1. Purpose

This Document provides information on maintenance requirements, frequencies and procedures for plug, ball and gate valves (here in after referred to as valves) installed in PG&E's gas systems.

2. Valve Maintenance Schedule

A schedule for valve inspection and maintenance shall be established by the responsible operating department. Mandatory work requirements and frequencies, and guidelines on additional recommended inspection and maintenance, are as follows:

A. New Valves

All valves shall be inspected prior to installation. Valves which require lubrication shall be lubricated prior to installation. Some valves are designed to be operated without lubrication, but are provided with lubrication systems to facilitate obtaining a good seal if the valve is worn. These valves should not be lubricated unless it is determined in the field that lubrication is necessary for proper operation. Once these valves are lubricated, they must continue to be periodically lubricated to assure reliable operation.

B. Manually Operated Valves

Manually operated valves in gas transmission and distribution systems must be inspected, serviced, lubricated (where required, see Paragraph 2.A.), and operated (see Paragraph 3.A.1.) at least once each calendar year as specified in Paragraph 2.E. unless a valve is not necessary for the safe and reliable operation of the system.

The responsible operating department shall identify all valves which are necessary for the safe and reliable operation of the system and ensure that these valves are properly maintained. Sectionalizing or isolation valves, regulator station block valves, and blowoff valves are usually required for safe and reliable system operation as are most other system valves. Valves which might be required in any type of emergency situation are necessary for safe system operation. If a valve requiring lubrication is not lubricated regularly, it may not be operable or seal adequately when needed.

C. Power Actuated Valves

Maintenance of power actuated valves installed in PG&E's gas system must, at a minimum, comply with paragraph 2.B. requirements for manually operated valves. However, it is recommended that more stringent maintenance schedules be adopted due to the added complexity of valve actuation and control, the use of power actuated valves in throttling applications, and because these valves are typically more critical to system operation.

It is recommended that power actuated isolation and block valves be inspected, serviced, lubricated (unless exempted by Paragraph 2.A.), and operated (see Paragraph 3.A.1. below) at least twice each calendar year as specified in Paragraph 2.E.

It is recommended that power actuated regulating valves on standby (not required to regulate during normal operations) or power actuated valves used for overpressure protection (monitors) be partially operated and inspected once a month, and serviced and lubricated (unless exempted by Paragraph 2.A.) at least twice each calendar year as specified in Section 2.E.

It is recommended that power actuated ball and plug valve regulators used frequently during normal operations be lubricated and inspected at least once a week.

D. Modification of Valve Maintenance Schedule

The valve maintenance timetables specified in Paragraphs 2.B. and 2.C. should be modified to provide additional inspection, servicing and lubrication when necessary due to frequent operation of valves or special operating conditions. The recommended timetables for power actuated valves are guidelines and may also be modified to reduce maintenance frequencies when operating conditions allow.

E. Scheduling of Maintenance – Anniversary Month

1. An annual "anniversary month" shall be established by the responsible operating department for the inspection and maintenance of each valve covered by Section 2. The "anniversary month" is the calendar month in which the inspection and maintenance required in Section 2 is scheduled. Except as permitted by Paragraph 2.E.4., the "anniversary month" shall be based on the month in which the valve was placed in service, or for valves

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installed prior to 1983, the month in which the last inspection and maintenance in 1983 was performed, and shall be the same month each subsequent year.

2. Where maintenance at least **twice** each calendar year is determined to be necessary, a **second** anniversary month should be established as the sixth month after the first annual anniversary month established in Paragraph 2.E.1.

3. The inspection and maintenance required by Section 2 shall be scheduled for the anniversary month(s). However, depending on the circumstances, the scheduled maintenance work may be performed in the month preceding or following the anniversary month, provided that the annual or semi–annual requirements of Section 2 are met. Performing the work during the month prior to or the month following the anniversary month does not require changing the anniversary month.

