



DOCTOR SERIES MD 3-WAY CONTROL VALVE

SIZES 1/2" – 12"
ANSI CLASS 125/150, 250/300

APPLICATION DATA

- Process control systems for food, pulp and paper, chemical, petrochemical & other industries
- HVAC systems
- Feed water and fuel system controls in boiler rooms
- Packaged systems (OEM) such as heat exchangers, water purification systems & vaporizer, metal cleaning and plating
- Especially designed for mix or diverting of clean, dirty, viscous and corrosive liquids, gasses and steam

- **Rigid Port Guiding** dampens vibration and ensures proper seating.
- **High Capacity Body Designs** means valve body flow areas are 140% of normal valve, reducing velocities and pressure loss.
- **Balanced Plug Design** of DV provides gradual, stable transition.
- **316 SS Valve Plugs & Seat Rings** for corrosion resistance
- **Mixing or Diverting** to suit your application.
- **Live Loaded V ring Packing** is self adjusting.

MODELS

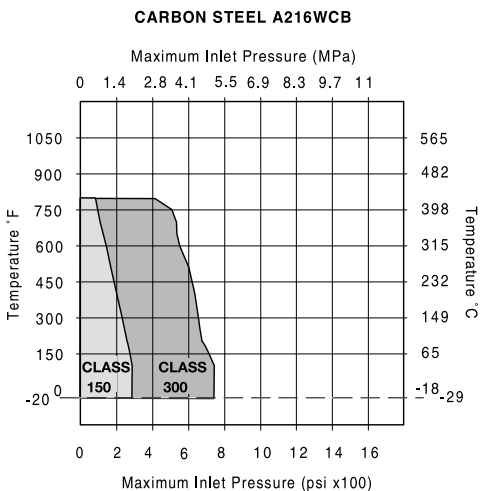
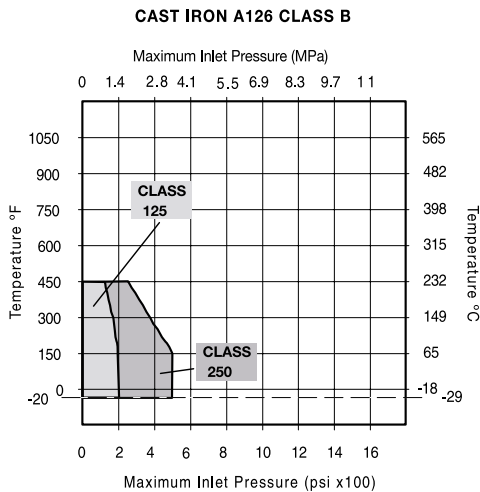
- M1 — Cast Iron Mix (MX)
- M2 — Cast Steel Mix (MX)
- M3 — Stainless Steel Mix (MX)
- M4 — Cast Iron Diverting (MX)
- M5 — Cast Steel Diverting (MX)
- M6 — Stainless Steel Diverting (MX)
- M7 — Cast Iron Diverting (DV)
- M8 — Cast Steel Diverting (DV)
- M9 — Stainless Steel Diverting (DV)

OPTIONS

- 40, 85, 145, 250 sq. in. Reverse and Direct Actuators
- Soft Seat
- Moore and PMV Accessories
- Alternate Packing for Severe Service
- Graphite or High Temperature Packing

APPLICABLE CODES

- ANSI B16.0 Face-To-Face Dimensions and ISA S75.03 Uniform Face-To-Face Dimensions for Flanged Globe Style Control Valves
- ANSI B16.37 Hydrotesting of Control Valves
- ISA S75.02 Control Valve Capacity Test Procedure



MAXIMUM RATED FLOW COEFFICIENTS* (Cv)

| MODEL | VALVE SIZE | | | | | | | | | | | |
|-------|------------|-----|----|-------|----|-------|-----|-----|-----|-----|-----|------|
| | 1/2 | 3/4 | 1 | 1 1/2 | 2 | 2 1/2 | 3 | 4 | 6 | 8 | 10 | 12 |
| MX | 5 | 7 | 12 | 28 | 50 | 70 | 116 | 158 | 352 | 475 | 739 | 1070 |
| DV | 5 | 7 | 12 | 28 | 52 | 76 | 108 | 160 | 365 | 475 | 795 | 1078 |

DOCTOR SERIES MD

3-WAY CONTROL VALVE

SPECIFICATION

All three way control valves shall be designed, built and tested in accordance with the latest revision of applicable industry standards. Valve body materials and end connections shall be as specified on the valve data sheets, in accordance with ANSI B16.34 and B16.5. Bonnets shall be through bolted, of the same material as the valve body. Stem packing shall be adjustable and suitable for the intended service. Asbestos or asbestos filled packings are prohibited. If graphite packing is selected or specified, use alternating rings of braided and die-cut anti-extrusion rings. Live-loaded PTFE V-ring packing shall be used to 450°F. Packing gland, clamp, studs and nuts shall be of 300 Series stainless steel. Rigid port guiding utilizing V-notch flow ports and balanced plug design on diverting service shall be used. Trim shall be of 316 Series corrosion resistant stainless steel. Valve Characteristic shall be modified linear or equal percent. Valve stems shall be 316 stainless steel with a minimum 16 RMS finish. Plug/stem assemblies shall be of a two piece threaded and pinned design. Actuators shall be of the spring and diaphragm type suitable for 60 psig continuous service. Actuators shall be capable of shutting off the valve without the use of line pressure assist. Actuator yokes shall be of cast iron unless otherwise specified and bolted or clamped to the valve bonnet. Locknut mounting is not preferred. Top mounted

handwheel manual overrides shall be provided where specified. Rim pull required to operate valve shall not exceed 40 pounds. Valves shall be sized to control within manufacturers published rangeability. Size valve to pass 110% of maximum stated flow. Valve generated noise shall not exceed 85 dBA when measured 3 feet downstream and 3 feet away from the pipe.

