RHINO VALVES WORLDWIDE

Series 6000

The most robust in the valves.
Manufactured of solid bar in diverse materials
and with seals of rude use, it is
specified ANSI 2500 # and it can be automated.

LICENSE No. 6D-0321

ISO 9001 REGISTERED
MGMT. SYS.
RvA C 024
DNV Certification B.V., The Netherlands

RHINO VALVES WORLDWIDE

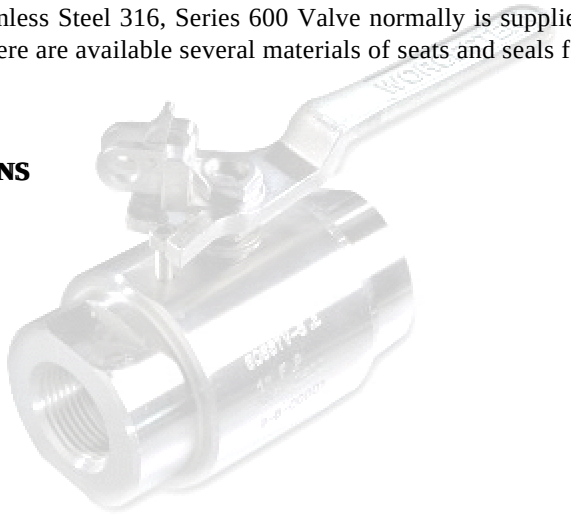
SERIES 6000

Rhino Valves, as always thinking in your security and your industrials needs, has developed "The Series 6000 Ball Valve ANSI 2500#".
This ANSI 2500# Valve consist, generally, in a body made of 2 robust pieces whit NPT, BS & SW ends and double security "O" rings seals, a full bore stainless steel ball to avoid strong line pressure drops, a casted stainless steel handle whit locking device (optional). These are just some of the features of this robust valve always ready for a secure handling an high pressures joined to the Rhino Valves security characteristics.

Due to this Valve is adequate for applications up to 6000 psi. Series 6000 Valve is the most convenient Ball Valve for high pressure installations, because its economy, design, easy installation, security against leakage, low torque operation, ease automation and reliability proved which characterizes to Rhino Valves.

Witch comprehensive stocks available, which guaranties short delivery time, availability of spare parts, possibility of modification according to your needs for a particular application/use and assured quality from a ISO 9001 registered company since 1994.

Available in 5 sizes from 1/2" to 2" in Carbon Steel WCB and Stainless Steel 316, Series 600 Valve normally is supplied whit Delrin or Peek* seats, but like in all the Rhino Valves range, there are available several materials of seats and seals for each application.
*Subject availability.



SPECIFICATIONS

Valve Size
1/2", 3/4", 1", 1 1/2", 2" (Full bore)
(15,20,25,40,50)

Wall Thickness:
ANSI 2500

Body and Plug Materials :
Carbon Steel: ASTM A29 Gr12L14
Stainless Steel: ASTM A276 Gr316

Stem Design:
Bottom entry, live self-adjustable seal (Belleville, Double internal nut seals, four upper seal nuts)

Bolting:
Screw and Nut: Stainless Steel: ASTM A193/193M (AISI 304)
Carbon Steel: Screw-SAE J429 Gr5; Nut-ASTM A304 Gr5

Stem Seals:
Delrin and Multifil or Peak and Multifil

Seats:
Delrin (Lubetal) UHMWPE, Peek, whit back Viton Seals ("O" rings).
Body Seals:
Double Viton Seals ("O" rings).
Note: Some others materials of seals and seats can be supplied, pleas check with factory availability.

