

# 2”- 42” Flanged Vacuum Breaker

## Operation, Maintenance and Installation Manual

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VAL-MATIC® VALVE AND MANUFACTURING CORP.

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# 2 to 42 in. FLANGED VACUUM BREAKER OPERATION, MAINTENANCE AND INSTALLATION

## INTRODUCTION

This manual will provide you with the information to properly install and maintain the vacuum breaker to ensure a long service life. The vacuum breaker is ruggedly constructed with bronze or stainless steel trim to give years of trouble free operation. The valve should be installed at high points along horizontal pipelines or over tanks.

The Vacuum Breaker is designed to open fully and allow air to re-enter the pipeline or system during critical vacuum conditions in the pipe or tank caused by power failure or rapid draining of the piping system. The vacuum breaker will not allow air to escape from the pipeline. An optional air release valve can be piped to the side of the valve to release trapped air during pipeline operation.

The size, cold working pressure, and model number are stamped on the nameplate for reference. This valve is not intended for fluids containing suspended solids such as wastewater. For wastewater and other high turbidity applications, use Val-Matic Series 1800VBS Vacuum Breakers for Wastewater Service.

**CAUTION:** This valve is not intended for fluids containing suspended solids or hazardous fluids.

## RECEIVING AND STORAGE

Inspect valves upon receipt for damage in shipment. Unload all valves carefully to the ground without dropping. When lifting, the valve should be secured by the body and never lifted by the bronze or stainless steel trim.

The valves should remain crated, clean and dry until installed to prevent weather related damage. For long-term storage greater than six months, the rubber surfaces of the seat should not be exposed to sunlight or ozone for any extended period.

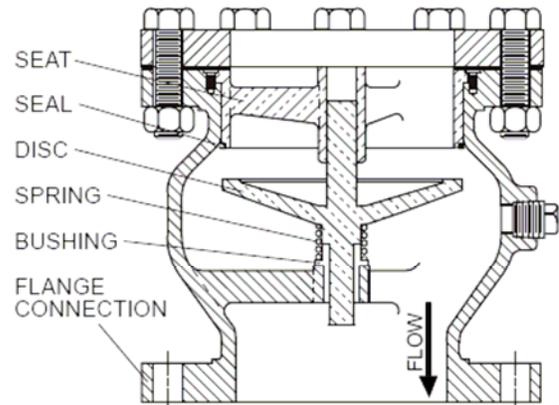


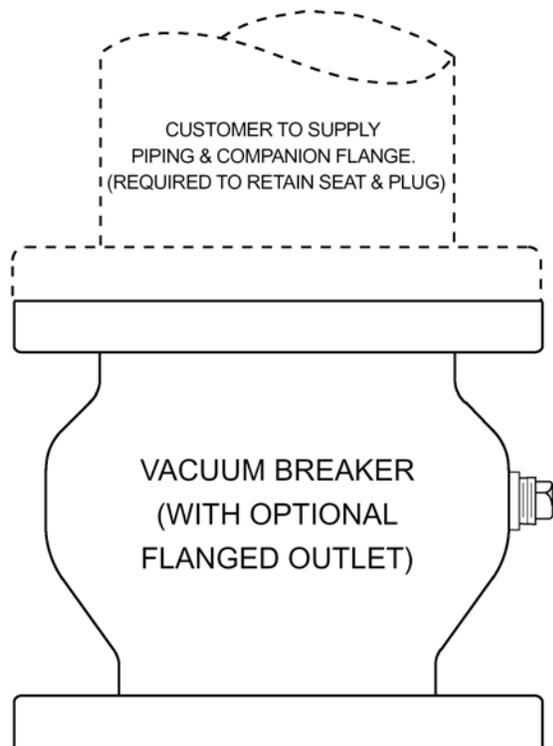
FIGURE 1. VACUUM BREAKER

## DESCRIPTION OF OPERATION

The vacuum breaker is designed to prevent vacuum conditions from occurring in pipes or tanks. After a power failure or rapid draining of the system, a vacuum condition often occurs in a pipe or tank. The pressure difference between the inside vacuum and outside air will cause a downward force on the disc. At vacuum pressures greater than -0.25 psig, the disc will compress the spring and move downward allowing free flow of outside air into the pipe or tank to eliminate the vacuum. When positive pressure is restored in the pipe or tank, the valve will automatically close and seal tightly. Optional valves can be piped to the vacuum breaker to vent trapped air in the pipeline if needed.

