

BONETTI[®] Piston Valves



VALFTEK[®]

Fig.1061 RATING for the Materials mentioned in this Bulletin

Max. Operating TEMPERATURE to DIN °C	Max. Operating PRESSURE to				
	DIN 2401 Class PN 16	DIN 2401 Class PN 16	DIN 2401 Class PN 40	DIN 2401 Class PN 40	DIN 2401 Class PN 63
	Mater. Sched. G bar	Mater. Sched. GS bar	Mater. Sched. GS bar	Mater. Sched. FS - F - M/H bar	Mater. Sched. FS - M/H bar
-10 +20	16	16	40	40	63
120	16	16	38	40	63
200	13	13	33	35	50
250	11	12	32	32	45
300	10	11	28	28	40
350	=	10	24	24	36
400	=	=	=	21	32

Max. Operating TEMPERATURE to ASME and API °C	Max. Operating PRESSURE to					
	ASME Class 150 Gr. 1.1	ASME Class 150 Gr. 2.2	ASME Class 300 Gr. 1.1	ASME Class 300 Gr. 2.2	API 602 Class 800 Gr. 1.1	API 602 Class 800 Gr. 2.2
	bar	bar	bar	bar	bar	bar
-29 +38	19.6	19.0	51.1	49.6	136.2	132.4
100	17.7	16.2	46.4	42.2	136.0	112.5
200	14.0	13.7	43.8	35.7	130.0	95.1
250	12.1	12.1	41.7	33.4	123.0	89.1
300	10.2	10.2	38.7	31.6	112.0	84.5
350	8.4	8.4	37.0	30.4	98.0	81.1
400	6.5	6.5	34.5	29.1	82.5	77.6
425	5.6	5.6	28.8	28.7	71.5	76.4

Max. Operating Conditions for Gr. 1.1 are related to valves of Carbon Steel (Mat. Sched. FS, F); for Gr. 2.2 to valves of Austenitic Stainless Steel (Mat. Sched. M/H).



BONETTI® Piston Valves

GENERAL INFORMATION

Seat tightness in a piston valve is obtained by a cylindrically shaped plug, connected to a spindle, and operated by a hand wheel, which enables it to move through the inner diameter of two packing rings. When the piston is in the high position, that is, held by only the upper valve ring, (which also ensures tightness to the environment), the valve is open. When the piston is lowered and is held in place by both the upper and lower valve rings (and thus ensuring seat tightness between the valve inlet and outlet), the valve is closed. Because of the use of the packing rings, the piston valve is considered a "soft-seated" valve.

The contact between the piston and rings (sealing effect) is positively assured by means of the pressure exerted by stud bolts with Belleville washers, which compensate for pressure and temperature variations.

A typical feature of piston valves - compared with globe valves - is that the piston is always held by at least one sealing ring. Therefore, there is no vibration during closing and opening operations.

Another primary feature of the piston valve is that the two cylindrical seating surfaces, bottom valve ring and piston, come in contact when the fluid flow is already nearly cut off. Another unique property of the BONETTI® Piston Valves is that with the valve completely open and the piston completely supported in the inner diameter of the upper valve ring, it is protected against erosive/corrosive elements as well as prevented from having foreign matter deposited upon it.

Piston valves - contrary to globe valves - are bi-directional. That is, they can be installed in a process line in both directions of flow. However, the most common installation is with the fluid inlet pressure below the valve piston.

Since no metallic sealing surfaces are present, there is perfect interchangeability of all components. A new set of spares can be immediately fitted without the need of adaptation to other existing parts. Therefore, inline reparability and maintenance is easy, does not require specialized personnel, and will always make the valve like new.

OPERATING RANGE

Engineering companies have been using our piston valves successfully for more than 75 years. Their first application, still widely used, was the tight shut-off of low and medium pressure steam.

In later years, piston valves have been selected to meet the severe demands of a large number of requirements in fluid handling applications in the industrial sector. As such, they are used in process lines containing many different fluids such as steam, superheated water, thermal transfer fluids, ammonia, LPG, hydrocarbons, acids, alkaloids, etc. Their ability to provide perfect seat shut off and packing tightness, and their long term trouble free operation, ensured by our patented reinforced seal rings, have served to greatly expand the number and types of applications where the BONETTI® Piston Valves are used. This is particularly true of their use in the handling of harmful and flammable fluids where tight seat and packing shut off is essential.

Although the seat seal rings are suitable for use in temperatures in excess of 550°C (1022°F), their use is limited to the restrictions applicable to the body material, as well as that of other metallic pressure retaining valve components. It should be noted that carbon steel bodies can not be used in temperatures above 427 °C (800°F).

DESIGN

Piston valves are usually T-pattern, straight through flow globe valves, with their stem perpendicular to the process line.

The present design is the result of our long experience in the design and manufacturing of this product, which began as early as 1926. Our latest designs reflect the remarkable progress in regards to the quality of the sealing rings, particularly for their application in valves DN 65 (2 1/2") and larger, as well as for their application in handling high pressure fluids using balanced pistons and rising, non-rotating spindles. Kindly refer to the details on page 4, where the BVE valves are described. (Please note: "e" means balanced piston.)

OPERATIONS

Piston valves are typically shut off valves. But by replacing the standard lantern bushing with a regulating lantern bushing, the valves can be turned into flow control valves for manual/automatic service. Since the piston is always held by the upper valve seal ring, no vibration can occur.

Piston type flow control valves, contrary to globe type flow control

valves, offer perfect seal tight shut off. Thus, a very interesting application of piston valves is their use as regulating or modulating valves in severe service applications. (See details on page 16.)

RATINGS

For reference purposes, the maximum operating pressure of a piston valve is directly related to the operating temperatures as show on table figure 1061, on page 1. The actual maximum operating conditions are those stated in the ASME B16.34 tables for the given material and pressure class.

In cases where severe duty will be experienced, such as, thermal shock vibrations, repeated stresses, condensate hammering, and the handling of harmful or dangerous fluids, the customer should consult with the factory for the proper selection of materials of construction. When soliciting a quotation or sending an inquiry, it is necessary that you supply the worst operating conditions, including type of fluid, inlet and outlet pressures, and temperatures.

MATERIAL SCHEDULES

The term "Material Schedule" refers to the types of materials of the various components of the valve. Kindly refer to figure 1062 - Material Schedules, below.

All valves may contain some copper bearing alloys, externally and not in direct contact with the fluid. In cases where this is not desirable, the factory can substitute these materials for special alloys. In such cases, a special material schedule designation, "H", shall be used. (ie.: "G/H", "FS/H", "F/H", etc.).

Fig. 1062 - Material Schedules

Material Schedule	Body	Materials Piston
G	Cast iron	Stainless steel
GS	Nodular iron	Stainless steel
FS	Forged steel	Stainless steel
F	Cast steel	Stainless steel
M/H	Stainless steel	Stainless steel

SIZES (DN)

Standard sizes are: from DN10 (3/8") up to DN 200 (8").