Maiz 263 Col. Valle del Sur Iztapalapa Mexico, D.F.
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Ball Materials:
Stainless Steel: ASTM A276 Gr316
Stems Materials: Stainless Steel: 17-4 PH
Style: Body and Plug threaded
Operation: Manual: Casted handle (1/2" to 2")
Designs Specifications: ANSI B16.10 - Face to Face dimensions
ANSI B16.34 - Wall thickness

SEATS

The design of Worcester/Rhino Valves allows flow pressure in both directions which is transferred to the floating ball. Then, this is pressed against the downstream seat, resulting in a bubble tight sealing. The resilient seats patented by Worcester allow relief the pressure to the upstream seat against the ball, resulting a low torque of operation and a long, soft operation even with high differential pressures. This low torque characteristic, permits a smaller actuator operation, resulting in lower cost. The seats also acts as a ball whipper, as it removes any adhered material to ball for a better sealing.

STEM

The stem is designed for both safety and a long, leak-tight service life. Inserted from the bottom through the cavity, it rests securely against an interior body shoulder.
The stem is held in place by a live loaded retaining system, featuring opposing belleville washers. These flex in response to thermal expansions and contractions and maintain effective sealing pressure as they compensate for normal stem seal wear. The seal can also be easily adjusted in-line by the accessible stem nut. In series 400 and 600, a stem nut retaining clip holds the nut in place and prevents backing off, particularly in high cycle actuated services. In series 152 a CHEVRON° type external stem seal is provided.

TORQUE

The operating torque of the ball valve is influenced by a number of factors which has to be considered to size a valve for actuation. These factors are divided in Design (type and material of valve seats), and application (pressure, media and frequency of operation).
The torque shown is in function of the pressure, as the friction between the floating ball and the seat is higher as the pressure is incremented.
Note: Our charts were made for reduced port valves (except for Series 152, which can be read directly). If you want to find the torque of a full port valve, please look for the curve of the next higher size, for example if you want to know the torque of a 1" fill port valve, you have to see the 1 1/4" valve readout.

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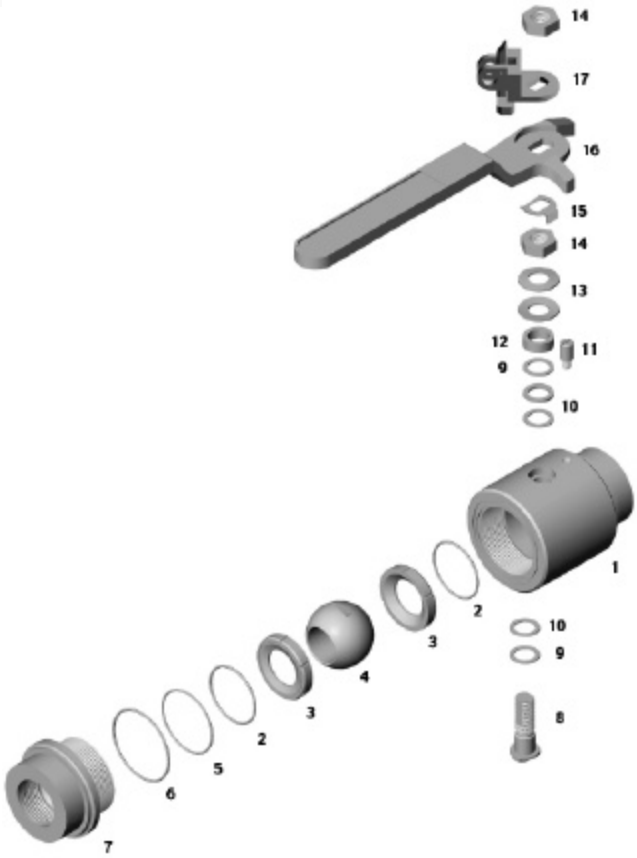
RHINO VALVES WORLDWIDE

SERIES 6000

SERIES 6000. Robust valve of heavy duty use for High Pressure. Full port from ½" to 2", manufactured of bar in carbon steel and stainless steel. Two piece Body design, wall thickness ANSI 2500#, pressure of maximum operation: 6000 psi, heavy duty seals in diverse materials. Optional locking device.



