



MODEL 1164

BACK PRESSURE/RELIEF REGULATOR



MODEL 1164
Back Pressure/Relief Regulator

The Model 1164 is a relief regulator suitable as a back pressure or bypass regulator for controlling inlet pressure between 5 and 150 psig (0.34–10.3 Barg). Available in sizes 3/4", 1", 1-1/2" and 2" (DN20, 25, 40 and 50).

FEATURES

- Versatile:** Three body materials and six trim material combinations allow compatibility with many fluids.
- High Capacity:** A large orifice and diaphragm provide sensitivity with high capacity.
- Tight Shut Off:** A TFE composition seat is available.
- Sensitivity:** A large area diaphragm plus no guiding friction assures positive reaction to the slightest change in pressure.

APPLICATIONS

Designed for controlling a wide range of fluids including air, inert gases, chemicals, water, fuel oil and steam. See Table 1 for more information.



CAUTION

This is not a safety device and must not be substituted for a code approved pressure safety relief valve or a rupture disc.

STANDARD/GENERAL SPECIFICATIONS

Body Sizes: 3/4", 1", 1-1/2" and 2".
(DN20, 25, 40 and 50).

End Connections: NPT female only.

Body/Spring Chamber Material Combinations: CI/CI, BRZ/CI, CS/CI, BRZ/BRZ and CS/CS.

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

See Table 3 for materials specifications.

Inlet Pressure:

Body Material	Max. Pressure	
	psig	(Barg)
CI	175	(12.1)
BRZ	200	(13.8)
CS	225	(15.5)

See Table 3.

Trim Designs: Metal seated or composition seated with metal diaphragm. See Table 2.

Temperature:

Standard:

CI: -20° to +350°F
(-29° to +177°C)

BRZ & CS: -20° to +400°F
(-29° to +205°C)

See Tables 2 and 3.

Capacities:

Up to 15.7 Cv; See Table 4 for Cv vs. set pressure vs. body size.

Water flow – See Table 5.

Compressed air flow – See Table 6.

Steam flow – See Table 7.

Capacities are for 10, 20, 30, 40 and 50 percent buildup over set pressure. Set pressures are made with a flow of 2% or less of the 20% build up capacities.

Example: 100 psig (6.89 Barg) set pressure and a 30% build up = 130 psig (8.96 Barg) flowing pressure for the capacity listed.

Gaskets:

Standard: Non-asbestos; Aramid/SBR.

NOT SUITABLE FOR OXYGEN SERVICE.

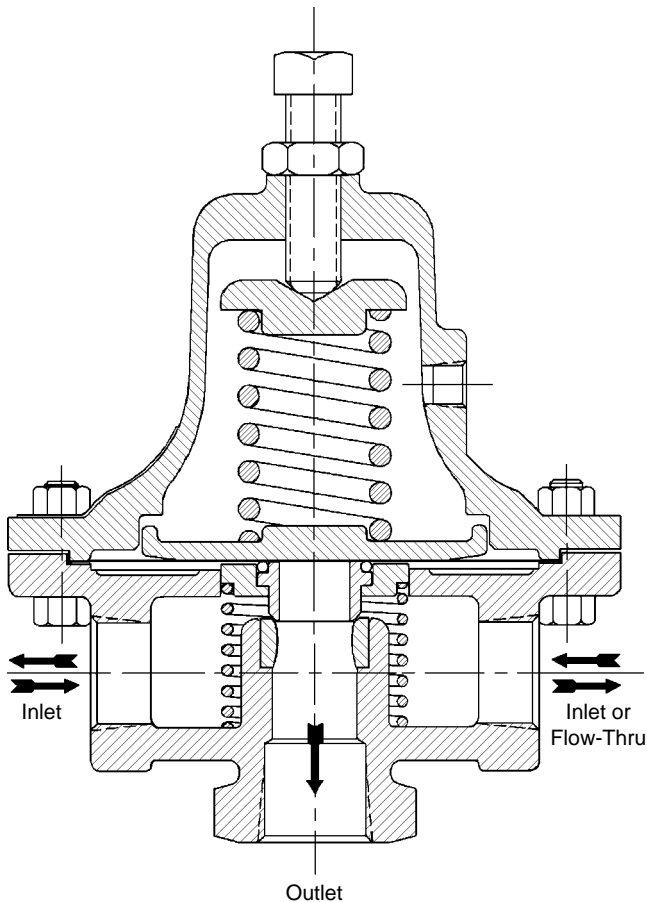
Alternate – See Option -45.

Range Springs:

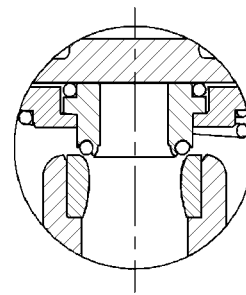
Standard: Epoxy coated steel.

Range Springs	
psig	(Barg)
5–15	(.34–1.03)
10–40	(0.69–2.8)
30–80	(2.1–5.5)
70–150 *	(4.8–10.3)

* See Table 3 for limitations for CI/CI/XX, BRZ/CI/XX and CS/CI/XX materials P vs T rating.



**Model 1164
Metal Seat**



**Model 1164
Composition Seat**

Flange Bolting: Standard: Cadmium or zinc plated, heat treated steel.

Painting: Standard: CI and CS – Enamel per Cashco Spec #S-1545.
BRZ – Non-painted.
Alternate: See Opt-95.