CONNECTIONS

BONETTI® Piston Valves are available for pipe connections to:

- Flanged to UNI (DIN, AFNOR etc) PN 16 and PN 40
- Flanged to ASME 16.5, classes 150 and 300
- Female threaded, NPT and B.S.P. (DIN 2999)
- Socket weld
- Butt weld

AUTOMATED VALVES

BONETTI® Piston Valves of any size, pressure class, or material schedule can be automated with pneumatic, hydraulic, or electric actuators for remote control. See details on page 15.

MAINTENANCE

In-line maintenance and repairs of BONETTI® Piston Valves is very simple and can be done without removing the valve from the line. However, there can not be fluid flow through the valve while it is being serviced or maintained.

SHIPPING PREPARATION

BONETTI® Valves are shipped only after they have passed all required dimensional and functional tests. All valves are supplied with valve ends protected by means of polyethylene covers, as well as with externally painted surfaces for storage and shipping purposes. Wooden containers are recommended and typically used for overseas shipments.

QUALIFICATION

All BONETTI products, including Piston valves, are manufactured under ISO 9001 procedures

More than this, BONETTI® Piston Valves have been qualified according to:

- API 6 FA and BS 6775: Fire Safe
- TA Luft: German Clean Air, TÜV Mannheim
- Druckbehälter verordnung 22: for railway and truck liquid tankers for service down to -40° F, TÜV München
- Pressure Equipment Directive 97/23/EC ("PED")



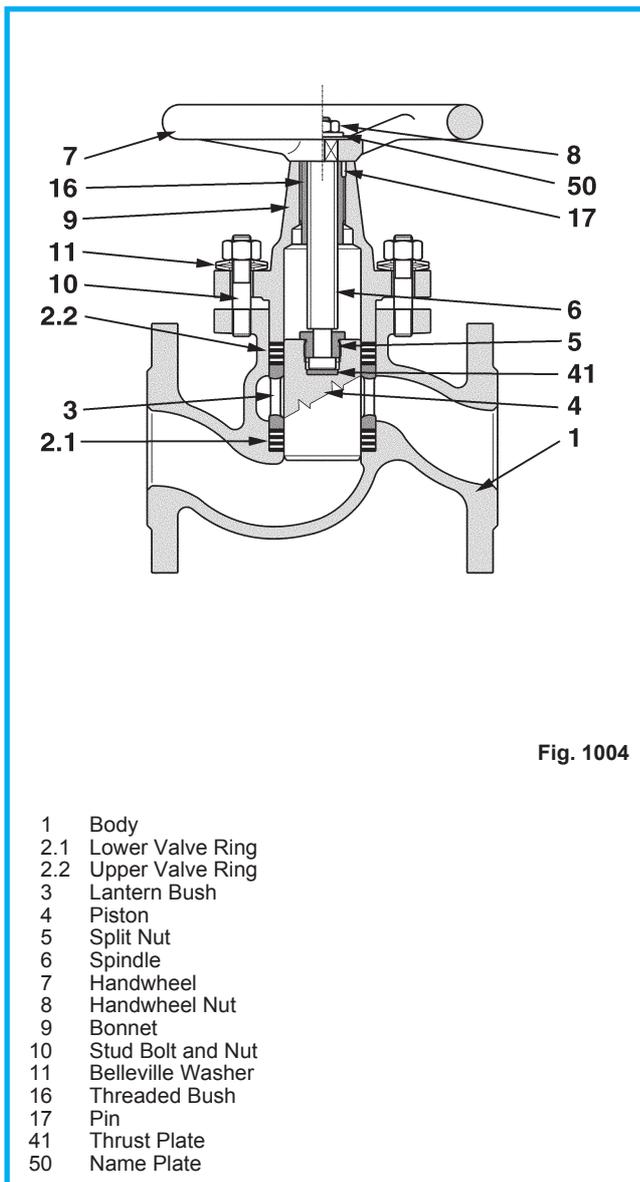
BONETTI® Piston Valves

Figure 1004 shows the basic design of a BONETTI® Piston Valve. The valve consists of a body (1), which is internally fitted with two sealing rings. The lower valve ring (2.1) ensures upstream/downstream seat tightness. The lantern bushing (3) is the spacer between the valve rings. The upper valve ring (2.2) ensures tightness to the environment. The two valve rings are compressed by the bonnet (9), which is compressed by the stud bolts and nuts (10) and by the Belleville washers (11). The latter compensates for expansion due to temperature variations.

The piston (4) is connected to the spindle (6), which is actuated by the hand wheel (7). When the piston is in the high position and fully encircled by the upper valve ring, the valve is open. When the piston is lowered into inner diameter of the lower valve ring, the valve is closed. The opening stroke ends when the split nut (5) contacts the bonnet (9). The closing stroke ends when the hand wheel (7) contacts the bonnet (9).

The following BONETTI® Piston Valves are manufactured in accordance to figure 1004.

The valves, using this design, are fitted with non-balanced piston and are denominated BVn, where the "n" means "non-balanced." All valves are further fitted with anti-friction threaded bushings in the bonnet and a thrust plate between spindle and piston.

BONETTI® piston valves are particularly well suited for use in railway and truck tankers used for the transportation of liquids such as LPG, ammonia, and other hydrocarbons. Currently, many tankers are equipped with BONETTI® piston valves type BK. These valves have been approved by the German authority TUV.



BONETTI® Piston Valves

Figure 1020 shows a BONETTI® Piston Valve type BVe with balanced piston (the "e" means balanced) and with rising, non-rotating stem. This design is required when the inlet pressure against the piston reaches such high values that the operation of the valve becomes difficult. By releasing some of the inlet fluid pressure through a hole in the balanced piston and against the bonnet (37) the piston is then in balance and the valve becomes easier to operate.

The valve is equipped with a standard gland nut (13) and packing rings (12.1 and 12.2). The following are also integral components of this new design of piston valves:

- Threaded stem (36) is rising and non-rotating.
- Integral anti-rotating device (23), which is also used as a stroke indicator.
- Perfect tightness when back seating is obtained by the back seating (32) wedging it self between the stem (36) and the bonnet (37) in an actual non-rotating motion
- Operating torque reduced by two roller bearings (30)

Valve Body Seal

Valve body seal tightness between body (1) and bonnet (37) is also ensured by an additional auto-sealing ring (35), which provides a tight seal. A perfect, durable body/bonnet seal is thus achieved. By so doing, we eliminate the need to use a third ring, which would take up considerable space and prevent the stud bolts from exerting the required pressure to the lower valve seat ring (2.1).

All BONETTI® Piston Valves are equipped with special graphite/metal alloy rings with the following features and advantages:

- Elimination of asbestos rings (environmentally sound practice).
- Wear and erosion resistance to nearly all types of fluid.
- Remarkable temperature stability and, consequently, substantial increase in the operating range, making it suitable for very high temperatures, since the limits of operation become a function of the body material and not of the seating rings.
- Reduced coefficient of friction resulting in longer life of both upper and lower sealing rings, as well as longer life for other components such as the threaded stem bushing, etc.

