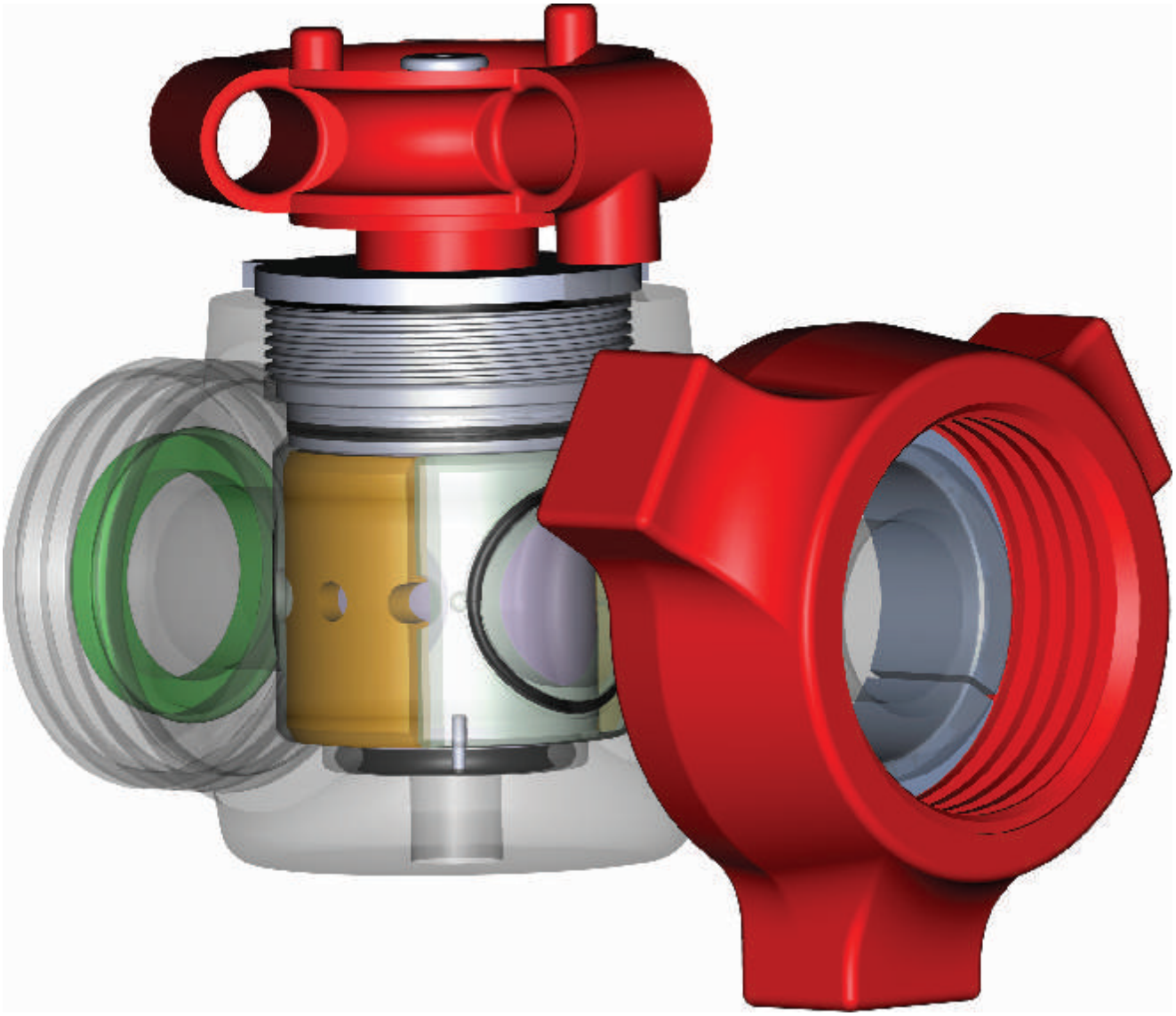
WEIR SPM

Excellent
Oil & Gas
Solutions

WEIR OIL & GAS

2″ Light Weight Plug Valve

Operating and Maintenance Instructions



SAFETY INFORMATION

WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED. READ THIS OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL BEFORE OPERATING PRODUCT.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR. FAILURE TO READ, UNDERSTAND AND FOLLOW THE OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

