



89-100 Series

Carbon Steel Ball Valve

1/4" - 1"



NPT Threaded, 2000 psig WOG. (See referenced P/T chart)
Cold Non-Shock. 150 psig Saturated Steam. Vacuum Service to 29 inches Hg.
Federal Specification: WW-V-35C, Type: II, Composition: CS, Style: 3.
MSS SP-110; Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FEATURES

- Investment cast components
- Reinforced seats
- Mounting pad for easy actuator mounting
- (-24) Certified to API 607, 4th, Edition, Class 600 burn
- Blow-out-proof stem design
- Adjustable packing gland
- Zinc phosphate corrosion protection

STANDARD MATERIAL LIST

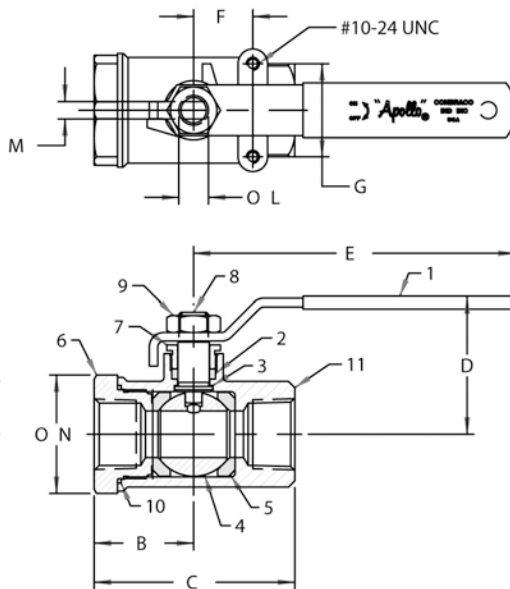
1. Lever and grip	Steel, zinc plated w/vinyl	9. Lever nut	Steel, zinc plated
2. Stem packing	MPTFE	10. Body seal	PTFE
3. Stem bearing	RPTFE	11. Body	A216-WCB
4. Ball	A108-CS chrome plated		
5. Seat (2)	RPTFE		
6. Retainer	A216-WCB		
7. Gland nut	A108-CS		
8. Stem	A108-CS		

VARIATIONS AVAILABLE:

89-140 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 3"
-03-	1-1/4" CS Stem Extension	1/4" to 3"
-04-	2-1/4" CS Stem Extension	1/4" to 3"
-07-	Steel Tee Handle	1/4" to 2"
-08-	90° Reversed Stem	1/4" to 3"
-10-	SS Lever & Nut	1/4" to 3"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 3"
-15-	Wheel Handle, Steel	1/4" to 2"
-16-	Chain Lever - Vertical	3/4" to 2"
-18-	Plain Yellow Grip	1/4" to 3"
-19-	Lock Plate	1/4" to 2"
-24-	Graphite Packing	1/4" to 3"
-27-	SS Latch-Lock Lever & Nut	1/4" to 3"
-30-	Cam-Lock and Grounded	1/4" to 2"
-32-	SS Tee Handle & Nut	1/4" to 2"
-35-	VTPE Trim	1/4" to 3"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/4" to 2"
-40-	Cyl-Loc and Grounded	1/4" to 2"
-44-	Seal Welded	1/4" to 2"
-45-	Less Lever & Nut	1/4" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 3"
-47-	SS Oval Latch-Lock Handle & Nut	1/4" to 1"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 3"
-56-	Multifill Seats & Packing	1/4" to 3"
-58-	Chain Lever - Horizontal	3/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 3"
-64-	250# Steam Trim	1/4" to 3"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 3"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 3"



CARBON STEEL BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	WT.
89-101-01A	1/4"	.37	1.02	2.05	1.71	3.85	.50	1.12	.88	.34	.53	.375	.234	1.16	.58
89-102-01A	3/8"	.37	1.02	2.05	1.71	3.85	.50	1.12	.88	.34	.53	.375	.234	1.16	.55
89-103-01A	1/2"	.50	1.12	2.23	1.79	3.85	.50	1.12	.90	.34	.59	.375	.234	1.38	.63
89-104-01A	3/4"	.75	1.47	2.96	2.03	4.75	.87	1.37	1.02	.42	.78	.437	.256	1.75	1.30
89-105-01A	1"	1.00	1.67	3.34	2.16	4.75	.87	1.37	1.02	.42	.91	.437	.256	1.94	1.60

