CROSBY STYLE JCE SAFETY VALVE

INSTALLATION, MAINTENANCE AND ADJUSTMENT INSTRUCTIONS

1 INSTALLATION

The valve must be installed with its main axis perpendicular either on pipework or directly on to the pressure vessel. The branch leading to the valve shall be of sufficient size to prevent a pressure drop in excess of 3% of the set pressure when the valve is discharging its rated capacity.

1.1 Drainage

If liquid can collect on the discharge side of the valve, the drain plug (42) should be removed and drain pipework connected so that the liquid can be discharged at a point where it will not cause injury to anyone.

1.2 Discharge pipework

In no case shall the nominal bore of the discharge pipework be less than the nominal bore of the valve outlet.
Except for balanced bellows valves, pipework should be as short as possible, and of sufficient size to limit the pressure drop through the pipework to 10% of the set pressure.
The pipework should be suitably supported so as not to impose an excessive load on the valve, and consideration should be given to the reaction due to the valve discharging its rated capacity.

1.3 Preparing for installation

Remove all packing material. Check that the set pressure and other details on the valve nameplate are correct. Fit an inlet gasket and ensure that it is properly located so that it does not impede the flow to the valve. Connect up the discharge piping, ensuring that an outlet gasket is properly located.
Note: Fluid discharged from the bonnet vent hole in the event of bellows failure on Balanced Bellows valves is usually discharged to atmosphere. If this fluid is toxic or inflammable, it must be piped away to a safe place, however atmospheric pressure within the casing must be maintained.
Note: Pipework leading to the valve should be thoroughly cleaned to remove any foreign matter, as this would cause the valve to leak if trapped between the seat (4) and disc (5).

2 PRESSURE ADJUSTMENT

The valve has been factory set, but if it is found necessary to make pressure alterations, it is desirable to remove the valve from the installation and use a suitable test rig. If this cannot be done, the pressure may be altered in situ by removing the cap (3), retaining the compression screw in position by means of the flats provided and slackening off the locknut (13). The set pressure of the valve may be increased by turning the compression screw (12) in a clockwise direction, or decreased by turning the screw in anti-clockwise direction.
Note: On valves with packed or marine caps the cap may be removed by following the procedure in 4.4 or 4.5.
The set pressure should be checked by bringing the pressure within the vessel or pipework up to the required level gradually. A pressure gauge must be installed so that the pressure may be checked.

3 MAINTENANCE

Before any maintenance work is carried out, all pressure should be exhausted from the system. If the work cannot be carried out in a satisfactory manner by competent personnel, the valve should be returned to the factory for service. It is not always possible to carry out maintenance work at the site, and we suggest that the valve should be removed from the plant and taken to a workshop.

4 DISMANTLING

4.1 All valve types - Refer to figure 1

Unscrew the cap (3), if a packed or marine type cap is fitted refer to sections 4.4 and 4.5. Slacken the locknut (13) and remove all compression from the spring (22) by turning the adjusting screw (12) anti-clockwise. It is recommended that the adjusting screw (12) is marked before removal so that the valve can be approximately reset to the correct pressure on reassembly. Slacken the body nuts (19) and remove the cover (2). Remove the spindle (10) from the guide plate (9), complete with the lower spring plate (11) as an assembly.
The lower spring plate (11) may then be lifted off its split collar (69) and removed from the spindle (10). Care should be taken not to lose the split collar (69). If the valve is an 80 mm or 100 mm high pressure model the 4 nuts (21) holding the cover spacer (68) to the body (1) should be removed and the cover spacer (68) lifted away from the guide plate (9). The guide plate (9) may now be removed from the body (1). It is not recommended to release the guide plate (9) by inserting a tool in the seat bore (4) as damage to the disc (5) and seat (4) will result.
Note: Care must be taken when removing the guide plate (9) not to damage the bellows unit (23) on balanced bellows valves.

