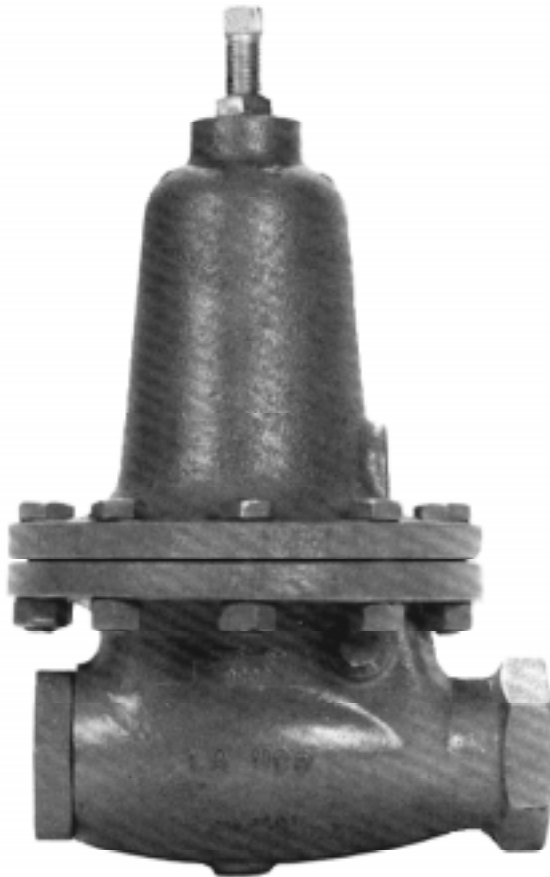




# MODEL 1000HP

## PROCESS PRESSURE REDUCING REGULATOR



Model 1000HP

### APPLICATIONS

Used primarily in utilities services – saturated steam, superheated steam, industrial gases, fuel oils, compressed air, or water condensate. Also used in sour gas, chemical and other process services.

Refer to technical bulletin 1000HP-DIFF-TB for differential pressure applications. Refer to technical bulletin 1000HP-CRYO-TB for cryogenic reducer applications.

Refer to technical bulletins 1000LP-BASIC-TB and 1000LP-DIFF-TB for the low pressure (LP) variation of the Model 1000 products.

Refer to technical bulletin 1000HP-H-TB for the high inlet pressure variation of the Model 1000 products.

The Model 1000HP is a high capacity, high pressure regulator used to control downstream pressure between 10 and 300 psig (0.69 and 20.7 Barg). Available in sizes from 1/2" thru 2" (DN15 thru DN50).

The unique internals design allows use in a multitude of applications, including process fluids, that normal pressure reducing regulators can not match. The most versatile self-contained, pressure reducing regulator available to users.

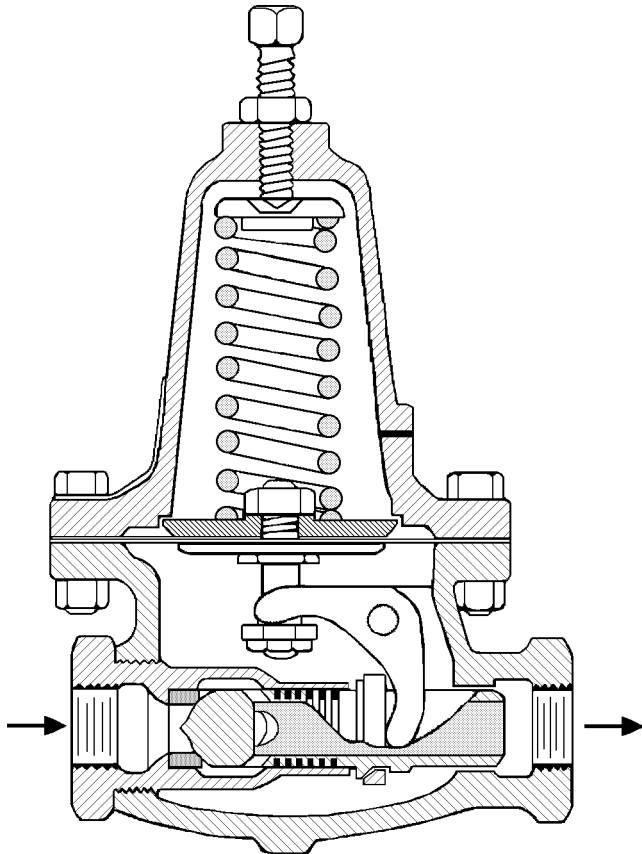
### FEATURES

- |                                   |                                                                                                                                                                                                                                                     |
|-----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Streamlined Flow Path:</b>     | Straight-thru flow path reduces internal turbulence and resistance to flow, increasing stability and capacity.                                                                                                                                      |
| <b>High Inlet Pressures:</b>      | Standard construction allows inlet pressures up to 740 psig (51.0 Barg).                                                                                                                                                                            |
| <b>High Outlet Pressures:</b>     | Controlled outlet pressure up to 300 psig (20.7 Barg).                                                                                                                                                                                              |
| <b>High Pressure Drop:</b>        | Standard construction with extended guiding allows pressure drop up to 650 psid (44.8 Bard). This regulator is routinely applied in severe service conditions.                                                                                      |
| <b>Flow-to-Open Plug:</b>         | Provides unmatched rangeability – far greater than competitive flow-to-close designs. Highly stable at either high or low flow rates.                                                                                                               |
| <b>Versatility:</b>               | Four body materials and 15 trim material selections allow usage in a multitude of various fluids. Optional constructions extend the capability.                                                                                                     |
| <b>Protected Diaphragm Zone:</b>  | Internal arrangement isolates the diaphragm from direct impingement, negating any flow induced instability at either low or high flow rates. Allows incorporation of dynamic boost from jet section. Uniformly registers pressure on the diaphragm. |
| <b>Non-Asbestos Construction:</b> | Standard construction provides all gaskets of non-asbestos materials.                                                                                                                                                                               |
| <b>Diaphragm Travel Stops:</b>    | Incorporates mechanical stop in spring chamber to limit diaphragm uptravel and in body for downtravel, minimizing potential internal damage from over-travel conditions.                                                                            |

## PRINCIPLES OF OPERATION

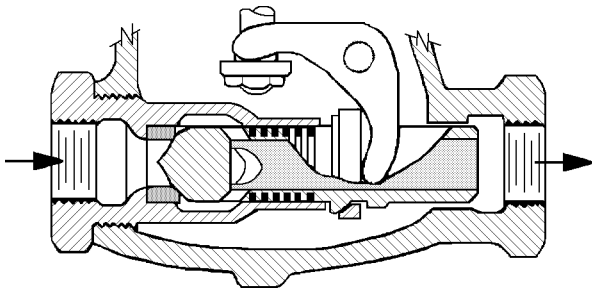
The Model 1000HP is a unique pressure reducing regulator in its design. The major design features are:

- A. Flow-to-Open (FTO) plug design.
- B. Inlet pressure contained in cylinder.
- C. Dynamic boost zone.
- D. Flow isolated diaphragm.
- E. High outlet pressure capability.



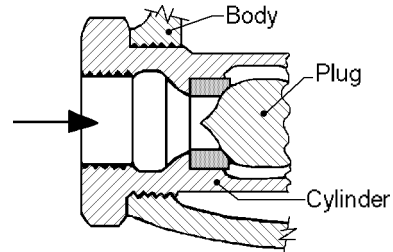
**Figure 1**  
Model 1000HP – Metal Seat

- A. FTO Plug Design. Model 1000HP incorporates an internals design that has the higher inlet pressure tending to push the plug open, allowing for greater stability at low flow rates, increasing rangeability.



**Figure 2**  
1000HP @ Lower Body

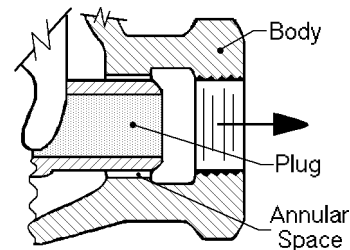
- B. Inlet Pressure in Cylinder. Model 1000HP's design has all the higher inlet pressure contained within the cylinder, and the cylinder is a separate casting from the body. This allows for much higher inlet pressure levels – up to 740 psig (51.0 Barg).



**Figure 3**  
1000HP @ Body Inlet

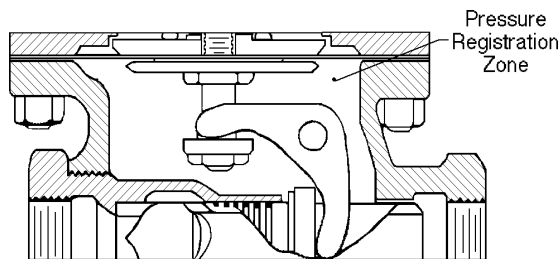
- C. Dynamic Boost Zone. At the point where the flow exits the plug, a velocity decrease occurs due to the increase in cross-sectional area. By proper location of the plug's exit and proper clearance of the annular space between the body and the plug, 1000HP is able to take extra advantage of the "dynamic boost" or "jet effect" that results. The principle is simply an application of Bernoulli's principles – at a point of increasing velocity, the static pressure decreases. The "jet effect" produces a lower registration pressure to the diaphragm, pulling the diaphragm down, allowing the plug to open further, increasing flow capacity.

Each regulator selection requires that the proper "jet" be selected – liquid, gas (vapor), or viscous liquid.



**Figure 4**  
1000HP @ Body Outlet

- D. Flow Isolated Diaphragm. The 1000HP's design never has flow directly contacting the diaphragm. This allows for effective use of the "jet effect", and does not allow turbulence to create false registration pressure effects directly on the diaphragm.



**Figure 5**  
1000HP @ Pressure Registration Zone

E. **High Outlet Pressure.** 1000HP allows for setpoint pressure levels thru a range of 10–300 psig (0.7–20.7 Barg) for sizes 1/2"–1" (DN15–25), and 10–225 psig (0.7–15.5 Barg) for sizes 1-1/4" & 1-1/2" (DN 32 and 40). Only size 2" (DN50) is limited to 150 psig (10.3 Barg).

F. **Summary:**

1. High inlet pressure capability.
2. High rangeability.
3. Stability at high and low flow.
4. High capacity.
5. Broad controlled pressure range.

**Limitations.** Because of Model 1000HP's FTO design, the fixed ratio of diaphragm area-to-port area limits the ratio of inlet pressure-to-outlet pressure level. For example, a 1/2" (DN15) body size, with full port, a setpoint pressure of 10 psig (0.7 Barg), and metal seat and diaphragm, will limit the maximum inlet pressure to 215 psig (14.8 Barg) (see Table 11). Only by three methods can the maximum inlet pressure be increased:

1. Use of reduced port.
2. Use of composition seat.
3. Increase setpoint pressure.

1 & 2. **Reduced Port and Use of Composition Seat.** Using a single-step reduced port (Opt.-12) with the 1/2" (DN15) unit, a setpoint pressure of 10 psig (0.7 Barg) allows a maximum inlet pressure of 270 psig (18.6 Barg) for a metal seated design, or a maximum of 300 psig (20.7 Barg) for a composition seat design (see Table 12).

3. **Increase Setpoint Pressure.** If the process can be varied, just by increasing the setpoint pressure to 20 psig (1.4 Barg), the same 1/2" (DN15) full port unit with metal seat and diaphragm can handle a maximum inlet pressure of 450 psig (31.0 Barg) (See Table 11).

## STANDARD/GENERAL SPECIFICATIONS

**Body Sizes:** 1/2", 3/4", 1", 1-1/4", 1-1/2" and 2"; (DN15, 20, 25, 32, 40 and 50).

**End Connections:** Standard – NPT female.  
Opt-31: BSP female.  
Opt-30: 150# or 300# RF flanged.  
Opt-32: Extended plain end pipe nipples.

**Body/Spring Chamber Material Combinations:** Uniform – CI/CI, BRZ/BRZ, CS/CS and SST/SST.  
Combinations – CS/CI, BRZ/CI, SST/CI and SST/CS.

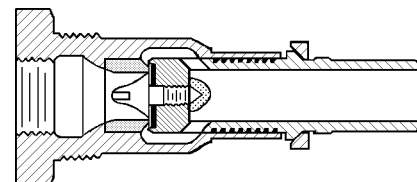
CI = Cast grey iron  
CS = Cast carbon steel  
BRZ = Cast bronze  
SST = Cast stainless steel

See Table 5 for material specifications.

**NOTE:** 1-1/4" SST body is not available.

**Trim Designs:** Metal seated (see Figure 1) or composition seat (see Figure 6). Metal or composition diaphragms.

"B\_" series designations – BRZ, BR, SST; see Table 7 for materials.  
"S\_" series designations – SST, CS; see Table 8 for materials.



**Figure 6:** Composition Seat Design

**Body/Cylinder Material Combinations:** CI/BRZ, CI/SST, CI/CS \*.  
BRZ/BRZ.  
CS/SST, CS/CS \*.  
SST/SST.  
\* 2" (DN50) body size only; carbon steel barstock cylinder.

**Maximum Inlet Pressure:** Dependent only on cylinder material and type of end connection (See Table 16):  
 BRZ – 400 psig (27.6 Barg);  
 SST – 740 psig (51.0 Barg);  
 CS \* – 740 psig (51.0 Barg).  
 \* 2" (DN50) body size only; carbon steel barstock cylinder.

**NOTES:** 1. 1000HP is a flow-to-open (FTO) design; this places an upper limitation on inlet pressure for a given outlet pressure setting.  
 2. Pressure/temperature ratings are reduced for Opt-37 and -37S due to use of SST bolting.

**Temperature Range:** Standard: For body/cylinder/spring chamber construction with:  
any BRZ materials –  
 -20° to +400°F (-29° to +205°C).  
any CI, CS or SST materials –  
 -20° to +450°F (-29° to +232°C)  
Optional: For body/cylinder/spring chamber construction with Opt-46 asbestos gasket:  
all CS or SST materials –  
 -20° to +600°F (-29° to +315°C).  
**NOTE:** Composition trim materials may lower above ranges.

**Outlet Pressure Range:** See Table 2 for individual range spring span.

Body Size In (mm)	Full Range psig (Barg)	Number of Range Springs
1/2" (DN15)	10–300 (0.7–20.7)	5
3/4" (DN20)		6
1" (DN25)		6
1-1/4" (DN32)	10–225 (0.7–15.5)	5
1-1/2" (DN40)		4
2" (DN50)	10–150 (0.7–10.3)	3

**NOTES:** 1. 1000HP is a flow-to-open (FTO) design; this places a lower limitation on outlet pressure setting for some inlet pressure levels.  
 2. Opt-37 and -37S use SST range springs, reducing number of range spring choices available.

**Maximum Pressure Drop:** Metal Seated Designs:  
 “B\_” series trim designations – up to 390 psid (26.9 Bard).  
 “S\_” series trim designations – up to 650 psid (44.8 Bard).

Composition Seat Designs:  
 “B\_” series trim designations – up to 390 psid (26.9 Bard).  
 “S\_” series trim designations – up to 650 psid (44.8 Bard).

**Minimum Pressure Drop:** Standard:  $\Delta P > 5$  psid (0.34 Bard)  
Opt-17:  $\Delta P \leq 1-5$  psid (0.07-0.34 Bard)  
 Minimum = 1 psid (0.07 Bard).

**Seat Leakage:** Meets ANSI/FCI 70-2 (Rev. 1991).  
Metal Seated – Class IV.  
Composition Seat – Class VI.

See Tables 9 thru 12 for flow capacity expressed in Cv’s for full port and 1-step reduced port (Opt-12).

Fluid	Table No.
Water	12
Air	13
Saturated Steam	14

See Table 3 for “Wide Open Cv”; use for sizing of safety relief device.

**Range Springs:** Standard: Heat treated steel, zinc plated.  
Opt-37 and -37S: SST.

**Diaphragm Flange Bolting:** Standard: High strength, zinc plated, heat treated steel. For all body/spring chamber materials.  
Opt-37 and -37S: SST.

**Gaskets:** Required for metal diaphragm constructions only; not required for composition diaphragm construction.

Standard: NON-ASBESTOS; Graphite/NBR. (Not suitable for oxygen service.)

$T_{max} = 450^{\circ}F$  (232°C)

Opt-45: TFE gaskets for oxygen service or as alternate.

$T_{max} = 400^{\circ}F$  (205°C).

Opt-46: Alternate asbestos gaskets.  $T_{max} = 600^{\circ}F$  (315°C).

**Painting:** CI and CS externals: Enamel per Cashco Spec. #S-1545.  
SST and BRZ externals: None.

Opt-95: Epoxy per Cashco Spec #S-1547.

**NOTE:** Refer to OPTION SPECIFICATIONS for alternate/extra design options, and to TECHNICAL SPECIFICATIONS for a more complete description of the above specifications.

## OPTION SPECIFICATIONS

**Option -1:** CLOSING CAP. A removeable ductile iron cap discourages tampering with spring setting. Available only with Cl or CS spring chamber materials. Includes a gasket for sealing the closing cap to the spring chamber, a sealing lock nut and a 1/4" NPT female vent connection.

**Option -1+6:** DIFFERENTIAL CONSTRUCTION.  
**Option -1+8:** Refer to Technical Bulletin 1000HP-DIFF-TB for technical information for differential pressure applications.

**Option -3:** MANUAL ADJUSTOR AND LOCKING LEVER. Use when frequent spring range settings are required. For sizes 1/2", 3/4" and 1" (DN15, 20 and 25) adjusting screw has handwheel fixed to end, and locking nut is replaced by a locking lever that is easily loosened/tightened. For sizes 1-1/4", 1-1/2" and 2" (DN32, 40, 50) handwheel is replaced by T-bar adjustor.

**Option -5:** BRZ/BR CRYOGENIC CONSTRUCTION. Refer to Technical Bulletin 1000HP-CRYO-TB for technical information for cryogenic applications.

**Option -12:** REDUCED PORT ORIFICE. Used when high inlet pressure negates use of the standard full port orifice. Also used when oversized body is desired to accommodate piping size. Available in metal seated or composition seat materials, in all "B\_" or "S\_" series trim designations, and in all body sizes except 1-1/4" (DN32). See Tables 10 and 12 for flow capacity in Cv's.

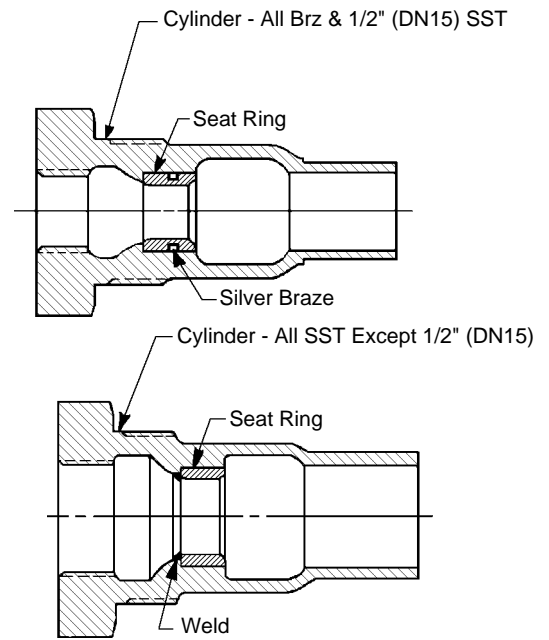
**Option -14:** INTEGRAL SEAT. Standard pressed-in seat ring-to-cylinder joint is sealed as a path of leakage by brazing or welding. The procedure also serves as a permanent joint for flow conditions where service conditions are "severe", subject to vibration, or thermal cycling.