**For Pressure/Temperature Ratings,
Refer to Page M-12, Graph No. 13**



89-100 Series

Carbon Steel Ball Valve

1-1/4" - 2"



NPT Threaded, 1500 psig WOG. (See referenced P/T chart)
 Cold Non-Shock. 150 psig Saturated Steam. Vacuum Service to 29 inches Hg.
 Federal Specification: WW-V-35C, Type: II, Composition: CS, Style: 3.
 MSS SP-110; Ball Valves Threaded, Socket-Welding, Solder Joint, Grooved and Flared Ends.

FEATURES

- Investment cast components
- Reinforced seats
- Mounting pad for easy actuator mounting
- (-24) Certified to API 607, 4th, Edition, Class 600 burn
- Blow-out-proof stem design
- Adjustable packing gland
- Zinc phosphate corrosion protection

STANDARD MATERIAL LIST

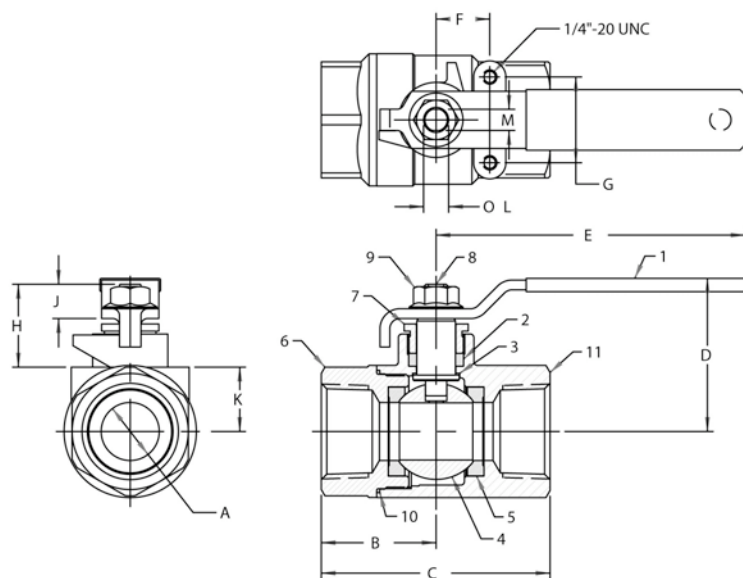
1. Lever and grip	Steel, zinc plated w/vinyl	9. Lever nut	Steel, zinc plated
2. Stem packing	MPTFE	10. Body seal	PTFE
3. Stem bearing	RPTFE	11. Body	A216-WCB
4. Ball	A108-CS chrome plated		
5. Seat (2)	RPTFE		
6. Retainer	A216-WCB		
7. Gland nut	A108-CS		
8. Stem	A108-CS		

VARIATIONS AVAILABLE:

89-140 Series (316 SS Ball & Stem)

OPTIONS AVAILABLE:

(SUFFIX)	OPTION	SIZES
-02-	Stem Grounded	1/4" to 3"
-03-	1-1/4" CS Stem Extension	1/4" to 3"
-04-	2-1/4" CS Stem Extension	1/4" to 3"
-07-	Steel Tee Handle	1/4" to 2"
-08-	90° Reversed Stem	1/4" to 3"
-10-	SS Lever & Nut	1/4" to 3"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 3"
-15-	Wheel Handle, Steel	1/4" to 2"
-16-	Chain Lever - Vertical	3/4" to 2"
-18-	Plain Yellow Grip	1/4" to 3"
-19-	Lock Plate	1/4" to 3"
-24-	Graphite Packing	1/4" to 3"
-27-	SS Latch-Lock Lever & Nut	1/4" to 3"
-30-	Cam-Lock and Grounded	1/4" to 2"
-32-	SS Tee Handle & Nut	1/4" to 2"
-35-	VTFE Trim	1/4" to 3"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/4" to 2"
-40-	Cyl-Loc and Grounded	1/4" to 2"
-44-	Seal Welded	1/4" to 2"
-45-	Less Lever & Nut	1/4" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 3"
-47-	SS Oval Latch-Lock Handle & Nut	1/4" to 1"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 3"
-56-	Multifill Seats & Packing	1/4" to 3"
-58-	Chain Lever - Horizontal	3/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 3"
-64-	250# Steam Trim	1/4" to 3"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 3"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 3"