4.2 Conventional valve - Refer to figure 1

4.2.1 Remove the disc assembly from the seat (4), being careful not to lose the ball (31). Examine the disc (5), re-lap as necessary. If the valve is a resilient seated model refer to next section.

4.2.2 *Resilient seated valve - Refer to figure 4.* The resilient seat (53) may be replaced, if necessary, by removing the circlip (65) from the disc assembly along with the retaining plate (66).

4.3 Bellows valve - Refer to figure 1

4.3.1 Remove the bellows unit (23) complete with disc assembly from the seat (4), being careful not to lose the lift stop (81) and ball (31). If the valve is a resilient seated model follow the procedure outlined in 4.2.2. to remove the resilient seal; this must be done before the bellows unit (23) is removed.

4.3.2 If the bellows unit (23) requires replacing, this will be supplied welded to the disc. The disc will be supplied fully lapped in protective wrapping. Only use factory supplied bellows units.

4.4 Marine cap - Refer to figure 2

To remove the marine cap (3) first remove the fulcrum pin (56) from the lever (73) using a suitable tool as a drift. The lever (73) may now be withdrawn from the cap (3). Slacken the grub screw (75) and unscrew the marine cap (3). It is recommended that the spindle nut (61) should be marked prior to removal so that the correct position can be attained upon reassembly. Remove the spindle nut (61) and the spindle washer (83).
Further dismantling of the valve is achieved by following the procedure outlined in 4.1.

4.5. Packed cap - Refer to figure 3

To remove the packed cap (3) first undo the gland (57). It may be necessary to ease the eccentric shaft (70) outwards during this operation to ensure that the gland (57) can be withdrawn from the cap (3). The lever assembly may now be withdrawn from the cap complete with gland packing (58).
The tension pin (35) should be released from the lever (73) by using a suitable tool as a drift. The lever (73), gland (57) and gland packing (58) may now be removed from the eccentric shaft (70).
Note: It will be necessary to fit new gland packing (58) on reassembly.
The cap (3) may now be unscrewed from the bonnet (2). It is recommended that the lock nut (82) should be marked prior to removal so that the correct position can be attained upon reassembly. Unscrew the locknut (82) and the spindle nut (61).
Further dismantling of the valve is achieved by following the procedure outlined in 4.1.

5 EXAMINATION AND RECONDITIONING

5.1 Disc

Examination of the disc (5) will reveal whether it requires re-lapping. The disc may be re-lapped, using a flat cast iron lapping plate. Using a fine lapping paste, without applying excessive pressure, lap the disc until all imperfections have been removed from the seating face. If the disc is too badly damaged to relap fit a new disc.

5.2 Seat

Examination of the seat (4) will reveal whether it requires relapping. The seat (4) may be lapped in situ in the body (1) using the same lapping plate as for the disc (5) and following the same procedure. If the seat face is too badly damaged to re-lap it must be remachined. The maximum amount of metal it is allowable to remove is 3 mm. If this is exceeded, the valve must be returned to the factory for a new seat fitting. Having been machined the seat (4) should be re-lapped as previously described.
Note: Ensure all lapping paste is removed from the seat (4) and the disc (5) before reassembly.

5.2.1 Seat replacement
In the event of complete seat replacement being required, the existing seat must be machined out, and an oversize seat obtained from the factory. Do not omit removal and replacement of the seat security pin.
Machine out seat recess diameter to give interference at ambient conditions according to the following table.

5.2.2 Procedure for fitting new seat
Remove existing seloc pin. Remove / machine seat from body. Re-machine body to dimensions in table above. Coat body recess with 'Boss White sealant'. Insert seat into liquid nitrogen and leave until temperature has been reduced to minus 196°C. Remove seat from liquid nitrogen and insert into body recess, using tools provided Hammer the seat into body ensuring that the seat properly 'bottoms' in the recess. Allow assembly to reach room temperature.

