Figure CV Dual Plate Check Valve.
General Installation Details.

The Dual Plate Check Valves are designed to be located within the bolt circle of the pipeline flanges. Fitted with a spring, the valves are suitable for both vertical and horizontal lines. Without a spring, the valves can only be used in a vertical line with an upward flow direction.

Pipeline flow velocities should not exceed 5m/s for fluids or 50 m/s for gases at S.T.P. (see table to right). Apply a correction factor for fluids with density or viscosity other than water.

Ensure that the check valve is located no closer than 5 to 10 pipe diameters from the delivery side of a pump flange or following bend/elbows.

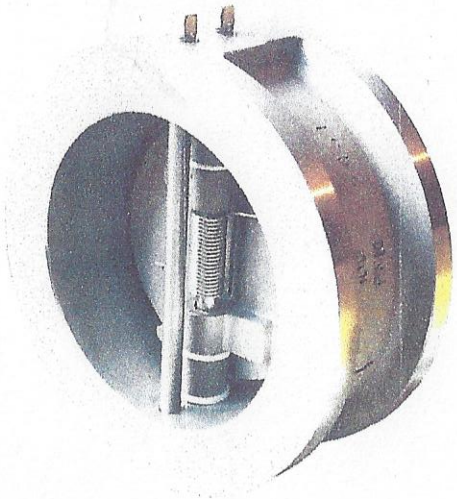
Sizes	Capacity		Open Press.
mm DN	Litres / s	M3 / h	(mBar / Pa)
50	14.1	50.9	18 / 1793
65	20.4	73.5	n/a
80	31.5	113.0	21 / 2096
100	55.2	198.7	12 / 1160
125	85.4	307.6	n/a
150	123.3	443.7	14 / 1364
200	212.4	764.6	16 / 1561
250	348.3	1253.7	16 / 1624
300	480.0	1728.0	19 / 1899
350	587.0	2113.0	16 / 1589
400	781.7	2814.3	17 / 1709
450	1086.3	3910.7	18 / 1751
500	1234.3	4443.7	14 / 1350
600	2057.0	7405.0	15 / 1456
700	2511.0	9035.0	n/a
Note :	Opening based on standard torque spring.		

Flow rates on water at 16°C.
Fluid velocity 5 m/s
Pipe to BS1600 with standard schedule wall.

C_v to K_v Conversions -

The relationship between valve flow coefficients quoted in Cv and Kv is :

$$K_v = \frac{C_v}{1.15602}$$



Hydrostatic test pressure (BS 6755 Part 1 1987)			
	Test Factor (of working pressure)	Water Temp. (Deg.C)	Duration (seconds)
Shell	1.5	20	180
Seat	1.1	20	60

Seal Material	Temperature (Deg.C)			
	Cast Iron & S.G. Iron		Stainless Steel & Al.Bronze	
	Minimum	Maximum	Minimum	Maximum
Nitrile	- 5	+ 100	- 10	+ 100
EPDM	- 5	+ 120	- 10	+ 120
Viton	- 5	+ 120	- 30	+ 204
Note :	Al. Bronze temperature is limited by the body material.			

Fig.No.	Valve Body	Closure Plates	Spring	Trim	Pressure limit
45D	Cast Iron ASTM A 126 B	St. Steel ASTM A 351 CF8M	BS2506 316/S42	St. steel AISI 316	16 Bar
45B	St. Steel ASTM A 351 CF8M	St. Steel ASTM A 351 CF8M	BS2506 316/S42	St. steel AISI 316	19 Bar (see note)
45C	Al.Bronze ASTM B 148 C95400	Al.Bronze ASTM B 148 C95400	BS2506 316/S42	St. steel AISI 316	19 Bar
45E	S.G. Iron ASTM A 356 64-45-12	St. Steel ASTM A 351 CF8M	BS2506 316/S42	St. steel AISI 316	25 Bar
Note :	1. Monel pins and Inconel X750 springs available on request. 2. Washers are PTFE as standard, stainless steel optional. 3. 25 Bar Stainless valves are available on request.				

Fitting Instructions -

1. On sizes 150mm and up - ensure the eye bolt is in position and secure.

2. Flow direction :
   When fitting the valve ensure the direction arrow on the valve nameplate corresponds with the fluid flow direction.

3. Orientation :
   a) When fitting to horizontal pipelines, ensure that the hinge and stop pins are located in the vertical axis.
   b) Any orientation may be used when fitting in vertical lines.

4. Assemble gaskets and bolts, then progressively tighten the bolts on a diagonal basis whilst ensuring the valve body remains centralized.

Maintenance Instructions -

1. The 45 series check valve should be periodically inspected to check that the spring is functional and that the valve closure plate seat is in good condition.

2. Should the spring need to be replaced, remove the retaining plugs and withdraw the hinge and stop pins. Check all the components are in a good state of repair.