OPTION SPECIFICATIONS

Option-25: TAPPED VENT. 1/4" NPT tapped opening in spring chamber for piping vent to remote location in the event of diaphragm failure. Available on CI and CS spring chambers only.

Option-45: NON-ASBESTOS GASKETS. For oxygen service. Utilizes TFE diaphragm gasket over standard gaskets. Temperature range; -20° to +400°F (-29° to +205°C).

Option-55: SPECIAL CLEANING. BRZ body material only. Cleaning per Cashco Specification #S-1134. Acceptable

cleaning level for oxygen gas service. Use for non-cryogenic service.

Option-56: SPECIAL CLEANING. CI or CS body materials only. Cleaning per Cashco Specification #S-1542. Not suitable for oxygen service. Use for non-cryogenic service.

Option-95: EPOXY PAINTED. Two-step epoxy coated for severe ambient conditions to minimize external corrosion. Applied to all exposed parts. Procedures and specs per Cashco Spec #S-1547.

APPLICATION AND SELECTION

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

STEP 1. FIVE KNOWNNS. The following minimal parameters/information must be available before a selection procedure can begin:

- a. Service Fluid – What is it? Liquid or gas? SG (Std. cond.).
- b. Inlet Pressure – P_1 (upstream pressure). How much can P_1 vary as flow varies?"
- c. Outlet Pressure – P_2 (downstream pressure).
- d. Desired capacity – Cv, GPM, SCFH; minimum and maximum.
- e. Fluid temperature – T_1 , SG (actual).

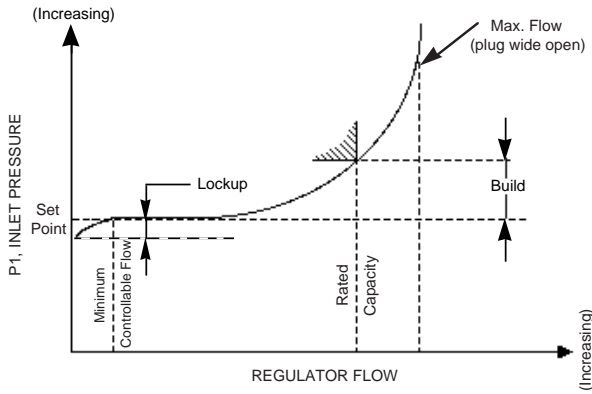
STEP 2. INLET PRESSURE. Ensure that the actual design inlet pressure and temperature limits do not exceed the limits established in Table 3. Both body and spring chamber must comply.

Consider level of pressure build to be added (Step 3 below).

STEP 3. PRESSURE BUILD. Once setpoint is reached and valve opens, all self-contained back pressure/relief regulators "build" from a setpoint pressure level as the flow rate increases.

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

The "% build", or stated maximum allowable build, 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 10% 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.

STEP 4.

GASKET MATERIAL. Considering the fluid, determine desired gasket material from two choices offered.

STEP 5.

CAPACITY. The five knowns of Step 1 allow proper sizing of the regulator. (Specific gravity tables are required.) With P_1 , P_2 , % build, flow rate (Cv, GPM, SCFH or #/HR), enter the capacity tables and confirm Model 1164 capability.

Refer to Tables 4 through 7 for capacities.

STEP 6.

TRIM MATERIAL. Use of Table 1 and Table 2 allows proper selection of "Trim Designation Numbers" for materials and temperatures. See Table 1 for type of service and recommended construction.

A composition seat will initially provide bubble-tight shutoff in clean service and without upstream over-pressurization. Minute leakage should be expected with metal seated designs.

TECHNICAL SPECIFICATIONS

**TABLE 1
APPLICATIONS**

Fluid	Recommended Construction	Trim #
Air or Inert Gases	TFE Seat and Metal Diaphragm	S5, S9 or S36
Chemicals	Metal Seat and Diaphragm	S0 or S1
	TFE Seat and Metal Diaphragm	S9, or S36
Fuel Oil	TFE Seat and Metal Diaphragm	S36
Hydrocarbon Gas or Liquids	TFE Seat and Metal Diaphragm	S36
Steam, Saturated or Superheated	Metal Seat and Diaphragm	S1 or S2
Water and Condensate, 32–300°F (0–149°C)	TFE Seat and Metal Diaphragm	S36
	Metal Seat and Diaphragm	S1 or S2

**TABLE 2
STAINLESS STEEL TRIM MATERIAL COMBINATIONS**

Part	S0	S1	S2 ¹	S5	S9	S36
Diaphragm	TFE Coated 302 SST	302 SST	302 SST	Phosphor Bronze	TFE Coated 302 SST	302 SST
Plug	316 SST	316 SST	416 SST	316 SST	316 SST	316 SST
Seat Ring	316 SST	316 SST	316 SST	316 SST	316 SST	316 SST
Seat O-ring	NONE	NONE	NONE	TFE	TFE	TFE
Plug Spring	302 SST	302 SST	302 SST	302 SST	302 SST	302 SST
Temperature Range	-20 – +400°F (-29 – +205°C)	-20 – +400°F (-29 – +205°C)	-20 – +400°F (-29 – +205°C)	-20 – +400°F (-29 – +205°C)	-20 – +400°F (-29 – +205°C)	-20 – +400°F (-29 – +205°C)