PARTS LISTING OF SERIES 6000

			MATERIAL	
ITEM	QUANTITY	DESCRIPTION	CARBON STEEL	STAINLESS STEEL
1	1	BODY	ASTM A 576 Tp. 1018	ASTM A 479 Tp. 316
2	2	SEAT´S "O-RING"	VITON	VITON
3	2	SEAT	DELRIN	DELRIN
4	1	BALL	ASTM A 574 (S17400)	ASTM A 574 (S17400)
5	1	PLUG END´S "O-RING"	VITON	VITON
6	1	PLUG END´S EXTERNAL "O-RING"	VITON	VITON
7	1	PLUG END	ASTM A 576 Tp. 1018	ASTM A 479 Tp. 316
8	1	STEM	ASTM A 574 (S17400)	ASTM A 574 (S17400)
9	2	STEM SEAL	DELRIN	DELRIN
10	3	SEAL PROTECTOR	MULTIFIL	MULTIFIL
11	1	STOP PIN	AISI 316	AISI 316
12	1	FOLLOWER	AISI 416	AISI 416
13	2	BELLEVILLE WASHER	AISI 1075	AISI 302
14	2	STEM NUT	ASTM A 194 2HM	ASTM A 594 TYPE A 304
15	1	LOCK NUT	AISI 304	AISI 304
16	1	HANDLE	ASTM A 743 CF8/CA15	ASTM A 743 CF8/CA15
17	1	LOCK DEVICE (OPTIONAL)	ASTM A 743 CF8/CA15	ASTM A 743 CF8/CA15

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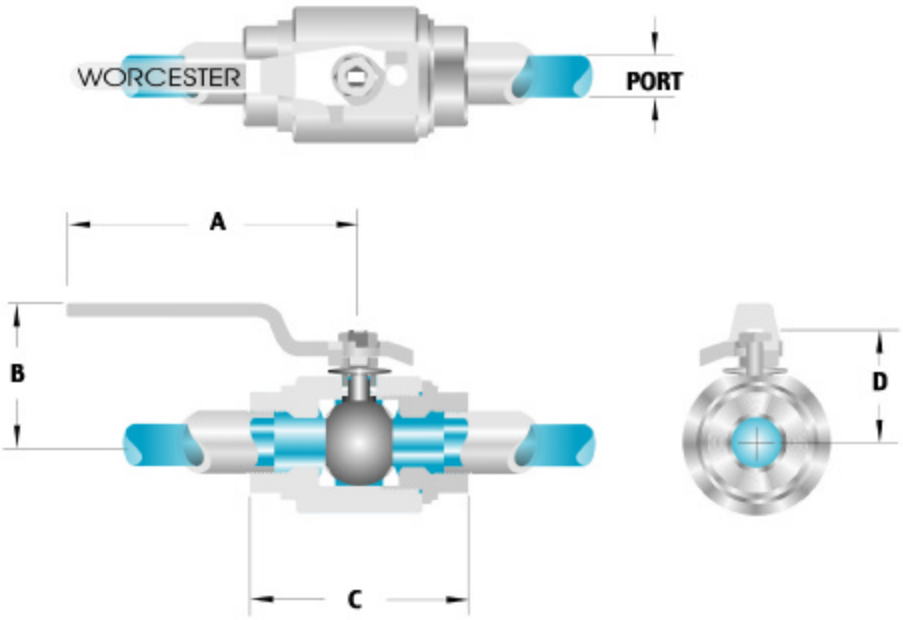
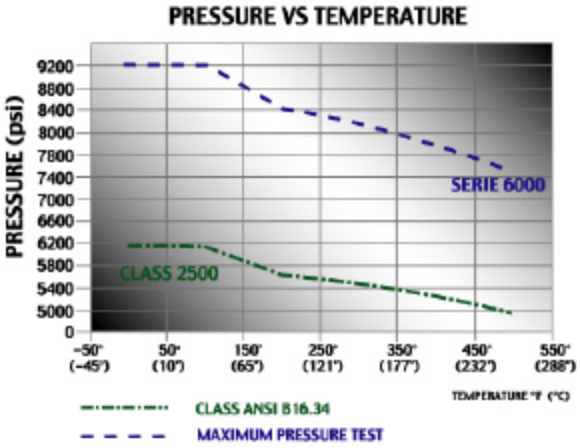
RHINO VALVES WORLDWIDE

SERIES 6000





The pipe is exclusively representative. They are only as reference and they are subject to changes without previous notice.