Contents

I. Product Description

Weir SPM's 2" Light Weight (LW) Plug Valve is engineered with one thing in mind: **Safety.**

It provides the following advantages to the Oil and Gas Industry:

- Compact/Lightweight Design
- Meets HSE Lifting Requirements*
- Easy Assembly/ Disassembly
- DNV Certified
- CE Compliant (97/23/EC)

***HSE compliant products offer a safe lifting weight of 55 lbs (25 kg) or less to be lifted and carried by one person.**

Like other Weir SPM high pressure plug valves, the 2" LW Plug valve is able to provide the same dependable service for applications such as:

- Acidizing
- Cementing
- Coil Tubing
- Fracturing
- Sand Control
- Well Kill

II. Pressure/Temperature Ratings

Pressure:

The 2" LW Plug Valve is rated for non-shock cold working pressures up to 15,000 PSI. This pressure is never to be exceeded in the field. Certified testing at Weir SPM subjects the new product to a one time test of 1.5 times the rated working pressure.

Field or customer controlled tests should be conducted with experienced personnel. Maximum working pressure should never be exceeded.

Temperature:

The maximum recommended operating temperature for the 2" LW Plug Valve is limited to the capability of the polymer seals to withstand elevated temperatures while maintaining seal integrity under pressure.

The accepted limit for the standard nitrile material is 230F (110C). Generally, chemical attack, gas absorbtion, compression set or tearing is accelerated in these conditions.

Minimum operating temperature of -22F (-30C) is acceptable for the nitrile seals materials.

Contact Weir SPM Engineering for any application involving higher temperatures.

Observe instructions, cautions, and warnings as noted in this manual. Failure to do so can lead to equipment damage, personnel injury, or loss of life.

III. End Connections

The 2” LW Plug Valve is available with Weir SPM wing union connections. The nameplate will indicate the cold working pressure allowable for each assembly.

Wing union connection on the plug valve is interchangeable with other union connections of the same size and pressure rating. Caution must be taken to avoid mixing in different ratings of wing connections. Failure to observe good judgment may lead to the failure of components and danger to personnel. Always verify working pressure ratings of each connection before use.

IV. Installation

Caustic and corrosive fluids will cause deterioration of internal surfaces including structural and seal members, leading to early seal failure and derating of structural components. The use of inhibitors in the service fluid along with routine flushing of components after each job will retard the effect of wear and tear on the product.

Internal friction in the plug valve is proportional to the working pressure and may vary significantly from one plug valve to the next.

The plug valve should not be used as a choke. This will quickly wash out any product and is not recommended by Weir SPM Engineering.

CAUTION

Weir SPM uses high strength, high alloy materials in their designs. This material does not comply with NACE MR0175 and is not suitable for sour gas application.

V. Maintenance

The 2" LW Plug Valve is made from high quality materials selected to provide the best service to the customer. However, the application of this product subjects it to handling fluids which are by their very nature corrosive and abrasive. These fluids operate at high velocities and usually at high pressures. Some fluids may also require being conveyed at elevated temperatures. Combinations of any and all of these conditions will speed up the deterioration of internal surfaces including seals and seal surfaces.

Without the benefit of scheduled maintenance to routinely service and inspect the condition of components, premature failure of parts can occur.

This can lead to unnecessary material replacement along with the danger of injury to personnel.