Seat ring is silver brazed to cylinder for all "B\_" series trim designations, and to 1/2" (DN15) body size cylinders with "S\_" series trim designations. For all other body sizes with "S\_" series

designations the seat ring is welded to the cylinder.

Recommended for all hydrogen or helium applications. Recommended when pressure drop exceeds 300 psid (20.7 Bard). Required when pressure drop exceeds 450 psid (31.0 Bard).

**NOTE:** Opt-14 is now included whenever Opt-15, stellite seat surfaces is specified.



**Figure 7:**  
Opt-14 Integral Seat

**Option -15:** STELLITED SEAT SURFACES. Available with metal seated S1 trim only, and with full port orifice or Opt-12 reduced port orifice. Both plug face and seat ring's seat edge are coated with stellite hard surfacing using a flame spray process. Always includes integral seat ring Opt-14 (formerly Opt-14+15).

Required for applications when:

1. Liquid flow is flashing and when both outlet pressure P2 < 50 psig (3.5 Barg) and ΔP > 50 psid (3.5 Bard).
2. Steam service when inlet pressure P1 > 450 psig (31.0 Barg).

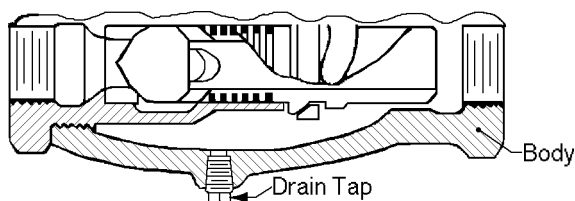
- Option -15 (Cont.):**
3. Steam service when  $\Delta P > 300$  psid (20.7 Bard).
  4. 2-phase flow (liquid + vapor i.e. "wet" steam) at inlet.

**Option -17:** PISTON SPRING. Required for applications where pressure drop is less than 5 psid (0.34 Bard). Minimizes plug/cylinder frictional effects. 302 SST material only. Not available in 2" (DN50) body size with CS cylinder.

**Option -20:** PRESSURE LOADED. Former Opt-20 with dome loaded topworks is obsolete. Use 1000HP-1+6 as alternate. See technical bulletin 1000HP-DIFF-TB.

**Option -25:** REMOTE VENTING. Use with hazardous or explosive gases where personnel/equipment safety is at issue when a diaphragm leak occurs. 1/4" NPT female connection in spring chamber for piping.

**Option -26:** DRAIN HOLE. 1/4" NPT drain tap with plug in body underside. Recommend use with highly viscous fluids (above 100 centipoise (Cp)) for downstream piping pressure sensing. Plug material similar to body material. Recommended for flashing liquids.



**Figure 8:**  
Opt-26 Drain Hole

**Option -27:** VISCOUS LIQUID SERVICE. Incorporates special valve plug with drilled openings near the "jet effect" zone to stabilize operation for fluids with viscosity greater than 100 Cp. B1 or S2 trim ONLY.

**Option -30:** FLANGED END CONNECTIONS. CS or SST body materials only. Flange and pipe nipple materials of same general chemistry as body material.

Available as 150# RF or 300# RF flange configurations. Requires lapped joint-type flange on inlet (cylinder) end. Short-threaded pipe nipples seal welded to body and cylinder. Outlet connection flange is socket weld-type. See Table 16 for lowered P vs T ratings. No post-weld stress relieving performed. Not suitable for NACE service. Not available in 1-1/4" body size.

**Option -31:** BSP SCREWED END CONNECTIONS. British Standard Pipe threads per ISO 7/1; used as alternate to NPT ends. Available all sizes and body materials.

**Option -32:** EXTENDED P.E. NIPPLES. Schedule 80 plain end pipe nipples used for field butt or socket welding into pipeline. Pipe nipples of same general chemistry as body material. Short-threaded pipe nipples seal welded to body and cylinder. Adds approximately 8 inches (200 mm) to the face-to-face dimension of standard unit. Use for socket weld pipe systems.

**Option -36:** SST CRYOGENIC CONSTRUCTION. Refer to technical bulletin 1000HP-CRYO-TB for technical information for cryogenic applications.

**Option -37:** ALL SST/CLEAN UNIT FOR LIQUIDS AND GASES. Packaged primarily for the food and pharmaceutical industries. NPT and 150# SST RF flanged end connections ONLY. 316 SST body and spring chamber materials ONLY. Use with S6 trim ONLY. T-bar handle, spring chamber internals, and flange bolting of SST materials. All wetted and external castings are electro-polished, and the unit is cleaned to Cashco Spec. #S-1576. Includes Opt-26 1/4" NPT tap with SST plug.

Use of SST diaphragm flange bolting limits P vs T ratings to levels below standard unit (see Table 16). Also limits pressure settings to overall range of 10–80 psig (0.7–5.5 Barg) using multiple SST springs.

**Option -37S:** ALL SST/CLEAN UNIT FOR STEAM. Similar to Option -37, except is equipped with different trim; use with

S1 trim ONLY. Includes carbon graphite diaphragm gasket material. Includes Opt-26 1/4" NPT tap with SST plug.

Use of SST flange bolting limits P vs T ratings to levels below standard unit (see Table 16). Also limits pressure settings to overall range of 10–80 psig (0.7–5.5 Barg) using multiple SST springs.

**Option -40:**

NACE CONSTRUCTION. Internal wetted portions meet NACE standard MR0175-90 Revision for application in sour gas service. Exterior of the unit to not be directly exposed to a sour gas environment, buried, insulated or otherwise denied direct atmospheric exposure. CS/CS or SST/CS body/spring chamber materials ONLY. Acceptable ONLY with S40 trim. Diaphragm flange bolting of heat treated steel per ASTM A449 and per NACE Class III. NPT end connections ONLY. Not available with Opt-14, Opt-15, Opt-17, Opt-30, Opt-32 or Opt-37.

**Option -45:**

ALTERNATE NON-ASBESTOS GASKET. Primarily for oxygen service. Utilizes TFE/Silicate diaphragm gaskets. Limits temperature range to -20° to +400°F (-29° to +205°C). Not required when using a composition diaphragm.

**Option -46:**

ASBESTOS GASKETS. Utilizes asbestos gaskets over standard gaskets. Primarily applied at temperatures over 400°F (205°C) or at customer's request; range of -20° to +600°F (-29° to +315°C).

**Option -55:**

SPECIAL CLEANING. BRZ or SST body materials ONLY. Cleaning per Cashco Spec #S-1134. Acceptable cleaning level for oxygen gas service.

**Option -56:**

SPECIAL CLEANING. All body materials. Cleaning per Cashco Spec #S-1542. Not suitable for oxygen service.

**Option -95:**

EPOXY PAINT. Two-part epoxy coating for severe ambient conditions to minimize external corrosion. Applied to all exposed external parts except those of SST. Per Cashco Spec #S-1547.

## APPLICATION AND SELECTION

The following procedure will help determine a suitable selection for an application.

Step 1.

FIVE KNOWNs. The following minimal parameter / information must be available before a selection procedure can begin:

- a. Service Fluid - What is it? Liquid or gas? Specific gravity (std. cond.)?
- b. Inlet Pressure – P1 (upstream pressure).
- c. Outlet Pressure – P2 (downstream pressure). How much can P2 vary as flow varies?
- d. Desired Capacity – Cv, GPM, SCFH; minimum and maximum.
- e. Fluid Temperature – T1, Specific gravity (actual).

Use above data to calculate the Cv required.

STEP 2.

INLET PRESSURE AND TEMPERATURE. Assure that the actual design

inlet pressure and temperature limits do not exceed the limits established in Tables 4 or 16. Both body and spring chamber must comply.

STEP 3.

SEAT DESIGN. Because the 1000HP is an FTO design, the seat design – metal or composition/soft – and materials must be selected before checking for temperature/pressure/pressure drop limitations. Use Table 6 as an aid for recommended possible trim designation numbers, and list the choices.

**CAUTION:** *Do not apply a metal seated 1000HP in deadend service.*

A composition seat will initially provide tight shutoff in clean fluid service, and will minimize downstream over-pressurization. The best results of repeatable tight shutoff are with “rubber”

STEP 3 (Cont.) materials – Buna-N or EPR. Because TFE is not elastic, repeatable tight shutoff is frequently compromised. Minute leakage should be expected with a metal seated design.

A downstream safety relief valve is recommended. If inlet pressure P1 is greater than the outlet pressure rating, a downstream safety relief valve is required.

STEP 4. TRIM MATERIALS. Refer to Table 7 or 8 for the materials of each wetted part; consider material's suitability for corrosion. Check applicable temperature range indicated in Table 7 or 8 for suitability with actual temperature of exposure.

Select a composition diaphragm whenever possible, as a composition diaphragm will give an extra 20-30% in capacity over the same body size unit with a metal diaphragm.

Systems subject to pulsating inlet or outlet pressures should be provided with metal diaphragms.

Combining Steps 3 and 4 allows a preliminary selection of "Trim Designation Numbers".

STEP 5. PRESSURE DROP. There are two  $\Delta P$  limits that should not be exceeded.

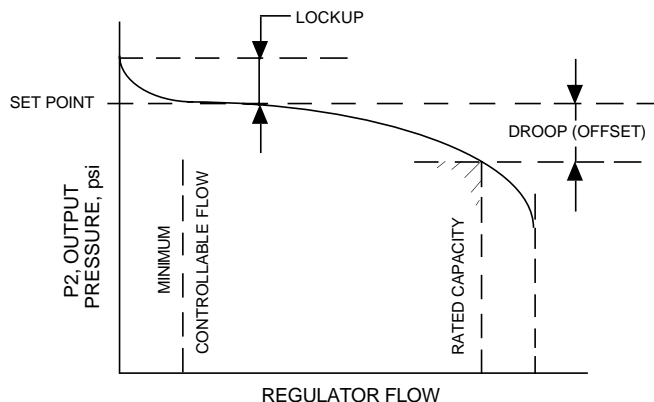
Check Table 1 for recommended maximum levels of pressure drop for the service fluid and trim designation number.

STEP 6. INLET PRESSURE. Check Tables 9 through 12 for the maximum inlet pressure as a function of the outlet (setpoint) pressure – P2. If the actual inlet pressure – P1, is greater than the maximum allowable inlet pressure from Table 9 or 11, go to a 1-Step reduced port, Opt-12, maximum allowable inlet pressure from Tables 10 or 12 (dependent on seat design).

Check Table 16 for pressure/temperature de-ratings due to use of optional constructions and various trim materials. Do not exceed limits.

STEP 7. OUTLET PRESSURE. All self-contained pressure reducing regulators "droop" or "fall-off" from a setpoint pressure level at a given flow as the flow rate increases.

This deviation in setpoint is described as "% droop". Droop is expressed on increasing flow, starting from a minimum flow level.



The "% droop" must be known to enter the capacity tables. The acceptable level of setpoint deviation should be known for the min-to-max flow variation.

A regulator may have a setpoint up to 15% below the lower stated range spring level. (Tags will show the standard ranges.) A setpoint above the higher range spring level is not recommended. Setpoint at the upper limit of a range spring is acceptable. If final setpoint is questionable and expected near the upper limit, the next higher range spring should be utilized. Best performance will be obtained when the lowest range spring is utilized.

Check Table 16 for pressure/temperature de-ratings due to use of optional constructions and various trim materials. Do not exceed limits.

STEP 8. FLUID JET. Depending on the fluid passing through the body, select a liquid, gas or viscous liquid (Opt -27) jet for proper aspiration effect.

STEP 9. GASKET MATERIAL. Considering the fluid, determine the desired gasket material from the three choices offered. Assure that the max temperature of the gasket material is not exceeded.

STEP 10.

CAPACITY. Flow capacities expressed as “Cv vs. Droop” are located in:

- Table 9: Full Port & Comp. Diaph.
- Table 10: Reduced Port & Comp. Diaph.
- Table 11: Full Port & Metal Diaph.
- Table 12: Reduced Port & Metal Diaph.

Full port, water, air or saturated steam flow rates (English units only) are located respectively in Tables 13, 14 and 15.

Using above “Cv vs. Droop” Capacity Tables 9 through 12, find the smallest body size to pass the calculated required Cv for the acceptable level of

droop, the proper diaphragm classification, and the setpoint pressure - P2. Use of the water, air or steam (GPM, SCFH, #/HR) Capacity Tables 13 through 15 will also require the inlet pressure - P1 level in addition to those variables above.

Consult factory for “EXCESSIVE PARTIAL CAVITATION” or “FULL CAVITATION” flow realm applications.

**CAUTION:** *Calculations giving required Cv, flow realm description, velocity levels, and noise prediction using actual flow conditions are always recommended over use of Tables 13 through 15.*

## TECHNICAL SPECIFICATIONS

TABLE 1  
RECOMMENDED PRESSURE DROP  
VS. TRIM DESIGN/MATERIALS

NOTE: Consult Factory with Application Details For ΔP's > 450 psid (31 Bard)

Fluid	Maximum Inlet Pressure psig (Barg)	Operating Pressure Drop Range psid (Bard)	Seat Design	Basic Trim Materials	Trim Designation Numbers
Liquids (Non-cavitating)	400 (27.6)	5–250 (0.34–17.2)	Soft Seat - All Comp Materials	BRZ/BR	B2, B3, B5
	740 (51.0)	5–400 (0.34–27.6)	Soft Seat - All Comp Materials	SST	S3, S3N, S6, S9, S36
	400 (27.6)	5–390 (0.34–26.9)	Metal Seated	BRZ/BR/SST	B1
	740 (51.0)	5–650 (0.34–44.8)	Metal Seated	SST	S2, S2N, S0, S1 S5, S40
Gas	400 (27.6)	5–390 (0.34–26.9)	Soft Seat - All Comp Materials <b>except SST/TFE</b>	BRZ/BR	B2,B3, B5
	740 (51.0)	5–650 (0.34–44.8)	Soft Seat - <b>SST/TFE ONLY</b>	SST	S3, S9, S36
			Metal Seated	SST	S2,S2N,S0,S1,S5,S40
Steam	400* (27.6)	5–200* (0.34–13.8)	Metal Seated	BRZ/BR/SST	B1
	450 (31.0)	5–300 (0.34–20.7)	Metal Seated	SST	S1, S2
	740 (51.0)	5–650 (0.34–44.8)	Metal Seated - Opt-15 Stellite	SST	S1

\* Saturated Only

NOTE: For ΔP = 1-5 psid (.07–.34 Bard), use Opt-17 piston spring.

TABLE 2  
RANGE SPRINGS

Body Size		Standard – Steel		SST – Opts.-37 & 37S	
In.	(mm)	psig	(Barg)	psig	(Barg)
1/2"	(DN15)	10–50	(.7–3.4)	10–50	(.7–3.4)
		40–100	(2.7–6.9)	40–80	(2.7–5.5)
		80–150	(5.5–10.3)		
		120–190	(8.3–13.1)		
		150–300	(10.3–20.7)		
3/4"	(DN20)	10–40	(.7–2.7)	10–40	(.7–2.7)
		30–60	(2.1–4.1)	30–60	(2.1–4.1)
		50–90	(3.4–6.2)	50–80	(3.4–5.5)
		70–110	(4.8–7.6)		
		90–170	(6.2–11.7)		
		140–300	(9.6–20.7)		
1"	(DN25)	10–40	(.7–2.7)	10–30	(.7–2.1)
		30–60	(2.1–4.1)	25–45	(1.7–3.1)
		50–70	(3.4–4.8)	35–50	(2.4–3.4)
		55–80	(3.8–5.5)	40–80	(2.7–5.5)
		65–130	(4.5–8.9)		
		100–300	(6.9–20.7)		
1-1/4"	(DN32)	10–40	(.7–2.7)		
		30–50	(2.1–3.4)		
		40–60	(2.7–4.1)		
		50–90	(3.4–6.2)		
		70–225	(4.8–15.5)		
1-1/2"	(DN40)	10–40	(.7–2.7)	10–50	(.7–3.4)
		30–75	(2.1–5.2)	40–80	(2.7–5.5)
		60–100	(4.1–6.9)		
		80–225	(5.5–15.5)		
2"	(DN50)	10–40	(.7–2.7)	10–30	(.7–2.1)
		30–60	(2.1–4.1)	25–45	(1.7–3.1)
		50–150	(3.4–10.3)	35–80	(2.4–5.5)

TABLE 3  
MAXIMUM CAPACITY – Cv  
FOR SIZING SAFETY RELIEF DEVICE  
(WITH PLUG WIDE OPEN)

Body Size		Orifice Size			
inch	(mm)	Standard		Opt. -12 Reduced	
		Size	Cv	Size	Cv
1/2"	(DN15)	1/2"	5	3/8"	3
3/4"	(DN20)	3/4"	9	1/2"	7
1"	(DN25)	7/8"	9	5/8"	8
1-1/4"	(DN32)	1"	13	NA	NA
1-1/2"	(DN40)	1-1/4"	17	7/8"	13
2"	(DN50)	1-1/2"	22	1-1/4"	20

- NOTES:**
1. NA = Not Available.
  2. Will permanently deform rocker arm and metal diaphragms
  3. See Footnote 1 of Table 16 for technical information on safety relief valve or rupture disc setpoint pressure.

TABLE 4  
 MAXIMUM ALLOWABLE PRESSURE vs. TEMPERATURE;  
 FOR PRESSURE CONTAINMENT OF  
 BODY, SPRING CHAMBER AND CYLINDER  
 (See Table 5 for Material Specifications)

Materials of Construction <sup>1</sup> Description - Abbreviation Body/Spring Chamber/Cylinder	Inlet – Cylinder				Outlet – Body & Spring Chamber			
	Pressure		Temperature		Pressure		Temperature	
	psig	(Barg)	°F	(°C)	psig	(Barg)	°F	(°C)
CI / CI / BRZ <u>or</u> BRZ / CI / BRZ <u>or</u> BRZ / BRZ / BRZ	400	(27.6)	-20 to +150	(-29 to +66)	400	(27.6)	-20 to +150	(-29 to +66)
	385	(26.5)	+200	(+94)	385	(26.5)	+200	(+94)
	365	(25.2)	+250	(+121)	365	(25.2)	+250	(+121)
	335	(23.1)	+300	(+149)	335	(23.1)	+300	(+149)
	300	(20.7)	+350	(+177)	300	(20.7)	+350	(+177)
CI / CI / SST <u>or</u> CS / CI / SST <u>or</u> SST / CI / SST <u>or</u> CI / CI / CS <sup>2</sup> <u>or</u> CS / CI / CS <sup>2</sup>	740	(51.0)	-20 to +450	(-29 to +232)	400	(27.6)	-20 to +268	(-29 to +131)
					395	(27.2)	+275	(+135)
					375	(25.9)	+300	(+149)
					335	(23.1)	+350	(+177)
					295	(20.3)	+400	(+205)
CS / CS / SST <u>or</u> SST / CS / SST <u>or</u> CS / CS / CS <sup>2</sup> SST / SST / SST	740	(51.0)	-20 to +600 <sup>3</sup>	(-29 to +315) <sup>3</sup>	400	(27.6)	-20 to +600 <sup>3</sup>	(-29 to +315) <sup>3</sup>

<sup>1</sup> For constructions containing following materials as the body, spring chamber, or cylinder, the pressure vs. temperature limits are based upon:

Material	ANSI Specification No.
BRZ	B16.15
CI	B16.1
CS	B16.5
SST	B16.5

<sup>2</sup> Cylinders of CS for 2" (DN50) body size only.

