	159	17.53	7.95	16.91	7.67	4

Ordering: T-433 and S-433 normally furnished with Bronze Disc (T-433-B) or (S-433-B).

Both available with PTFE Steam Disc (T-433-Y), (S-433-Y).

Install 5 pipe diameters minimum downstream from pump discharge or changes in direction to avoid flow turbulence. Flow straighteners may be required in extreme cases.

Note: On pump discharge, the preferred check valves are:
- inline, spring assisted, center-guided, lift checks.

NIBCO® Check Valves may be installed in both horizontal and vertical lines with upward flow or in any intermediate position. They will operate satisfactorily in a declining plane (no more than 15°).

Warning – Do Not Use For Reciprocating Air Compressor Service.

♦ For detailed Operating Pressure, refer to Pressure Temperature Chart on page 116.



WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Visit our website for the most current information.

Class 125 Iron Body Check Valves

Bolted Bonnet • Horizontal Swing • Renewable Seat and Disc*

200 PSI/13.8 bar non-shock cold working pressure to -20°F to 150°F/-29°C to 66°C*

Maximum working temperature 450°F/232°C at 125 PSI/8.6 bar

125 PSI/8.6 bar saturated steam to 353°F/178°C

CONFORMS TO MSS SP-71 TYPE 1

MATERIAL LIST

PART	SPECIFICATION
1. Body Bolt	Steel ASTM A307
2. Identification Plate	Aluminum
3. Bonnet	Cast Iron ASTM A126 Class B
4. Body Gasket	Synthetic Fibers
5. Body Nut	Steel ASTM A563
6. Side Plug	Brass ASTM B16 Alloy C36000
7. Hanger Pin	Brass ASTM B16 Alloy C36000
8. Hanger	Ductile Iron ASTM A536
9. ¹ Disc	Brass ASTM B584 Alloy C84400 or ASTM A536 Ductile Iron with Brass Face Ring
10. Seat Ring	Brass ASTM B584 Alloy C84400
11. Disc Nut	Brass ASTM B16 Alloy C36000
12. Body	Cast Iron ASTM A126 Class B
13. ¹ Disc Bolt	Brass ASTM B16 Alloy C36000
14. Disc Plate**	Cast Iron ASTM A126 Class B
15. Disc Cage**	Cast Iron ASTM A126 Class B

¹2" thru 4" have Bronze ASTM B584 Disc.

⁵" thru 12" have Iron Disc with Bronze Disc Face Rings and Disc Bolt.

**These items are not in the -B, only the -W and -Y.

DIMENSIONS—WEIGHTS—QUANTITIES

Dimensions

Size		F-918-B		T-918-B		B		D		E		F-918-B		T-918-B	
In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	In.	mm.	Lbs.	Kg.	Lbs.	Kg.
2	50	8.00	203	6.50	165	3.94	100	6.00	152	.63	16	24	11	15	7
2½	65	8.50	216	7.50	191	4.50	114	7.00	178	.69	17	35	16	26	12
3	80	9.50	241	8.00	203	5.13	130	7.50	191	.75	19	47	21	31	14
4	100	11.50	292	9.38	238	6.13	156	9.00	229	.94	24	80	36	54	24
5	125	13.00	330	x	x	6.81	173	10.00	254	.94	24	100	45	80	36
6	150	14.00	356	x	x	8.00	203	11.00	279	1.00	25	146	66	121	54
8	200	19.50	495	x	x	9.44	240	13.50	343	1.13	29	274	124	x	x
10	250	24.50	622	x	x	12.06	306	16.00	406	1.19	30	426	193	x	x
12	300	27.50	699	x	x	16.13	410	19.00	483	1.25	32	675	306	x	x

Note: On pump discharge, the preferred check valves are:

- inline, spring assisted, center-guided, lift checks
- spring assisted twin (double) disc
- swing design with lever and weight or lever and spring

*Proper machining facilities required.

x Not available this size.

2½" thru 12" are available with lever and weight or lever and spring.

Install 5 pipe diameters minimum downstream from pump discharge or changes in direction to avoid flow turbulence. Flow straighteners may be required in extreme cases.

NIBCO Iron Body Check Valves may be installed in both horizontal and vertical lines with upward flow or in any intermediate position.

Warning – Do Not Use For Reciprocating Air Compressor Service.

♦ For detailed Operating Pressure, refer to Pressure Temperature Chart on page 114.



