

PRODUCT DATA SHEET

WATTS INDUSTRIES, INC.

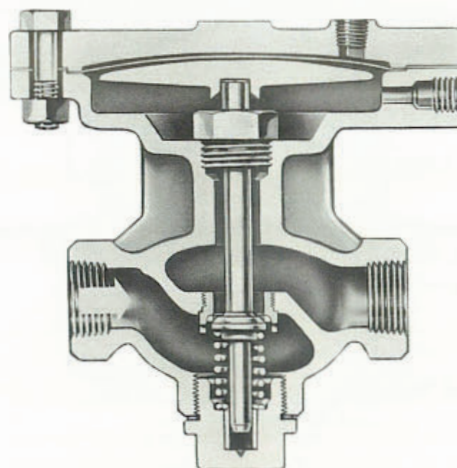

LESLIE
CONTROLS, INC.

LESLIE CLASS GPK AND GPB AIR LOADED REDUCING VALVES

- **Fast acting**
- **High rangeability - 100:1**
- **Exclusive Spiroflex® diaphragm**
- **Packless construction**
- **3 Year Warranty**

Leslie Class GPK (cast iron) and GPB (cast bronze) are air loaded steel or stainless steel reducing valves suitable for any pressure drops within body material limits. They are used in process lines, steam heat lines, steam reducing stations, and make-up supply to heaters, gland sealing systems and process equipment. They are particularly desirable where there are poor steam conditions or in standby service.

Since there are no moving parts penetrating the pressure boundary, these valves require no packing. Packless construction means low hysteresis, fast response, high rangeability, and no fugitive leak path.



For most applications, a simple air loader is all that is needed to adjust the set point. However, the GPK and GPB can also be used with the Leslie PMC electro-pneumatic controller when indicating control or interface with an electronic remote set point signal is required.

SPECIFICATIONS

Classes:

GPK, GPB

Body material:

Cast iron: GPK and variants

Cast bronze: GPB and variants

Sizes and end connections:

Cast iron:

Threaded: 1/2, 3/4, 1, 1 1/4, 1 1/2, 2"

Flanged 125# ANSI: 2, 2 1/2, 3, 4"

Flanged 250# ANSI: 1 1/2, 2, 2 1/2, 3, 4"

Cast bronze:

Threaded: 1/2, 3/4, 1, 1 1/4, 1 1/2, 2"

Flanged 300# ANSI: 1/2 - 4"

Main valve:

Stainless Steel, hardened

Seat ring:

Stainless steel with cobalt-nickel alloy hardfacing:

GPK-4S, GPK-1S, GPK-4TS, GPK-2TS, GPB, GPB-4TS, GPB-2TS and all 2 1/2 - 4" valves (Class IV shutoff)

Stainless steel with resilient insert: GPK-4T, GPK-2T, GPB-4T, GPB-2T and GPK in 1/2-2" Sizes (Class VI shutoff)

Stem guides:

Bronze (top and bottom guided)

Main valve spring:

Stainless steel

Diaphragm:

Spiral-formed stainless steel (Spiroflex®) standard PTFE (Superflex): GPK-4T, GPK-2T, GPK-4TS, GPK-2TS, GPB-4T, GPB-2T, GPB-4TS, GPB-2TS

Diaphragm cover:

Carbon steel

Maximum inlet pressure:

See table on next page

Reduced pressure range:

GPK (125# FLG): 0 - 120 psig

GPK (250# FLG and THD): 0 - 245 psig

GPB: 0 - 285 psig

Maximum inlet temperature:

See table on next page

Minimum pressure drop across valve:

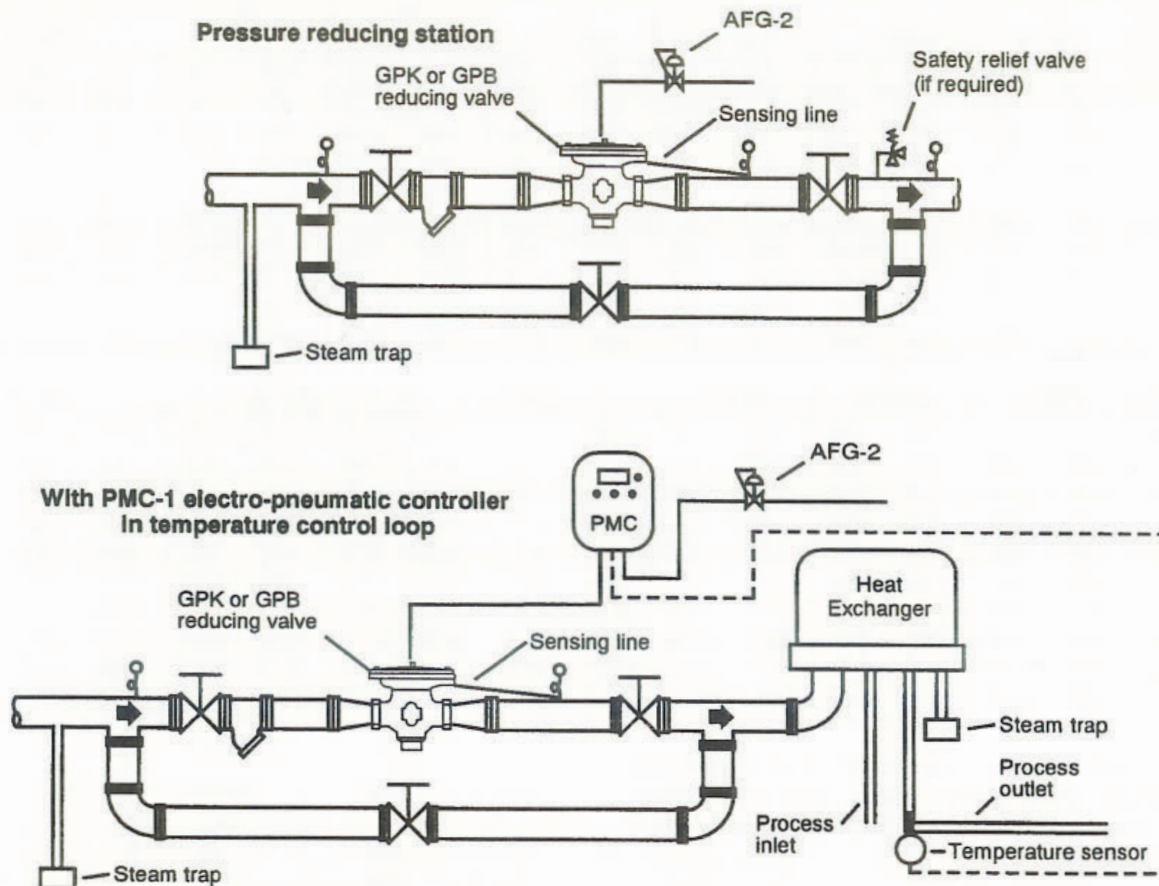
1/2 psi

Rangeability: 100:1


ISO 9001

GPK AND GPB REDUCING VALVES

TYPICAL INSTALLATIONS



HOW TO SPECIFY THE GPK OR GPB PRESSURE REDUCING VALVE

Provide air loaded steam pressure reducing valve capable of being set by adjusting the air pressure to the diaphragm by means of a filter regulator.