The valve may be supplied with either an optional hooded outlet (not shown) or a flange for connection to external piping or vent piping as shown in Figure 2. A flanged outlet is used when the valve vault is subject to flooding or the vault cannot supply sufficient air to the pipeline.

The only moving parts in the valve are the disc and spring. The body bushing controls the movement of the plug and assures that the plug contacts the seat evenly. The valve has a resilient seal for drop tight service.



**FIGURE 2. VACUUM BREAKER WITH OPTIONAL FLANGE**

## INSTALLATION

The installation of the valve is important for its proper operation. The seat end must be oriented upward. The valve should be installed on top of horizontal lines or tanks and equipped with an isolation valve. If installed in a vault, adequate ventilation is needed to supply air to the vacuum breaker.

The valve should be installed to a standard flat-face flange per ANSI B16.5 or AWWA C207.

When used with an outlet flange, special flange requirements are given in Drawing SS-1381 on page 3. The mating flange inside diameter must overlap the valve seat to provide proper seat retention. Outlet piping and companion flange are required to retain the seat and disc. Remove the ring flange and 2 bolts supplied with the vacuum breaker, and replace with external, full-size flanged piping.

**WARNING:** Vacuum Breakers with Flanged Outlets must have outlet piping installed or damage may occur.

When mating the check valve with butterfly isolation valves, the clearance between the butterfly disc and the fully open check valve stem must be checked.

The location of the stem is also shown on the vacuum breaker submittal drawings. 10 inch and smaller vacuum breakers have sufficient clearance for most butterfly valves. However, on 12 inch and larger valves, the shaft extends beyond the flange face and may interfere with the operation of adjacent valves. A short run of pipe or spacer may be needed between the vacuum breaker and the isolation valve.

**FLANGED ENDS:** The flange should be mated with flat-faced pipe flanges equipped with resilient gaskets. When ring gaskets are used, the bolt material shall be ASTM A307 Grade B or SAE Grade 2 Carbon Steel. Higher strength bolts should only be used with full-face gaskets.

**INSTALLATION:** Lower valve over mating flange using slings or chains around the valve body. Lubricate the flange bolts and insert them around the flange. Lightly turn bolts until gaps are eliminated. The tightening of the bolts should then be done in graduated steps using the cross-over tightening method. Recommended lubricated torques for use with resilient gaskets (75 durometer) are given in Table 1.

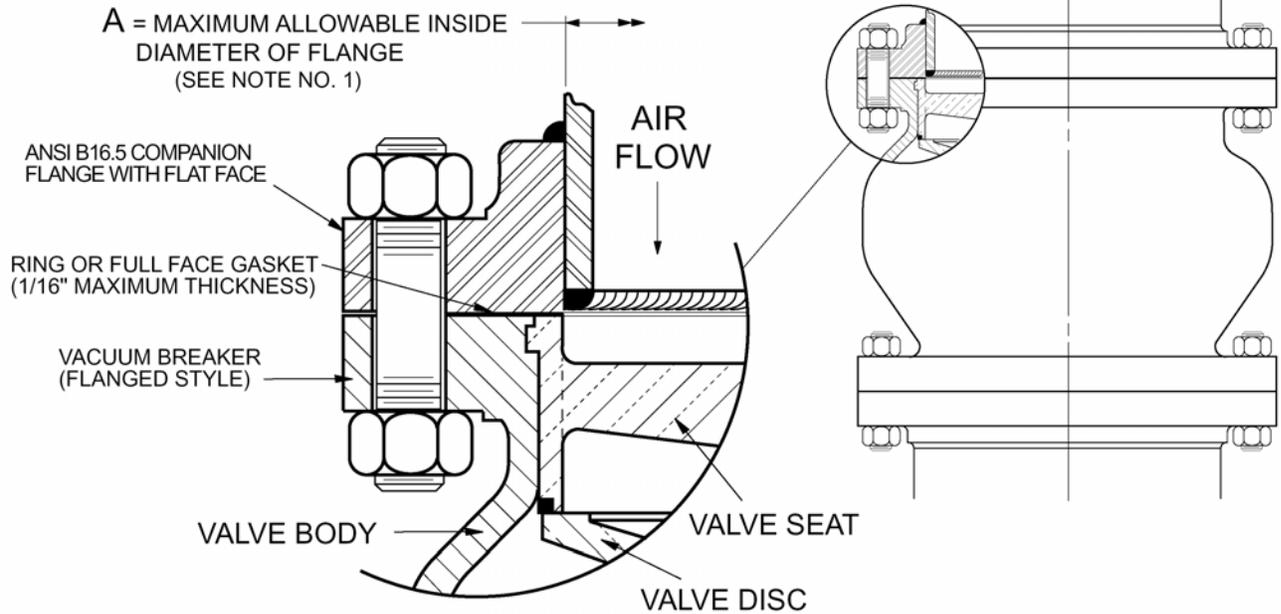
If leakage occurs, allow gaskets to absorb fluid and check torque and leakage after 24 hours. Do not exceed bolt rating or crush gasket more than 50 per cent of its thickness.