For special applications, PTFE valve rings can also be supplied on request.

The following Bonetti piston valves are manufactured in accordance

- to figure 1020 BVe:
- Size from DN 65 (2. ½") to DN 200 (8") for:

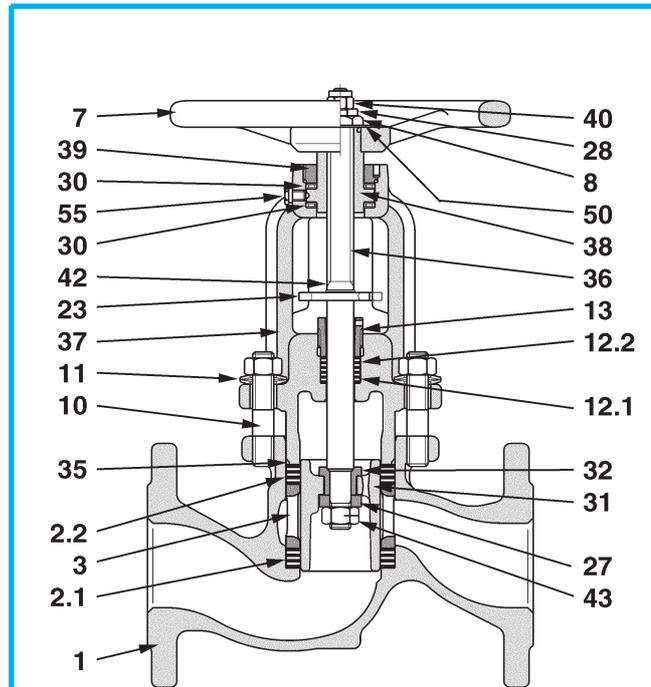


Fig. 1020

Type BVe

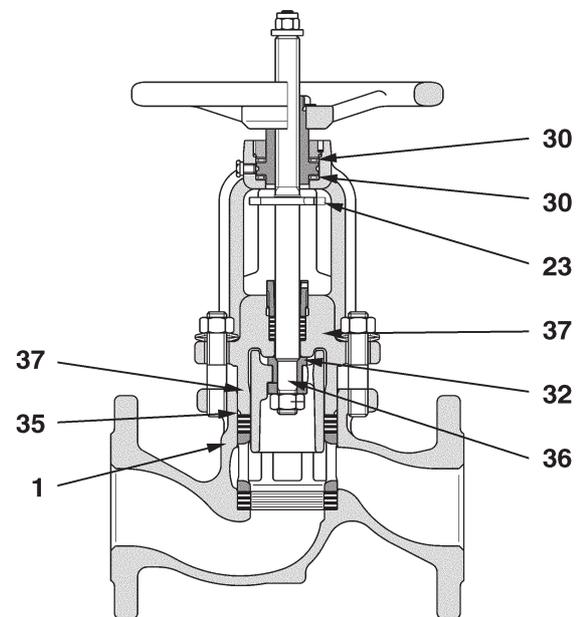


Fig. 1020.1

- | | |
|------|--|
| 1 | Body |
| 2.1 | Lower Valve Ring |
| 2.2 | Upper Valve Ring |
| 3 | Lantern Bush |
| 7 | Handwheel |
| 8 | Handwheel Nut |
| 10 | Stud Bolt and Nut |
| 11 | Belleville Washer |
| 12.1 | Stuffing-box Lower Ring |
| 12.2 | Stuffing-box Upper Ring |
| 13 | Gland Nut |
| 23 | Antirotating Device / Stroke Indicator |
| 27 | Nonrotating Disc |
| 28 | Locking Washer |
| 30 | Roller Bearing |
| 31 | Balanced Piston |
| 32 | Backseat |
| 35 | Autoseal Ring |
| 36 | Stem |
| 37 | Bonnet |
| 38 | Stem Bush |
| 39 | Retaining Nut |
| 40 | Nut |
| 42 | Retaining Ring |
| 43 | Notched Nut |
| 50 | Name Plate |
| 55 | Lubricator |



BONETTI® Piston Valves – Cast Iron

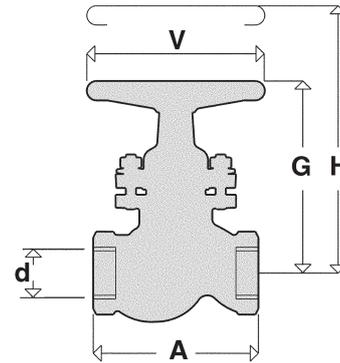
Stop Valves

Female Screwed Ends Type: BVm

Rating: DIN 2401 - PN 16

Size 3/8" to 2"

- 1 Standard female screwed ends to B.S.P. (TS-ENISO 228-1)
- 2 . Length of body (A) to DIN 3202 - M9 - (except 1.1/2", 2" and type B V R).
Standard Material Schedule: G - PN 16.
- 3 Pressure - Temperature Rating on page 2.
- 4



Type	DN inches	Fig.	Mater. Sched.	B.S.P. Thread d inches	Dimensions				Weight kg	Valve Rings (see page 12)		
					A mm	G mm	H mm	V mm		d mm	D mm	h mm
BVm	3/8"	1018	G	3/8"	100	110	140	95	1,3	15	23,5	9
BVm	1/2"	1018	G	1/2"	100	110	140	95	1,3	15	23,5	9
BVm	3/4"	1018	G	3/4"	120	135	170	115	2,1	20	30	10
BVm	1"	1018	G	1"	135	150	185	115	3,1	25	38	12
BVm	1.1/4"	1018	G	1.1/4"	160	170	215	150	5,0	30	45	15
BVm	1.1/2"	1018	G	1.1/2"	175	195	250	150	7,0	40	58	16
BVm	2"	1018	G	2"	195	225	285	150	10,9	50	70	17

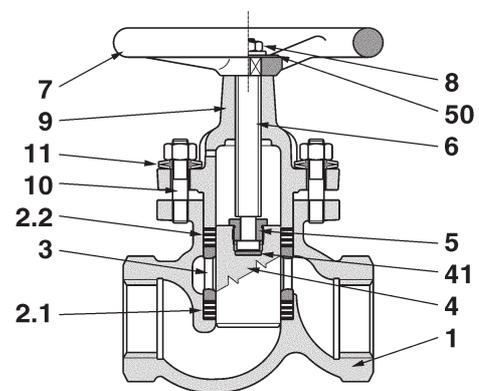


Fig. 1018

Part	Part Material for Material Schedule G
1 Body	JL 1040 (GG 25)
2.1 Lower Valve Ring	Graphite T1
2.2 Upper Valve Ring	Graphite T4
3 Lantern Bush	Carbon Steel /JL 1040 (GG25)★
4 Piston	1.4301/1.4104
5 Split Nut	Fe37 + H.T.
6 Spindle	C30
7 Handwheel	Cast iron JL 1030 (GG20)
8 Handwheel Nut	5.6 - 5-2
9 Bonnet	JL 1040 (GG25)
10 Stud Bolt and Nut	5.6 - 5-2
11 Belleville Washer	50 Cr V4
41 Thrust Plate	AISI 420 H.T.
50 Name Plate	Aluminium

★ depending upon Size

■ for Size 1." and larger, only



BONETTI® Piston Valves – Cast Iron

Stop Valves

Flanged Ends to TS-EN 1092-2 - PN 16

Rating: DIN 2401 - PN 16

Size DN 15 to DN 100

- 1 Full Bore - BV, BVn
R
- 2 Standard Flanges are Raised Face, drilled.
- 3 Face-to-Face Dimension (A) to TS-EN 558-1
- 4 Standard Material Schedule: G - PN 16.
- 5 Pressure - Temperature Rating on page 2.