CARBON STEEL BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	H	J	K	L	M	WT.
89-106-01	1-1/4"	1.00	2.00	4.00	2.68	5.40	.94	1.50	1.50	.60	1.12	.625	.377	3.10
89-107-01	1-1/2"	1.25	2.17	4.34	3.06	7.75	.94	1.50	1.50	.60	1.28	.625	.377	4.20
89-108-01	2"	1.50	2.69	5.43	3.26	7.75	.94	1.50	1.46	.60	1.50	.625	.377	6.10

**For Pressure/Temperature Ratings,
Refer to Page M-11, Graph No. 11**



89-100 Series

Carbon Steel Ball Valve

2-1/2" - 3"



NPT Threaded, 1000 psig WOG. (See referenced P/T chart)
 Cold Non-Shock. 150 psig Saturated Steam. Vacuum Service to 29 inches Hg.
 Federal Specification: WW-V-35C, Type: II, Composition: CS, Style: 3.
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5. Seat (2)	RPTFE		
6. Retainer	A216-WCB		
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-03-	1-1/4" CS Stem Extension	1/4" to 3"
-04-	2-1/4" CS Stem Extension	1/4" to 3"
-07-	Steel Tee Handle	1/4" to 2"
-08-	90° Reversed Stem	1/4" to 3"
-10-	SS Lever & Nut	1/4" to 3"
-14-	Side Vented Ball (Uni-Directional)	1/4" to 3"
-15-	Wheel Handle, Steel	1/4" to 2"
-16-	Chain Lever - Vertical	3/4" to 2"
-18-	Plain Yellow Grip	1/4" to 3"
-19-	Lock Plate	1/4" to 2"
-24-	Graphite Packing	1/4" to 3"
-27-	SS Latch-Lock Lever & Nut	1/4" to 3"
-30-	Cam-Lock and Grounded	1/4" to 2"
-32-	SS Tee Handle & Nut	1/4" to 2"
-35-	VTFE Trim	1/4" to 3"
-39-	SS Hi-Rise Locking Wheel Handle, SS Nut	1/4" to 2"
-40-	Cyl-Loc and Grounded	1/4" to 2"
-44-	Seal Welded	1/4" to 2"
-45-	Less Lever & Nut	1/4" to 3"
-46-	Latch Lock Lever - Lock in Closed Position Only	1/4" to 3"
-47-	SS Oval Latch-Lock Handle & Nut	1/4" to 1"
-48-	SS Oval Handle (No Latch) & Nut	1/4" to 2"
-50-	2-1/4" CS Locking Stem Extension	1/4" to 3"
-56-	Multifill Seats & Packing	1/4" to 3"
-58-	Chain Lever - Horizontal	3/4" to 2"
-60-	Static Grounded Ball & Stem	1/4" to 3"
-64-	250# Steam Trim	1/4" to 3"
-P01-	BSPP (Parallel) Thread Connection	1/4" to 3"
-T01-	BSPT (Tapered) Thread Connection	1/4" to 3"

**For Pressure/Temperature Ratings,
Refer to Page M-10, Graph No. 7**

CARBON STEEL BALL VALVE

NUMBER	SIZE	A	B	C	D	E	F	G	H	J	K	L	M	N	WT.
89-109-01	2-1/2"	2.50	3.38	6.75	4.03	7.75	1.38	3.37	1.71	.60	2.00	.625	.377	-	15.60
89-100-01	3"	2.50	3.38	6.75	4.03	7.75	1.38	3.37	1.71	.60	2.00	.625	.377	-	16.50

FLOW DATA

For Apollo® Ball Valves

The listed Cv "factors" are derived from actual flow testing, in the Apollo® Ball Valve Division, Conbraco Industries, Inc., Pageland, South Carolina. 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 Cv is a factor, the formula can be used to estimate flow of most media for valve sizing.