Dimension in inches.

Service Conditions:

CONDITION	*CARBON STEEL*	*STAINLESS STEEL*
ANSI CLASS #	2500	2500
OPERATION TEMPERATURE	-20 to 100°F (-29 to 38°C)	-20 to 100°F (-29 to 38°C)
MAX. ALLOWABLE WORKING PRESSURE	6170 psi (434 kg/cm2)	6000 psi (422 kg/cm2)
MAXIMUM PRESSSURE TEST	9275 psi (651 kg/cm2)	9000 psi (633 kg/cm2)

Note: *Always consider the maximum, pressure allowed by the soft elements as seats and seals.*

SERIE 6000 1/2" - 2"

B16.34 class 2500						
SIZE	A	B	C	D	PORT	WEIGHT IN Lbs.
1/2"	4 1/4	1.81	3.26	1.67	0.500	2.227
3/4""	4 1/4	2.05	3.75	1.86	0.750	3.880
1"	5 3/4	2.54	4.44	2.48	1.000	5.688
1 1/2"	7	3.33	5.12	3.06	1.500	18.629
2"	7 3/8	4.01	5.50	3.57	2.000	29.410

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RHINO VALVES WORLDWIDE

APPLICABLE INTERNATIONAL STANDARDS

APPLICABLE INTERNATIONAL STANDARDS				
Norm	**Description**	**Applicable in**	**Size**	**Content**
NACE MR-01-75	Valves that require special resistance to fractures and hydrosulfuric attack	All the models except Brass	1/4" - 8"	For sour environment, stainless ferrous and not ferrous metals
ANSI/FCI 70-2	for seat leaks of control valves. Class VI	All the models	1/4" - 8"	(pneumatic) trapped air test
MSS-SP-26	System of Marking Standard	All the models except series 42, 43, 1000	1/4" - 8"	Size-thread-temperature. Pressure-material-Nom. Casting Heat. No.
MSS-SP-55	Visual inspection Method acceptance of cast steel valves	All the models except Brass	1/2" - 8"	12 types of frequent surface irregularities identifiable by comparative visual inspection
API 6D	Specification for piping and valves	All the models	2" - 8"	Quality system according to American Petroleum Institute
API 607	"Fire Safe" testing	All the models except series 42, 43 and 1000	1/4" - 8"	Available certificate in some valves
API 598	Inspection and test of valves	All the models	1/4" - 2"	Hydrostatic and pneumatic inspection
ANSI B 16.5	Flanges for steel pipe lines	All the flanged models	1/2" - 8"	Dimension-material-range. Pressure temperature-facing. Different types of flanges
ANSI B 16.10	End to end dimensions of valves with flanges and/or to weld ends	All the flanged models and weld end models	1/2" - 8"	Face to face Dimensions
ANSI B 16.11	End Dimensions: S.W. (Socket Weld) S.E. (Threaded)	All the models except flanged	1/4" - 6"	Face to face Dimensions
ANSI B 16.34	Steel valves	All the models	1/4" - 14"	Wall Thickness designs. Material-specifications. Range-Pressure-Temperature. Hydrostatic Test
ANSI B 16.25	Buttweld ends	All the models except flanged	1/2" - 6"	Angle of machine beveling and O.D. And I.D.