5.2.3 Seat change procedure
Drill into seat 'B' depth as shown below through existing hole in body, and fit new 'Seloc' pin. Cut and dress pin flush with body. (Note that body will be received drilled)

Valve size	Body dimensions (inch)	Seat dimensions (inch)	Interference (inch)
1"	1.3008 / 1.2992	1.3039 / 1.3029	0.0037 / 0.0021
1¼"	1.5764 / 1.5748	1.5795 / 1.5785	0.0047 / 0.0021
1½"	1.9701 / 1.9685	1.9739 / 1.9729	0.0054 / 0.0028
2"	2.3642 / 2.3622	2.3690 / 2.3678	0.0068 / 0.0036
2½"	3.1516 / 3.1496	3.1576 / 3.1564	0.0080 / 0.0048
3"	3.7425 / 3.7401	3.7499 / 3.7485	0.0098 / 0.0060
4"	4.7268 / 4.7244	4.7358 /4.7344	0.0114 / 0.0076

DN	25	32	40	50	65	80	100
'A' pin dia x length prior to cut off	ø3 x 18	ø3 x 24	ø3 x 28	ø3 x 36	ø3 x 36	ø3 x 40	ø3 x 45
'B' pin/drill depth	1	1.5	2.5	2.5	2.5	2	2.5

5.3 General examination
Ensure that the bore of the guide plate (9) is in good condition, and that the spindle (10) where it passes through the guide (9) and the adjusting screw bush (77) is free from any surface defects. Ensure that the adjusting screw bush (77) is not worn. Examine the ball location points in the disc (5) and the spindle (10) and ensure that they are of a clean smooth finish. Examine the ball (31) for surface imperfections and replace if damaged. If the spring is corroded it should be replaced.

5.4 Resilient seal
If the resilient O-ring (53) is damaged it should be replaced. The seal is removed from the disc (5) by following the procedure outlined in 4.2.3.

5.5 Bellows
If the bellows unit is damaged, distorted or corroded in any way it should be replaced.

6 REASSEMBLY

6.1 Conventional metal seated valves

6.1.1 Apply grease to both ball and adjusting screw. Place the ball (31) in position on the disc (5) and position the disc assembly onto the seat (4). Place new gasket (27) onto the guide recess in the body.

6.1.2 Fit the spindle (10) on to the ball (31) and slide the guide plate (9) into position in the body recess. Ensure that the spindle (10) is free to move. Fit the split collar (69) onto the spindle (10) and slide the lower spring plate (11) into position. Ensure that the spring plate (11) is fully located on the split collar. Place a new gasket (27) onto the guide plate (9).
If the valve is an 80 mm or 100 mm high pressure model the cover spacer (68) should be positioned onto the guide plate (9) and the 4 nuts (21) tightened. A new gasket should be positioned on top of the spacing piece.
Place the spring (22) onto the lower spring plate (11) and fit the upper spring plate (11) onto the spring (22). Lower the bonnet (2) over the spindle (10) and onto the guide plate (9). Tighten down fully the 4 nuts (19). Slide the adjusting screw (12) over the spindle (10) and screw it into the bonnet (2). Set the adjusting screw (12) to its original position and secure with the locknut (13).

6.2 Bellows metal seated valves

6.2.1 Place the ball (31) in position on the disc (5) and the lift stop (81).

6.2.2 Place a new gasket (27) onto the body recess and position the spacing piece (47) onto the body (1). Position the disc/bellows assembly onto the seat (4) and ensure that the bellows flange locates squarely into the spacing piece recess. Follow the procedure outlined in 6.1.2 to further assembly the valve. It is very important that an effective seal is achieved between the bellows flange and the guide plate.