125# FLANGE DATA			250# FLANGE DATA		
Valve Size (in)	Bolt Dia. (in)	Bolt Torque (ft-lbs)	Valve Size (in)	Bolt Dia. (in)	Bolt Torque (ft-lbs)
2.5	5/8	25-75	2.5	3/4	25-75
3	5/8	25-75	3	3/4	35-75
4	5/8	30-90	4	3/4	50-150
5	3/4	30-90	5	3/4	70-150
6	3/4	30-90	6	3/4	70-150
8	3/4	40-120	8	7/8	90-200
10	7/8	45-150	10	1	110-300
12	7/8	65-200	12	1 1/8	160-450
14	1	80-250	14	1 1/8	140-450
16	1	90-300	16	1 1/4	180-600
18	1 1/8	100-350	18	1 1/4	190-600
20	1 1/8	120-450	20	1 1/4	220-600
24	1 1/4	150-500	24	1 1/2	350-900
30	1 1/4	180-600	30	1 3/4	500-1500
36	1 1/2	250-750	36	2	700-2000
42	1 1/2	300-900	42	2	800-2500

**TABLE 1. FLANGE BOLT TORQUES**

## VACUUM BREAKER INSTALLATION REQUIREMENTS

DAMAGE TO THE VALVE AND / OR INTERNAL LEAKAGE MAY RESULT IF PIPE FLANGES OTHER THAN THOSE WITH STANDARD FLAT FACES, CONFORMING TO ANSI B16.5 OR AWWA C207 ARE USED. **WARNING NOTICE: FLANGES HAVING AN EXPANDED INSIDE DIAMETER (OFTEN FOUND ON MORTAR LINED PIPE) CANNOT BE USED ON THE INLET SIDE OF THE VALVE. A RING FLANGE HAVING A MAXIMUM INSIDE DIAMETER, AS SHOWN IN "A" DIMENSION BELOW, MUST BE INSERTED BETWEEN THE VALVE AND MORTAR LINED PIPE FLANGE.**



NOTE NO. 1 - THE MATING COMPANION FLANGE I.D. MUST OVERLAP THE VALVE SEAT. THIS IS REQUIRED TO PROVIDE PROPER SEAT RETENTION.

NOTE NO. 2 - THE FLANGE GASKET MUST BE PROPERLY CENTERED AND OF THE SIZE INDICATED. THIS IS REQUIRED TO ACHIEVE A SEAL BETWEEN THE SEAT O.D. AND THE BODY I.D. INTERFACE AREA.