Proper knowledge and application of the plug valve is necessary for safe operation. It is recommended that a routine program include, at the very least:

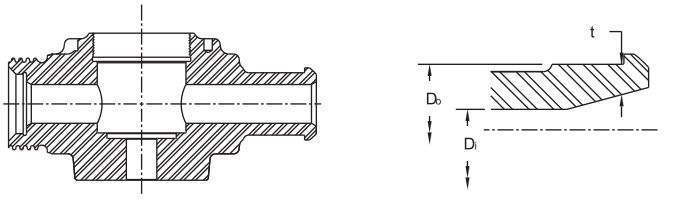
1. Inspection of wall thickness loss
2. Routine replacement of o-rings and seals
3. Scheduled greasing of the Plug Valve after every use with recommended lubricants:

   • *Climax 804X- (Temp Range -20F to 400F)*
   • *Val-Tex 972- (Temp Range -20F to 600F)*

Scheduled re-greasing is very important. Normal working operations will allow for grease loss if the plug valve is not maintained. This can create voids within the assembly. These voids will quickly accumulate sand and proppants thus increasing the force required to open/close the valve.

Frequent greasing will prevent the voids from occurring and will ensure easy operation of the valve.

Once the plug valve body wall thickness falls below the minimums listed in Figure 1 below, it must be removed from service. Wall thickness may be measured by mechanical, sonic, or visual means.



CONNECTION END	DESCRIPTION	PRESSURE RATING, PSI	t NEW WALL	t MIN WALL
Male End	2" SP150	15000	0.547	0.28

Figure 1: 2" LW Plug Valve minimum wall thickness

VI. Service

ALWAYS REMEMBER

1. DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH.

2. Clean all components thoroughly prior to re-assembly using protective clothing and safety glasses.

3. Check sealing areas of segments, plug and body for pitting or erosion. Failure in sealing can result if these areas are not smooth.