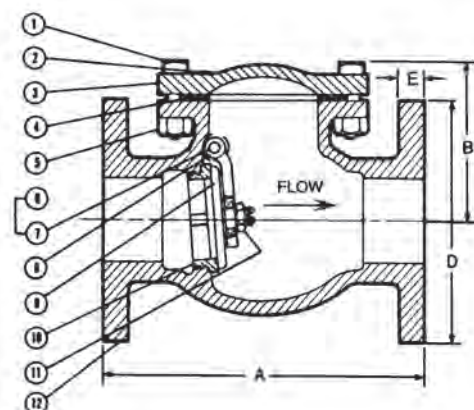
F-918-B

Flanged



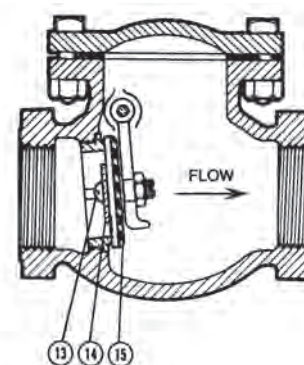
T-918-B

Threaded



F-918-B

Flg x Flg



T-918

NPT x NPT

Buna-N Disc Shown



WARNING: This product can expose you to chemicals including lead, which is known to the State of California to cause cancer and birth defects or other reproductive harm. For more information go to www.P65Warnings.ca.gov.

Style B

Y-Strainer

Cast Iron (ASTM A 126, Class B)

250 lb. Threaded



Cast Iron Y-Strainer

APPLICATIONS

Steam, water, oil or gas where protection from foreign matter in a pipeline is required.

CONSTRUCTION

The Keckley Style B strainers are constructed from rugged cast iron castings that are machined to exacting specifications.

FEATURES

The Keckley Style B strainer features a tapered bushing in sizes 1/4" thru 2" and bolted cover with gasket for sizes 2-1/2", 3" and 4". All Keckley Style B strainers are furnished standard with a NPT blow-off connection and can be supplied with a cast iron blow-off plug upon request.

SCREENS

Standard screens are 20 mesh 304 stainless steel through size 2". Sizes 2-1/2", 3" and 4" are furnished with 1/16" perforated 304 stainless steel screens. All screens are spot welded for maximum strength. Different size perforations and meshes are available in stainless steel, monel, and brass to meet specific media requirements. If media is not indicated, screens for *water* will be supplied.

SELF CLEANING

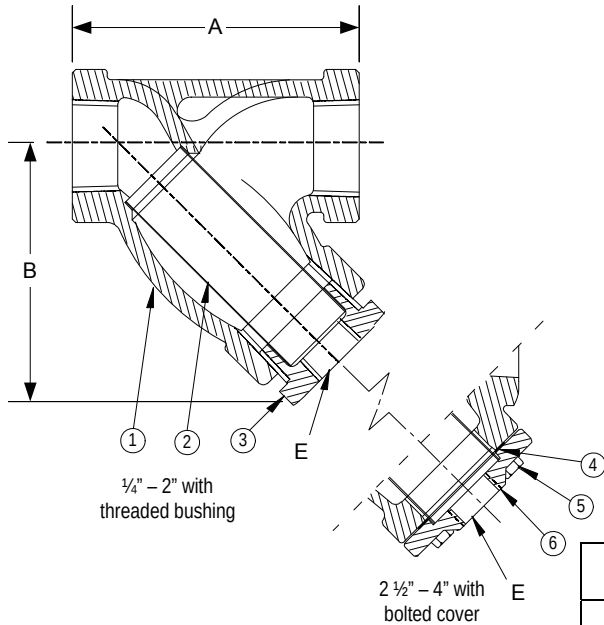
Self cleaning is accomplished by opening the valve or drain plug connected to the blow-off port. **Warning:** See Maintenance Instructions on page S6 of the Strainer Information Section for additional precautions and detailed information on servicing the strainer.

WORKING PRESSURES – NON SHOCK

NOM. RATING	MEDIA	1/4" to 4"	8 mm to 100 mm
250# (THREADED)	STEAM	250 PSI @ 406°F	1724 KPa @ 208°C
	W.O.G.	400 PSI @ 150°F	2759 KPa @ 66°C

GOVERNMENT/MILITARY SPECIFICATIONS

Style B cast iron threaded strainers meet or exceed government specification WW-S-2739 (Supersedes MIL-S-16293).



