Bailey

470 Pressure Reducing Valve

470 Direct Acting Pressure Reducing Valve

The 470 direct acting pressure reducing valve is best suited for use on steam and is designed to automatically maintain a reduced pressure on the downstream side of the valve.
A simple and reliable design has been adopted to allow for ease of maintenance.

OPERATION

The steam enters at the inlet port (upstream), passing through the strainer screen and seat to the valve outlet (downstream). The amount of valve opening is controlled by the diaphragm.
The diaphragm moves in accordance with the forces exerted upon it by the main spring and the downstream pressure acting on the underside of the diaphragm, which opposes the main spring.

When the force exerted by the main spring is greater than that exerted by the downstream pressure, the valve is pushed off its seat by means of the push rod, thus allowing steam to flow from inlet to outlet. When the force exerted by the downstream pressure is equal or greater than that exerted by the main spring, the diaphragm will return to a horizontal position, and the valve spring, assisted by the steam pressure, will force the valve against the seat, thus cutting off the flow.
In actual operation, the valve will find a steady, open position in relation to the seat.

TECHNICAL SPECIFICATION

Size :	15, 20, 25, 32, 40, 50 mm (1/2, 3/4, 1, 1-1/4, 1-1/2, 2 inch)
Connection :	Screwed BSP parallel female. Others available on request.
Material :	Bronze.
Temperature Range :	-20 to 230°C.
Maximum Inlet Pressure :	Steam: 17.2 Barg.
Maximum Outlet Pressure :	15 to 20mm : 10.3 Barg. 25 to 50mm : 8.6 Barg.
Minimum Outlet Pressure* :	0.7 Barg

Outlet pressure should not be less than 10% of the inlet pressure.
* Setting including rise at dead end.

470

SPRING SELECTION

SPRING DEAD END PRESSURE SETTING RANGE (Barg)	SELECTION DEAD END PRESSURE SETTING RANGE (Psig)	COLOUR CODE	VALVE SIZE
0.7 to 3.5	10 to 50	Orange	All
2.1 to 6.2	30 to 90	Purple	All
3.5 to 10.3	50 to 150	Green	15 to 20mm
3.5 to 8.6	50 to 125	Green	25 to 50mm

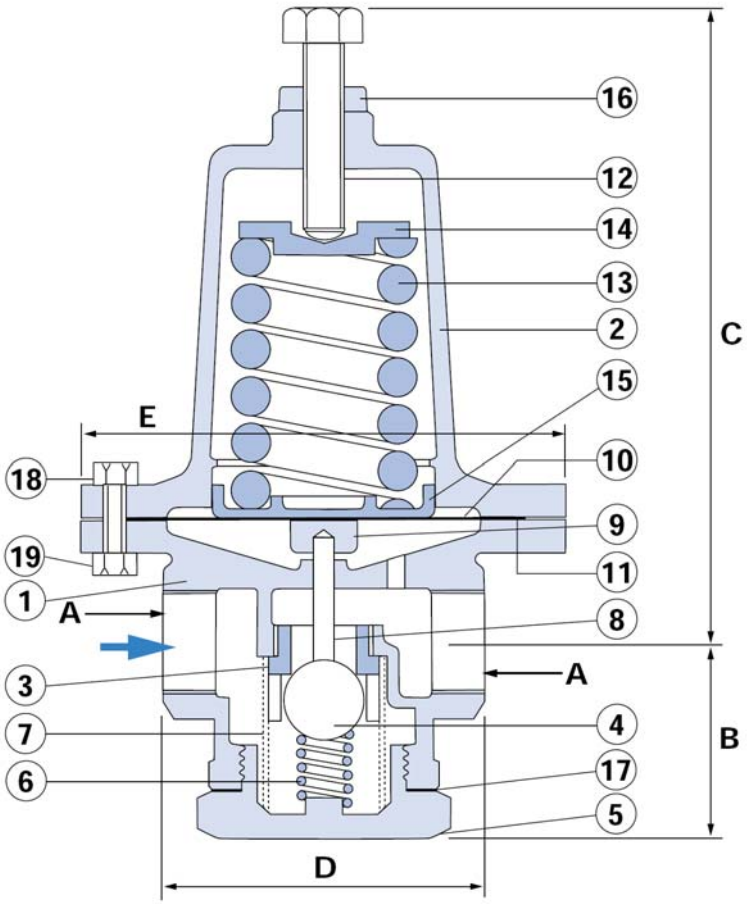
FEATURES AND BENEFITS

- Spherical stainless steel valve - self cleaning.
- Renewable seats - gunmetal or stainless steel.
- Integral strainer to maximise operability and increase reliability.
- Simple design - enables the valve to be easily maintained and serviced without removal from the line.
- Self activation/regulation - requires no external power source.