The body material shall be (*cast iron or cast bronze*).

The throttling surfaces of the main valve shall consist of a valve plug and seat ring. The valve plug and stem shall be of one piece construction of 17-4PH hardened stainless steel. The seat ring shall be stainless steel with resilient seat insert up to 2". Above 2" and for applications above 400°F on sizes below 2", the seat ring shall be stainless steel with cobalt-nickel alloy hardfacing.

The actuating diaphragm shall be specially formed

stainless steel providing longer travel and lower diaphragm stress than a flat diaphragm.

The reducing valve shall be capable of operating with a minimum pressure drop of ½ psig and a maximum pressure drop equal to the maximum allowable inlet pressure. The control rangeability shall be 100:1, providing accurate pressure control down to 1% of the valve's maximum rated steam capacity.

The reducing valve, when installed and operated in accordance with manufacturer's instructions, will be repaired or replaced free of charge, should failure occur within three years due to materials, workmanship, or normal wear.

Since LESLIE CONTROLS was founded in 1900, we have been an industry leader in quality fluid control equipment. We have developed a full line of engineered products to suit your requirements, including diaphragm control valves, control instrumentation, pressure and temperature regulators, and steam water heaters.

WATTS INDUSTRIES, INC.



LESLIE
CONTROLS, INC.

12501 Telecom Drive • Tampa, FL 33637-0906
Ph: (813) 978-1000 • Fax: (813) 978-0984

GPK AND GPB REDUCING VALVES

PRESSURE AND TEMPERATURE RATINGS

| | | THD. | 125 FLG. | 250 FLG. | 300 FLG. |
|----------------------------|----------------|------|-------------|-------------|-------------|
| GPK-4T, -2T -4TS, -2TS | Max. P1 (psig) | 250 | 125 | 250 | — |
| | Max. T1 (F) | 400 | 400 | 400 | — |
| GPK (all others) | Max. P1 (psig) | 250 | 125 | 250 | — |
| | Max. T1 (F) | 450 | 450 | 450 | — |
| GPB-4T, -2T, -4TS, -2TS | Max. P1 (psig) | 300 | — | — | 300 |
| | Max. T1 (F) | 400 | — | — | 400 |
| GPB (all others) | Max. P1 (psig) | 300 | — | — | 300 |
| | Max. T1 (F) | 550 | — | — | 550 |

NOTE: Allowable inlet pressure rating for flanges may be reduced by service temperature. See ANSI B16.34 or Leslie Engineering Data Sheet 5/0.3.3.

| MAX. DIAPHRAGM LOADING PRESSURE (psig) | |
|--|-----|
| GPK (125# FLG) | 125 |
| GPK (250# FLG and THD) | 250 |
| GPB | 300 |

NOTE: See Leslie Engineering Data sheet 30/4.3.1 for details on the relationship between loading pressure and reduced pressure.

THREE YEAR WARRANTY

Standard on both the GPK and GPB reducing valves is the exclusive Spiroflex® stainless steel diaphragm. This specially formed diaphragm provides longer travel and lower diaphragm stress than a flat diaphragm. The "-2T/-4T" versions, designed specifically for tire molding and similar applications, feature a PTFE Superflex diaphragm with specially enveloped properties. Longer diaphragm and trim life is backed by a *three year no maintenance warranty*.

PRINCIPLE OF OPERATION

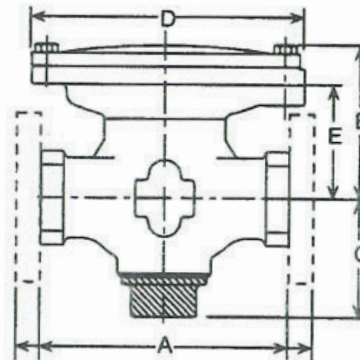
Loading pressure—either air or inert gas—is applied to the top of the diaphragm to open the main valve against the valve spring and inlet pressure.

Reduced pressure from the downstream piping system is applied to the bottom of the diaphragm through an external sensing line.

The loading pressure keeps the valve open while the desired reduced pressure builds up under the diaphragm until the valve begins to modulate and equilibrium is reached.

The increase of loading pressure over the desired reduced pressure is directly proportional to the inlet pressure and pressure drop across the valve.

DIMENSIONS



| SIZE | DIMENSIONS (INCHES) | | | | | | | | WEIGHT (LB.) | | | |
|------|---------------------|------------|------------|-----|-----|----|-----|----|--------------|------------|------------|------------|
| | THD | 125 FLG | 250 FLG | 300 | B | C | D | E | THD | 125 FLG | 250 FLG | 300 FLG |
| ½ | 6½ | — | — | 7½ | 5½ | 3½ | 8½ | 3½ | 34 | — | — | 40 |
| ¾ | 6½ | — | — | 7¾ | 5½ | 3½ | 8½ | 3½ | 35 | — | — | 41 |
| 1 | 7¼ | — | — | 8¼ | 5½ | 3½ | 8½ | 4 | 36 | — | — | 43 |
| 1¼ | 7¾ | — | — | 9¼ | 6¼ | 4 | 8¾ | 4¼ | 42 | — | — | 50 |
| 1½ | 8½ | — | 10¼ | 10½ | 6¾ | 4½ | 10¼ | 4¾ | 66 | — | 74 | 75 |
| 2 | 8½ | 10 | 10½ | 10½ | 6¾ | 4¾ | 10¼ | 4¾ | 78 | 87 | 87 | 87 |
| 2½ | — | 10¾ | 11½ | 11½ | 8¼ | 5½ | 16 | 4¾ | — | 195 | 195 | 195 |
| 3 | — | 11¾ | 12½ | 12½ | 9 | 6¼ | 16 | 4¾ | — | 252 | 252 | 252 |
| 4 | — | 13¾ | 14½ | 14½ | 10¼ | 7¾ | 16 | 6¼ | — | 295 | 295 | 295 |

HOW TO SIZE

Reliability in service and cost of maintenance are greatly dependent on proper sizing and correct installation. Maximum steam flows must be calculated with full information and should be based on accurate data for each steam consumer including condensation losses. Sizing should be based on the true inlet and outlet pressures across the valve. If pressure is measured at a header, pressure losses through fittings and stop valves must be taken into account. Caution should also be used in making allowances for overloads or future requirements. (Leslie Engineering Data Sheets and Reference Tables provide helpful information for estimating steam flows and for calculating equipment requirements.)