Flow of Liquid

$$Q = Cv \sqrt{\frac{\Delta P}{SpGr}}$$

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

Where:

Q = flow in US gpm
 ΔP = pressure drop (psig)
 SpGr = specific gravity at flowing temperature
 Cv = valve constant

Flow of Gas

$$Q = 1360 Cv \sqrt{\frac{(\Delta P) (P_1)}{(SpGr) (T)}}$$

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

Where:

Q = flow in SCFH
 ΔP = pressure drop (psig)
 SpGr = specific gravity (based on air = 1.0)
 P₁ = outlet pressure-psia (psig + 14.7)
 T = (temp. °F + 460)
 Cv = valve constant

Cv FACTORS

SERIES:

70-100, 71-100, 71AR, 73A-100,
 74-100, 76-100, 76AR, 80-100
 81-100, 89-100

SIZE		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
OPEN	90°	8.4	7.2	15	30	43	48	84	108	503	370	670

Cv FACTORS

76F, 77, 77AR, 77C, 77D SERIES

SIZE		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"
OPEN	90°	8.1	15	15	51	68	125	177	389	503

Cv FACTORS

82-100/200, 83R-100/200/700, 85R-100/200, 86R-100/200/700, 83-500/600, 86-500/600/900 SERIES

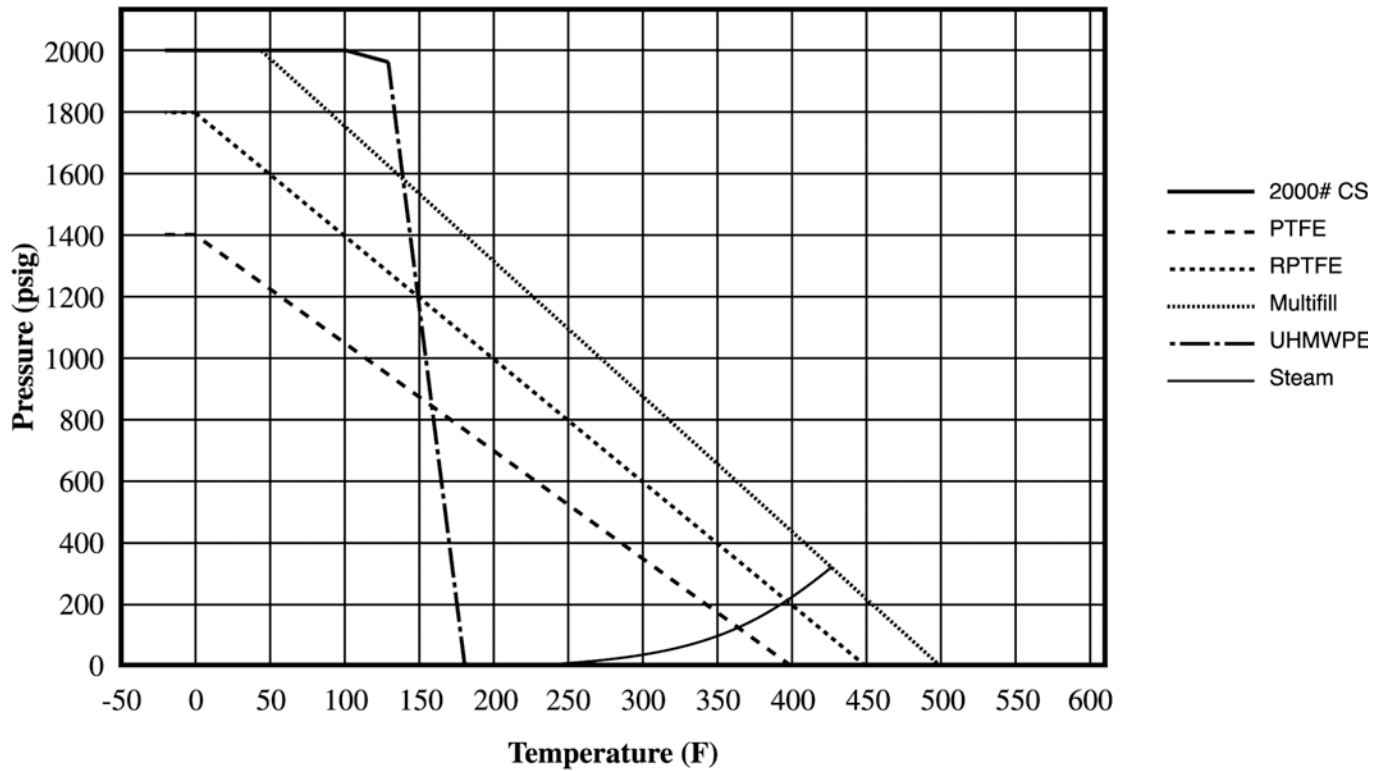
SIZE		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"	2-1/2"	3"	4"
OPEN	90°	8.1	14	26	51	68	120	170	376	510	996	1893