<sup>3</sup> Requires use of Opt-46, asbestos gasket for temperatures from +450 to +600°F (+232 to +315°C)

TABLE 5  
 MATERIAL SPECIFICATIONS OF  
 BODY, SPRING CHAMBER AND CYLINDER

Material	ASTM Specifications
BRZ – cast bronze	B62, Alloy 83600; 85% Cu, 5% Sn, 5% Pb, 5% Zn
CI – cast iron	A126, Class B
CS – cast carbon steel	A216, Gr. WCB
SST – cast stainless steel	A351, Gr. CF8M (cast 316 SST)
CS – carbon steel <sup>1</sup>	A108, Cold drawn carbon steel bar, Alloy C1018

<sup>1</sup> Cylinders of CS for 2" (DN50) body size only.

TABLE 6  
APPLICATIONS

Fluid	Recommended Construction	Trim Designation No. <sup>1</sup>
Air or Inert Gases	Composition Seat & Diaphragm Metal Seat & Composition Diaphragm	B2, B3, S3N S2N
Liquids	Metal Seat & Diaphragm Composition Seat & Diaphragm	S1 B2, B3, S3N
Chemicals	Metal Seat & Composition Diaphragm Metal Seat & Diaphragm Composition Seat & Diaphragm Composition Seat & Metal Diaphragm	S5, S40 S0 S3, S6 S9
Sour Gas	Metal Seat & Composition Diaphragm	S40
Fuel Oil	Composition Seat & Diaphragm	B2, B3, S3, S3N
Hydrocarbon Gas or Liquids	Composition Seat & Diaphragm	B2, B3, S3, S3N
Steam, Saturated or Superheated	Metal Seat & Diaphragm	B1, S1, S2
Water and Condensate, Low Temperature (32 – 180°F)	Composition Seat & Diaphragm Metal Seat & Composition Diaphragm	B2, B3, S3, S3N S2N
Water and Condensate High Temperature (180 – 300°F)	Metal Seat & Diaphragm	B1, S1 or S2

<sup>1</sup> S1 trim is available with stellite faced plug and valve seat (Opt. -15).

TABLE 7  
BRASS TRIM MATERIAL COMBINATIONS

Part	Brass Trim #			
	B1	B2	B3	B5
Diaphragm	302 SST	Neoprene	Neoprene	Phos. Bronze
Cylinder	Brass	Brass	Brass	Brass
Valve Seat	316 SST	Brass	Brass	Brass
Plug	416 SST	Brass	Brass	Brass
Seat Disc	None (metal)	Buna-N	TFE	TFE
Seat Disc Screw	None	Brass	Brass	Brass
Plug Collar	Brass	Brass	Brass	Brass
Rocker Arm Shaft	Brass	Brass	Brass	Brass
Rocker Arm	Bronze	Bronze	Bronze	Bronze
Pusher Plate Stud	Brass	Brass	Brass	Brass
Pusher Plate	Bronze	Bronze	Bronze	Bronze
Stud Collar	Brass	Brass	Brass	Brass
Cotter Pin	Brass	Brass	Brass	Brass
Nut	Brass	Brass	Brass	Brass
Temperature Range °F	-20 to 400	-20 to 180	-20 to 180	-20 to 400
Temperature Range °C	-29 to 205	-20 to 83	-29 to 83	-29 to 205

TABLE 8  
STAINLESS STEEL TRIM MATERIAL COMBINATIONS

Part	Stainless Steel Trim #										
	S0	S1 <sup>1</sup>	S2	S2N	S3	S3N	S5	S6	S9	S36	S40
Diaphragm	TFE/ 302 SST	302 SST	302 SST	Neoprene	Neoprene	Neoprene	FC Elast.*	EPDM	TFE/ 302 SST	302SST	Neoprene
Cylinder	CF8M	CF8M	CF8M <sup>2</sup>	CF8M <sup>2</sup>	CF8M	CF8M	CF8M <sup>2</sup>	CF8M	CF8M	CF8M	CF8M
Valve Seat	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Plug	316 SST	316 SST	416 SST	416 SST	316 SST	316 SST	416 SST	316 SST	316 SST	316 SST	316 SST
Seat Disc	None (Metal)	None (Metal)	None (Metal)	None (Metal)	TFE	Buna-N	None (Metal)	EPR	TFE	TFE	None (Metal)
Seat Disc Screw	None	None	None	None	316 SST	316 SST	None	316 SST	316 SST	316 SST	None
Plug Collar	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Rocker Arm Shaft	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Rocker Arm	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M
Pusher Plate and Stud	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M	CF8M
Stud Collar	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Cotter Pin	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Nut	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Temperature Range °F	-20 to 400	-20 to 600	-20 to 600	-20 to 180	-20 to 180	-20 to 180	-20 to 400	-20 to 300	-20 to 400	-20 to 400	-20 to 180
Temperature Range °C	-29 to 205	-29 to 315	-29 to 315	-29 to 83	-29 to 83	-29 to 83	-29 to 205	-29 to 149	-29 to 205	-29 to 205	-29 to 83

<sup>1</sup> Available with Stellite faced plug and valve seat (Opt. -15). Includes a screwed-in seat cone.

<sup>2</sup> Steel cylinder furnished with 2" units using trim S2, S2N or S5 in iron or steel bodies. All others use 316 SST cylinders with SST trim. Opt. -17 not available with steel cylinder.

\* FC Elast. = Fluorocarbon Elastomer

TABLE 9  
Cv – FLOW CAPACITY

**FULL PORT – COMPOSITION DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>COMPOSITION DIAPHRAGM – SIZE – 1/2" (DN15) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	185	(12.8)	185	(12.8)	0.71	1.30	1.89	10–50	(0.7–3.4)
15	(1.0)	300	(20.7)	300	(20.7)	0.77	1.39	1.98	10–50	(0.7–3.4)
20	(1.4)	420	(29.0)	420	(29.0)	0.84	1.48	2.08	10–50	(0.7–3.4)
25	(1.7)	535	(36.9)	425	(29.3)	0.90	1.57	2.17	10–50	(0.7–3.4)
35	(2.4)	685	(47.2)	435	(30.0)	1.03	1.74	2.35	10–50	(0.7–3.4)
50	(3.4)	700	(48.3)	450	(31.0)	1.33	2.17	2.82	40–100	(2.8–6.9)
75	(5.2)	740	(51.0)	475	(32.8)	1.58	2.52	3.43	40–100	(2.8–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	2.07	3.35	3.50	80–150	(5.5–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	2.17	3.50	3.50	80–150	(5.5–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	1.98	3.28	3.50	120–190	(8.3–13.1)
175	(12.1)	740	(51.0)	575	(39.7)	2.00	3.39	3.50	120–190	(8.3–13.1)
200	(13.8)	740	(51.0)	600	(41.4)	2.02	3.50	3.50	150–300	(10.3–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	2.05	3.50	3.50	150–300	(10.3–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	2.09	3.50	3.50	150–300	(10.3–20.7)

<b>COMPOSITION DIAPHRAGM – SIZE – 3/4" (DN20) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	145	(10.0)	145	(10.0)	1.16	2.23	2.86	10–40	(0.7–2.8)
15	(1.0)	230	(15.9)	230	(15.9)	1.26	2.34	3.00	10–40	(0.7–2.8)
20	(1.4)	320	(22.1)	320	(22.1)	1.37	2.44	3.15	10–40	(0.7–2.8)
25	(1.7)	410	(28.3)	410	(28.3)	1.47	2.55	3.29	10–40	(0.7–2.8)
35	(2.4)	540	(37.2)	435	(30.0)	1.97	3.15	4.12	30–60	(2.1–4.1)
50	(3.4)	700	(48.3)	450	(31.0)	2.30	2.69	4.85	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	2.83	4.77	5.00	50–90	(3.4–6.2)
100	(6.9)	740	(51.0)	500	(34.5)	3.33	5.00	5.00	70–110	(4.8–7.6)
125	(8.6)	740	(51.0)	525	(36.2)	3.10	5.00	5.00	90–170	(6.2–11.7)
150	(10.3)	740	(51.0)	550	(37.9)	3.33	5.00	5.00	90–170	(6.2–11.7)
175	(12.1)	740	(51.0)	575	(39.7)	2.17	3.54	4.77	140–300	(9.7–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	2.24	3.60	5.00	140–300	(9.7–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	2.37	3.74	5.00	140–300	(9.7–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	2.58	3.87	5.00	140–300	(9.7–20.7)

<b>COMPOSITION DIAPHRAGM – SIZE – 1" (DN25) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	130	(9.0)	130	(9.0)	1.25	2.41	3.61	10–40	(0.7–2.8)
15	(1.0)	205	(14.1)	205	(14.1)	1.40	2.69	3.81	10–40	(0.7–2.8)
20	(1.4)	285	(19.7)	285	(19.7)	1.55	2.96	4.01	10–40	(0.7–2.8)
25	(1.7)	360	(24.8)	360	(24.8)	1.70	3.24	4.21	10–40	(0.7–2.8)
35	(2.4)	485	(33.4)	435	(30.0)	2.49	4.21	5.07	30–60	(2.1–4.1)
50	(3.4)	695	(47.9)	450	(31.0)	2.90	5.00	6.00	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	3.67	6.00	6.00	55–80	(3.8–5.5)
100	(6.9)	740	(51.0)	500	(34.5)	3.85	6.00	6.00	65–130	(4.5–9.0)
125	(8.6)	740	(51.0)	525	(36.2)	3.70	6.00	6.00	100–300	(6.9–20.7)
150	(10.3)	740	(51.0)	550	(37.9)	3.76	6.00	6.00	100–300	(6.9–20.7)
175	(12.1)	740	(51.0)	575	(39.7)	3.83	6.00	6.00	100–300	(6.9–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	3.89	6.00	6.00	100–300	(6.9–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	4.02	6.00	6.00	100–300	(6.9–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	4.15	6.00	6.00	100–300	(6.9–20.7)

TABLE 9 (Continued)  
Cv – FLOW CAPACITY

**FULL PORT – COMPOSITION DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>COMPOSITION DIAPHRAGM – SIZE – 1-1/4" (DN32) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	105	(7.2)	105	(7.2)	1.83	4.07	6.25	10–40	(0.7–2.8)
15	(1.0)	170	(11.7)	170	(11.7)	2.11	4.55	6.69	10–40	(0.7–2.8)
20	(1.4)	235	(16.2)	235	(16.2)	2.40	5.03	7.13	10–40	(0.7–2.8)
25	(1.7)	300	(20.7)	300	(20.7)	2.68	5.51	7.58	10–40	(0.7–2.8)
35	(2.4)	380	(26.2)	380	(26.2)	4.10	7.70	9.00	30–50	(2.1–3.4)
50	(3.4)	525	(36.2)	450	(31.0)	5.30	8.83	9.00	40–60	(2.7–4.1)
75	(5.2)	670	(46.2)	475	(32.8)	7.70	9.00	9.00	50–90	(3.4–6.2)
100	(6.9)	495	(34.1)	495	(34.1)	8.68	9.00	9.00	70–225	(4.8–15.5)
125	(8.6)	700	(48.3)	525	(36.2)	8.73	9.00	9.00	70–225	(4.8–15.5)
150	(10.3)	740	(51.0)	550	(37.9)	8.79	9.00	9.00	70–225	(4.8–15.5)
175	(12.1)	740	(51.0)	575	(39.7)	8.84	9.00	9.00	70–225	(4.8–15.5)
200	(13.8)	740	(51.0)	600	(41.4)	8.90	9.00	9.00	70–225	(4.8–15.5)
225	(15.5)	740	(51.0)	625	(43.1)	8.95	9.00	9.00	70–225	(4.8–15.5)

<b>COMPOSITION DIAPHRAGM – SIZE – 1-1/2" (DN40) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	110	(7.6)	110	(7.6)	2.37	4.59	6.87	10–40	(0.7–2.8)
15	(1.0)	180	(12.4)	180	(12.4)	2.75	5.20	7.38	10–40	(0.7–2.8)
20	(1.4)	245	(16.9)	245	(16.9)	3.14	5.80	7.90	10–40	(0.7–2.8)
25	(1.7)	315	(21.7)	315	(21.7)	3.52	6.41	8.41	10–40	(0.7–2.8)
35	(2.4)	395	(27.3)	395	(27.3)	4.40	8.80	10.00	30–75	(2.1–5.2)
50	(3.4)	600	(41.4)	450	(31.0)	5.50	9.05	10.55	30–75	(2.1–5.2)
75	(5.2)	740	(51.0)	475	(32.8)	6.35	9.65	10.90	60–100	(4.1–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	7.33	10.25	11.00	80–225	(5.5–15.5)
125	(8.6)	740	(51.0)	525	(36.2)	7.49	10.32	11.00	80–225	(5.5–15.5)
150	(10.3)	740	(51.0)	550	(37.9)	7.65	10.39	11.00	80–225	(5.5–15.5)
175	(12.1)	740	(51.0)	575	(39.7)	7.81	10.46	11.00	80–225	(5.5–15.5)
200	(13.8)	740	(51.0)	600	(41.4)	7.97	10.53	11.00	80–225	(5.5–15.5)
225	(15.5)	740	(51.0)	625	(43.1)	8.13	10.60	11.00	80–225	(5.5–15.5)

<b>COMPOSITION DIAPHRAGM – SIZE – 2" (DN50) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	120	(8.3)	120	(8.3)	3.60	7.27	10.30	10–40	(0.7–2.8)
15	(1.0)	220	(15.2)	220	(15.2)	3.84	7.60	10.83	10–40	(0.7–2.8)
20	(1.4)	315	(21.7)	315	(21.7)	4.08	7.92	11.36	10–40	(0.7–2.8)
25	(1.7)	415	(28.6)	415	(28.6)	4.32	8.25	11.89	10–40	(0.7–2.8)
35	(2.4)	420	(29.0)	420	(29.0)	7.90	11.05	12.80	30–60	(2.1–4.1)
50	(3.4)	690	(47.6)	450	(31.0)	8.80	11.75	13.00	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	7.27	10.63	12.37	50–150	(3.4–10.3)
100	(6.9)	740	(51.0)	500	(34.5)	7.78	10.95	12.70	50–150	(3.4–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	8.29	11.26	12.90	50–150	(3.4–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	8.80	11.58	13.00	50–150	(3.4–10.3)

TABLE 10  
Cv – FLOW CAPACITY

**OPT -12, 1-STEP REDUCED PORT – COMPOSITION DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>COMPOSITION DIAPHRAGM – SIZE – 1/2" (DN15) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated						
psig	(Barg)	psig	(Barg)	psig	(Barg)	10%	20%	30%	psig	(Barg)
10	(0.7)	200	(13.8)	220	(15.2)	0.47	1.00	1.55	10–50	(0.7–3.4)
15	(1.0)	335	(23.1)	370	(25.5)	0.53	1.10	1.61	10–50	(0.7–3.4)
20	(1.4)	475	(32.8)	420	(29.0)	0.60	1.18	1.68	10–50	(0.7–3.4)
25	(1.7)	610	(42.1)	425	(29.3)	0.66	1.26	1.74	10–50	(0.7–3.4)
35	(2.4)	685	(47.2)	435	(30.0)	0.78	1.42	1.86	10–50	(0.7–3.4)
50	(3.4)	740	(51.0)	450	(31.0)	1.06	1.79	2.22	40–100	(2.8–6.9)
75	(5.2)	740	(51.0)	475	(32.8)	1.26	2.09	2.36	40–100	(2.8–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	1.67	2.44	2.50	80–150	(5.5–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	1.79	2.50	2.50	80–150	(5.5–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	1.74	2.48	2.50	120–190	(8.3–13.1)
175	(12.1)	740	(51.0)	575	(39.7)	1.81	2.50	2.50	120–190	(8.3–13.1)
200	(13.8)	740	(51.0)	600	(41.4)	1.57	2.37	2.50	150–300	(10.3–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	1.66	2.42	2.50	150–300	(10.3–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	1.75	2.48	2.50	150–300	(10.3–20.7)

<b>COMPOSITION DIAPHRAGM – SIZE – 3/4" (DN20) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated						
psig	(Barg)	psig	(Barg)	psig	(Barg)	10%	20%	30%	psig	(Barg)
10	(0.7)	175	(12.1)	300	(20.7)	0.71	1.30	1.89	10–40	(0.7–2.8)
15	(1.0)	280	(19.3)	415	(28.6)	0.77	1.39	1.98	10–40	(0.7–2.8)
20	(1.4)	380	(26.2)	420	(29.0)	0.84	1.48	2.08	10–40	(0.7–2.8)
25	(1.7)	480	(33.1)	425	(29.3)	0.90	1.57	2.17	10–40	(0.7–2.8)
35	(2.4)	665	(45.9)	435	(30.0)	1.03	1.74	2.35	30–60	(2.1–4.1)
50	(3.4)	740	(51.0)	450	(31.0)	1.33	2.17	2.82	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	1.58	2.52	3.43	50–90	(3.4–6.2)
100	(6.9)	740	(51.0)	500	(34.5)	2.07	3.35	3.50	70–110	(4.8–7.6)
125	(8.6)	740	(51.0)	525	(36.2)	2.17	3.50	3.50	90–170	(6.2–11.7)
150	(10.3)	740	(51.0)	550	(37.9)	2.12	3.47	3.50	90–170	(6.2–11.7)
175	(12.1)	740	(51.0)	575	(39.7)	2.00	3.39	3.50	140–300	(9.7–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	2.02	3.50	3.50	140–300	(9.7–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	2.05	3.50	3.50	140–300	(9.7–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	2.09	3.50	3.50	140–300	(9.7–20.7)