GPK and GPB reducing valves should be sized to operate as closely as possible to their rated capacities, although they will throttle accurately down to zero flow during load changes.

To size a reducing valve properly, the following information should be available: maximum and minimum pressure at inlet of reducing valve; reduced pressure or range at outlet of reducing valve; maximum and minimum continuous flow in pounds of steam per hour.

GPK and GPB reducing valves can be sized using either the capacity chart or by calculating Cv using the

GPB AND GPB REDUCING VALVES

CAPACITY TABLE — SATURATED STEAM CAPACITY IN LBS./HR. STEAM

| Press. psig | Inlet | 10 (239° F) | | 15 (250° F) | | 20 (259° F) | | 25 (267° F) | | 50 (298° F) | | 75 (320° F) | | 100 (338° F) | | |
|-------------------|--------|-----------------|-------|-----------------|-------|-----------------|-------|-----------------|-------|----------------|-----------------|----------------|-------|-----------------|-------|-------|
| | Outlet | 0-2 | 5 | 0-2 | 5 | 0-2 | 10 | 0-5 | 10 | 0-17 | 25 | 0-30 | 40 | 0-42 | 50 | 75 |
| Valve size-inches | ½ | 135 | 115 | 175 | 165 | 210 | 180 | 235 | 225 | 380 | 360 | 520 | 495 | 665 | 645 | 520 |
| | ¾ | 225 | 190 | 290 | 270 | 350 | 300 | 395 | 370 | 635 | 600 | 870 | 825 | 1110 | 1070 | 870 |
| | 1 | 400 | 340 | 520 | 485 | 625 | 540 | 710 | 665 | 1140 | 1070 | 1550 | 1470 | 1980 | 1920 | 1550 |
| | 1¼ | 555 | 470 | 720 | 670 | 860 | 745 | 980 | 920 | 1570 | 1480 | 2150 | 2040 | 2730 | 2660 | 2140 |
| | 1½ | 785 | 665 | 1020 | 950 | 1220 | 1050 | 1390 | 1300 | 2230 | 2100 | 3040 | 2880 | 3870 | 3760 | 3040 |
| | 2 | 925 | 785 | 1200 | 1120 | 1440 | 1240 | 1630 | 1530 | 2620 | 2470 | 3580 | 3390 | 4550 | 4430 | 3570 |
| | 2½ | 1320 | 1120 | 1710 | 1600 | 2050 | 1770 | 2330 | 2190 | 3740 | 3530 | 5110 | 4850 | 6510 | 6320 | 5110 |
| | 3 | 2060 | 1750 | 2670 | 2490 | 3200 | 2760 | 3630 | 3410 | 5840 | 5510 | 7980 | 7570 | 10150 | 9860 | 7960 |
| 4 | 2740 | 2330 | 3550 | 3320 | 4260 | 3670 | 4840 | 4540 | 7780 | 7330 | 10620 | 10070 | 13510 | 13130 | 10600 | |
| Press. psig | Inlet | 125 (239° F) | | 150 (250° F) | | 175 (378° F) | | 200 (398° F) | | | 225 (397° F) | | | 250 (406° F) | | |
| | Outlet | 0-55 | 75 | 0-67 | 100 | 0-80 | 125 | 0-92 | 125 | 150 | 0-105 | 150 | 175 | 0-117 | 150 | 200 |
| Valve size-inches | ½ | 800 | 745 | 945 | 830 | 1085 | 915 | 1220 | 1130 | 990 | 1360 | 1210 | 1050 | 1500 | 1410 | 1120 |
| | ¾ | 1340 | 1240 | 1570 | 1380 | 1800 | 1520 | 2040 | 1880 | 1640 | 2270 | 2020 | 1760 | 2490 | 2360 | 1870 |
| | 1 | 2390 | 2220 | 2810 | 2480 | 3230 | 2720 | 3650 | 3360 | 2940 | 4060 | 3610 | 3140 | 4460 | 4220 | 3340 |
| | 1¼ | 3300 | 3060 | 3880 | 3420 | 4460 | 3760 | 5040 | 4640 | 4060 | 5610 | 4990 | 4340 | 6160 | 5830 | 4610 |
| | 1½ | 4680 | 4340 | 5500 | 4850 | 6320 | 5320 | 7140 | 6570 | 5750 | 7940 | 7070 | 6150 | 8730 | 8250 | 6530 |
| | 2 | 5510 | 5100 | 6470 | 5710 | 7430 | 6260 | 8410 | 7730 | 6770 | 9350 | 8320 | 7240 | 10270 | 9710 | 7680 |
| | 2½ | 7870 | 7290 | 9250 | 8150 | 10620 | 8950 | 12010 | 11050 | 9670 | 13350 | 11890 | 10340 | 14670 | 13870 | 10980 |
| | 3 | 12270 | 11370 | 14430 | 12720 | 16570 | 13960 | 18730 | 17230 | 15090 | 20830 | 18550 | 16140 | 22880 | 21640 | 17130 |
| 4 | 16340 | 15140 | 19210 | 16930 | 22060 | 18580 | 24940 | 22940 | 20090 | 27740 | 24690 | 21480 | 30460 | 28810 | 22800 | |

Leslie Computer Sizing Program. While both methods will generally yield good results, the Cv method provides more detailed service information and allows for more flexibility.

CAPACITY CHART METHOD

Enter the capacity table at the inlet pressure reading corresponding to the minimum expected inlet pressure and select the reduced pressure column closest to but not lower than the required outlet pressure. Find the smallest capacity figure equal to or greater than the estimated maximum flow. The size of the reducing valve required is shown in the left-hand column horizontally opposite the capacity figure.