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RHINO VALVES WORLDWIDE

HOW TO ORDER

HOW TO ORDER TO RHINO VALVES

1 1/2"	D	4	4	6	T	T	SW
Valve Size	Type	Series	Material: Body, pipe ends	Material: Ball Steam	Material: Seat	Material: Body Seals	Ends
1/4" 3/8" 1/2" 3/4" 1" 1 1/4" 1 1/2" 2" 3" 4" 6" 8"	- Normal FS - Fire Safe D - Diverter T - 3 Ways C - Cryogenic PT - Full Port	4 - 400 (44) 6 - 600 H6 - H600 42 - Mite 43 - Mass 60 - 6000 45 150 151 152 300 302 10 - 1000 20 - 2000	1 - Brass 4 - Carbon Steel 6 - Stainless Steel 6L - Stainless Steel CF-3M	1 - Brass 4 - Carbon Steel 6 - Stainless Steel	B - Buna T - Ptfe R - Tfe Y - Lubetal (Delrin) MT - Multifil U - Uhmwpe D - Devlon Note : Use only one letter if body seal is to be same material as seat	B - Buna T - Ptfe R - Tfe Y - Lubetal (Delrin) MT - Multifil U - Uhmwpe D - Devlon G - Graphoil V - Viton	SE - Screw End SW - Socket Weld BW - Butt Weld 150# - Ansi 150 300# - Ansi 300

NOT ALL THE COMBINATIONS ARE AVAILABLE. SEE THE FOLLOWING TABLE AND CONSULT TO THE COMPANY OR AUTHORIZED DISTRIBUTOR FOR AVAILABILITY.
THERE ARE SOME OTHER MATERIALS, OPTIONS AND ENDS AVAILABLE

COMMON COMBINATION FOR SEALS AND SEATS MATERIALS

SERIES	SEATS	BODY SEALS	STEAM SEAL
ALL	BUNA	BUNA	RTFE
ALL	PTFE	PTFE	RTFE
ALL	RTFE	PFTE	RTFE
ALL	LUBETAL	VITON	RTFE
ALL	MULTIFIL	MULTIFIL	MULTIFIL
ALL	UHMWPE	VITON	RTFE
FS ONLY	PTFE	GRAPHOIL	GRAPHOIL
H600 ONLY	DELRIN	VITON	DELRIN/MULTIFIL
6000 ONLY	DELRIN/VITON	VITON	DELRIN/MULTIFIL

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Receiving Inspection.
All valves must be inspected when they arrive at the purchaser site, to verify that no damages have occurred during transportation or handing. Any damage found must be reported immediately.

Handling.
Store the valve in a safety place, free of rain, dust or any agent that can deteriorate it. All our valves are shipped with end protectors, you must keep them until the installation to avoid introduction of dust and other materials to the inside of the valve.
Note : If you plan to stock the valve for a long period of time, we recommend to leave it in the open position to avoid deformation on seats.

GENERAL INFORMATION.

Materials:

DESCRIPTION	***CARBON STEEL***	***STAINLESS STEEL***
BODY AND PLUG END	A-576 Type 1018	A-479 type 316
SEAT	DELRIN	DELRIN
BALL	ASTM A574 (S17400)	ASTM A574 (S17400)
O- RING (BACK SEAT AND SEALS)	VITON	VITON
STEM	ASTM A574 (S17400)	ASTM A574 (S17400)
THRUST BEARING	DELRIN	DELRIN
STEM SEAL	MULTIFIL	MULTIFIL
STOP PIN	AISI 316	AISI 316
FOLLOWER	AISI 416	AISI 416
BELLEVILLE WASHER	AISI 1075	AISI 304
NUT	ASTM A-194-2HM	F-594 TYPE 304
LOCK NUT	AISI 304	AISI 304
HANDLE	ASTM A743 CF8/CA15	ASTM A743 CF8/CA15
LOCKING DEVICE	ASTM A743 CF8/CA15	ASTM A743 CF8/CA15

Service Conditions:

CONDITION	***CARBON STEEL***	***STAINLESS STEEL***
ANSI CLASS #	2500	2500
OPERATION TEMPERATURE	-20 to 100°F (-29 to 38°C)	-20 to 100°F (-29 to 38°C)
MAX. ALLOWABLE WORKING PRESSURE	6170psi (434 Kg/cm2)	6000psi (422 Kg/cm2)
MAXIMUM PRESSURE TEST	9275 psi (651 Kg/cm2)	9000 psi (633 Kg/cm2)