6.3 Resilient valves
Place the O-ring (53) into position on the disc (5) along with the retaining plate (65). Secure the assembly with the circlip (66) ensuring that the retaining plate (65) is centrally located on the O-ring (65).
Follow the relevant procedure outlined in 6.1.1 or 6.2.1 to further re-assemble the valve

6.4 Pressure Setting
The set pressure on gas/vapor is defined where audible discharge occurs. On liquid valves this is defined where the first steady stream of liquid occurs. In both cases, the pressure gauge measuring inlet pressure will stop rising when set pressure is reached.
Ensure that the internal surfaces of the valve inlet and test rig are clean and mount the valve securely on the test rig. Set the valve to the required pressure using air or nitrogen for valves intended for gas or vapor service. Inhibited water should be used for valves intended for liquid duty. Adjust the adjusting screw (12) until the required set pressure is achieved and pull up the locknut (13). Finally check that the set pressure has not altered. Refit the cap (3) using a new gasket (28) if applicable. To reassemble the packed and marine caps reverse the procedure described in 4.4 or 4.5.

7 SUPPLEMENTARY NOTES

7.1 Danger can emanate from the incorrect installation, maintenance and adjustment of this product. For this reason only qualified persons are permitted to work on the product within the guidelines supplied by the manufacturer.

7.2 Failure to adhere to these instructions will invalidate any CE marking.

PARTS LIST

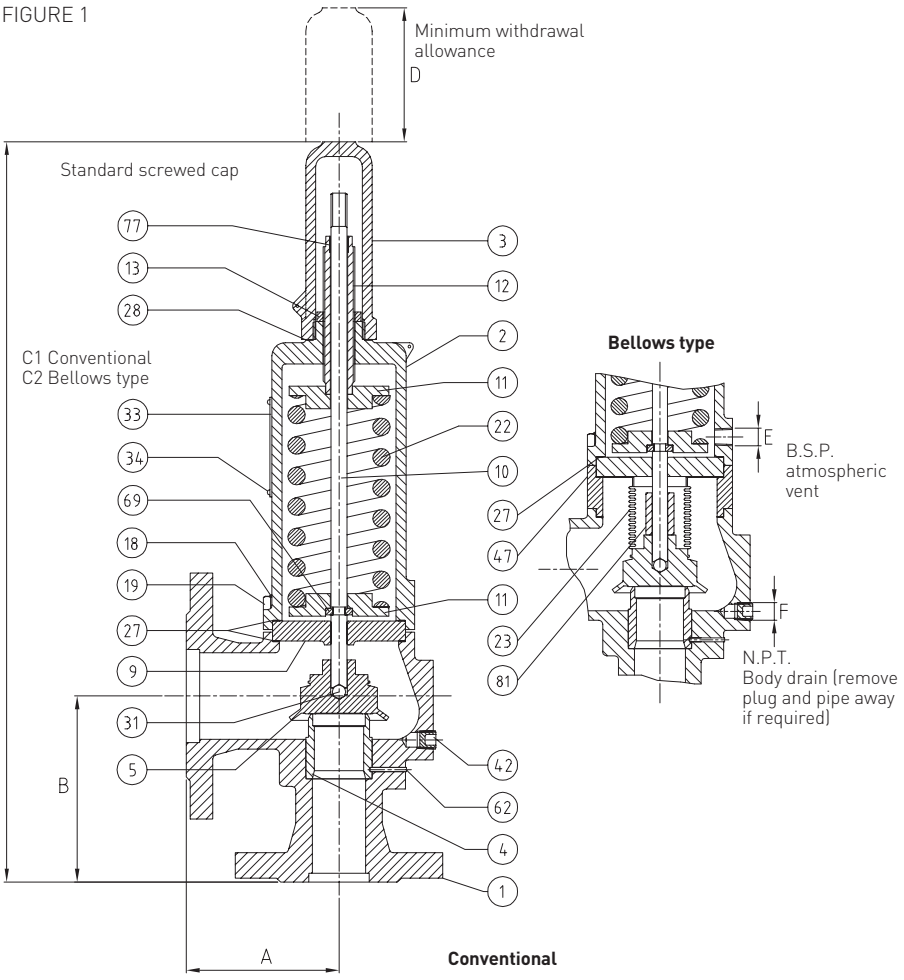
Item nr.	Part name
1	Body
2	Bonnet
3	Cap
4	Seat
5	Disc
9	Guide plate
10	Spindle
11	Spring plate
12	Adjusting screw
13	Locknut
18	Body stud
19	Body nut
20 (H)	Cover stud
21 (H)	Cover nut
22	Spring
23 (B)	Bellows unit
27	Body/bonnet gasket
28	Cap gasket
31	Ball
33	Nameplate
34	Nameplate pin
41	Warranty seal
42	Drain plug
47 (B)	Spacing piece
62	Seat pin
68 (H)	Cover spacer
69	Split collar
77	Adjusting screw bush
81 (B)	Lift stop

