

# MODEL 345

## HIGH PRESSURE REDUCING REGULATOR

### OVERVIEW

The Model 345 is a piston style, heavy duty, high pressure reducing regulator that can include balanced trim with a TFE or nylon seat for controlling down stream pressure between 50 and 3000 psig (3.4 and 207 Barg), with inlet pressures up to 4000 psig (275 Barg). The metal seated version is an unbalanced trim design. Where trim wear is expected, metal seating surfaces may be stellite. Sizes 1/2", 3/4" and 1" (DN15, 20, and 25). Available options include flanged end connections.

### FEATURES

- High Pressure:** High inlet and outlet pressures; high pressure drops.
- Balanced Trim:** Minimizes the effect of large changes in inlet pressure such as those encountered with bottled gas.
- Tight Shutoff:** TFE or nylon seat provides tight shutoff.
- Adjustment Ease:** Radial Roller bearings to reduce frictional forces and wear. Standard T-bar handle.

### APPLICATIONS

Primarily used as first stage letdown valve on high pressure applications.

Used for controlling clean gases. Handles bottled gas up to 4000 psig (275 Barg) inlet pressure, with a maximum pressure drop of up to 3000 psid (207 Bard).

Use in liquid service is for non-cavitating fluids, i.e. lubricants, up to 1000 psid (69.0 Bard) pressure drop, metal seated.

 **CAUTION**

DO NOT APPLY IN STEAM SERVICE



MODEL 345



**LINE SIZES AVAILABLE**  
1/2" (DN15), 3/4" (DN20), 1" (DN25)



**END CONNECTIONS**  
NPT, FLANGED, 14" FACE TO FACE



**COMMON APPLICATIONS**  
LET DOWN VALVE ON HIGH PRESSURE APPLICATIONS, CLEAN GASES, BOTTLED GASES, LIQUIDS



**DESIGN PRESSURE**  
INLET: UP TO 4000 psig (275 Barg)  
OUTLET: 50-3000 psig (3.4-206 Barg)

## STANDARD/GENERAL SPECIFICATIONS

**Body Sizes:** 1/2", 3/4", 1"  
(DN15, 20, and 25).

**Maximum Pressure Drop:** See Table 2.

**End Connections:** Standard: NPT female.  
Opt-30: 300#, 600#, 900# or 1500#  
RF flanges with SST body.  
Opt-34: 14" Face to Face Flange  
Dim.

**Trim Designs:** Primarily 316 SST material.  
Metal Seat - Unbalanced.  
Composition Seat - Balanced. See  
Table 4.

**Body Materials:** AL BRZ = Aluminum Bronze  
ASTM B148, Alloy C95500.  
SST = Cast Stainless Steel  
ASTM A351, Gr. CF8M.

**Capacities:** See Tables 6 through 9.  
Recommended practical limit of 20%  
droop.  
See Table 5 for maximum wide open  
C<sub>v</sub> level.

**Spring Chamber Material:** BRZ = Cast Bronze  
ASTM B584, Alloy C90300.

**Range Springs:** Epoxy coated steel.

**Inlet Pressure:** Up to 4000 psig (275 Barg).

**Inlet Temperature:** Function of trim materials.  
Up to 400°F (205°C), S1 trim only.  
(See Table 4.)

**Outlet Pressure:** 50 to 3000 psig (3.4 to 206 Barg) with  
multiple range springs.

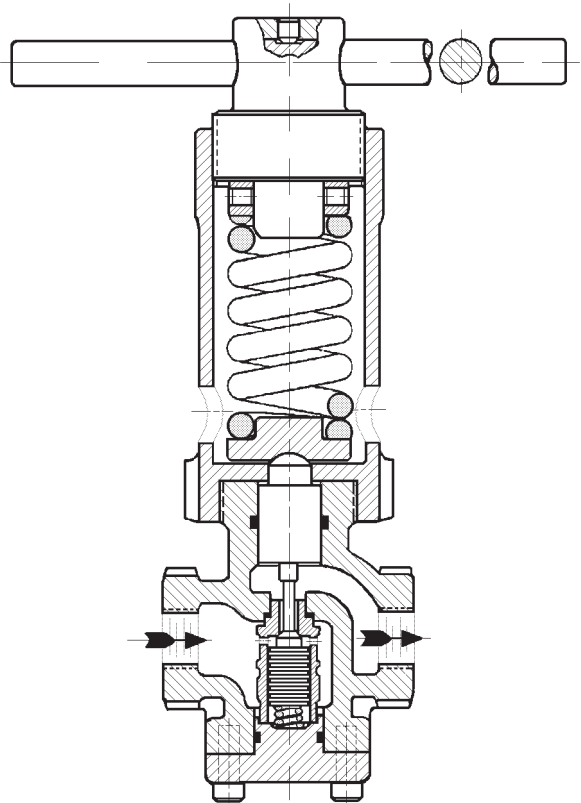
**Pressure vs. Temperature Ratings:** May be reduced when available  
flanged end connections are selected.  
See Table 1 and Table 10.

| Applicable Seat Design | Range      |               |
|------------------------|------------|---------------|
|                        | psig       | (Barg)        |
| Balanced - Comp *      | 50 - 150   | (3.4 - 10.3)  |
| Balanced - Comp *      | 125 - 250  | (8.6 - 17.2)  |
| All                    | 200 - 600  | (13.8 - 41.4) |
| All                    | 500 - 1000 | (34.5 - 69.0) |
| All                    | 900 - 3000 | (62.1 - 207)  |

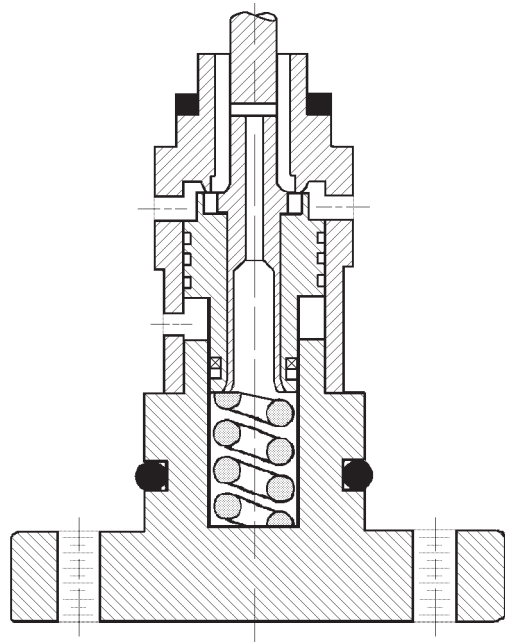
\* See Table 6.

**Gaskets:** Standard: Graphite/NBR. NOT SUIT-  
ABLE FOR OXYGEN SERVICE.

Alternate Material: See Opt-45.



**Figure 1:** Metal Seat,  
Unbalanced Trim Design



**Figure 2:** Composition Seat,  
Balanced Trim Design

## OPTION SPECIFICATIONS

This section indicates special variations which are available to the standard Model 345 product. Multiple options may be selected; i.e. 345-15 +30 which is the standard 345 product plus the -15 and the -30 Options together. Care must be exhibited to not develop conflicting combinations; i.e. an aluminum bronze body 345-30.