<b>COMPOSITION DIAPHRAGM – SIZE – 1" (DN25) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated						
psig	(Barg)	psig	(Barg)	psig	(Barg)	10%	20%	30%	psig	(Barg)
10	(0.7)	170	(11.7)	250	(17.2)	0.86	1.72	2.57	10–40	(0.7–2.8)
15	(1.0)	270	(18.6)	400	(27.6)	0.96	1.93	2.83	10–40	(0.7–2.8)
20	(1.4)	370	(25.5)	420	(29.0)	1.07	2.15	3.09	10–40	(0.7–2.8)
25	(1.7)	475	(32.8)	425	(29.3)	1.17	2.36	3.36	10–40	(0.7–2.8)
35	(2.4)	635	(43.8)	435	(30.0)	1.57	3.50	4.60	30–60	(2.1–4.1)
50	(3.4)	740	(51.0)	450	(31.0)	1.95	4.50	5.46	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	2.85	5.46	5.46	55–80	(3.8–5.5)
100	(6.9)	740	(51.0)	500	(34.5)	2.74	5.38	5.46	65–130	(4.5–9.0)
125	(8.6)	740	(51.0)	525	(36.2)	2.50	5.20	5.46	100–300	(6.9–20.7)
150	(10.3)	740	(51.0)	550	(37.9)	2.58	5.38	5.46	100–300	(6.9–20.7)
175	(12.1)	740	(51.0)	575	(39.7)	2.66	5.46	5.46	100–300	(6.9–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	2.74	5.46	5.46	100–300	(6.9–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	2.91	5.46	5.46	100–300	(6.9–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	3.07	5.46	5.46	100–300	(6.9–20.7)

TABLE 10 (Continued)  
Cv – FLOW CAPACITY

**OPT -12, 1-STEP REDUCED PORT – COMPOSITION DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>COMPOSITION DIAPHRAGM – SIZE – 1-1/2" (DN40) – 1-STEP REDUCED PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	165	(11.4)	225	(15.5)	1.25	2.41	3.61	10–40	(0.7–2.8)
15	(1.0)	265	(18.3)	365	(25.2)	1.40	2.69	3.81	10–40	(0.7–2.8)
20	(1.4)	360	(24.8)	420	(29.0)	1.55	2.96	4.01	10–40	(0.7–2.8)
25	(1.7)	460	(31.7)	425	(29.3)	1.70	3.24	4.21	10–40	(0.7–2.8)
35	(2.4)	570	(39.3)	435	(30.0)	2.49	4.21	5.07	30–75	(2.1–5.2)
50	(3.4)	700	(48.3)	450	(31.0)	2.90	5.00	6.00	30–75	(2.1–5.2)
75	(5.2)	740	(51.0)	475	(32.8)	3.67	6.00	6.00	60–100	(4.1–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	3.65	6.00	6.00	80–225	(5.5–15.5)
125	(8.6)	740	(51.0)	525	(36.2)	3.70	6.00	6.00	80–225	(5.5–15.5)
150	(10.3)	740	(51.0)	550	(37.9)	3.76	6.00	6.00	80–225	(5.5–15.5)
175	(12.1)	740	(51.0)	575	(39.7)	3.83	6.00	6.00	80–225	(5.5–15.5)
200	(13.8)	740	(51.0)	600	(41.4)	3.89	6.00	6.00	80–225	(5.5–15.5)
225	(15.5)	740	(51.0)	625	(43.1)	3.95	6.00	6.00	80–225	(5.5–15.5)

<b>COMPOSITION DIAPHRAGM – SIZE – 2" (DN50) – 1-STEP REDUCED PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	145	(10.0)	145	(10.0)	2.37	4.59	6.87	10–40	(0.7–2.8)
15	(1.0)	245	(16.9)	245	(16.9)	2.75	5.20	7.38	10–40	(0.7–2.8)
20	(1.4)	340	(23.4)	340	(23.4)	3.14	5.80	7.90	10–40	(0.7–2.8)
25	(1.7)	430	(29.7)	425	(29.3)	3.52	6.41	8.41	10–40	(0.7–2.8)
35	(2.4)	460	(31.7)	435	(30.0)	4.40	8.80	10.00	30–60	(2.1–4.1)
50	(3.4)	690	(47.6)	450	(31.0)	5.50	9.05	10.55	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	6.35	9.65	10.90	50–150	(3.4–10.3)
100	(6.9)	740	(51.0)	500	(34.5)	7.33	10.25	11.00	50–150	(3.4–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	7.49	10.32	11.00	50–150	(3.4–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	7.65	10.39	11.00	50–150	(3.4–10.3)

TABLE 11  
Cv – FLOW CAPACITY

**FULL PORT – METAL DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>METAL DIAPHRAGM – SIZE – 1/2" (DN15) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	215	(14.8)	215	(14.8)	0.42	0.81	1.18	10–50	(0.7–3.4)
15	(1.0)	335	(23.1)	335	(23.1)	0.47	0.89	1.27	10–50	(0.7–3.4)
20	(1.4)	450	(31.0)	420	(29.0)	0.53	0.98	1.37	10–50	(0.7–3.4)
25	(1.7)	570	(39.3)	425	(29.3)	0.58	1.04	1.45	10–50	(0.7–3.4)
35	(2.4)	685	(47.2)	435	(30.0)	0.67	1.18	1.62	10–50	(0.7–3.4)
50	(3.4)	740	(51.0)	450	(31.0)	0.88	1.52	2.01	40–100	(2.8–6.9)
75	(5.2)	740	(51.0)	475	(32.8)	1.03	1.78	2.34	40–100	(2.8–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	1.59	2.58	3.50	80–150	(5.5–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	1.72	2.69	3.50	80–150	(5.5–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	1.64	2.66	3.40	120–190	(8.3–13.1)
175	(12.1)	740	(51.0)	575	(39.7)	1.72	2.80	3.50	120–190	(8.3–13.1)
200	(13.8)	740	(51.0)	600	(41.4)	1.58	2.64	3.50	150–300	(10.3–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	1.67	2.72	3.50	150–300	(10.3–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	1.77	2.88	3.50	150–300	(10.3–20.7)

<b>METAL DIAPHRAGM – SIZE – 3/4" (DN20) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	160	(11.0)	160	(11.0)	0.70	1.36	2.07	10–40	(0.7–2.8)
15	(1.0)	250	(17.2)	250	(17.2)	0.76	1.50	2.20	10–40	(0.7–2.8)
20	(1.4)	340	(23.4)	340	(23.4)	0.82	1.65	2.34	10–40	(0.7–2.8)
25	(1.7)	425	(29.3)	425	(29.3)	0.88	1.77	2.44	10–40	(0.7–2.8)
35	(2.4)	580	(40.0)	435	(30.0)	1.00	2.01	2.65	30–60	(2.1–4.1)
50	(3.4)	700	(48.3)	450	(31.0)	1.33	2.66	3.47	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	1.93	3.32	4.43	50–90	(3.4–6.2)
100	(6.9)	740	(51.0)	500	(34.5)	2.56	4.18	5.00	70–110	(4.8–7.6)
125	(8.6)	740	(51.0)	525	(36.2)	2.43	4.00	5.00	90–170	(6.2–11.7)
150	(10.3)	740	(51.0)	550	(37.9)	2.57	4.18	5.00	90–170	(6.2–11.7)
175	(12.1)	740	(51.0)	575	(39.7)	1.72	3.07	4.14	140–300	(9.7–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	1.80	3.13	4.20	140–300	(9.7–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	2.00	3.38	4.67	140–300	(9.7–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	2.18	3.63	5.00	140–300	(9.7–20.7)

<b>METAL DIAPHRAGM – SIZE – 1" (DN25) – FULL PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	145	(10.0)	145	(10.0)	0.78	1.55	2.42	10–40	(0.7–2.8)
15	(1.0)	220	(15.2)	220	(15.2)	0.87	2.10	2.67	10–40	(0.7–2.8)
20	(1.4)	300	(20.7)	300	(20.7)	0.96	1.92	2.93	10–40	(0.7–2.8)
25	(1.7)	375	(25.9)	375	(25.9)	1.04	2.13	3.13	10–40	(0.7–2.8)
35	(2.4)	515	(35.5)	435	(30.0)	1.21	2.54	3.53	30–60	(2.1–4.1)
50	(3.4)	700	(48.3)	450	(31.0)	1.67	3.47	4.62	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	2.25	4.79	6.00	55–80	(3.8–5.5)
100	(6.9)	740	(51.0)	500	(34.5)	3.03	5.20	6.00	65–130	(4.5–9.0)
125	(8.6)	740	(51.0)	525	(36.2)	2.80	4.93	6.00	100–300	(6.9–20.7)
150	(10.3)	740	(51.0)	550	(37.9)	2.88	5.02	6.00	100–300	(6.9–20.7)
175	(12.1)	740	(51.0)	575	(39.7)	2.95	5.11	6.00	100–300	(6.9–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	3.03	5.20	6.00	100–300	(6.9–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	3.18	5.32	6.00	100–300	(6.9–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	3.33	5.45	6.00	100–300	(6.9–20.7)

TABLE 11 (Continued)  
Cv – FLOW CAPACITY

**FULL PORT – METAL DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>METAL DIAPHRAGM – SIZE – 1-1/4" (DN32) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	115	(7.9)	115	(7.9)	1.30	2.80	4.40	10–40	(0.7–2.8)
15	(1.0)	180	(12.4)	180	(12.4)	1.47	3.18	4.87	10–40	(0.7–2.8)
20	(1.4)	240	(16.6)	240	(16.6)	1.64	3.55	5.34	10–40	(0.7–2.8)
25	(1.7)	300	(20.7)	300	(20.7)	1.81	3.93	5.81	10–40	(0.7–2.8)
35	(2.4)	370	(25.5)	370	(25.5)	2.35	6.13	8.30	30–50	(2.1–3.4)
50	(3.4)	500	(34.5)	450	(31.0)	4.55	8.60	9.00	40–60	(2.8–4.1)
75	(5.2)	670	(46.2)	475	(32.8)	5.30	8.92	9.00	50–90	(3.4–6.2)
100	(6.9)	740	(51.0)	495	(34.1)	6.80	9.00	9.00	70–225	(4.8–15.5)
125	(8.6)	740	(51.0)	525	(36.2)	6.90	9.00	9.00	70–225	(4.8–15.5)
150	(10.3)	740	(51.0)	550	(37.9)	6.99	9.00	9.00	70–225	(4.8–15.5)
175	(12.1)	740	(51.0)	575	(39.7)	7.09	9.00	9.00	70–225	(4.8–15.5)
200	(13.8)	740	(51.0)	600	(41.4)	7.19	9.00	9.00	70–225	(4.8–15.5)
225	(15.5)	740	(51.0)	625	(43.1)	7.38	9.00	9.00	70–225	(4.8–15.5)

<b>METAL DIAPHRAGM – SIZE – 1-1/2" (DN40) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	115	(7.9)	115	(7.9)	1.75	3.27	4.82	10–40	(0.7–2.8)
15	(1.0)	190	(13.1)	190	(13.1)	2.04	3.79	5.42	10–40	(0.7–2.8)
20	(1.4)	260	(17.9)	260	(17.9)	2.33	4.30	6.01	10–40	(0.7–2.8)
25	(1.7)	330	(22.8)	330	(22.8)	2.62	4.82	6.61	10–40	(0.7–2.8)
35	(2.4)	435	(30.0)	435	(30.0)	3.75	6.53	8.70	30–75	(2.1–5.2)
50	(3.4)	635	(43.8)	450	(31.0)	4.15	7.15	9.10	30–75	(2.1–5.2)
75	(5.2)	740	(51.0)	475	(32.8)	5.30	8.75	10.30	60–100	(4.1–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	6.10	9.40	10.75	80–225	(5.5–15.5)
125	(8.6)	740	(51.0)	525	(36.2)	6.23	9.49	10.78	80–225	(5.5–15.5)
150	(10.3)	740	(51.0)	550	(37.9)	6.37	9.58	10.80	80–225	(5.5–15.5)
175	(12.1)	740	(51.0)	575	(39.7)	6.50	9.68	10.83	80–225	(5.5–15.5)
200	(13.8)	740	(51.0)	600	(41.4)	6.63	9.77	10.85	80–225	(5.5–15.5)
225	(15.5)	740	(51.0)	625	(43.1)	6.90	9.95	10.90	80–225	(5.5–15.5)

<b>METAL DIAPHRAGM – SIZE – 2" (DN50) – FULL PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	165	(11.4)	165	(11.4)	2.10	4.27	6.55	10–40	(0.7–2.8)
15	(1.0)	270	(18.6)	270	(18.6)	2.26	4.58	6.90	10–40	(0.7–2.8)
20	(1.4)	370	(25.5)	370	(25.5)	2.42	4.90	7.25	10–40	(0.7–2.8)
25	(1.7)	470	(32.4)	425	(29.3)	2.59	5.21	7.60	10–40	(0.7–2.8)
35	(2.4)	500	(34.5)	435	(30.0)	5.55	9.60	11.30	30–60	(2.1–4.1)
50	(3.4)	700	(48.3)	450	(31.0)	6.85	10.35	12.00	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	5.87	9.70	11.40	50–150	(3.4–10.3)
100	(6.9)	740	(51.0)	500	(34.5)	6.48	10.03	11.73	50–150	(3.4–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	7.09	10.37	12.07	50–150	(3.4–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	7.70	10.70	12.40	50–150	(3.4–10.3)

TABLE 12  
Cv – FLOW CAPACITY

**OPT -12, 1-STEP REDUCED PORT – METAL DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

( $F_L = 0.93$ )

<b>METAL DIAPHRAGM – SIZE – 1/2" (DN15) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	270	(18.6)	300	(20.7)	0.23	0.57	0.87	10–50	(0.7–3.4)
15	(1.0)	405	(27.9)	415	(28.6)	0.27	0.59	0.95	10–50	(0.7–3.4)
20	(1.4)	540	(37.2)	420	(29.0)	0.31	0.61	1.03	10–50	(0.7–3.4)
25	(1.7)	670	(46.2)	425	(29.3)	0.36	0.63	1.12	10–50	(0.7–3.4)
35	(2.4)	685	(47.2)	435	(30.0)	0.44	0.66	1.28	10–50	(0.7–3.4)
50	(3.4)	740	(51.0)	450	(31.0)	0.63	1.21	1.67	40–100	(2.8–6.9)
75	(5.2)	740	(51.0)	475	(32.8)	0.83	1.52	2.03	40–100	(2.8–6.9)
100	(6.9)	740	(51.0)	500	(34.5)	1.24	2.10	2.45	80–150	(5.5–10.3)
125	(8.6)	740	(51.0)	525	(36.2)	1.32	2.18	2.52	80–150	(5.5–10.3)
150	(10.3)	740	(51.0)	550	(37.9)	1.29	2.17	2.52	120–190	(8.3–13.1)
175	(12.1)	740	(51.0)	575	(39.7)	1.36	2.22	2.52	120–190	(8.3–13.1)
200	(13.8)	740	(51.0)	600	(41.4)	1.28	2.13	2.52	150–300	(10.3–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	1.37	2.21	2.52	150–300	(10.3–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	1.45	2.29	2.52	150–300	(10.3–20.7)

<b>METAL DIAPHRAGM – SIZE – 3/4" (DN20) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	190	(13.1)	325	(22.4)	0.42	0.81	1.18	10–40	(0.7–2.8)
15	(1.0)	295	(20.3)	415	(28.6)	0.47	0.89	1.27	10–40	(0.7–2.8)
20	(1.4)	395	(27.2)	420	(29.0)	0.53	0.98	1.37	10–40	(0.7–2.8)
25	(1.7)	500	(34.5)	425	(29.3)	0.58	1.04	1.45	10–40	(0.7–2.8)
35	(2.4)	685	(47.2)	435	(30.0)	0.67	1.18	1.62	30–60	(2.1–4.1)
50	(3.4)	740	(51.0)	450	(31.0)	0.88	1.52	2.01	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	475	(32.8)	1.03	1.78	2.34	50–90	(3.4–6.2)
100	(6.9)	740	(51.0)	500	(34.5)	1.59	2.58	3.50	70–110	(4.8–7.6)
125	(8.6)	740	(51.0)	525	(36.2)	1.72	2.69	3.50	90–170	(6.2–11.7)
150	(10.3)	740	(51.0)	550	(37.9)	1.40	2.48	3.45	140–300	(9.7–20.7)
175	(12.1)	740	(51.0)	575	(39.7)	1.49	2.56	3.50	140–300	(9.7–20.7)
200	(13.8)	740	(51.0)	600	(41.4)	1.58	2.64	3.50	140–300	(9.7–20.7)
250	(17.2)	740	(51.0)	650	(44.8)	1.67	2.72	3.50	140–300	(9.7–20.7)
300	(20.7)	740	(51.0)	700	(48.3)	1.77	2.88	3.50	140–300	(9.7–20.7)

<b>METAL DIAPHRAGM – SIZE – 1" (DN25) – 1-STEP REDUCED PORT</b>										
Outlet Pressure		Max Inlet Pressure				Cv @ % DROOP			Range Spring	
		Metal Seated		Composition Seated		10%	20%	30%	psig	(Barg)
psig	(Barg)	psig	(Barg)	psig	(Barg)					
10	(0.7)	190	(13.1)	280	(19.3)	0.51	1.05	1.55	10–40	(0.7–2.8)
15	(1.0)	290	(20.0)	430	(29.7)	0.57	1.17	1.74	10–40	(0.7–2.8)
20	(1.4)	395	(27.2)	580	(40.1)	0.63	1.29	1.93	10–40	(0.7–2.8)
25	(1.7)	495	(34.1)	675	(46.6)	0.68	1.29	1.93	10–40	(0.7–2.8)
35	(2.4)	675	(46.6)	685	(47.2)	0.68	1.40	2.13	30–60	(2.1–4.1)
50	(3.4)	740	(51.0)	700	(48.3)	0.92	1.90	3.10	30–60	(2.1–4.1)
75	(5.2)	740	(51.0)	725	(50.0)	1.13	2.41	4.02	55–80	(3.8–5.5)
100	(6.9)	740	(51.0)	750	(51.7)	1.75	4.08	5.46	65–130	(4.5–9.0)
125	(8.6)	740	(51.0)	775	(53.4)	2.02	4.83	5.46	65–130	(4.5–9.0)
150	(10.3)	740	(51.0)	800	(55.2)	1.88	4.28	5.46	100–300	(6.9–20.7)
175	(12.1)	740	(51.0)	825	(56.9)	1.94	4.39	5.46	100–300	(6.9–20.7)
200	(13.8)	740	(51.0)	850	(58.6)	1.99	4.50	5.46	100–300	(6.9–20.7)
250	(17.2)	740	(51.0)	900	(62.1)	2.04	4.60	5.46	100–300	(6.9–20.7)
300	(20.7)	740	(51.0)	950	(65.5)	2.15	4.82	5.46	100–300	(6.9–20.7)

TABLE 12 (Continued)  
Cv – FLOW CAPACITY

**OPT -12, 1-STEP REDUCED PORT – METAL DIAPHRAGM**

Based on 400 psid (27.6 Bard) max pressure drop limit for composition seat,  
and on 650 psid (44.8 Bard) for metal seat.