1 Not available in Bronze bodies; only Iron or Steel bodies.

**TABLE 3
MAXIMUM PRESSURE/TEMPERATURE RATINGS**

STANDARD CONSTRUCTIONS					
Material Specifications (Body/Spring Chamber)		Inlet			
Description Abbr.	ASTM No.	Pressure		Temperature	
		psig	(Barg)	°F	°C
CI/CI	A126, Class B	175	(12.1)	-20 to +150	(-29 to +65.9)
BRZ/CI	B62, Alloy C83600/ A126, Class B	165	(11.4)	-20 to +200	(-29 to +93.7)
		150	(10.3)	-20 to +250	(-29 to +121.4)
CS/CI	A216, Gr. WCB/ A126, Class B	140	(9.7)	-20 to +300	(-29 to +149.2)
		125	(8.6)	-20 to +350	(-29 to +177)
BRZ/BRZ	B62, Alloy C83600	200	(13.8)	-20 to +400	(-29 to +205)
CS/CS	A216, Gr. WCB	225	(15.5)	-20 to +400	(-29 to +205)

**TABLE 4
C_v FOR SET PRESSURE PLUS PRESSURE BUILD UP
(F_L = 0.945)**

Set Pressure psig	3/4" & 1" Bodies Pressure Build-up over Set Pressure					1-1/2" & 2" Body Pressure Build-up over Set Pressure				
	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
5	.88	1.55	2.11	2.61	2.96	1.62	2.98	4.12	5.07	6.04
10	1.11	1.93	2.60	3.17	3.60	2.56	4.29	5.75	7.09	8.36
15	1.33	2.31	3.09	3.72	4.24	3.46	5.61	7.39	9.09	10.6
25	1.20	2.01	2.68	3.30	3.86	3.53	5.22	6.91	8.40	10.1
35	1.50	2.45	3.24	3.95	4.66	4.63	6.73	8.76	10.8	12.8
50	1.17	1.97	2.71	3.35	3.91	3.93	5.76	7.41	9.16	10.9
75	1.63	2.77	3.77	4.60	5.44	5.39	7.82	10.1	12.5	14.7
100	1.52	2.75	3.72	4.67	5.68	5.30	7.51	9.39	11.4	13.4
150	2.24	3.75	4.95	6.63	7.95	6.39	9.02	11.3	13.5	15.7

TABLE 5

WATER CAPACITY IN GPM ¹
S.G. = 1.0 T = 60°F F_L = 0.945
(Outlet Pressure is Atmosphere)

