



# 86A-100 Series

## 3-Piece Full Port Stainless Steel

### 1500 CWP NPT Ball Valve

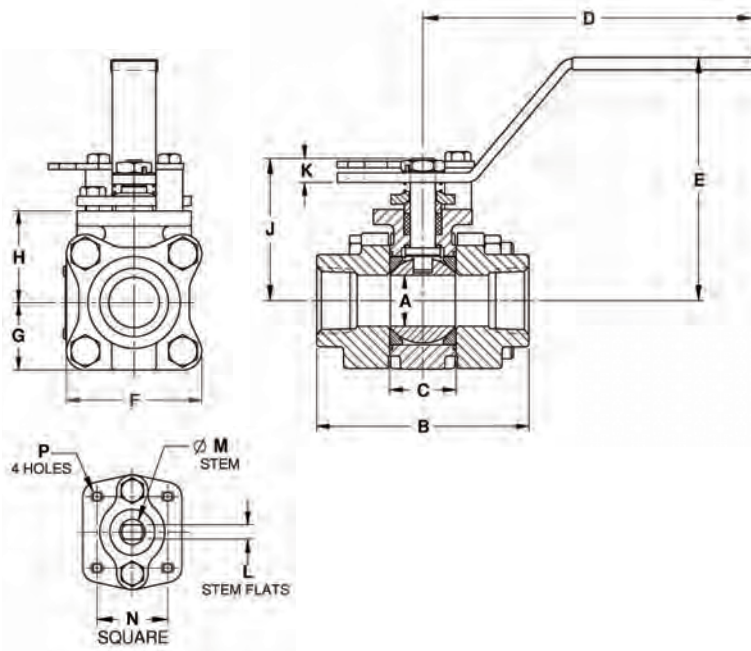
**Standard Compliance** - Valve design: MSS SP-110, End Connections: NPT per ASME B1.20.1, Valve Marking: MSS SP-25, Production Testing: MSS SP-110, NACE MR0175, 2000 edition.

## 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

|                 |                      |                      |                            |
|-----------------|----------------------|----------------------|----------------------------|
| 1. Body         | ASTM A351-CF8M       | 10. Body Nuts        | 18-8 Stainless Steel       |
| 2. End Caps     | ASTM A351-CF3M       | 11. Stop Bolts       | 18-8 Stainless Steel       |
| 3. Ball         | ASTM A276-316SS      | 12. Gland Bolts      | 18-8 Stainless Steel       |
| 4. Stem         | ASTM A276-316SS      | 13. Handle Nut/Screw | 300 Series Stainless Steel |
| 5. Seat         | Multi-Seal           | 14. Packing Gland    | ASTM A276-316SS            |
| 6. Packing      | PTFE                 | 15. Gland Plate      | 300 Series Stainless Steel |
| 7. Stem Bearing | PEEK/PTFE            | 16. Lever Handle     | 300 Series Stainless Steel |
| 8. Body Gasket  | RPTFE                | 17. Lock Plate       | 300 Series Stainless Steel |
| 9. Body Bolts   | 18-8 Stainless Steel | 18. Stops            | 300 Series Stainless Steel |



## OPTIONS AVAILABLE:

| (SUFFIX) | OPTION                            | SIZES      |
|----------|-----------------------------------|------------|
| -04      | 2-1/4" Stem Extension             | 1/4" to 2" |
| -14      | Vented Ball (see page J-2)        | 1/4" to 2" |
| -15      | Round Handle                      | 1/4" to 2" |
| -49      | Assembled Dry                     | 1/4" to 2" |
| -57      | Cleaned for Oxygen Service        | 1/4" to 2" |
| -60      | Static Grounding                  | 1/4" to 2" |
| -62      | Center Section Only               | 1/4" to 2" |
| -63      | NPT x Socketweld                  | 1/4" to 2" |
| -69      | Drilled & Tapped Purge & Drains   | 1/4" to 2" |
| -70      | Extended Bonnet                   | 1/4" to 2" |
| -76      | Live Loaded (Lever Operated)      | 1/4" to 2" |
| -77      | Live Loaded (Actuated)            | 1/4" to 2" |
| -90      | Extended Bonnet w/Double Packing  | 1/4" to 2" |
| -SR      | Spring Return Handle              | 1/4" to 1" |
| -P01     | BSPP (Parallel) Thread Connection | 1/4" to 2" |
| -T01     | BSPT (Tapered) Thread Connection  | 1/4" to 2" |