Note : *Always consider the maximum pressure allowed by the soft elements as seats and seals.*

General Dimensions:

	Series 6000 Regular Bore				
DESCRIPTION	***½"***	***¾"***	***1"***	***1 ½"***	***2"***
LENGTH in (mm)	3.26 (82.8)	3.75 (95.3)	4.44 (112.8)	5.12 (130)	5.50 (139.7)
WIDTH in (mm)	2.00 (50.8)	2.50 (63.5)	3.00 (76.2)	4.63 (117.5)	5.75 (146)
HIGH in (mm) To handle	2.81 (71.4)	3.30 (83.8)	4.04 (102.6)	5.64 (143.3)	6.89 (175)
WEIGHT lb (Kg)	9.7 (1.01)	3.9 (1.76)	5.7 (2.58)	18.6 (8.45)	29.4 (13.34)

INSTALLATION AND OPERATION:

Your valve is bi-directional and you can install it in any position.
It can be operated manually by rotating smoothly the handle 90 degrees. When the handle is parallel with valve line, the valve is opened. At 90 degrees it is in the closed position. Automation devices (optional) can also operate the valve.

Caution : *Remember that a Ball Valve is an OPEN/CLOSE device and it is not designed to control the flow. Never leave the valve in a different position from the OPEN or CLOSE position as it will eventually damage the seats, reducing its life.*

Actuated valves:

If your valve have an automation bracket and elements, you can perform following instructions without disassembling them from the valve.

Welded Valves to the pipe by any technique:

Your valve has soft seats and seals, ***Don't heat it excessively.***

1. Unscrew the plug end.
2. Remove the body's seals and seats. Close the Valve and remove the ball, preventing from scratching its surface. Place it over a soft material free of burrs.
3. Return the body to its position on line and screw the plug end again.
4. Complete the welding (If you're welding with gas or bronze, don't apply the flame directly to the body).
5. Reassemble the Valve. Remember ball only can be assembled with the valve in the closed position.

Note : This design includes have back seat o-rings to reduce the torque of the valve. Be sure to place the o-rings correctly while you install the seats back in the valve.

6. If you remove the actuator bracket, place it again together with the coupling element. Be sure all assembling is aligned in the center. If the actuator is not aligned and/or the coupling element is not perpendicular with the valve, the whole element could not work properly and/or media could leaks through the stem.

Threaded Valves:

Depending of the conditions or the used technique, screw in or disassemble the complete Valve following the instructions of points 1 and 2 of the previous section and screwing in each part in its corresponding extreme. Reassemble the Valve following the instructions of the points 3, 5 and 6 of the previous section.

Caution *: After installation, some burrs can stay inside the pipe line. If they are not removed, they can produce scratches in the seats and ball, resulting in leaks. Always clean the pipeline after installation, to remove strange agents.*

The valve will operate with no leaks and low torque for a long life if it is operated under its design parameters. The torque for a new valve depends of its size and the material of the seats installed. Please consult our printed or multimedia catalogs or visit our website: ***www.worcester.com.mx*** at your convenience, to get this data.

After proper installing (or maintenance) and before operation, always follow the safety instructions at the end of this document.

MAINTENANCE :

After operation and depending of the usage's conditions, Valve may need maintenance. Remember that your Valve has one-year warranty, if it is still in that period, please contact with your distributor, do not try to fix it or you may lost the warranty. Use ONLY originals RHINO Spare Parts, it assures you Valve will work according with its specifications. You can request them through the wide net of distributors all around the World.