Outlet Pressure P2, psig	Inlet Pressure P1, psig	GPM @ 3/4" Body Size					GPM @ 1" Body Size					GPM @ 1-1/2" Body Size					GPM @ 2" Body Size				
		Build					Build					Build					Build				
		10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
0	5	2.1	3.8	5.4	6.9	8.1	2.1	3.8	5.4	6.9	8.1	3.8	7.3	10.5	13.4	16.5	3.8	7.3	10.5	13.4	16.5
	10	3.7	6.7	9.4	11.9	13.9	3.7	6.7	9.4	11.9	13.9	8.5	14.9	20.7	26.5	32.4	8.5	14.9	20.7	26.5	32.4
	15	5.4	9.8	13.6	17.0	20.1	5.4	9.8	13.6	17.0	20.1	14.1	23.8	32.6	38.5	50.3	14.1	23.8	32.6	38.5	50.3
	25	6.3	11.0	15.1	18.7	21.8	6.3	11.0	15.1	18.7	21.8	18.5	28.6	39.1	51.4	57.1	18.5	28.6	39.1	51.4	57.1
	35	9.3	15.5	20.5	25.0	29.5	9.3	15.5	20.5	25.0	29.5	28.7	42.6	55.4	68.3	81.0	28.7	42.6	55.4	68.3	81.0
	50	8.5	14.2	19.6	24.2	28.2	8.5	14.2	19.6	24.2	28.2	28.4	41.6	53.5	66.2	78.7	28.4	41.6	53.5	66.2	78.7
	75	13.9	23.6	32.1	39.2	46.3	13.9	23.6	32.1	39.2	46.3	45.9	66.6	86.0	106.4	125.1	45.9	66.6	86.0	106.4	125.1
	100	14.6	26.5	35.8	45.0	54.7	14.6	26.5	35.8	45.0	54.7	51.0	72.3	90.4	109.8	129.0	51.0	72.3	90.4	109.8	129.0
	125	20.0	34.5	46.0	60.0	72.4	20.0	34.5	46.0	60.0	72.4	62.1	87.8	109.9	132.3	154.6	62.1	87.8	109.9	132.3	154.6
150	25.9	43.3	57.1	76.5	91.7	25.9	43.3	57.1	76.5	91.7	73.7	104.1	130.4	155.8	181.2	73.7	104.1	130.4	155.8	181.2	
2.5	5	1.5	2.9	4.2	5.5	6.6	1.5	2.9	4.2	5.5	6.6	2.8	5.6	8.2	10.8	13.5	2.8	5.6	8.2	10.8	13.5
	10	3.2	5.9	8.4	10.7	12.7	3.2	5.9	8.4	10.7	12.7	7.5	13.2	18.6	24.0	29.6	7.5	13.2	18.6	24.0	29.6
	15	5.0	9.1	12.7	16.0	19.0	5.0	9.1	12.7	16.0	19.0	12.9	22.1	30.5	36.1	47.4	12.9	22.1	30.5	36.1	47.4
	25	6.0	10.5	14.7	18.7	21.8	6.0	10.5	14.7	18.7	21.8	17.7	27.4	37.8	51.4	57.1	17.7	27.4	37.8	51.4	57.1
	35	9.0	15.4	20.5	25.0	29.5	9.0	15.4	20.5	25.0	29.5	27.8	42.3	55.4	68.3	81.0	27.8	42.3	55.4	68.3	81.0
	50	8.5	14.2	19.6	24.2	28.2	8.5	14.2	19.6	24.2	28.2	28.4	41.6	53.5	66.2	78.7	28.4	41.6	53.5	66.2	78.7
	75	13.9	23.6	32.1	39.2	46.3	13.9	23.6	32.1	39.2	46.3	45.9	66.6	86.0	106.4	125.1	45.9	66.6	86.0	106.4	125.1
	100	14.6	26.5	35.8	45.0	54.7	14.6	26.5	35.8	45.0	54.7	51.0	72.3	90.4	109.8	129.0	51.0	72.3	90.4	109.8	129.0
	125	20.0	34.5	46.0	60.0	72.4	20.0	34.5	46.0	60.0	72.4	62.1	87.8	109.9	132.3	154.6	62.1	87.8	109.9	132.3	154.6
150	25.9	43.3	57.1	76.5	91.7	25.9	43.3	57.1	76.5	91.7	73.7	104.1	130.4	155.8	181.2	73.7	104.1	130.4	155.8	181.2	
5	10	2.7	5.1	7.4	9.5	11.4	2.7	5.1	7.4	9.5	11.4	6.3	11.4	16.3	21.3	26.4	6.3	11.4	16.3	21.3	26.4
	15	4.5	8.3	11.8	14.9	17.7	4.5	8.3	11.8	14.9	17.7	11.7	20.2	28.1	33.6	44.3	11.7	20.2	28.1	33.6	44.3