**For Pressure/Temperature Ratings,  
Refer to Page M-17, Graph No. 24**

## STAINLESS STEEL 3-PIECE FULL PORT BALL VALVE

| NUMBER     | SIZE   | A    | B    | C    | D    | E    | F    | G    | H    | J    | K    | L     | M     | N     | P       | WT.  |
|------------|--------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|---------|------|
| 86A-101-01 | 1/4"   | .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  |
| 86A-102-01 | 3/8"   | .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  |
| 86A-103-01 | 1/2"   | .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  |
| 86A-104-01 | 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  |
| 86A-105-01 | 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  |
| 86A-106-01 | 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 |
| 86A-107-01 | 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 |
| 86A-108-01 | 2"     | 2.00 | 5.86 | 2.56 | 8.40 | 5.47 | 4.92 | 2.46 | 3.17 | 4.74 | 0.80 | 0.477 | 0.750 | 1.949 | 5/16-18 | 27.6 |

# 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)  
 P<sub>2</sub> = outlet pressure-psia  
 (psig + 14.7)  
 T = (temp. °F + 460)  
 Cv = valve constant

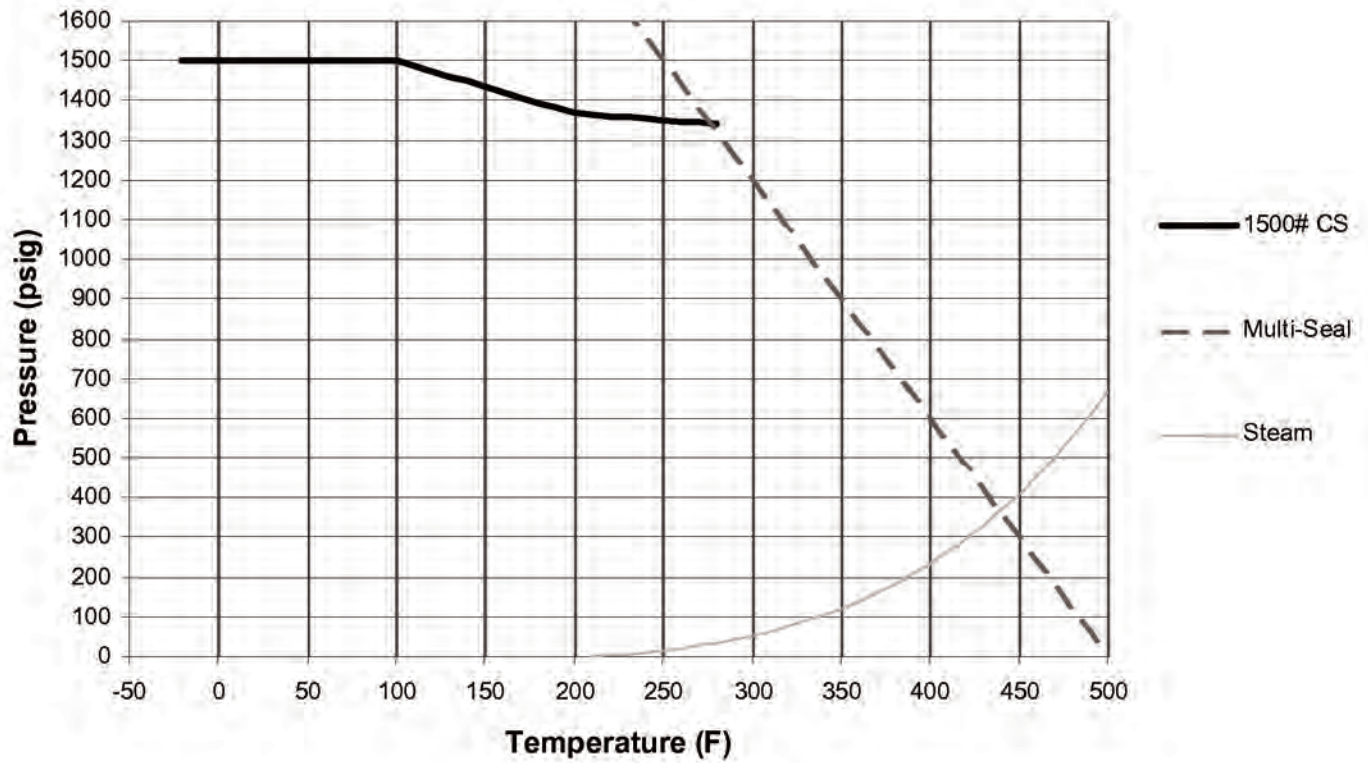
### Cv FACTORS FOR APOLLO VALVES

| Valve Size (inches) | 1/4 | 3/8 | 1/2 | 3/4 | 1  | 1-1/4 | 1-1/2 | 2   | 2-1/2 | 3    | 4    | 6  | 8  | 10 | 12 |
|---------------------|-----|-----|-----|-----|----|-------|-------|-----|-------|------|------|----|----|----|----|
| <b>Ball Valves</b>  |     |     |     |     |    |       |       |     |       |      |      |    |    |    |    |
| 32-100/200 Series   | 5.1 | 6.6 | 8   | 24  | 30 | 45    | 55    | 95  | --    | --   | --   | -- | -- | -- | -- |
| 64-100/200 Series   | 6   | 7   | 19  | 34  | 50 | 104   | 268   | 309 | 629   | 1018 | 1622 | -- | -- | -- | -- |
| 64W Series          | --  | --  | --  | --  | -- | --    | --    | --  | 629   | 1018 | 1622 | -- | -- | -- | -- |
| 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   | --  | --  | 26  | 48  | 65 | 125   | 170   | 216 | --    | --   | --   | -- | -- | -- | -- |
| 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    | --  | --    | --   | --   | -- | -- | -- | -- |
| 71AR 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 | --    | --   | --   | -- | -- | -- | -- |
