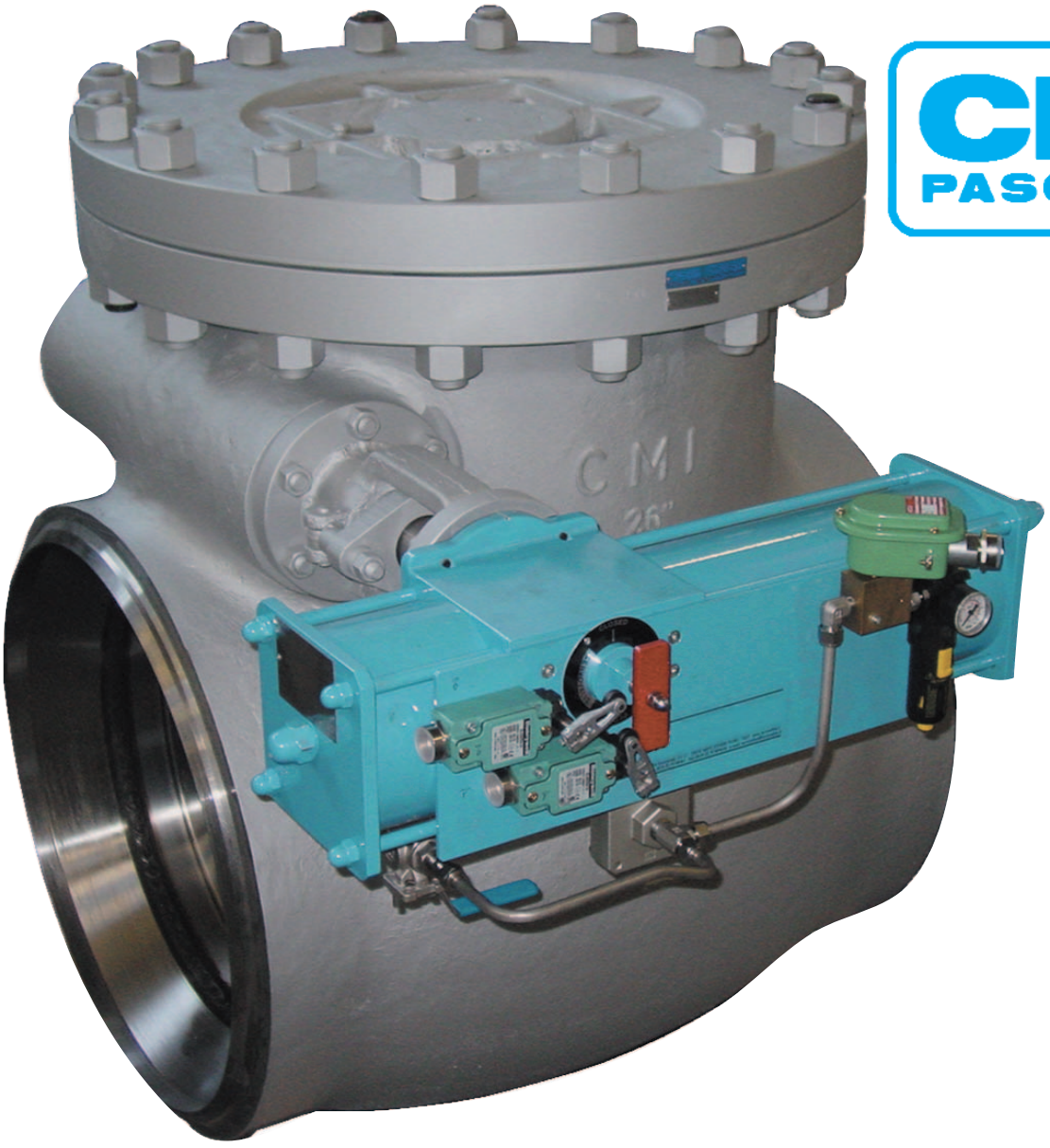
BONETTI®

CMI PASQUINI

Check Valves



CMI Pasquini

CMI Pasquini S.p.A. originated in 1921 with the establishment of the firm "Cocard Italiana di Ing. Pasquini & C.".
This company markets in the early years the valves manufactured by a French company, then starts a manufacturing activity under license and year after year with considerable increase in local production is recorded in comparison with the sales of the foreign products.

The Second World War has a remarkable influence in this direction; the previous experience is used in order to develop their own know-how and that permits the production of valves designed and manufactured completely in Italy with no more collaboration with the French company.

In 1950 the company name is renamed "Costruzioni Meccaniche Industriali già Ing. Gino Pasquini S.p.A.". This trade name has been maintained since 1957, after the death of the founder of the Company. In the sixties - a period of large industrial expansion in Italy - CMI Pasquini S.p.A. becomes very important in the field of valves for heavy duty on the new thermoelectric, chemical and petrochemical plants.

We can say, without hesitation, that CMI Pasquini during these years became the only Italian producer in a position to ensure that such products and their continuous development were compliant with the requirements of the users, which are not only Italian but also located in foreign countries due to direct and indirect supplies.

In consideration of product importance, very close contacts and collaboration with customers have always been fundamental to verify from the beginning any possibility in the operating conditions of the plants. That has been and is the constant policy of CMI Pasquini.

End 1984 - thanks to the partnership of Cesare Bonetti S.p.A., a leader in Italy and abroad in the field of high quality industrial valves - a new substantial boost is given to modernisation of managing, planning and manufacturing facilities and methods.

In 1992 the Company was merged into Cesare Bonetti S.p.A. as CMI Pasquini Division.

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Foreword

BONETTI's "CMI Pasquini" production range consists of:

- Gate valves
- Globe valves, Stop, Stop-Check and Piston Lift Check type
- Check valves, Swing disk, Tilting disk and Testable Pneumatically actuated type;
- Valves for Chemical Applications.

All valves above listed are suitable for high pressures and temperatures

The main technical features of these valves have been verified and optimized during over 50 years of in-house production and supply by Bonetti/CMI on electric power plants, in particular for applications on boiler feedwater, steam shutoff, against backflow as well on chemical and petrochemical plants.

Details of the lengthy Bonetti/CMI experience can be found in "Users List" with indication of valves fitted on thermoelectric power plants and other installations, where high reliability under severe operating conditions is a constant requirement.

Bonetti/CMI are always assisting their customers, both engineering/manufacturing companies and end users, by integrating their own know-how with that of the customers.

Consequently CMI production line is uptodated and meets the highest engineering and quality levels. The pressure and temperature values as well the sizes listed in this bulletin shall not be considered as a limit of CMI's production range. Bonetti can produce CMI special valves to meet customer's requirements.

Bonetti has successfully supplied CMI valves having ratings higher than ASME Class 2500, for instance:
- Gate Valves in different sizes for main shutoff of boilers, manufactured according to interpolated rating ASME Special Class 2860,
- Gate Valves in different sizes for shutoff of boiler safety valve, manufactured according to rating ASME Class 4500.

Even the materials listed in this bulletin for bodies, bonnets and trims shall not be considered as a limit. Bonetti often manufactures CMI valves in special materials, in accordance with special design requirements at customer's requests.

CMI Check Valves

This catalogue describes our check valves with Swing disk and Tilting disk type only.
Bonetti's CMI valves Piston-Lift Check type are described in separate catalogue (see the CMI Globe valve Catalogue).

DESIGN

BONETTI's CMI Swing disk and Testable Pneumatic check valves are manufactured with Bolted Bonnet or Pressure Seal Bonnet design. Tilting disk check valves are manufactured with Pressure Seal Bonnet design.

OPERATIONS

BONETTI's CMI check valves are straight-through valves usually operated automatically. The Testable Pneumatic check type is equipped with a safety pneumatic actuator that provides assistance to the valve at the beginning of closing operation.

CONNECTIONS

BONETTI's CMI check valves illustrated in this catalogue have Buttwelding End connections according to ASME B16.25 (see page12) or to different Standard:
Depending on size and patterns connection are available also with Flanged Ends according to ASME B16.5 (usually for Class 600 only, not for higher pressure Classes) or to different Standard.

We can supply check valves with connections different from the above, e.g. butt welding Ends.to DIN or different ones.

SIZES

Bonetti's CMI check valves are currently manufactured in sizes from 2.½" (DN 65) up to 42" (DN 1050).

RATINGS

Bonetti's CMI check valves currently manufactured as standard are suitable for the following Ratings:
ASME Class 150 - 300 - 600 - 900 - 1500 - 2500.
As stated in the foreword, Bonetti's experience with CMI valves is not limited within above limits: we can supply valves up to ASME Class 4500 or Special Classes.

Tables showing max operating conditions (pressure and temperature) for Rating and Material Code are at page 13.
We want to point out that Cesare Bonetti's CMI valves are overdimensioned with respect to international Standards.
Actual max allowed operating conditions can be supplied on request.

MATERIAL CODE

CMI check valves are manufactured in different Material Codes. For "Material Code" we mean the standard material of construction for the valve components.

In the Table at page 5 the materials used for the more important components are clearly indicated for each standard Material Code.
Here below we list the main characteristic elements of the different Material Codes:

Material Code	Material for Body and Bonnet	Trim and Hardfaced Surfaces
CB	ASTM A216 WCB	Stellite or SS✶
C6	ASTM A217 WC6	Stellite or SS✶
C9	ASTM A217 WC9	Stellite or SS✶
C12A	ASTM A217 C12A	Stellite or SS✶
CF8M	ASTM A351 CF8M	Stellite or SS✶

✶ - Stellite or SS depending on operating conditions or according to Customer's specification

It should be noted that, except where molds are not compatible, some components usually made of cast steel can be made of the corresponding forged steel.