4. A new anniversary month(s) for scheduled maintenance may be established by performing the required inspection and maintenance during a month which is earlier than the anniversary month. A new anniversary month may **not** be established by performing the scheduled maintenance during a month following the established anniversary month.

3. Lubrication Procedure

A. General

1. When servicing a valve as required in Section 2, the valve shall be operated (or "stroked") through its complete range when operating conditions permit. When operating conditions do not permit full operation of the valve, it shall be stroked through the maximum range that is practicable, and for normally closed valves, never less than the amount required to establish flow through the valve.

2. ***Any*** *problem experienced with the operation of* ***any*** *of the valves, either during scheduled maintenance or at any other time, shall be reported on a Material Failure Report* (S.P. 460.21–7).

3. Valves equipped with buttonhead lubricating fittings are to be lubricated, when required, with a high–pressure grease gun equipped with the appropriate pressure gauge. Valves equipped with lubricant screws are to be lubricated with stick type lubricants. All lubricants must be clean and be the specific lubricants **specified by the valve manufacturer.** Use of lubricants not recommended by each manufacturer voids their warranty and leaves PG&E vulnerable in any potential lawsuit involving third party damages considered caused by valve leakage. Refer to the manufacturer's lubrication instructions for proper use of lubricants.

   Note: Resun and Walworth plug valve manufacturers have permitted the use of Rockwell lubricant 1033. (See Paragraph 3.B.16.).

   Each valve requiring lubrication for normal maintenance shall be lubricated as required by Section 2.E. Service conditions may require more frequent lubrication of some valves. (See Paragraph 2.D.).

4. Optional: A tag may be attached to the valve to indicate if lubrication is required. If the valve does require lubrication, the tag shall state the type of lubricant, frequency of application, and the last date work was performed.

5. When block and bleed type valves are exposed to water, condensates, or other foreign matter, the valve body should be drained to prevent damage to the valve, **especially after hydrotests.**

6. If a valve is difficult to operate, then flushing out the old lubricant may be necessary. On plug valves, it may be necessary to make a plug adjustment per the manufacturer's recommended procedure, in order to get the valve to operate properly. See Section 4 for valve flushing procedures and approved valve flushes.

7. If the steps mentioned in Paragraph 3.A.6. are not successful in fixing a "difficult to operate" valve, then the injection of limited amounts of Sealweld 5050 is acceptable. Also, valves requiring the use of Sealweld 5050 to operate satisfactorily should be scheduled for replacement as soon as economically feasible.

8. As part of the maintenance program on valve–operator combinations, a continuing record should be maintained of the torque or the time required to close and open the

valve. Plotting this information over a period of time will show changes in torque or time required to open and close the valve which can indicate wear or binding in the operator or problems with the valve.

B. Plug Valves

1. Plug valves should always be lubricated in the fully open or fully closed position. In either of these positions, all grease grooves in the body are connected with the circular grooves at the top and bottom of the plug, and the surface of the plug is mated to the walls of the body. This assures a full and even spread of lubricant over all the services so that it can act as a bearing interface as well as a sealant. Multiport valves have special lubrication systems and should only be lubricated in one of the 90° positions. Where operating conditions permit, the valve should be turned through its complete range or through the maximum range which is practicable, as described in Paragraph 3.A.1.

   Plug valves used as regulators, which are backed up by monitor valves, should be put in the the fully open position for lubrication, permitting the monitor valve to take over the control function. Plug valve monitors should be lubricated in their normal fully open position.

2. During the first days of operation or after a significant operating change, a plug valve used as a regulator should be observed very closely. If the valve is cycling often, lubrication should be performed as frequently as every other day (see Paragraph 2.C. for normal maintenance).

3. If a valve plug is stuck, lubricant should be injected to free it if possible. After lubrication, the valve should be operated until it turns freely. If lubricating the valve fails to get it to turn freely, the valve must be flushed as specified in Section 4. It may be necessary to make a plug adjustment per the manufacturer's recommended procedure, in order to get the valve to operate properly.