- |                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                                                                                                                                                                               |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p><b>Option -15:</b>     <u>STELLITED SEATS.</u> Stellite seating surfaces on unbalanced metal seating piston and cylinder. Can only be applied to S1 trim.</p>                                                                                                                                                                                                                            | <p><b>Option -55:</b>     <u>SPECIAL CLEANING.</u> SST body material ONLY. Cleaning per Cashco Spec #S-1134 for Oxygen gas Service.<br/><b>NOTE:</b> Design Pressure Rating shall not exceed 375 psig (25.8 Barg) when body material is SST and process medium is oxygen.</p> |
| <p><b>Option -30:</b>     <u>FLANGED END CONNECTIONS.</u> 300#, 600#, 900#, and 1500# raised face flanges available for 316 SST body. Flanges and nipples of same basic material as body.</p> <p>With all flanges, the flange pressure ratings are the pressure limiting factors, not the body inlet rating. (Refer to Table 10 for allowable working pressure vs. temperature tables.)</p> | <p><b>Option -56:</b>     <u>SPECIAL CLEANING.</u> Cleaning per Cashco Spec. #S-1542. Not suitable for Oxygen Service.</p>                                                                                                                                                    |
| <p><b>Option -34:</b>     <u>SPECIAL 14" FACE TO FACE DIMENSION FOR FLANGED END CONNECTIONS.</u> See Opt.-30 for standard face to face dimension.</p>                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                               |
| <p><b>Option -45:</b>     <u>FKM GASKET.</u> Primarily for oxygen service. Utilizes FKM gasket over standard gasket. (S3S Trim has gylon gasket.)</p>                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                               |

## TECHNICAL SPECIFICATIONS

**TABLE 1  
DESIGN PRESSURE –TEMPERATURE RATINGS  
MATERIAL SPECIFICATIONS**

| Standard Construction                              |                               |                |        |                              |        |                          |              |
|----------------------------------------------------|-------------------------------|----------------|--------|------------------------------|--------|--------------------------|--------------|
| Material Specifications<br>(Body / Spring Chamber) |                               | Inlet Pressure |        | Outlet <sup>1</sup> Pressure |        | Temperature <sup>‡</sup> |              |
| Material                                           | ASTM No.                      | psig           | (Barg) | psig                         | (Barg) | °F                       | (°C)         |
| AL BRZ/BRZ                                         | B148, C95500/<br>B584, C90300 | 4000           | (275)  | 3000                         | (207)  | -20 to +100              | (-29 to +38) |
|                                                    |                               | 3200           | (221)  | 2700                         | (186)  | +200                     | (+93)        |
|                                                    |                               | 2700           | (186)  | 2500                         | (172)  | +300                     | (+149)       |
|                                                    |                               | 2500           | (172)  | 2500                         | (172)  | +400                     | (+205)       |
| SST/BRZ                                            | A351, Gr CF8M<br>B584, C90300 | 3600           | (248)  | 3000                         | (207)  | -20 to +100              | (-29 to +38) |
|                                                    |                               | 3100           | (214)  | 2800                         | (193)  | +200                     | (+93)        |
|                                                    |                               | 2800           | (193)  | 2500                         | (172)  | +300                     | (+149)       |
|                                                    |                               | 2500           | (172)  | 2500                         | (172)  | +400                     | (+205)       |

<sup>1</sup> See Table 5 for emergency over-pressures allowed for sizing and selection of safety relief valve.

<sup>‡</sup> The design temperature range of the regulator may be limited by the trim selection. See Table 4.

**TABLE 2**  
**MAXIMUM ALLOWABLE PRESSURE DROPS**

| Fluid  | Maximum Recommended Operating Pressure Drop   |                    |                                   |                    | Seat Design                   | Trim Designation Number |
|--------|-----------------------------------------------|--------------------|-----------------------------------|--------------------|-------------------------------|-------------------------|
|        | Clean Fluid<br>Industrial Quality             |                    | Unclean Fluid<br>Pipeline Quality |                    |                               |                         |
|        | psid                                          | (Bard)             | psid                              | (Bard)             |                               |                         |
| Liquid | 1000 <sup>1</sup>                             | (69) <sup>1</sup>  | 600 <sup>1</sup>                  | (41) <sup>1</sup>  | Metal-Stellited Unbalanced    | S1                      |
|        | 1000 <sup>1</sup>                             | (69) <sup>1</sup>  | 400 <sup>1</sup>                  | (28) <sup>1</sup>  | Metal Unbalanced <sup>1</sup> | S1                      |
|        | 600                                           | (41)               | N/R                               | N/R                | Composition Balanced          | S3, S3B, S3E            |
| Gas    | 3000 <sup>1</sup>                             | (207) <sup>1</sup> | 2400 <sup>1</sup>                 | (166) <sup>1</sup> | Metal-Stellited Unbalanced    | S1                      |
|        | 3000 <sup>1</sup>                             | (207) <sup>1</sup> | 600 <sup>1</sup>                  | (41) <sup>1</sup>  | Metal Unbalanced              | S1                      |
|        | 3000 @ -20° to +70°F<br>(207 @ -29° to +21°C) |                    | N/R                               |                    | Composition TFE Balanced      | S3, S3B, S3E,<br>S3S    |
|        | 2500 @ +100°F<br>(173 @ +38°C)                |                    |                                   |                    |                               |                         |
|        | 2000 @ +150°F<br>(138 @ +66°C)                |                    |                                   |                    |                               |                         |
|        | 3000 @ +70° to +200°F<br>(207 @ +93°C)        |                    | N/R                               |                    | Composition Nylon Balanced    | S3Y                     |

<sup>1</sup> Minimum outlet (P<sub>2</sub>) pressure levels apply to unbalanced, metal seat constructions, which may override pressure drop capability. N/R: Not recommended.

**TABLE 3**  
**APPLICATIONS**

| Fluid                                             | Recommended Construction               | Trim Designation Number |
|---------------------------------------------------|----------------------------------------|-------------------------|
| Air or Industrial Chemicals                       | Clean Fluid; Balanced Composition Seat | S3, S3Y                 |
| Chemicals                                         | Clean Fluid; Balanced Composition Seat | S3, S3Y                 |
|                                                   | Unclean Fluid; Unbalanced Metal Seat   | S1                      |
| Hydrocarbon Gas or Liquids                        | Clean Fluid; Balanced Composition Seat | S3, S3Y                 |
|                                                   | Unclean Fluid; Unbalanced Metal Seat   | S1                      |
| Water and Condensate<br>35° to 180°F (2° to 82°C) | Balanced Composition Seat              | S3, S3Y                 |
| All Fluids except Oxygen <sup>†</sup>             | Balanced Composition Seat              | S3B, S3E                |

<sup>†</sup> Process Fluid must be compatible with O-ring material.

**TABLE 4**  
**STAINLESS STEEL TRIM MATERIAL COMBINATIONS**

| Part              | Stainless Steel Trim Designation Number |                                   |                                   |                                   |                                   |                                    |
|-------------------|-----------------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|-----------------------------------|------------------------------------|
|                   | Unbalanced Metal                        | Balanced-Composition              |                                   |                                   |                                   |                                    |
|                   | S1                                      | S3                                | S3B                               | S3E                               | S3Y (H2, He)                      | S3S <sup>2</sup>                   |
| Cylinder          | 316 SST                                 | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                            |
| Piston            | 316 SST                                 | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                            |
| Seat Disc         | None                                    | TFE                               | TFE                               | TFE                               | Nylon                             | TFE                                |
| Piston Spring     | 302 SST                                 | 302 SST                           | 302 SST                           | 302 SST                           | 302 SST                           | 302 SST                            |
| Cylinder Gasket   | Grafoil ®                               | Grafoil ®                         | Grafoil ®                         | Grafoil ®                         | Grafoil ®                         | Gylon                              |
| Pressure Piston   | 316 SST                                 | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                           | 316 SST                            |
| Body Cap          | <sup>1</sup> See below                  | <sup>1</sup> See below            | <sup>1</sup> See below            | <sup>1</sup> See below            | <sup>1</sup> See below            | <sup>1</sup> See below             |
| Quad Ring         | N/A                                     | FKM                               | FKM                               | FKM                               | FKM                               | Silicone                           |
| O-rings           | FKM                                     | FKM                               | Buna-N                            | EPDM                              | FKM                               | Silicone                           |
| Backup Ring(s)    | TFE                                     | TFE                               | TFE                               | TFE                               | TFE                               | TFE                                |
| Temperature Range | -20 to +400° F<br>(-29 to +205° C)      | -20 to +150° F<br>(-29 to +66° C) | -40 to +150° F<br>(-40 to +66° C) | -70 to +150° F<br>(-57 to +66° C) | +70 to +200° F<br>(+21 to +93° C) | -135 to +150° F<br>(-93 to +66° C) |

<sup>1</sup> Brass body cap for aluminum bronze body - 316SST body cap for SST bodies.