$(F_L = 0.93)$

<b>METAL DIAPHRAGM – SIZE – 1-1/2" (DN40) – 1-STEP REDUCED PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	185	(12.8)	255	(17.6)	0.78	1.55	2.42	10-40	(0.7-2.8)
15	(1.0)	285	(19.7)	395	(27.2)	0.87	2.10	2.67	10-40	(0.7-2.8)
20	(1.4)	385	(26.6)	420	(29.0)	0.96	1.92	2.93	10-40	(0.7-2.8)
25	(1.7)	385	(26.6)	425	(29.3)	1.04	2.13	3.13	10-40	(0.7-2.8)
35	(2.4)	660	(45.5)	435	(30.0)	1.21	2.54	3.53	30-75	(2.1-5.2)
50	(3.4)	740	(51.0)	450	(31.0)	1.67	3.47	4.62	30-75	(2.1-5.2)
75	(5.2)	740	(51.0)	475	(32.8)	2.25	4.79	6.00	60-100	(4.1-6.9)
100	(6.9)	740	(51.0)	500	(34.5)	2.72	4.84	6.00	80-225	(5.5-15.5)
125	(8.6)	740	(51.0)	525	(36.2)	2.80	4.93	6.00	80-225	(5.5-15.5)
150	(10.3)	740	(51.0)	550	(37.9)	2.88	5.02	6.00	80-225	(5.5-15.5)
175	(12.1)	740	(51.0)	575	(39.7)	2.95	5.11	6.00	80-225	(5.5-15.5)
200	(13.8)	740	(51.0)	600	(41.4)	3.03	5.20	6.00	80-225	(5.5-15.5)
225	(15.5)	740	(51.0)	625	(43.1)	3.10	5.26	6.00	80-225	(5.5-15.5)

<b>METAL DIAPHRAGM – SIZE – 2" (DN40) – 1-STEP REDUCED PORT</b>										
<b>Outlet Pressure</b>		<b>Max Inlet Pressure</b>				<b>Cv @ % DROOP</b>			<b>Range Spring</b>	
		<b>Metal Seated</b>		<b>Composition Seated</b>						
<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>psig</b>	<b>(Barg)</b>	<b>10%</b>	<b>20%</b>	<b>30%</b>	<b>psig</b>	<b>(Barg)</b>
10	(0.7)	165	(11.4)	165	(11.4)	1.75	3.27	4.82	10-40	(0.7-2.8)
15	(1.0)	265	(18.3)	265	(18.3)	2.04	3.79	5.42	10-40	(0.7-2.8)
20	(1.4)	365	(25.2)	365	(25.2)	2.33	4.30	6.01	10-40	(0.7-2.8)
25	(1.7)	460	(31.7)	425	(29.3)	2.62	4.82	6.61	10-40	(0.7-2.8)
35	(2.4)	530	(36.6)	435	(30.0)	3.75	6.53	8.70	30-60	(2.1-4.1)
50	(3.4)	700	(48.3)	450	(31.0)	4.15	7.15	9.10	30-60	(2.1-4.1)
75	(5.2)	740	(51.0)	475	(32.8)	5.30	8.75	10.30	50-150	(3.4-10.3)
100	(6.9)	740	(51.0)	500	(34.5)	6.10	9.40	10.75	50-150	(3.4-10.3)
125	(8.6)	740	(51.0)	525	(36.2)	6.23	9.49	10.78	50-150	(3.4-10.3)
150	(10.3)	740	(51.0)	550	(37.9)	6.37	9.58	10.80	50-150	(3.4-10.3)

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## NOTES

**TABLE 13**  
**WATER CAPACITY - GPM**  
 S.G. = 1.0      T = 60°F      F<sub>L</sub> = 0.93

**FULL PORT – COMPOSITION DIAPHRAGM & SEAT**

Outlet Pressure P2,psig	Inlet Pressure P1,psig	Pressure Drop psi	GPM @ 1/2" Body Size			GPM @ 3/4" Body Size			GPM @ 1" Body Size			GPM @ 1-1/4" Body Size			GPM @ 1-1/2" Body Size			GPM @ 2" Body Size			
			Droop			Droop			Droop			Droop			Droop			Droop			
			10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	
10	25	15	2.7	5.0	7.3	4.5	8.6	11.1	4.8	9.3	14.0	7.1	15.8	24.2	9.2	17.8	26.6	13.9	28.2	39.9	
	50	40	4.5	8.2	12.0	7.3	14.1	18.1	7.9	15.2	22.8	11.6	25.7	39.5	15.0	29.0	43.4	22.8	46.0	65.1	
	75	65	5.7	10.5	HI VEL	9.4	18.0	23.1	10.1	19.4	29.1	14.8	32.8	50.4	19.1	37.0	55.4	29.0	58.6	83.0	
	100	90	6.7	12.3	HI VEL	11.0	21.2	27.1	11.9	22.9	34.2	17.4	38.6	59.3	22.5	43.5	65.2	34.2	69.0	97.7	
	125	115	7.6	13.9	HI VEL	12.4	23.9	HI VEL	13.4	25.8	38.7	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
	150	140	8.4	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	175	165	9.1	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
200	190	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
15	25	10	2.4	4.4	6.3	4.0	7.4	9.5	4.4	8.5	12.0	6.7	14.4	21.2	8.7	16.4	23.3	12.1	24.0	34.2	
	50	35	4.6	8.2	11.7	7.5	13.8	17.7	8.3	15.9	22.5	12.5	26.9	39.6	16.3	30.8	43.7	22.7	45.0	64.1	
	75	60	6.0	10.8	HI VEL	9.8	18.1	23.2	10.8	20.8	29.5	16.3	35.2	51.8	21.3	40.3	57.2	29.7	58.9	83.9	
	100	85	7.1	12.8	HI VEL	11.6	21.6	27.7	12.9	24.8	35.1	19.5	41.9	61.7	25.4	47.9	68.0	35.4	70.1	99.8	
	125	110	8.1	HI VEL	HI VEL	13.2	24.5	HI VEL	14.7	28.2	40.0	22.1	47.7	70.2	28.8	54.5	77.4	40.3	79.7	113.6	
	150	135	8.9	HI VEL	HI VEL	14.6	27.2	HI VEL	16.3	31.3	44.3	24.5	52.9	77.7	32.0	60.4	85.7	44.6	88.3	125.8	
	175	160	9.7	HI VEL	HI VEL	15.9	HI VEL	HI VEL	17.7	34.0	48.2	HI P1	HI P1	HI P1	34.8	65.8	93.4	46.6	96.1	137.0	
200	185	10.5	HI VEL	HI VEL	17.1	HI VEL	HI VEL	19.0	36.6	51.8	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	52.2	103.4	147.3		
250	235	CAV	CAV	CAV	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
20	25	5	1.9	3.3	4.7	3.1	5.5	7.0	3.5	6.6	9.0	5.4	11.2	15.9	7.0	13.0	17.7	9.1	17.7	25.4	
	50	30	4.6	8.1	11.4	7.5	13.4	17.3	8.5	16.2	22.0	13.1	27.6	39.1	17.2	31.8	43.3	22.3	43.4	62.2	
	75	55	6.2	11.0	HI VEL	10.2	18.1	23.4	11.5	22.0	29.7	17.8	37.3	52.9	23.3	43.0	58.6	30.3	58.7	84.2	
	100	80	7.5	13.2	HI VEL	12.3	21.8	28.2	13.9	26.5	35.9	21.5	45.0	63.8	28.1	51.9	70.7	36.5	70.8	101.6	
	125	105	8.6	HI VEL	HI VEL	14.0	25.0	HI VEL	15.9	30.3	41.1	24.6	51.5	73.1	32.2	59.4	81.0	41.8	81.2	116.4	
	150	130	9.6	HI VEL	HI VEL	15.6	27.8	HI VEL	17.7	33.7	45.7	27.4	57.4	81.3	35.8	66.1	90.1	46.5	90.3	129.5	
	175	155	10.5	HI VEL	HI VEL	17.1	HI VEL	HI VEL	19.3	36.9	49.9	29.9	62.6	88.8	39.1	72.2	98.4	50.8	98.6	141.4	
200	180	11.3	HI VEL	HI VEL	18.4	HI VEL	HI VEL	20.8	39.7	53.8	32.2	67.5	95.7	42.1	77.8	106.0	54.7	106.3	152.4		
250	230	12.7	HI VEL	HI VEL	20.8	HI VEL	HI VEL	23.5	44.9	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	61.9	120.1	172.3		
25	50	25	4.5	7.9	10.9	7.4	12.8	16.5	8.5	16.2	21.1	13.4	27.6	37.9	17.6	32.1	42.1	21.6	41.3	59.5	
	75	50	6.4	11.1	HI VEL	10.4	18.0	23.3	12.0	22.9	29.8	19.0	39.0	53.6	24.9	45.3	59.5	30.5	58.3	84.1	
	100	75	7.8	13.6	HI VEL	12.7	22.1	28.5	14.7	28.1	36.5	23.2	47.7	65.6	30.5	55.5	72.8	37.4	71.4	103.0	
	125	100	9.0	HI VEL	HI VEL	14.7	25.5	HI VEL	17.0	32.4	42.1	26.8	55.1	75.8	35.2	64.1	84.1	43.2	82.5	118.9	
	150	125	10.1	HI VEL	HI VEL	16.4	28.5	HI VEL	19.0	36.2	47.1	30.0	61.6	84.7	39.4	71.7	94.0	48.3	92.2	132.9	
	175	150	11.0	HI VEL	HI VEL	18.0	HI VEL	HI VEL	20.8	39.7	51.6	32.8	67.5	92.8	43.1	78.5	103.0	52.9	101.0	145.6	
	200	175	11.9	HI VEL	HI VEL	19.4	HI VEL	HI VEL	22.5	42.9	HI VEL	35.5	72.9	100.3	46.6	84.8	111.3	57.1	109.1	157.3	
250	225	13.5	HI VEL	HI VEL	22.1	HI VEL	HI VEL	25.5	48.6	HI VEL	40.2	82.7	HI VEL	52.8	96.2	126.2	64.8	123.8	178.4		
35	50	15	4.0	6.7	9.1	7.6	12.2	16.0	9.6	16.3	19.6	15.9	29.8	34.9	17.0	34.1	38.7	30.6	42.8	49.6	
	75	40	6.5	11.0	HI VEL	12.5	19.9	26.1	15.7	26.6	32.1	25.9	48.7	56.9	27.8	55.7	63.2	50.0	69.9	81.0	
	100	65	8.3	14.0	HI VEL	15.9	25.4	HI VEL	20.1	33.9	40.9	33.1	62.1	72.6	35.5	70.9	80.6	63.7	89.1	103.2	
	125	90	9.8	HI VEL	HI VEL	18.7	HI VEL	HI VEL	23.6	39.9	48.1	38.9	73.0	85.4	41.7	83.5	94.9	74.9	104.8	121.4	
	150	115	11.0	HI VEL	HI VEL	21.1	HI VEL	HI VEL	26.7	45.1	HI VEL	44.0	82.6	96.5	47.2	94.4	107.2	84.7	118.5	137.3	
	175	140	12.2	HI VEL	HI VEL	23.3	HI VEL	HI VEL	29.5	49.8	HI VEL	48.5	91.1	HI VEL	52.1	104.1	118.3	93.5	130.7	151.5	
	200	165	13.2	HI VEL	HI VEL	25.3	HI VEL	HI VEL	32.0	HI VEL	HI VEL	52.7	98.9	HI VEL	56.5	113.0	128.5	101.5	141.9	164.4	
250	215	HI VEL	HI VEL	HI VEL	28.9	HI VEL	HI VEL	36.5	HI VEL	HI VEL	60.1	HI VEL	HI VEL	64.5	129.0	146.6	115.8	162.0	187.7		
50	75	25	6.7	10.9	14.1	11.5	13.5	24.3	14.5	25.0	30.0	26.5	44.2	45.0	27.5	45.3	52.8	44.0	58.8	65.0	
	100	50	9.4	HI VEL	HI VEL	16.3	19.0	HI VEL	20.5	35.4	42.4	37.5	62.4	63.6	38.9	64.0	74.6	62.2	83.1	91.9	
	125	75	11.5	HI VEL	HI VEL	19.9	23.3	HI VEL	25.1	43.3	52.0	45.9	76.5	77.9	47.6	78.4	91.4	76.2	101.8	112.6	
	150	100	13.3	HI VEL	HI VEL	23.0	26.9	HI VEL	29.0	50.0	HI VEL	53.0	88.3	90.0	55.0	90.5	105.5	88.0	117.5	130.0	
	175	125	HI VEL	HI VEL	HI VEL	25.7	HI VEL	HI VEL	32.4	HI VEL	HI VEL	59.3	98.7	100.6	61.5	101.2	118.0	98.4	131.4	145.3	
	200	150	HI VEL	HI VEL	HI VEL	28.2	HI VEL	HI VEL	35.5	HI VEL	HI VEL	64.9	HI VEL	HI VEL	67.4	110.8	129.2	107.8	143.9	159.2	
	250	200	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	41.0	HI VEL	HI VEL	75.0	HI VEL	HI VEL	77.8	128.0	149.2	124.5	166.2	183.8	
75	100	25	7.9	12.6	HI VEL	14.2	23.9	25.0	18.4	30.0	30.0	38.5	45.0	45.0	31.8	48.3	54.5	36.4	53.2	61.9	
	125	50	11.2	HI VEL	HI VEL	20.0	HI VEL	HI VEL	26.0	42.4	42.4	54.4	63.6	63.6	44.9	68.2	77.1	51.4	75.2	87.5	
	150	75	13.7	HI VEL	HI VEL	24.5	HI VEL	HI VEL	31.8	52.0	52.0	66.7	77.9	77.9	55.0	83.6	94.4	63.0	92.1	107.1	
	175	100	HI VEL	HI VEL	HI VEL	28.3	HI VEL	HI VEL	36.7	HI VEL	HI VEL	77.0	90.0	90.0	63.5	96.5	109.0	72.7	106.3	123.7	
	200	125	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	41.0	HI VEL	HI VEL	86.1	100.6	100.6	71.0	107.9	121.9	81.3	118.8	138.3	
	250	175	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	48.5	HI VEL	HI VEL	101.9	HI VEL	HI VEL	84.0	127.7	144.2	96.2	140.6	163.6	
	250	25	10.4	HI VEL	HI VEL	16.7	25.0	25.0	19.3	30.0	30.0	43.4	45.0	45.0	36.7	51.3	55.0	38.9	54.8	63.5	
100	150	50	HI VEL	HI VEL	HI VEL	23.5	HI VEL	HI VEL	27.2	42.4	42.4	61.4	63.6	63.6	51.8	72.5	77.8	55.0	77.4	89.8	
	175	75	HI VEL	HI VEL	HI VEL	28.8	HI VEL	HI VEL	33.3	52.0	52.0	75.2	77.9	77.9	63.5	88.8	95.3	67.4	94.8	110.0	
	200	100	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	38.5	HI VEL	HI VEL	86.8	90.0	90.0	73.3	102.5	110.0	77.8	109.5	127.0	
	250	150	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	47.2	HI VEL	HI VEL	101.9	HI VEL	HI VEL	89.8	125.5	134.7	95.3	134.1	155.5	
125	150	25	10.9	HI VEL	HI VEL	15.5	25.0	25.0	18.5	30.0	30.0	43.7	45.0	45.0	37.5	51.6	55.0	41.5	56.3	64.5	
	175	50	HI VEL	HI VEL	HI VEL	21.9	HI VEL	HI VEL	26.2	42.4	42.4	61.7	63.6	63.6	53.0	73.0	77.8	58.6	79.6	91.2	
	200	75	HI VEL	HI VEL	HI VEL	26.8	HI VEL	HI VEL	32.0	52.0	52.0	75.6	77.9	77.9	64.9	89.4	95.3	71.8	97.5	111.7	
	250	125	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	41.4	HI VEL	HI VEL	97.6	100.6	100.6	83.7	115.4	123.0	92.7	125.9	144.2	
150	175	25	9.9	HI VEL	HI VEL	16.7	25.0	25.0	18.8	30.0	30.0	44.0	45.0	45.0	38.3	52.0	55.0	44.0	57.9	65.0	
	200	50	14.0	HI VEL	HI VEL	23.5	HI VEL	HI VEL	26.6	42.4	42.4	62.2	63.6	63.6	54.1	73.5	77.8	62.2	81.9	91.9	
	250	100	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	HI VEL	37.6	HI VEL	HI VEL	87.9	90.0	90.0	76.5	103.9	110.0				