MATERIALS OF CONSTRUCTION

BodyIron ASTM A-126 Class B
 ASTM A-216 Steel Gr.WCB
 ASTM A-351 Gr.CF8M
 Plug316 St. Stl. ASTM A351 Grade CF8M
 Seat Rings ...316 St. Stl. ASTM A351 Grade CF8M
 Stem316 Stainless Steel
 Spring (V-Ring Packing)316 Stainless Steel
 Packing SetBTG, TC, LG or Environmental
 Packing Follower316 Stainless Steel
 Packing FlangeCadmium Plated Steel
 GasketNitrile Rubber Bonded, PTFE or Grafoil®

DOCTOR SERIES MD
3-WAY VALVE

CODE SELECTION CHART

| Model | Orifice | Size | Connections | Trim | Packing- | Actuator | Spring | Positioner | Posit. Set | Accessories - | Inlet Pressure | | | | | | | | |
|-------|---------|------|-------------|------|----------|----------|--------|------------|------------|---------------|----------------|----|----|----|----|----|----|----|----|
| M | 1 | T | J | 2 | 1 | 1 | 4 | 2 | C | 1 | A | A | 0 | 1 | 0 | 1 | 1 | 2 | 5 |
| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |

| | | | | |
|---|---|---|--|---|
| Model - Position 1 & 2 M1 = Cast Iron M2 = Cast Steel M3 = SS Mix (MX) M4 = CI Div (MX) M5 = CS Div (MX) M6 = SS Div (MX) M7 = CI Div (DV) M8 = CS Div (DV) M9 = SS Div (DV) | Size - Position 4 C = ½ D = ¾ E = 1 F = 1¼ G = 1½ H = 2 J = 2½ K = 3 M = 4 P = 6 Q = 8 R = 10 T = 12 | Trim - Position 6 1 = Metal Packing - Position 7 1 = V-ring 2 = Graphite 3 = Hi-Temp Actuator - Position 8 & 9 01 = None 40 = 40S Rev 41 = 40S Dir 42 = 85S Rev 43 = 85S Dir 44 = 145S Rev 45 = 145S Dir 46 = 250S Rev 47 = 250S Dir | Spring - Position 10 & 11 AA = None B1 = B1C B2 = B2C B6 = B6C C1 = C1E C2 = C2E C6 = C6E D1 = D1E D2 = D2E E1 = E1E E2 = E2E E3 = E3E F1 = F1F Positioner - Position 12 & 13 MI = Moore I/P MP = Moore P 4P = PMV P4 P 5I = PMV P5 I/P 5P = PMV P5 P | Positioner Set Position 14 & 15 01 = None 02 = 3-15/4-20 mA 03 = 3-9/4-12 mA 04 = 9-15/12-20 mA Accessories - Position 16 & 17 01 = None 02 = Limit Switch, Mechanical 03 = Limit Switch, Proximity Switch 04 = Feedback Potentiometer 1K 05 = Feedback 4-20mA Posit. Trans Inlet Pressure - Position 18, 19 & 20 ____ = Actual Setting |
|---|---|---|--|---|

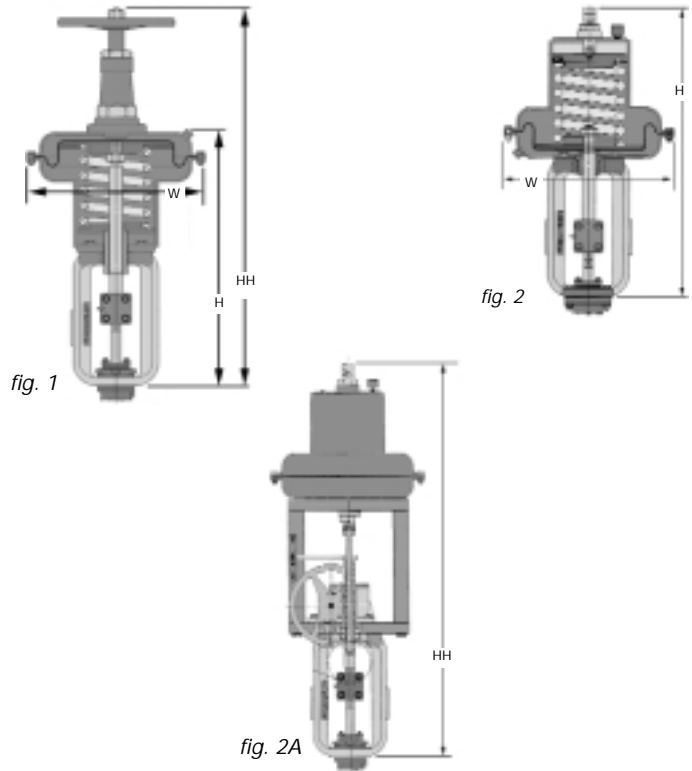
DOCTOR DIMENSIONS

Dimensions of Actuators

| fig 1 | D I R E C T A C T I N G | | | | | |
|-------|-------------------------|---------------|----------------|---------------|-------------------|--|
| | inches (mm) | H | HH | W | WGT Lbs.(Kgs.) | |
| | MODEL | | | | | |
| | DL-40-D | 19.5 (495) | 32.7 (831) | 10.1 (257) | 37 (17) | |
| | DL-85-D | 20.9 (531) | 41.7 (833) | 14.8 (375) | 84 (38) | |
| | DL-145-D | 29 (739) | 49.8 (1044) | 19.3 (489) | 192 (87) | |
| | DL-250-D | 31.3 (795) | 54.3 (1158) | 23.6 (600) | 251 (114) | |

| fig 2 | R E V E R S E A C T I N G | | | | | |
|-------|---------------------------|----------------|----------------|---------------|-------------------|--|
| | inches (mm) | H | HH* | W | WGT Lbs.(kgs.) | |
| | MODEL | | | | | |
| | DL-40-R | 25.8 (655) | 39.8 (1011) | 10.1 (257) | 54 (25) | |
| | DL-85-R | 38.4 (975) | 57.4 (1458) | 14.8 (375) | 125 (57) | |
| | DL-145-R | 47.5 (1207) | 66.5 (1689) | 19.3 (489) | 197 (89) | |
| | DL-250-R | 57.8 (1468) | 76.8 (1951) | 23.6 (600) | 331 (150) | |