STANDARDS

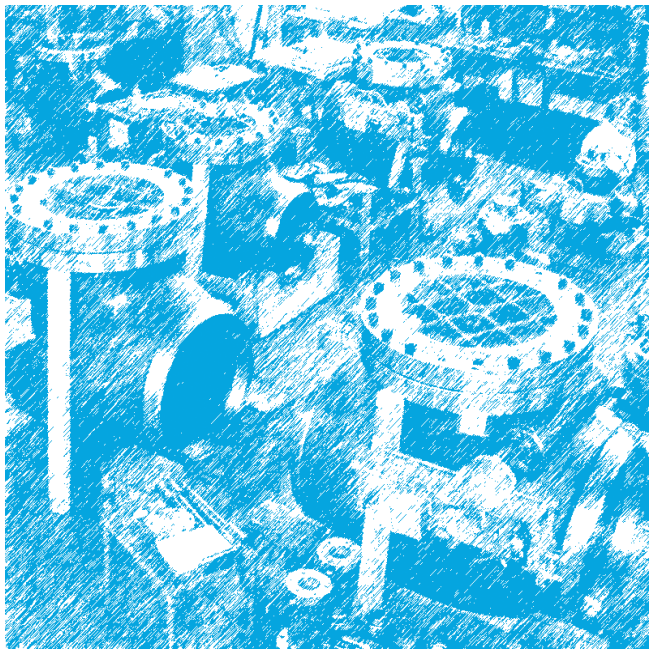
Bonetti's CMI check valves have been designed, rated, manufactured and inspected, where applicable, in accordance with the most popular international Standards, namely:
- ASME B16.34 - Steel valves, Flanged and Butt-welding Ends
- ASME B16.10 - Face-to-Face and End-to-End Dimensions
- Applicable Sections of ASME Boiler and Pressure Vessel Code, including Nuclear Section III.
- MSS SP 44 Steel pipe line flanges
- MSS SP 61 Hydrostatic testing of steel valves
- API Standard 598 - Valve inspection and test
- ASME B16.25 - Buttwelding Ends
- others (on request).

SHIPPING PREPARATION

BONETTI's CMI valves are delivered only after undergoing the required dimensional and operating inspections.
For storage and shipment valves are adequately protected.

REQUESTS AND ORDERS

To guarantee perfect valve operation please state:
- Size of the valve
- Fluid to be handled
- Design conditions (pressure and temperature) or Rating
- Operating conditions (pressure and temperature)
- Operating Δp
- Flow Rate
- Connections type
- Operating type (Swing, Tilting, Testable Pneumatic Check)
- Installation type, that is the orientation of the valve within the space
- Required materials
- Optional features
- Possible environmental and operating peculiarities.



CMI PASQUINI Check valves

Bolted Bonnet type - Construction Details

ASME Class 150 - 300 - 600

Fig. 270.1

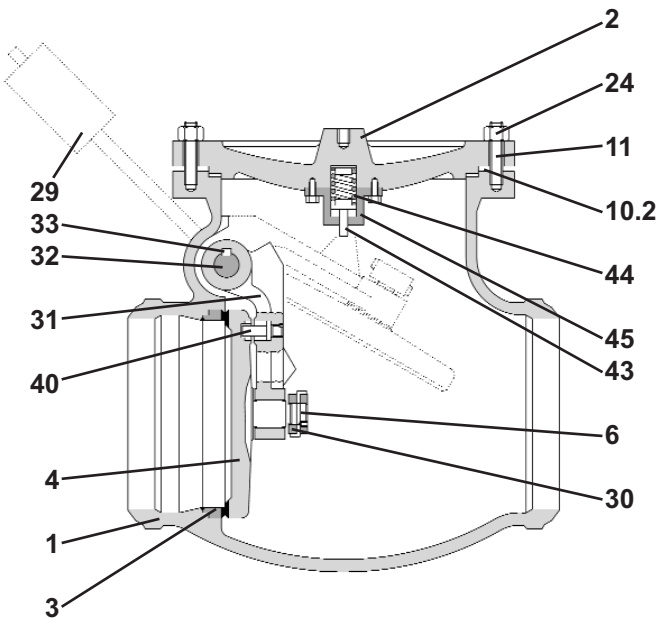
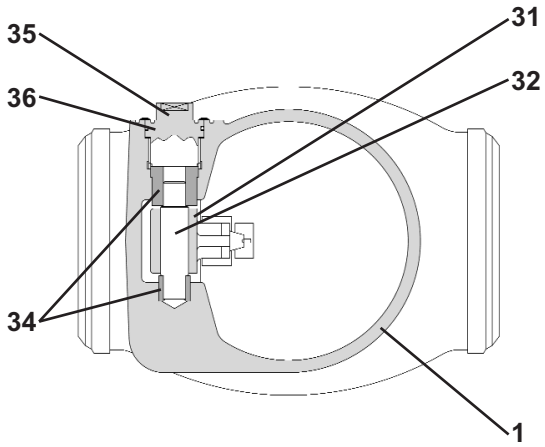


Fig. 270.3



CMI PASQUINI Check valves

Pressure Seal Bonnet type - Construction Details

ASME Class 600 - 900 - 1500 - 2500

Fig. 271.1

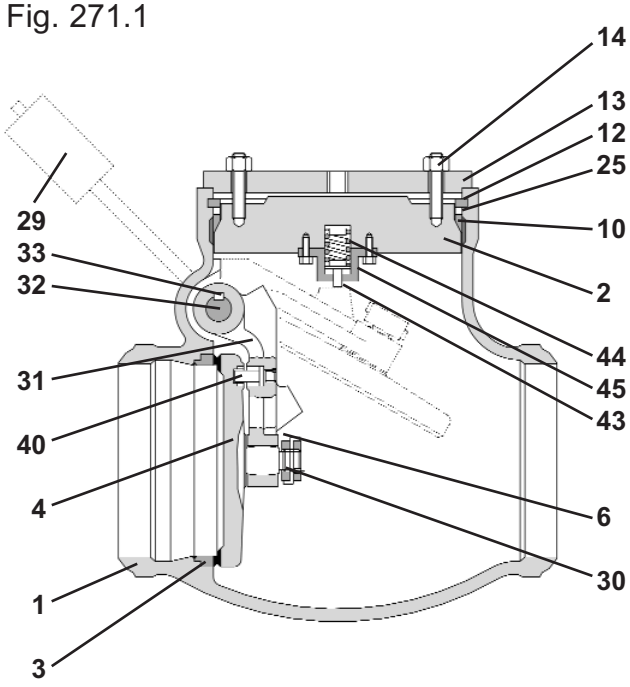
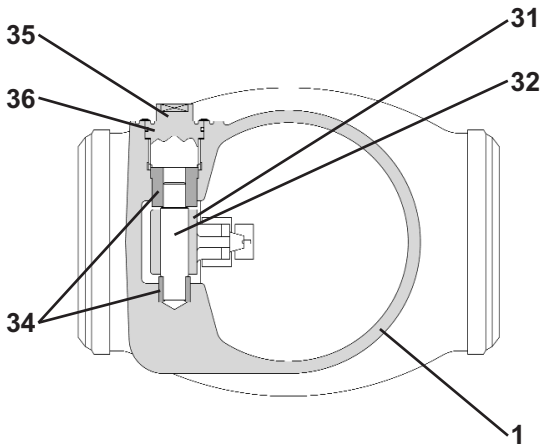


Fig. 271.3



1 - BODY

Available in Carbon steel and various alloy steels, usually a cast material.
Some sizes and classes can be supplied in forged material.
When the bonnet is pressure seal type (Fig. 271.1), a stainless steel inlay (26) on the body-gasket sealing area guarantees effective and long-life bonnet closure and sealing.
Final machining of seating and other surfaces in a single operation insures perfect alignment of all components.

2 - BONNET

Usually the same material as body. It can be:
- bolted to the body, or
- pressure seal type

In pressure seal bonnet type (Fig. 271.1) the bonnet (2) is pushed by the inner pressure against the pressure seal gasket (10) which is kept in place by the spacer ring (25) and the segmental ring (12).
Specially accurate are:
- easy beginning of pressure seal tightness,
- easy disassembling and reassembling.

3 - SEAT

In the Swing Disk check valves, seat hardfacing is applied on the seat-ring, then the seat ring is welded into the body.
In the Tilting Disk check valves, seat hardfacing is directly welded to the body. Note that tilting disk check valves have a conical mating between seat and disk.
Standard seat hardfacing consist of Stellite (other materials suitable on request), deposited with a highly specialised and automatic welding procedure.

Perfect design and manufacturing enables BONETTI's CMI Pasquini check valves to have a perfect sealing having a vertical seat (that is 90° positioned respect to the flow and to the body), whereas competitors need to incline the seat to obtain the same sealing result.

Seat vertical design of BONETTI's CMI check valves gives the following advantages:
- a very low flow is needed to move and open the disk, since it does not need to fight against its weight, as it happens in the presence of an inclined seat;
- the disk opening angle is wider;
- the valve has a real "straight-through" internal flow bore, reducing turbulence of flow during its passage.

Therefore the pressure drop is minimised, as the head loss in terms of "velocity head" or equivalent length in pipe diameters L/D, is half the value of the most common type of check valves that have the seat inclined and the downstream body some what contracted (see page 10).

4 - DISK

Of the same material as the body, depending on size it can be made of cast, forged or bar stock material. Standard seating surface area is integral Stellite (other materials suitable on request), deposited with a highly specialised automatic welding procedure.
In the swing-disk type, the disk is self-aligning thanks to a spherical joint connecting the disk to the hinge. In this way a perfect fitting of mating seat surfaces is obtained.
A special device (40) is fitted to prevent disk rotation.