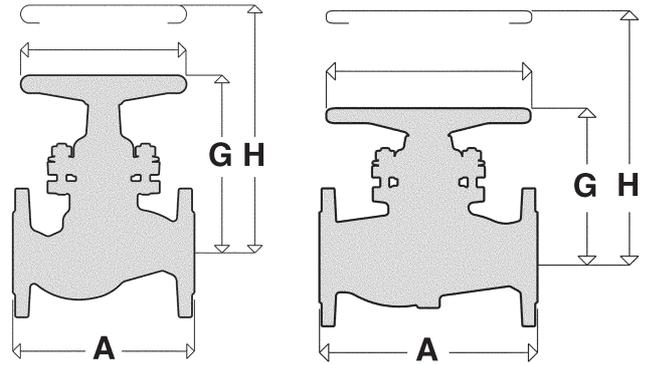


Fig. 1010 - 1075

Fig. 1045

Type	DN mm	Fig.	Mater. Sched.	Dimensions				Flange Dimensions					Weight kg	Valve Rings (see page 12)		
				A mm	G mm	H mm	V mm	Outs. Dia. mm	Thick. mm	No. of Holes No.	Dia. of Holes mm	Dia. of Bolt Circle mm		d mm	D mm	h mm
BV	15	1010	G	130	110	140	95	95	14	4	14	65	2,5	15	23,5	9
BV	20	1010	G	150	135	170	115	105	16	4	14	75	3,8	20	30	10
BV	25	1010	G	160	150	185	125	115	16	4	14	85	5,3	25	38	12
BV	32	1010	G	180	170	215	150	140	18	4	19	100	7,7	30	45	15
BV	40	1010	G	200	195	250	150	150	18	4	19	110	11,3	40	58	16
BV	50	1010	G	230	225	285	200	165	20	4	19	125	15,4	50	70	17
BVn	65	1045	G	290	210	260	300	185	20	4	19	145	21,0	60	82	16
BVn	80	1045	G	310	230	290	300	200	22	8	19	160	28,0	70	94	19
BVn	100	1045	G	350	275	350	300	220	24	8	19	180	41,0	90	112	20

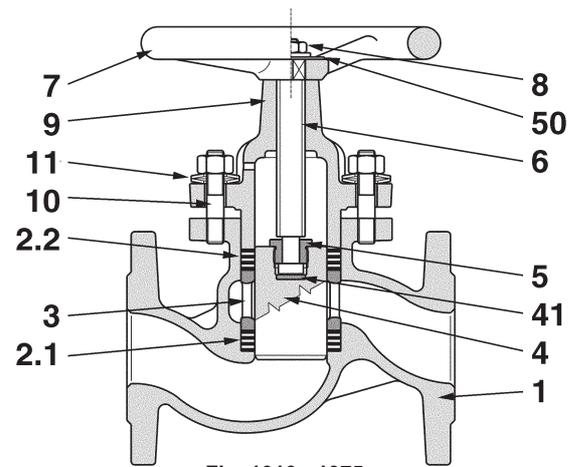


Fig. 1010 - 1075

Part	Part Material for Material Schedule G
1 Body	JL 1040 (GG 25)
2.1 Lower Valve Ring	Graphite T1
2.2 Upper Valve Ring	Graphite T1/T4
3 Lantern Bush	JL 1040 (GG 20)
4 Piston	1.4301/1.4104 & 1.4086 (Not existing DN10-20)
5 Split Nut	Fe37 + H.T.
6 Spindle	C30
7 Handwheel	Cast iron JL 1030 (GG20)
8 Handwheel Nut	5-2
9 Bonnet	JL 1040 (GG25)
10 Stud Bolt and Nut	5.6 - 5-2
11 Belleville Washer	50 Cr V4
16 Threaded Bush	MS 58(For sizes DN65 and Larger only)
17 Pin	Carbon Steel (For sizes DN65 and Larger only)
41 Thrust Plate	AISI 420 H.T.(For sizes DN32 and Larger only)
50 Name Plate	Aluminium

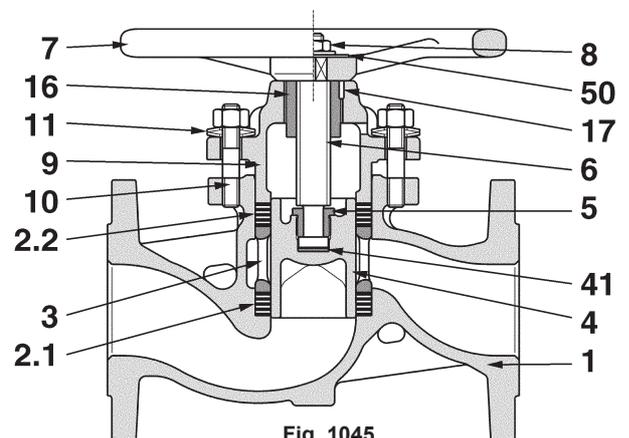


Fig. 1045



BONETTI® Piston Valves - Cast Iron,

Stop Valves – Type BVe

Flanged Ends to TS-EN 1092-2 - PN 16

Rating: DIN 2401 - PN 16

Size DN 65 to DN 200

1 Standard Flanges are Raised Face, drilled.

2 Face-to-Face Dimension (A) to TS-EN 558-1.

3 Standard Material Schedule: G - PN 16,

4 Pressure - Temperature Rating on page 2.

These DN 200 valves are designed and suitable for PN 16.

Some Countries accept DN 200 and larger sized valves of cast iron for lower PN, only. We suggest to examine carefully the relevant standards in force.