* See Fig. 2A



Dimensions of Bodies C Dimensions

| Valve Size inches (mm) | Standard Bonnet | | | | | |
|------------------------------|-----------------|-----------------|------------------|------------------|------------------|------------------|
| | Yoke Code | | | | | |
| | C&E | | F | | H | |
| | Mixing | Diverting | Mixing | Diverting | Mixing | Diverting |
| .5 (15) | 4.62 (117.3) | 4.62 (117.3) | — | — | — | — |
| .75 (20) | 4.62 (117.3) | 4.62 (117.3) | — | — | — | — |
| 1 (25) | 5.44 (138.2) | 5.44 (138.2) | — | — | — | — |
| 1.5 (40) | 6.25 (158.8) | 6.25 (158.8) | 7.38 (187.5) | 7.38 (187.5) | — | — |
| 2 (50) | 6.88 (174.8) | 6.88 (174.8) | 8.00 (203.2) | 8.00 (203.2) | — | — |
| 2.5 (65) | 7.66 (194.6) | 7.66 (194.6) | 8.75 (222.2) | 8.75 (222.2) | 9.88 (251.0) | 9.88 (277.1) |
| 3 (80) | 7.31 (185.7) | 8.72 (221.5) | 8.44 (214.4) | 9.84 (249.9) | 9.50 (241.3) | 10.91 (277.1) |
| 4 (100) | 8.94 (227.1) | 9.88 (251.0) | 10.06 (255.5) | 11.00 (279.4) | 11.19 (284.2) | 12.12 (307.8) |
| 6 (150) | — | — | 11.81 (300.0) | 14.31 (363.5) | 12.94 (328.7) | 15.44 (392.2) |
| 8 (200) | — | — | — | — | 15.00 (381.0) | 17.19 (436.6) |
| 10* (250) | — | — | — | — | 17.0 (431.8) | 19.19 (487.4) |
| 12* (300) | — | — | — | — | 18.38 (466.9) | 21.88 (555.8) |

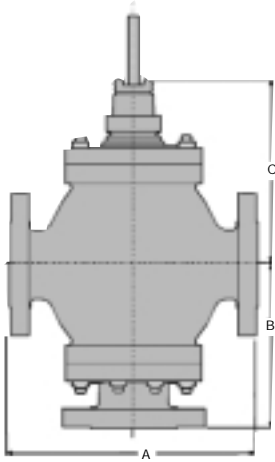
*On Application
Note: All dimensions are subject to change without notice. Request certified drawings for use in preparing piping layouts. All dimensions given in Inch (millimeter)

See diagrams on facing page

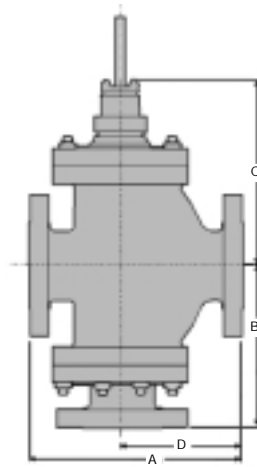
Actuator Notes

- Size 40 uses "C" yoke only.
- Size 85 uses "E" yoke only.
- Size 145 uses "E" yoke only.
- Size 250 uses "E, F, H" yoke sizes.

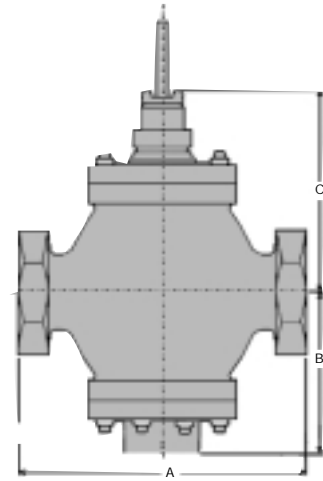
DOCTOR DIMENSIONS



Valve Sizes
Diverting 0.5" - 1.5"
Mixing 0.5" - 12"



Valve Sizes
Diverting 2" - 12"



Valve Sizes
Diverting 0.5" - 2"
Mixing 0.5" - 2"