<sup>2</sup> S3S Trim requires 316 SST body cap bolting, 316 SST adjusting screw & handle & a 316 SST spring button.

N/A: Not applicable FKM - Fluorocarbon Elastomer

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**NOTE:** Cashco does not recommend metal seated trim on any service where the flow will be dead ended downstream of the pressure reducing regulator.

**TABLE 5**  
**OUTLET PRESSURE LIMITS – SAFETY RELIEF VALVE**  
**SIZING AND SELECTION <sup>1</sup>**

| Size | Material   | Range Spring |        | Emergency Over-Pressure Level <sup>2</sup> |        |             |              | Maximum Cv<br>with Valve Plug<br>Wide Open |
|------|------------|--------------|--------|--------------------------------------------|--------|-------------|--------------|--------------------------------------------|
|      |            |              |        | Pressure                                   |        | Temperature |              |                                            |
|      |            | psig         | (Barg) | psig                                       | (Barg) | °F          | (°C)         |                                            |
| All  | AL BRZ/BRZ | All          | All    | 3300                                       | (228)  | -20 to +200 | (-29 to +93) | 2.0                                        |
|      |            |              |        | 2970                                       | (205)  | +300        | (+149)       |                                            |
|      |            |              |        | 2750                                       | (190)  | +400        | (+205)       |                                            |
|      | SST/BRZ    | All          | All    | 3300                                       | (228)  | -20 to +200 | (-29 to +93) |                                            |
|      |            |              |        | 3080                                       | (212)  | +300        | (+149)       |                                            |
|      |            |              |        | 2750                                       | (190)  | +400        | (+205)       |                                            |

<sup>1</sup> Sizing and setpoint data supplied to protect Model 345 regulator. Process application may require lower setpoint.

<sup>2</sup> Safety relief valve (SRV) must be provided if it is possible to attain this pressure level upstream of the Model 345; must include SRV pressure build up over SRV setpoint. Internal mechanical damage may result if over-pressure level is exceeded.

**TABLE 6**  
**Cv AT FLOWING PRESSURE (F<sub>L</sub> = .945)**

| Range Spring   |             | Flowing Outlet Pressure P <sub>2</sub> |        | All Sizes |      |
|----------------|-------------|----------------------------------------|--------|-----------|------|
|                |             |                                        |        | Droop     |      |
| psig           | (Barg)      | psig                                   | (Barg) | 10%       | 20%  |
| 50 – 150 *     | (3.4-10.3)  | 50                                     | (3.4)  | .43       | .87  |
|                |             | 75                                     | (5.2)  | .58       | 1.10 |
|                |             | 100                                    | (6.9)  | .70       | 1.28 |
|                |             | 125                                    | (8.6)  | .83       | 1.45 |
|                |             | 150                                    | (10.3) | 1.12      | 1.80 |
| 125 – 250 *    | (8.6-17.2)  | 200                                    | (13.8) | 1.28      | 1.80 |
| 200 – 600      | (13.8-41.4) | 250                                    | (17.2) | .50       | .96  |
|                |             | 300                                    | (20.7) | .57       | 1.08 |
|                |             | 400                                    | (27.6) | .74       | 1.27 |
|                |             | 500                                    | (34.5) | .88       | 1.46 |
| 500-1000       | (34.5-69.0) | 750                                    | (51.7) | .74       | 1.27 |
| 900-3000<br>** | (62-207)    | 1000                                   | (69.0) | .60       | .90  |
|                |             | 1500                                   | (103)  | .58       | 1.11 |
|                |             | 2000                                   | (138)  | .75       | 1.28 |
|                |             | 2500                                   | (172)  | .88       | 1.46 |
|                |             | 3000                                   | (207)  | 1.05      | 1.65 |

\* The Model 345 contains no diaphragm. If the S1 unbalanced trim is utilized, then an additional consideration or "unbalanced effect" must be included along with "droop". As inlet (P<sub>1</sub>) pressure varies, then outlet (P<sub>2</sub>) pressure setpoint will vary in a **negative** 5:1 ratio.

Example: P<sub>1</sub>=2500psig                      3000-2500 = 500psi increase  
P<sub>2</sub>= 500psig at cond.#1                      at 5:1 (P<sub>1</sub>:P<sub>2</sub>) ratio > 500/5 = 100psi  
If P<sub>1</sub> increases to 3000psig                      New P<sub>2</sub> = 500-100 = 400psig  
P<sub>2</sub> becomes ?? at cond. #2

If P<sub>1</sub> increases, P<sub>2</sub> decreases, likewise if P<sub>1</sub> decreases, P<sub>2</sub> increases.

Therefore, the lower two range springs are not allowed to be utilized with unbalanced trim.

If S3\_, balanced trim is utilized, the "unbalanced effect" is essentially zero and may be neglected.

\*\* 900 - 3000 psig range spring not available with S3S Trim.