4. Proper lubrication is indicated when the pressure gauge shows steadily increasing pressure with each stroke of the lubricant gun until the pressure gauge reading no longer rises but begins to drop and the pumping effort decreases. At this point the valve has been sufficiently filled and lubricant injection should be stopped.

5. Lubricant pressure on the gauge should read a minimum of 2,000 psi for any plug valve, with pressures not to exceed 5,000 psi when lubricating semi–steel valves, and 12,000 psi when lubricating steel valves. Very low pressure or no static pressure on the gauge indicates one of the following troubles:

   (a) The gun is empty.

   (b) The valve plug is loose.

   (c) The gun is malfunctioning and should be checked. No repairs are to be made to the hydraulic system. If the gun is unsatisfactory, an order shall be issued for its reconditioning.

6. If excessive clearance exists between the plug and the body due to the adjustment gland or adjustment screw being backed off too far, the lubricant migrates into the pipeline, and the lubricant pressure will not build up properly.

7. If a high pressure is immediately built up, it may indicate a defective lubricant fitting, which would prevent lubricant from getting into the valve.

   Caution: *Coupler should not be attached or detached while gun is under pressure.* Gun pressure should be relieved by opening the by–pass valve.

8. The practice of loosening adjustments to obtain a temporarily free turning plug will invariably result in undesirable secondary effects. The secondary effects of improper plug adjustment is as follows:

   (a) Leakage

   (b) Entrance of foreign or abrasive materials between the plug and seat, resulting in damaged sealing surfaces

   (c) Higher torque characteristics as damage occurs

   (d) Possible gear and operator damage as torque becomes excessive

   (e) Ultimate need for valve replacement

9. The adjustment of the valve gland on fixed adjustment gland valves are generally not necessary and should not be made except as specified by the manufacturer.

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10. When the valve plug is not properly seated or when lubrication is not effective in loosening a tight valve, and an approved valve flush has been used, the gland adjustment nuts should be tightened. This tightening will seal off lubricant leakage and will help develop the proper hydraulic pressure system during lubrication. The tightening operation should **not** be attempted without consulting the manufacturer unless the operator is experienced with this particular adjustment (never loosen the packing gland prior to lubrication).

11. Valves of the Rockwell Hypreseal type have an adjustment screw in the bottom cover. This screw is adjusted at the factory to strict specifications. To prevent tampering, a cover is welded over this screw. It should not be necessary to adjust the screw position in the field.

12. The lubrication screw must not be left in the plug stem beyond complete engagement of the threads, otherwise a pocket will be provided where water, dirt, or corrosion products could collect and make the lubricant screw difficult to remove.

13. When specified adjustments to adjustable valves are unsuccessful and proper lubrication cannot be obtained, or when an inoperable plug valve requires adjustment, a Material Failure Report shall be submitted (S.P. 460.21-7).

14. Prior to installing any lubricated plug valve, it must be inspected and lubricated. This is to assure proper flow and distribution of lubricant throughout the valve body (and lube extension pipe if used) before installation. This should be done by construction personnel in cooperation with the operating personnel responsible for the station after construction. If a valve is found to be operating improperly, a Material Failure Report shall be submitted.

15. The specified types of general purpose lubricant for plug valves are listed in Tables 1-3 on Page 6. Use **only** the manufacturer's recommended lubricants, as shown in the table, for each valve. Standard sizes and packages of approved lubricants are available by specifying the code number shown.

    Caution: *Routine use of Teflon bearing lubricants in plug valves must be avoided.* Teflon particles can clog orifices in the Company's pneumatic control equipment and customer's appliances, resulting in serious problems.

16. Rockwell sealant 1033 has been added to the list of recommended lubricants for Resun and Walworth plug valves. Such use will not void the manufacturer's warranty.