31 - HINGE (ARM)

Of the same material as the body, depending on size it can be made of cast, forged or bar stock material.
Depending on operating conditions, to prevent hinge shock and hammering against the bonnet, a special anti-shock device (43-44-45) can be provided .
The right opening angle is assured by a stop device. We never allow the tip of the disk to be out of the steam flow, this prevents the disc clattering
A special counter-weight (29) applied to the shaft can also be provided, to smooth operation of hinge and disk.

32 - SHAFT (HINGE PIN)

Usually made of 13% Chrome stainless steel, heat treated to obtain the best mechanical features and to avoid seizing.

34 - SHAFT BUSHING

Usually of Stainless steel, and, depending on size and rating, it is heat treated or nitrited to minimise friction with shaft. Every seizing possibility is excluded.

39 - PACKING

When the valve is equipped with counterweight and or pneumatic actuator, the pin extrudes outside the body and its sealing is performed by a packing made of an adequate number of preformed rings of special quality pure graphite, suitable for high pressure and high temperature.
Other special packing materials are available on request.
The entire system (Packing - Packing chamber - Gland stud & flange - Gland studs) is very carefully designed and manufactured. It is as far as possible from fluid flow, for longer packing life.

Item No.	Component	Material for Material Code			
		CB	C6	C9	C12A
1	Body	A216 WCB	A217 WC6	A217 WC9	A217 C12A
2	Bonnet	A216 WCB / A105	A217 WC6 / A182 F11	A217 WC9 / A182 F22	A217 C12A
3	Seat Ring	A105 + Stellite	A182 F11 + Stellite	A182 F22 + Stellite	A182 F91 + Stellite
4	Disk	A216 WCB + Stellite	A217 WC6 + Stellite	A217 WC9 + Stellite	A217 C12A + Stellite
6	Disk/nut/pin/grub	A182 F304	A182 F304	A182 F304	A182 F304
8	Bushing	A182 F316 Nitrited	A182 F316 Nitrited	A182 F316 Nitrited	A182 F316 Nitrited
10	Pressure Seal Gasket	A182 F316	A182 F316	A182 F316	A182 F316
10.2	Body-Bonnet Seal Gasket	Graphite	Graphite	Graphite	Graphite
11	Body-Bonnet Bolt	A193 B7	A193 B7	A193 B7	A193 B7
12	Segmental Ring	AISI 420	AISI 420	AISI 420	AISI 420
13	Bonnet Flange	A105	A105	A105	A105
14	Bonnet Stud	A193 B7	A193 B7	A193 B7	A193 B7
24	Nut	A194 2H	A194 2H	A194 2H	A194 2H
25	Spacer Ring	A105	A105	A105	A105
29	counterweight	Carbon steel	Carbon steel	Carbon steel	Carbon steel
30	Disk Nut	AISI 304	AISI 304	AISI 304	AISI 304
31	Hinge	A216 WCB	A217 WC6	A217 WC9	A217 C12A
32	Hinge Pin	A182 F6	A182 F6	A182 F6	A182 F XM19
33	Pin Screw	AISI 304	AISI 304	AISI 304	AISI 304
34	Pin Bush	A182 F316	A182 F316	A182 F316	A182 F316
35	Pin Plug	A105	A182 F11	A182 F22	A182 F91
36	Gasket	Graphite	Graphite	Graphite	Graphite
40	Antirotation device	AISI 420	AISI 420	AISI 420	AISI 420
43	Pin	A182F6	A182F6	A182F6	A182F6
44	Spring	Stainless Steel	Stainless Steel	Stainless Steel	Stainless Steel
45	Cap	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel

Note: Material as above are indicated only as reference and could be different depending on operating conditions.
Counterweigth (29) and Antishock device (43-44-45) are delivered as standard on CMI Pneumatic Testable swing disk check valves (see at page 9 and 10) and can be delivered, as optional under request, on the others types of CMI swing disk check valves

CMI PASQUINI Check valves

Swing disk type - Bolted Bonnet

ASME Class 150 - Size from 4” up to 42”
ASME Class 300 - Size from 4” up to 42”
ASME Class 600 - Size from 4” up to 16”

Fig. 270.2

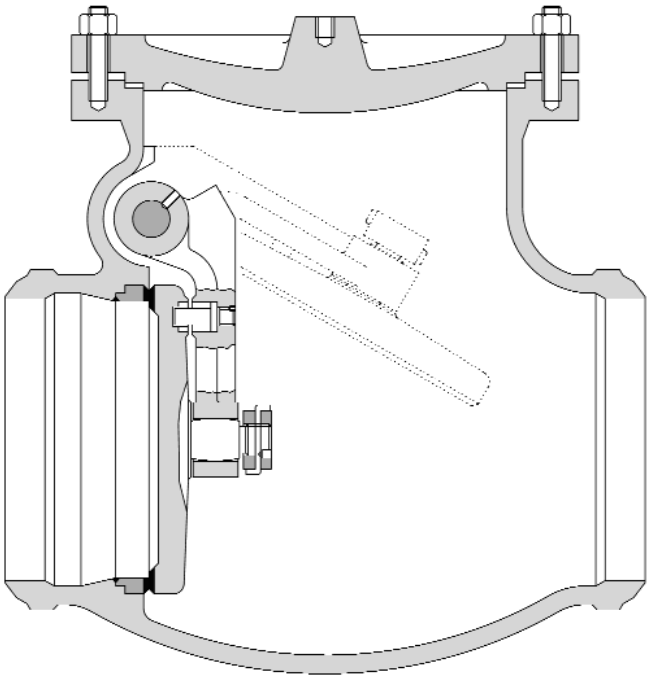
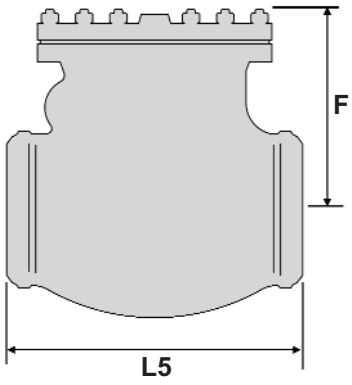


Fig. 270.4



SIZE		ASME 150			ASME 300			ASME 600		
		L5	F	Weight	L5	F	Weight	L5	F	Weight
mm	Inches	mm	mm	kg	mm	mm	kg	mm	mm	kg
100	4"	292	215	40	356	250	55	432	310	100
150	6"	356	260	70	444	380	150	559	350	200
200	8"	495	375	180	533	420	220	660	430	320
250	10"	622	420	220	622	430	320	787	475	450
300	12"	698	480	300	711	490	445	838	500	660
350	14"	787	500	410	838	510	500	889	560	900
400	16"	864	595	600	864	660	760	991	680	1050
450	18"	978	690	750	978	690	950			
500	20"	978	700	820	1016	690	1150			
600	24"	1295	725	1250	1346	730	1500			
650	26”	1295	745	1350	1346	760	1620			
750	30”	1524	950	3350	1594	950	3420			
800	32”	1524	960	3400	1594	960	3480			
850	34”	1524	980	3450	1594	980	3550			
900	36"	1580	1050	3800	1580	1050	3800			
1050	42"	1676	1150	6500	1676	1150	6500			

Material Codes currently manufactured are: CB, C6, C9, C12A, CF8M.

The relevant Ratings for each Material Code are shown at page 13, for the applicable Class.

Connections are usually as per BW ends - ASME B16.25
On request we can supply different BW ends (e.i. DIN) or flanged end valves to any required Standard, which are not listed in this catalogue.

Connection between Disk and Hinge is made by means of a spherical joint, for perfect fitting of mating seat surfaces.
On request the valve can be provided with anti-rotation device on disk, counterweight, shock absorber spring.

Notes:

1 Dimensions which are expressed in millimetres, but converted from original Standard in inches, are rounded.
2 Some components usually made of cast steel can be made of the corresponding forged steel.
3 Different connections available on request.
15 For ASME Class 600, body length L5 is stated according to ASME B16.10 Swing Check, Long Pattern.
For ASME Class 150 and 300 in sizes over 30” body length is according to CMI standard
20 The Weight listed in the table is not binding.

CMI PASQUINI Check valves

Swing disk type - Pressure Seal Bonnet

ASME Class 600 - Size from 6” up to 24”
ASME Class 900 - Size from 2.½” up to 24”
ASME Class 1500 - Size from 2.½” up to 24”
ASME Class 2500 - Size from 2.½” up to 20”

Fig. 271.2

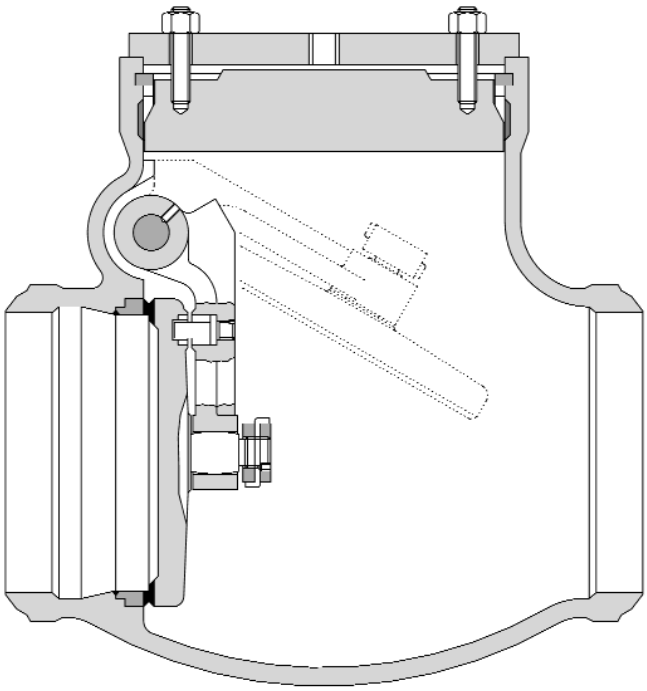
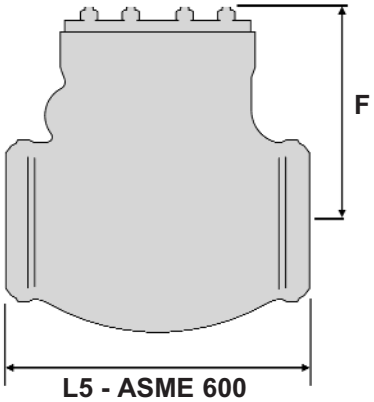