	25	5.7	10.1	14.1	18.1	21.8	5.7	10.1	14.1	18.1	21.8	16.7	26.1	36.2	49.8	57.1	16.7	26.1	36.2	49.8	57.1
	35	8.7	14.9	20.5	25.0	29.5	8.7	14.9	20.5	25.0	29.5	26.8	40.9	55.4	68.3	81.0	26.8	40.9	55.4	68.3	81.0
	50	8.3	14.2	19.6	24.2	28.2	8.3	14.2	19.6	24.2	28.2	27.8	41.6	53.5	66.2	78.7	27.8	41.6	53.5	66.2	78.7
	75	13.9	23.6	32.1	39.2	46.3	13.9	23.6	32.1	39.2	46.3	45.9	66.6	86.0	106.4	125.1	45.9	66.6	86.0	106.4	125.1
	100	14.6	26.5	35.8	45.0	54.7	14.6	26.5	35.8	45.0	54.7	51.0	72.3	90.4	109.8	129.0	51.0	72.3	90.4	109.8	129.0
	125	20.0	34.5	46.0	60.0	72.4	20.0	34.5	46.0	60.0	72.4	62.1	87.8	109.9	132.3	154.6	62.1	87.8	109.9	132.3	154.6
	150	25.9	43.3	57.1	76.5	91.7	25.9	43.3	57.1	76.5	91.7	73.7	104.1	130.4	155.8	181.2	73.7	104.1	130.4	155.8	181.2
7.5	10	2.1	4.1	6.1	8.1	9.9	2.1	4.1	6.1	8.1	9.9	4.8	9.1	13.5	18.1	22.9	4.8	9.1	13.5	18.1	22.9
	15	4.0	7.5	10.7	13.7	16.4	4.0	7.5	10.7	13.7	16.4	10.4	18.2	25.6	30.9	41.1	10.4	18.2	25.6	30.9	41.1
	25	5.4	9.5	13.4	17.3	21.1	5.4	9.5	13.4	17.3	21.1	15.8	24.8	34.6	47.7	55.3	15.8	24.8	34.6	47.7	55.3
	35	8.4	14.4	20.0	25.0	29.5	8.4	14.4	20.0	25.0	29.5	25.8	39.5	54.0	68.3	81.0	25.8	39.5	54.0	68.3	81.0
	50	8.1	14.2	19.6	24.2	28.2	8.1	14.2	19.6	24.2	28.2	27.1	41.6	53.5	66.2	78.7	27.1	41.6	53.5	66.2	78.7
	75	13.9	23.6	32.1	39.2	46.3	13.9	23.6	32.1	39.2	46.3	45.9	66.6	86.0	106.4	125.1	45.9	66.6	86.0	106.4	125.1
	100	14.6	26.5	35.8	45.0	54.7	14.6	26.5	35.8	45.0	54.7	51.0	72.3	90.4	109.8	129.0	51.0	72.3	90.4	109.8	129.0
	125	20.0	34.5	46.0	60.0	72.4	20.0	34.5	46.0	60.0	72.4	62.1	87.8	109.9	132.3	154.6	62.1	87.8	109.9	132.3	154.6
	150	25.9	43.3	57.1	76.5	91.7	25.9	43.3	57.1	76.5	91.7	73.7	104.1	130.4	155.8	181.2	73.7	104.1	130.4	155.8	181.2
10	15	3.4	6.5	9.5	12.3	15.0	3.4	6.5	9.5	12.3	15.0	8.8	15.9	22.8	27.9	37.5	8.8	15.9	22.8	27.9	37.5
	25	5.0	9.0	12.7	16.5	20.2	5.0	9.0	12.7	16.5	20.2	14.8	23.3	32.8	45.5	53.0	14.8	23.3	32.8	45.5	53.0
	35	8.0	13.9	19.3	24.7	29.5	8.0	13.9	19.3	24.7	29.5	24.7	38.1	52.2	67.4	81.0	24.7	38.1	52.2	67.4	81.0
	50	7.8	13.9	19.6	24.2	28.2	7.8	13.9	19.6	24.2	28.2	26.4	40.7	53.5	66.2	78.7	26.4	40.7	53.5	66.2	78.7
	75	13.9	23.6	32.1	39.2	46.3	13.9	23.6	32.1	39.2	46.3	45.9	66.6	86.0	106.4	125.1	45.9	66.6	86.0	106.4	125.1
	100	14.6	26.5	35.8	45.0	54.7	14.6	26.5	35.8	45.0	54.7	51.0	72.3	90.4	109.8	129.0	51.0	72.3	90.4	109.8	129.0
	125	20.0	34.5	46.0	60.0	72.4	20.0	34.5	46.0	60.0	72.4	62.1	87.8	109.9	132.3	154.6	62.1	87.8	109.9	132.3	154.6
	150	25.9	43.3	57.1	76.5	91.7	25.9	43.3	57.1	76.5	91.7	73.7	104.1	130.4	155.8	181.2	73.7	104.1	130.4	155.8	181.2