17. Comparison of Rockwell lubricants.

    Rockwell lubricants 1033 and 386 are quite different in chemical formulation, but for natural gas, both perform very similarly. The 1033 is slightly more viscous, providing a better seal in a worn or poorly adjusted valve, and less loss of sealant during operation. However, it is slightly harder to pump. Also, the 1033 is much more resistant to being dissolved by organic solvents, and would, therefore, be preferred if hydrocarbon condensates in the pipeline are known to be a problem.

    On the other hand, 386 is much more resistant to inorganic chemical attack (acids, bases and other chemicals). This is not likely to be an issue for gas pipelines. The 1033 lube has a higher temperature rating than the 386, but the 386 is stable up to at least 250 degrees F., so this is not a significant issue for gas pipelines.

    Rockwell lubricant 555 is no longer recommended by the manufacturer since its clay base composition may cause hardness over time.

Table 1 Recommended Lubricants for Rockwell Plug Valves [1]

Lubricant Fitting Type	Thread Size (Inches)	Lubricant form Designation (Units per Box)	Codes [2]	
			Rockwell #386	Rockwell #1033
Threaded	1/2	B (24) Stick	503072	Not Available
	3/8	C (24) Stick	503073	Not Available
	1/2	D (24) Stick	503074	Not Available
	3/4	G (24) Stick	015596	Not Available
Button Head Fitting [3] (See Note 1)		K (12) Stick GP (6) Gun Pack [4]	015597 015594	015585 015593
		GP (6) Gun Pack J (6) Stick Cartridge (4) [5]	015594 503076 015579	015593 015540 015564
		Bulk (1) 5 Quart can [6]	503100	034873

1 Colors of Rockwell Lubricants:
No. 386 ⇒ Cream
No. 1033 ⇒ Green
2 See Paragraph B.17 for a comparison of Rockwell lubricants
3 Requires Lubricant hand gun
4 Use with No. 400A hand gun
5 Use with No. 400D hand gun
6 Use with Hypregun

Table 2 Recommended Lubricants for Walworth Plug Valves [1]

Lubricant Fitting Type	Thread Size (Inches)	Valve Size (Inches)	Stick or Cartridge Designation (Units per Box)	Code Numbers for Specified Lubricants	
				Walseal #1	Walseal #2
Threaded	1/4	1/2–2	B (24) Stick	015555	015561
	3/8	2-1/2–3	C (24) Stick	015556	015562
	1/2	4	D (24) Stick	015557	015563
	3/4	6 and Up	G (24) Stick	015558	503109
Button Head Fitting [2]	-	-	Jumbo Stick (6) [3]	015559	015573
			Cartridge (1) [4]	015560	015574

1 Colors of Walworth lubricants:
No. 1 ⇒ Light Brown Color
No. 2 ⇒ Black Color
2 Requires Lubricant hand gun
3 Use with No. 1699 hand gun
4 Use with No. 101 hand gun

Table 3 Recommended Lubricants for Resun Plug Valves [1]

Lubricant Fitting Type	Thread Size (Inches)	Valve Size (Inches)	Stick or Cartridge Designation (Units per Box)	Codes	
				Resun #62	Resun #62G
Threaded	1/2	1–3	62 or 62G (24)	015575	-
	3/4	6 and Up	62 or 62G	015576	-
Button Head Fitting [2]	-	-	1-1/4" x 9" (4) Gun Stick [3]	015577	-
			1-1/2" x 8" (1) Gun Cartridge [3]	-	015578

1 Colors of Resun Lubricants:
No. 62 (Stick) ⇒ Black
No. 62G (Cartridge) ⇒ Black

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C. Ball Valves

1. All pipeline ball valves 2" and larger shall have a body cavity drain fitting and lubricant injection fittings. For buried service; these fittings shall be extended above ground using Grade B schedule 80 seamless steel pipe.