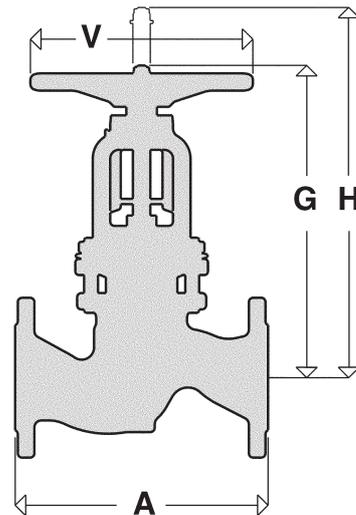


Fig. 1021

Type	DN	Fig.	Mater. Sched.	Dimensions				Flange Dimensions					Weight	Valve Rings (see page 17)			Stuffing-box Rings (see page 12)			
				A	G	H	V	Outs. Dia.	Thick.	No. of Holes	Dia. of Holes	Dia. of Bolt Circle		d	D	h	d	D	h	
	mm			mm	mm	mm	mm	mm	mm	No.	mm	mm	kg	mm	mm	mm	mm	mm	mm	mm
BVe	65	1021	G	290	340	395	250	185	20	4	19	145	23,5	60	82	16	20	30	7	
BVe	80	1021	G	310	370	430	250	200	22	8	19	160	31,0	70	94	19	20	30	7	
BVe	100	1021	G	350	415	490	300	220	24	8	19	180	43,0	90	112	20	20	30	7	
BVe	125	1021	G	400	460	545	350	250	26	8	19	210	65,0	110	135	22	25	38	9	
BVe	150	1021	G	480	495	590	350	285	26	8	23	240	91,0	130	155	23	25	38	9	
BVe	200	1021	G	600	580	695	400	340	30	12	23	295	175,0	170	200	15	25	38	9	

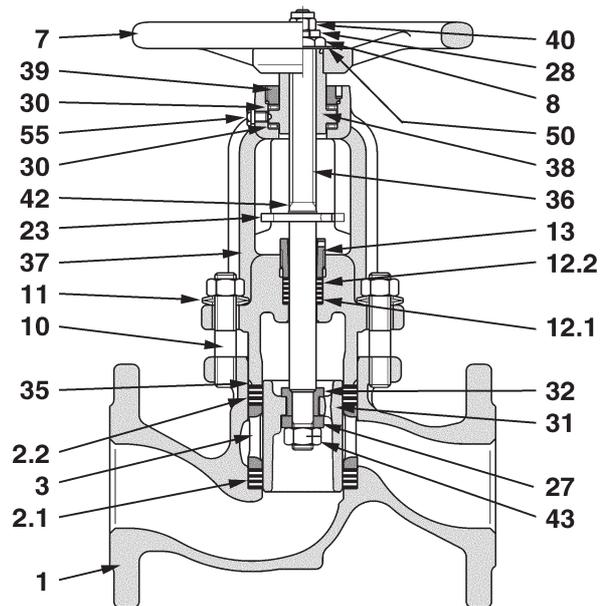


Fig. 1021

Part	Part Material for Material Schedule G
1 Body	JL 1040 (GG25)
2.1 Lower Valve Ring	Graphite T1
2.2 Upper Valve Ring	Graphite T1
3 Lantern Bush	JL 1030 (GG20)
7 Handwheel	JL 1030 (GG20)
8 Handwheel Nut	Carbon Steel
10 Stud Bolt and Nut	5.6 - 5-2
11 Belleville Washer	50 Cr V4
12.1 Stuff.-box Lower Ring	Graphite T1
12.2 Stuff.-box Upper Ring	Graphite T1
13 Gland Nut	Carbon Steel
23 Antirotating Device	Carbon Steel
Stroke Indicator	Carbon Steel
27 Nonrotating Disc	Carbon Steel
28 Locking Washer	ASTM A182 F6
30 Roller Bearing	Alloy Steel
31 Balanced Piston	W Nr 1.4086
32 Piston bush	AISI 420
35 Autoseal Ring	Graphite T3
36 Stem	AISI 420
37 Bonnet	JL 1040 (GG25)
38 Stem Bush	AISI 420
39 Retaining Nut	Carbon Steel
40 Nut	Carbon Steel
42 Retaining Ring	AISI 420
43 Notched Nut	Carbon Steel
50 Name Plate	Aluminium
55 Lubricator	3/8" H1



Stop Valves

Flanged Ends to TS-EN1092-2 - PN 40

Rating: DIN 2401 - PN 40

Size DN 15 to DN 50

- 1 Full Bore - BV
Reduced Bore - BVR - Available on request
- 2 Standard Flanges are Raised Face, drilled.
- 3 On request instead of Raised Face flanges can have following finishings:
- 4
- 5 Face-to-Face Dimension (A) to TS-EN 558-1.
- 6 Standard Material Schedules:
GS - PN 40.

Pressure - Temperature Rating on page 2.

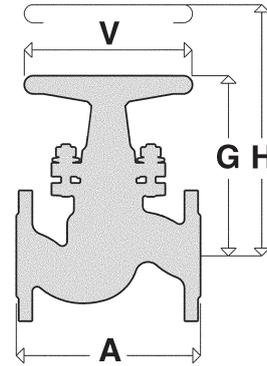


Fig. 1080

Type	DN mm	Fig.	Mater. Sched.	Dimensions				Flange Dimensions					Weight kg	Valve Rings (see page 12)		
				A mm	G mm	H mm	V mm	Outs. Dia. mm	Thick. mm	No. of Holes No.	Dia. of Holes mm	Dia. of Bolt Circle mm		d mm	D mm	h mm
BV	15	1080	GS	130	110	140	95	95	16	4	14	65	2,9	15	23,5	9
BV	20	1080	GS	150	135	170	115	105	18	4	14	75	4,4	20	30	10
BV	25	1080	GS	160	150	185	125	115	18	4	14	85	6,1	25	38	12
BV	32	1080	GS	180	170	215	150	140	18	4	19	100	9,2	30	45	15
BV	40	1080	GS	200	195	250	150	150	18	4	19	110	12,2	40	58	16
BV	50	1080	GS	230	225	285	200	165	20	4	19	125	17,1	50	70	17

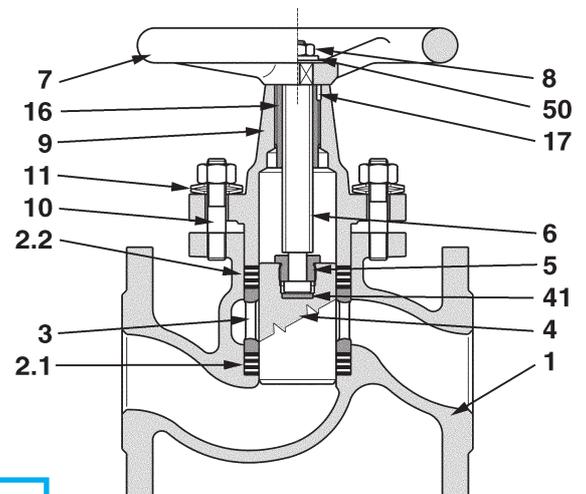


Fig. 1080

Part	Part Material for Material Schedule GS
1 Body	JS 1049 (GGG 40.3)
2.1 Lower Valve Ring	Graphite T1
2.2 Upper Valve Ring	Graphite T1
3 Lantern Bush	Carbon Steel. / GG20 JL1030 (Depending upon sizes)
4 Piston	1.4301/1.4104
5 Split Nut	Fe37 + H.T. (Not existing DN10-20)
6 Spindle	AISI 420
7 Handwheel	JL 1030 (GG-20)
8 Handwheel Nut	5-2
9 Bonnet	JS 1049 (GGG 40.3)
10 Stud Bolt and Nut	5,6 - 5-2
11 Belleville Washer	50 Cr V4
16 Threaded Bush	MS 58 (For sizes DN32 and Larger only)
17 Pin	Carbon Steel (For sizes DN32 and Larger only)
41 Thrust Plate	AISI 420 H.T.
50 Name Plate	Aluminium