- All pressures are in psig.
- Rated capacities do not increase for reduced pressures lower than shown for each inlet pressure.
- Capacities are in pounds of saturated steam per hour. Saturated steam temperature is shown for each inlet pressure. For superheated steam, use the Cv method.
- Rated capacities are based on 95% accuracy of regulation at constant air load.

Refer to Leslie Data Sheet 5/0.3.4 to estimate expected noise levels.

| SIZE | Standard Cv ¹ | Extended Cv ² |
|-------|-----------------------------|-----------------------------|
| 1/2 | 3.65 | 5.67 |
| 3/4 | 6.08 | 10.0 |
| 1 | 10.9 | 15.7 |
| 1 1/4 | 15.0 | 21.9 |
| 1 1/2 | 21.3 | 29.1 |
| 2 | 25.1 | 29.1 |
| 2 1/2 | 35.8 | 65.7 |
| 3 | 55.8 | 84.6 |
| 4 | 74.3 | 103.0 |

¹ 95% accuracy
(2 psi min. droop)

² 90% accuracy
(3 1/2 psi min. droop)

Cv METHOD

Enter the service conditions into the Leslie Computer Sizing Program, and calculate the required Cv. Using the Cv chart above, select the smallest size valve with a Cv equal to or greater than the required Cv. Note that Cv's are provided for two levels of accuracy: 95% and 90%.

Noise level calculations provided by the Leslie Computer Sizing Program should be taken into account when sizing. To avoid excessive noise, a valve should be chosen that is larger than the minimum sonic body size calculated by the Leslie Computer Sizing Program.

PRODUCT DATA SHEET

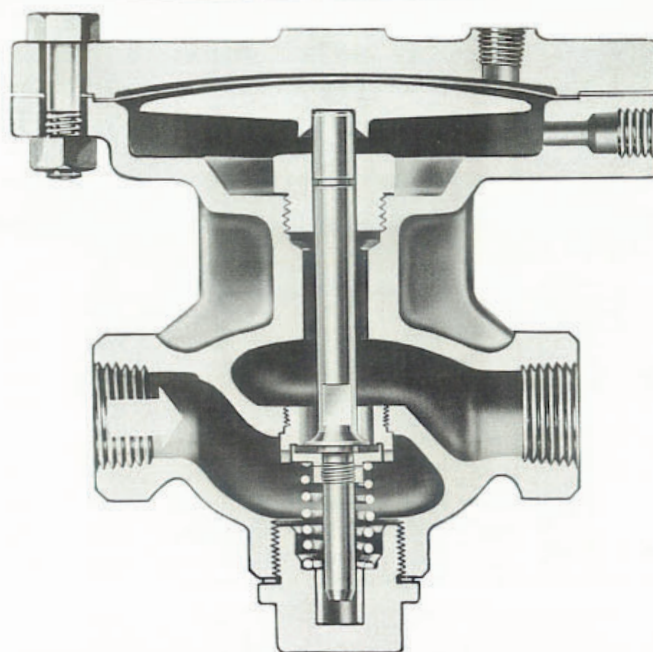
WATT'S INDUSTRIES, INC.


LESLIE
CONTROLS, INC.

LESLIE CLASS GPAK

NO-MAINTENANCE PRESSURE REDUCING VALVES FOR AIR, GAS, & VAPOR SERVICE

- Fast acting
- High rangeability
- Packless construction
- Resilient trim assures bubble tight shutoff
- Ideal for regulating air, butane, CO₂, helium, methane, nitrogen, natural gas, and other gases



PRINCIPLE OF OPERATION

Loading pressure — either air or inert gas — is applied to the top of the diaphragm by the loader to open the main valve against the valve spring and inlet pressure.

After the valve is open, more loading pressure is applied to the top of the diaphragm to keep the valve open while building up the desired reduced pressure

under the diaphragm and to restore equilibrium under flow conditions.

Reduced pressure from the downstream piping system is applied to the bottom of the metal diaphragm through an external impulse line.

The increase of loading pressure over the desired reduced pressure is directly proportional to the inlet pressure and pressure drop across the valve.

SPECIFICATIONS

END CONNECTIONS:

Threaded: 1/2" - 2"
Flanged 125# ANSI: 2" - 4"
Flanged 250# ANSI: 1" - 4"

MAIN VALVE: Bronze

SEAT RING: Bronze

DISC HOLDER: Bronze

MAIN VALVE DISC: Rubber compound

STEM SEAL: Rubber O-ring

MAIN VALVE NUT: Stainless steel

MAIN VALVE SPRING: Stainless steel

MAIN VALVE GUIDES: Bronze

DIAPHRAGM: Rubber compound

MAX. INLET TEMP: 180°F

INLET PRESSURE RANGE: 0-400 psig

REDUCED PRESSURE RANGE:

0-120 psig w/ LESLIE-Airmate loader

0-249 psig w/ any suitable loader

250 psig max. reduced pressure plus loading pressure

MIN. PRESSURE DROP ACROSS VALVE: 0.5 psig

OPTIONAL MANUAL OPENING DEVICE: 1/2"-1" sizes

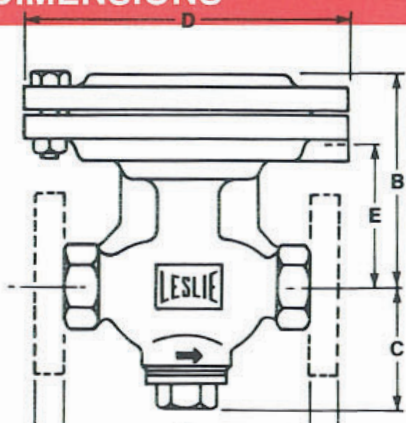

ISO 9001

PRESSURE REDUCING VALVES - Air, Gas, & Vapor Service

CAPACITY TABLE

| Press psig | Inlet | 10 | | 15 | | 20 | | 25 | | 50 | | 75 | 100 | | | | 125 | | 150 | | | 175 | | |
|---------------------|--------|------|-----|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|------|--|
| | Outlet | 0-2 | 5 | 0-2 | 5 | 0-2 | 10 | 0-5 | 10 | 0-17 | 25 | 0-30 | 0-42 | 75 | 85 | 0-55 | 100 | 0-67 | 100 | 125 | 0-80 | 125 | 150 | |
| Valve size - inches | • | 39 | 33 | 53 | 49 | 64 | 54 | 73 | 68 | 119 | 111 | 164 | 210 | 162 | 132 | 255 | 183 | 301 | 263 | 202 | 347 | 288 | 218 | |
| | ½ | 63 | 53 | 82 | 76 | 100 | 85 | 113 | 106 | 185 | 173 | 256 | 327 | 253 | 205 | 398 | 285 | 470 | 410 | 314 | 540 | 449 | 340 | |
| | 1 | 139 | 117 | 181 | 169 | 220 | 187 | 250 | 233 | 408 | 382 | 564 | 722 | 559 | 453 | 879 | 629 | 1040 | 905 | 693 | 1190 | 992 | 751 | |
| | 1 ½ | 201 | 170 | 264 | 245 | 319 | 272 | 363 | 339 | 593 | 556 | 820 | 1050 | 812 | 658 | 1280 | 914 | 1510 | 1310 | 1010 | 1730 | 1440 | 1090 | |
| | 2 | 331 | 280 | 434 | 403 | 525 | 448 | 598 | 558 | 977 | 915 | 1350 | 1730 | 1340 | 1080 | 2100 | 1510 | 2480 | 2160 | 1660 | 2850 | 2370 | 1800 | |
| | 2 ½ | 355 | 300 | 465 | 432 | 563 | 480 | 641 | 598 | 1050 | 981 | 1450 | 1850 | 1430 | 1160 | 2250 | 1610 | 2660 | 2320 | 1780 | 3060 | 2540 | 1930 | |
| | 3 | 533 | 450 | 697 | 648 | 844 | 720 | 961 | 897 | 1570 | 1470 | 2170 | 2780 | 2150 | 1740 | 3380 | 2420 | 3990 | 3480 | 2660 | 4590 | 3810 | 2890 | |
| | 4 | 758 | 639 | 992 | 922 | 1200 | 1020 | 1370 | 1280 | 2230 | 2090 | 3090 | 3950 | 3060 | 2480 | 4800 | 3440 | 5670 | 4950 | 3790 | 6520 | 5430 | 4110 | |
| | | 1070 | 899 | 1390 | 1300 | 1690 | 1440 | 1920 | 1790 | 3140 | 2940 | 4340 | 5560 | 4300 | 3480 | 6760 | 4840 | 7970 | 6960 | 5330 | 9170 | 7630 | 5780 | |

| Press psig | Inlet | 200 | | | | 225 | | | 250 | | | 300 | | | 400 | |
|---------------------|--------|-------|------|------|------|-------|-------|------|-------|-------|------|-------|-------|-------|-------|-------|
| | Outlet | 0-92 | 125 | 150 | 175 | 0-105 | 150 | 175 | 0-117 | 150 | 200 | 0-167 | 200 | 250 | 0-192 | 300 |
| Valve size - inches | " | 393 | 359 | 311 | 234 | 438 | 386 | 333 | 484 | 452 | 354 | 554 | 510 | 392 | 757 | 610 |
| | 1/2" | 611 | 558 | 486 | 365 | 683 | 602 | 520 | 754 | 704 | 552 | 863 | 795 | 611 | 1180 | 951 |
| | 1" | 1350 | 1230 | 1070 | 805 | 1510 | 1330 | 1150 | 1660 | 1560 | 1220 | 1910 | 1750 | 1350 | 2610 | 2100 |
| | 1 1/2" | 1960 | 1790 | 1560 | 1170 | 2190 | 1930 | 1670 | 2420 | 2260 | 1770 | 2770 | 2550 | 1960 | 3790 | 3050 |
| | 2" | 3230 | 2950 | 2570 | 1930 | 3610 | 3180 | 2750 | 3990 | 3720 | 2920 | 4560 | 4200 | 3230 | 6240 | 5020 |
| | 2 1/2" | 3460 | 3160 | 2750 | 2060 | 3860 | 3410 | 2940 | 4270 | 3990 | 3120 | 4890 | 4500 | 3460 | 6690 | 5380 |
| | 3" | 5200 | 4740 | 4130 | 3100 | 5800 | 5110 | 4420 | 6410 | 5980 | 4690 | 7330 | 6750 | 5190 | 10000 | 8070 |
| | 4" | 7390 | 6740 | 5870 | 4400 | 8240 | 7270 | 6280 | 9110 | 8510 | 6670 | 10400 | 9590 | 7380 | 14300 | 11500 |
| | | 10400 | 9480 | 8250 | 6190 | 11600 | 10200 | 8830 | 12800 | 12000 | 9370 | 14700 | 13500 | 10400 | 20100 | 16100 |

| Cv | | DIMENSIONS | | | | | | |
|--------|------|---|--|--|--|--|--|--|
| Size | Cv |  | | | | | | |
| 1/2" | 3.4 | | | | | | | |
| 3/4" | 5.6 | | | | | | | |
| 1" | 11.7 | | | | | | | |
| 1 1/2" | 17 | | | | | | | |
| 2" | 28 | | | | | | | |
| 2 1/2" | 30 | | | | | | | |
| 3" | 45 | | | | | | | |
| 4" | 64 | | | | | | | |
| 6" | 90 | | | | | | | |

| in inches | | A | | B | C | D | E |
|-----------|-------|-------------|-------------|---------------|---------------|---------------|---------------|
| Size | Thd | 125# Flg | 250# Flg | All Bodies | All Bodies | All Bodies | All Bodies |
| 1/2" | 6-1/8 | — | — | 5-1/2 | 3-3/8 | 8-5/8 | 3-5/8 |
| 3/4" | 6-1/2 | — | — | 5-1/2 | 3-3/8 | 8-5/8 | 3-5/8 |
| 1" | 7-1/4 | — | — | 5-7/8 | 3-3/8 | 8-5/8 | 3-15/16 |
| 1 1/2" | 7-5/8 | — | — | 6 | 3-7/8 | 10-1/4 | 4-1/8 |
| 2" | 8-1/2 | — | 10-1/2 | 6-3/8 | 4-1/4 | 10-1/4 | 4-3/8 |
| 2 1/2" | — | — | 10-1/2 | 6-3/16 | 4-3/8 | 10-1/4 | 4-5/16 |
| 3" | — | 10-7/8 | 11-1/2 | 8-1/4 | 5-1/2 | 16 | 5-1/2 |
| 4" | — | 11-3/4 | 12-1/2 | 9 | 6-1/4 | 16 | 6-1/4 |
| 6" | — | 13-7/8 | 14-1/2 | 10-1/4 | 7-7/8 | 16 | 7-1/2 |

Air service — Capacity tables are based on the capacity of the valve in scfm. Enter capacity table at inlet pressure and select reduced pressure nearest to your requirements. Find capacity figure equal to or slightly greater than the required flow. The correct

valve size corresponding to these conditions is read in the left column (valve size).