**TABLE 14**  
**COMPRESSED AIR CAPACITY – SCFH**  
 S.G. = 1.0      T = 60°F      F<sub>L</sub> = 0.93

**FULL PORT – COMPOSITION DIAPHRAGM & SEAT**

Outlet Pressure P2,psig	Inlet Pressure P1,psig	Pressure Drop psi	SCFH @ 1/2" Body Size			SCFH @ 3/4" Body Size			SCFH @ 1" Body Size			SCFH @ 1-1/4" Body Size			SCFH @ 1-1/2" Body Size			SCFH @ 2" Body Size		
			Droop			Droop			Droop			Droop			Droop			Droop		
			10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%
10	25	15	800	1,500	2,200	1,400	2,600	3,300	1,500	2,800	4,200	2,100	4,800	7,300	2,800	5,400	8,000	4,200	8,500	12,000
	50	40	1,500	2,700	3,900	2,400	4,600	5,900	2,600	5,000	7,400	3,800	8,400	12,900	4,900	9,400	14,100	7,400	15,000	21,200
	75	65	2,000	3,700	5,400	3,300	6,400	8,200	3,600	6,900	10,300	5,200	11,600	17,800	6,800	13,100	19,600	10,300	20,800	29,400
	100	90	2,600	4,700	6,900	4,200	8,100	10,400	4,600	8,800	13,200	6,700	14,900	22,800	8,700	16,800	25,100	13,100	26,600	37,600
	150	140	3,700	6,800	9,900	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	200	190	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
15	25	10	800	1,400	2,000	1,300	2,400	3,100	1,400	2,800	3,900	2,200	4,700	6,900	2,800	5,400	7,600	4,000	7,800	11,200
	50	35	1,600	2,800	4,000	2,600	4,800	6,100	2,900	5,500	7,800	4,300	9,300	13,600	5,600	10,600	15,100	7,800	15,500	22,100
	75	60	2,200	4,000	5,700	3,600	6,700	8,600	4,000	7,700	10,900	6,000	13,000	19,100	7,900	14,800	21,100	11,000	21,700	30,900
	100	85	2,800	5,100	7,200	4,600	8,500	11,000	5,100	9,800	13,900	7,700	16,600	24,400	10,000	19,000	27,000	14,000	27,800	39,600
	150	135	4,000	7,300	10,400	6,600	12,300	15,700	7,300	14,100	20,000	11,100	23,900	35,100	14,400	27,300	38,700	20,100	39,900	56,800
	200	185	5,300	9,500	13,500	8,600	16,000	20,500	9,600	18,400	26,100	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	250	235	6,500	11,700	16,700	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	300	285	7,700	14,000	SONIC	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	350	335	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	500	485	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
20	25	5	700	1,200	1,600	1,100	1,900	2,500	1,200	2,300	3,100	1,900	3,900	5,600	2,500	4,600	6,200	3,200	6,200	8,900
	50	30	1,700	3,000	4,100	2,700	4,900	6,300	3,100	5,900	8,000	4,800	10,000	14,200	6,300	11,600	15,800	8,100	15,800	22,700
	75	55	2,400	4,200	5,900	3,900	7,000	9,000	4,400	8,400	11,400	6,800	14,300	20,300	9,000	16,500	22,500	11,600	22,600	32,400
	100	80	3,100	5,400	7,600	5,000	8,900	11,500	5,700	10,800	14,600	8,800	18,400	26,000	11,500	21,200	28,900	14,900	28,900	41,500
	150	130	4,400	7,800	10,900	7,200	12,800	16,500	8,100	15,500	21,000	12,600	26,400	37,400	16,500	30,400	41,400	21,400	41,600	59,600
	200	180	5,700	10,100	14,200	9,400	16,700	21,600	10,600	20,300	27,400	16,400	34,400	48,800	21,500	39,700	54,100	27,900	54,200	77,700
	250	230	7,100	12,500	17,600	11,600	20,600	26,600	13,100	25,000	33,800	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	300	280	8,400	14,900	SONIC	13,800	24,500	31,600	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	350	330	9,800	17,200	SONIC	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	500	480	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
25	50	25	1,700	3,000	4,200	2,800	4,900	6,300	3,300	6,200	8,100	5,100	10,600	14,500	6,700	12,300	16,100	8,300	15,800	22,800
	75	50	2,600	4,500	6,200	4,200	7,200	9,300	4,800	9,200	11,900	7,600	15,600	21,500	10,000	18,200	23,900	12,300	23,400	33,700
	100	75	3,300	5,700	7,900	5,400	9,300	12,000	6,200	11,800	15,900	9,800	20,100	27,700	12,900	23,400	30,700	15,800	30,100	43,400
	150	125	4,700	8,200	11,400	7,700	13,400	17,300	8,900	17,000	22,100	14,100	28,900	39,800	18,500	33,600	44,100	22,700	43,300	62,400
	200	175	6,200	10,700	14,800	10,100	17,400	22,500	11,600	22,200	28,800	18,300	37,700	51,900	24,100	43,900	57,500	29,600	56,500	81,400
	250	225	7,600	13,300	18,300	12,400	21,500	27,800	14,300	27,300	35,500	22,600	46,500	64,000	29,700	54,100	71,000	36,500	69,600	100,400
	300	275	9,000	15,800	21,800	14,800	25,600	33,000	17,100	32,500	42,300	26,900	55,300	76,100	35,300	64,400	84,400	43,400	82,800	119,400
	350	325	10,500	18,300	SONIC	17,100	29,700	38,300	19,800	37,700	49,000	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	400	375	11,900	20,800	SONIC	19,500	33,800	SONIC	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	500	475	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
35	50	15	1,700	2,800	3,800	3,200	5,100	6,700	4,100	6,900	8,300	6,700	12,600	14,700	7,200	14,400	16,300	12,900	18,100	20,900
	75	40	2,800	4,800	6,400	5,400	8,600	11,300	6,800	11,600	13,900	11,300	21,100	24,700	12,100	24,100	27,400	21,700	30,300	35,100
	100	65	3,700	6,300	8,500	7,200	11,400	15,000	9,000	15,300	18,400	14,900	28,000	32,700	16,000	32,000	36,300	28,700	40,100	46,500
	150	115	5,400	9,100	12,300	10,300	16,500	21,600	13,100	22,100	26,600	21,500	40,400	47,200	23,100	46,200	52,500	41,400	58,000	67,200
	200	165	7,000	11,900	16,100	13,500	21,600	28,200	17,000	28,800	34,700	28,100	52,700	61,600	30,100	60,200	68,400	54,100	75,600	87,600
	250	215	8,700	14,700	19,800	16,600	26,600	34,800	21,000	35,500	42,800	34,600	65,000	76,000	37,100	74,300	84,400	66,700	93,300	108,000
	300	265	10,300	17,500	23,600	19,800	31,600	41,400	25,000	42,300	50,900	41,200	77,300	90,400	44,200	88,400	100,400	79,300	110,900	128,500
	350	315	12,000	20,300	27,400	22,900	36,700	48,000	29,000	49,000	59,000	47,700	89,600	104,800	51,200	102,400	116,400	92,000	128,600	149,000
	400	365	13,600	23,000	SONIC	26,100	41,700	SONIC	33,000	55,700	67,100	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
	500	465	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
50	75	25	3,200	5,200	6,800	5,600	8,500	11,700	7,000	12,100	14,500	12,800	21,300	21,700	13,300	21,900	25,500	21,300	28,400	31,400
	100	50	4,600	7,600	9,900	8,000	12,400	16,900	10,100	17,500	21,000	18,500	30,900	31,500	19,200	31,600	36,900	30,800	41,100	45,400
	150	100	7,000	11,400	14,800	12,100	18,100	25,400	15,200	26,200	31,400	27,800	46,300	47,200	28,800	47,400	55,300	46,100	61,600	68,100
	200	150	9,100	14,800	19,300	15,700	24,400	33,200	19,800	34,200	41,100	36,300	60,400	61,600	37,600	61,900	72,200	60,200	80,400	89,000
	250	200	11,200	18,300	23,800	19,400	29,700	40,900	24,500	42,200	50,600	44,700	74,500	76,000	46,400	76,400	89,000	74,300	99,200	109,700
	300	250	13,400	21,800	28,300	23,100	35,700	49,100	29,100	50,200	60,200	53,200	88,700	90,400	55,200	90,900	105,900	88,400	118,000	130,500
	350	300	15,500	25,300	32,800	26,800	41,300	56,500	33,800	58,200	69,800	61,700	102,800							

TABLE 14 (Continued)  
 COMPRESSED AIR CAPACITY – SCFH  
 S.G. = 1.0      T = 60°F      F<sub>L</sub> = 0.93

**FULL PORT – COMPOSITION DIAPHRAGM & SEAT**

Outlet Pressure P2,psig	Inlet Pressure P1,psig	Pressure Drop psi	SCFH @ 1/2" Body Size			SCFH @ 3/4" Body Size			SCFH @ 1" Body Size			SCFH @ 1-1/4" Body Size			SCFH @ 1-1/2" Body Size			SCFH @ 2" Body Size					
			Droop			Droop			Droop			Droop			Droop			Droop					
			10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%
100	150	50	9,400	15,300	16,000	15,200	22,800	22,800	17,600	27,400	27,400	39,600	41,100	41,100	33,400	46,800	50,200	35,500	50,000	58,000			
	200	100	13,700	22,200	23,200	22,100	33,200	33,200	25,500	39,800	39,800	57,600	59,700	59,700	48,600	68,000	73,000	51,600	72,600	84,200			
	250	150	17,400	28,100	29,400	28,000	42,000	42,000	32,300	50,400	50,400	72,900	75,600	75,600	61,600	86,100	92,400	65,300	92,000	106,600			
	300	200	20,800	33,600	35,100	33,400	50,200	50,200	38,700	60,200	60,200	87,100	90,400	90,400	73,600	102,900	110,400	78,100	109,900	127,500			
	350	250	24,100	39,000	40,700	38,800	58,200	58,200	44,800	69,800	69,800	101,000	104,800	104,800	85,300	119,300	128,100	90,600	127,500	147,800			
	400	300	27,400	44,400	46,300	44,100	66,200	66,200	51,000	79,400	79,400	114,900	119,200	119,200	97,100	135,700	145,600	103,000	145,000	168,200			
	500	400	34,000	55,100	57,500	54,700	82,200	82,200	63,300	98,600	98,600	HI P1	HI P1	HI P1	120,500	168,500	180,800	127,900	180,000	208,800			
600	500	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
125	150	25	7,700	12,400	12,400	10,900	17,600	17,600	13,100	21,200	21,200	30,800	31,800	31,800	26,400	36,400	38,800	29,300	39,700	45,500			
	200	75	13,500	21,700	21,700	19,200	31,000	31,000	23,000	37,200	37,200	54,200	55,800	55,800	46,500	64,000	68,200	51,400	69,900	80,000			
	250	125	17,800	28,700	28,700	25,400	41,000	41,000	30,300	49,200	49,200	71,600	73,800	73,800	61,400	84,600	90,200	68,000	92,300	105,800			
	300	175	21,600	34,900	34,900	30,900	49,900	49,900	36,900	59,800	59,800	87,100	89,800	89,800	74,700	102,900	109,700	82,700	112,300	128,600			
	350	225	25,200	40,700	40,700	36,100	58,200	58,200	43,100	69,800	69,800	101,600	104,700	104,700	87,100	120,100	128,000	96,500	131,000	150,100			
	400	275	28,700	46,300	46,300	41,000	66,200	66,200	49,000	79,400	79,400	115,600	119,200	119,200	99,200	136,600	145,600	109,800	149,100	170,800			
	500	375	35,700	57,500	57,500	51,000	82,200	82,200	60,800	98,600	98,600	143,500	147,900	147,900	123,100	169,600	180,800	136,300	185,100	212,000			
600	475	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
150	200	50	10,800	17,800	19,000	18,100	27,200	27,200	20,500	32,600	32,600	47,800	49,000	49,000	41,600	56,500	59,800	47,900	63,000	70,700			
	250	100	15,500	25,600	27,300	26,000	39,100	39,100	29,400	46,900	46,900	68,700	70,300	70,300	59,800	81,200	85,900	68,800	90,500	101,600			
	300	150	19,300	32,000	34,200	32,500	48,900	48,900	36,700	58,600	58,600	85,900	87,900	87,900	74,700	101,500	107,500	86,000	113,100	127,000			
	350	200	22,900	37,900	40,400	38,500	57,700	57,700	43,400	69,300	69,300	101,500	103,900	103,900	88,300	120,000	127,000	101,600	133,700	150,100			
	400	250	26,200	43,400	46,300	44,000	66,100	66,100	49,700	79,300	79,300	116,200	119,000	119,000	101,200	137,400	145,500	116,400	153,100	171,900			
	500	350	32,500	53,900	57,500	54,700	82,200	82,200	61,800	98,600	98,600	144,500	147,900	147,900	125,700	170,800	180,800	144,600	190,300	213,700			
	600	450	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
175	200	25	8,200	13,900	14,400	8,900	14,600	19,600	15,800	24,700	24,700	36,400	37,000	37,000	32,100	43,000	45,200	41,200	51,200	58,000			
	250	75	14,400	24,300	25,100	15,600	25,400	34,300	27,500	43,100	43,100	63,500	64,600	64,600	56,100	75,100	79,000	68,000	84,000	94,000			
	300	125	18,800	31,900	32,900	20,400	33,300	44,900	36,000	56,500	56,500	83,200	84,700	84,700	73,500	98,400	103,500	81,000	103,500	118,000			
	350	175	22,700	38,400	39,700	24,600	40,100	54,100	43,400	68,000	68,000	100,300	102,100	102,100	88,600	118,600	124,800	101,600	133,700	150,100			
	400	225	26,200	44,500	45,900	28,500	46,400	62,600	50,200	78,700	78,700	116,000	118,100	118,100	102,500	137,200	144,300	116,400	153,100	171,900			
	500	325	32,900	55,700	57,500	35,700	58,200	78,400	63,000	98,600	98,600	145,300	147,900	147,900	128,400	171,900	180,800	144,600	190,300	213,700			
	600	425	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
200	250	50	12,500	21,700	21,700	13,900	22,300	31,000	24,100	37,200	37,200	55,200	55,800	55,800	49,400	65,300	68,200	51,200	67,000	76,000			
	300	100	17,900	31,000	31,000	19,800	31,900	44,300	34,400	53,100	53,100	78,800	79,700	79,700	70,600	93,200	97,400	78,000	103,000	118,000			
	350	150	22,200	38,500	38,500	24,600	39,600	55,000	42,800	66,000	66,000	97,900	99,000	99,000	87,700	115,800	121,000	86,000	113,000	128,000			
	400	200	26,100	45,200	45,200	28,900	46,500	64,600	50,200	77,500	77,500	114,900	116,200	116,200	102,900	135,900	142,000	101,600	133,700	150,100			
	500	300	33,100	57,400	57,400	36,700	59,000	81,900	63,700	98,300	98,300	145,800	147,500	147,500	130,600	172,600	180,300	144,600	190,300	213,700			
	600	400	39,700	68,700	68,700	44,000	70,700	98,200	76,400	117,800	117,800	174,800	176,700	176,700	156,500	206,800	216,000	164,000	213,700	240,000			
250	300	50	14,100	24,100	24,100	16,300	25,700	34,400	27,700	41,300	41,300	61,200	62,100	62,100	54,000	72,000	74,000	58,000	76,000	86,000			
	350	100	20,100	34,300	34,300	23,200	36,600	49,000	39,400	58,800	58,800	85,200	86,100	86,100	75,000	102,000	107,000	78,000	103,000	118,000			
	400	150	24,800	42,400	42,400	28,700	45,300	60,600	48,700	72,700	72,700	105,200	106,100	106,100	93,000	124,000	130,000	92,000	124,000	140,000			
	500	250	32,900	56,200	56,200	38,000	60,000	80,200	64,500	96,300	96,300	141,200	142,100	142,100	128,000	170,000	178,000	136,000	180,000	200,000			
	600	350	40,100	68,400	68,400	46,300	73,100	97,700	78,600	117,300	117,300	171,300	172,200	172,200	158,000	206,800	216,000	164,000	213,700	240,000			
300	350	50	15,700	26,300	26,300	19,400	29,000	37,500	31,100	45,000	45,000	66,000	66,900	66,900	58,000	78,000	81,000	68,000	92,000	106,000			
	400	100	22,300	37,300	37,300	27,500	41,300	53,300	44,200	64,000	64,000	92,000	92,900	92,900	81,000	108,000	114,000	81,000	108,000	124,000			
	500	200	32,000	53,600	53,600	39,500	59,300	76,600	63,600	91,900	91,900	132,000	132,900	132,900	116,000	156,000	163,000	116,000	156,000	178,000			
	600	300	40,100	67,100	67,100	49,500	74,200	95,900	79,600	115,100	115,100	166,000	166,900	166,900	148,000	198,000	206,000	164,000	213,700	240,000			

- NOTES:**
1. Where "HI P1" is indicated, the inlet pressure exceeds the limit established in Table 9.
  2. Where "HI P2" is indicated, the maximum outlet pressure is exceeded.

**TABLE 15**  
**SATURATED STEAM CAPACITY - LBS/HR**  
 T = Sat.      F<sub>L</sub> = 0.93

**FULL PORT – METAL DIAPHRAGM & SEAT**

OUTLET PRESSURE P2, psig	INLET PRESSURE P1, psig	PRESSURE DROP psi	Lbs/Hr @ 1/2" BODY SIZE			Lbs/Hr @ 3/4" BODY SIZE			Lbs/Hr @ 1" BODY SIZE			Lbs/Hr @ 1-1/4" BODY SIZE			Lbs/Hr @ 1-1/2" BODY SIZE			Lbs/Hr @ 2" BODY SIZE					
			DROOP			DROOP			DROOP			DROOP			DROOP			DROOP					
			10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%
10	25	15	26	50	73	43	84	128	48	96	149	80	173	272	108	202	298	130	264	404			
	50	40	46	88	128	76	147	224	84	168	262	141	303	476	190	354	522	227	462	709			
	75	65	65	125	181	108	209	318	120	238	372	200	431	677	269	503	741	323	657	1007			
	100	90	83	159	232	138	268	407	154	305	476	256	551	866	344	644	949	413	840	1289			
	125	115	100	193	281	167	324	494	186	370	577	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	501	1018	1562		
	150	140	118	227	HI VEL	196	381	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	588	1195	1832	
	175	165	135	260	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
	200	190	153	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
250	240	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
15	25	10	26	48	69	41	81	119	47	114	145	80	172	264	111	205	294	123	248	374			
	50	35	50	95	136	81	160	235	93	224	285	157	339	520	218	405	579	241	489	737			
	75	60	70	133	189	113	224	328	130	313	398	219	474	726	304	565	808	337	683	1029			
	100	85	93	175	250	150	295	433	171	413	526	289	626	959	402	746	1067	445	901	1358			
	125	110	112	212	303	181	358	525	208	501	637	351	758	1161	487	904	1293	539	1092	1646			
	150	135	132	249	HI VEL	213	420	HI VEL	243	588	747	411	890	1362	571	1060	1516	632	1281	1930			
	175	160	151	286	HI VEL	244	482	HI VEL	280	675	858	473	1022	1565	656	1218	1742	726	1472	2218			
	200	185	171	323	HI VEL	276	545	HI VEL	316	762	969	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	821	1663	2505		
	250	235	210	HI VEL	HI VEL	339	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	1008	2043	3077	
	300	285	249	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1
350	335	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
20	25	5	22	40	56	34	68	96	39	79	120	67	146	219	96	176	247	99	201	297			
	50	30	55	102	142	85	171	243	100	200	304	170	369	555	242	447	624	251	509	753			
	75	55	79	146	204	122	245	348	143	285	435	244	527	793	346	639	893	360	728	1077			
	100	80	102	188	263	157	317	449	184	368	562	315	681	1024	447	825	1153	464	940	1391			
	125	105	126	234	327	196	394	558	229	458	699	391	847	1274	556	1026	1433	577	1169	1729			
	150	130	148	274	383	229	462	655	269	537	820	459	993	1494	652	1203	1681	677	1371	2028			
	175	155	170	315	HI VEL	264	530	HI VEL	309	617	942	527	1141	1716	749	1382	1932	778	1575	2330			
	200	180	192	356	HI VEL	298	599	HI VEL	349	697	1064	595	1289	1939	846	1561	2182	879	1779	2632			
	250	230	236	HI VEL	HI VEL	366	HI VEL	HI VEL	428	856	HI VEL	HI P1	HI P1	HI P1	1039	1918	HI VEL	1079	2185	3233			
	300	280	281	HI VEL	HI VEL	434	HI VEL	HI VEL	508	1016	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	1281	2594	3837			
	350	330	325	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	1482	3002	HI VEL		
	400	380	369	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	
25	50	25	58	103	144	88	176	243	103	212	311	180	391	578	261	479	657	258	518	756			
	75	50	85	153	213	130	261	359	153	314	461	266	578	855	386	709	973	381	767	1118			
	100	75	110	197	275	167	336	463	197	404	593	343	745	1102	497	914	1253	491	988	1441			
	125	100	137	245	341	207	417	575	245	502	737	426	925	1368	617	1135	1556	610	1227	1790			
	150	125	162	291	406	246	495	683	291	596	876	506	1099	1625	733	1348	1849	725	1458	2126			
	175	150	186	334	HI VEL	283	569	784	334	685	1006	582	1263	1867	842	1549	2125	833	1675	2443			
	200	175	211	378	HI VEL	320	643	HI VEL	378	773	1136	657	1427	2109	951	1750	2400	940	1892	2759			
	250	225	259	HI VEL	HI VEL	393	789	HI VEL	464	950	HI VEL	807	1753	HI VEL	1169	2150	2948	1155	2324	3389			
	300	275	307	HI VEL	HI VEL	466	HI VEL	HI VEL	550	1127	HI VEL	958	2080	HI VEL	1387	2551	HI VEL	1371	2758	4023			
	350	325	355	HI VEL	HI VEL	539	HI VEL	HI VEL	637	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	1587	3192	4656		
400	375	404	HI VEL	HI VEL	613	HI VEL	HI VEL	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	HI P1	1804	3630	HI VEL			
35	50	15	56	99	136	84	169	223	102	214	297	198	516	699	316	550	733	467	808	952			
	75	40	95	167	229	142	284	375	171	359	499	332	867	1174	531	924	1231	785	1358	1599			
	100	65	126	221	304	188	377	497	227	476	662	441	1150	1556	703	1225	1631	1041	1800	2119			
	125	90	154	271	372	230	462	608	278	583	810	540	1407	1906	861	1499	1997	1274	2204	2594			
	150	115	183	322	442	273	548	723	330	693	963	641	1672	2264	1023	1781	2373	1514	2619	3083			
	175	140	215	379	521	321	646	852	389	816	1135	755	1970	2668	1205	2099	2796	1784	3086	3632			
	200	165	243	428	HI VEL	363	730	962	439	922	1282	853	2226	HI VEL	1362	2371	3159	2015	3485	4103			
	250	215	299	526	HI VEL	446	896	HI VEL	540	1133	1574	1048	2734	HI VEL	1672	2912	HI VEL	2475	4281	5040			
	300	265	355	HI VEL	HI VEL	529	HI VEL	HI VEL	640	1344	HI VEL	1244	HI VEL	HI VEL	1985	3456	HI VEL	2938	5081	5981			
	350	315	410	HI VEL	HI VEL	613	HI VEL	HI VEL	741	1556	HI VEL	1440	HI VEL	HI VEL	2297	HI VEL	HI VEL	3400	5881	HI VEL			
400	365	467	HI VEL	HI VEL	697	HI VEL	HI VEL	843	HI VEL	HI VEL	HI P1	HI P1	HI P1	2612	HI VEL	HI VEL	3866	HI VEL	HI VEL				