Fig. 271.4



L5 - ASME 600
L6 - ASME 900
L7 - ASME 1500
L8 - ASME 2500

SIZE		ASME 600			ASME 900			ASME 1500			ASME 2500		
		L5	F	Weight	L6	F	Weight	L7	F	Weight	L8	F	Weight
mm	Inches	mm	mm	kg	mm	mm	kg	mm	mm	kg	mm	mm	kg
65	2.1/2"				254	185	25	254	200	25	330	220	30
80	3"				305	185	30	305	200	30	368	220	40
100	4"				356	210	40	406	230	70	457	265	70
125	5"	559	255	90	508	280	110	559	310	160	610	360	205
150	6"	660	365	175	660	350	215	711	370	270	762	430	410
200	8"	787	375	300	787	410	335	864	425	470	914	495	625
250	10"	838	430	435	914	475	510	991	510	760	1041	560	1165
300	12"	889	480	535	991	520	680	1067	575	900	1118	685	2050
350	14"	991	550	825	1092	582	950	1194	660	1450	1245	685	2200
400	16"	1092	625	1205	1219	640	1380	1537	740	2550	1500	880	2350
450	18"	1194	820	1700	1321	685	1825	1664	830	2700	1550	900	2400
500	20"	1194	820	1730	1549	785	3065	1943	950	4250			
600	24"	1397	820	2560	1549	785	3065	1943	950	4250			

Material Codes currently manufactured are: CB, C6, C9, C12A, CF8M

The relevant Ratings for each Material Code are shown on page **, for the applicable Class.

Connections are usually made as per BW Ends - ASME B16.25
On request we can supply flanged end Valves to any required Standard, which are not listed in this catalogue.

Connection between Disk and Hinge is reached by means of a spherical joint, for perfect fitting of mating seat surfaces.
On request the valve can be provided with anti-rotation device on disk, counterweight, shock absorber spring.

Notes:

1 Dimensions which are expressed in millimetres, but converted from original Standard in inches, are rounded.
2 Some components usually made of cast steel can be made of the corresponding forged steel.
3 Different connections available on request.
15 For ASME Class 600, Body Length L5 is stated according to ASME B16.10 Swing Check as follows:
- short pattern up to 12” (DN 300);
- regular pattern from 14” (DN 350) up to 24” (DN 600)..
16 For ASME Class 900, Body Length L6 is stated according to ASME B16.10, Swing Check as follows:
- Short Pattern up to 16" (DN 400)
- Regular Pattern from 18" (DN 450)up to 24" (DN 600).
17 For ASME Class 1500 and 2500, Body Length L7 is stated according to ASME B16.10 Swing Check, Short Pattern or CMI standard from 14” (DN 350) up to 24” (DN 600).
20 The Weight listed in the table is not binding.

CMI PASQUINI Check valves

Tilting disk type - Pressure Seal Bonnet

ASME Class 600 - Size from 6” up to 24”
ASME Class 900 - Size from 2.½” up to 24”
ASME Class 1500 - Size from 2.½” up to 18”
ASME Class 2500 - Size from 4” up to 12”

Fig. 281.1

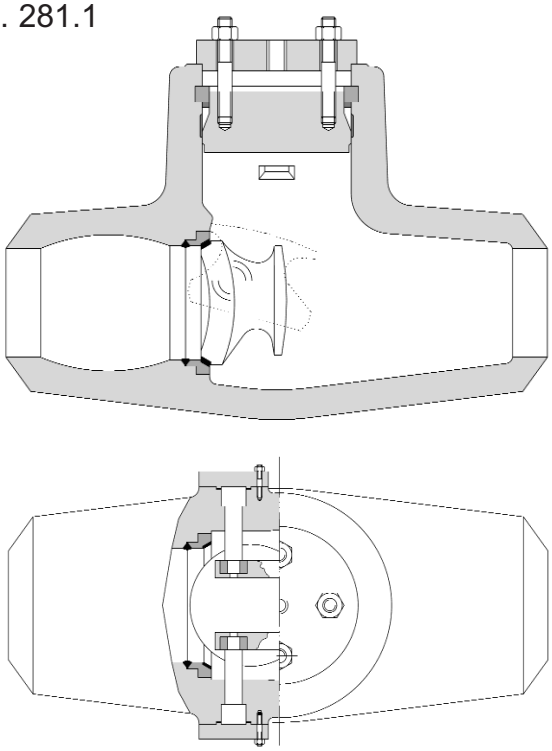
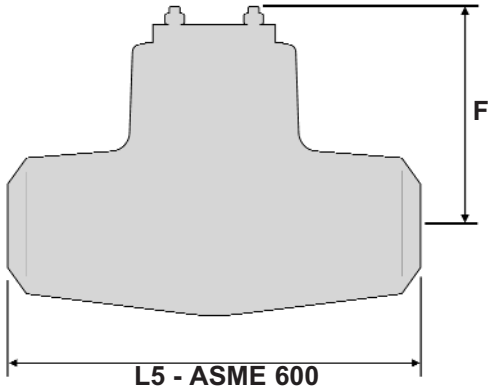


Fig. 281.4



L5 - ASME 600
L6 - ASME 900
L7 - ASME 1500
L8 - ASME 2500

SIZE		ASME 600			ASME 900			ASME 1500			ASME 2500		
		L5	F	Weight	L6	F	Weight	L7	F	Weight	L8	F	Weight
mm	Inches	mm	mm	kg	mm	mm	kg	mm	mm	kg	mm	mm	kg
65	2.1/2"				254	180	45	254	180	45			
80	3"				305	180	50	305	180	50			
100	4"				356	185	55	406	195	60	457	200	70
150	6"	559	230	110	508	255	130	559	265	150	610	285	205
200	8"	660	290	225	660	295	235	711	300	245	762	315	370
250	10"	787	340	400	787	350	420	864	365	435	914	395	550
300	12"	838	395	630	914	405	650	981	435	700	1041	450	1000
350	14"	889	430	680	991	445	700	1067	490	750			
400	16"	991	495	1150	1092	515	1400	1194	550	1500			
450	18"	1092	550	1600	1219	565	1660	1537	615	1850			
500	20"	1194	590	1950	1321	605	2150						
600	24"	1397	670	3000	1549	675	4500						

Material Codes currently manufactured are: CB, C6, C9, C12A, CF8M. The relevant Ratings for each Material Code are shown on page **, for relevant Class.

Connections are usually manufactured as per BW Ends - ASME B16.25 (Fig. 281 - 282 - 283 - 284).
On request we can supply flanged end valves to any required Standard, which are not listed in this catalogue.

In comparison to the more familiar Swing Check, the Tilting Disk Valve design, presents the following in-built advantages:

A **Quick Closing** - To minimise the pendulum period during closure, and consequently to reduce also the "loud" slamming and vibrations produced by the flow inversion, the disk pivot is located close to the disk centre of gravity.

B **Tight and Reliable Sealing** - The disk shape is designed with an integral counterweight which alone assures the reliable seating of the disk when the valve is installed in either a vertical or horizontal position. The hard-faced conical surfaces mating of the disk and seat guarantee the proper tight sealing enhanced by the fluid counterflow pressure.

C **Noiseless Operation and Duration** - Damaging slamming of disk and vibration noises are highly reduced, in fact for a large flow range the disk remains in the fully open position. Therefore the pivot wear due to friction is largely reduced and the valve life span is increased. Furthermore no screw or threaded parts are located inside the valve or exposed to the fluid passage.

Notes:

1 Dimensions expressed in millimetre, but converted from original Standard in inches, are rounded.
2 Some components usually made of cast steel can be made of the corresponding forged steel.
3 Different connections available on request.
15 For ASME Class 600, Body Length L5 is stated according to ASME B16.10 Swing Check, Regular Pattern.
18 For ASME Class 900, Body Length L6 is stated according to ASME B16.10, Swing Check as follows:
- Short Pattern up to 16" (DN 400)
- Regular Pattern from 18" (DN 450)up to 24" (DN 600).
17 For ASME Class 1500 and 2500, Body Length L7 is stated according to ASME B16.10 Swing Check, Short Pattern or CMI standard from 14” (DN 350) up to 24” (DN 600).