MAXIMUM ALLOWABLE INSIDE DIAMETER OF FLANGE (SEE NOTE NO. 1)			
VALVE SIZE	A	VALVE SIZE	A
2 1/2	2.940	14	14.140
3	3.570	16	16.160
4	4.570	18	18.180
5	5.660	20	20.200
6	6.720	24	24.250
8	8.720	30	30.250
10	10.880	36	36.250
12	12.880	42	42.250

STANDARD RING GASKET DIMENSIONS (SEE NOTE NO. 2)							
VALVE SIZE	I.D. FOR 125 LB. AND 250 LB. GASKET	O.D. FOR 125 LB. GASKET	O.D. FOR 250 LB. GASKET	VALVE SIZE	I.D. FOR 125 LB. AND 250 LB. GASKET	O.D. FOR 125 LB. GASKET	O.D. FOR 250 LB. GASKET
2 1/2	2.875	4.875	5.125	14	14.000	17.750	19.125
3	3.500	5.375	5.875	16	16.000	20.250	21.250
4	4.500	6.875	7.125	18	18.000	21.625	23.500
5	5.562	7.750	8.500	20	20.000	23.875	25.750
6	6.625	8.750	9.875	24	24.000	28.250	30.500
8	8.625	11.000	12.125	30	30.000	34.750	37.500
10	10.750	13.375	14.250	36	36.000	41.250	44.000
12	12.750	16.125	16.625	42	42.000	48.000	50.750

VACUUM BREAKER FLANGE AND GASKET INSTALLATION REQUIREMENTS

DATE 4-25-96

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DRWG. NO.