**TABLE 7**  
**AIR CAPACITIES IN SCFH - (All Sizes)**  
**S.G. = 1.0 TEMP. = 60°F F<sub>L</sub> = .945**

| Outlet Flowing Pressure |        | Inlet Pressure |        | 1/2" (DN15) Body |           | 3/4" (DN20) Body |           | 1" (DN25) Body |           |
|-------------------------|--------|----------------|--------|------------------|-----------|------------------|-----------|----------------|-----------|
| psig                    | (Barg) | psig           | (Barg) | 10% Droop        | 20% Droop | 10% Droop        | 20% Droop | 10% Droop      | 20% Droop |
| 50                      | (3.4)  | 500            | (34.5) | 7600             | 15400     | 7600             | 15400     | 7600           | 15400     |
|                         |        | 625            | (43.1) | 9500             | 19300     | 9500             | 19300     | 9500           | 19300     |
|                         |        | 750            | (51.7) | 11400            | SONIC     | 11400            | 23100     | 11400          | 23100     |
|                         |        | 1000           | (69.0) | 15300            | SONIC     | 15300            | 30900     | 15300          | 30900     |
|                         |        | 1250           | (86.2) | 19100            | SONIC     | 19100            | SONIC     | 19100          | 38600     |
|                         |        | 1500           | (103)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 2000           | (137)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 2750           | (189)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | SONIC          | SONIC     |
| 75                      | (5.2)  | 500            | (34.5) | 10300            | 19500     | 10300            | 19500     | 10300          | 19500     |
|                         |        | 625            | (43.1) | 12800            | 24300     | 12800            | 24300     | 12800          | 24300     |
|                         |        | 750            | (51.7) | 15400            | 24300     | 15400            | 29200     | 15400          | 29200     |
|                         |        | 1000           | (69.0) | 20600            | SONIC     | 20600            | 39000     | 20600          | 39000     |
|                         |        | 1250           | (86.2) | 25800            | SONIC     | 25800            | 48800     | 25800          | 48800     |
|                         |        | 1500           | (103)  | SONIC            | SONIC     | 31000            | SONIC     | 31000          | 58800     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | 36200            | SONIC     | 36200          | 68700     |
|                         |        | 2000           | (137)  | SONIC            | SONIC     | 41500            | SONIC     | 41500          | 78700     |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | 46800            | SONIC     | 46800          | 88800     |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | SONIC            | SONIC     | 52200          | SONIC     |
|                         |        | 2750           | (189)  | SONIC            | SONIC     | SONIC            | SONIC     | 57500          | SONIC     |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | 62600          | SONIC     |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | 72800          | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | 82800          | SONIC     |
| 100                     | (6.9)  | 500            | (34.5) | 12400            | 22600     | 12400            | 22600     | 12400          | 22600     |
|                         |        | 625            | (43.1) | 15500            | 28300     | 15500            | 28300     | 15500          | 28300     |
|                         |        | 750            | (51.7) | 18600            | 34000     | 18600            | 34000     | 18600          | 34000     |
|                         |        | 1000           | (69.0) | 24800            | SONIC     | 24800            | 45400     | 24800          | 45400     |
|                         |        | 1250           | (86.2) | 31100            | SONIC     | 31100            | 56800     | 31100          | 56800     |
|                         |        | 1500           | (103)  | SONIC            | SONIC     | 37400            | SONIC     | 37400          | 68400     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | 43700            | SONIC     | 43700          | 80000     |
|                         |        | 2000           | (138)  | SONIC            | SONIC     | 50100            | SONIC     | 50100          | 91600     |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | 56500            | SONIC     | 56500          | 103300    |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | 63000            | SONIC     | 63000          | SONIC     |
|                         |        | 2750           | (190)  | SONIC            | SONIC     | SONIC            | SONIC     | 69400          | SONIC     |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | 75500          | SONIC     |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | 87900          | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | 100000         | SONIC     |
| 125                     | (8.6)  | 500            | (34.5) | 14700            | 25600     | 14700            | 25600     | 14700          | 25600     |
|                         |        | 625            | (43.1) | 18400            | 32100     | 18400            | 32100     | 18400          | 32100     |
|                         |        | 750            | (51.7) | 22100            | 38500     | 22100            | 38500     | 22100          | 38500     |
|                         |        | 1000           | (69.0) | 29400            | SONIC     | 29400            | 51400     | 29400          | 51400     |
|                         |        | 1250           | (86.2) | 36800            | SONIC     | 36800            | 64400     | 36800          | 64400     |
|                         |        | 1500           | (103)  | 44300            | SONIC     | 44300            | 77400     | 44300          | 77400     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | 51900            | SONIC     | 51900          | 90600     |
|                         |        | 2000           | (138)  | SONIC            | SONIC     | 59400            | SONIC     | 59400          | 103800    |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | 67000            | SONIC     | 67000          | 117100    |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | 74600            | SONIC     | 74600          | 130400    |
|                         |        | 2750           | (190)  | SONIC            | SONIC     | SONIC            | SONIC     | 82300          | SONIC     |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | 89600          | SONIC     |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | 104200         | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | 118500         | SONIC     |
| 150                     | (10.3) | 500            | (34.5) | 19700            | 31700     | 19700            | 31700     | 19700          | 31700     |
|                         |        | 625            | (43.1) | 24800            | 39800     | 24800            | 39800     | 24800          | 39800     |
|                         |        | 750            | (51.7) | 29800            | 47900     | 29800            | 47900     | 29800          | 47900     |
|                         |        | 1000           | (69.0) | 39700            | SONIC     | 39700            | 63900     | 39700          | 63900     |
|                         |        | 1250           | (86.2) | 49700            | SONIC     | 49700            | 79900     | 49700          | 79900     |
|                         |        | 1500           | (103)  | SONIC            | SONIC     | 59800            | SONIC     | 59800          | 96100     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | 70000            | SONIC     | 70000          | 112400    |
|                         |        | 2000           | (138)  | SONIC            | SONIC     | 80200            | SONIC     | 80200          | 128800    |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | 90400            | SONIC     | 90400          | 145300    |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | SONIC            | SONIC     | 100700         | 161900    |
|                         |        | 2750           | (190)  | SONIC            | SONIC     | SONIC            | SONIC     | 111100         | SONIC     |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | 120900         | SONIC     |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | 140700         | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | 158900         | SONIC     |
| 200                     | (13.8) | 500            | (34.5) | 22100            | 31100     | 22100            | 31100     | 22100          | 31100     |
|                         |        | 625            | (43.1) | 28100            | 39500     | 28100            | 39500     | 28100          | 39500     |
|                         |        | 750            | (51.7) | 34000            | 47800     | 34000            | 47800     | 34000          | 47800     |
|                         |        | 1000           | (69.0) | 45400            | 63900     | 45400            | 63900     | 45400          | 63900     |
|                         |        | 1250           | (86.2) | 56800            | SONIC     | 56800            | 79900     | 56800          | 79900     |
|                         |        | 1500           | (103)  | 68400            | SONIC     | 68400            | 96100     | 68400          | 96100     |
|                         |        | 1750           | (121)  | SONIC            | SONIC     | 80000            | 112400    | 80000          | 112400    |
|                         |        | 2000           | (138)  | SONIC            | SONIC     | 91600            | SONIC     | 91600          | 128800    |
|                         |        | 2250           | (155)  | SONIC            | SONIC     | 103300           | SONIC     | 103300         | 145300    |
|                         |        | 2500           | (172)  | SONIC            | SONIC     | 115100           | SONIC     | 115100         | 161900    |
|                         |        | 2750           | (190)  | SONIC            | SONIC     | SONIC            | SONIC     | 127000         | 178500    |
|                         |        | 3000           | (207)  | SONIC            | SONIC     | SONIC            | SONIC     | 138100         | 194300    |
|                         |        | 3500           | (241)  | SONIC            | SONIC     | SONIC            | SONIC     | 160800         | SONIC     |
|                         |        | 4000           | (276)  | SONIC            | SONIC     | SONIC            | SONIC     | 182800         | SONIC     |
| 250                     | (17.2) | 500            | (34.5) | 8300             | 16000     | 8300             | 16000     | 8300           | 16000     |
|                         |        | 625            | (43.1) | 10800            | 20700     | 10800            | 20700     | 10800          | 20700     |
|                         |        | 750            | (51.7) | 13200            | 25300     | 13200            | 25300     | 13200          | 25300     |
|                         |        | 1000           | (69.0) | 17700            | 34000     | 17700            | 34000     | 17700          | 34000     |
|                         |        | 1250           | (86.2) | 22200            | 42600     | 22200            | 42600     | 22200          | 42600     |
|                         |        | 1500           | (103)  | 26700            | 51300     | 26700            | 51300     | 26700          | 51300     |
|                         |        | 1750           | (121)  | 31200            | 60000     | 31200            | 60000     | 31200          | 60000     |
|                         |        | 2000           | (138)  | 35800            | 68700     | 35800            | 68700     | 35800          | 68700     |
|                         |        | 2250           | (155)  | 40400            | 77500     | 40400            | 77500     | 40400          | 77500     |
|                         |        | 2500           | (172)  | 45000            | SONIC     | 45000            | 86300     | 45000          | 86300     |
|                         |        | 2750           | (190)  | 49600            | SONIC     | 49600            | 95200     | 49600          | 95200     |
|                         |        | 3000           | (207)  | 54000            | SONIC     | 54000            | 103600    | 54000          | 103600    |
|                         |        | 3500           | (241)  | 62800            | SONIC     | 62800            | 120600    | 62800          | 120600    |
|                         |        | 4000           | (276)  | 71400            | SONIC     | 71400            | 137100    | 71400          | 137100    |

**NOTE:** Where "SONIC" is indicated within the above capacity tables, outlet velocity with Schedule 160 pipe has reached sonic velocity of 1118 fps. Additional flow cannot be obtained, and pipeline velocity is in excess of customary pipe velocity design limits. Flow will be approximately the last indicated value in the column above "SONIC".

