Figure CV Wafer Check Valves.
General Installation Details

The Wafer Check Valves are designed to be located within the bolt circle of the pipeline flanges. They are suitable for both vertical and horizontal lines provided that in the latter case the flow direction is upwards.

Pipeline flow velocities should not exceed 3 m/s for fluids or 30 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.

Check that the minimum bore of the pipe is no less than that shown in the dimensional tables.

Sizes mm DN	Capacity Litres / s	M3 / h
40	4.0	14.3
50	6.5	23.4
65	9.4	33.8
80	14.5	52.0
100	25.4	91.4
125	39.3	141.5
150	56.7	204.1
200	97.7	351.7
250	160.2	576.7
300	220.8	794.9
350	270.0	972.0
400	359.6	1,294.6
450	499.7	1,798.9
500	567.8	2,044.1
600	946.2	3,406.3
700	1,155.0	4,156.0

Flow rates on water at 16°C. Fluid velocity 3 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 :

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

Fitting Instructions -

1. Secure the eye bolt into position and tighten the retaining nut where applicable.

2. Flow direction :
   a) When fitting the valve ensure the direction arrow on the valve nameplate corresponds with the fluid flow direction.
   b) In vertical pipelines the valve must only be installed with the flow upwards.

3. Orientation :
   a) When fitting to horizontal pipelines, ensure that the eye bolt is located along the vertical axis and is uppermost on the valve.
   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.

Service Pressure Ratings (Non Shock) Size mm DN	Bars
40 to 80	49.6
100 to 700	19.0

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

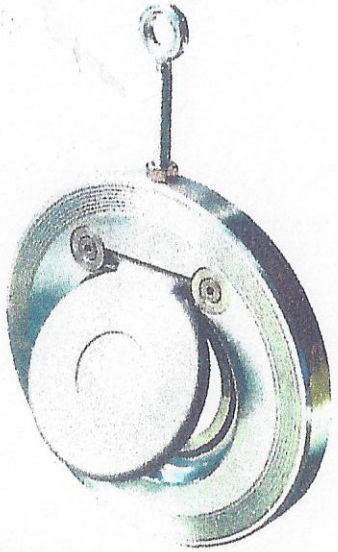

Fig.No.	Valve Body	Closure Plate	Trim	Seals
38A	Carbon Steel (ASTM A105)	316 St/Steel	316 St/Steel	Nitrile
38L	Carbon Steel (ASTM A105)	Carbon Steel (ASTM A105)	316 St/Steel	Nitrile
38B	316 St/Steel	316 St/Steel	316 St/Steel	Viton
38C	Aluminium Bronze (ASTM B148 C95400)	Aluminium Bronze (ASTM B148 C95400)	316 St/Steel	EPDM
Note :	Carbon steel valve bodies and closure plates are zinc plated to BS1706.			

Seal Material	Temperature (Deg.C) Carbon Steel Minimum	Carbon Steel Maximum	Stainless Steel Minimum	Stainless Steel Maximum
Nitrile	- 10	+ 120	- 30	+ 120
EPDM	- 10	+ 120	- 30	+ 120
Viton	- 10	+ 205	- 25	+ 205
PTFE	- 10	+ 250	-50	+ 250
Silicon	- 10	+ 225	- 55	+ 225
Note :	Al. Bronze temperature and pressure on request.			

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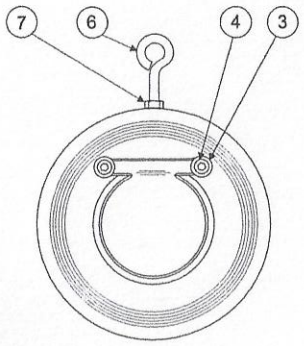

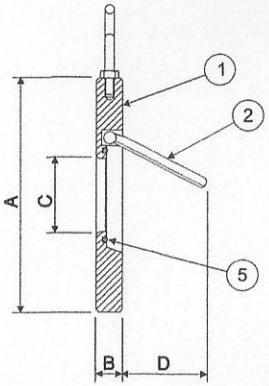

Item No.	Description
1	Body
2	Disk
3	Retaining Washers
4	Retaining Screws
5	'O' Ring Seal
6	Lifting Eye
7	Nut

	Dimension A									
Size mm DN	BS10 Table E	BS4504 PN10	BS4504 PN16	ANSI 150	B Thick	C Diameter	D Swing	Minimum pipe bore	WT (Kg) approx	Kv
40		86		†	15	24	30	40.9	0.7	27.5
50	*	105			14	32	35	52.5	0.9	49
65	*	124		†	14	40	48	62.7	1.2	72
80	*	137			14	54	60	77.9	1.5	125
100	*	164			18	70	78	102.3	2.4	205
125	*	195			18	92	98	128.2	3.4	400
150	*	220			20	112	117	154.1	4.6	590
200		275			22	154	160	202.7	7.5	1050
250		330			26	200	200	254.5	13.1	1800
300		380			32	240	235	304.9	20.4	2300
350	447	440	447	450	38	270	258	333.4	32.0	4169
400	498	490	495	514	44	310	300	381.0	48.0	5233
450	562	540	557	548	50	360	331	438.2	63.0	6695
500	619	595	619	605	56	405	368	489.0	87.0	10229
600	724	698	734	717	62	486	435	584.0	130.0	14200
700	*	813	807	828	68	580	585	682.0	210.0	17250

Note 1 : Valves marked * are not suitable for BS10 table D/E. The valve bodies for these sizes can machined down to suit.

Note 2 : Valves marked † need to have a special type of groove to be suitable for ANSI150 raised face. At the time of placing an order please advise that you require the valve for an ANSI150 raised face service.

	Minimum Opening Pressure (mBar / Pascals)		
Flow Direction	DN 40 to DN 150	DN 200 to DN 350	DN 400 to DN 700
Horizontal Open 10°	3 / 294	3 / 294	6 / 588
Horizontal Open 30°	9 / 882	12 / 1177	16 / 1569
Horizontal Open 60°	13 / 1275	19 / 1863	26 / 2549
Vertical Uphill	16 / 1569	22 / 2157	32 / 3138
Vertical Downhill	Valves cannot be mounted in this position		

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 meters 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 250mm DN valve,
water at a flow rate of 401 m³/h. (see table on page 2 for velocity to capacity conversions)

A 250mm valve has a K_v of 1800

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

$$\Delta p = \left(\frac{1}{1800^2} \cdot 10^5 \cdot 1 \right) \cdot 401^2$$

$$\Delta p = 0.03086 \cdot 401^2$$

$$\Delta p = 4963 \ pascals$$

$$\equiv 0.05 \ bar$$

$$\equiv 0.5 \ m \ water \ head$$

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.

$$\Delta p = \left(\frac{1}{400^2} \cdot 10^5 \cdot \frac{1.26}{998} \right) \cdot 1300$$

$$\Delta p = 0.000789 \cdot 1300^2$$

$$\Delta p = 1334 \ pascals$$

$$\equiv 0.01334 \ bar$$

$$\equiv 0.1334 \ m \ water \ head$$