¹ Many of the above capacities meet or exceed the velocities recommended for piping. Use reducers and larger pipe to reduce the velocities to acceptable limits.

NOTE: Flow capacities in shaded areas within the above table indicate that the water has reached full cavitation, and the flow is choked.

TABLE 6

AIR CAPACITY IN SCFH
 S.G. = 1.0 T = 60°F F_L = 0.945
 (Outlet Pressure is Atmosphere)

Outlet Pressure P2, psig	Inlet Pressure P1, psig	SCFH @ 3/4" Body Size					SCFH @ 1" Body Size					SCFH @ 1-1/2" Body Size					SCFH @ 2" Body Size				
		Build					Build					Build					Build				
		10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
0	5	590	1070	1490	1890	2190	590	1070	1490	1890	2190	1090	2060	2920	3670	4480	1090	2060	2920	3670	4480
	10	950	1720	2400	3040	3570	950	1720	2400	3040	3570	2200	3820	5320	6790	8290	2200	3820	5320	6790	8290
	15	1390	2520	3530	4430	5260	1390	2520	3530	4430	5260	3600	6120	8440	10010	13160	3600	6120	8440	10010	13160
	25	1690	3000	4220	5470	6730	1690	3000	4220	5470	6730	4970	7790	10890	15080	17600	4970	7790	10890	15080	17600
	35	2660	4640	6510	8400	10460	2660	4640	6510	8400	10460	8220	12740	17610	22970	28720	8220	12740	17610	22970	28720
	50	2720	4910	7210	9480	11710	2720	4910	7210	9480	11710	9150	14370	19720	25910	32650	9150	14370	19720	25910	32650
	75	5290	9690	14130	SONIC	SONIC	5290	9690	14130	18390	23110	17500	27350	37850	49970	SONIC	17500	27350	37850	49970	62450
	100	6330	12370	SONIC	SONIC	SONIC	6330	12370	17980	24130	SONIC	22080	33790	45390	SONIC	SONIC	22080	33790	45390	58910	73730
	125	9560	SONIC	SONIC	SONIC	SONIC	9560	17880	SONIC	SONIC	SONIC	29700	45450	SONIC	SONIC	SONIC	29700	45450	61220	78910	SONIC
	150	13450	SONIC	SONIC	SONIC	SONIC	13450	SONIC	SONIC	SONIC	SONIC	38370	SONIC	SONIC	SONIC	SONIC	38370	58680	79180	SONIC	SONIC
2.5	5	570	1030	1440	1820	2120	570	1030	1440	1820	2120	1050	1990	2810	3540	4320	1050	1990	2810	3540	4320
	10	950	1720	2400	3040	3570	950	1720	2400	3040	3570	2200	3820	5320	6790	8290	2200	3820	5320	6790	8290
	15	1390	2520	3530	4430	5260	1390	2520	3530	4430	5260	3600	6120	8440	10010	13160	3600	6120	8440	10010	13160
	25	1690	3000	4220	5470	6730	1690	3000	4220	5470	6730	4970	7790	10890	15080	17600	4970	7790	10890	15080	17600
	35	2660	4640	6510	8400	10460	2660	4640	6510	8400	10460	8220	12740	17610	22970	28720	8220	12740	17610	22970	28720
	50	2720	4910	7210	9480	11710	2720	4910	7210	9480	11710	9150	14370	19720	25910	32650	9150	14370	19720	25910	32650
	75	5290	9690	14130	SONIC	SONIC	5290	9690	14130	18390	23110	17500	27350	37850	49970	62450	17500	27350	37850	49970	62450
	100	6330	12370	SONIC	SONIC	SONIC	6330	12370	17980	24130	SONIC	22080	33790	45390	58910	SONIC	22080	33790	45390	58910	73730
	125	9560	SONIC	SONIC	SONIC	SONIC	9560	17880	25640	SONIC	SONIC	29700	45450	61220	SONIC	SONIC	29700	45450	61220	78910	98290
	150	13450	SONIC	SONIC	SONIC	SONIC	13450	24400	SONIC	SONIC	SONIC	38370	58680	SONIC	SONIC	SONIC	38370	58680	79180	101360	SONIC
5	10	920	1660	2320	2930	3440	920	1660	2320	2930	3440	2120	3690	5130	6550	7990	2120	3690	5130	6550	7990
	15	1380	2520	3520	4430	5260	1380	2520	3520	4430	5260	3600	6120	8430	10000	13150	3600	6120	8430	10000	13150
	25	1690	3000	4220	5470	6730	1690	3000	4220	5470	6730	4970	7790	10890	15080	17600	4970	7790	10890	15080	17600
	35	2660	4640	6510	8400	10460	2660	4640	6510	8400	10460	8220	12740	17610	22970	28720	8220	12740	17610	22970	28720
	50	2720	4910	7210	9480	11710	2720	4910	7210	9480	11710	9150	14370	19720	25910	32650	9150	14370	19720	25910	32650
	75	5290	9690	14130	18390	SONIC	5290	9690	14130	18390	23110	17500	27350	37850	49970	62450	17500	27350	37850	49970	62450
	100	6330	12370	17980	SONIC	SONIC	6330	12370	17980	24130	31250	22080	33790	45390	58910	73730	22080	33790	45390	58910	73730
	125	9560	17880	SONIC	SONIC	SONIC	9560	17880	25640	SONIC	SONIC	29700	45450	61220	SONIC	SONIC	29700	45450	61220	78910	98290
150	13450	SONIC	SONIC	SONIC	SONIC	13450	24400	SONIC	SONIC	SONIC	38370	58680	SONIC	SONIC	SONIC	38370	58680	79180	101360	SONIC	
7.5	10	750	1350	1890	2390	2810	750	1350	1890	2390	2810	1730	3010	4190	5350	6530	1730	3010	4190	5350	6530
	15	1340	2430	3400	4280	5080	1340	2430	3400	4280	5080	3480	5910	8140	9660	12700	3480	5910	8140	9660	12700
	25	1690	3000	4220	5470	6730	1690	3000	4220	5470	6730	4970	7790	10890	15080	17600	4970	7790	10890	15080	17600
	35	2660	4640	6510	8400	10460	2660	4640	6510	8400	10460	8220	12740	17610	22970	28720	8220	12740	17610	22970	28720
	50	2720	4910	7210	9480	11710	2720	4910	7210	9480	11710	9150	14370	19720	25910	32650	9150	14370	19720	25910	32650
	75	5290	9690	14130	18390	SONIC	5290	9690	14130	18390	23110	17500	27350	37850	49970	62450	17500	27350	37850	49970	62450
	100	6330	12370	17980	SONIC	SONIC	6330	12370	17980	24130	31250	22080	33790	45390	58910	73730	22080	33790	45390	58910	73730
	125	9560	17880	SONIC	SONIC	SONIC	9560	17880	25640	35810	SONIC	29700	45450	61220	78910	SONIC	29700	45450	61220	78910	98290
150	13450	SONIC	SONIC	SONIC	SONIC	13450	24400	34690	SONIC	SONIC	38370	58680	79180	SONIC	SONIC	38370	58680	79180	101360	125740	
10	15	1200	2190	3070	3850	4570	1200	2190	3070	3850	4570	3130	5320	7330	8700	11440	3130	5320	7330	8700	11440
	25	1680	2970	4190	5430	6670	1680	2970	4190	5430	6670	4930	7720	10790	14950	17450	4930	7720	10790	14950	17450
	35	2660	4640	6510	8400	10460	2660	4640	6510	8400	10460	8220	12740	17610	22970	28720	8220	12740	17610	22970	28720
	50	2720	4910	7210	9480	11710	2720	4910	7210	9480	11710	9150	14370	19720	25910	32650	9150	14370	19720	25910	32650
	75	5290	9690	14130	18390	23110	5290	9690	14130	18390	23110	17500	27350	37850	49970	62450	17500	27350	37850	49970	62450
	100	6330	12370	17980	24130	SONIC	6330	12370	17980	24130	31250	22080	33790	45390	58910	73730	22080	33790	45390	58910	73730
	125	9560	17880	SONIC	SONIC	SONIC	9560	17880	25640	35810	SONIC	29700	45450	61220	78910	SONIC	29700	45450	61220	78910	98290
	150	13450	24400	SONIC	SONIC	SONIC	13450	24400	34690	SONIC	SONIC	38370	58680	79180	SONIC	SONIC	38370	58680	79180	101360	125750

NOTES: 1. Flow capacities in shaded areas within above table indicate that flow has reached or exceeded a velocity of Mach 0.35, an accepted limit for expanded air on the downstream side. Use of higher velocities normally generate high noise levels.

2. Where "SONIC" is indicated within the above table, outlet velocity with Schedule 40 pipe has reached sonic velocity of 1118 fps. Additional flow can not be obtained, and pipeline velocity is in excess of customary pipe velocity design limits. Flow will be approximately the last indicated value in the column above "SONIC".