Stem:

Although the Stem's design includes a self-adjustable system, compensatory of the wear and the contractions and expansions produced by thermal changes, if the valve presents leak for this section you must consider the next recommendations:

a) If your Valve has an actuator installed, check if it is aligned with the stem through the couple. A disaligned actuator can produce laterals pressure on the stem, which will have repercussions on leaks.
b) Tight lightly the adjusting nut of the stem until the leak stops. Remember tightening too much this nut will increase the torque of the Valve and can damage stem seal, reducing its life. If after you tightened the nut a leak continues, follow the next steps:
c) Shutoff the line where the valve is installed, verifying that no pressure and no dangerous media remains in the pipe and inside the valve. Proceed to disassemble the valve following instructions of steps 1 and 2 of the "Installation" section.

Caution: *Ball Valves can retain pressurized media in the body cavity when closed. Take care when disassembling. Always open Valve to relieve pressure prior to disassembly.*

Caution : *Always depressurize, disconnect and disengaged automation components installed on the valve before you work on it.*

d) Change the thrust bearing and stem's seals, taking out the handle, the adjustment's nut, the lock nut, the Belleville washers and the follower.
e) Reassemble the stem's elements in an inverse way you took them out. Tighten lightly to the stem's adjusting nut (once you have installed the valve on line, you can give the final adjustment).
f) Finish the Valve following steps 3, 5 and 6 of "installation" section.

***Note**: Be careful with the seats, do not mistreat or scratch them, otherwise you will need to replace them.*

Seals:

In case of leak between the body and plug end, you may consider next recommendations:

a) Verify that the plug end is correctly and completely screwed to the body. Tight it as necessary.
b) If leak persist, disassemble the Valve according to the steps 1 and 2 of the "installation" section.
c) Reassemble the Valve placing new seals according to the steps 3, 5 and 6 of the "installation" section.

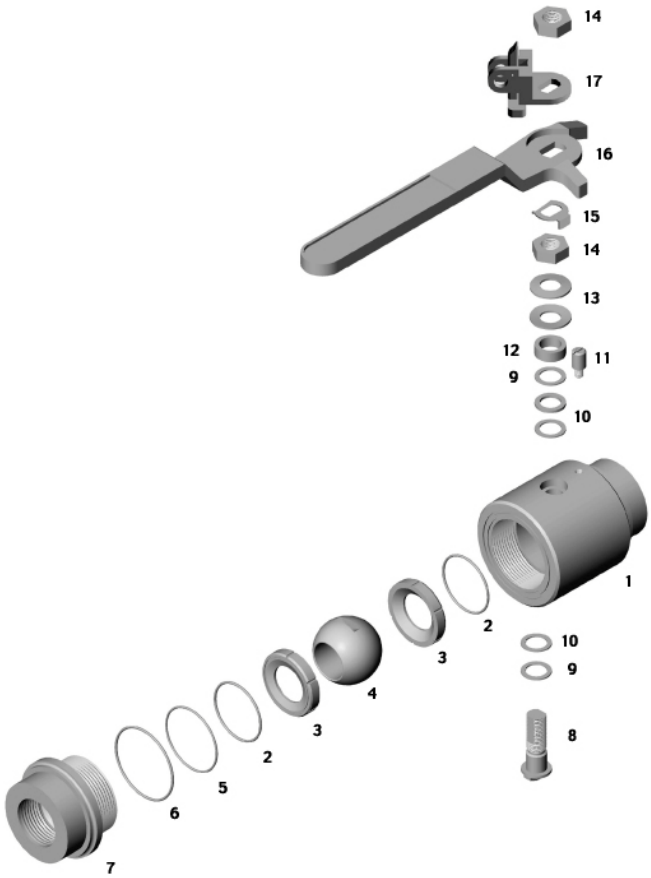
Internal Leak:

If the Valve presents internal leak (the fluid goes through it in closed position) it may be due to a wear on the seats or a scratch in the seats or ball. We suggest considering the next recommendations:

a) Some solid materials can clog between seat and ball. Operate the Valve several occasions to try to unblock these residues.
b) If your Valve has an actuator installed, check if it completes its own route and close perfectly, if not, maybe the Valve has and elevated torque or the actuator may be disaligned or defective. Verify that the voltage and/or air pressure of automation components is correct. If it is necessary, we recommend removing the actuator and manually operating the valve to check if this is the cause of the leak.
c) If the valve has an excessive torque, try loosing lightly the stem nut. If this is not enough or a stem leak appears, you must change the stem seals.
d) If the leak persists, disassemble the Valve following the steps 1 and 2 of the "installation" section.
e) Check carefully the seats and the ball, paying attention on the surfaces of mutual contact. Look for any clog material and any scratch or imperfection and in any case replace the damaged part. Also pay attention in the o-rings in the back of the seats.
f) Reassemble the Valve placing new seals according to steps 3, 5 and 6 of the "installation" section.

Note : *The seats made from harder material as Delrin, Peek, etc. are factory-adjusted during the valve assemble to get the softer torque without leaks. If you replace these kind of seats in the field and notice a dramatically higher torque of the valve, we recommend to reduce the height of the seats until get the desired torque. You can use sandpaper on a flat surface, moving the seats circularly over it avoiding a wavy or not flat back seat face.*

1. **BODY**
2. **BACK SEAT O-RING**
3. **SEAT**
4. **BALL**
5. **INTERNAL SEAL**
6. **EXTERNAL SEAL**
7. **PLUG END**
8. **STEM**
9. **THRUST BEARING**
10. **STEM SEAL**
11. **STOP PIN**
12. **FOLLOWER**
13. **BELLEVILLE WASHER**
14. **NUT**
15. **LOCK WASHER**
16. **HANDLE**
17. **LOCKING DEVICE (OPT)**



SAFETY :

WARNING !

Valves are actually pressure vessels, which can be dangerous if they are not properly calculated, selected, installed, maintenance and operated. To prevent risks, follow the next precautions :

1. **Always select the proper pressure rating of the Valve according with your application.**

Series	ANSI Class #	Maximum Operating Pressure psi (kg cm²)	
		Carbon Steel Body	Stainless Steel Body
6000	2500	6170psi (434 Kg/cm2)	6000psi (422 Kg/cm2)

2. **Always choose the appropriate materials for your application, by checking them in corrosion charts or consulting with our factory. An aggressive media can wear the Valve's metal, make it thinner and less pressure resistant. Aggressive media can destroy their seal capability as it can also attack soft elements (seats and seals).**

3. **Choose and protect the valve accordingly to the facility conditions. Remember that Carbon Steel Valves are subject to environment corrosion. Don't leave them in the open environment without proper protection. The Black Oxidized given in our factory is to protect them from corrosion during stock and handling exclusively.**

4. **Always use the appropriate equipment as gloves to handle and install valves, as some sharp ends can remain in the Valve. Valves can be heavy, use always appropriated equipment to handle it, including industrial shoes and back support. Extremely hot or cold media can be flown through the valve, placing you in risk if you touch it without protection. Also the valves can conduct extremely dangerous media, existing the risk of permanent injury to your person if any leakage in the piping system, including the valve. Always use the appropriate aids as gloves, safety glasses or mask to operate a valve.**

5. **Do not install or use the valve at the end of the line or in a safety loop.**

6. **Always review bolting torque and adjust as necessary after installation and before to operate the valve.**

7. **After operation, and even if the line has been shutdown, a dangerous pressure can remain into the Valve as Ball Valves can retain pressurized media in the body cavity when closed. Take care when disassembling. Always open the Valve to relieve pressure prior to disassembly. Depressurize, drain and vent the line before working with the valve.**

8. **Do not introduce your hands or other part of your body into the Valve, specially if the Valve has been automated, as the ball can spin suddenly and risk of bite or loose of part of your body can occur. Always depressurize, disconnect and disengaged automation components installed on the valve before you work on it.**

9. **Do not use non-OEM parts. No warranty will apply if you do.**

10. **Consult and follow all local rules applicable.**

Visit our web site : *www.worcester.com.mx*