



86D-100 SERIES

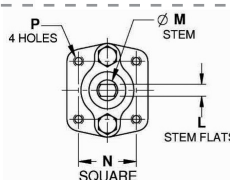
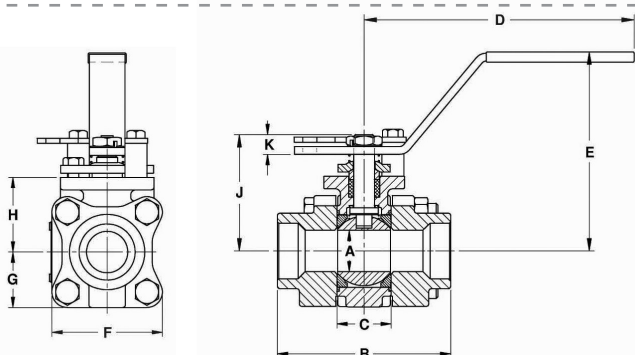
3-Piece Full Port Hastelloy® C Class 600 NPT Ball Valve

Standard Compliance - Valve Design: ASME B16.34, Class 600, NACE MR0175 (2000) & MR0103 (2003), API 608
End Connections: NPT per ASME B1.20.1 Valve Marking: ASME B16.34 Production Testing: ASME B16.34



FEATURES

- 3-Piece construction w/ enclosed fasteners
- Full port
- Stainless steel trim & hardware
- Swing-out center section
- Pressure balanced solid ball
- Compression controlled spiral wound gaskets
- Anti-blowout one piece bottom entry stem
- Statically grounded ball, stem, & body
- 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
- Fire safe "by design" (requires -24 suffix)
- Vacuum service to 29 in of Hg.
- 250 psig saturated steam



STANDARD MATERIAL LIST

| PART | MATERIAL |
|---------------------|----------------------------|
| 1 Body | ASTM A494-CW12MW |
| 2 End Caps | ASTM A494-CW12MW |
| 3 Ball | ASTM B574-C276 |
| 4 Stem | ASTM B574-C276 |
| 5 Seat | Multi-Seal |
| 6 Packing | PTFE |
| 7 Stem Bearing | PEEK/PTFE |
| 8 Body Gasket | PTFE/HC Spiral Wound |
| 9 Body Bolts | ASTM A193-Gr. B8M3 |
| 10 Body Nuts | ASTM A194-Gr. 8 |
| 11 Stop Bolts | 18-8 Stainless Steel |
| 12 Gland Bolts | ASTM A193-Gr. B8 |
| 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 |
| 19 Grnd. Springs | 300 Series Stainless Steel |

FOR PRESSURE/TEMPERATURE RATINGS, REFER TO PAGE M-21, GRAPH NO. 28

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- | 2.25" Stem Extension (Carbon Steel, Zinc Plated) | 1/2" to 2" |
| -14- | Vented Ball | 1/2" to 2" |
| -15- | Round Handle | 1/2" to 2" |
| -21- | UHMWPE Seats w/Graphite Seals | 1/2" to 2" |
| -24- | Graphite packing, spiral wound graphite body seal, PTFE/PEEK bearing (fire safe "by design") | 1/2" to 2" |
| -26- | Chlorine Service. Vented. Special Cleaning. Assembled dry. (for CS, HC, & Monel only) | 1/2" to 2" |
| -38- | Peek Seats, Graphite Stem Packing & Gaskets | 1/2" to 2" |
| -49- | No Lubrication. Assembled Dry. | 1/2" to 2" |
| -57- | Cleaned for Oxygen Service | 1/2" to 2" |
| -62- | Center Section Only | 1/2" to 2" |
| -63- | NPT x Socketweld | 1/2" to 2" |
| -69- | Drilled & Tapped Purge & Drains | 1/2" to 2" |
| -70- | 4" Extended Bonnet | 1/2" to 2" |
| -76- | Live Loaded (Lever Operated) | 1/2" to 2" |
| -77- | Live Loaded (Actuated) | 1/2" to 2" |
| -90- | Double Packed 4" Extended Bonnet | 1/2" to 2" |
| -9P- | Double Packed 4" Extended Bonnet w/ Monitoring Port | 1/2" to 2" |
| -EP- | Garlock EVSP Stem Packing w/Spiral Wound Graphite Gasket (Fire Safe by Design) | 1/2" to 2" |
| -KF- | PCTFE Stem Bearing | 1/2" to 2" |
| -SR- | Spring Return Handle | 1/2" to 1" |