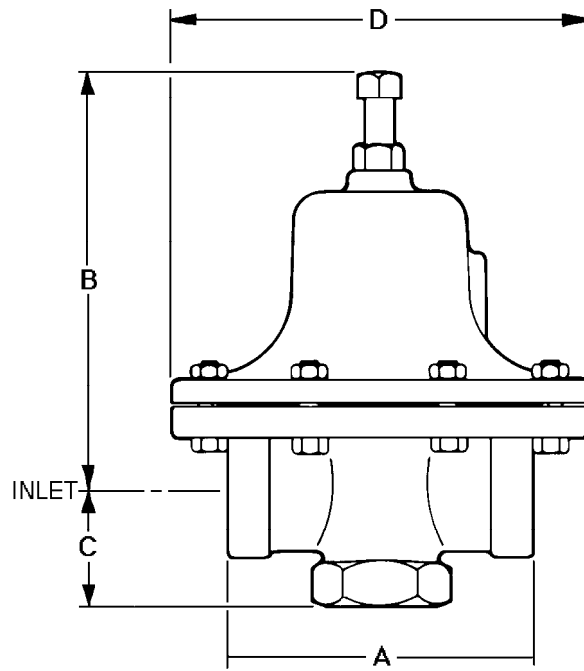
TABLE 7

STEAM CAPACITY IN LBS/HR
 S.G. = Actual T = Saturated F_L = 0.945
 (Outlet Pressure is Atmosphere)

Outlet Pressure P2, psig	Inlet Pressure P1, psig	PPH @ 3/4" Body Size					PPH @ 1" Body Size					PPH @ 1-1/2" Body Size					PPH @ 2" Body Size				
		Build					Build					Build					Build				
		10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%	10%	20%	30%	40%	50%
0	5	25	44	61	76	87	25	44	61	76	87	46	85	119	148	178	46	85	119	148	178
	10	45	80	110	137	158	45	80	110	137	158	105	179	244	306	367	105	179	244	306	367
	15	69	122	167	205	239	69	122	167	205	239	178	296	399	463	597	178	296	399	463	597
	25	85	146	200	253	303	85	146	200	253	303	249	380	516	697	794	249	380	516	697	794
	35	133	224	305	382	463	133	224	305	382	463	410	615	825	1046	1273	410	615	825	1046	1273
	50	134	234	332	423	509	134	234	332	423	509	451	684	909	1158	1418	451	684	909	1158	1418
	75	257	454	639	806	SONIC	257	454	639	806	982	851	1281	1713	2189	2654	851	1281	1713	2189	2654
	100	305	574	SONIC	SONIC	SONIC	305	574	805	1044	SONIC	1064	1567	2031	2549	SONIC	1064	1567	2031	2549	3092
	125	458	SONIC	SONIC	SONIC	SONIC	458	823	1138	SONIC	SONIC	1422	2093	2717	SONIC	SONIC	1422	2093	2717	3385	4085
	150	641	SONIC	SONIC	SONIC	SONIC	641	1117	SONIC	SONIC	SONIC	1829	2688	SONIC	SONIC	SONIC	1829	2688	3494	4322	SONIC
2.5	5	19	33	46	58	66	19	33	46	58	66	34	64	90	112	135	34	64	90	112	135
	10	42	74	101	126	145	42	74	101	126	145	96	164	224	281	337	96	164	224	281	337
	15	66	117	160	197	229	66	117	160	197	229	171	284	383	445	573	171	284	383	445	573
	25	84	145	198	250	300	84	145	198	250	300	247	375	511	689	785	247	375	511	689	785
	35	132	223	304	382	463	132	223	304	382	463	409	614	823	1044	1271	409	614	823	1044	1271
	50	134	234	332	423	509	134	234	332	423	509	451	684	909	1158	1418	451	684	909	1158	1418
	75	257	454	639	806	SONIC	257	454	639	806	982	851	1281	1713	2189	2654	851	1281	1713	2189	2654
	100	305	574	805	SONIC	SONIC	305	574	805	1044	1311	1064	1567	2031	2549	3092	1064	1567	2031	2549	3092
	125	458	823	SONIC	SONIC	SONIC	458	823	1138	SONIC	SONIC	1422	2093	2717	SONIC	SONIC	1422	2093	2717	3385	4085
	150	641	SONIC	SONIC	SONIC	SONIC	641	1117	SONIC	SONIC	SONIC	1829	2688	SONIC	SONIC	SONIC	1829	2688	3494	4322	5191
5	10	36	64	87	108	125	36	64	87	108	125	83	141	193	242	290	83	141	193	242	290
	15	62	110	150	185	215	62	110	150	185	215	161	267	360	418	538	161	267	360	418	538
	25	82	142	194	246	294	82	142	194	246	294	242	368	501	676	770	242	368	501	676	770
	35	132	222	303	379	460	132	222	303	379	460	406	610	818	1037	1263	406	610	818	1037	1263
	50	134	234	332	423	509	134	234	332	423	509	451	684	908	1158	1418	451	684	908	1158	1418
	75	257	454	639	806	982	257	454	639	806	982	851	1281	1713	2189	2654	851	1281	1713	2189	2654
	100	305	574	805	SONIC	SONIC	305	574	805	1044	1311	1064	1567	2031	2549	3092	1064	1567	2031	2549	3092
	125	458	823	SONIC	SONIC	SONIC	458	823	1138	1536	SONIC	1422	2093	2717	3385	SONIC	1422	2093	2717	3385	4085
150	641	SONIC	SONIC	SONIC	SONIC	641	1117	1531	SONIC	SONIC	1829	2688	3494	SONIC	SONIC	1829	2688	3494	4322	5191	
7.5	10	27	47	65	81	93	27	47	65	81	93	62	105	144	180	216	62	105	144	180	216
	15	56	100	136	168	195	56	100	136	168	195	146	242	326	379	488	146	242	326	379	488
	25	80	138	189	239	286	80	138	189	239	286	235	358	487	657	749	235	358	487	657	749
	35	130	220	299	375	455	130	220	299	375	455	402	603	809	1026	1249	402	603	809	1026	1249
	50	134	233	332	423	508	134	233	332	423	508	450	683	907	1156	1415	450	683	907	1156	1415
	75	257	454	639	806	982	257	454	639	806	982	851	1281	1713	2189	2654	851	1281	1713	2189	2654
	100	305	574	805	1044	SONIC	305	574	805	1044	1311	1064	1567	2031	2549	3092	1064	1567	2031	2549	3092
	125	458	823	1138	SONIC	SONIC	458	823	1138	1536	SONIC	1422	2093	2717	3385	4085	1422	2093	2717	3385	4085
150	641	1117	SONIC	SONIC	SONIC	641	1117	1531	SONIC	SONIC	1829	2688	3494	SONIC	SONIC	1829	2688	3494	4322	5191	
10	15	48	85	116	143	167	48	85	116	143	167	125	207	279	323	417	125	207	279	323	417
	25	77	132	181	229	275	77	132	181	229	275	226	344	468	632	719	226	344	468	632	719
	35	128	216	295	369	448	128	216	295	369	448	396	594	796	1010	1230	396	594	796	1010	1230
	50	133	232	330	421	506	133	232	330	421	506	448	680	903	1151	1409	448	680	903	1151	1409
	75	257	454	639	806	982	257	454	639	806	982	851	1281	1713	2189	2654	851	1281	1713	2189	2654
	100	305	574	805	1044	SONIC	305	574	805	1044	1311	1064	1567	2031	2549	3092	1064	1567	2031	2549	3092
	125	458	823	1138	SONIC	SONIC	458	823	1138	1536	1912	1422	2093	2717	3385	4085	1422	2093	2717	3385	4085
150	641	1117	SONIC	SONIC	SONIC	641	1117	1531	SONIC	SONIC	1829	2688	3494	4322	SONIC	1829	2688	3494	4322	5191	