4. Reassemble with an approved valve assembly grease.

5. Use only 2" Weir SPM LW Plug Valve replacement parts to eliminate mismatched parts.

6. Use only Weir SPM body caps and actuator caps with Weir SPM LW Plug Valves.

7. Pressure test in accordance with instructions given in every repair kit prior to putting the valve into service.

8. Flush and grease valve thoroughly after each use.

Tools Required

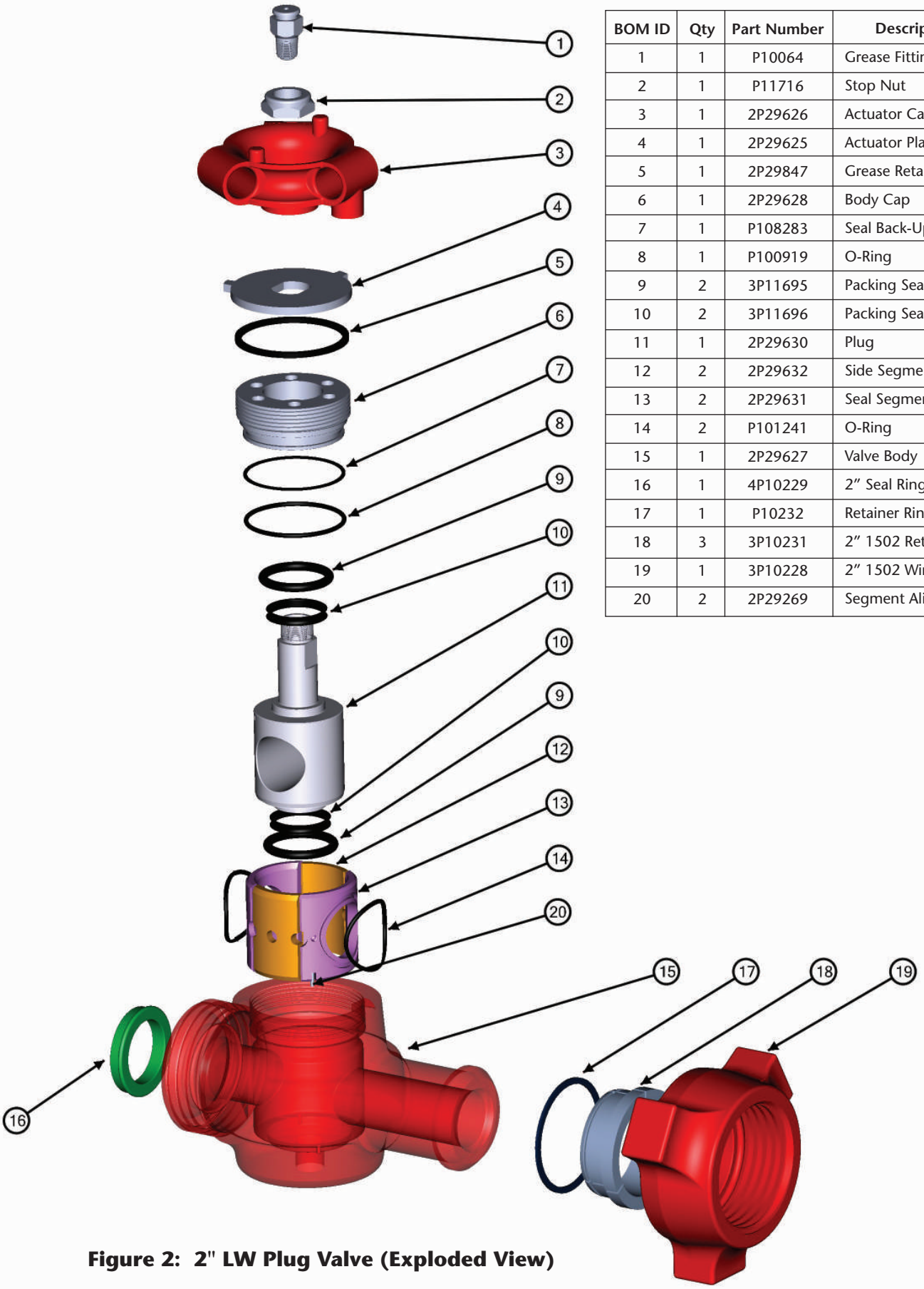
1. Body Cap Wrench (P/N 2A30360)
2. 400 Grit Sandpaper
3. Soft Face Mallet
4. Grease Gun (P/N P13335)
5. Stick Grease, Low Temp Service Climax 8204
   (P/N: P16832 - Single Tube)
   (P/N: P13337 - Case of 10 tubes)
6. Assembly Grease Climax 800XHK
   (P/N: P16740 - Single Canister)
   (P/N: P13336 - Case of 10 Canisters)
7. Protective Clothing and Safety Glasses

DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH

DISASSEMBLY

1. Make sure there is no pressure on the valve.
2. Remove grease fitting (1) from plug.
3. Remove Hex nut (2), holding Actuator cap (3) .
4. Remove Actuator cap (3), Actuator Plate (4) and Grease Retainer Gasket (5).
5. Using the proper body cap wrench (2P30029), remove the body cap (6).
6. Remove plug (11) by lifting while twisting it back and forth. Sometimes it is necessary to hammer lightly from the bottom.
7. Remove the side segments (12) and then the seal segments (13) . (The segments may have to be rotated and lightly pried or pulled on by a screwdriver or pliers)
8. Remove segment seal o-rings (14), plug seal rings (9) and back-up rings (10), body cap seal ring (8) and back-up ring (7).

VI. Service



BOM ID	Qty	Part Number	Description
1	1	P10064	Grease Fitting
2	1	P11716	Stop Nut
3	1	2P29626	Actuator Cap
4	1	2P29625	Actuator Plate
5	1	2P29847	Grease Retainer Gasket
6	1	2P29628	Body Cap
7	1	P108283	Seal Back-Up
8	1	P100919	O-Ring
9	2	3P11695	Packing Seal
10	2	3P11696	Packing Seal Back-Up
11	1	2P29630	Plug
12	2	2P29632	Side Segment
13	2	2P29631	Seal Segment
14	2	P101241	O-Ring
15	1	2P29627	Valve Body
16	1	4P10229	2″ Seal Ring
17	1	P10232	Retainer Ring
18	3	3P10231	2″ 1502 Retainer Segments
19	1	3P10228	2″ 1502 Wing Nut
20	2	2P29269	Segment Alignment Pin