DOCTOR
DIMENSIONS

Dimensions of Bodies A, B & D Dimensions

| DIMENSIONS IN INCHES | | | | Shpg. Info. ¹ | | DIMENSIONS IN MILLIMETERS | | | | Shpg. Info. ¹ | |
|--|-------|--------|-------|--------------------------|--------------------|---------------------------|-------|--------|-----|--------------------------|---------------------|
| SIZE | A | B | D | WGT. | VOL. | SIZE | A | B | D | WGT. | VOL. |
| ANSI 125/150 Flanged - Mixing & Diverting | | | | | | | | | | | |
| .5 | 7.25 | 5.56 | — | 45 lb. | 1 ft ³ | 15 | 184 | 141.2 | — | 20 kg | .03 m ³ |
| .75 | 7.25 | 5.62 | — | 45 lb. | 1 ft ³ | 20 | 184 | 142.7 | — | 20 kg | .03 m ³ |
| 1 | 7.25 | 6.19 | — | 61 lb. | 1 ft ³ | 25 | 184 | 157.2 | — | 28 kg | .03 m ³ |
| 1.5 | 8.75 | 7.44 | — | 72 lb. | 2 ft ³ | 40 | 222 | 189.0 | — | 33 kg | .06 m ³ |
| 2 | 10.00 | 7.81* | 5.44 | 94 lb. | 2 ft ³ | 50 | 254 | 198.4* | 138 | 43 kg | .06 m ³ |
| 2.5 | 10.88 | 8.75* | — | 105 lb. | 3 ft ³ | 65 | 276 | 222.2* | — | 48 kg | .08 m ³ |
| 3 | 11.75 | 8.19* | 6.81 | 160 lb. | 3 ft ³ | 80 | 298 | 208.0* | 173 | 73 kg | .08 m ³ |
| 4 | 13.88 | 10.19* | 8.12 | 193 lb. | 5 ft ³ | 100 | 353 | 258.8* | 206 | 88 kg | .14 m ³ |
| 6 | 17.75 | 12.12* | 10.44 | 455 lb. | 8 ft ³ | 150 | 451 | 307.8* | 265 | 206 kg | .23 m ³ |
| 8 | 21.38 | 14.69* | 12.69 | 635 lb. | 13 ft ³ | 200 | 543 | 373.1* | 322 | 288 kg | .37 m ³ |
| 10 | 26.00 | 17.50* | 15.50 | 1050 lb. | 21 ft ³ | 250 | 648 | 444.5* | 394 | 476 kg | .59 m ³ |
| 12 | 29.75 | 19.81* | 18.00 | 1690 lb. | 30 ft ³ | 300 | 756 | 503.2* | 457 | 767 kg | .85 m ³ |
| ANSI 250/300 Flanged - Mixing & Diverting | | | | | | | | | | | |
| .5 | 7.5 | 5.69 | — | 45 lb. | 1 ft ³ | 15 | 191 | 144.5 | — | 20 kg | .03 m ³ |
| .75 | 7.62 | 5.75 | — | 45 lb. | 1 ft ³ | 20 | 194 | 146.0 | — | 20 kg | .03 m ³ |
| 1 | 7.75 | 6.44 | — | 61 lb. | 1 ft ³ | 25 | 197 | 163.6 | — | 28 kg | .03 m ³ |
| 1.5 | 9.25 | 7.69 | — | 72 lb. | 2 ft ³ | 40 | 235 | 195.3 | — | 33 kg | .06 m ³ |
| 2 | 10.5 | 8.06* | 5.69 | 94 lb. | 2 ft ³ | 50 | 267 | 204.7* | 267 | 43 kg | .06 m ³ |
| 2.5 | 11.5 | 9.06* | — | 105 lb. | 3 ft ³ | 65 | 292 | 230.1* | — | 48 kg | .08 m ³ |
| 3 | 12.5 | 8.56* | 7.19 | 160 lb. | 4 ft ³ | 80 | 318 | 217.4* | 318 | 73 kg | .11 m ³ |
| 4 | 19.5 | 10.50* | 8.44 | 193 lb. | 8 ft ³ | 100 | 368 | 266.7* | 368 | 88 kg | .23 m ³ |
| 6 | 18.62 | 12.56* | 10.88 | 455 lb. | 10 ft ³ | 150 | 473 | 319.0* | 473 | 206 kg | .28 m ³ |
| 8 | 22.38 | 15.19* | 13.19 | 635 lb. | 16 ft ³ | 200 | 569 | 385.8* | 568 | 288 kg | .45 m ³ |
| 10 | 26.88 | 18.19* | 16.19 | 1050 lb. | 24 ft ³ | 250 | 682 | 462.0* | 683 | 476 kg | .68 m ³ |
| 12 | 31.25 | 20.56* | 18.75 | 1690 lb. | 36 ft ³ | 300 | 794 | 522.2* | 817 | 767 kg | 1.02 m ³ |
| ANSI 250 Threaded - Mixing & Diverting | | | | | | | | | | | |
| .5 | 5.69 | 3.62 | — | 45 lb. | 1 ft ³ | 15 | 144.5 | 91.9 | — | 20 kg | .03 m ³ |
| .75 | 5.69 | 3.62 | — | 45 lb. | 1 ft ³ | 20 | 144.5 | 91.9 | — | 20 kg | .03 m ³ |
| 1 | 6.19 | 4.44 | — | 61 lb. | 1 ft ³ | 25 | 157.2 | 112.8 | — | 28 kg | .03 m ³ |
| 1.5 | 7.75 | 5.30 | — | 72 lb. | 2 ft ³ | 40 | 196.8 | 136.7 | — | 33 kg | .06 m ³ |
| 2 | 9.19 | 6.06 | — | 94 lb. | 2 ft ³ | 50 | 233.4 | 153.9 | — | 43 kg | .06 m ³ |

NOTE: DIMENSIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE. Request certified drawings for piping layout and construction purposes.

¹ Approximate weight and volume
* Mixing Service ONLY

DOCTOR PRINCIPLE OF OPERATION

The Three Way Globe Valve design has been successfully applied for over 50 years in chemical, refining, power, paper, and H.V.A.C. industries worldwide. They are designed for mixing or diverting of clean, dirty, viscous and corrosive liquids, high and low pressure steam, and clean, dirty and corrosive gases.

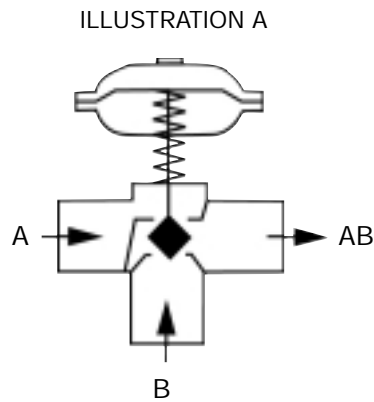
MIXING SERVICE (Type MX)

The inner valves in type MX seat inside the two seat rings (see illustration A). When these valves are used for mixing service, the forces developed by the two inlet flows oppose each other, creating little, if any, unbalance. Thus, the actuator can control the flow efficiently, with very little power lost in overcoming dynamic unbalance.

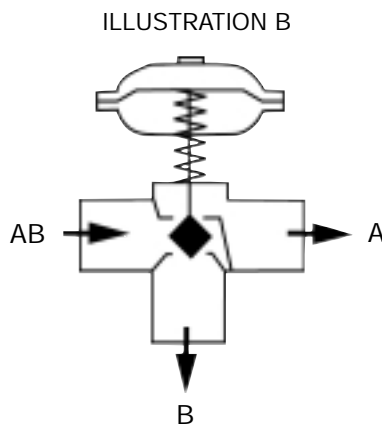
The Type MX valve is also used for diverting service, generally restricted to the smaller sizes (see illustration B).

DIVERTING SERVICE (Type DV)

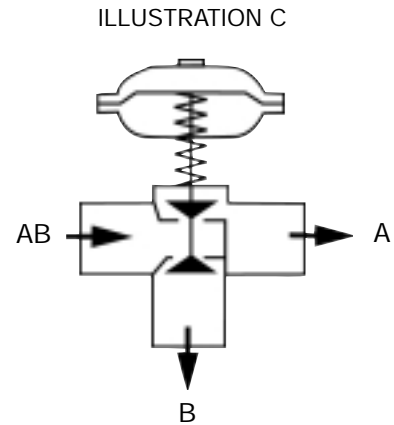
In contrast to the MX control valve, the inner valve in the type DV seats outside the two seat rings (see illustration C). The flow enters between the two seats and the pressure tends to move the inner valve away from the seats, adding to the stability of operation. Therefore, the Type DV is preferred for diverting service in larger valve sizes and at higher pressure.