Gases other than air — Multiply the square root of the specific gravity of the gas by the required flow and read from the capacity table.

Since LESLIE CONTROLS was founded in 1900, we have been an industry leader in quality fluid control equipment. We have developed a full line of engineered products to suit your requirements, including diaphragm control valves, control instrumentation, pressure and temperature regulators, and steam water heaters.

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CONTROLS, INC.

12501 Telecom Drive • Tampa, FL 33637-0906
Ph: (813) 978-1000 • Fax: (813) 978-0984

P R O D U C T D A T A S H E E T

WATTS INDUSTRIES, INC.


LESLIE
CONTROLS, INC.


ISO 9001

LESLIE CLASS

GPS-1 AND VARIANTS

STEEL REDUCING VALVES

- **Fast acting**
- **High rangeability - 100:1**
- **Exclusive Spiroflex® diaphragm**
- **Packless construction**
- **3 Year Warranty**

Leslie Class GPS-1, GPSS-1 and variants are air loaded steel or stainless steel reducing valves suitable for any pressure drops within body material limits. They are used in process lines, steam heat lines, steam reducing stations, and make-up supply to heaters, gland sealing systems and process equipment. They are particularly desirable where there are poor steam conditions or in standby service.

Since there are no moving parts penetrating the pressure boundary, these valves require no packing. Packless construction means low hysteresis, fast response, high rangeability, and no fugitive leak path.



For most applications, a simple air loader is all that is needed to adjust the set point. However, the GPS-1 and GPSS-1 can also be used with the Leslie PMC electro-pneumatic controller when indicating control or interface with an electronic remote set point signal is required.

S P E C I F I C A T I O N S

Classes:

GPS-1, GPS-1S, GPS-1T, GPS-1TS
GPHS-1
GPSS-1, GPSS-1S

Body material:

Cast carbon steel WCB:GP(H)S-1 and variants
Cast stainless steel CF8M:GPSS-1 and variants
Other alloys available on request

Sizes and end connections:

Threaded and SWE: ½, ¾, 1, 1½, 2"
Separable flanges 150# ANSI: 1, 1½, 2"
Integral flanges 150# ANSI: 3, 4"
Separable flanges 300# ANSI: 1, 1½, 2"
Integral flanges 300# ANSI: 3, 4"

Main valve:

Stainless Steel, hardened

Seat ring:

Stainless steel with cobalt-nickel alloy hardfacing:
GPS-1S, GPS-1TS, GPHS-1, GPSS-1S and all
3" and 4" valves (Class IV shutoff)
Stainless steel with resilient insert: GPS-1, GPS-1T,
GPSS-1 in ½-2" Sizes (Class VI shutoff)

Stem guides:

Bronze (top and bottom guided) standard, copper
free material optional

Main valve spring:

Stainless steel

Diaphragm:

Spiral-formed stainless steel (Spiroflex®) standard
PTFE (GPS-1T, GPS-1TS)

Diaphragm cover:

Carbon steel standard
Stainless steel optional (GPSS-1 only)

Maximum inlet pressure:

See table on next page

Reduced pressure range:

GPHS-1: 0—285 psig
GPS(S)-1 and variants with std. cover: 0—280 psig
GPSS-1 and variants with SST cover: 0—270 psig

Maximum inlet temperature:

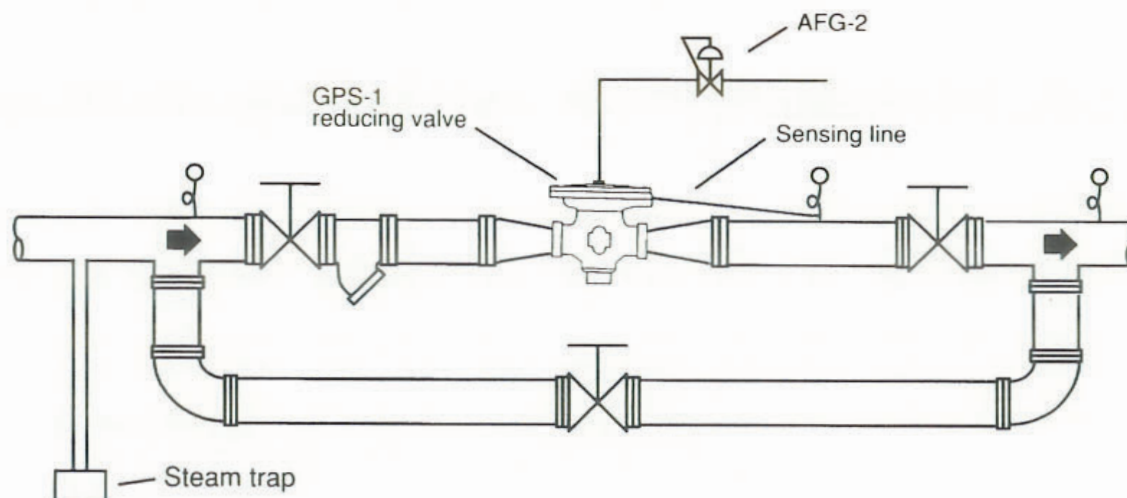
See table on next page

Minimum pressure drop across valve: ½ psi

Rangeability: 100:1

GPS-1 STEEL REDUCING VALVE

TYPICAL INSTALLATION



HOW TO SPECIFY THE GPS-1 PRESSURE REDUCING VALVE

Provide air loaded steam pressure reducing valve capable of being set by adjusting the air pressure to the diaphragm by means of a filter regulator.

The body material shall be (*cast carbon steel grade WCB or cast stainless steel gauge CV8M*).

The throttling surfaces of the main valve shall consist of a valve plug and seat ring. The valve plug and stem shall be of one piece construction of 17-4PH hardened stainless steel. The seat ring shall be stainless steel with resilient seat insert up to 2". Above 2" and for applications above 400°F on sizes below 2", the seat ring shall be stainless steel with cobalt-nickel alloy hardfacing.

The actuating diaphragm shall be specially formed stainless steel providing longer travel and lower diaphragm stress than a flat diaphragm.

The reducing valve shall be capable of operating with a minimum pressure drop of ½ psig and a maximum pressure drop equal to the maximum allowable inlet pressure. The control rangeability shall be 100:1, providing accurate pressure control down to 1% of the valve's maximum rated steam capacity.