20 The Weight listed in the table is not binding.

CMI PASQUINI Power Actuated check valves with Pneumatic Actuator

Swing disk type - Testable valves

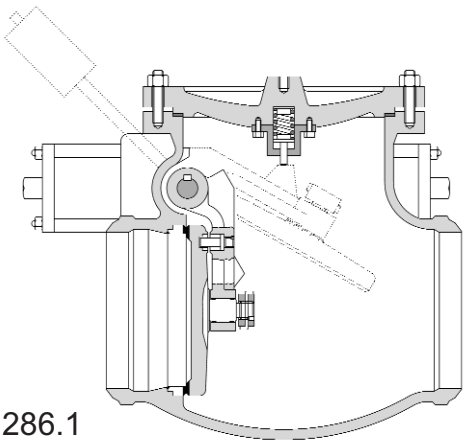


Fig. 286.1

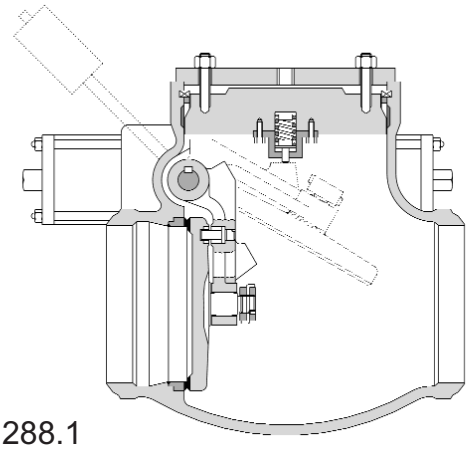


Fig. 288.1

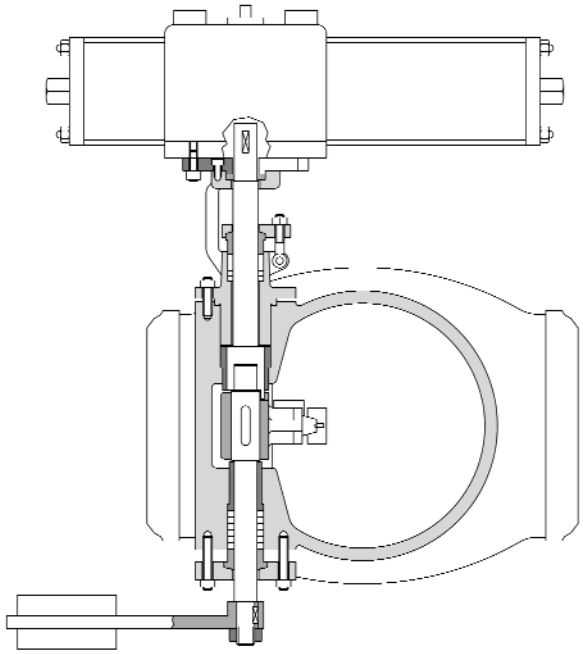


Fig. 289

OPERATION

These special type of swing-disk check valves are usually installed on the turbine steam bleeding lines of the feedwater preheating stages of modern power station cycles. The main function is the quick shut off of the bleeding steam pipes, in case of loss of turbine load, to prevent the dangerous water carry-over from the preheater back to the turbine.

Usually the actuator is composed of a pneumatic cylinder with a single effect piston, counterbalanced by a spring.

The actuator is mounted on one side of the swing check valve body and connected to the valve disk by means of a shaft.

The actuator air pressure range is typically between 4 and 11 bar.

Under manual operation conditions, compressed air is fed in the cylinder to load the spring and the check valve is free to operate automatically in conventional way.

In the upset or emergency condition of the turbine the compressed air is vented, the spring is free to extend inside the cylinder and the actuator piston rotates the valve disk to intercept the steam bleeding pipe. The main function of the spring is to overrun the starting friction on the packing and pivot bearings.

Besides the usual optionals, we can supply also valves with:
- antirotating, antioscillating feature;
- damping device on the shaft operating the valve disk;
- three-way valve (to be installed on the compressed air feed line) manually operated by a spring loaded lever (the spring is needed to run back the lever in the valve closed position) to test during maintenance the operation of the check valve and actuator;
- microswitches on the actuator for the indication of:
  - check valve open during normal operation,
  - check valve closed.

CONTROL CIRCUIT

Control Circuit could be different depending on application. Please apply to our sale or technical department if you need to obtain more information about the control circuit.

RATING and SIZES

Rating and sizes usually manufactured are:
- **ASME Class 150 Bolted Bonnet**
  Sizes 4" to 42" (DN 100 to 1050)
- **ASME Class 300 Bolted Bonnet**
  Sizes 4" to 42" (DN 100 to 1050)
- **ASME Class 600 Pressure Seal Bonnet**
  Sizes 4" to 20" (DN 100 to 500)
- **ASME Class 600 Bolted Bonnet**
  Sizes 4" to 16" (DN 100 to 400)
- **ASME Class 1500 Pressure Seal Bonnet**
  Sizes 4" to 12" (DN 100 to 300)
- **ASME Class 2500 (PN 420) Pressure Seal Bonnet**
  Sizes 4" to 8" (DN 100 to 200)

CONNECTIONS, MATERIAL CODE and STANDARDS

Applied connections, Material Codes and Standards for design, rating, manufacturing, inspecting are the same as all C M I Valves (see at page 5).

DIMENSION and WEIGHT

As dimensions and weight of the system valve+actuator are dependent on the operating and design conditions, they will be communicated to the Client under request.
Valve end to end available dimensions are those of ASME B16.10 Swing Check: Regular or Short Pattern.

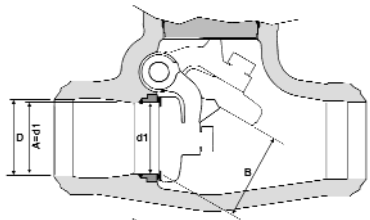
CMI PASQUINI Pneumatic check valves - Technical notes

1 - INTRODUCTION

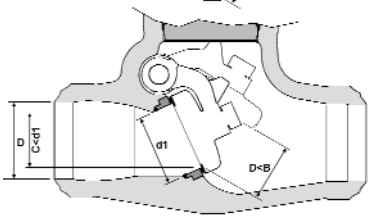
A well known fact among turbine manufacturers and power utilities is that excessive overspeed of a turbine-generator shaft can be disastrous, a lesser known fact is that energy contained in the fedewater heaters of a steam power cycle is often sufficient to take turbine to overspeed. This energy in the steam is contained in the turbine extraction piping ("bleeding" lines), in the water is contained in the heater shell and in the metal parts.
After a load rejection, the steam admission valves will close causing the pressure of steam, already in the turbine, to decay.
This decay allows the steam in the extraction piping and heater shell to flow back into turbine giving its energy back to turbine rotor.
Therefore, immediately after an electrical load rejection or turbine trip, this steam flow inversion must be prevented by some mean. The most common of which is by the use of Pneumatic Operated Testable Check Valves.
The pneumatic actuators that control the swing check valves, installed on the turbines bleeding lines, are single effect type: air to open/spring to close.
During the normal operation the actuator spring is compressed by the air feeding the actuator piston.
In the need of a fast and effective check valve closure, the air is dumped from the lower chamber of the piston and the spring does extend.
Through a system of a fork-lever-control shaft or with a rotative actuator a torque is transmitted to the swing arm, sufficient to close the valve disc against its seat.
The linear or rotating movement impressed to the piston by the actuator spring is transformed into a rotating movement by the "claw-clutch" operation of the lever onto the valve lever control shaft.
When the actuator spring is free to extend, for closing the valve, the lever control shaft does not immediately engage on to the swing arm but for a 5° angular rotation, being free to move, accumulates kinetic energy so that the rotation is transferred to the swing arm in an impulsive way like an hammer blow.
Such an impulse make sure to overcome any static friction not only due to the contacts between the various valve components but also any other friction derived from the oxidation of parts.
Due to such unknowns the force that the spring must exert, is usually sized by BONETTI's CMI check valve to overcome the known friction forces by a factor of 4.
To reduce the friction forces we usually install, as packing, pure commercial graphite rings.
When it is specifically necessary to reduce the pressure drop, the angular opening of the swing disc is increased.
For such reason a counterweight is installed on the arm pin on the side opposite to the actuator. In this case the check valve swing arm is no longer free to rotate respect to the arm pin but instead is keyed on to it.
In the latter case the arm pin, protruding outside the valve body, needs to be sealed.
Pure commercial graphite rings are used in the stuffing box.

2 - DESIGN BASIC CRITERIA

The disc seat of BONETTI's CMI check valves are positioned at 90° respect to the steam flow and the body, afterwards the seat, is bulged to allow a sufficient pressure recovery which ensures a low overall pressure drop.



BONETTI's CMI Pasquini
Swing check valve
with 90° seat



Swing check valve
with inclined seat

BONETTI's CMI check valves: $K = 50 \cdot f/t$
other inclined seat check valves: $K = 100 \cdot f$
where: K = resistance coefficient; f = friction factor in zone of complete turbulence = t

Therefore with the BONETTI's CMI Pneumatic Operated Testable Check Valves, the resistance coefficient K, which indicates the head losses in terms of "velocity head" or equivalent length in pipe diameters L/D, that will cause the same head loss as the valve, is half the value of the most common type of check valves with the seat inclined and the body downward more or less contracted.

2.1 Features

a) The design of the pneumatic check valves is done on the basis of the standards and the experiences of our company; in particular, the optimization of the building parameters of the internal parts is performed to obtain the pressure drops required by your data sheets, respecting the characteristics of mechanical resistance in according to the rating classes.
b) It is assured that the compression of the actuator spring gives a torque, including a safety margin, applicable on the shaft of the clapet suitable to overcome any possible friction which could prevent the valve closing when the flow rate is null.
c) Flow variations during service may suddenly open the valve and subsequently the valve is subject to several heavy impacts. The use of a damping device allows to absorb through the spring part of the inertia of rotating messes and the rest is discharged on the body, so that the arm-pin is not subject to heavy stresses. Such damping device consists of a bonnet and a cap, a guided pin in the bonnet and a spring. The pin is dimensioned in such a way that the arm/disk assembly is stopped a few degrees before the body-stop. The pin moves when the arm/disk assembly thrust is higher than the reaction of the spring.
Following the recommendations of EPRI we never allow the tip of the disk to be out of the steam flow, this prevents the disc clattering.

2.2 Functional calculation

According to the procedure in use in our Company the functional calculation of the check valves has been performed as follows:
- the opening angle of the clapet is calculated, without counterweight, at the nominal conditions indicated on the data sheets.
- the CV value and the pressure drop is checked. In case that the pressure drop exceeded the value requested by the Customer the previous points are repeated taking into consideration the counterweight effect.
To perform the calculations a special BONETTI's CMI software is used.