**NOTES:** See Next Page

TABLE 15 (Continued)  
 STEAM CAPACITY - LBS/HR  
 T = Sat. F<sub>L</sub> = 0.93

**FULL PORT – METAL DIAPHRAGM & SEAT**

OUTLET PRESSURE P2, psig	INLET PRESSURE P1, psig	PRESSURE DROP psi	Lbs/Hr @ 1/2" BODY SIZE			Lbs/Hr @ 3/4" BODY SIZE			Lbs/Hr @ 1" BODY SIZE			Lbs/Hr @ 1-1/4" BODY SIZE			Lbs/Hr @ 1-1/2" BODY SIZE			Lbs/Hr @ 2" BODY SIZE		
			DROOP			DROOP			DROOP			DROOP			DROOP			DROOP		
			10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%	10%	20%	30%
50	75	25	109	188	248	164	329	429	206	429	571	562	1062	1112	513	883	1124	846	1278	1482
	100	50	158	272	360	238	476	621	299	621	827	814	1539	1611	743	1280	1629	1226	1852	2148
	125	75	199	343	454	300	600	783	377	783	1042	1027	1940	2031	936	1613	2053	1545	2335	2707
	150	100	236	408	539	357	714	931	448	931	1240	1221	2308	2415	1114	1919	2442	1838	2778	3220
	175	125	273	471	622	412	824	1075	517	1075	1431	1409	2663	2787	1285	2214	2818	2121	3205	3716
	200	150	312	538	712	471	942	1229	591	1229	1636	1611	3046	3187	1470	2532	3223	2426	3665	4250
	250	200	393	678	HI VEL	593	1186	HI VEL	745	1548	2060	2029	HI VEL	HI VEL	1851	3189	4058	3055	4616	5352
	300	250	466	HI VEL	HI VEL	704	HI VEL	HI VEL	884	1837	HI VEL	2408	HI VEL	HI VEL	2197	3784	4816	3626	5478	6351
	350	300	539	HI VEL	HI VEL	815	HI VEL	HI VEL	1023	HI VEL	HI VEL	2787	HI VEL	HI VEL	2542	4380	HI VEL	4196	6340	7351
400	350	613	HI VEL	HI VEL	927	HI VEL	HI VEL	1163	HI VEL	HI VEL	3170	HI VEL	HI VEL	2891	HI VEL	HI VEL	4772	7210	HI VEL	
75	100	25	148	256	336	277	477	636	323	688	862	761	1281	1293	761	1257	1480	843	1394	1638
	125	50	212	367	482	398	684	913	464	987	1236	1092	1838	1854	1092	1803	2122	1209	1998	2349
	150	75	265	457	601	496	853	1138	578	1230	1541	1361	2291	2312	1361	2248	2646	1508	2492	2928
	175	100	312	540	710	585	1007	1343	682	1453	1819	1607	2705	2729	1607	2653	3123	1780	2941	3457
	200	125	357	618	812	670	1152	1537	781	1662	2082	1839	3095	3123	1839	3036	3574	2037	3365	3955
	250	175	443	765	HI VEL	829	1427	HI VEL	967	2058	2578	2277	3833	3867	2277	3760	4426	2522	4168	4899
	300	225	538	930	HI VEL	1008	1734	HI VEL	1175	2502	HI VEL	2768	4658	4700	2768	4570	5379	3066	5066	5954
	350	275	631	HI VEL	HI VEL	1182	HI VEL	HI VEL	1378	HI VEL	HI VEL	3247	HI VEL	HI VEL	3247	5360	6310	3596	5942	6983
	400	325	718	HI VEL	HI VEL	1345	HI VEL	HI VEL	1568	HI VEL	HI VEL	3692	HI VEL	HI VEL	3692	6096	HI VEL	4089	6758	7942
100	125	25	256	416	564	412	673	805	488	838	967	1095	1450	1450	983	1514	1732	1044	1616	1890
	150	50	365	593	804	588	960	1149	696	1195	1378	1562	2068	2068	1401	2159	2470	1489	2304	2695
	175	75	454	736	999	731	1193	1427	865	1484	1712	1940	2568	2568	1741	2682	3068	1849	2862	3347
	200	100	533	864	1172	858	1400	1675	1015	1742	2010	2278	3015	3015	2043	3149	3601	2171	3360	3929
	250	150	676	1096	HI VEL	1088	1776	2125	1288	2210	2549	2889	3824	3824	2592	3994	4568	2753	4262	4984
	300	200	810	HI VEL	HI VEL	1304	2129	HI VEL	1543	2648	3055	3463	4583	4583	3106	4787	5474	3300	5108	5973
	350	250	941	HI VEL	HI VEL	1515	HI VEL	HI VEL	1793	3078	3551	4025	5327	5327	3610	5563	6362	3835	5936	6942
	400	300	1099	HI VEL	HI VEL	1770	HI VEL	HI VEL	2095	3596	HI VEL	4702	6223	6223	4218	6500	7433	4481	6935	8111
125	150	25	304	475	618	429	706	883	494	871	1059	1218	1589	1589	1100	1676	1903	1252	1831	2131
	175	50	433	677	880	611	1006	1258	704	1240	1509	1736	2264	2264	1567	2387	2712	1784	2609	3036
	200	75	536	838	1090	757	1246	1557	872	1535	1869	2149	2803	2803	1940	2955	3357	2208	3229	3759
	250	125	710	1110	1444	1003	1650	2063	1155	2034	2476	2847	3713	3713	2571	3916	4448	2925	4279	4980
	300	175	865	1353	HI VEL	1223	2012	2516	1409	2480	3019	3471	4528	4528	3134	4775	5424	3567	5217	6073
	350	225	1012	HI VEL	HI VEL	1430	2353	HI VEL	1647	2900	3530	4059	5295	5295	3665	5583	6342	4171	6101	7101
	400	275	1155	HI VEL	HI VEL	1631	2685	HI VEL	1880	3309	4028	4632	6042	6042	4182	6370	7236	4759	6961	8102
150	175	25	313	508	649	491	798	955	550	959	1146	1335	1719	1719	1217	1830	2063	1471	2044	2369
	200	50	446	723	924	698	1136	1358	783	1364	1630	1899	2445	2445	1731	2603	2934	2092	2907	3369
	250	100	642	1041	1330	1005	1635	1956	1127	1964	2347	2734	3520	3520	2492	3747	4224	3012	4185	4850
	300	150	805	1305	1668	1261	2051	2453	1413	2463	2943	3429	4415	4415	3125	4700	5298	3777	5249	6083
	350	200	953	1546	HI VEL	1494	2430	2906	1674	2918	3487	4063	5231	5231	3702	5568	6277	4475	6219	7207
	400	250	1095	1777	HI VEL	1717	2792	HI VEL	1924	3353	4007	4669	6011	6011	4254	6398	7213	5143	7146	8282
175	200	25	352	572	716	352	628	846	603	1045	1227	1449	1840	1840	1329	1979	2214	HI P2	HI P2	HI P2
	250	75	616	1002	1253	616	1099	1482	1056	1829	2147	2537	3221	3221	2326	3464	3876	HI P2	HI P2	HI P2
	300	125	809	1317	1647	809	1444	1948	1388	2404	2823	3336	4234	4234	3058	4554	5095	HI P2	HI P2	HI P2
	350	175	978	1592	1990	978	1745	2354	1677	2905	3411	4031	5117	5117	3695	5503	6157	HI P2	HI P2	HI P2
	400	225	1135	1848	HI VEL	1135	2026	2733	1947	3373	3960	4680	5940	5940	4290	6389	7148	HI P2	HI P2	HI P2
200	250	50	486	813	1078	554	964	1293	933	1601	1847	2213	2771	2771	2041	3008	3340	HI P2	HI P2	HI P2
	300	100	697	1164	1544	794	1380	1852	1336	2293	2646	3171	3969	3969	2924	4309	4785	HI P2	HI P2	HI P2
	350	150	868	1450	1923	989	1719	2307	1665	2857	3296	3950	4944	4944	3642	5367	5960	HI P2	HI P2	HI P2
	400	200	1023	1709	2265	1165	2026	2718	1961	3365	3883	4653	5825	5825	4291	6323	7022	HI P2	HI P2	HI P2
250	300	50	569	926	1192	681	1151	1590	1083	1811	2043	2948	3595	3595	2756	3975	4354	HI P2	HI P2	HI P2
	350	100	812	1322	1701	972	1643	2270	1546	2586	2917	3856	4702	4702	3605	5199	5695	HI P2	HI P2	HI P2
	400	150	1008	1642	2113	1207	2040	2819	1920	3211	3622	4640	5658	5658	4338	6255	6853	HI P2	HI P2	HI P2
300	350	50	655	1066	1296	807	1344	1851	1233	2018	2222	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2
	400	100	935	1521	1848	1151	1917	2640	1759	2878	3168	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2	HI P2

**NOTES:** 1. Where "HI VEL" is indicated, the flow has reached or exceeded a velocity of Mach 0.35.  
 2. Where "HI P1" is indicated, the inlet pressure exceeds the limit established in Table 11.  
 3. Where "HI P2" is indicated, the maximum outlet pressure is exceeded.

**TABLE 16**  
**CONSOLIDATED PRESSURE vs. TEMPERATURE MATERIALS OPERATING LIMITS,**  
**INCLUDING TRIM AND OPTION LIMITS**

Materials	End Conn. Option No.	Trim Design. No.	Inlet Pressure		Outlet Pressure <sup>1</sup>		Inlet & Outlet Temperature Rg.		Limiting Portion		
			psig	(Barg)	psig	(Barg)	°F	(°C)			
BRZ / BRZ / BRZ BRZ / CI / BRZ CI / CI / BRZ	Std -NPT, Opt-31, Opt-45, Opt-46	B2, B3	400	(27.6)	400	(27.6)	-20 to +150	(-29 to +66)	BRZ, Mech. Internals		
			390	(26.9)	390	(26.9)	+180	(+83)	BRZ, Neoprene		
		B1, B5	400	(27.6)	400	(27.6)	-20 to +150	(-29 to +66)	BRZ, Mech. Internals		
			385	(26.6)	385	(26.6)	+200	(+94)	BRZ		
			365	(25.2)	365	(25.2)	+250	(+121)			
			335	(23.1)	335	(23.1)	+300	(+149)			
			300	(20.7)	300	(20.7)	+350	(+177)	BRZ, TFE		
250	(17.2)	250	(17.2)	+400	(+205)						
CI / CI / SST CS / CI / SST SST / CI / SST (Note 2)	Std - NPT, Opt-31, Opt-32, Opt-45, Opt-46	S2N, S3, S40	740	(51.0)	400	(27.6)	-20 to +180	(-29 to +83)	Neoprene, Mech. Internals		
			400	(27.6)	400	(27.6)	-20 to +250	(-29 to +121)	Mech. Internals		
		S6	740	(51.0)	400	(27.6)	+268	(+131)	CI, Mech. Internals		
			395	(27.2)	375	(25.9)	+275	(+135)	CI		
	S0, S1, S2, S5 S9, S36	740	(51.0)	400	(27.6)	400	(27.6)	-20 to +250	(-29 to +121)	Mech. Internals	
				395	(27.2)	375	(25.9)	+268	(+131)	CI, Mech. Internals	
		295	(20.3)	335	(23.1)	300	(20.7)	+275	(+135)	CI	
				295	(20.3)	295	(20.3)	+300	(+149)		
	Std-NPT, Opt-31, Opt-32, Opt-46	S1, S2	740	(51.0)	270	(18.6)	250	(17.2)	-20 to +425	(-29 to +219)	CI, TFE, Fluorocarbon Elastomer
					250	(17.2)	250	(17.2)	+400	(+205)	CI, Std. Gasket
CS / CS / SST SST / CS / SST SST / SST / SST (Note 2)	Std - NPT, Opt-31, Opt-32, Opt-45, Opt-46	S2N, S3, S40	740	(51.0)	400	(27.6)	-20 to +180	(-29 to +83)	Neoprene, Mech. Internals		
			740	(51.0)	400	(27.6)	-20 to +300	(-29 to +149)	EPDM/EPR, Mech. Internals		
		S0, S5, S9, S36	740	(51.0)	400	(27.6)	-20 to +400	(-29 to +205)	TFE, Fluorocarbon Elastomer, Mech. Internals		
	Std - NPT, Opt-31, Opt-32, Opt-46	S1, S2	740	(51.0)	400	(27.6)	-20 to +450	(-29 to +232)	Mech. Internals, Std. Gaskets		
					400	(27.6)	-20 to +600	(-29 to +315)	Mech. Internals, Asb. Gaskets		
CS / CI / SST CS / CS / SST (Note 2)	Opt-30, 150# Flg., Opt-45, Opt-46	S2N, S3 S40	285	(19.7)	285	(19.7)	-20 to +100	(-29 to +38)	150# Flg.		
			265	(18.3)	265	(18.3)	+180	(+83)	150# Flg., Neoprene		
		S6	285	(19.7)	285	(19.7)	-20 to +100	(-29 to +38)	150# Flg.		
			260	(17.9)	260	(17.9)	+200	(+94)	150# Flg., EPDM/EPR		
		230	(15.9)	230	(15.9)	+300	(+149)				
						285	(19.7)	285	(19.7)	-20 to +100	(-29 to +38)
	260	(17.9)	260	(17.9)	+200	(+94)					
					230	(15.9)	230	(15.9)	+300	(+149)	
	200	(13.8)	200	(13.8)					+400	(+205)	TFE, FC Elast. , 150# Flg.
					S1, S2	285	(19.7)	285	(19.7)	-20 to +100	(-29 to +38)
260	(17.9)	260	(17.9)	+200						(+94)	
230	(15.9)	230	(15.9)	+300		(+149)					
				200		(13.8)	200	(13.8)	+400	(+205)	TFE Gasket, 150# Flg.
Opt-30, 150# Flg., Opt-46	S1, S2	185	(12.8)	185	(12.8)	-20 to +450	(-29 to +232)	Std. Gasket, 150# Flg., CI			
						170	(11.7)	170	(11.7)	-20 to +500	(-29 to +260)
CS / CS / SST (Note 2)	Opt-30, 150# Flg. & Opt-46 (Req'd)	S1, S2	140	(9.7)	140	(9.7)	+600	(315)	Asb. Gasket, 150# Flg., Mech. Internals		
							140	(9.7)	140	(9.7)	+600
SST / CI / SST SST / CS / SST SST / SST / SST (Note 2)	Opt-30 150# Flg., Opt-45, Opt-46	S2N, S3 S40	275	(19.0)	275	(19.0)	-20 to +100	(-29 to +38)	150# Flg.		
			245	(16.9)	245	(16.9)	+180	(+83)	150# Flg., Neoprene		
		S6	275	(19.0)	275	(19.0)	-20 to +100	(-29 to +38)	150# Flg.		
			240	(16.6)	240	(16.6)	+200	(+94)	150# Flg., EPDM/EPR		
		215	(14.8)	215	(14.8)	+300	(+149)				
						275	(19.0)	275	(19.0)	-20 to +100	(-29 to +38)
	240	(16.6)	240	(16.6)	+200	(+94)					
					215	(14.8)	215	(14.8)	+300	(+149)	
	195	(13.4)	195	(13.4)					+400	(+205)	TFE, FC Elast., 150# Flg.
					S1, S2	275	(19.0)	275	(19.0)	-20 to +100	(-29 to +38)
240	(16.6)	240	(16.6)	+200						(+94)	
215	(14.8)	215	(14.8)	+300		(+149)					
				195		(13.4)	195	(13.4)	+400	(+205)	TFE Gasket, 150# Flg.
**	S1, S2	180	(12.4)	180	(12.4)	-20 to +450	(-29 to +233)	Std. Gasket., 150# Flg., CI			
						170	(11.7)	170	(11.7)	-20 to +500	(-29 to +260)
SST / CS / SST SST / SST / SST (Note 2)	Opt-30 150# Flg. & Opt-46 (Req'd)	S1, S2	140	(9.7)	140	(9.7)	+600	(+315)	150# Flg., Asb. Gasket, Mech. Internals		
							140	(9.7)	140	(9.7)	+600

\*\* Opt-30 150# Flg., Opt-46

FC Elast. = Fluorocarbon Elastomer

1 See Next Page

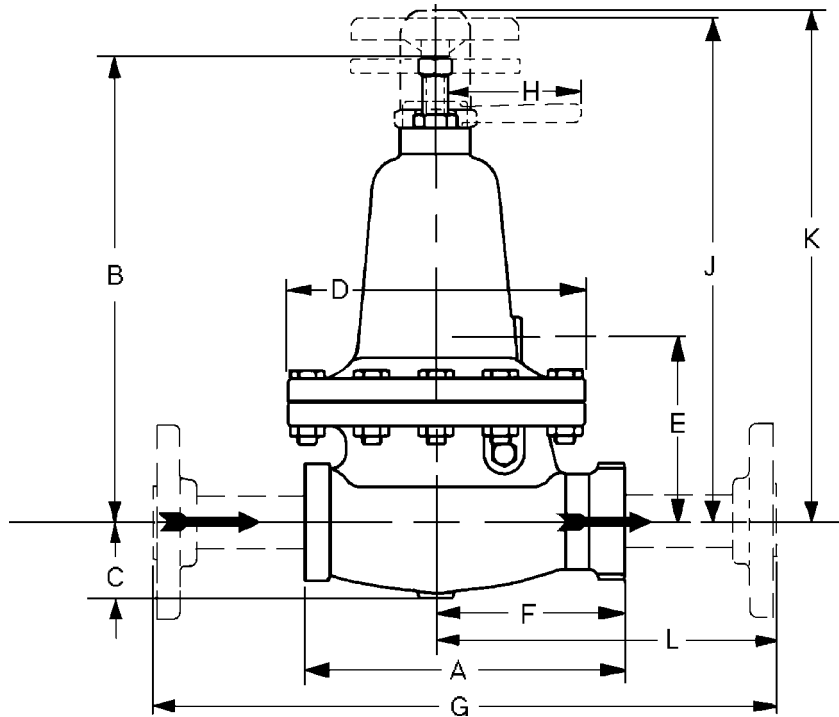
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TABLE 16 (Continued)