The reducing valve, when installed and operated in accordance with manufacturer's instructions, will be repaired or replaced free of charge, should failure occur within three years due to materials, workmanship, or normal wear.

Since LESLIE CONTROLS was founded in 1900, we have been an industry leader in quality fluid control equipment. We have developed a full line of engineered products to suit your requirements, including diaphragm control valves, control instrumentation, pressure and temperature regulators, and steam water heaters.

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CONTROLS, INC.

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GPS-1 STEEL REDUCING VALVE

PRESSURE AND TEMPERATURE RATINGS

| | | THD.& SWE | 150 FLG. | 300 FLG. |
|-----------------|----------------|--------------|-------------|-------------|
| GPS(S)-1 (½-2") | Max. P1 (psig) | 300 | 285* | 300 |
| | Max. T1 (F) | 450 | 450 | 450 |
| GPS(S)-1T, -1TS | Max. P1 (psig) | 300 | 285* | 300 |
| | Max. T1 (F) | 400 | 400 | 400 |
| GPS-1 (3"-4") | Max. P1 (psig) | 300 | 285* | 300 |
| | Max. T1 (F) | 600 | 600 | 600 |
| GPS-1S (½-2") | Max. P1 (psig) | 600** | — | 600 |
| | Max. T1 (F) | 600** | — | 600 |

*Max. P1=275 psig for stainless steel body (GPSS-1).

**SWE only.

NOTE: Allowable inlet pressure rating for flanges may be reduced by service temperature. See ANSI B16.34 or Leslie Engineering Data Sheet 5/0.3.3

| MAX. DIAPHRAGM LOADING PRESSURE (psig) | |
|--|-----|
| GPS-1, -1T, -1S, -1TS | 285 |
| GPSS-1, -1S, (CS diaphragm cover) | 285 |
| GPSS-1, -1S, (SST diaphragm cover) | 275 |
| GPHS-1 | 300 |

NOTE: See Leslie Engineering Data sheet 30/4.3.1 for details on the relationship between loading pressure and reduced pressure.

PRINCIPLE OF OPERATION

Loading pressure—either air or inert gas—is applied to the top of the diaphragm to open the main valve against the valve spring and inlet pressure.

Reduced pressure from the downstream piping system is applied to the bottom of the diaphragm through an external sensing line.

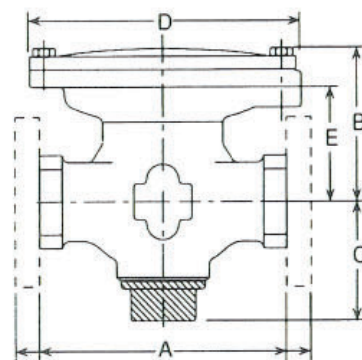
The loading pressure keeps the valve open while the desired reduced pressure builds up under the diaphragm until the valve begins to modulate and equilibrium is reached.

The increase of loading pressure over the desired reduced pressure is directly proportional to the inlet pressure and pressure drop across the valve.

HOW TO SIZE

Reliability in service and cost of maintenance are greatly dependent on proper sizing and correct installation. Maximum steam flows must be calculated with full information and should be based on accurate data for each steam consumer including condensation losses. Sizing should be based on the true inlet and outlet pressures across the valve. If pressure is measured

DIMENSIONS



| SIZE | DIMENSIONS (INCHES) | | | | | | | WEIGHT (LB.) | | |
|------|---------------------|------------|------------|-----|----|-----|----|--------------|------------|------------|
| | THD/ SWE | 150 FLG | 300 FLG | B | C | D | E | THD/ SWE | 150 FLG | 300 FLG |
| ½ | 8½ | — | — | 5½ | 3¾ | 8⅝ | 3⅝ | 38 | — | — |
| ¾ | 8½ | — | — | 5½ | 3¾ | 8⅝ | 3⅝ | 39 | — | — |
| 1 | 8½ | 8½ | 8½ | 5⅞ | 3¾ | 8⅝ | 4 | 40 | 48 | 48 |
| 1½ | 9½ | 9½ | 9½ | 6¾ | 4½ | 10¼ | 4¾ | 70 | 80 | 80 |
| 2 | 11½ | 11½ | 11½ | 6¾ | 4½ | 10¼ | 4¾ | 83 | 95 | 95 |
| 3 | — | 11¾ | 12½ | 9 | 6¼ | 16 | 4⅝ | — | 267 | 267 |
| 4 | — | 13⅞ | 14½ | 10¼ | 7⅞ | 16 | 6¼ | — | 335 | 335 |

*All inlet and outlet flange dimensions are per ANSI 16.5. Face-to-face dimensions are per ISA SP75.08 for ½-2" sizes (separate flanges) and ANSI B16.10 for 3-4" sizes (integral flanges).

at a header, pressure losses through fittings and stop valves must be taken into account. Caution should also be used in making allowances for overloads or future requirements. (Leslie Engineering Data Sheets and Reference Tables provide helpful information for estimating steam flows and for calculating equipment requirements.)

GPS-1 and GPSS-1 reducing valves should be sized to operate as closely as possible to their rated capacities, although they will throttle accurately down to zero flow during load changes.

To size a reducing valve properly, the following information should be available: maximum and minimum pressure at inlet of reducing valve; reduced pressure or range at outlet of reducing valve; maximum and minimum continuous flow in pounds of steam per hour.

GPS-1 and GPSS-1 reducing valves can be sized using either the capacity chart or by calculating Cv using the Leslie Computer Sizing Program. While both methods will generally yield good results, the Cv method provides more detailed service information and allows for more flexibility.