Cv FACTORS

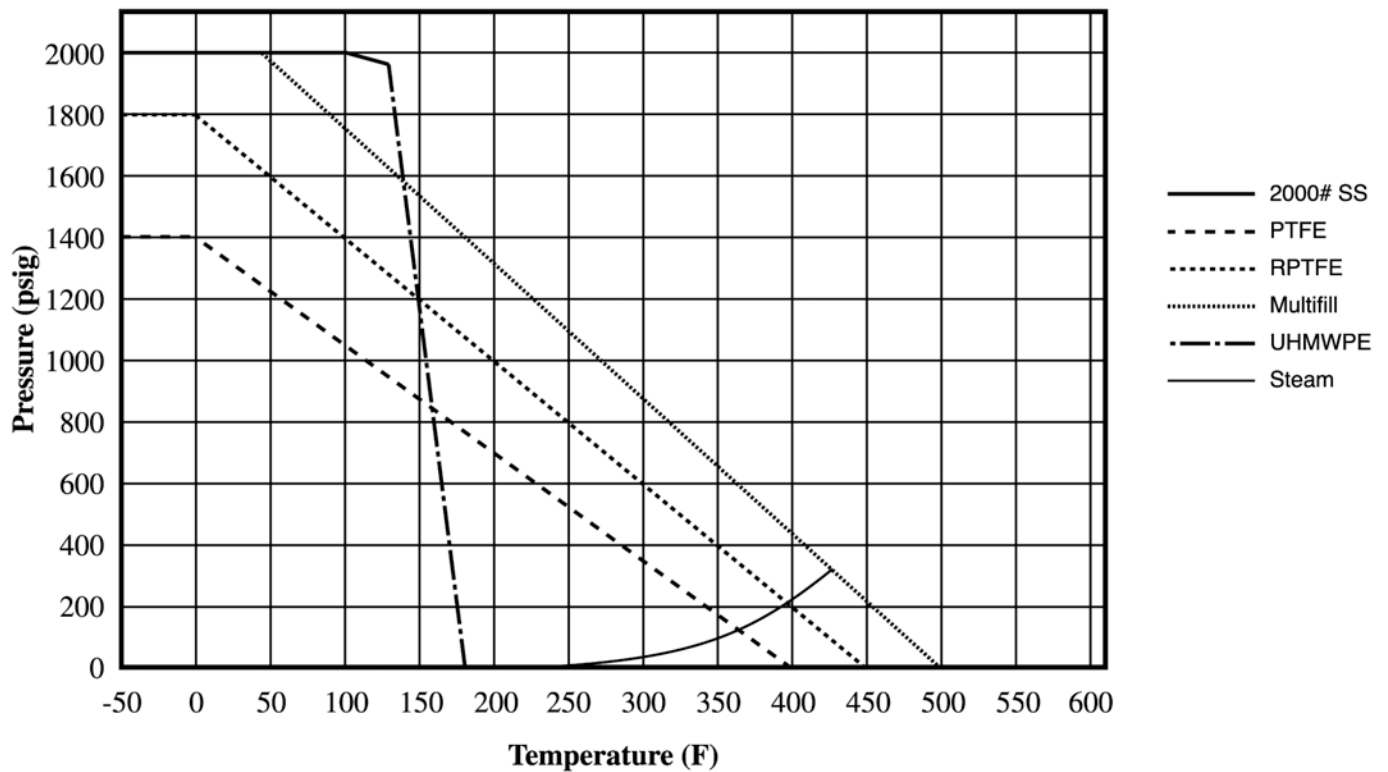
83A/83B, 86A/86B, 86C SERIES

SIZE		1/4"	3/8"	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