Type MX Inner Valve used for mixing service.



Type MX Inner Valve used for diverting service 1/2" - 2" sizes only.



Type DV Inner Valve used for diverting service.

Note: When selecting a direct acting actuator, plug is up on air loss. When selecting a reverse acting actuator, plug is down on air loss.

DOCTOR SHUTOFF & CV TABLE

ACTUATOR SHUTOFF TABLE
(Direct & Reverse)

| Valve Size | Actuator Code | Spring Number | 20 psi air |
|------------|---------------|---------------|-------------|
| | | | 12 psi Span |
| 1 | 40 | B2 | 0 - 140 |
| | 40 | B1 | 140 - 225 |
| | 42 | C2 | 225 - 430 |
| 1-1/2 | 40 | B1 | 0 - 65 |
| | 40 | B6 | 65 - 105 |
| | 42 | C1 | 105 - 200 |
| | 44 | E2 | 200 - 220 |
| | 44 | E1 | 220 - 445 |
| 2 | 42 | C1 | 0 - 100 |
| | 42 | C6 | 100 - 180 |
| | 44 | E1 | 180 - 235 |
| | 46 | E3 | 235 - 320 |
| 2-1/2 | 42 | C1 | 0 - 50 |
| | 42 | C6 | 50 - 90 |
| | 44 | E1 | 90 - 110 |
| | 44 | D2 | 110 - 200 |
| 3 | 42 | C6 | 0 - 50 |
| | 44 | D2 | 50 - 115 |
| | 46 | E2 | 115 - 160 |
| 4 | 44 | D1 | 0 - 75 |
| | 46 | E1 | 75 - 115 |
| 6 | 46 | F1 | 0 - 55 |

Consult Factory for 3/4" and 1/2" sizes.

DOCTOR SHUTOFF
& Cv TABLES

Cv TABLE

| Valve Size Inches (mm) | Mixing-Type MX | Diverting-Type DV |
|---------------------------|----------------|-------------------|
| .5 (15) | 5 | 5 |
| .75 (20) | 7 | 7 |
| 1 (25) | 12 | 12 |
| 1.5 (40) | 28 | 28 |
| 2 (50) | 50 | 52 |
| 2.5 (65) | 70 | 76 |
| 3 (80) | 116 | 108 |
| 4 (100) | 158 | 160 |
| 6 (150) | 352 | 365 |
| 8 (200) | 475 | 475 |
| 10 (250) | 739 | 795 |
| 12 (300) | 1070 | 1078 |

DOCTOR WATER CAPACITY TABLE

(Modified Equal Percent Contour Plug) (G.P.M.)