GPS-1 STEEL REDUCING VALVE

| Press. psig | Inlet | 10 (239 F) | | 15 (250 F) | | 20 (259 F) | | 25 (267 F) | | 50 (298 F) | | 75 (320 F) | | 100 (338 F) | | |
|-------------------|--------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|-------|----------------|----------------|----------------|-------|-------------------------------|
| | Outlet | 2 | 5 | 2 | 5 | 0-2 | 10 | 0-5 | 10 | 0-17 | 25 | 0-30 | 40 | 0-42 | 50 | 75 |
| Valve size-inches | ½ | 135 | 115 | 175 | 165 | 210 | 180 | 235 | 225 | 380 | 360 | 520 | 495 | 665 | 645 | 520 |
| | ¾ | 225 | 190 | 290 | 270 | 350 | 300 | 395 | 370 | 635 | 600 | 870 | 825 | 1110 | 1070 | 870 |
| | 1 | 400 | 340 | 520 | 485 | 625 | 540 | 710 | 665 | 1140 | 1070 | 1550 | 1470 | 1980 | 1920 | 1550 |
| | 1½ | 785 | 665 | 1020 | 950 | 1220 | 1050 | 1390 | 1300 | 2230 | 2100 | 3040 | 2880 | 3870 | 3760 | 3040 |
| | 2 | 925 | 785 | 1200 | 1120 | 1440 | 1240 | 1630 | 1530 | 2620 | 2470 | 3580 | 3390 | 4550 | 4430 | 3570 |
| | 3 | 2060 | 1750 | 2670 | 2490 | 3200 | 2760 | 3630 | 3410 | 5840 | 5510 | 7980 | 7570 | 10150 | 9860 | 7960 |
| | 4 | 2740 | 2330 | 3550 | 3320 | 4260 | 3670 | 4840 | 4540 | 7780 | 7330 | 10620 | 10070 | 13510 | 13130 | 10600 |
| Press. psig | Inlet | 125 (239 F) | | 150 (250 F) | | 175 (378 F) | | 200 (398 F) | | 225 (397 F) | | | 250 (406 F) | | | |
| | Outlet | 0-55 | 75 | 0-67 | 100 | 0-80 | 125 | 0-92 | 125 | 150 | 0-105 | 150 | 175 | 0-117 | 150 | 200 |
| Valve size-inches | ½ | 800 | 745 | 945 | 830 | 1085 | 915 | 1220 | 1130 | 990 | 1360 | 1210 | 1050 | 1500 | 1410 | 1120 |
| | ¾ | 1340 | 1240 | 1570 | 1380 | 1800 | 1520 | 2040 | 1880 | 1640 | 2270 | 2020 | 1760 | 2490 | 2360 | 1870 |
| | 1 | 2390 | 2220 | 2810 | 2480 | 3230 | 2720 | 3650 | 3360 | 2940 | 4060 | 3610 | 3140 | 4460 | 4220 | 3340 |
| | 1½ | 4680 | 4340 | 5500 | 4850 | 6320 | 5320 | 7140 | 6570 | 5750 | 7940 | 7070 | 6150 | 8730 | 8250 | 6530 |
| | 2 | 5510 | 5100 | 6470 | 5710 | 7430 | 6260 | 8410 | 7730 | 6770 | 9350 | 8320 | 7240 | 10270 | 9710 | 7680 |
| | 3 | 12270 | 11370 | 14430 | 12720 | 16570 | 13960 | 18730 | 17230 | 15090 | 20830 | 18550 | 16140 | 22880 | 21640 | 17130 |
| | 4 | 16340 | 15140 | 19210 | 16930 | 22060 | 18580 | 24940 | 22940 | 20090 | 27740 | 24690 | 21480 | 30460 | 28810 | 22800 |
| Press. psig | Inlet | 275 (414 F) | | 300 (421 F) | | 350 (436 F) | | 400 (448 F) | | 450 (459 F) | | 500 (469 F) | | 600 (489 F) | | Shaded area for GPS-1 only |
| | Outlet | 0-130 | 175 | 0-142 | 200 | 0-167 | 250 | 0-192 | 250 | 0-217 | 270 | 0-242 | 267 | 0-285 | | |
| Valve size-inches | ½ | 1640 | 1510 | 1780 | 1590 | 2060 | 1760 | 2340 | 2190 | 2360 | 2500 | 2900 | 3170 | 3480 | | |
| | ¾ | 2730 | 2510 | 2970 | 2660 | 3440 | 2940 | 3900 | 3640 | 4370 | 4160 | 4830 | 5290 | 5790 | | |
| | 1 | 4880 | 4500 | 5310 | 4750 | 6150 | 5260 | 6970 | 6510 | 7830 | 7450 | 8630 | 9460 | 10360 | | |
| | 1½ | 9550 | 8800 | 10390 | 9300 | 12030 | 10290 | 13650 | 12750 | 15320 | 14580 | 16900 | 18510 | 20280 | | |
| | 2 | 11230 | 10350 | 12220 | 10940 | 14150 | 12100 | 16060 | 15000 | 18020 | 17160 | 19880 | 21780 | 23860 | | |
| | 3 | 25040 | 23070 | 27230 | 24380 | 31540 | 26970 | 35790 | 33430 | 40170 | 38240 | 44310 | 48550 | 53170 | | |
| | 4 | 33330 | 30710 | 36260 | 32460 | 41990 | 35910 | 47650 | 44510 | 53470 | 50910 | 58990 | 64630 | 70790 | | |

CAPACITY CHART METHOD

Enter the capacity table at the inlet pressure reading corresponding to the minimum expected inlet pressure and select the reduced pressure column closest to but not lower than the required outlet pressure. Find the smallest capacity figure equal to or greater than the estimated maximum flow. The size of the reducing valve required is shown in the left-hand column horizontally opposite the capacity figure.

- All pressures are in psig.
- Rated capacities do not increase for reduced pressures lower than shown for each inlet pressure.
- Capacities are in pounds of saturated steam per hour. Saturated steam temperature is shown for each inlet pressure. For superheated steam, use the Cv method.
- Rated capacities are based on 95% accuracy of regulation at constant air load.

Refer to Leslie Data Sheet 5/0.3.4 to estimate expected noise levels.

| SIZE | Standard Cv ¹ | Extended Cv ² |
|-------|-----------------------------|-----------------------------|
| 1/2 | 3.65 | 5.67 |
| 3/4 | 6.08 | 10.0 |
| 1 | 10.9 | 15.7 |
| 1 1/2 | 21.3 | 29.1 |
| 2 | 25.1 | 29.1 |
| 3 | 55.8 | 84.6 |
| 4 | 74.3 | 103.0 |

¹ 95% accuracy
(2 psi min. droop)

² 90% accuracy
(3 1/2 psi min. droop)

Cv METHOD

Enter the service conditions into the Leslie Computer Sizing Program, and calculate the required Cv. Using the Cv chart above, select the smallest size valve with a Cv equal to or greater than the required Cv. Note that Cv's are provided for two levels of accuracy: 95% and 90%.

Noise level calculations provided by the Leslie Computer Sizing Program should be taken into account when sizing. To avoid excessive noise, a valve should be chosen that is larger than the minimum sonic body size calculated by the Leslie Computer Sizing Program.