OPEN	90°	8.1	14	26	51	68	120	170	376

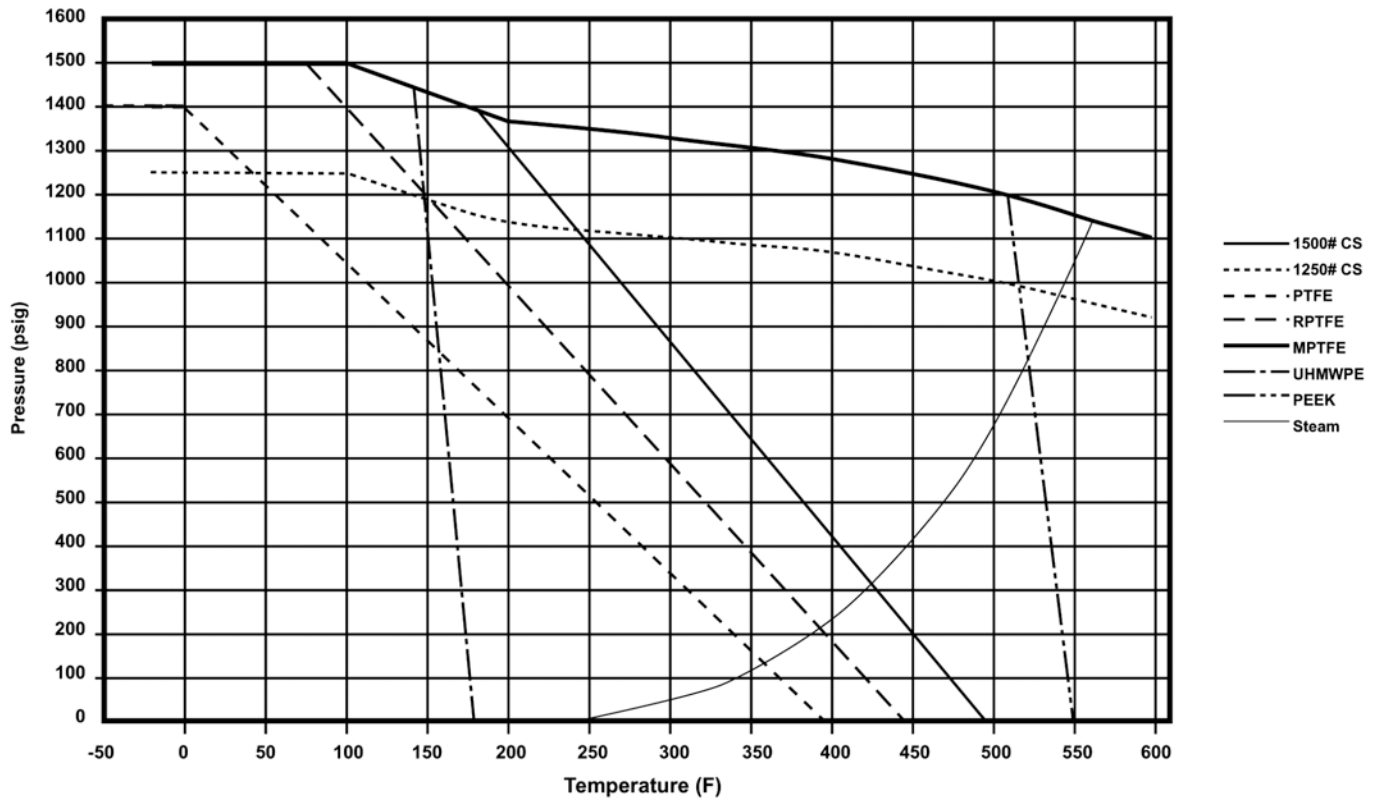
2000# CS P-T Rating (Graph 13)