**TABLE 7 (cont.)**  
**AIR CAPACITIES IN SCFH - (All Sizes)**  
**S.G. = 1.0 TEMP. = 60°F F<sub>L</sub> = .945**

| Outlet Flowing Pressure |         | Inlet Pressure |         | 1/2" (DN15) Body |           | 3/4" (DN20) Body |           | 1" (DN25) Body |           |
|-------------------------|---------|----------------|---------|------------------|-----------|------------------|-----------|----------------|-----------|
| psig                    | (Barg)  | psig           | (Barg)  | 10% Droop        | 20% Droop | 10% Droop        | 20% Droop | 10% Droop      | 20% Droop |
| 300                     | (20.7)  | 500            | (34.5)  | 8900             | 16900     | 8900             | 16900     | 8900           | 16900     |
|                         |         | 625            | (43.1)  | 12000            | 22700     | 12000            | 22700     | 12000          | 22700     |
|                         |         | 750            | (51.7)  | 14800            | 28000     | 14800            | 28000     | 14800          | 28000     |
|                         |         | 1000           | (69.0)  | 20100            | 38100     | 20100            | 38100     | 20100          | 38100     |
|                         |         | 1250           | (86.2)  | 25300            | 47900     | 25300            | 47900     | 25300          | 47900     |
|                         |         | 1500           | (103)   | 30400            | 57700     | 30400            | 57700     | 30400          | 57700     |
|                         |         | 1750           | (121)   | 35600            | 67500     | 35600            | 67500     | 35600          | 67500     |
|                         |         | 2000           | (138)   | 40800            | 77300     | 40800            | 77300     | 40800          | 77300     |
|                         |         | 2250           | (155)   | 46000            | 87200     | 46000            | 87200     | 46000          | 87200     |
|                         |         | 2500           | (172)   | 51300            | 97100     | 51300            | 97100     | 51300          | 97100     |
|                         |         | 2750           | (190)   | 56500            | SONIC     | 56500            | 107100    | 56500          | 107100    |
|                         |         | 3000           | (207)   | 61500            | SONIC     | 61500            | 116600    | 61500          | 116600    |
| 400                     | (27.6)  | 3500           | (241)   | 71600            | SONIC     | 71600            | 135600    | 71600          | 135600    |
|                         |         | 4000           | (276)   | 81400            | SONIC     | 81400            | 154200    | 81400          | 154200    |
|                         |         | 500            | (34.5)  | 9000             | 15500     | 9000             | 15500     | 9000           | 15500     |
|                         |         | 625            | (43.1)  | 14100            | 24100     | 14100            | 24100     | 14100          | 24100     |
|                         |         | 750            | (51.7)  | 18200            | 31300     | 18200            | 31300     | 18200          | 31300     |
|                         |         | 1000           | (69.0)  | 25600            | 44000     | 25600            | 44000     | 25600          | 44000     |
|                         |         | 1250           | (86.2)  | 32600            | 56000     | 32600            | 56000     | 32600          | 56000     |
|                         |         | 1500           | (103)   | 39400            | 67700     | 39400            | 67700     | 39400          | 67700     |
|                         |         | 1750           | (121)   | 46200            | 79300     | 46200            | 79300     | 46200          | 79300     |
|                         |         | 2000           | (138)   | 53000            | 90900     | 53000            | 90900     | 53000          | 90900     |
|                         |         | 2250           | (155)   | 59700            | 102500    | 59700            | 102500    | 59700          | 102500    |
|                         |         | 2500           | (172)   | 66600            | 114200    | 66600            | 114200    | 66600          | 114200    |
| 500                     | (34.5)  | 2750           | (190)   | 73400            | 126000    | 73400            | 126000    | 73400          | 126000    |
|                         |         | 3000           | (207)   | 79900            | SONIC     | 79900            | 137100    | 79900          | 137100    |
|                         |         | 3500           | (241)   | 92900            | SONIC     | 92900            | 159500    | 92900          | 159500    |
|                         |         | 4000           | (276)   | 105700           | SONIC     | 105700           | 181300    | 105700         | 181300    |
|                         |         | 625            | (43.1)  | 13500            | 22300     | 13500            | 22300     | 13500          | 22300     |
|                         |         | 750            | (51.7)  | 19600            | 32500     | 19600            | 32500     | 19600          | 32500     |
|                         |         | 1000           | (69.0)  | 29400            | 48800     | 29400            | 48800     | 29400          | 48800     |
|                         |         | 1250           | (86.2)  | 38100            | 63300     | 38100            | 63300     | 38100          | 63300     |
|                         |         | 1500           | (103.4) | 46500            | 77200     | 46500            | 77200     | 46500          | 77200     |
|                         |         | 1750           | (120.7) | 54800            | 90900     | 54800            | 90900     | 54800          | 90900     |
|                         |         | 2000           | (137.9) | 62900            | 104400    | 62900            | 104400    | 62900          | 104400    |
|                         |         | 2250           | (155.2) | 71000            | 117900    | 71000            | 117900    | 71000          | 117900    |
| 750                     | (51.7)  | 2500           | (172.4) | 79100            | 131300    | 79100            | 131300    | 79100          | 131300    |
|                         |         | 2750           | (189.6) | 87300            | 144800    | 87300            | 144800    | 87300          | 144800    |
|                         |         | 3000           | (206.9) | 95000            | 157600    | 95000            | 157600    | 95000          | 157600    |
|                         |         | 3500           | (241.4) | 110500           | SONIC     | 110500           | 183400    | 110500         | 183400    |
|                         |         | 4000           | (275.9) | 125700           | SONIC     | 125700           | 208500    | 125700         | 208500    |
|                         |         | 1000           | (69.0)  | 19800            | 34400     | 19800            | 34000     | 19800          | 34000     |
|                         |         | 1250           | (86.2)  | 29100            | 50000     | 29100            | 50000     | 29100          | 50000     |
|                         |         | 1500           | (103)   | 37200            | 63900     | 37200            | 63900     | 37200          | 63900     |
|                         |         | 1750           | (121)   | 44800            | 76800     | 44800            | 76800     | 44800          | 76800     |
|                         |         | 2000           | (138)   | 52000            | 89300     | 52000            | 89300     | 52000          | 89300     |
|                         |         | 2250           | (155)   | 59200            | 101500    | 59200            | 101500    | 59200          | 101500    |