Figure 2: 2" LW Plug Valve (Exploded View)

VI. Service (continued)

9. Clean all grease and foreign material from the valve and components parts.

REPLACEMENT AND REASSEMBLY

1. For best results and most efficient use of time, Weir SPM recommends complete kit replacement. If any old internal parts are to be reused, after de-greasing, inspect them for wear and corrosion.

2. If using used side and seal segments, thoroughly clean rust from sealing areas of seal segments that contact the plug and body. Scrape and lightly sand rust (with 400 grit sandpaper) from valve body surfaces which touch the center portion of the seal segments.

3. Using 400 grit sandpaper, clean all other seal surfaces.

4. Visually inspect all new parts and remove any foreign contaminants.

5. Clean valve body; install both pins into valve body with small punch and hammer.

6. Apply a thin film of assembly grease on OD of seal segments (13), seals and ID of body (15). If excessive grease is used, it can make the plug hard to start or dislodge the segment seal rings.

7. Using a punch and hammer, insert (2) segment alignment pins (20), into their respective holes inside the plug valve body (15).

8. Install seals (14) in seal segment grooves and install seal segments and side segments (12) in valve body (15). Seal segments should always be installed in pairs from the same manufacturer.

7. To test passages, pump grease into plug until clean grease exits grease passages.

8. Coat plug liberally with assembly grease and install top and bottom packing seal (9) and packing seal back up rings (10).

9. Install plug (11) into valve. You should be able to install plug by hand. If necessary a soft face mallet may be used to lightly tap plug in.

10. Install body cap seal (8) and backup ring (7), where required, onto body cap (6) with valve assembly grease.

11. Install body cap in valve. There is a difference between the Weir SPM body cap and that of other manufacturers.

12. Replace actuator cap (3) and grease retainer gasket (5). Tighten stop nut (2) until snug. Install grease fittings (1) into plug using Teflon tape or pipe dope and tighten to 50-60 ft. lbs. There is a difference between the Weir SPM actuator cap and that of other manufacturers.

13. With valve in open position, pump valve full of assembly grease, P16832, (Usually 15 to 20 pumps is sufficient). The valve is full when grease flows from bore.

14. Test valve per instructions included in every repair kit. Use only Weir SPM body caps in Weir SPM 2" LW Plug Valves.

WARNING: MISUSE, IMPROPER MAINTENANCE OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

VALVE TEST PROCEDURES

Upon final assembly or reassembly of valve, a pressure test is to be performed as follows:

NOTE: Prior to any pressure testing all air must be evacuated from the valve and pressure apparatus. Failure to do so could result in personnel injury or death and/or severe damage to the valve.

1. Both ends of the valve are to be capped. Both caps must have pressure access ports as shown in Figure 3 below. Valve is to be tested so as to have pressure applied to both sides of plug - hence the need for pressure access ports at both ends of the plug.

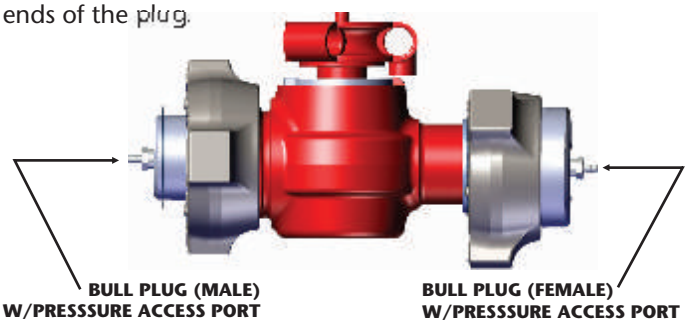


Figure 3: Pressure Access Ports

2. With caps in place and valve in the "OPEN" position and filled with liquid - (all air must be evacuated from valve at this point) - pressure valve slowly to maximum working pressure and inspect for visible signs of leakage, or failure to maintain pressure at the gauge.