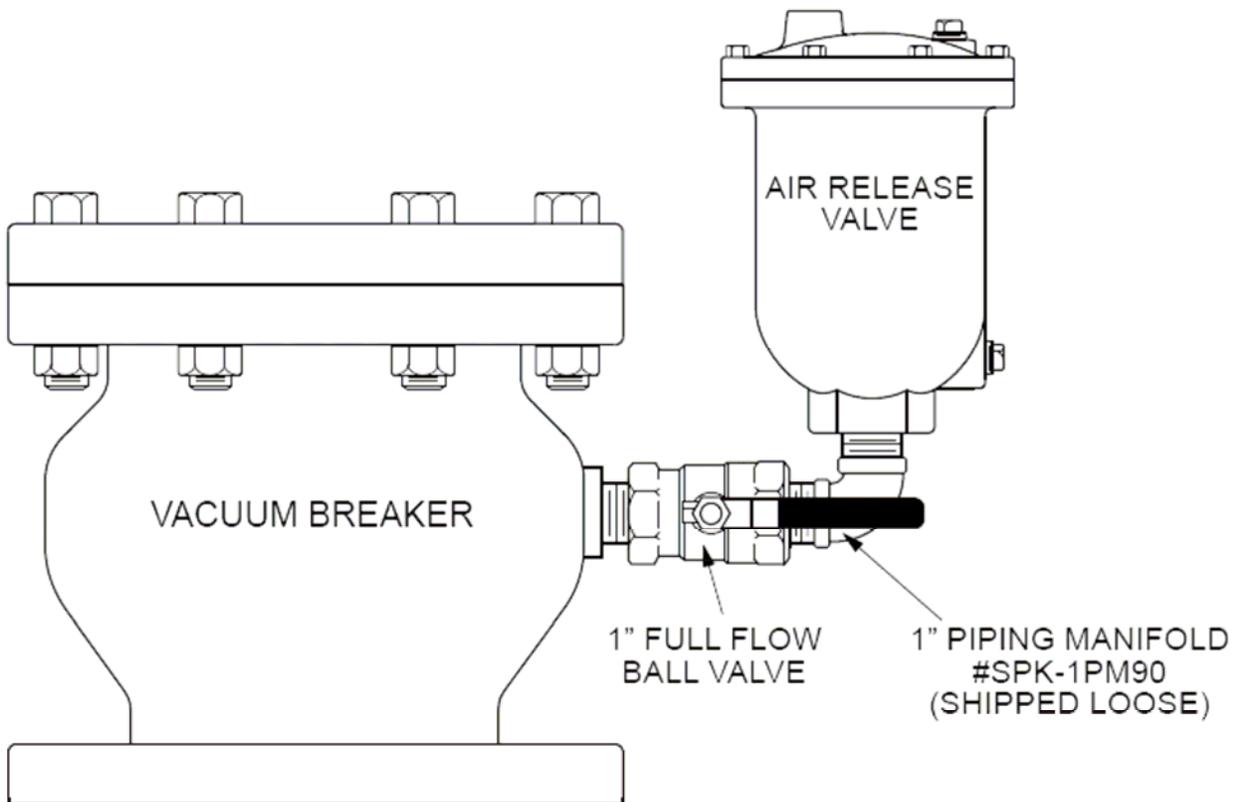
SS-1381

**CAUTION:** The use of raised-face flanges or excessive bolt torque may damage valve flanges.

**OPTIONAL AIR RELEASE VALVE:** The vacuum breaker may be furnished with an optional air release valve as shown in Figure 3. The purpose of the air release valve is to vent accumulated air while the pipeline is in operation and under pressure. This is a common application for high points on a large water pipeline subject to column separation. In this application the function of the vacuum breaker is to allow large quantities of air to enter the pipeline after power failure at the point of column separation. Then when the columns re-unite, the air serves as a

cushion. The air is then slowly vented from the pipeline through the air release valve.

**AIR RELEASE INSTALLATION:** Connect the piping manifold and air release valve to the side of the vacuum breaker as shown in the figure. Be sure to open the ball valve after installation. The air release valve will automatically close and open as needed to vent air.



**FIGURE 3. VACUUM BREAKER WITH OPTIONAL AIR RELEASE VALVE**

## VALVE CONSTRUCTION

The standard vacuum breaker body (1) is constructed of cast iron. See the specific Materials List submitted for the order if other than standard iron construction. The internal metal components are bronze or stainless steel. The disc (3) and spring (4) are the only moving parts and require no maintenance or lubrication. The general details of construction are illustrated in Figure 4.

The body (1) is flanged to connect to a pipe flange. The seat (2) is retained in the body (1) with screws (6) to allow assembly in the pipeline. 2-1/2" and smaller valves have a threaded seat and no seat screws (6). The screws will not retain the seat against full pressure so the ring flange (10) must be kept connected to the valve at all times. Do not remove the ring flange while the pipeline is under pressure or the seat (2) may become dislodged from the body.

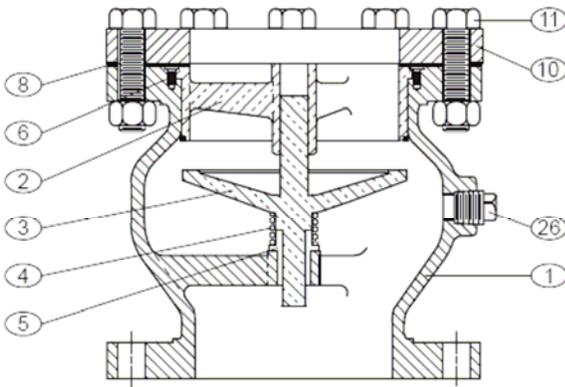


FIGURE 4. FLANGED VACUUM BREAKER

ITEM	DESCRIPTION	MATERIAL
1	Body	Cast Iron
2	Seat*	Bronze or SS
3	Disc*	Bronze or SS (with Buna-N)
4	Spring*	Stainless Steel
5	Bushing*	Bronze
6	Screw*	Stainless Steel
8	Gasket*	Non-asbestos
10	Ring Plate	Steel
11	Fastener	Plated Steel

\*Recommended Spare Part

TABLE 2. PARTS LIST

## MAINTENANCE

Vacuum Breakers require no scheduled lubrication.

MAINTENANCE: consists of keeping the outlet free from debris on an annual basis.

INSPECTION: Periodic inspection for leakage can be performed by inspecting the top of the valve for accumulation of fluid. If leakage is heard, close the isolation valve, drain the vacuum breaker connection, remove the vacuum breaker, and inspect the seating surfaces for wear or mineral deposits. Clean, or repair trim as needed.

**WARNING:** Removal of ring flange without draining the pipeline may cause injury or damage to the valve.

## TROUBLESHOOTING

Several problems and solutions are presented below to assist you in trouble shooting the valve assembly in an efficient manner.