| PRODUCT NUMBER | SIZE | A | B | C | D | E | F | G | H | J | K | L | M | N | P | WT. |
|----------------|-------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|---------|------|
| 86D-101-01 | 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 | 1.000 | 10-24 | 2.3 |
| 86D-102-01 | 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 | 1.000 | 10-24 | 2.3 |
| 86D-103-01 | 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 | 1.000 | 10-24 | 2.3 |
| 86D-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 |
| 86D-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 |
| 86D-106-01 | 1.25" | 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 |
| 86D-107-01 | 1.5" | 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 |
| 86D-108-01 | 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 | 27.6 |





FLOW DATA

For Apollo® Ball Valves

www.hccl.ie

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

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

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

Where:

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

FLOW OF GAS

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

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

Where:

Q = flow in SCFH
 ΔP = pressure drop (psig)
 SpGr = specific gravity (based on air = 1.0)
 P₂ = outlet pressure-psia (psig + 14.7)
 T = (temp. °F + 460)
 Cv = 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

| 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 | -- | -- | -- | -- | -- | -- | -- |
| 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 | 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 | -- | -- | -- | -- | -- | -- | -- |

continued on next page





FLOW DATA

For Apollo® Ball Valves

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 |
| 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 | -- | -- | -- | -- | -- |

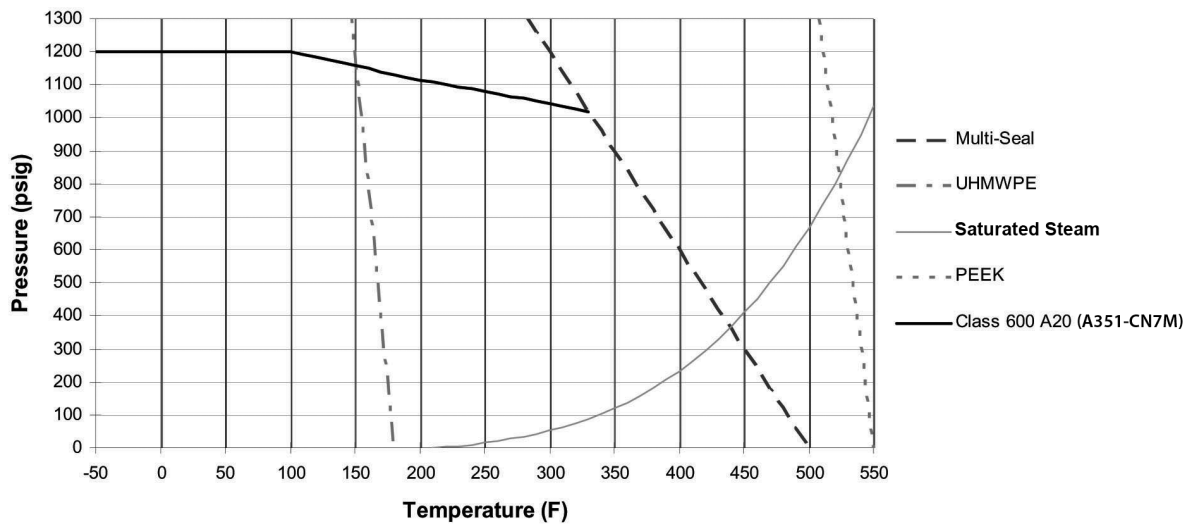


PRESSURE TEMPERATURE RATINGS

ASME Class 600

(Alloy 20) ASTM A351-CN7M

(GRAPH 27)



ASME Class 600

(Hastelloy C) ASTM A494-CW12MW

(GRAPH 28)