Materials	End Conn. Option No.	Trim Design. No.	Inlet Pressure		Outlet Pressure <sup>1</sup>		Inlet & Outlet Temperature Rg.		Limiting Portion
			psig	(Barg)	psig	(Barg)	°F	(°C)	
CS / CI / SST CS / CS / SST (Note 2)	Opt-30 300# Flg., Opt-45, Opt-46	S2N, S3 S40	740	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals
			685	(47.2)	400	(27.6)	+180	(+83)	300# Flg., Mech. Internals, Neoprene
		S6	740	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals
			675	(46.6)	400	(27.6)	+200	(+94)	300# Flg., Mech. Internals, EPDM/EPR
			655	(45.2)	400	(27.6)	+300	(+149)	300# Flg., Mech. Internals
			400	(27.6)	400	(27.6)	+400	(+205)	300# Flg., Mech. Internals, TFE, Fluorocarbon Elastomer
		S0, S5 S9, S36	740	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals
			675	(46.6)	400	(27.6)	+200	(+94)	300# Flg., Mech. Int., TFE Gskt.
			655	(45.2)	400	(27.6)	+300	(+149)	300# Flg., Mech. Internals, Std. Gaskets, CI
			635	(43.8)	400	(27.6)	+400	(+205)	
S1, S2	740	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals		
	675	(46.6)	400	(27.6)	+200	(+94)	300# Flg., Mech. Int., TFE Gskt.		
Opt-30 300# Flg., Opt-46	S1, S2	615	(42.4)	400	(27.6)	-20 to +450	(-29 to +232)	300# Flg., Mech. Internals, Std. Gaskets, CI	
CS / CS / SST (Note 2)	Opt-30, 300# Flg. & Opt-46(Req'd)	S1, S2	600	(41.4)	400	(27.6)	-20 to +500	(-29 to +260)	300# Flg., Mech. Internals
			550	(37.9)	400	(27.6)	+600	(+315)	300# Flg., Mech. Internals, Asb. Gaskets
SST / CI / SST SST / CS / SST SST / SST / SST (Note 2)	Opt-30 300# Flg., Opt-45, Opt-46	S2N, S3 S40	720	(49.7)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals
			640	(44.1)	400	(27.6)	+180	(+83)	300# Flg., Mech. Internals, Neoprene
		S6	720	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals
			620	(42.8)	400	(27.6)	+200	(+94)	300# Flg., Mech. Internals, EPDM/EPR
			560	(38.6)	400	(27.6)	+300	(+149)	300# Flg., Mech. Internals
			400	(27.6)	400	(27.6)	+400	(+205)	300# Flg., Mech. Internals, TFE, Fluorocarbon Elastomer
		S0, S5, S9, S36	720	(51.0)	400	(27.6)	-20 to + 100	(-29 to +38)	300# Flg., Mech. Internals
			620	(42.8)	400	(27.6)	+200	(+94)	300# Flg., Mech. Int., TFE Gskt.
			560	(38.6)	400	(27.6)	+300	(+149)	300# Flg., Mech. Internals, Std. Gaskets, CI
			515	(35.5)	400	(27.6)	+400	(+205)	
S1, S2	720	(51.0)	400	(27.6)	-20 to +100	(-29 to +38)	300# Flg., Mech. Internals		
	620	(42.8)	400	(27.6)	+200	(+94)	300# Flg., Mech. Int., TFE Gskt.		
	560	(38.6)	400	(27.6)	+300	(+149)	300# Flg., Mech. Internals, Std. Gaskets, CI		
	515	(35.5)	400	(27.6)	+400	(+205)			
Opt-30, 300# Flg., Opt-46	S1, S2	495	(34.1)	400	(27.6)	-20 to +450	(-29 to +232)	300# Flg., Mech. Internals, Std. Gaskets, CI	
SST / CS / SST SST / SST / SST (Note 2)	Opt-300, 300# Flg. & Opt-46 (Req'd)	S1, S2	480	(33.1)	400	(27.6)	-20 to +500	(-29 to +260)	300# Flg., Mech. Internals
			450	(31.0)	400	(27.6)	+600	(+315)	300# Flg., Mech. Internals Asb. Gaskets
SST / SST / SST	Opt-37	S6	250	(17.2)	100	(6.9)	-20 to +100	(-29 to +38)	Diaphragm Flg. Bolting
SST / SST / SST	Opt-37S	S1	100	(6.9)	100	(6.9)	-20 to +350	(-29 to +177)	Diaphragm Flg. Bolting

<sup>1</sup> Indicated outlet pressure limits are those to contain overpressure conditions; such overpressure may cause diaphragm damage. It is recommended that pressure safety devices – safety relief valve or rupture disc – have their setpoint relief pressures at 110% of the UVRS (UVRS = “Upper Value of Range Spring”). **Example:** For a 90–170 psig (6.2–11.7 Barg) range spring, the safety device should be set to relieve at 110% x 170 psig = 187 psig (12.9 Barg).

<sup>2</sup> Body size 2" (DN50) may utilize CS cylinder material; limits do not change.



Valve Size (Inches)	DIMENSIONS – ENGLISH (Inches)												Approx. Weight - lbs.		
	A	B	C	D	E	F	G <sup>1</sup>	G <sup>2</sup>	G <sup>3</sup>	H	J	K	L	wo/ Flanges	w/ Flanges
1/2"	5.94	10.00	1.62	5.62	3.75	3.94	10.75	11.00	13.94	3.13	11.50	11.62	5.38	18	22
3/4"	7.12	11.25	1.75	6.56	3.81	4.00	11.88	12.25	15.12	3.13	13.00	12.81	5.62	28	34
1"	7.94	11.75	2.12	7.38	4.38	4.69	13.62	14.00	15.94	3.13	13.56	13.44	6.75	37	45
1-1/4"	8.50	12.25	2.38	8.00	4.50	5.06	NA	NA	16.50	4.31	13.94	14.19	6.81	48	N/A
1-1/2"	9.75	15.75	2.50	9.12	6.19	5.75	15.88	16.19	17.75	4.31	16.50	17.00	7.31	77	93
2"	11.25	16.00	2.88	11.25	7.06	6.62	19.31	19.62	19.22	4.31	16.75	17.38	9.81	109	126

- <sup>1</sup> 150# Flange
- <sup>2</sup> 300# Flange
- <sup>3</sup> P.E. Pipe Nipples

Valve Size (mm)	DIMENSIONS – METRIC (mm)												Approx. Weight - kg.		
	A	B	C	D	E	F	G <sup>1</sup>	G <sup>2</sup>	G <sup>3</sup>	H	J	K	L	wo/ Flanges	w/ Flanges
DN15	151	254	41	143	95	100	273	279	354	79	292	295	137	8	11
DN20	181	286	44	167	97	102	302	311	384	79	330	325	143	13	16
DN25	202	298	54	187	111	119	346	356	405	79	344	341	171	17	21
DN32	216	311	60	203	114	129	NA	NA	419	110	354	360	173	22	N/A
DN40	248	400	64	232	157	146	403	411	451	110	419	432	186	35	42
DN50	286	406	73	286	179	168	490	498	488	110	425	441	249	49	59

- <sup>1</sup> 150# Flange
- <sup>2</sup> 300# Flange
- <sup>3</sup> P.E. Pipe Nipples

TABLE 4

STAINLESS STEEL TRIM	
DESIG. NO.	CODE
S1	<b>S1</b>
S6	<b>S6</b>

TABLE 3

BODY/SP. CHMB.	SIZES	CODE
SST/SST	ALL	<b>A</b>

TABLE 2

SIZE	ASPIRATION LEVEL / SERVICE	
	GASEOUS	LIQUID
	CODE	CODE
1/2"	<b>4</b>	<b>J</b>
3/4"	<b>5</b>	<b>K</b>
1"	<b>6</b>	<b>L</b>
1-1/2"	<b>8</b>	<b>N</b>
2"	<b>9</b>	<b>P</b>

TABLE 1

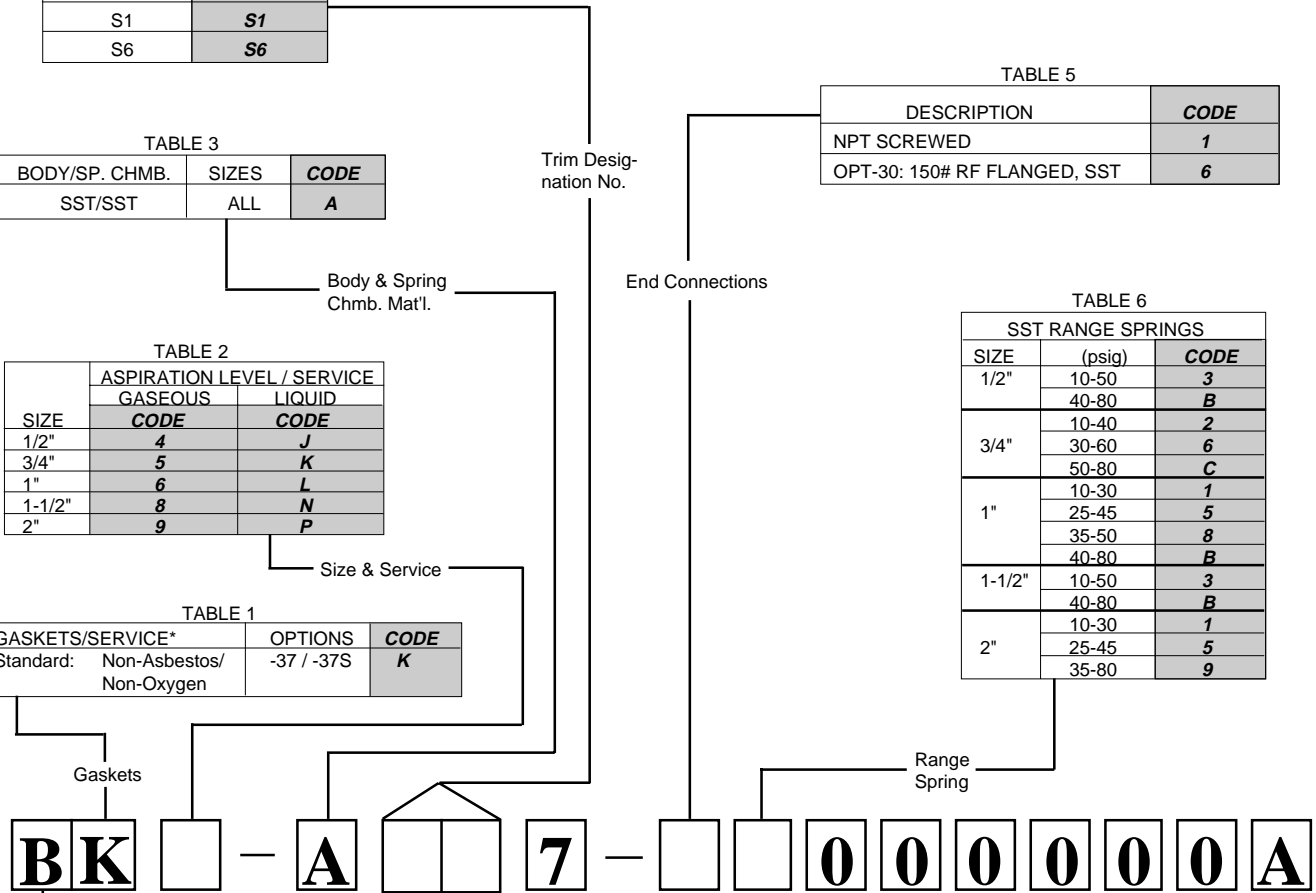
GASKETS/SERVICE*	OPTIONS	CODE
Standard: Non-Asbestos/ Non-Oxygen	-37 / -37S	<b>K</b>

TABLE 5

DESCRIPTION	CODE
NPT SCREWED	<b>1</b>
OPT-30: 150# RF FLANGED, SST	<b>6</b>

TABLE 6

SST RANGE SPRINGS		
SIZE	(psig)	CODE
1/2"	10-50	<b>3</b>
	40-80	<b>B</b>
3/4"	10-40	<b>2</b>
	30-60	<b>6</b>
	50-80	<b>C</b>
1"	10-30	<b>1</b>
	25-45	<b>5</b>
	35-50	<b>8</b>
	40-80	<b>B</b>
1-1/2"	10-50	<b>3</b>
	40-80	<b>B</b>
2"	10-30	<b>1</b>
	25-45	<b>5</b>
	35-80	<b>9</b>



**MODEL "1000HP"**  
**PRESSURE REDUCING REGULATOR**  
**FOR THE**  
**FOOD AND PHARMACEUTICAL INDUSTRY**

TABLE 4

BRASS TRIM			STAINLESS STEEL TRIM				
DESIG.	APPLIC. SIZES	CODE	DESIG.	APPLIC. SIZES	BODY MATERIAL		
					CI CODE	CS CODE	SST CODE
B1	ALL	B1	S0	1/2"-1", 1-1/2"-2"	S0	S0	S0
B2	ALL	B2	S1	ALL	S1	S1	S1
B3	ALL	B3	S2	1/2" - 1-1/2"	S2	S2	S2
B5	ALL	B5	S2N	2" ONLY	C2	C2	—
			S2N	1/2" - 1-1/2"	SN	SN	SN
				2" ONLY	CN	CN	—
			S3	ALL	S3	S3	S3
			S3N	ALL	SC	SC	SC
			S5	1/2" - 1-1/2"	S5	S5	S5
				2" ONLY	C5	C5	—
			S6	1/2"-1", 1-1/2"-2"	S6	S6	S6
			S9	1/2"-1", 1-1/2"-2"	S9	S9	S9
			S36	ALL	36	36	36
			S40	ALL	40	40	40

PRODUCT CODE 06/15/98

TABLE 5

DESCRIPTION	CODE
NPT SCREWED	1
-30 OPT, 150 LB. RF FLGS. * **	6
-30 OPT, 300 LB. RF FLGS. * **	7
-31 OPT, BSP-SCREWED	B
British Standard Pipe Thread	
-32 OPT, SCH. 80 EXT. NIPPLES *	E

\* Nipples and Flanges of same material as body. CS or SST Bodies only.  
 \*\* Not available in 1-1/4" size.

TABLE 2

SIZE	ASPIRATION LEVEL / SERVICE			VISCIOUS (-27 OPT)
	GASEOUS	LIQUID		
	CODE	CODE	CODE	
1/2"	4	J	R	
3/4"	5	K	S	
1"	6	L	T	
1-1/4"	7	M	U	
1-1/2"	8	N	V	
2"	9	P	W	

TABLE 3

BODY/SP CH	CODE
CI/CI	1
BRZ/CI	2
BRZ/BRZ	3
CS/CI	4
CS/CS	5
<sup>1</sup> SST/CI	7
<sup>1</sup> SST/CS	9
<sup>1</sup> SST/SST	A

<sup>1</sup> NOTE: SST Bodies not available in 1-1/4" size.

Size & Service

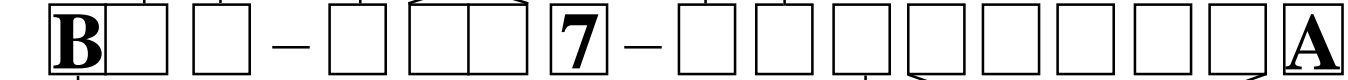
Body & Spring Chamber Material

TABLE 1

* GASKETS/SERVICE	OPTIONS	CODE
Standard : Non-Asbestos/Non-Oxygen	--	B
Non-Asbestos/Oxygen	-45	D
Asbestos	-46	A

\* Gaskets only required for metal diaphs. or closing cap -1 Opt. Refer to Tech Bulletin for suitable gasket temp. range

Gaskets & Service



Trim Variations

**MODEL "1000HP" PRESSURE REDUCING REGULATOR**

When ordering a valve per one of Cashco's special drawings, the code "X" and the 5-digit number following overrides all other options. Otherwise, proceed with the following.

- ASSIGNMENT OF "OPTION" CODES
1. NUMERIC digits assigned first in "ascending" order.
  2. ALPHA designations are assigned second in "alphabetical" order.
  3. Left justify.
  4. Add "0" to all unused squares.
  5. If insufficient quantity of squares, consult factory for proper code.

TABLE 7

DESCRIPTION	OPTION	CODE	TRIM OPTION PLUS PISTON SPG. (-17 OPT)	
			OPTION	CODE
SPECIAL CONSTRUCTION	--	X	--	--
<b>NO SPECIAL TRIM VARIATION</b>	--	0	--	--
REDUCED ORIFICE (ONE-STEP) All Sizes, except 1-1/4"	-12	A	-12+17	1
INTEGRAL SEAT SURFACE: B1, B5, S0, S1, S2, S2N, S3, S5, S36 Trims	-14	C	-14+17	3
STELLITED SEAT SURFACES, INTEGRAL SEAT, S1 Trim Only	-15 *	D	-15+17 *	4
REDUCED ORIFICE (ONE-STEP), INTEGRAL SEAT	-12+14	E	-12+14+17	5
B1, B5, S1, S2, S2N, S3, S5, & S36 Trims. All Sizes, except 1-1/4"	-12+15 *	F	-12+15+17 *	6
REDUCED ORIFICE (ONE-STEP), INTEGRAL & STELLITED SEAT SURFACES - S1 Trim Only, All Sizes, except 1-1/4"				
PISTON SPRING				
All Sizes, except 2" with C2 or C5 trim	-17	H	--	--

\* Includes integral seat.

TABLE 8

DESCRIPTION	OPTION	CODE
DI CLOSING CAP		
CI or CS Spring Chamber	-1	1
HANDWHEEL & LOCKING LEVER		
1/2", 3/4" & 1" Sizes	-3	3
T-BAR & LOCKING LEVER		
1-1/4", 1-1/2" & 2" Sizes	-3	4
1/4" NPT SPRING CHAMBER VENT TAP	-25	E
1/4" NPT DRAIN HOLE/PRESSURE TAP	-26	F
NACE CONSTRUCTION: CS/CS/XX Per MR0175-90 Rev., NPT Body	-40	J
All Sizes, except 1-1/4", S40 Trim only.		
NACE CONSTRUCTION: SST/SST/XX OR SST/CS/XX, Per MR0175-90 Rev. NPT Body, All Sizes, except 1-1/4", S40 Trim only.	-40SST	K
SPECIAL CLEANING: Per Cashco Spec #S-1134. W/properly selected mat'l's, this procedure suitable for oxy. serv. BRZ or SST sp. ch./body mat'l's only.	-55	M
SPECIAL CLEANING: Per Cashco Spec #S-1542. SST, CS & CI sp.ch/body Mat'l's only.	-56	N
EPOXY PAINTED	-95	W