2.3 Pressure Drop Calculation.

The pressure drop calculation of the BONETTI's CMI check valves is performed according to the following procedure:
a) The clapet opening angle is assessed by the rotational equation of equilibrium, around the valve arm pin, due to the dynamic effect of the steam flow on the bleeding line against the resisting torque due to the weight of disc and arm.
The calculation is usually performed at the MCR conditions indicated by the Client in the Valve Data Sheet.
b) Knowing the clapet opening angle it is possible to assess the valve CV and, therefore, the pressure drop on the valve.
Due notice is taken of those valves on which the pressure drop is higher than the value admitted by the Client specification.
c) If the Client Specification allows the use of counterweight the value necessary to increase the opening of the clapet is assessed.
On the contrary, only two possibilities are left: either to restrict the valve seating port (down to a minimum but not lower than 90% of the full port).
d) The clapet opening angle is recalculated taking into due account the effect of the counterweight.
e) Finally the pressure drop is recalculated reiterating the above procedure steps.

2.4 Pneumatic Actuator Sizing

The calculation of the pneumatic actuator has been performed by means of a dedicated software program.
Assumed inputs are:
a) the stuffing box (or boxes, in the case of counterweighted valve) geometrical dimensions;
b) the 110% of the operating pressure;
c) the friction factors on the: Packing / Control Lever Shaft-Arm Pin, Inner Bushing and Outer Radial Bearing;
d) the actuator torque, when the spring is compressed (and the clapet is free to rotate), and the actuator stroke are defined.
The value of the safety factor considered in our calculations, with compressed spring, is 4 minimum: the value of the working pressure is lower than the test pressure, therefore the torque due to the stuffing box is actually much lower.

3 - CONCLUSION

The reliability of BONETTI's CMI-Pasquini Pneumatic Operated Testable Check Valves originates from:
- examination in details of the selection of the materials utilised for the different parts of the valve
- design of the body pattern that, due to its higher recovery factor respect to the other pattern more tapered after the seat zone, guarantees a lower pressure drop of about 50%.
This assertion is supported by the pressure drop valves and the minimum velocity value to completely open the clapet which are shown by the CRANE's book "Flow of Fluids Tech Paper" of fluid for which refer.

The reliability of our Pneumatic Operated Testable Check Valves can be also verified from the high number of the valves under operation, from the long period of operation without maintenance (please contact us to obtain our References List).

MATERIALS

Material		ASTM A216WCB	ASTM A217WC6	ASTM A217WC9	ASTM A351CF8M	ASTM A217C12A	Stellite Gr.6	ASTM A479 T.410C.3	ASTM A193B7	ASTM A182 F XM 19	ASTM A1942H	ASTM B150 C62300	ASTM B166 N06600	ASTM A182F6	ASTM A564T.630 Cond.H1075	ASTM A453 Gr. 660
Chemical Analysis		(Note 1)														
Carbon	%	0.35 max	0.10-0.20	0.15 max	0.08 max	0.08-0.12	1	0.13 max	0.38-0.48	0.06 max	0.40 max		0.15 max	0.15 max	0,07	0.08 max
Manganese	%	0.60-105	0.30-0.80	0.30-0.60	2.00 max	0.30-0.60		1.00 max	0.75-1.00	4.0-6.0		0.5 max	1.0 max	1.00 max	1.0 max	2.00 max
Phosphorus	%	0.04 max	0.04 max	0.04 max	0.04 max	0.02 max		0.04 max	0.04 max	0.04 max	0.04 max			0.04 max	0.04 max	0.040 max
Sulphur	%	0.05 max	0.04 max	0.04 max	0.03 max	0.01 max		0.03 max	0.04 max	0.03 max	0.05 max		0.015 max	0.30 max	0.03 max	0.030 max
Silicon	%	0.35 max	0.5-1.0	0.5 max	1.00 max	0.20-0.50		1.00 max	0.20-0.35	1.00 max		0.25 max	0.5 max	1.00 max	1.0 max	1.00 max
Chromium	%		1.0-1.5	2.0-2.5	16.00-18.00	8.00-9.50	28	11.5-13.5	0.80-1.10	20.5-23.5			14.0-17.0	11.5-13.5	15.0-17.5	13.5-16.0
Nickel	%				10.00-14.00	0.40 max		0.50 max		11.5-13.5		1.0 max	72 min+Co	0.50 max	3.0-5.0	24.0-27.0
Molybdenum	%		0.44-0.65	0.87-1.13	2.00-3.00	0.85-1.05			0.15-0.25	1.5-3.0					1.2-2.0	1.0-1.5
Copper	%											82.2 min	0.50 max		3.0-5.0	
Aluminium	%											8.5-10.0				0.35 max
Iron	%											2.0-4.0	6.0-10.0			
Cobalt	%						66									
Tungsten	%						5									
Titanium	%															1.90-2.35
Columbium	%									0.10-0.30						
Mechanical features								(Note 2)				(Note 2)	(Note 2)			
Tensile Strength	psi	70000	70000	75000	75000	85000		130000	125000	100000		78000	155000	110000	145000	130000
	MPa	485	485	515	515	585		900	860	690		542	1.069	760	1000	895
Yield Strength	psi	36000	40000	45000	30000	60000		100000	105000	55000		32000	90000	85000	125000	85000
	MPa	250	275	310	205	415		690	720	380		221	620	585	862	585
Elongation on 2"	%min	22	20	20	30	20		12	16	35		15	10	15	13	15

Notes for Materials
(Those Notes apply also to Rating Tables on pag. 30)

Chemical Analysis and Mechanical Features are given for Customer's convenience only. Actual and binding values are the ones specified by original Standard

1 We also utilise steel with lower Carbon content (≤ 0,25%).

2 Mechanical features depend on heat treatment.
Prescribed heat treatment permits us to obtain the most suitable physical and chemical characteristics.

Notes for Rating
(Those Notes apply also to Rating Tables on pag. 13)

3 Ratings of Tables on page 13 are those indicated by ASME B 16.34 for Classes 600, 900, 1500, 2500

4 Due to a possible transformation of carbide into graphite, ASME B 16.34 does not recommend the use of Carbon steel valves (CMI-BONETTI material Code "CB") over 425 °C (800 °F) for extended periods.

5 For A217 WC6 and A217 WC9 valves (CMI-BONETTI material Code "C6" and "C9"), ASME B 16.34 recommends:
"*Use normalised and tempered material only - Not to be used over 595 °C (1100 °F)".*

6 At temperatures above 538 °C (1000 °F), material A351 CF8M (CMI-BONETTI material Code CF8M), must be used only when the Carbon content is 0.04% or higher.

7 As BONETTI's CMI PASQUINI valves are oversized versus International Standard requirements, including ASME B16.34, effective maximum operating condition can be communicated on request.

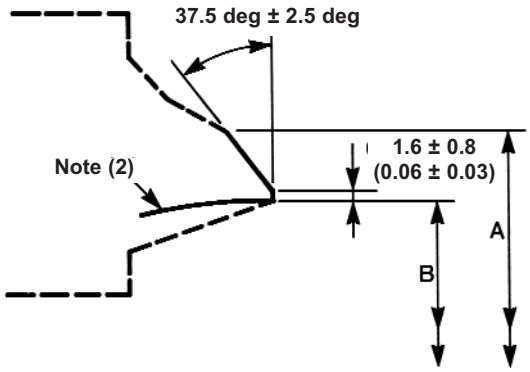


Fig. 107 Welding end detail for joint without backing ring for use on 22 mm (0.88 in.) and thinner nominal wall thickness.

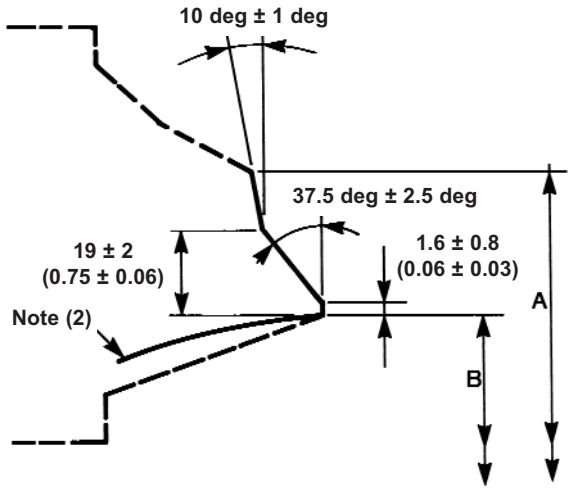


Fig. 108 Welding end detail for joint without backing ring for use on nominal wall thickness greater than 22 mm (0.88 in.).

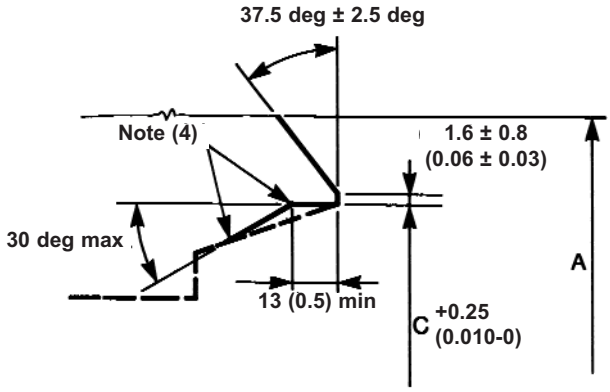


Fig. 109 Welding end detail for joint using continuous rectangular backing ring.