BONETTI® Piston Valves –Nodular Iron

Stop Valves – Type BVe
Flanged Ends to TS-EN 1092-2 - PN 40
Rating: DIN 2401 - PN 40
Size DN 65 to DN 200

- 1 Standard Flanges are Raised Face, drilled.
- 2 On request instead of Raised Face flanges can have following finishings:
- 3 Face-to-Face Dimension (A) to EN 558-1.
- 4 Standard Material Schedules: GS - PN 40.
- 5 Pressure - Temperature Rating on page 2.

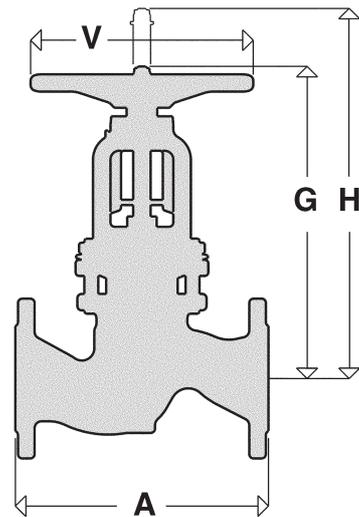


Fig. 1022

Type	DN	Fig.	Mater. Sched.	Dimensions				Flange Dimensions					Weight	Valve Rings (see page 12)			Stuffing-box Rings			
				A	G	H	V	Outs. Dia.	Thick.	No. of Holes	Dia of Holes	Dia of Bolt Circle		d	D	h	d	D	h	
	mm			mm	mm	mm	mm	mm	mm	No.	mm	mm	kg	mm	mm	mm	mm	mm	mm	mm
BVe	65	1022	GS	290	345	400	250	185	22	8	19	145	26	60	82	16	20	30	7	
BVe	80	1022	GS	310	375	435	250	200	24	8	19	160	33	70	94	19	20	30	7	
BVe	100	1022	GS	350	415	490	300	235	24	8	23	190	50	90	112	20	20	30	7	
BVe	125	1022	GS	400	460	545	350	270	26	8	28	220	80	110	135	22	25	38	9	
BVe	150	1022	GS	480	495	590	350	300	28	8	28	250	110	130	155	23	25	38	9	
BVe	200	1022	GS	600	580	695	400	375	34	12	31	320	190	170	200	15	25	38	9	

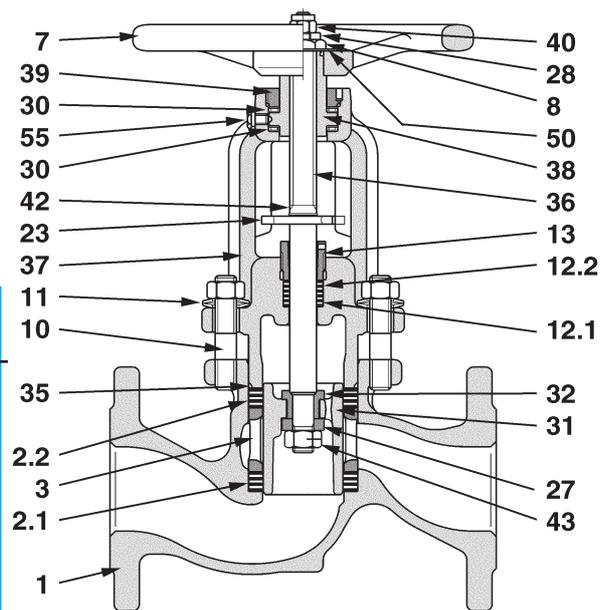


Fig. 1022

Part	Part Material for Material Schedule GS
1 Body	JS1049 (GGG-40.3)
2.1 Lower Valve Ring	Graphite T1
2.2 Upper Valve Ring	Graphite T1
3 Lantern Bush	JL 1030 (GG-20)
7 Handwheel	JL 1030 (GG-20)
8 Handwheel Nut	Carbon Steel
10 Stud Bolt and Nut	5.6 - 5-2
11 Belleville Washer	50 Cr V4
12.1 Stuff.-box Lower Ring	Graphite T1
12.2 Stuff.-box Upper Ring	Graphite T1
13 Gland Nut	Carbon Steel
23 Antirotating Device	Carbon Steel
Stroke Indicator	
27 Nonrotating Disc	AISI 420
28 Locking Washer	ASTM A182 F6
30 Roller Bearing	Alloy Steel
31 Balanced Piston	W.Nr.1.4086
32 Backseat	AISI 420
35 Autoseal Ring	Graphite T3
36 Stem	AISI 420
37 Bonnet	JS1049 (GGG-40.3)
38 Stem Bush	MS58
39 Retaining Nut	Carbon Steel
40 Nut	Carbon Steel
42 Retaining Ring	Stainless Steel
43 Notched Nut	Carbon Steel
50 Name Plate	Aluminium
55 Lubricator	1/8" BSP



BONETTI® Piston Valves

Modulating Flow Control Valves

Although piston valves are primarily used as on/off globe valves they are also suitable for use as modulating control valves. (Please refer to page 3.) The flow path for BONETTI® piston valves provides an excellent means for control of flow rate, even when just the standard lantern bushing component is used, and which is not designed for modulating flow control.

The modulating flow control piston valve design is fitted with a lantern bushing (fig. 1070) that has a multiple hole design and which will yield an equal percentage flow characteristic. Upon request, linear or quick opening flow characteristics are also available.



Fig. 1070

We also wish to point out that:

- The flow control piston valve design provides tight sealing when closed, like all other BONETTI® piston valves, and therefore it is not necessary to use additional valves for shut-off.
- Even with high differential pressure, our piston flow control valves do not allow vibration or noise thanks to their having a continually guided piston, which is very much in contrast with that of control valves with contoured plugs.

Our piston modulating valves are equipped with actuators operated by means of signals coming from process controllers.

In order to submit a proper quotation, it is suggested that the specially designed product data sheet should be submitted to us for evaluation.

In most cases, the following data should be sufficient:

- Kind of fluid
- Upstream and downstream pressure
- Operating pressure
- Flow rate
- Type of controlling signal.

