



VSI SERIES 2100 RESILIENT SEATED BUTTERFLY VALVES

***VSI, LLC.***  
**2" - 30" SERIES 2100**  
**RESILIENT SEATED BUTTERFLY VALVES**  
**INSTALLATION, OPERATION AND MAINTENANCE MANUAL**



Publication: **V2100-3**  
August 2016



## **TABLE OF CONTENTS**

INSTRUCTIONS	3
SAFETY MESSAGES	3
FUNCTIONAL DESCRIPTION	4
RATINGS	4
INSTALLATION	5
TABLE 1 BOLT LENGTH	7
FIGURE 1 BOLT TIGHTENING	7
OPERATION	8
MAINTENANCE	8
TROUBLESHOOTING	8

**INSTRUCTIONS:**

These instructions are for the SERIES 2100 2" - 30" Butterfly Valves and who will be responsible for the installation, operation and maintenance of the valves.

**SAFETY MESSAGES:**

All Safety messages in this manual are flagged with an exclamation symbol and the word Danger, Caution or Warning. These messages indicate procedures that must be followed exactly to avoid equipment damage, personal injury or death.

 **WARNING!**

Personnel involved in the installation or maintenance of valves should be constantly alert to potential emissions of pipeline material and take appropriate safety precautions. Always wear suitable protection when dealing with hazardous pipeline material, also handle valves that have been removed from service with suitable protection from any potential pipeline material in the valve.

**INSPECTION:**

Your SERIES 2100 Butterfly Valve has been packaged to provide protection during shipping. However, it is still possible to be damaged during shipping. Please inspect the unit for damage upon arrival and file a claim if damage is apparent.

**PARTS:**

Order parts from your VSI, LLC. sales representative. Please include the serial number, located on the valve tag, when ordering parts.

 **WARNING!**

Read all applicable instructions and directions prior to any maintenance, installation or troubleshooting.

## SECTION 1 - FUNCTIONAL DESCRIPTION

The SERIES 2100 Butterfly Valve is a resilient-seated valve for general industrial and commercial applications. Both lugged and wafered end connections are available, and a variety of options in disc, shaft and seat materials.

Pressure ratings are shown on the valve tag. The valve disc rotates 1/4 turn and provides bubble tight shutoff in water pipelines. The valves can be used to regulate flow rates by positioning the disc between 10 and 90 degrees open.

## SECTION 2 - RATINGS

### **WARNING!**

Valves shall never be exposed to temperatures or pressures beyond their rated capacity. Exposure to excess temperature or pressure will lead to increased likelihood of failure.

#### **Sec 2.1 Body Pressure Ratings**

Hydrostatic body maximum pressure ratings for the Series 2100 Butterfly Valve are shown below. Seat pressure may be a lower rating than the hydrostatic pressure rating and is noted on valve tag.

Temperature (°F)	Pressure (psi)
-20 to 100	250
200	235
300	215
400	200
500	170
600	140
650	125

#### **Sec 2.1 Seat Temperature Ratings**

Valve seats in the Series 2100 Butterfly Valve are rated continuously to the following temperatures:

Material	Temperature Rating (°F)
EPDM	-30 to 225
PTFE	40 to 250
Buna-N	10 to 180
Neoprene	20 to 200
Hypalon	0 to 275
Viton	10 to 275
High Temp. Viton	10 to 400

## **SECTION 3 - INSTALLATION**

### **WARNING!**

Valves are a significant component of any piping system. Failure due to faulty installation, improper operation or maintenance in such systems could result in damage, down time, and costly repairs. Many problems can be traced to improper installation, operation or maintenance procedures.

### **Sec 3.1 Unloading**

Inspect valves upon receipt for any damage that may have occurred during shipping, as well as conformance with quantity, configuration and description from the shipping order. When removing valves from the shipping containers, be careful not to lift the valves using slings or chain around the operating shaft, actuator, or thru the waterway. Instead, lift the valves with eye bolts or rods thru the flange holes.

### **Sec 3.2 Storage**

The valves should be stored on a pallet or “skid” in a clean, dry warehouse. If the valves must be stored outside, the following should apply:

1. Valves must be kept off the ground high enough to avoid standing water.
2. Cover the valves with a water repellent cover (not included with the valve), to prevent dirt and water from compromising the valve body or seat.

### **Sec 3.3 Guidelines**

1. SERIES 2100 Butterfly Valves are designed for installation between ANSI Class 125/150 flat or raised face flanges. Gaskets are not required.
2. SERIES 2100 Butterfly Valves have been designed so that the disc, in the open position, will clear the inside diameter of schedule 40 and 80 steel pipe.