- Valve Chatters or Vibrates: Check to see if the pipeline operates at a regular vacuum condition. Contact the factory about alternate spring settings.
- Valve Leakage: Check gaskets and flange bolts for tightness. Drain line, remove valve, and inspect seating surfaces for debris or damage. If rubber seat (2) is damaged, then a new seat should be installed.
- Valve Does Not Pass Flow: Verify that seat end is up away from the pipeline or tank. Verify that pipeline is at a vacuum condition greater than minus 0.25 psig. Verify that isolation valve is open and there is no line blockage downstream.
- Valve Slams: Remove valve and inspect spring. Heavier springs can be furnished for severe high-head applications.

## DISASSEMBLY

The valve should be removed from the pipeline for disassembly. All work on the valve should be performed by a skilled mechanic with proper tools. Refer to Figure 4.

**WARNING:** The line must be drained before removing the valve or pressure may be released causing injury.

1. Lay valve on flat surface or bench with the hood facing up. 12" and larger valves require support for the spring during disassembly.
2. Remove ring plate (10) by removing bolts and nuts (11).
3. Remove seat retaining screws (6). Note: 2-1/2" valves have threaded seats in lieu of retaining screws.
4. Flip the seat (2) over and inspect the seating surface. Some minor dents and discoloration are normal. Grooves or wear areas will cause leakage and requires seat replacement. Note: Replace seat if resilient seat is worn or damaged.
5. Lift disc (3) from body. Inspect shafts and seating surfaces for wear. The shaft diameter is normally about 1/32" smaller in diameter than the hole in the seat (2) and bushing (5). Some minor dents and discoloration are normal. Wear areas will

cause leakage and require seat replacement. Heavy mineral deposits should be removed with lapping compound or fine sand paper.

6. Remove spring (4) and check for wear or cracks.
7. Remove bushing (5) and inspect for wear. The inside diameter of the bushing should be about 1/32" larger in diameter than the shaft.

## REASSEMBLY

All parts must be clean and gasket surfaces should be cleaned with a stiff wire brush in the direction of the serrations or machine marks. Worn parts, gaskets, and seals should be replaced during reassembly.

1. Insert bushing (5) into body (1). The bushing is retained by the spring (4).
2. Lay spring (4) and disc (3) over bushing (5).
3. Install seat (2) with the retaining screws (6). 12" and larger valves may require a 2x4 board and C-clamps to compress the spring into the body.
4. Install ring plate (10) with bolts and nuts (11) and new gasket (8).
5. Install new gaskets and valve. Tighten flange bolts evenly using the cross-over tightening method and the torque values given in Table 1 on page 2.

## PARTS AND SERVICE

Parts and service are available from your local representative or the factory. Make note of the Valve Size and Model Number located on the valve nameplate and contact:

Val-Matic Valve and Manufacturing Corp.  
905 Riverside Drive  
Elmhurst, IL 60126  
Phone: (630) 941-7600  
Fax: (630) 941-8042  
www.valmatic.com

A sales representative will quote prices for parts or arrange for service as needed.

**LIMITED WARRANTY**

All products are warranted to be free of defects in material and workmanship for a period of one year from the date of shipment, subject to the limitations below.

If the purchaser believes a product is defective, the purchaser shall: (a) Notify the manufacturer, state the alleged defect and request permission to return the product; (b) if permission is given, return the product with transportation prepaid. If the product is accepted for return and found to be defective, the manufacturer will, at his discretion, either repair or replace the product, f.o.b. factory, within 60 days of receipt, or refund the purchase price. Other than to repair, replace or refund as described above, purchaser agrees that manufacturer shall not be liable for any loss, costs, expenses or damages of any kind arising out of the product, its use, installation or replacement, labeling, instructions, information or technical data of any kind, description of product use, sample or model, warnings or lack of any of the foregoing. NO OTHER WARRANTIES, WRITTEN OR ORAL, EXPRESS OR IMPLIED, INCLUDING THE WARRANTIES OF FITNESS FOR A PARTICULAR PURPOSE AND MERCHANTABILITY, ARE MADE OR AUTHORIZED. NO AFFIRMATION OF FACT, PROMISE, DESCRIPTION OF PRODUCT OF USE OR SAMPLE OR MODEL SHALL CREATE ANY WARRANTY FROM MANUFACTURER, UNLESS SIGNED BY THE PRESIDENT OF THE MANUFACTURER. These products are not manufactured, sold or intended for personal, family or household purposes.



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