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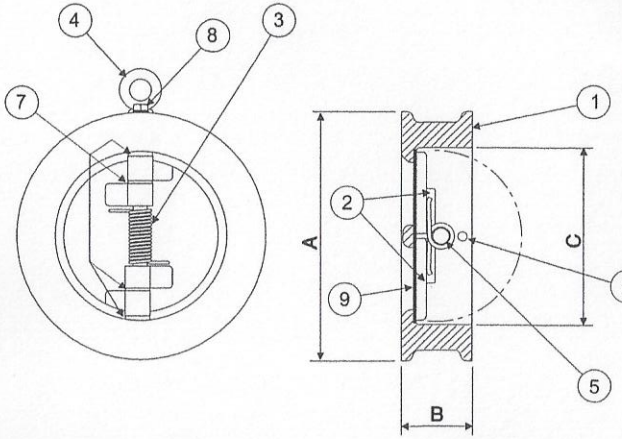

Item No.	Description
1	Body
2	Closure Plates
3	Spring
4	Lifting Eye
5	Hinge Pin
6	Stop Pin
7	Washers
8	Pin plugs
9	Seals

	Dimension A				Dimension B						
Size mm DN	BS4504 PN10	BS4504 PN16	API594 ANSI 125 / 150	BS4504 PN25	EN558-1 series 16	EN558-1 series 51	API594 ANSI 150	C Diameter	Minimum pipe bore	WT (Kg) approx	Kv
50		105			43	54	60	32	52.5	3.5	42
65		124			46	54	67	40	62.7	4.5	74
80		137			64	57	73	54	77.9	6.0	130
100		164		170	64	64	73	70	102.3	7.5	341
125		195		196	70	70	*	92	128.2	9	562
150		220		226	76	76	98	112	154.1	16	779
200		275		286	89	95	127	154	202.7	30	1375
250		330		343	114	108	146	200	254.5	50	2855
300		380		403	114	143	181	240	304.9	75	3396
350	440	447	450	460	127	184	184	270	333.4	98	4687
400	490	495	514	517	140	191	191	310	381.0	134	7142
450	540	557	548	567	152	203	203	360	438.2	295	9041
500	595	619	605	627	152	213	219	405	489.0	368	12328
600	698	734	717	734	178	222	222	486	584.0	525	22933
700	813	807	828	836	229	321	*	580	682.0	580	29065
Note :	* For ANSI125 please consult.										

Surface Finish -
Epoxy Coated Powder to BS6920 - 200 micrometres for both Cast Iron and S.G. Iron.

Valve Pressure Losses

Based on the method laid out in BS 5793 Part 2 Section 2.3: 1984. (To determine the flow coefficient 'Kv' as a metric flow for 1 bar pressure differential.)

The flow coefficient K_v in cubic metres per hour is a special volumetric flow rate (capacity) through a valve at a specified travel and at the following conditions :
- The static pressure loss (Δp_{Kv}) across the valve is 10^5 Pa (1 bar),
- The fluid is water within a temperature range of 278 K to 313 K (5°C to 40°C),
- The unit of the volumetric flow rate is cubic metre per hour.

Note - subsection 5 provides for a coefficient tolerance of ±5%. The Kv is valid when the flow is turbulent and no cavitation or flashing occurs.

Pressure Loss From Kv.

To calculate the pressure loss across a valve for a particular flow rate and fluid density, use:

$$\Delta p = \left(\frac{1}{K_v^2} \cdot \Delta p_{kv} \cdot \frac{p}{p_w} \right) \cdot Q^2$$

Kv From Experimentation.

The value of K_v can be obtained from test results using the following equation :

$$K_v = Q \sqrt{\frac{\Delta p k_v}{\Delta p} \cdot \frac{p}{p_w}}$$

Where :
- Δp Is the pressure loss in pascals (Pa)
- K_v Is the valve rating (based on m³/h)
- Δp_{kv} Is the static pressure loss = 10^5 Pa (1 bar)
- p Is the density of the fluid in Kg/m³
- p_w Is the density of water = 998 Kg/m³ at 5°C, = 992 Kg/m³ at 40°C
- Q Is the flow rate through the valve in cubic metres per hour.

Example 1 :
For a 50mm DN valve,
water at a flow rate of 17.91 m³/h. (see table on page 4 for velocity to capacity conversions)

A 50mm valve has a K_v of 45.0

With the density ratio : p/p_w = 1(assuming cold water)

$$\Delta p = \left(\frac{1}{45^2} \cdot 10^5 \cdot 1 \right) \cdot 17.91^2$$
$$\Delta p = 49.4 \cdot 17.91^2$$
$$\Delta p = 15846 \ pascals$$
$$\equiv 0.16 \ bar$$
$$\equiv 1.6 \ m \ water \ head$$

Example 2 :
For a 125mm DN valve,
air at a flow rate of 1300 m³/h.
The air has a density of 1.26 kg/m³.

A 125mm valve has a K_v of 400

The density ratio, p/p_w is used to adjust for the lower air density.

$$\Delta p = \left(\frac{1}{400^2} \cdot 10^5 \cdot \frac{1.26}{998} \right) \cdot 1300^2$$
$$\Delta p = 0.000789 \cdot 1300^2$$
$$\Delta p = 1334 \ pascals$$
$$\equiv 0.01334 \ bar$$
$$\equiv 0.1334 \ m \ water \ head$$