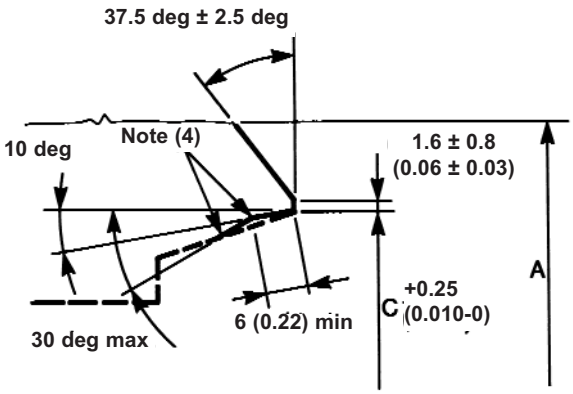


Fig. 110 Welding end detail for joint using continuous tapered backing ring.

Notes

1 Dotted lines denote maximum envelope for transition from welding bevel and root face into body of component.

2 Contour within the envelope is manufacturer's option unless otherwise specified by the Customer.

3 See ASME B16.25 Section 5 for tolerances other than those given in these figures.

4 Intersections should be slightly rounded.

5 Linear dimensions are in inches with metric values shown in millimetres in parenthesis.

6 All dimensions given in this page are for Customer's convenience only. Actual and binding values are the ones prescribed by original Standard.

Legenda

A = Nominal outside diameter of component at welding end, for cast steel valve.
B = Inside diameter at welding end.
C = Inside diameter at welding end, using backing ring.
t = Nominal wall thickness of the pipe.

RATING (See Notes on page 11)

Metrical Units

Operating Temperature °C	Max Operating Pressure (bar) ASME Class 150 Material Code					Max Operating Pressure (bar) ASME Class 300 Material Code					Max Operating Pressure (bar) ASME Class 600 Material Code					Max Operating Pressure (bar) ASME Class 900 Material Code					Max Operating Pressure (bar) ASME Class 1500 Material Code					Max Operating Pressure (bar) ASME Class 2500 Material Code					Max Operating Pressure (bar) ASME Class 4500 Material Code				
	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A
-29 +38	19,6	19,8	19,8	19,8	20,0	51,1	51,7	51,7	51,7	51,7	102,1	103,4	103,4	99,3	99,3	153,2	155,1	155,1	148,9	155,1	255,3	258,6	258,6	248,2	258,6	425,5	430,9	430,9	413,7	430,9	765,9	775,7	775,7	744,6	775,7
50	19,2	19,5	19,5	19,5	19,5	50,1	51,7	51,7	50,8	51,7	102,1	103,4	103,4	96,2	103,4	150,4	155,1	155,1	144,3	155,1	250,6	258,6	258,6	240,6	258,6	417,7	430,9	430,9	400,9	430,9	751,9	775,7	775,7	721,7	775,7
100	17,7	17,7	17,7	18,1	17,7	46,6	51,5	51,5	47,1	51,5	100,2	103,4	103,4	84,4	103,4	139,8	154,4	154,6	126,6	154,6	233,0	257,4	257,6	211,0	257,6	388,3	429,0	429,4	351,6	429,4	699,0	772,2	773,0	632,9	773,0
150	15,8	15,8	15,8	16,5	15,8	45,1	49,7	50,3	43,0	50,3	93,2	103,0	103,0	77,0	103,0	135,2	149,2	150,6	115,5	150,6	225,4	248,7	250,8	192,5	250,8	375,6	414,5	418,2	320,8	418,2	676,1	746,2	752,8	577,4	752,8
200	13,8	13,8	13,8	15,3	13,8	43,8	48,0	48,6	39,8	48,6	90,2	99,5	100,3	71,3	100,3	131,4	143,9	145,8	107,0	145,8	219,0	239,8	243,4	178,3	243,4	365,0	399,6	405,4	297,2	405,4	657,0	719,4	729,8	534,9	729,8
250	12,1	12,1	12,1	14,3	12,1	41,9	46,3	46,3	37,3	46,3	87,6	95,9	97,2	66,8	97,2	125,8	139,0	139,0	100,1	139,0	209,7	231,8	231,8	166,9	231,8	349,5	386,2	386,2	278,1	386,2	629,1	694,8	694,8	500,6	694,8
300	10,2	10,2	10,2	13,5	10,2	39,8	42,9	42,9	35,3	42,9	83,9	92,7	92,7	63,2	92,7	119,5	128,6	128,6	94,9	128,6	199,1	214,4	214,4	158,1	214,4	331,8	357,1	357,1	263,5	357,1	597,3	642,6	642,6	474,3	642,6
350	9,3	9,3	9,3	13,2	9,3	38,7	41,4	41,4	34,5	41,4	79,6	85,7	85,7	61,8	85,7	116,1	124,0	124,0	92,7	124,0	193,6	206,6	206,6	154,4	206,6	322,6	344,3	344,3	257,4	344,3	580,7	619,6	619,6	463,3	619,6
375	8,4	8,4	8,4	13,0	8,4	37,6	40,3	40,3	33,8	40,3	77,4	82,6	82,6	60,7	82,6	112,7	120,7	120,7	91,0	120,7	187,8	201,1	201,1	151,6	201,1	313,0	335,3	335,3	252,7	335,3	563,5	603,3	603,3	454,9	603,3
400	7,4	7,4	7,4	12,8	7,4	36,4	38,9	38,9	33,3	38,9	75,1	80,4	80,4	59,8	80,4	109,1	116,5	116,5	89,6	116,5	181,8	194,1	194,1	149,4	194,1	303,1	323,2	323,2	249,0	323,2	545,5	581,8	581,8	448,2	581,8
425	6,5	6,5	6,5	12,6	6,5	34,7	36,5	36,5	32,9	36,5	72,7	77,6	77,6	58,9	77,6	104,2	109,8	109,8	88,3	109,8	173,6	183,1	183,1	147,2	183,1	289,3	304,9	304,9	245,3	304,9	520,8	548,5	548,5	441,6	548,5
450	5,5	5,5	5,5	12,5	5,5	28,8	35,2	35,2	32,5	35,2	69,4	73,3	73,3	58,3	73,3	86,3	105,1	105,1	87,4	105,1	143,8	175,1	175,1	145,7	175,1	239,7	291,6	291,6	242,9	291,6	431,5	524,7	524,7	437,1	524,7
475	4,6	4,6	4,6	12,3	4,6	23,0	33,7	33,7	32,2	33,7	57,5	70,0	70,0	57,7	70,0	69,0	101,4	101,4	86,5	101,4	115,0	169,0	169,0	144,2	169,0	191,7	281,8	281,8	240,4	281,8	345,1	507,0	507,0	432,7	507,0
500	3,7	3,7	3,7	12,3	3,7	17,4	31,7	31,7	32,0	31,7	46,0	67,7	67,7	57,3	67,7	52,3	95,1	95,1	86,0	95,1	87,2	158,2	158,2	143,4	158,2	145,3	263,9	263,9	238,9	263,9	261,5	474,8	474,8	430,1	474,8
525	2,8	2,8	2,8	12,2	2,8	11,8	25,7	28,2	31,7	28,2	34,9	63,4	63,4	56,5	63,4	35,3	77,2	84,7	84,7	84,7	58,8	128,6	140,9	140,9	140,9	97,9	214,4	235,0	235,0	235,0	176,3	385,9	423,0	423,0	423,0
538	1,4	1,4	1,4	11,0	1,4	5,9	14,9	18,4	29,0	25,2	23,5	51,5	56,5	50,0	56,5	17,7	44,7	55,3	75,2	75,2	29,5	74,5	92,2	125,5	125,5	49,2	124,1	153,7	208,9	208,9	88,6	223,4	276,6	375,8	375,8
550		1,4	1,4	11,0	1,4		12,7	15,6	29,0	25,0	11,8	29,8	36,9	49,8	50,0		38,1	46,9	74,8	74,8		63,5	78,2	124,9	124,9		105,9	130,3	208,0	208,0		190,6	234,5	374,2	374,2
575		1,4	1,4	10,9	1,4		8,8	10,5	28,6	24,0		25,4	31,3	47,9	49,8		26,4	31,6	71,8	71,8		44,0	52,6	119,7	119,7		73,4	87,7	199,5	199,5		132,0	157,9	359,1	359,1
600		1,4	1,4	9,5	1,4		6,1	6,9	24,9	19,5		17,6	21,1	39,8	47,9		18,3	20,7	59,7	58,5		30,5	34,4	99,5	97,5		50,9	57,4	165,9	162,5		91,6	103,3	298,6	292,5
625		1,4	1,4	7,6	1,4		4,3	4,5	19,8	14,6		12,2	13,8	31,6	39,0		12,8	13,4	47,4	43,8		21,3	22,3	79,1	73,0		35,5	37,2	131,8	121,6		63,9	66,9	237,2	219,1
650		1,1	1,1	6,1	1,4		2,8	2,8	15,8	9,9		8,5	8,9	25,3	29,2		8,5	8,5	38,0	29,8		14,2	14,2	63,3	49,6		23,6	23,6	105,5	82,7		42,6	42,6	189,9	148,9
675				4,9					12,9			5,7	5,7	20,6	19,9				31,0					51,6					86,0					154,8	
700				4,4					11,4					16,8					25,1					41,9					69,8					125,7	
725				3,7					9,5					14,0					21,0					34,9					58,2					104,8	
750				2,8					7,4					11,7					17,6					29,3					48,9					87,9	
775				2,2					5,8					9,0					13,7					22,8					38,0					68,4	
800				1,8					4,4					7,0					10,5					17,4					29,2					52,6	
816				1,4					3,4					5,9					8,6					14,1					23,8					42,7	
	Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6	

Hydrostatic Testing Pressure (bar)

