

86C-100 SERIES

ALLOY 20 3-PIECE FULL PORT
CLASS 600 NPT BALL VALVE



STANDARD COMPLIANCE

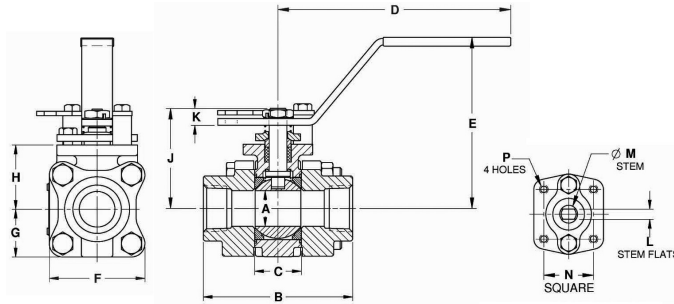
- Valve Design: ASME B16.34, Class 600, NACE MR0175 (2000) & MR0103 (2003), API 608
- End Connections: NPT per ASME B1.20.1

- 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
- Vacuum service to 29 in of Hg.
- CE Marking, 1-1/4” and larger (add “-CE” suffix)
- 250 psig saturated steam
- Fire safe “by design” (requires -24 suffix)



STANDARD MATERIAL LIST

| PART | MATERIAL | |
|------|---------------------------|-------------------------------------|
| 1 | Body | ASTM A351-CN7M |
| 2 | End Caps | ASTM A351-CN7M |
| 3 | Ball | ASTM B473 (UNS N08020) or ASTM-CN7M |
| 4 | Stem | ASTM B473 (UNS N08020) |
| 5 | Seat | Multi-Seal |
| 6 | Packing | PTFE |
| 7 | Stem Bearing | PEEK/PTFE |
| 8 | Body Gasket | PTFE 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 | Internal Grounding Spring | 300 Series Stainless Steel |
| 20 | External Grounding Spring | 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 |
| -P -01- | BSPP (Parallel) Thread Connection | All |
| -T -01- | BSPT (Tapered) Thread Connection | All |
| -04- | 2-1/4” Stem Extension (Carbon Steel, Zinc Plated) | All |
| -14- | Vented Ball | All |
| -15- | Stainless Steel Locking Round Handle | All |
| -21- | UHMWPE Seats w/ Graphite Seals | All |
| -24- | Graphite Packing, Spiral Wound Graphite Body Seal, PTFE/PEEK Bearing (Fire Safe API 607, 6th Edition, ISO 10497:2010) | All |
| -38- | PEEK Seats, Graphite Stem Packing & Gaskets | All |
| -49- | No Lubrication. Assembled Dry | All |
| -57- | Cleaned for Oxygen Service | All |
| -62- | Center Section Only | All |
| -63- | NPT x Socketweld | 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 |
| -CE- | CE Marking | 1-1/4” to 2” |
| -EF- | Graphite Packing (API 641 Compliant) | 3/4” to 2” |
| -EP- | Garlock EVSP Stem Packing w/ Spiral Wound Graphite Gasket (Fire Safe by Design) | All |
| -KF- | PCTFE Stem Bearing | All |
| -SR- | Spring Return Handle | 1/4” to 1” |
| -ZP1- | Fugitive Emissions Packing (Viton) | All |
| -ZP2- | Fugitive Emissions Packing (Buna-N) | All |
| -ZP3- | Fugitive Emissions Packing (Kalrez) | All |

Pressure/Temperature Ratings - Page M-21, Graph No. 27

DIMENSIONS

| PART NO. | SIZE | A | B | C | D | E | F | G | H | J | K | L | M | N | P | WT. |
|------------|--------|------|------|------|------|------|------|------|------|------|------|-------|-------|-------|---------|------|
| 86C-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 | 1.00 | 10-24 | 2.3 |
| 86C-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 | 1.00 | 10-24 | 2.3 |
| 86C-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 | 1.00 | 10-24 | 2.3 |
| 86C-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 |
| 86C-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 |
| 86C-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 |
| 86C-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 |
| 86C-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 | 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 1psig 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

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

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

WHERE:

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

FLOW OF GAS

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

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

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 (P_1) exceeds 0.02.

NOTE: Only use the gas equation shown if $(P_1 - P_2)/P_1$ 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

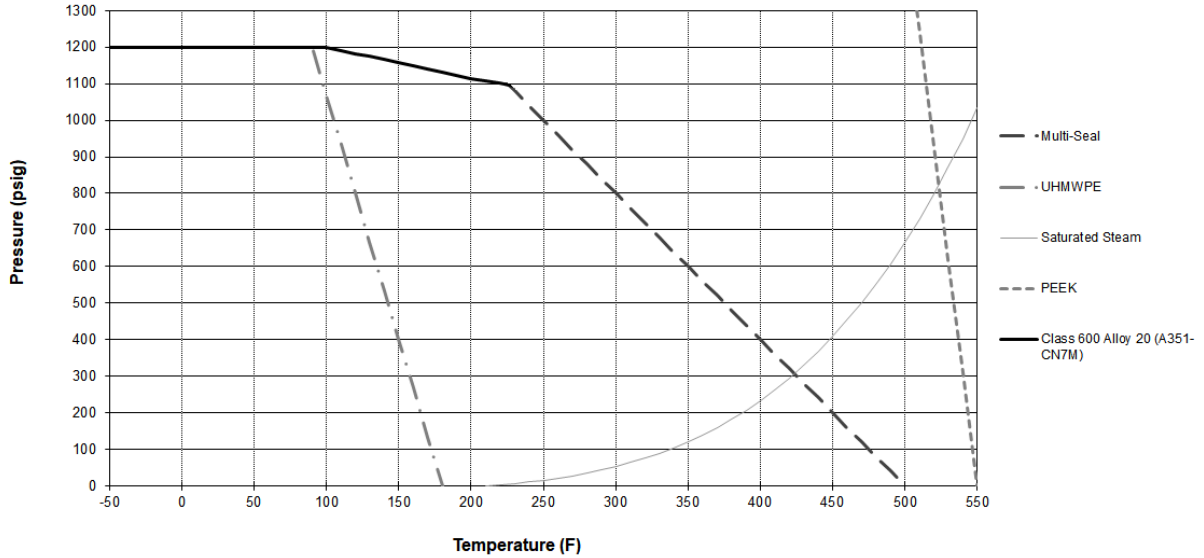
CV FACTORS FOR APOLLO VALVES (CONTINUED FROM M-3)

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

ASME CLASS 600

(ALLOY 20) ASTM A351-CN7M

GRAPH 27



ASME CLASS 600

(HASTELLOY C) ASTM A494-CW12MW

GRAPH 28