3. Reduce pressure to zero and place valve in "CLOSED" position.

4. With the valve in "CLOSED" position - (again air must be evacuated from valve and system) - apply pressure slowly to one side of the valve, leaving the opposite side open, to a pressure equal to the maximum non-shock cold working pressure of the valve and maintain for a period of at least 3 minutes. Open and shut the valve. Re-pressurize the valve to its maximum non-shock cold working pressure and maintain for an additional 3 minutes. Inspect the valve during this procedure for any signs of leakage. Bleed the pressure off of the valve.

5. Reverse the valve and reconnect the pressure source to the opposite side of valve and repeat step #4 making sure all air is evacuated from valve and system.

6. Consult Weir SPM Engineering on any valve not performing properly during any phase of test or operation.

SAFETY GUIDE FOR PLUG VALVES

!!WARNING!!
MISUSE, SIDE LOADING, IMPROPER MAINTENANCE, OR DISASSEMBLY UNDER PRESSURE CAN CAUSE SERIOUS INJURY OR DEATH!

The following information is given in good faith and should aid in the safe use of your Weir SPM products. This information is not meant to replace any existing Company's safety policies or practices. It is important to read and understand the "General Safety Data for all Weir SPM Products" and the Weir SPM Product Safety Guide for "Union and Union End Products". Both of these are available from Weir SPM.

Personal Responsibilities:

A-1 When using these assemblies, safety glasses, approved safety shoes and hard hat must be used. Hammering and lifting these assemblies must be done with caution. Where unions are present, read and understand the Weir SPM Safety Guide for Unions and Union End Products.

A-2 Personnel should only hammer on makeup lugs and not strike union nut or valve body. Fractures can occur from repeated misuse. Excessive hammering can damage components.

A-3 Proper leg lifting should be used when lifting. Back lifts should be avoided.

A-4 Only the proper actuator bar should be used to turn Weir SPM plug valves. Valves require torque to operate. Makeshift bars can become dislodged easily and cause an accident. Use only a Weir SPM actuator bar, part number 3P11542, for 2" Plug Valves. It is a personal responsibility to become knowledgeable and trained in the proper use and handling of this tool.

A-5 Do not hammer on, or be around valve assemblies when pressure is present.

Hand actuation (with the appropriate actuator bar) should be done only by specially trained personnel under direct supervisory instruction; and only when necessary due to application.

On Location:

B-1 Proper transportation of plug valves is important. Racks that will secure valves and prevent accidental unloading are critical.

Never transport any Weir SPM product in a fashion that would allow it to become dislodged and cause an accident.

B-2 Valve unions should be clean and lightly oiled prior to each use. A visual inspection for damage should also be performed at this time. Union seals should be checked, and replaced when worn or damaged.

B-3 Each valve has a size and pressure code designated on the valve. Use this code for proper mating and pressure limits.

CAUTION
SINCE PLUG VALVES MAY BE REPAINTED IN DIFFERENT COLORS FOR VARIOUS APPLICATIONS, DO NOT USE FACTORY COLOR AS PRIMARY MEANS OF IDENTIFICATION.

B-4 Valve usage should be monitored by a qualified supervisor or foreman. Supervisory personnel must approve proper placement, position, and handling of all plug valves in the system. Only specially trained personnel under direct supervisory instruction, should actuate valves under pressure.

B-5 Prior to applying pressure, valves should be greased in both the opened and closed position. This should be done before each use. If valve is excessively hard to operate, it should be removed and not used until repairs are made.

B-6 It is sometimes necessary to turn valves when pressure is present. It is recommended that remote control actuators be used for this purpose. If this is not feasible, then only experienced specially trained personnel under direct supervisory instruction should perform this task.