NOTES: 1. Flow capacities in shaded areas within above table indicate that flow has reached or exceeded a velocity of Mach 0.35, an accepted limit for expanded steam on the downstream side. Use of higher velocities normally generate high noise levels.

2. Where "SONIC" is indicated within the above table, outlet velocity with Schedule 40 pipe has reached sonic velocity of 1118 fps. Additional flow can not be obtained, and pipeline velocity is in excess of customary pipe velocity design limits. Flow will be approximately the last indicated value in the column above "SONIC".



DIMENSIONS & WEIGHTS

Body Size	ENGLISH UNITS - Inch & Lbs.				Ship Wt.
	A	B	C	D	
3/4" and 1"	5.13	7	1.94	7	18
1-1/2" and 2"	6.91	9	2.88	9.63	37

Body Size	METRIC UNITS - mm & kg				Ship Wt.
	A	B	C	D	
DN20 and 25	130	178	49	178	8.17
DN40 and 50	175	229	73	244	16.79

NOTES

NOTES

PRODUCT CODE 05/15/95

TABLE 3

Body/Spring Chamber	CODE
CI/CI	1
BRZ/CI	2
BRZ/BRZ	3
CS/CI	4
CS/CS	5

Body & Spring Chamber Material

TABLE 2

SIZE	CODE
3/4"	5
1"	6
1-1/2"	8
2"	9

Size

TABLE 1

* GASKETS/SERVICE	OPTIONS	CODE
Standard : Non-Asbestos/Non-Oxygen	—	B
Non-Asbestos TFE/Oxygen	-45	D

* Refer to Tech Bulletin for suitable gasket temp. range.

Service & Gaskets

NPT Connections

TABLE 4

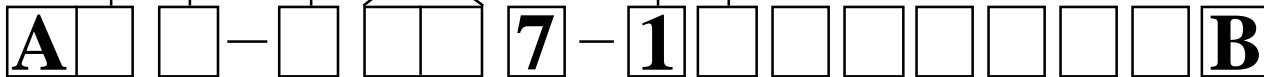
STAINLESS STEEL TRIM			
DESIG.	BODY MATERIAL		
	BRZ CODE	CI CODE	CS CODE
S0	—	S0	S0
S1	S1	S1	S1
S2	—	S2	S2
S5	S5	S5	S5
S9	—	S9	S9
S36	36	36	36

Trim Designation No.

TABLE 5

STANDARD	
STEEL RANGE SPRING (psig)	CODE
5-15	1
10-40	2
30-80	3
70-150	4

Range Spring



MODEL "1164" BACK PRESSURE RELIEF REGULATOR

TABLE 6

DESCRIPTION	OPTION	CODE
SPECIAL CONSTRUCTION	—	X
1/4" NPT SPRING CHAMBER VENT TAP CI or CS Spring Chamber	-25	E
SPECIAL CLEANING: Per Cashco Spec #S-1134. With properly selected materials, this procedure suitable for oxygen service. BRZ body/spring chamber materials only.	-55	M
SPECIAL CLEANING: Per Cashco Spec #S-1542. CS & CI body/sp.ch. materials only.	-56	N
EPOXY PAINTED	-95	W

ASSIGNMENT OF "OPTION" CODES

1. When ordering a valve per one of Cashco's special drawings, the code "X" and the 5-digit number following override all other options. Otherwise, proceed with the following.
2. NUMERIC digits assigned first in "ascending" order.
3. ALPHA designations are assigned second (excluding the "X") in "alphabetical" order.
4. Left justify.
5. Add "0" to all unused squares.
6. If insufficient quantity of squares, consult factory for proper code.

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