CE MARKING

The 470 has been certified to the requirements of the PED (Category II). Valve sizes below 32mm (1-1/4 inch), do not require, and hence, cannot be CE marked.

PARTS



ITEM	PART	MATERIAL
1	Body	Bronze
2	Cover	Brass
3	Seat	Bronze
4	Valve	St. St.
5	Cap	Bronze
6	Valve Spring	St. St.
7	Strainer	Brass
8	Pusher Rod	St. St.
9	Pusher Disc	Brass
10	Diaphragm	St. St.
11	Diaphragm Gasket	NAF
12	Adjusting Screw	Brass
13	Main Spring	Steel
14	Spring Plate	Brass
15	Guide Plate	Bronze
16	Lock Nut	Brass
17	Cap Gasket	NAF
18	Cover Bolt	Steel
19	Cover Nut S	teel

DIMENSIONS

SIZE	DN15	DN20	DN25	DN32	DN40	DN50
A BSP	1/2"	3/4"	1"	1-1/4"	1-1/2"	2"
B	41	54	64	70	87	87
C	159	175	200	259	298	305
D	73	89	108	130	159	165
E	114	137	152	178	222	222
Kg	3.5	5	8	12	19	20

All dimensions in mm.

SATURATED STEAM CAPACITIES

470 Saturated Steam Capabilities - Kg/hr								
Inlet Pressure (Barg)	**Outlet Pressure (Barg)**	**Rise to Dead End**	**15mm**	**20mm**	**25mm**	**32mm**	**40mm**	**50mm**
0.70	**0.35**	0.35 Bar	6.34	18.95	42.73	55.45	111	111
1.00	**0.65**	0.35 Bar	7.12	20.62	47.00	60.64	115	115
	0.35	0.35 Bar	8.89	25.72	58.64	75.67	144	144
2.00	**1.65**	0.35 Bar	9.28	25.34	58.96	75.27	128	128
	1.00	0.35 Bar	13.82	37.74	87.82	112	191	191
	0.35	0.35 Bar	14.68	40.08	93.25	119	202	202
5.00	**4.50**	10%	16.87	43.53	103	131	196	196
	2.50	0.35 Bar	30.94	80.00	190	240	359	359
	0.50	0.35 Bar	31.00	80.00	190	240	359	359
10.00	**9.00**	10%	33.18	83.54	NA	NA	NA	NA
	8.50	10%	39.19	98.66	237	297	419	419
	5.00	10%	58.29	147	352	442	623	623
	1.00	0.35 Bar	58.29	147	352	442	623	623
15.00	**10.30**	10%	71.76	188	NA	NA	NA	NA
	8.50	10%	78.90	206	434	526	732	732
	7.00	10%	79.54	208	438	529	738	738
	1.50	0.35 Bar	79.54	208	438	529	738	738
17.20	**10.30**	10%	79.55	216	NA	NA	NA	NA
	8.50	10%	81.47	221	469	564	786	786
	1.72	0.35 Bar	81.47	221	469	564	786	786

Note: to achieve all the above flows, it is critical that the correct pipe sizes are used.

470 Air Capacity - l/s @ 15°C								
Inlet Pressure (Barg)	**Outlet Pressure (Barg)**	**Rise to Dead End**	**15mm**	**20mm**	**25mm**	**32mm**	**40mm**	**50mm**
0.70	**0.35**	0.35 Bar	2.6	7.6	20.3	22.9	39.9	39.9
1.00	**0.65**	0.35 Bar	2.8	8.2	21.3	24.8	41.7	41.7
	0.35	0.35 Bar	3.5	10.3	26.5	30.9	52.0	52.0
2.00	**1.65**	0.35 Bar	3.7	10.2	24.9	30.8	48.2	48.2
	1.00	0.35 Bar	5.5	15.2	37.0	45.9	71.8	71.8
	0.35	0.35 Bar	5.8	16.1	39.3	48.7	76.3	76.3
5.00	**4.50**	10%	6.5	17.2	39.0	51.9	75.0	75.0
	2.50	0.35 Bar	11.9	31.5	71.7	95.1	138	138
	0.50	0.35 Bar	11.9	31.5	71.7	95.1	138	138
10.00	**9.00**	10%	12.5	32.6	NA	NA	NA	NA
	8.50	10%	16.8	38.5	84.8	116	162	162
	5.00	10%	22.0	57.2	126	173	241	241
	1.00	0.35 Bar	22.0	57.2	126	173	241	241
15.00	**10.30**	10%	27.7	72.2	NA	NA	NA	NA
	8.50	10%	30.4	79.4	173	207	288	288
	7.00	10%	30.7	80.0	174	208	290	290
	1.50	0.35 Bar	30.7	80.0	174	208	290	290
21.00	**10.30**	10%	35.2	93.9	NA	NA	NA	NA
	8.50	10%	35.2	93.9	197	226	326	326
	2.10	0.35 Bar	35.2	93.9	197	226	326	326

SIZING GUIDELINES FOR AIR AND GAS DUTIES

The capacity sizing charts are for:

1) Critical pressure drop sizing.
2) Air.
3) Temperature of 15°C.
4) Units l/s.
5) Standard rise at dead end setting.