DOCTOR WATER CAPACITY TABLE

| Pressure (PSI) | | Valve Size and Type | | | | | | | | | | | | | | | | | | |
|----------------|-----|---------------------|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|------|------|-------|-------|-------|-------|
| | | 1/2 | 3/4 | 1 | 1.5 | 2 | | 2.5 | | 3 | | 4 | | 6 | | 8 | | 10 | | 12 |
| P1 | P2 | | | | | MX | DV | MX | DV | MX | DV | MX | DV | MX | DV | MX | DV | MX/DV | MX | DV |
| 10 | 5 | 11 | 16 | 27 | 63 | 112 | 116 | 157 | 170 | 259 | 241 | 353 | 358 | 787 | 816 | 1062 | 1652 | 1778 | 2393 | 2410 |
| | 2 | 14 | 20 | 34 | 79 | 141 | 147 | 198 | 215 | 328 | 305 | 447 | 453 | 996 | 1032 | 1344 | 2090 | 2249 | 3026 | 3049 |
| 15 | 10 | 11 | 16 | 27 | 63 | 112 | 116 | 157 | 170 | 259 | 241 | 353 | 358 | 787 | 816 | 1062 | 1652 | 1778 | 2393 | 2410 |
| | 7 | 14 | 20 | 34 | 79 | 141 | 147 | 198 | 215 | 328 | 305 | 447 | 453 | 996 | 1032 | 1344 | 2090 | 2249 | 3026 | 3049 |
| | 3 | 17 | 24 | 42 | 97 | 173 | 180 | 242 | 263 | 402 | 374 | 547 | 554 | 1219 | 1264 | 1645 | 2560 | 2754 | 3707 | 3734 |
| 20 | 15 | 11 | 16 | 27 | 63 | 112 | 116 | 157 | 170 | 259 | 241 | 353 | 358 | 787 | 816 | 1062 | 1652 | 1778 | 2393 | 2410 |
| | 10 | 16 | 22 | 38 | 89 | 158 | 164 | 221 | 240 | 367 | 342 | 500 | 506 | 1113 | 1154 | 1502 | 2337 | 2514 | 3384 | 3409 |
| | 3 | 21 | 29 | 49 | 115 | 206 | 214 | 289 | 313 | 478 | 445 | 651 | 660 | 1451 | 1505 | 1958 | 3047 | 3278 | 4412 | 4445 |
| 30 | 25 | 11 | 16 | 27 | 63 | 112 | 116 | 157 | 170 | 259 | 241 | 353 | 358 | 787 | 816 | 1062 | 1652 | 1778 | 2393 | 2410 |
| | 20 | 16 | 22 | 38 | 89 | 158 | 164 | 221 | 240 | 367 | 342 | 500 | 506 | 1113 | 1154 | 1502 | 2337 | 2514 | 3384 | 3409 |
| | 5 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| 40 | 25 | 19 | 27 | 46 | 108 | 194 | 201 | 271 | 294 | 449 | 418 | 612 | 620 | 1363 | 1414 | 1840 | 2862 | 3079 | 4144 | 4175 |
| | 15 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 6 | 29 | 41 | 70 | 163 | 292 | 303 | 408 | 443 | 676 | 630 | 921 | 933 | 2052 | 2128 | 2770 | 4309 | 4636 | 6239 | 6286 |
| 50 | 35 | 19 | 27 | 46 | 108 | 194 | 201 | 271 | 294 | 449 | 418 | 612 | 620 | 1363 | 1414 | 1840 | 2862 | 3079 | 4144 | 4175 |
| | 30 | 22 | 31 | 54 | 125 | 224 | 233 | 313 | 340 | 519 | 483 | 707 | 716 | 1574 | 1632 | 2124 | 3305 | 3555 | 4785 | 4821 |
| | 25 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| 60 | 7 | 33 | 46 | 79 | 184 | 328 | 341 | 459 | 498 | 761 | 708 | 1036 | 1049 | 2308 | 2393 | 3115 | 4846 | 5213 | 7016 | 7069 |
| | 45 | 19 | 27 | 46 | 108 | 194 | 201 | 271 | 294 | 449 | 418 | 612 | 620 | 1363 | 1414 | 1840 | 2862 | 3079 | 4144 | 4175 |
| | 40 | 22 | 31 | 54 | 125 | 224 | 233 | 313 | 340 | 519 | 483 | 707 | 716 | 1574 | 1632 | 2124 | 3305 | 3555 | 4785 | 4821 |
| 75 | 25 | 30 | 41 | 71 | 166 | 296 | 308 | 414 | 450 | 686 | 639 | 935 | 947 | 2082 | 2159 | 2810 | 4372 | 4703 | 6330 | 6378 |
| | 9 | 36 | 50 | 86 | 200 | 357 | 371 | 500 | 543 | 828 | 771 | 1128 | 1143 | 2514 | 2607 | 3392 | 5278 | 5677 | 7641 | 7698 |
| | 55 | 22 | 31 | 54 | 125 | 224 | 233 | 313 | 340 | 519 | 483 | 707 | 716 | 1574 | 1632 | 2124 | 3305 | 3555 | 4785 | 4821 |
| 100 | 50 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 25 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| | 11 | 40 | 56 | 96 | 224 | 400 | 416 | 560 | 608 | 928 | 864 | 1264 | 1280 | 2816 | 2920 | 3800 | 5912 | 6360 | 8560 | 8624 |
| 125 | 75 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 50 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| | 14 | 46 | 65 | 111 | 260 | 464 | 482 | 649 | 705 | 1076 | 1002 | 1465 | 1484 | 3264 | 3385 | 4405 | 6853 | 7373 | 9923 | 9997 |
| 150 | 100 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 50 | 43 | 61 | 104 | 242 | 433 | 450 | 606 | 658 | 1005 | 935 | 1368 | 1386 | 3048 | 3161 | 4114 | 6400 | 6885 | 9266 | 9336 |
| | 18 | 52 | 72 | 124 | 290 | 517 | 538 | 724 | 786 | 1200 | 1117 | 1634 | 1655 | 3641 | 3776 | 4913 | 7644 | 8224 | 11068 | 11151 |
| 175 | 125 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 75 | 43 | 61 | 104 | 242 | 433 | 450 | 606 | 658 | 1005 | 935 | 1368 | 1386 | 3048 | 3161 | 4114 | 6400 | 6885 | 9266 | 9336 |
| | 20 | 57 | 80 | 137 | 319 | 570 | 593 | 798 | 867 | 1323 | 1231 | 1801 | 1824 | 4013 | 4162 | 5416 | 8426 | 9064 | 12200 | 12291 |
| 200 | 150 | 25 | 35 | 60 | 140 | 250 | 260 | 350 | 380 | 580 | 540 | 790 | 800 | 1760 | 1825 | 2375 | 3695 | 3975 | 5350 | 5390 |
| | 100 | 43 | 61 | 104 | 242 | 433 | 450 | 606 | 658 | 1005 | 935 | 1368 | 1386 | 3048 | 3161 | 4114 | 6400 | 6885 | 9266 | 9336 |
| | 50 | 56 | 78 | 134 | 313 | 559 | 581 | 783 | 850 | 1297 | 1207 | 1766 | 1789 | 3935 | 4081 | 5311 | 8262 | 8888 | 11963 | 12052 |
| 225 | 24 | 61 | 86 | 147 | 344 | 614 | 639 | 860 | 934 | 1425 | 1327 | 1942 | 1966 | 4325 | 4485 | 5837 | 9081 | 9769 | 13148 | 13247 |
| | 150 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| | 100 | 50 | 70 | 120 | 280 | 500 | 520 | 700 | 760 | 1160 | 1080 | 1580 | 1600 | 3520 | 3650 | 4750 | 7390 | 7950 | 10700 | 10780 |
| 250 | 27 | 66 | 92 | 158 | 368 | 658 | 684 | 921 | 1000 | 1526 | 1421 | 2078 | 2104 | 4630 | 4801 | 6248 | 9720 | 10457 | 14074 | 14179 |
| | 175 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| | 100 | 56 | 78 | 134 | 313 | 559 | 581 | 783 | 850 | 1297 | 1207 | 1766 | 1789 | 3935 | 4081 | 5311 | 8262 | 8888 | 11963 | 12052 |
| 300 | 30 | 70 | 98 | 168 | 391 | 698 | 726 | 977 | 1061 | 1620 | 1508 | 2206 | 2234 | 4915 | 5097 | 6633 | 10320 | 11102 | 14942 | 15053 |
| | 200 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| | 175 | 43 | 61 | 104 | 242 | 433 | 450 | 606 | 658 | 1005 | 935 | 1368 | 1386 | 3048 | 3161 | 4114 | 6400 | 6885 | 9266 | 9336 |
| 400 | 100 | 61 | 86 | 147 | 343 | 612 | 637 | 857 | 931 | 1421 | 1323 | 1935 | 1960 | 4311 | 4470 | 5818 | 9051 | 9737 | 13105 | 13203 |
| | 34 | 73 | 103 | 176 | 412 | 735 | 764 | 1029 | 1117 | 1705 | 1587 | 2322 | 2352 | 5173 | 5364 | 6981 | 10861 | 11684 | 15726 | 15843 |
| | 250 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| 400 | 100 | 71 | 99 | 170 | 396 | 707 | 735 | 990 | 1075 | 1640 | 1527 | 2234 | 2263 | 4978 | 5162 | 6718 | 10451 | 11243 | 15132 | 15245 |
| | 40 | 81 | 113 | 193 | 451 | 806 | 838 | 1129 | 1225 | 1870 | 1741 | 2548 | 2580 | 5676 | 5885 | 7659 | 11916 | 12819 | 17253 | 17382 |
| | 350 | 35 | 49 | 85 | 198 | 354 | 368 | 495 | 537 | 820 | 764 | 1117 | 1131 | 2489 | 2581 | 3359 | 5226 | 5621 | 7566 | 7623 |
| 400 | 200 | 71 | 99 | 170 | 396 | 707 | 735 | 990 | 1075 | 1640 | 1527 | 2234 | 2263 | 4978 | 5162 | 6718 | 10451 | 11243 | 15132 | 15245 |
| | 50 | 94 | 131 | 224 | 524 | 935 | 973 | 1310 | 1422 | 2170 | 2020 | 2956 | 2993 | 6585 | 6829 | 8886 | 13825 | 14873 | 20018 | 20168 |