NOTE

B = denotes only used on bellows type valves

H = denotes only used on high pressure type valve

FIGURE 1



	Dimensions (mm) unless otherwise stated						
	25 x 40	32 x 50	40 x 65	50 x 80	65 x 100	80 x 125	100 x 150
A	100	110	115	120	140	160	180
B	105	115	140	150	170	195	220
C1	410	455	570	615	725	825/925 H	925/1030 H
C2	445	490	605	665	785	865/965 H	955/1060 H
D	85	85	125	125	155	155	180
E	⅜"	⅜"	½"	½"	¾"	¾"	¾"
F	¼"	¼"	¼"	¼"	¼"	⅜"	⅜"
WT	8-5	14-0	20-0	30-0	42-5	64-5	86-0

NOTE

Weights (kg) given are approximate for cast iron valves.

H = denotes high pressure valve longer bonnet, spring and spindle.

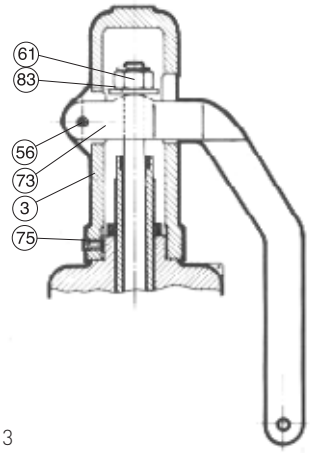
OPEN TYPE EASING GEAR

Valves which are used for steam or compressed air are normally fitted with open type easing gear.
This type of easing gear can also be used on other fluids where a small escape of the fluid to atmosphere, when the valve is discharging, is not objectionable. It is normally fitted on conventional type valves only. The purpose of the easing gear is to check that the valve can operate freely.

PARTS LIST

Item number	Part name
3	Open type bonnet
56	Fulcrum pin
61	Spindle nut
73	Marine easing lever
75	Grub screw
83	Spindle washer

FIGURE 2
Open (marine) easing gear



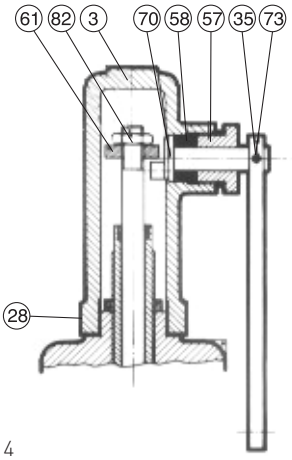
PACKED EASING GEAR

Alternatively packed easing gear can be supplied. This is used when the fluid can not be allowed to escape to atmosphere except through the outlet connection, but where it is necessary to check that the valve is free to operate.

PARTS LIST

Item number	Part name
3	Packed type bonnet
28	Cap gasket
35	Tension pin
57	Gland
58	Gland packing
61	Spindle nut
70	Eccentric shaft
73	Packed easing lever
82	Spindle lock nut

FIGURE 3
Packed easing gear



RESILIENT SEAT

The standard construction using metal-to-metal seats lapped to IMI Bailey Birkett's high standard is suitable for most applications. Elastomeric seals are supplied as conditions dictate.

PARTS LIST

Item number	Part name
5	Resilient disc
53	O-ring seal
65	Circlip
66	Retaining plate

O-ring material	Temp. range
A. Viton	-30 to 200°C
B. Nitrile	-40 to 100°C

Other materials may be available upon request

FIGURE 4
Resilient disc