When installing the valve adjacent to lined pipe, as-cast fittings, or schedule 80 plastic pipe. In some instances the disc in the open position will interfere with the adjacent component and could cause damage to the disc.

3. SERIES 2100 Butterfly Valves are a unidirectional seat design, and need to be installed with the flow indicator on the body of the valve pointing with the correct direction of the flow.
4. For the best results in slurry service, position the valve assembly so that the valve stem is in the horizontal position, and the lower disc edge opens downstream. This will create a self-flushing effect, thereby extending the service life of the valve.
5. SERIES 2100 Butterfly Valves should be installed a minimum of six (6) pipe diameters upstream and four (4) pipe diameters downstream from other line components (valves, elbows, etc.). This is not always practical, but it is important to design in as much distance as possible.

### **Sec 3.4 Pre-installation**

1. Remove any protective flange covers from the valve and the pipe flanges.
2. Remove all material such as weld splatter, oil, grease, and dirt from the valve, flanges, and pipeline.
3. Check the valve identification tag to make sure it is the appropriate valve for the location and service that it is being installed for.
4. See Table 1 to make sure you have the appropriate size, threading and length of bolts for the valve.

**Sec 3.5 Installation**

1. SERIES 2100 Butterfly Valves should be installed in the “Almost Closed” position. You want to open the valve so that the seat is not entirely compressed, but still have the disc edges within the edges of the valve body.
2. Spread the flanges to exceed the valves face to face dimension.
3. Carefully place the valve into place between the flanges. Take care that the flange seating surface and the valve seats are not scratched. Do not apply any lubricants to the seat faces as this may damage them.
4. Line up, center and secure the valve between the flanges using the desired bolts or studs. Do not tighten bolts at this time.
5. Carefully open the valve to assure free and unobstructed disc movement.
6. While gradually removing the flange spreaders, center the valve body to the flanges and tighten the bolts hand tight. Slowly close the valve to check for adequate disc clearance.
7. Return the valve to the “Almost Closed” position.
8. Using an alternating cross-over pattern shown in Figure 1, tighten the bolts to the minimum torque values listed in Table 1. When installing valves 12” or larger, you want to tighten both sides of the valve evenly while still using the same cross-over pattern.
9. If an actuator is being used, connect any pneumatic or electrical connections as required by the actuator documentation.
10. Cycle the actuator fully, to the open and then to the closed position, checking the actuator travel stop settings for proper disc alignment. The valve should be operated to assure that no binding is taking place.
11. Pressurize the piping to the valve and inspect for leakage. If leakage occurs, tighten the bolts using the cross-over pattern, increasing the torque, till the leakage stops. Do not exceed maximum torques listed in Table 1.
12. The valve is now ready for service.