The following instructions will assist when the actual service conditions differ from the above criteria.

1) **Critical Pressure Drop**

The air capacity charts are based on critical pressure drop sizing. To achieve these flows, it is critical that the correct pipe sizes are used.

2) **Other Gases**

If you wish to use the valve on other compatible gases, the chart opposite can be used, however the capacity will change depending on the specific gravity of the flowing gas. Divide the valve air capacity by $\sqrt{SG}$ to give the gas capacity (SG = specific gravity, relative to air = 1)

3) **Other Temperatures**

If the flowing temperature is not 15°C the chart capacity will need to be divided by $\sqrt{(T/288)}$
where: T= flowing temperature °C + 273°K

4) **Useful Conversions**

m^3/h = l/s x 3.6
CFM = l/s x 2.12

5) **Non-Standard Rise at Dead End**

For a definition of rise at dead-end. To calculate capacities at a different rise at dead end multiply chart capacity by the below figures.

Example:

Chart air capacity = 100 l/s
SG of gas = 0.8
Gas capacity of valve will be
$100 \div \sqrt{0.8}$ = 111.8 l/s (gas)

Example:

Chart air capacity = 100 l/s
Air temperature = 50°C (T = 323°K)
Actual Air capacity at temperature will be:
$100 \div \sqrt{323/288}$ = 94.4 l/s (@ 50°C)

Example:

Chart air capacity = l/s
Valve type Class T
Required rise at dead end 0.35 Barg
Actual air capacity will become
1000 x 0.54 = 540 l/s

VALVE TYPE RISE AT DEAD END

470	10% (minimum 0.35 Bar)

SIZING GUIDELINES FOR WATER AND OTHER LIQUIDS

The capacity sizing charts are for:

1) Water.
2) Units l/s.
3) Standard rise at dead end setting.

The following instructions will assist when the actual service conditions differ from the above criteria.

1) **Other Liquids**

If you wish to use the valve on other compatible liquids, the sizing chart opposite can be used.
However, the valve capacity will change depending on the specific gravity of the flowing liquid. Divide the valve water capacity by $\sqrt{SG}$ to give the liquid capacity.
(SG = specific gravity, relative to water =1.)

2) **Useful Conversions**

lgpm = l/s x 13.33
m^3/min = l/s x 0.06

3) **Non-Standard Rise at Dead End**

For a definition of rise at dead end.

Standard rise at dead end is 1 barg.
To determine the capacity at a different rise at dead end, multiply the water capacity by the following factors.
Note. The capacity is unaffected by changes in temperature.

Example:

Chart water capacity = 2 l/s
SG of liquid = 0.8
Liquid capacity of valve will be
$2 \div \sqrt{0.8}$ = 2.24 l/s (liquid).

Example:

Chart water capacity = 2 l/s
Valve Type C10
Size 1”

Required rise at dead end 1.4 barg
actual water capacity will become
2 x 1.190 = 2.38 l/s

SIZING GUIDELINES FOR STEAM

The capacity charts are for:

1) Critical pressure drop sizing.
2) Dry saturated steam.
3) Units kg/h.

The following instructions will assist when the actual service conditions differ from these criteria.

1) **Critical Pressure Drop**

The above steam capacity chart is based on critical pressure drop sizing. To achieve these flows, it is critical that the correct pipe sizes are used.