| 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  | -- | -- | -- | -- |
| 76AR 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 | --    | --   | --   | -- | -- | -- | -- |
| 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  | --    | --   | --   | -- | -- | -- | -- |
| 7K-100 Series       | --  | --  | 15  | 51  | 68 | 125   | 177   | 389 | 503   | --   | --   | -- | -- | -- | -- |
| 77AR Series         | 8.1 | 15  | 15  | 51  | 68 | 125   | 177   | 389 | --    | --   | --   | -- | -- | -- | -- |
| 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 | --    | --   | --   | -- | -- | -- | -- |
| 77X Series          | --  | --  | 16  | 36  | 68 | --    | --    | --  | --    | --   | --   | -- | -- | -- | -- |
| 77-100/200 Series   | 8.1 | 15  | 15  | 51  | 68 | 125   | 177   | 389 | 503   | --   | --   | -- | -- | -- | -- |

## Cv FACTORS FOR APOLLO VALVES

| Valve Size (inches) | 1/4 | 3/8 | 1/2 | 3/4 | 1  | 1-1/4 | 1-1/2 | 2   | 2-1/2 | 3    | 4    | 6    | 8    | 10    | 12    |
|---------------------|-----|-----|-----|-----|----|-------|-------|-----|-------|------|------|------|------|-------|-------|
| <b>Ball Valves</b>  |     |     |     |     |    |       |       |     |       |      |      |      |      |       |       |
| 79 Series           | 8.5 | 8.5 | 9.8 | 32  | 44 | 66    | 148   | 218 | 440   | 390  | --   | --   | --   | --    | --    |
| 80/81 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 |
| 87B-100 Series      | --  | --  | --  | --  | -- | --    | --    | --  | --    | 375  | 673  | 1099 | 1902 | 3890  | --    |
| 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 |
| 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  | --    | --   | --   | --   | --   | --    | --    |
| 91-100 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 | --   | --   | --    | --    |
| 95-100/200 Series   | --  | --  | 15  | 51  | 68 | --    | --    | --  | --    | --   | --   | --   | --   | --    | --    |
| 95A-300/400 Series  | --  | --  | 19  | 34  | 50 | --    | --    | --  | --    | --   | --   | --   | --   | --    | --    |
| 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 P-T Rating  
(Graph 23)**



**1500 CWP SS P-T Rating  
(Graph 24)**