Flow Coefficient

BONETTI® Piston Valve Flow Coefficient

Based on theory and experimentation, a series of mathematical equations have been developed which facilitate the estimation of a valve's ability to handle a fluid based on the type of fluid, the inlet pressure, and the temperature.

The use of the aforementioned equations can yield a parameter, which is often constant within certain limits, and directly related to the type of valve and its internal dimensions and configuration. The parameter can then be proven through testing and experimentation and, thus, becomes valid for an entire series of similar valves, for all operating conditions. Once established, this parameter can be an effective aid in the selection of a valve size suitable for proper handling of a set of flow conditions.

The parameter, which is known as **Flow Coefficient**, is used to estimate the volume of water, under standard conditions, that can flow through a valve under a stated pressure drop. Accordingly, Flow Coefficient (stated as **Cv** under the ASME system, and **Kv** under the European system) is defined as:

One Cv is the ability to flow one U.S. gallon of water per minute, at 60 °F, through a fully opened valve, under 1 psi pressure differential.

One Kv is the ability to flow one cubic meter of water per hour, at 20 °C, through a fully opened valve, under 1 bar pressure differential.

The Flow Coefficients for the selection of Bonetti Piston Valves are as follows:

Flow Coefficient for Stop Valves

DN	Fig.	Cv (Kv)	Fig.	Cv (Kv)
10 3/8"	1010 , 1018 1039 , 1053	3,5 (3,5)	1024 1046	95 (82) 150 (130) 220 (190) 340 (290) 515 (440)
15 1/2"		5 (4,5)		
20 3/4"		10 (8,5)		
25 1"		16 (14,0)		
32 1.1/4"		24 (20,5)		
40 1.1/2"	1079 , 1080	38 (32)		
50 2"		58 (50)		
65 2.1/2"	1045	82 (70)		
80 3"	1021	120 (105)		
100 4"	1022	190 (165)		
125 5"	1023	290 (255)		
150 6"		420 (360)		
200 8"		690 (590)		

For BVR type Valves, select the Cv and Kv values of a valve having nominal bore (DN) one size smaller.

Flow Coefficient for Flow Control Valves

DN	Fig.	Cv (Kv)	Fig.	Cv (Kv)
10 3/8"	1010 , 1018 1039 , 1053	4 (3,5)	1024 1046	75 (65) 115 (100) 210 (180) 260 (220) 360 (310)
15 1/2"		7 (6,0)		
25 1"		12 (10,5)		
32 1.1/4"		18 (15,5)		
40 1.1/2"		28 (24)		
50 2"	1079 , 1080	44 (38)		
65 2.1/2"		62 (53)		
80 3"	1045	92 (79)		
100 4"	1021	140 (120)		
125 5"	1022	220 (190)		
150 6"	1023	300 (260)		
200 8"		510 (440)		

For BVR type Valves, select the Cv and Kv values of a valve having nominal bore (DN) one size smaller.

BONETTI® Sealing Rings for Piston Valves

The dimensions of the rings fitted in each valve are indicated in the last column, on the right side, of each descriptive table. The spare rings are normally pre-compressed and their height (H dimension) is lower than the value listed on the tables.

- The patented BONETTI® Piston Valve Rings are made of alloy metal reinforced lamellar graphite. Their composition, design, and manufacturing have been established after a long period of laboratory testing as well as actual field applications. The primary features of these rings are as follows:
 - Durable perfect class VI seat tightness
 - Resistance to temperatures up to 1022°F
 - Resistance to etching by the processed fluids
 - Practically only one type of valve ring material to handle all fluids which reduces inventory and eliminates confusion
 - Low coefficient of friction and low operating torques
 - No need to re-torque bolts during extended service
 - Longer operating life than that of asbestos rings and maintenance free
- For piston valve figure 1071 (with non-balanced piston) one complete kit of sealing rings consists of:
 - Two rings (items 2.1 and 2.2) of metal alloy re-enforced lamellar graphite (figure 1001)
- For piston valve figure 1072 (with balance piston) one complete kit of seating rings consists of:
 - Two rings (items 2.1 and 2.2) of metal alloy reinforced lamellar graphite (figure 1001)
 - 2 Stuffing-box rings (item 12.1 and 12.2)
 - 1 Auto seal ring (item 35 - Fig. 1009)
- We usually supply spare valve rings kits, each consisting of all the rings necessary for the complete replacement in any given valve type and size
- Upon request, and for very special applications, we supply PTFE valve rings with same dimensions as in Fig. 1065.
- The Spare Rings are normally precompressed and their height (h) could be lower than the value shown in Fig. 1065.
- The recommended torques of the bonnet nuts (item 10) are listed on the table of Fig. 1065.

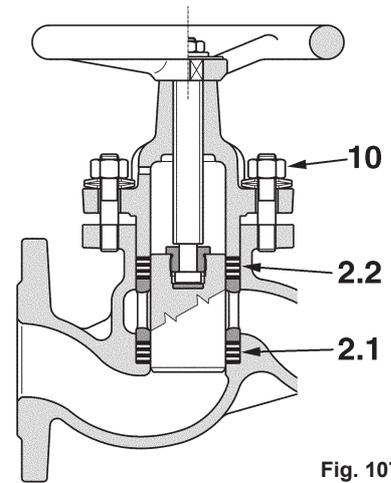


Fig. 1071

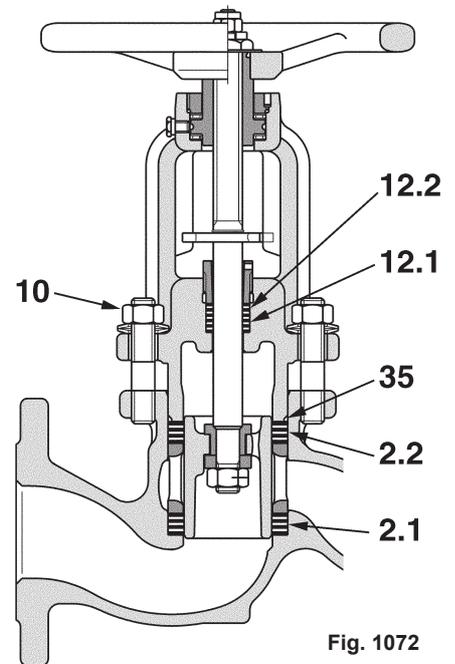


Fig. 1072

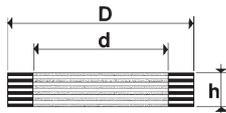
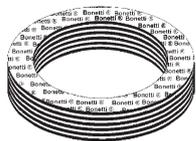