|                         |         | 2500           | (172)   | 66200            | 113600    | 66200            | 113600    | 66200          | 113600    |
| 1000                    | (69.0)  | 2750           | (190)   | 73200            | 125700    | 73200            | 125700    | 73200          | 125700    |
|                         |         | 3000           | (207)   | 79800            | 136900    | 79800            | 136900    | 79800          | 136900    |
|                         |         | 3500           | (241)   | 92900            | 159500    | 92900            | 159500    | 92900          | 159500    |
|                         |         | 4000           | (276)   | 105700           | 181300    | 105700           | 181300    | 105700         | 181300    |
|                         |         | 1250           | (86.2)  | 18400            | 27600     | 18400            | 27600     | 18400          | 27600     |
|                         |         | 1500           | (103)   | 26800            | 40200     | 26800            | 40200     | 26800          | 40200     |
|                         |         | 1750           | (121)   | 33900            | 50900     | 33900            | 50900     | 33900          | 50900     |
|                         |         | 2000           | (138)   | 40400            | 60700     | 40400            | 60700     | 40400          | 60700     |
|                         |         | 2250           | (155)   | 46600            | 70000     | 46600            | 70000     | 46600          | 70000     |
|                         |         | 2500           | (172)   | 52700            | 79000     | 52700            | 79000     | 52700          | 79000     |
|                         |         | 2750           | (190)   | 58600            | 87900     | 58600            | 87900     | 58600          | 87900     |
|                         |         | 3000           | (207)   | 64100            | 96200     | 64100            | 96200     | 64100          | 96200     |
| 1500                    | (103.4) | 3500           | (241)   | 75100            | 112600    | 75100            | 112600    | 75100          | 112600    |
|                         |         | 4000           | (276)   | 85600            | 128400    | 85600            | 128400    | 85600          | 128400    |
|                         |         | 1750           | (121)   | 21700            | 41600     | 21700            | 41600     | 21700          | 41600     |
|                         |         | 2000           | (138)   | 31300            | 60000     | 31300            | 60000     | 31300          | 60000     |
|                         |         | 2250           | (155)   | 39200            | 75000     | 39200            | 75000     | 39200          | 75000     |
|                         |         | 2500           | (172)   | 46300            | 88600     | 46300            | 88600     | 46300          | 88600     |
|                         |         | 2750           | (190)   | 52900            | 101200    | 52900            | 101200    | 52900          | 101200    |
|                         |         | 3000           | (207)   | 58900            | 112800    | 58900            | 112800    | 58900          | 112800    |
|                         |         | 3500           | (241)   | 70500            | 135000    | 70500            | 135000    | 70500          | 135000    |
|                         |         | 4000           | (276)   | 81400            | 155700    | 81400            | 155700    | 81400          | 155700    |
|                         |         | 2250           | (155)   | 32500            | 55400     | 32500            | 55400     | 32500          | 55400     |
|                         |         | 2500           | (172)   | 46600            | 79600     | 46600            | 79600     | 46600          | 79600     |
| 2000                    | (137.9) | 2750           | (190)   | 58000            | 99000     | 58000            | 99000     | 58000          | 99000     |
|                         |         | 3000           | (207)   | 67800            | 115700    | 67800            | 115700    | 67800          | 115700    |
|                         |         | 3500           | (241)   | 85200            | 145500    | 85200            | 145500    | 85200          | 145500    |
|                         |         | 4000           | (276)   | 100800           | 172100    | 100800           | 172100    | 100800         | 172100    |
|                         |         | 2750           | (190)   | 42700            | 70900     | 42700            | 70900     | 42700          | 70900     |
|                         |         | 3000           | (207)   | 60800            | 100900    | 60800            | 100900    | 60800          | 100900    |
|                         |         | 3500           | (241)   | 87700            | 145500    | 87700            | 145500    | 87700          | 145500    |
|                         |         | 4000           | (276)   | 109300           | 181400    | 109300           | 181400    | 109300         | 181400    |
|                         |         | 3500           | (241)   | 79000            | 124200    | 79000            | 124200    | 79000          | 124200    |
|                         |         | 4000           | (276)   | 113200           | 177800    | 113200           | 177800    | 113200         | 177800    |
|                         |         | 2750           | (190)   | 42700            | 70900     | 42700            | 70900     | 42700          | 70900     |
| 2500                    | (172.4) | 3000           | (207)   | 60800            | 100900    | 60800            | 100900    | 60800          | 100900    |
|                         |         | 3500           | (241)   | 87700            | 145500    | 87700            | 145500    | 87700          | 145500    |
|                         |         | 4000           | (276)   | 109300           | 181400    | 109300           | 181400    | 109300         | 181400    |
|                         |         | 3500           | (241)   | 79000            | 124200    | 79000            | 124200    | 79000          | 124200    |
|                         |         | 4000           | (276)   | 113200           | 177800    | 113200           | 177800    | 113200         | 177800    |
|                         |         | 2750           | (190)   | 42700            | 70900     | 42700            | 70900     | 42700          | 70900     |
|                         |         | 3000           | (207)   | 60800            | 100900    | 60800            | 100900    | 60800          | 100900    |
|                         |         | 3500           | (241)   | 87700            | 145500    | 87700            | 145500    | 87700          | 145500    |
|                         |         | 4000           | (276)   | 109300           | 181400    | 109300           | 181400    | 109300         | 181400    |
|                         |         | 3500           | (241)   | 79000            | 124200    | 79000            | 124200    | 79000          | 124200    |
|                         |         | 4000           | (276)   | 113200           | 177800    | 113200           | 177800    | 113200         | 177800    |
|                         |         | 2750           | (190)   | 42700            | 70900     | 42700            | 70900     | 42700          | 70900     |
| 3000                    | (206.9) | 3000           | (207)   | 60800            | 100900    | 60800            | 100900    | 60800          | 100900    |
|                         |         | 3500           | (241)   | 87700            | 145500    | 87700            | 145500    | 87700          | 145500    |