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.



DOCTOR WATER CAPACITY TABLE

(Modified Equal Percent Contour Plug) (M3/Hr.)

| Pressure (bar) | | Valve Size and Type | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------|-----|---------------------|----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|------|------|------|------|------|------|------|--|----|--|----|--|--|
| | | 1/2 | | 3/4 | | 1 | | 1.5 | | 2 | | 2.5 | | 3 | | 4 | | 6 | | 8 | | 10 | | 12 | | |
| P1 | P2 | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0.7 | 0.5 | 2 | 3 | 5 | 11 | 19 | 20 | 27 | 29 | 45 | 42 | 61 | 62 | 136 | 141 | 184 | 286 | 307 | 414 | 417 | | | | | | |
| | 0.2 | 3 | 4 | 7 | 17 | 31 | 32 | 43 | 46 | 71 | 66 | 97 | 98 | 215 | 223 | 290 | 452 | 486 | 654 | 659 | | | | | | |
| 1 | 0.7 | 2 | 3 | 6 | 13 | 24 | 25 | 33 | 36 | 55 | 51 | 75 | 76 | 167 | 173 | 225 | 350 | 377 | 507 | 511 | | | | | | |
| | 0.5 | 3 | 4 | 7 | 17 | 31 | 32 | 43 | 46 | 71 | 66 | 97 | 98 | 215 | 223 | 290 | 452 | 486 | 654 | 659 | | | | | | |
| | .2 | 4 | 5 | 9 | 22 | 39 | 40 | 54 | 59 | 90 | 84 | 122 | 124 | 272 | 282 | 367 | 572 | 615 | 828 | 834 | | | | | | |
| 1.5 | 1 | 3 | 4 | 7 | 17 | 31 | 32 | 43 | 46 | 71 | 66 | 97 | 98 | 215 | 223 | 290 | 452 | 486 | 654 | 659 | | | | | | |
| | 0.7 | 4 | 5 | 9 | 22 | 39 | 40 | 54 | 59 | 90 | 84 | 122 | 124 | 272 | 282 | 367 | 572 | 615 | 828 | 834 | | | | | | |
| | .2 | 5 | 7 | 12 | 28 | 49 | 51 | 69 | 75 | 114 | 106 | 156 | 158 | 347 | 360 | 468 | 729 | 784 | 1055 | 1063 | | | | | | |
| 2 | 1.5 | 3 | 4 | 7 | 17 | 31 | 32 | 43 | 46 | 71 | 66 | 97 | 98 | 215 | 223 | 290 | 452 | 486 | 654 | 659 | | | | | | |
| | 1 | 4 | 6 | 10 | 24 | 43 | 45 | 61 | 66 | 100 | 93 | 137 | 138 | 304 | 316 | 411 | 639 | 687 | 925 | 932 | | | | | | |
| | .3 | 6 | 8 | 14 | 32 | 56 | 59 | 79 | 86 | 131 | 122 | 178 | 180 | 397 | 412 | 536 | 833 | 896 | 1206 | 1215 | | | | | | |
| 3 | 2 | 4 | 6 | 10 | 24 | 43 | 45 | 61 | 66 | 100 | 93 | 137 | 138 | 304 | 316 | 411 | 639 | 687 | 925 | 932 | | | | | | |
| | 1 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | .5 | 7 | 10 | 16 | 38 | 68 | 71 | 96 | 104 | 159 | 148 | 216 | 219 | 481 | 499 | 649 | 1010 | 1087 | 1463 | 1474 | | | | | | |
| 3.5 | 3 | 3 | 4 | 7 | 17 | 31 | 32 | 43 | 46 | 71 | 66 | 97 | 98 | 215 | 223 | 290 | 452 | 486 | 654 | 659 | | | | | | |
| | 2 | 5 | 7 | 13 | 30 | 53 | 55 | 74 | 80 | 123 | 114 | 167 | 169 | 373 | 387 | 503 | 783 | 842 | 1133 | 1142 | | | | | | |
| | 1 | 7 | 10 | 16 | 38 | 68 | 71 | 96 | 104 | 159 | 148 | 216 | 219 | 481 | 499 | 649 | 1010 | 1087 | 1463 | 1474 | | | | | | |
| | .5 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| 4 | 3 | 4 | 6 | 10 | 24 | 43 | 45 | 61 | 66 | 100 | 93 | 137 | 138 | 304 | 316 | 411 | 639 | 687 | 925 | 932 | | | | | | |
| | 2 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | 1 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| | .6 | 8 | 11 | 19 | 45 | 80 | 83 | 112 | 121 | 185 | 172 | 252 | 255 | 561 | 582 | 757 | 1178 | 1268 | 1706 | 1719 | | | | | | |
| 5 | 4 | 4 | 6 | 10 | 24 | 43 | 45 | 61 | 66 | 100 | 93 | 137 | 138 | 304 | 316 | 411 | 639 | 687 | 925 | 932 | | | | | | |
| | 3 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | 2 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| | .8 | 9 | 12 | 21 | 50 | 89 | 92 | 124 | 135 | 206 | 191 | 280 | 284 | 624 | 647 | 842 | 1310 | 1409 | 1896 | 1910 | | | | | | |
| 6 | 5 | 4 | 6 | 10 | 24 | 43 | 45 | 61 | 66 | 100 | 93 | 137 | 138 | 304 | 316 | 411 | 639 | 687 | 925 | 932 | | | | | | |