Fig. 1001

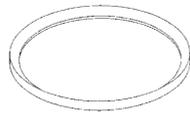


Fig. 1009
Autoseal Ring

Fig. 1065

Note	For Valve		Dimensions of Rings (Note 6)									Bolting Torque (Note 7)					
			Valve Rings (items 2.1 and 2.2)			Stuffing-box Rings (items 12.1 and 12.2)			Autoseal Ring (item 35)			BV - BVR - BVn		BVe		BVd	
	Type	DN mm inches	Type	DN mm inches	d mm	D mm	h mm	d mm	D mm	h mm	D9 mm	h9 mm	PN 16 PN 40 150 lb 300 lb Nm	PN 63 800 lb Nm	PN 16 Nm	PN 40 150 lb Nm	300 lb Nm
2	BV	10 3/8"	BVR	15 3/8" 1/2"	10	18	6	=	=	=	=	=	5	8			
	BV	15 1/2"	BVR	20 3/4"	15	23,5	9	=	=	=	=	=	5	10			
	BV	20 3/4"	BVR	25 1"	20	30	10	=	=	=	=	=	6	12			
	BV	25 1"	BVR	32 1.1/4"	25	38	12	=	=	=	=	=	6	17			
	BV	32 1.1/4"	BVR	40 1.1/2"	30	45	15	=	=	=	=	=	8	18			
	BV	40 1.1/2"	BVR	50 2"	40	58	16	=	=	=	=	=	9	18			
	BV	50 2"	BVR		50	70	17	=	=	=	=	=	10	18			
2	BVn	65			60	82	16	=	=	=	=	=	10				
	BVn	80			70	94	19	=	=	=	=	=	5				
	BVn	100			90	112	20	=	=	=	=	=	5				
	BVn	125			110	135	22	=	=	=	=	=	14				
	BVn	150			130	155	23	=	=	=	=	=	12				
3	BVe	65			60	82	16	20	30	7	82	4,2			12	20	
	BVe	80 3"			70	94	19	20	30	7	94	4,2			8	18	
	BVe	100 4"			90	112	20	20	30	7	112	4,2			8	20	
	BVe	125			110	135	22	25	38	9	135	5,4			18	27	
	BVe	150 6"			130	155	23	25	38	9	155	5,4			16	28	
	BVe	200 8"			170	200	15	25	38	9	200	5,4			40	50	55
3	BVd	65/70			70	94	19	25	38	12	94	4,2					-
	BVd	80 3"			80	105	20	25	38	12	105	4,2					18
	BVd	100 4"			100	130	22	30	45	15	130	5,4					20
	BVd	125			125	155	22	30	45	15	155	5,4					-
	BVd	150 6"			150	180	28	30	45	15	180	5,4					28



Conversion Table from °C to °F

°C	°F	°C	°F	°C	°F	°C	°F
-270	-454	165	329	520	968	1100	2012
-260	-436	170	338	525	977	1120	2048
250	-418	17.5	347	530	986	1140	2084
-240	-400	180	356	535	995	1160	2120
230	-382	185	365	540	1004	1180	2156
-220	-364	190	374	545	1013	1200	2192
210	-346	195	383	550	1022	1220	2228
-200	-328	200	392	555	1031	1240	2264
190	-310	205	401	560	1040	1260	2300
-180	-292	210	410	565	1049	1280	2336
170	-274	215	419	570	1058	1300	2372
-160	-256	220	428	575	1067	1320	2408
150	-238	225	437	580	1076	1340	2444
-140	-220	230	446	585	1085	1360	2480
130	-202	235	455	590	1094	1380	2516
-120	-184	240	464	595	1103	1400	2552
110	-166	245	473	600	1112	1420	2588
-100	-148	250	482	605	1121	1440	2624
95	-139	255	491	610	1130	1460	2660
-90	-130	260	500	615	1139	1480	2696
85	-121	265	509	620	1148	1500	2732
-80	-112	270	518	625	1157	1520	2768
-75	-103	275	527	630	1166	1540	2804
-70	-94	280	536	635	1175	1560	2840
-65	-85	285	545	640	1184	1580	2876
-60	-76	290	554	645	1193	1600	2912
-55	-67	295	563	650	1202	1620	2948
50	-58	300	572	655	1211	1640	2984
-45	-49	305	581	660	1220	1660	3020
-40	-40	310	590	665	1229	1680	3056
-35	-31	315	599	670	1238	1700	3092
-30	-22	320	608	675	1247	1750	3182
-25	-13	325	617	680	1256	1800	3272
-20	4	330	626	685	1265	1850	3362
-17,8	0	335	635	690	1274	1900	3452
-15	5	340	644	695	1283	1950	3542
-10	14	345	653	700	1292	2000	3632
-5	23	350	662	710	1310	2050	3722
0	32	355	671	720	1328	2100	3812
5	41	360	680	730	1346	2150	3902
10	50	365	689	740	1364	2200	3992
15	59	370	698	750	1382	2250	4082
20	68	375	707	760	1400	2300	4172
25	77	380	716	770	1418	2350	4262
30	86	385	725	780	1436	2400	4352
35	95	390	734	790	1454	2450	4442
40	104	395	743	800	1472	2500	4532
45	113	400	752	810	1490	2550	4622
50	122	405	761	820	1508	2600	4712
55	131	410	770	830	1526	2650	4802
60	140	415	779	840	1544	2700	4892
65	149	420	788	850	1562	2750	4982
70	158	425	797	860	1580	2800	5072
75	167	430	806	870	1598	2850	5162
80	176	435	815	880	1616	2900	5252
85	185	440	824	890	1634	2950	5342
90	194	445	833	900	1652	3000	5432
95	203	450	842	910	1670		
100	212	455	851	920	1688		
105	221	460	860	930	1706		
110	230	465	869	940	1724		
115	239	470	878	950	1742		
120	248	475	887	960	1760		
125	257	480	896	970	1178		
130	266	485	905	980	1796		
135	275	490	914	990	1814		
140	284	495	923	1000	1832		
145	293	500	932	1020	1868		
150	302	505	941	1040	1904		
155	311	510	950	1060	1940		
160	320	515	959	1080	1976		

Pressure/Temperature Table for Saturated Water Steam

bar	°C
1	99,1
1,5	110,7
2	119,6
2,5	126,7
3	132,8
3,5	138,1
4	142,9
4,5	147,2
5	151,1
5,5	154,7
6	158,0
6,5	161,1
7	164,1
7,5	167,1
8	169,6
8,5	172,2
9	174,5
9,5	176,7
10	179,0
11	183,2
12	187,0
13	190,7
14	194,1
15	197,3
16	200,4
17	203,3
18	206,1
19	208,8
20	211,4
22	216,2
24	220,7
26	225,0
28	228,9
30	232,7
35	241,4
40	249,1
45	256,2
50	262,7
55	268,6
60	274,2
65	279,5
70	284,4
75	289,1
80	293,6
85	297,8
90	301,9
95	305,8
100	309,5
105	313,3
110	316,5
115	319,8
120	323,1
125	326,2
130	329,3
135	332,2
140	335,1
145	337,8
150	340,6
155	343,2
160	345,7
165	348,3
170	350,6
175	353,0
180	355,4
185	357,5
190	359,8
195	361,9
200	364,1
205	366,1
210	368,1
215	370,2
220	372,0
225	374,0