Metric Conversion Factor: SCFH / 35.31 = Sm³/Hr; SCFH / 37.32 = Nm³/Hr

**TABLE 8**  
**WATER CAPACITIES IN GPM - (All Sizes)**  
**S.G. = 1.0 TEMP. = 60°F F<sub>L</sub> =.945**

| Outlet Flowing Pressure |        | Inlet Pressure |        | 1/2" (DN15) Body |           | 3/4" (DN20) Body |           | 1" (DN25) Body |           |
|-------------------------|--------|----------------|--------|------------------|-----------|------------------|-----------|----------------|-----------|
| psig                    | (Barg) | psig           | (Barg) | 10% Droop        | 20% Droop | 10% Droop        | 20% Droop | 10% Droop      | 20% Droop |
| 50                      | (3.4)  | 500            | (34.5) | 9.1              | 18.5      | 9.1              | 18.5      | 9.1            | 18.5      |
|                         |        | 625            | (43.1) | CAV              | CAV       | CAV              | CAV       | CAV            | CAV       |
| 75                      | (5.2)  | 500            | (34.5) | 12.0             | 22.7      | 12.0             | 22.7      | 12.0           | 22.7      |
|                         |        | 625            | (43.1) | 13.6             | 25.8      | 13.6             | 25.8      | 13.6           | 25.8      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
|                         |        | 875            | (60.3) | CAV              | CAV       | CAV              | CAV       | CAV            | CAV       |
| 100                     | (6.9)  | 500            | (34.5) | 14.0             | 25.6      | 14.0             | 25.6      | 14.0           | 25.6      |
|                         |        | 625            | (43.1) | 16.0             | 29.3      | 16.0             | 29.3      | 16.0           | 29.3      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 125                     | (8.6)  | 500            | (34.5) | 16.1             | 28.1      | 16.1             | 28.1      | 16.1           | 28.1      |
|                         |        | 625            | (43.1) | 18.6             | 32.4      | 18.6             | 32.4      | 18.6           | 32.4      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 150                     | (10.3) | 500            | (34.5) | 21.0             | 33.7      | 21.0             | 33.7      | 21.0           | 33.7      |
|                         |        | 625            | (43.1) | 24.4             | 39.2      | 24.4             | 39.2      | 24.4           | 39.2      |
|                         |        | 750            | (51.7) | 27.4             | 44.1      | 27.4             | 44.1      | 27.4           | 44.1      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 200                     | (13.8) | 500            | (34.5) | 22.2             | 31.2      | 22.2             | 31.2      | 22.2           | 31.2      |
|                         |        | 625            | (43.1) | 26.4             | 37.1      | 26.4             | 37.1      | 26.4           | 37.1      |
|                         |        | 750            | (51.7) | 30.0             | 42.2      | 30.0             | 42.2      | 30.0           | 42.2      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 250                     | (17.2) | 500            | (34.5) | 7.9              | 15.2      | 7.9              | 15.2      | 7.9            | 15.2      |
|                         |        | 625            | (43.1) | 9.7              | 18.6      | 9.7              | 18.6      | 9.7            | 18.6      |
|                         |        | 750            | (51.7) | 11.2             | 21.5      | 11.2             | 21.5      | 11.2           | 21.5      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 300                     | (20.7) | 500            | (34.5) | 8.1              | 15.3      | 8.1              | 15.3      | 8.1            | 15.3      |
|                         |        | 625            | (43.1) | 10.3             | 19.5      | 10.3             | 19.5      | 10.3           | 19.5      |
|                         |        | 750            | (51.7) | 12.1             | 22.9      | 12.1             | 22.9      | 12.1           | 22.9      |
|                         |        | 875            | (60.3) | 13.7             | 25.9      | 13.7             | 25.9      | 13.7           | 25.9      |
|                         |        | 1000           | (69.0) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |

NOTE: Where "CAV" is indicated within the above capacity tables, the water has reached full cavitation, and flow is choked.

Metric Conversion Factor: GPM X 3.785 = LPM

**TABLE 9**  
**OIL CAPACITIES IN GPM - (All Sizes)**  
**S.G. = 0.85 TEMP. = 60°F F<sub>L</sub> =.945**

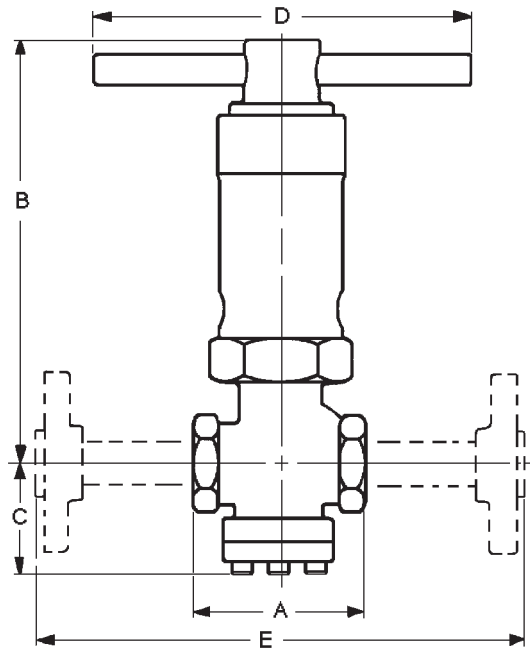
| Outlet Flowing Pressure |        | Inlet Pressure |        | 1/2" (DN15) Body |           | 3/4" (DN20) Body |           | 1" (DN25) Body |           |
|-------------------------|--------|----------------|--------|------------------|-----------|------------------|-----------|----------------|-----------|
| psig                    | (Barg) | psig           | (Barg) | 10% Droop        | 20% Droop | 10% Droop        | 20% Droop | 10% Droop      | 20% Droop |
| 50                      | (3.4)  | 500            | (34.5) | 9.7              | 19.7      | 9.7              | 19.7      | 9.7            | 19.7      |
|                         |        | 625            | (43.1) | CAV              | CAV       | CAV              | CAV       | CAV            | CAV       |
| 75                      | (5.2)  | 500            | (34.5) | 12.7             | 24.2      | 12.7             | 24.2      | 12.7           | 24.2      |
|                         |        | 625            | (43.1) | 14.5             | 27.5      | 14.5             | 27.5      | 14.5           | 27.5      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 100                     | (6.9)  | 500            | (34.5) | 14.9             | 27.3      | 14.9             | 27.3      | 14.9           | 27.3      |
|                         |        | 625            | (43.1) | 17.1             | 31.3      | 17.1             | 31.3      | 17.1           | 31.3      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 125                     | (8.6)  | 500            | (34.5) | 17.1             | 29.9      | 17.1             | 29.9      | 17.1           | 29.9      |
|                         |        | 625            | (43.1) | 19.8             | 34.6      | 19.8             | 34.6      | 19.8           | 34.6      |
|                         |        | 750            | (51.7) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 150                     | (10.3) | 500            | (34.5) | 22.3             | 35.9      | 22.3             | 35.9      | 22.3           | 35.9      |
|                         |        | 625            | (43.1) | 26.0             | 41.8      | 26.0             | 41.8      | 26.0           | 41.8      |
|                         |        | 750            | (51.7) | 29.2             | 47.0      | 29.2             | 47.0      | 29.2           | 47.0      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 200                     | (13.8) | 500            | (34.5) | 23.6             | 33.2      | 23.6             | 33.2      | 23.6           | 33.2      |
|                         |        | 625            | (43.1) | 28.1             | 39.6      | 28.1             | 39.6      | 28.1           | 39.6      |
|                         |        | 750            | (51.7) | 32.0             | 45.0      | 32.0             | 45.0      | 32.0           | 45.0      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 250                     | (17.2) | 500            | (34.5) | 8.4              | 16.2      | 8.4              | 16.2      | 8.4            | 16.2      |
|                         |        | 625            | (43.1) | 10.3             | 19.8      | 10.3             | 19.8      | 10.3           | 19.8      |
|                         |        | 750            | (51.7) | 11.9             | 22.9      | 11.9             | 22.9      | 11.9           | 22.9      |
|                         |        | 875            | (60.3) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |
| 300                     | (20.7) | 500            | (34.5) | 8.6              | 16.3      | 8.6              | 16.3      | 8.6            | 16.3      |
|                         |        | 625            | (43.1) | 11.0             | 20.8      | 11.0             | 20.8      | 11.0           | 20.8      |
|                         |        | 750            | (51.7) | 12.9             | 24.4      | 12.9             | 24.4      | 12.9           | 24.4      |
|                         |        | 875            | (60.3) | 14.6             | 27.6      | 14.6             | 27.6      | 14.6           | 27.6      |
|                         |        | 1000           | (69.0) | HI DP            | HI DP     | HI DP            | HI DP     | HI DP          | HI DP     |

NOTE: Where "CAV" is indicated within the above capacity tables, the oil has reached full cavitation, and flow is choked.