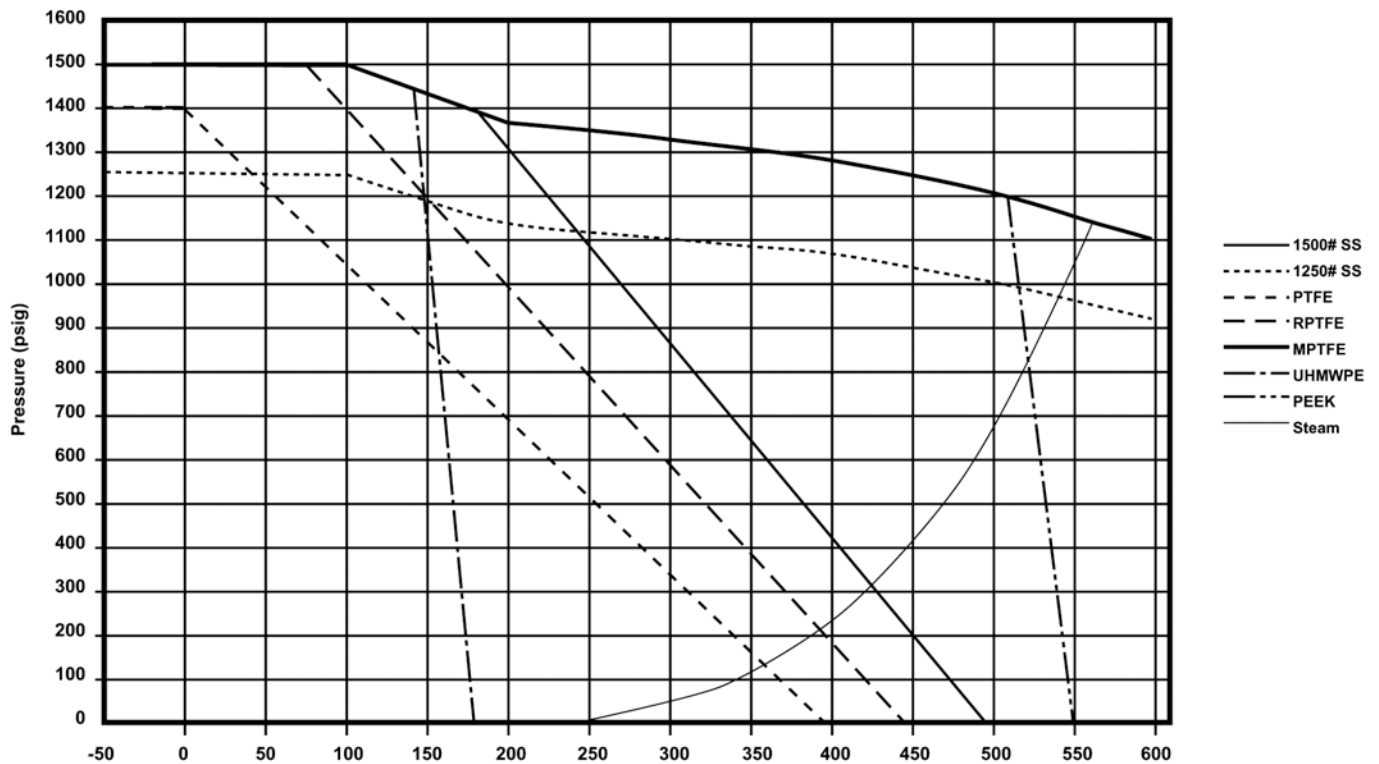
2000# SS P-T Rating (Graph 14)