Style B

**Y-Strainer, 250 lb. Threaded
Cast Iron (ASTM A 126, Class B)**

PARTS LIST

ITEM	DESCRIPTION	MATERIAL
1	BODY	CAST IRON (ASTM A 126, CLASS B)
2	SCREEN	STAINLESS STEEL (304)
3	BUSHING	MALLEABLE IRON
4	GASKET*	COMPOSITION
5	CAP SCREW*	STEEL
6	COVER*	CAST IRON (ASTM A 126, CLASS B)

Optional: Blow-off Plug, Malleable Iron

* 2 1/2", 3" & 4" ONLY

STANDARD SCREENS SUPPLIED

SIZE		SCREEN GAGE	SCREEN PERFORATION					
in	mm		FOR STEAM		OPEN AREA	FOR LIQUID		OPEN AREA
			in	mm		in	mm	
1/4 to 2	8 to 50		20 MESH STAINLESS STEEL					
								49%
2-1/2 to 4	65 to 100	28	3/64	1.2	33%	1/16	1.6	30%

Standard screens supplied are for liquid service, unless otherwise specified.

Options: Other meshes, perforations, and screen materials are available.

SIZE		DIMENSIONS						WEIGHTS	
		A		B		E			
in	mm	in	mm	in	mm	in	mm	lbs	kgs
1/4	8	3	76	2-5/8	67	3/8	10	2	0.9
3/8	10	3	76	2-5/8	67	3/8	10	2	0.9
1/2	15	3	76	2-5/8	67	3/8	10	2	0.9
3/4	20	4	102	3-5/8	92	1/2	15	3	1.4
1	25	4-7/8	124	4-1/2	114	3/4	20	4.5	2.0
1-1/4	32	5-1/8	130	4-3/4	121	3/4	20	6	2.7
1-1/2	40	5-3/4	146	4-7/8	124	1	25	8	3.6
2	50	7-1/4	184	5-3/4	146	1-1/4	32	15.5	7.0
2-1/2	65	8-7/8	225	7-1/2	191	1-1/4	32	25	11.3
3	80	10	254	8	203	1-1/2	40	36	16.3
4	100	15-1/4	387	12-1/2	318	2	50	95	43.1

Certified dimensional drawings are available upon request.

†This table reflects only the nearest metric equivalents.

FLOW COEFFICIENTS

Size	C _v	Size	C _v	Size	C _v
1/2"	9.5	1-1/4"	44.9	2-1/2"	129.7
3/4"	18.7	1-1/2"	61	3"	161.3
1"	30	2"	98	4"	256.2

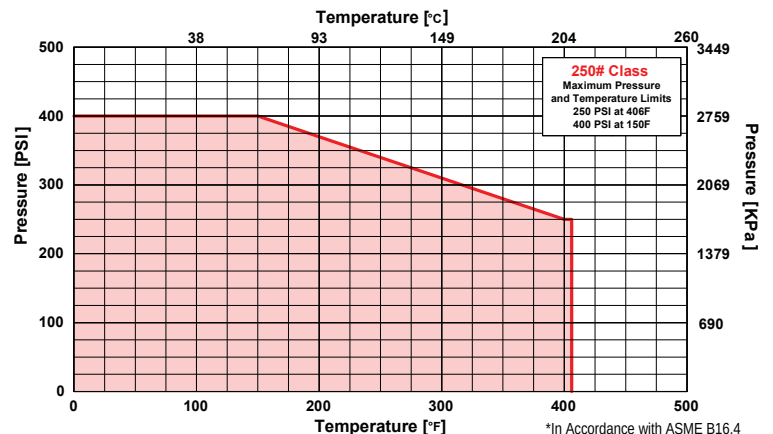
TOTAL SCREEN AREA

Size	(in ²)	Size	(in ²)	Size	(in ²)
1/2"	5.50	1-1/4"	18.69	2-1/2"	54.13
3/4"	8.59	1-1/2"	23.37	3"	73.51
1"	15.22	2"	36.23	4"	154.98

*See DETERMINING RATIOS on page S5 of the Strainer Information Section for calculating NET FREE AREA of the screen to inside pipe area.

PRESSURE vs. TEMPERATURE CHART

250# Threaded Cast Iron (ASTM A 126, Class B)



*In Accordance with ASME B16.4