B-7 Venting flammable or explosive gases to the atmosphere through individual Weir SPM plug valves must be avoided. Choke manifolds are available from Weir SPM and should be used for this purpose. If used for bleeding, ample anchoring of the valve manifold must be done. Specially designed torture valves are available from Weir SPM for bleed off applications.

GASES OR FLUIDS CONTAINING GASES WILL CAUSE VALVES TO WHIP AND CAN CAUSE SERIOUS INJURY OR DEATH!

B-8 When opening a Weir SPM plug valve under pressure, the initial torque to start the stem turning is always greater than the moving torque. You must position your body to be able to compensate for this change.

B-9 Do not position any part of your body in the path of exit flow of the valve.

B-10 Do not position the exit of any plug valve, used for bleeding, where rocks or debris may be picked up by the exit stream.

B-11 If any valve becomes plugged, or does not operate properly, contact a supervisor immediately. DO NOT look into the end of the valve to check for debris, blockage, or for any other reason.

B-12 If valve is slow to open or close, remove it from service. Do not hammer on the valve's actuator cap.

B-13 It is recommended that a rate in excess of 42 feet per second be avoided. Rates above this will cause a more rapid wear and erosion.

B-14 Flush clean and grease after each job with water and the proper Weir SPM valve grease. Use only a Weir SPM pressure rated gun for greasing.

Special Precautions:

C-1 Welding, brazing, or heating on Weir SPM plug valves is prohibited.

C-2 Valve operation sometimes requires personnel to be around pressurized lines. Experienced personnel only should be dispatched for this purpose. Exposure time should be a minimum. Always use remote controlled valves whenever possible. Never look into, or position yourself in, the path of the exit flow of the valve.

C-3 Never alternate a valve's service. Acid service should never be followed by cold temperature service. When acid etching or erosion is present, replace the valve.

C-4 Weir SPM offers specially designed valves for torture service, cold temperature service, H_2S service, and aromatic service. Only valves designed and approved for these special services should be used in these applications.

C-5 Each integral union connection is clearly marked with a pressure code (i.e. "1502", 15,000 psi). This pressure must not be exceeded. This code should also be used with mating unions. Improper mating can result in failures. All integral union connections must match (according to size, pressure rating, etc.). These connections must also match the service of the designated string they are installed in.

Inspection - Repair - Testing:

D-1 Valves should be greased after each use. Use only the following Weir SPM gun and grease.

Lube Grease: Low Temperature: P16832
Gun Assembly: P13335

D-2 Any alteration of the Weir SPM valve is prohibited.

D-3 Use only repair methods as outlined by Weir SPM valve service literature. Use only the proper Weir SPM repair tools.

D-4 Weir SPM Repair Kits should be used for repair. Valve Body and all components must be clean and Weir SPM assembly grease used as recommended.

Assembly Grease:

Low Temperature: P16740

D-5 Weir SPM does not allow weld repair to be attempted on its product. Replacing worn components is a more effective and safe approach.

!!CAUTION!!
THE RATED WORKING PRESSURE IS NOT TO BE EXCEEDED DURING SERVICE OR FIELD TESTING

TROUBLESHOOTING GUIDE

The following is intended as a general guide in helping resolve most problems encountered in repairing plug valves.