Metric Conversion Factor: GPM X 3.785 = LPM

**TABLE 10**  
**STAINLESS STEEL FLANGED PRESSURE vs. TEMPERATURE RATINGS – ASME B31.3**

| Temperature<br>°F | English Units            |      |      |      | Metric Units |      |       |       | Temperature<br>°C |
|-------------------|--------------------------|------|------|------|--------------|------|-------|-------|-------------------|
|                   | Working Pressure Classes |      |      |      |              |      |       |       |                   |
|                   | 300                      | 600  | 900  | 1500 | 300          | 600  | 900   | 1500  |                   |
|                   | psig                     | psig | psig | psig | Barg         | Barg | Barg  | Barg  |                   |
| -20 to +100       | 720                      | 1440 | 2160 | 3600 | 49.6         | 99.3 | 148.9 | 248.2 | -29 to +38        |
| 200               | 620                      | 1240 | 1860 | 3095 | 42.7         | 85.5 | 128.2 | 213.4 | 94                |
| 300               | 560                      | 1120 | 1680 | 2795 | 38.6         | 77.2 | 115.8 | 192.7 | 149               |
| 400               | 515                      | 1025 | 1540 | 2570 | 35.5         | 70.7 | 106.2 | 177.2 | 205               |



| Size<br>(Inches) | DIMENSIONS – ENGLISH UNITS (In) |       |      |       |       |       | Shipping<br>Weight ***<br>(lb) |
|------------------|---------------------------------|-------|------|-------|-------|-------|--------------------------------|
|                  | A                               | B     | C    | D     | E *   | E **  |                                |
| 1/2"             | 4.50                            | 11.00 | 3.25 | 10.00 | 13.00 | 14.00 | 27                             |
| 3/4"             |                                 |       |      |       |       |       |                                |
| 1"               |                                 |       |      |       |       |       |                                |
| Size<br>(DN)     | DIMENSIONS – METRIC UNITS (mm)  |       |      |       |       |       | Shipping<br>Weight ***<br>(kg) |
|                  | A                               | B     | C    | D     | E *   | E **  |                                |
| (15)             | 114                             | 279   | 85   | 254   | 330   | 356   | 12.2                           |
| (20)             |                                 |       |      |       |       |       |                                |
| (25)             |                                 |       |      |       |       |       |                                |

\* Opt -30 Face-to-face dimensions are the same for all flange pressure classes.

\*\* Opt -34 Special 14" face to face flanged dim for all flange pressure classes.

\*\*\* Weights do not include flanges.

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## NOTES

The contents of this publication are presented for informational purposes only, and while every effort has been made to ensure their accuracy, they are not to be construed as warranties or guarantees, express or implied, regarding the products or services described herein or their use or applicability. We reserve the right to modify or improve the designs or specifications of such product at any time without notice. Cashco does not assume responsibility for the selection, use or maintenance of any product. Responsibility for proper selection, use and maintenance of any Cashco product remains solely with the purchaser.

# MODEL 345 PRODUCT CODER 02/07/20

An "X" in POS 12 followed by a 5-digit control number overrides remaining selections.

|          |       |       |   |       |           |          |   |        |        |        |             |        |           |
|----------|-------|-------|---|-------|-----------|----------|---|--------|--------|--------|-------------|--------|-----------|
| <b>0</b> | POS 2 | POS 3 | — | POS 5 | POS 6 & 7 | <b>7</b> | — | POS 10 | POS 11 | POS 12 | <b>0000</b> | POS 16 | <b>0B</b> |
|----------|-------|-------|---|-------|-----------|----------|---|--------|--------|--------|-------------|--------|-----------|

| POSITION 2 - GASKETS * & SERVICE                                                |         |          |
|---------------------------------------------------------------------------------|---------|----------|
| Gaskets - Service                                                               | Options | CODE     |
| Standard : Graphite / NBR - Non-Oxygen                                          | --      | <b>B</b> |
| FKM - Primarily for Oxygen                                                      | -45     | <b>D</b> |
| * Refer to Tech Bulletin for temperature limits.<br>(S3S Trim has Gylon gasket) |         |          |

| POSITION 3 - SIZES |      |          |
|--------------------|------|----------|
| Size               |      | CODE     |
| in                 | (DN) |          |
| 1/2"               | (15) | <b>4</b> |
| 3/4"               | (20) | <b>5</b> |
| 1"                 | (25) | <b>6</b> |

| POSITION 5 - BODY / SPRING CHAMBER MATERIALS     |          |
|--------------------------------------------------|----------|
| Body / Sp. Ch.                                   | CODE     |
| Al Brz/Brz<br>(Not for use with oxygen service.) | <b>K</b> |
| SST/Brz                                          | <b>L</b> |

| POSITION 6 & 7 - TRIM DESIGNATION NUMBERS |           |          |           |
|-------------------------------------------|-----------|----------|-----------|
| Stainless Steel Trim                      |           |          |           |
| Unbalanced                                |           | Balanced |           |
| Desig.                                    | CODE      | Desig.   | CODE      |
| S1                                        | <b>S1</b> | S3       | <b>S3</b> |
|                                           |           | S3B      | <b>3B</b> |
|                                           |           | S3E      | <b>3E</b> |
|                                           |           | S3Y      | <b>3Y</b> |
|                                           |           | S3S      | <b>3S</b> |

| POSITION 10 - END CONNECTIONS                                     |          |
|-------------------------------------------------------------------|----------|
| Description                                                       | CODE     |
| NPT - Screwed                                                     | <b>1</b> |
| -30 Opt.- 300 LB RF Flgs. *                                       | <b>7</b> |
| -30 Opt.- 600 LB RF Flgs. *                                       | <b>8</b> |
| -30 Opt.- 900 LB RF Flgs. *                                       | <b>9</b> |
| -30 Opt.- 1500 LB RF Flgs. *                                      | <b>A</b> |
| -34 Opt. - 300 LB RF Flgs. 14" F to F Dim. *                      | <b>W</b> |
| -34 Opt. - 600 LB RF Flgs. 14" F to F Dim. *                      | <b>Y</b> |
| -34 Opt. - 900 LB RF Flgs. 14" F to F Dim. *                      | <b>Z</b> |
| -34 Opt. - 1500 LB RF Flgs. 14" F to F Dim. *                     | <b>U</b> |
| * Nipples & flanges of same material as body.<br>SST bodies only. |          |

| POSITION 11 - RANGE SPRINGS                                                                |             |          |
|--------------------------------------------------------------------------------------------|-------------|----------|
| Steel Range Spring                                                                         |             | CODE     |
| psig                                                                                       | (Barg)      |          |
| 50 - 150 *                                                                                 | (3.4-10.3)  | <b>1</b> |
| 125 - 250 *                                                                                | (8.6-17.2)  | <b>2</b> |
| 200 - 600                                                                                  | (13.8-41.4) | <b>3</b> |
| 500 -1000                                                                                  | (34.5-69.0) | <b>4</b> |
| 900 -3000 **                                                                               | (62-207)    | <b>5</b> |
| * DO NOT use with S1 Trim.<br>** 900 - 3000 psig range spring not available with S3S Trim. |             |          |

| POSITION 12 - FEATURE OPTIONS                                        |        |          |
|----------------------------------------------------------------------|--------|----------|
| Description                                                          | Option | CODE     |
| No Option                                                            | -      | <b>0</b> |
| Stellited Seat Surfaces (SST S1 Trim Only).                          | -15    | <b>A</b> |
| For Special Construction<br>Contact Cashco for Special Product Code. | SPQ    | <b>X</b> |

| POSITION 16 - CERTIFICATE OPTIONS                                            |        |          |
|------------------------------------------------------------------------------|--------|----------|
| Description                                                                  | Option | CODE     |
| No Option                                                                    | -      | <b>0</b> |
| * Special Cleaning: Per Cashco Spec #S-1134.<br>Suitable for Oxygen Service. | -55    | <b>M</b> |
| Special Cleaning: Per Cashco Spec #S-1542.                                   | -56    | <b>N</b> |
| * For use with SST bodies only. Must use Code D in Position 2.               |        |          |

**\* For information on ATEX see pages 8 & 9 on the IOM.**

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