| | 3 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| | 1 | 10 | 14 | 23 | 54 | 97 | 101 | 135 | 147 | 224 | 209 | 306 | 309 | 681 | 706 | 919 | 1429 | 1537 | 2069 | 2085 | | | | | | |
| 8 | 6 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | 3 | 10 | 14 | 23 | 54 | 97 | 101 | 135 | 147 | 224 | 209 | 306 | 309 | 681 | 706 | 919 | 1429 | 1537 | 2069 | 2085 | | | | | | |
| | 1.1 | 11 | 16 | 27 | 64 | 114 | 118 | 159 | 173 | 264 | 245 | 359 | 363 | 800 | 829 | 1079 | 1679 | 1806 | 2431 | 2449 | | | | | | |
| 10 | 8 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | 5 | 10 | 14 | 23 | 54 | 97 | 101 | 135 | 147 | 224 | 209 | 306 | 309 | 681 | 706 | 919 | 1429 | 1537 | 2069 | 2085 | | | | | | |
| | 1.4 | 13 | 18 | 30 | 71 | 127 | 132 | 178 | 193 | 294 | 274 | 401 | 406 | 893 | 926 | 1205 | 1874 | 2016 | 2714 | 2734 | | | | | | |
| 12 | 10 | 6 | 9 | 15 | 34 | 61 | 64 | 86 | 93 | 142 | 132 | 193 | 196 | 430 | 446 | 581 | 904 | 972 | 1309 | 1318 | | | | | | |
| | 7 | 10 | 14 | 23 | 54 | 97 | 101 | 135 | 147 | 224 | 209 | 306 | 309 | 681 | 706 | 919 | 1429 | 1537 | 2069 | 2085 | | | | | | |
| | 5 | 11 | 16 | 27 | 64 | 114 | 119 | 160 | 174 | 265 | 247 | 361 | 366 | 805 | 835 | 1087 | 1691 | 1819 | 2448 | 2466 | | | | | | |
| | 1.7 | 14 | 19 | 33 | 78 | 139 | 144 | 194 | 211 | 322 | 300 | 439 | 444 | 977 | 1013 | 1318 | 2051 | 2206 | 2970 | 2992 | | | | | | |
| 14 | 10 | 9 | 12 | 21 | 48 | 86 | 90 | 121 | 131 | 201 | 187 | 273 | 277 | 609 | 631 | 822 | 1278 | 1375 | 1851 | 1864 | | | | | | |
| | 7 | 11 | 16 | 27 | 64 | 114 | 119 | 160 | 174 | 265 | 247 | 361 | 366 | 805 | 835 | 1087 | 1691 | 1819 | 2448 | 2466 | | | | | | |
| | 2 | 15 | 21 | 36 | 84 | 150 | 156 | 210 | 228 | 347 | 324 | 473 | 479 | 1054 | 1093 | 1423 | 2214 | 2382 | 3205 | 3229 | | | | | | |
| 15 | 12 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| | 7 | 12 | 17 | 29 | 68 | 122 | 127 | 171 | 186 | 284 | 264 | 386 | 391 | 861 | 893 | 1162 | 1808 | 1945 | 2617 | 2637 | | | | | | |
| | 2 | 16 | 22 | 37 | 87 | 156 | 162 | 218 | 237 | 362 | 337 | 493 | 499 | 1098 | 1138 | 1481 | 2304 | 2479 | 3336 | 3361 | | | | | | |
| 17 | 14 | 7 | 10 | 18 | 42 | 75 | 78 | 105 | 114 | 174 | 162 | 237 | 240 | 527 | 547 | 711 | 1107 | 1191 | 1603 | 1615 | | | | | | |
| | 10 | 11 | 16 | 27 | 64 | 114 | 119 | 160 | 174 | 265 | 247 | 361 | 366 | 805 | 835 | 1087 | 1691 | 1819 | 2448 | 2466 | | | | | | |
| | 5 | 15 | 21 | 36 | 84 | 150 | 156 | 210 | 228 | 347 | 324 | 473 | 479 | 1054 | 1093 | 1423 | 2214 | 2382 | 3205 | 3229 | | | | | | |
| | 2.4 | 17 | 23 | 40 | 93 | 165 | 172 | 231 | 251 | 383 | 357 | 522 | 529 | 1163 | 1206 | 1570 | 2442 | 2627 | 3536 | 3562 | | | | | | |
| 20 | 15 | 10 | 14 | 23 | 54 | 97 | 101 | 135 | 147 | 224 | 209 | 306 | 309 | 681 | 706 | 919 | 1429 | 1537 | 2069 | 2085 | | | | | | |
| | 10 | 14 | 19 | 33 | 77 | 137 | 142 | 191 | 208 | 317 | 295 | 432 | 438 | 963 | 998 | 1299 | 2021 | 2174 | 2926 | 2948 | | | | | | |
| | 2.7 | 18 | 25 | 43 | 101 | 180 | 187 | 252 | 273 | 417 | 388 | 568 | 575 | 1266 | 1313 | 1709 | 2658 | 2860 | 3849 | 3877 | | | | | | |
| 27 | 20 | 11 | 16 | 27 | 64 | 114 | 119 | 160 | 174 | 265 | 247 | 361 | 366 | 805 | 835 | 1087 | 1691 | 1819 | 2448 | 2466 | | | | | | |
| | 15 | 15 | 21 | 36 | 84 | 150 | 156 | 210 | 228 | 347 | 324 | 473 | 479 | 1054 | 1093 | 1423 | 2214 | 2382 | 3205 | 3229 | | | | | | |
| | 3.5 | 21 | 29 | 50 | 117 | 210 | 218 | 293 | 319 | 486 | 453 | 662 | 671 | 1476 | 1530 | 1991 | 3098 | 3333 | 4486 | 4519 | | | | | | |

DOCTOR WATER CAPACITY TABLE

- It is recommended to keep valve outlet velocity below 30,000 ft./min.
- Capacities based on maximum Cv.