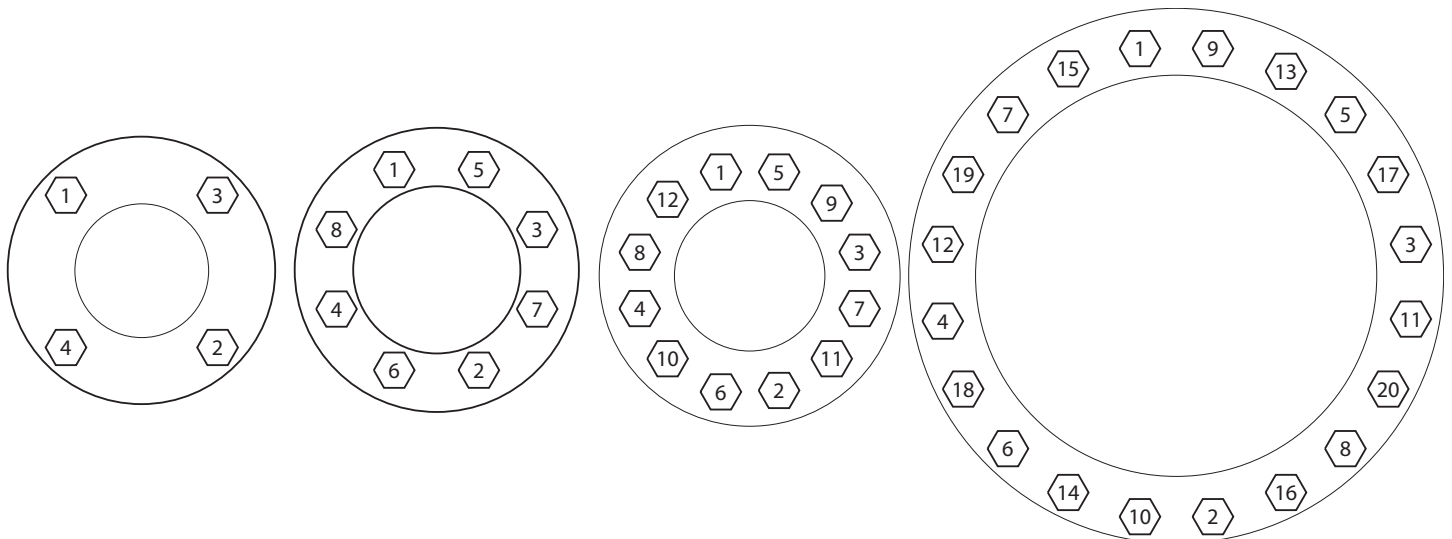
**TABLE 1: RECOMMENDED BOLT LENGTHS**

Valve Solutions Lug and Wafer Valves, 2" - 30", ASME 125/150 Bolt Pattern

Valve Size	Thread Size UNC	Number Required	Lug Bolt Length (in)	Wafer Stud Length (in)	Min Torque (ft-lbs)	Max Torque (ft-Lbs)
2" (DN50)	5/8 - 11	4	1.25	4.75	15	70
2.5" (DN65)	5/8 - 11	4	1.5	5.25	15	70
3" (DN75)	5/8 - 11	4	1.5	5.25	15	70
4" (DN100)	5/8 - 11	8	1.75	5.75	15	70
5" (DN125)	3/4 - 10	8	1.75	6	30	120
6" (DN150)	3/4 - 10	8	2	6.25	30	120
8" (DN200)	3/4 - 10	8	2.25	6.75	30	120
10" (DN250)	7/8 - 9	12	2.25	7.25	50	200
12" (DN300)	7/8 - 9	12	2.5	7.75	50	200
14" (DN350)	1 - 8	12	2.75	8.25	70	240
16" (DN400)	1 - 8	16	2.75	8.75	70	240
18" (DN450)	1 1/8 - 7	16	3.5	10	100	380
20" (DN500)	1 1/8 - 7	20	4	11.25	100	380
24" (DN600)	1 1/4 - 7	20	4.75	12.75	150	520
30" (DN750)	1 1/4 - 7	24 +4	4.5 4.25	13.75 (Bolt) 4.25	150	520

Bolting and torque recommendations are made without warranty, and apply only to steel weld-neck or slip-on flanges. The use of lock washers and/or lubrication with the bolting will affect stated torque values.

**FIGURE 1: RECOMMENDED BOLT TIGHTENING PATTERN**



## SECTION 4 - OPERATION

Clockwise rotation of the valve shaft to close the disc into the seat. The valve is fully closed when the flat side of the disc is parallel with the flange sealing surface of the body. The valve is fully open when the disc is 90° counterclockwise from the closed position. A set of machined flats on the top of the valve shaft can be used to determine the approximate position of the disc when the disc is not visible.

A valve actuator is connected to the valve shaft, and positions the disc at the closed, open, or intermediate position. Any adjustable stops for the open and closed positions of the valve are pre-set to match the valve’s open and closed positions. Please see the actuator instructions for any information on adjusting the end stops on the actuator.

## SECTION 5 - MAINTENANCE

Routine maintenance or lubrication is not required.

## SECTION 6 - TROUBLESHOOTING

SYMPTOM	PROBLEM	SOLUTION
The valve opens only a few degrees and stops. (The valve will not open fully.)	Improper installation. The valve is improperly aligned.	Loosen the flange bolts, realign the valve with the flanges, and retighten the bolts to the recommend torques.
Leakage past the flange face.	The flange bolts are not evenly torqued.	Loosen the flange bolts and retighten them in the recommended order and toques.
	Improper flanges.	Please refer to Installation Guidelines on page 4 for proper flange requirements.
Leakage in the closed position. (Leakage in the pipeline).	The disc is not closing fully. The actuator is not adjusted properly	See actuator documentation for proper adjustment of travel stops on the actuator.
	Damaged seat.	Replace valve.
	Line pressure exceeds valve’s working pressure.	Reduce the line pressure to the valve’s working pressure.
	Damaged disc.	Replace valve.
Water hammer	The valve is closing too quickly.	Adjust actuator.
Excessively high torque.	Obstruction in the pipeline.	Remove the valve from the pipeline and remove obstruction.
	Valve stem or disc bent.	Replace valve. Check the pipeline for water hammer or freezing of line material.
	Scale build-up on stem or seat.	Open and close the valve several times. Operate the valve at least once a month. Check the valve seat for deterioration.