PROBLEM	SOLUTION
1. Valve leaks through bore when closed.	a. Seal segments from two different manufacturers have been installed. (ALWAYS REPLACE SEGMENTS IN PAIRS FROM THE SAME MANUFACTURER.) **Always use Weir SPM LW Plug Valve segments in Weir SPM LW Plug Valves.** b. Sealing area of segments or body scored or pitted. Resurface with 400 grit sandpaper or replace segments and/or body. c. Plug scored or worn. Replace plug. d. ID of body or OD of seal segments not cleaned properly. Remove parts and clean out any contaminants. If the ID of the body is not cleaned properly this will not let the O-ring or seal segments seat properly. ID of body may be too pitted to reuse. e. Segment seal left out, not properly installed, or damaged during assembly. Remove segments, inspect seals and reinstall or replace as necessary. f. Wrong actuator cap installed forcing plug to tilt to one side. Insure actuator cap is from same manufacturer as body. **(Always use Weir SPM actuator caps on Weir SPM valves.)**
2. Valve will not fully open.	Worn or damaged actuator cap or actuator cap not Weir SPM. Remove and install Weir SPM actuator cap. **(Always use Weir SPM actuator caps on Weir SPM valves.)**
3. Valve leaks at body threads.	a. Body cap not tight. Re-tighten. Cap should bottom out. b. Body cap O-ring scored or cut or no longer maintains seal. Replace O-ring. c. Body cap damaged or worn. Replace cap. **(Always use Weir SPM body caps in Weir SPM valves.)** d. On 2" valves, back-up ring not installed. Install back-up ring above the O-ring with concave surface touching the O-ring. e. Seal area scored or pitted in body. Clean up with 400 grit sandpaper or replace body
4. Seals swollen and softened or tacky.	Avoid solvents. Buna-N seals are not compatible with solvents such as toluene or xylene. If Buna seals are used, replace with Viton.
5. Lower edge of plug chipped.	Always start plug into valve upon reassembly by hand to align chambers on plug and seal segments. Hammering plug before it is properly started can chip the plug's leading edge and often score or damage the seal segments. Use only soft type hammers.
6. Valve leaks out the bottom.	a. Body cap not Weir SPM. Remove and reinstall Weir SPM body cap. Weir SPM bodies and body caps are designed differently to eliminate leaky cap problems. **(Always use Weir SPM body caps in Weir SPM valves.)** b. Actuator cap not Weir SPM. Remove and re-install Weir SPM actuator cap. (ACTUATOR CAPS FROM COMPETITIVE VALVES WILL NOT WORK PROPERLY ON WEIR SPM VALVES. (Always use Weir SPM actuator caps in Weir SPM valves.) c. Plug seal O-ring and back-up ring on bottom of plug not seated properly. Remove plug and reinstall O-ring and Nylon back-up ring.
7. Valve leaks around plug top stem.	a. Top plug seal O-ring and back-up scored or not seated properly. Replace or re-install. b. Body cap not properly tightened. Re-tighten snugly until it bottoms out. c. Body cap damaged or worn. Replace. d. Body cap not Weir SPM. Remove and re-install Weir SPM body cap. Weir SPM bodies and body caps are designed differently to eliminate leaky cap problems. **(Always use Weir SPM body caps in Weir SPM valves.)**
8. Valve binding up. Hard or impossible to open or close.	a. ID of body not clean. Clean body and components. Re-assemble. b. Pins that hold detent spring may be interfering with actuator cap. Re-tighten pins in body. c. Actuator cap is not Weir SPM or is worn. Remove and install Weir SPM actuator cap and felt gasket. **(Always use Weir SPM actuator caps on Weir SPM valves.)**

If problems not covered here are encountered, contact Weir SPM for assistance.

NOTES:

NOTES:

SAFETY INFORMATION

WARNING

IMPORTANT SAFETY INFORMATION ENCLOSED. READ THIS OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL BEFORE OPERATING PRODUCT.

IT IS THE RESPONSIBILITY OF THE EMPLOYER TO PLACE THE INFORMATION IN THIS MANUAL INTO THE HANDS OF THE OPERATOR. FAILURE TO READ, UNDERSTAND AND FOLLOW THE OPERATING AND MAINTENANCE INSTRUCTIONS MANUAL COULD RESULT IN SEVERE PERSONAL INJURY OR DEATH.

Weir SPM

7601 Wyatt Drive
Fort Worth
TX 76108
USA

Tel: (817) 246 2461
Fax (817) 246 6324

www.weiroilandgas.com

V.2 09/11