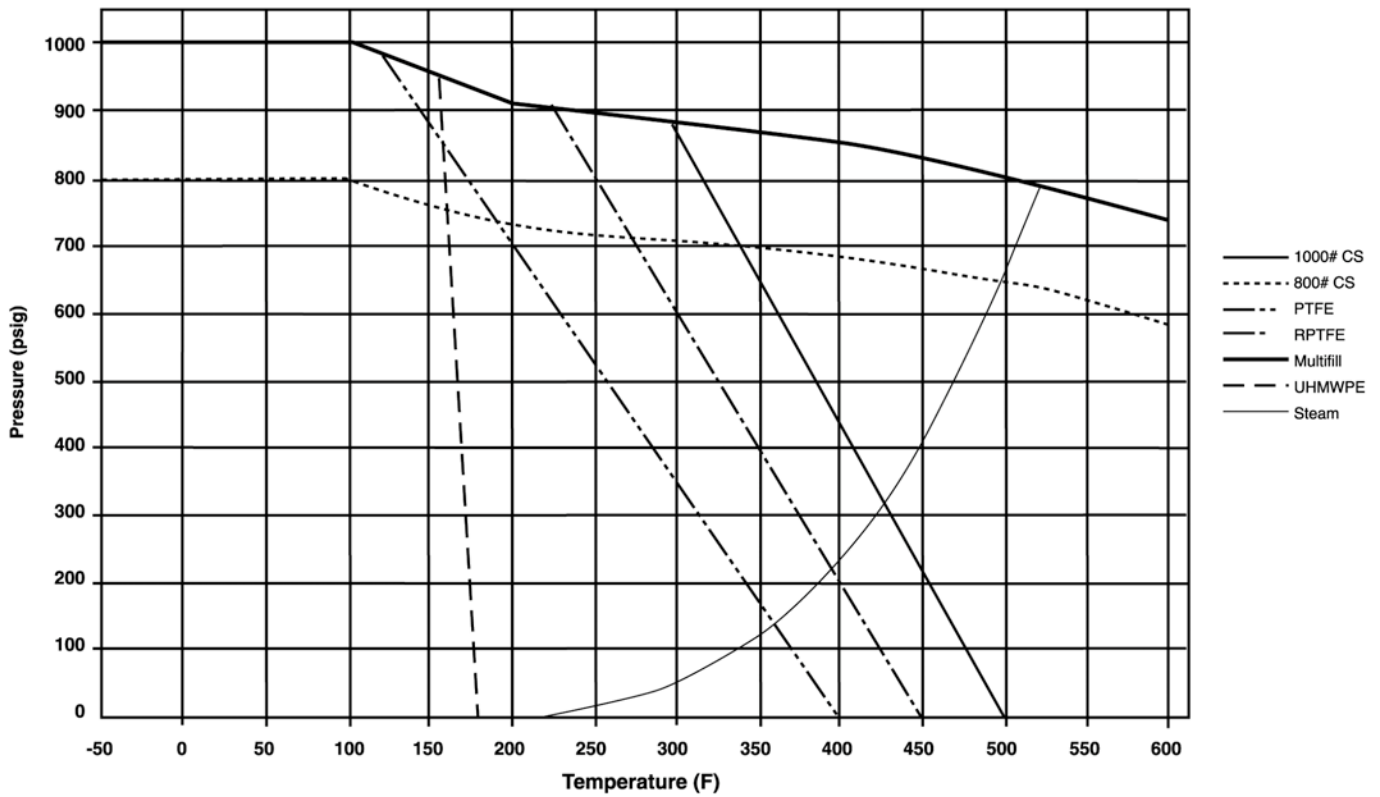
1500# CS P-T Rating (Graph 11)



1500# SS P-T Rating (Graph 12)



1000# CS P-T Rating (Graph 7)



1000# SS P-T Rating (Graph 8)