2) **Super Heated Steam**

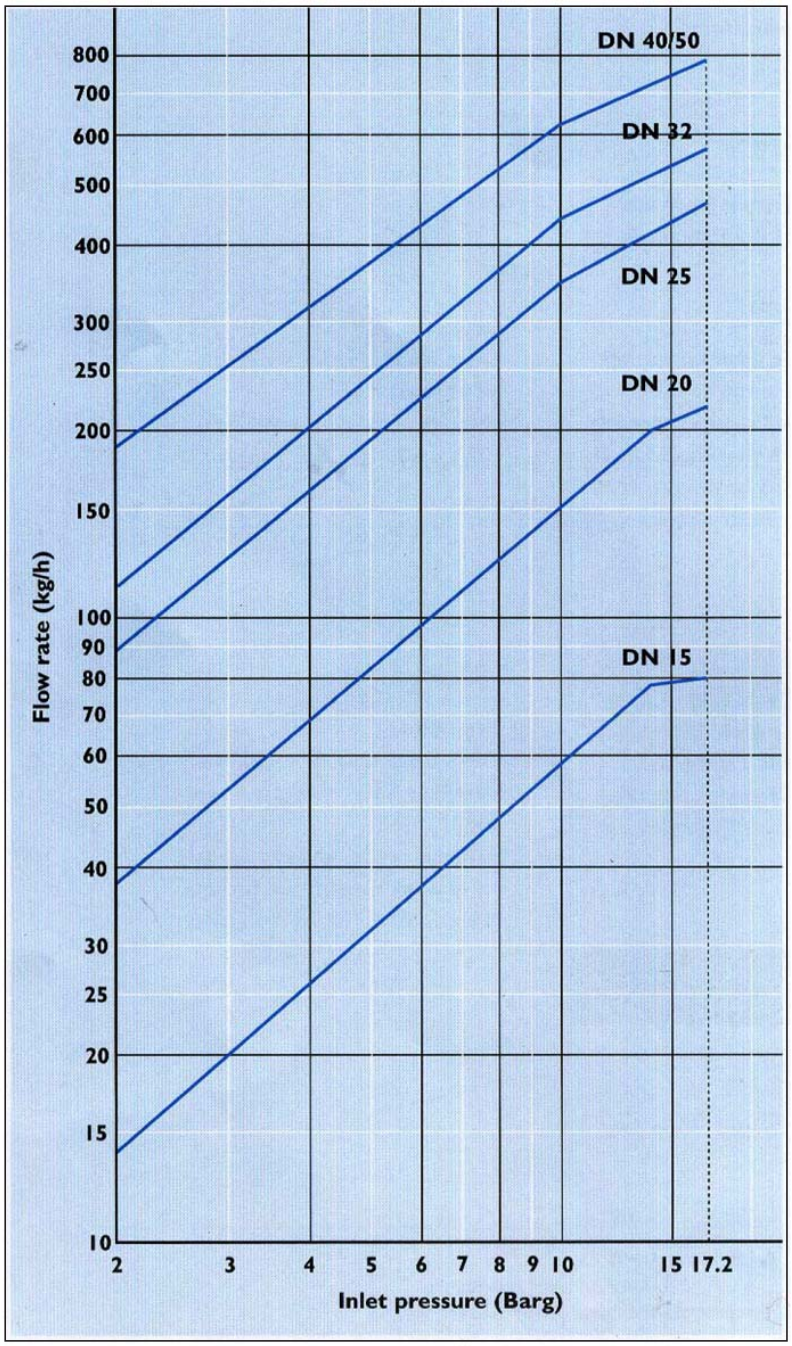
Most systems usually use saturated steam. However, if the steam temperature is greater than the saturated steam temperature the extra temperature will decrease the flow through the valve. Refer to office for details.

3) **Useful Conversions**

1b/hr = Kg/h x 2.2046.

** Due to the difficuty of reading charts below 2 Barg, we recommend the use of our sizing programme or please contact our Bailey Sales Engineers for assistance*

The above capacity chart is based on a 'rise at dead end' of 10% (minimum 0.35 Barg)



INSTALLATION OF PRESSURE REGULATING VALVES

Installation

1) Mount the valve with the spring centre line vertical and with the adjusting screw uppermost.
2) Ensure the valve and pipework is adequately supported and that the pipe does not impose strain onto the valve.
3) Provide adequate headroom or adjustment and space underneath to remove the bottom cover or plug, to give access for dismantling.
4) It is recommended to fit pressure gauges downstream of the valve.
5) Isolating valves and line strainers are advisable.
6) The downstream (outlet) system should be protected by a correctly sized safety relief valve, set at a pressure not less than 1 barg or 15% (whichever is the greater) above the dead end setting of the regulator.
7) Flush the pipework to ensure that it is clear of dirt and debris.
8) For valves on air, gas and steam. The outlet piping should be expanded to accommodate the increased volume.
9) Ensure correct orientation of the valve, with respect to the direction of flow. Each valve is marked with a flow direction arrow.
10) Ensure that the correct spring is fitted for the required downstream (outlet) pressure, including the 'rise at dead end'

Setting

All direct acting regulating valves should be set against a 'Dead end', allowing for a 'rise at dead end'. For definitions of these terms please refer to Page 90.
1) Remove all the load from the spring by unscrewing the adjusting screw (see item 12 on individual valve drawings).
2) Provide a downstream (outlet) 'Dead end' complete with pressure gauge, by closing a suitable isolating valve.
3) Admit upstream (inlet) pressure.
4) Commence adding load to the spring by screwing the adjusting screw (item 12). Stop when the required downstream (outlet) dead end setting pressure has been achieved.
5) Open the downstream isolating valve slowly to allow flow through the valve. On steam applications
it is important that the down stream system is allowed to clear any condensate and to warm through gradually.
6) If necessary, reset the pressure by turning the adjusting screw and then checking the new dead end setting.