Shell	29,4	29,7	29,7	29,7	30,0	76,7	77,6	77,6	77,6	77,6	153,2	155,1	155,1	149,0	155,1	229,8	232,7	232,7	223,4	232,7	383,0	387,9	387,9	372,3	387,9	638,3	646,4	646,4	620,6	646,4	1148,9	1163,6	1163,6	1116,9	1163,6
Seat	21,6	21,8	21,8	21,8	22,0	56,2	56,9	56,9	56,9	56,9	112,3	113,7	113,7	109,2	113,7	168,5	170,6	170,6	163,8	170,6	280,8	284,5	284,5	273,0	284,5	468,1	474,0	474,0	455,1	474,0	842,5	853,3	853,3	819,1	853,3

RATING (See Notes on page 11)

English Units

Operating Temperature °F	Max Operating Pressure (psi) ASME Class 150 Material Code					Max Operating Pressure (psi) ASME Class 300 Material Code					Max Operating Pressure (psi) ASME Class 600 Material Code					Max Operating Pressure (psi) ASME Class 900 Material Code					Max Operating Pressure (psi) ASME Class 1500 Material Code					Max Operating Pressure (psi) ASME Class 2500 Material Code					Max Operating Pressure (psi) ASME Class 4500 Material Code				
	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A	CB	C6	C9	CF8M	C12A
-20 +100	285	290	290	275	290	740	750	750	720	750	1480	1500	1500	1440	1500	2220	2250	2250	2160	2250	3705	3750	3750	3600	3750	6170	6250	6250	6000	6250	11110	11250	11250	10800	11250
200	260	260	260	235	260	680	750	750	620	750	1360	1500	1500	1240	1500	2035	2250	2250	1860	2250	3395	3750	3750	3095	3750	5655	6250	6250	5160	6250	10185	11250	11250	9290	11250
300	230	230	230	215	230	655	720	730	560	730	1310	1445	1455	1120	1455	1965	2165	2185	1680	2185	3270	3610	3640	2795	3640	5450	6015	6070	4660	6070	9815	10830	10925	8390	10925
400	200	200	200	195	200	635	695	705	515	705	1265	1385	1410	1025	1410	1900	2080	2115	1540	2115	3170	3465	3530	2570	3530	5280	5775	5880	4280	5880	9505	10400	10585	7705	10585
500	170	170	170	170	170	605	665	665	480	665	1205	1330	1330	955	1330	1810	1995	1995	1435	1995	3015	3325	3325	2390	3325	5025	5540	5540	3980	5540	9040	9965	9965	7165	9965
600	140	140	140	140	140	570	605	605	450	605	1135	1210	1210	900	1210	1705	1815	1815	1355	1815	2840	3025	3025	2255	3025	4730	5040	5040	3760	5040	8515	9070	9070	6770	9070
650	125	125	125	125	125	550	590	590	440	590	1100	1175	1175	890	1175	1650	1765	1765	1330	1765	2745	2940	2940	2220	2940	4575	4905	4905	3700	4905	8240	8825	8825	6660	8825
700	110	110	110	110	110	530	570	570	435	570	1060	1135	1135	870	1135	1590	1705	1705	1305	1705	2665	2840	2840	2170	2840	4425	4730	4730	3620	4730	7960	8515	8515	6515	8515
750	95	95	95	95	95	505	530	530	425	530	1015	1065	1065	855	1065	1520	1595	1595	1280	1595	2535	2660	2660	2135	2660	4230	4430	4430	3560	4430	7610	7970	7970	6410	7970
800	80	80	80	80	80	410	510	510	420	510	825	1015	1015	845	1015	1235	1525	1525	1265	1525	2055	2540	2540	2110	2540	3430	4230	4230	3520	4230	6170	7610	7610	6335	7610
850	65	65	65	65	65	320	485	485	420	485	640	975	975	835	975	955	1460	1460	1255	1460	1595	2435	2435	2090	2435	2655	4060	4060	3480	4060	4785	7305	7305	6265	7305
900	50	50	50	50	50	230	450	450	415	450	460	900	900	830	900	690	1350	1350	1245	1350	1150	2245	2245	2075	2245	1915	3745	3745	3460	3745	3455	6740	6740	6230	6740
950	35	35	35	35	35	135	320	385	385	385	275	640	755	775	775	410	955	1160	1160	1160	685	1595	1930	1930	1930	1145	2655	3220	3220	3220	2055	4785	5795	5795	5795
1000	20	20	20	20	20	85	215	265	365	365	170	430	535	700	725	255	650	800	1050	1090	430	1080	1335	1750	1820	715	1800	2230	2915	3030	1285	3240	4010	5245	5450
1050		20	20	20	20		145	175	360	360		290	350	685	720		430	525	1030	1080		720	875	1720	1800		1200	1455	2865	3000		2160	2625	5155	5400
1100		20	20	20	20		95	110	305	300		190	220	610	605		290	330	915	905		480	550	1525	1510		800	915	2545	2515		1440	1645	4575	4525
1150		20	20	20	20		65	70	235	225		130	135	475	445		195	205	710	670		325	345	1185	1115		545	570	1970	1855		975	1030	3550	3345
1200		15	15	20	20		40	40	185	145		80	80	370	290		125	125	555	430		205	205	925	720		345	345	1545	1200		615	615	2775	2160
1250				20					145					295					440					735					1230					2210	
1300				20					115					235					350					585					970					1750	
1350				20					95					190					290					480					800					1440	
1400				20					75					150					225					380					630					1130	
1450				20					60					115					175					290					485					875	
1500				15					40					85					125					205					345					620	
	Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6		Note 4	Note 5	Note 5	Note 6	

Hydrostatic Testing Pressure (psig)

Shell	427,5	435	435	412,5	435	1110	1125	1125	1080	1125	2220	2250	2250	2160	2250	3330	3375	3375	3240	3375	5557,5	5625	5625	5400	5625	9255	9375	9375	9000	9375	16665	16875	16875	16200	16875
Seat	313,5	319	319	302,5	319	814	825	825	792	825	1628	1650	1650	1584	1650	2442	2475	2475	2376	2475	4075,5	4125	4125	3960	4125	6787	6875	6875	6600	6875	12221	12375	12375	11880	12375


TÜV CERT
CERTIFICATE
The TÜV CERT Certification Body
for QM-Systems of RWTÜV Systems GmbH
hereby certifies in accordance with TÜV CERT
procedure that
CESARE BONETTI S.P.A.
Via Cesare Bonetti, 17
I - 20024 Garbagnate Milanese (MI)
has established and applies a quality system for
Engineering and manufacturing of valves, glass and
magnetic level gauges, magnetic switches and accessories
An audit was performed, Report No. 2.5-0190/2004
Proof has been furnished that the requirements according to
ISO 9001 : 2000 / EN ISO 9001 : 2000
are fulfilled. The certificate is valid until 16 February 2007
Certificate Registration No. 04100 20040189
RWTÜV
Essen, 17.02.2004
TÜV CERT
RWTÜV
CERTIFICATE
Quality-System
for Pressure Equipment Manufacturer
according to Directive 97/23/EC
Certificate-No.: 04 202 2 130 02.00004
Name and address of manufacturer:
Cesare Bonetti S.p.A.
Via Cesare Bonetti, 17
20024 Garbagnate Milanese (MI) – Italy
It is hereby certified, that the manufacturer has introduced and applies a quality system according to Directive 97/23/EC. The manufacturer is authorized, to affix the following sign to those equipments he produced in the range of validity of this QA-system.
CE 0044
Audited according to Directive 97/23/EC: QA-system (module H)
Audit report No.: 303463
Scope: Forged and cast valves
Production facility:
Cesare Bonetti S.p.A.
Via Cesare Bonetti, 17
20024 Garbagnate Milanese (MI) – Italy
Essen, 13.05.2002
TÜV CERT Certification Body
for Pressure Equipment of
RWTÜV Systems GmbH

CNC Machining Center for valves up to size 36”

Swing Disk Check Valve size 32” ASME 300

CNC Machining Center for check valves up to size 20”

Testable pneumo-check valve 34” ASME 150

CMI check valves assembling department

CMI check valve 20” ASME Class 2500

CMI check valves in different types, sizes and ratings

CMI check valves 26” ASME Class 150

In 1905, **Cesare Bonetti** opened a shop in Milan, Italy, to manufacture small hand valves to meet the local demand. In the early 1920s, this small but growing firm, took on a new industrial look and moved into the production and sale of industrial valves.

BONETTI®, by this time, had become a well known company for the production of piston valves, sleeve-packed cocks, and glass level gauges. Subsequently, the production range, bearing the **BONT**® and **CMI Pasquini**® registered trademarks was increased to include new valves for high temperature and high pressure service designed to meet the strictest requirements of the time and using the most advanced design and manufacturing technology. This included double sealing valves, bellows valves, diaphragm valves, and magnetic level gauges.

After two expansions, in 1969, the company moved to its new headquarters and main factory in Garbagnate Milanese, where Bonetti continues its passion for growth through research, development and design accuracy. Such expansion continued with the new factories of Limburg an der Lahn (Germany) and Suzhou (Popular Republic of China).

Production facilities are supported by international joint-ventures and by a sales network serving Customers around the world.

In 2005 BONETTI purchased Williams Valve Engineering ball valves business and manufacturing, moving all facilities in its Garbagnate main factory.
***WVE** (Williams Valve Engineering)* trademark now identifies the new Bonetti's ball valve line.

This, in turn, increases its opportunities to continue to grow and expand.

Facilities:

Enclosed surface	66,000 sq.m
Offices building (with car parking below) for three stories	2,200 sq.m
Facilities building (mess-hall, locker rooms, sanitary department, etc.) for three stories	2,000 sq.m
Manufacturing shed (including Production Department and general Facilities)	19,000 sq.m

A broad international sales network is available to serve your needs.

Please contact us for more information about our International Technical Sales Organisation

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