2. Rockwell Hypresphere Ball Valves (old floating ball model manufacture ended in 1973):

   (a) Lubrication of the Hypresphere valve must be done when the valve is fully open or fully closed. Three lubricant fittings will be found on certain sizes, one for each seat and one for the stem. All valves should be kept lubricated for satisfactory operation, with attention given to thoroughly lubricating the seat on the low pressure side of the valve, especially if the valve is difficult to operate.

   Caution: *When a valve is closed and the line is blown down on what is normally the upstream side of the valve, seat reversal occurs. Before the line is pressurized and returned to service, lubricate* ***both*** *valve seats.*

   (b) Rockwell's specified lubricant for Hypresphere valves is Rockwell No.386 or No. 1033. Do not use any other lubricant on Rockwell valves.

3. Rockwell TM Hypresphere Ball Valves (new model, Trunnion Mounted Ball manufactured since 1972):

   (a) The Rockwell TM Hypresphere ball valve is designed to require no lubrication for tight shutoff. However, as noted below, periodic maintenance should be performed according to a schedule that is designed to keep the valve in good working order. Longer seat life and easier operation can be obtained if lubricant is injected periodically.

   (b) The valve has a lubricant injection system to provide a backup seat seal should the seats become damaged and tight shutoff cannot be obtained. Both valve seats have lubricant injection fittings on the sides of the valve body. In addition, there is a lubricant injection fitting at the base of the valve stem to provide a secondary stem seal. Valves smaller than 20" and larger have five.

   (c) Although lubricant injection is not necessary for shutoff, Rockwell states that "periodic lubricant injection with approved Rockwell lubricants helps maintain good operating conditions and minimizes wear and abrasion on the seats and ball." Depending on the severity of the service environment, it is recommended that lubricant be injected on six month or less intervals.

   (d) Rockwell TM Hypresphere ball valves should be lubricated prior to installation. This should be done by construction personnel in cooperation with the operating personnel responsible for the station after construction. The valves should be visually checked for excretion of lubricant around the ball port and valve body. This is to assure proper flow and distribution of lubricant throughout the valve body (and lube extension pipe if used) before installation. Lubrication should be performed as often as necessary to ensure smooth operation when the valve is being throttled. The valves should be lubricated in the closed position if possible. Any problem experienced with the operation of these valves, either during scheduled maintenance or at any other time, shall be reported on a Material Failure Report (S.P. 410.21–7).

4. TK and Grove Ball Valves

   (a) TK and Grove Model B–4 and B–5 ball valves are designed to require no lubrication for bubble tight shutoff. Valves **not** used as monitors or standby regulators should be lubricated, using the fittings provided, only if positive shutoff cannot otherwise be obtained. Valves which do not provide positive shutoff should be checked for possible valve seat or ball damage. Once the valve is lubricated, lubrication must be performed to obtain positive shutoff.

   (b) The manufacturer's specified lubricant for shutoff on TK and Grove Model B–4 and B–5 ball valves and for Grove BVR–4 and BVR–5 ball valve regulators is Sealweld No. 911, (Cartridge Code No. 015571). Do not use any other lubricant on Grove ball valve regulators.

   (c) Grove Model BVR–4 and BVR–5 ball valve regulators should be lubricated prior to installation. Lubrication should be performed by construction personnel in cooperation with the operating

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personnel responsible for the station after construction. The valves should be visually checked for excretion of lubricant around the ball port and valve body. This is to assure proper flow and distribution of lubricant throughout the valve body (and lubricant extension pipe if used) before installation.

After release to operation, lubrication should be performed as often as necessary to ensure smooth operation when the valve is throttling. The valves should be lubricated in the closed position if possible. Any problem experienced with the operation of these valves, either during scheduled maintenance or at any other time, shall be reported on a Material Failure Report (S.P. 410.21–7).

(d) Grove regulating valves with retractable seats (commonly known as Arcron Model) must not be lubricated, as this would destroy the retractable seat feature. The valve has no lubrication fittings to lubricate the valve seats. It does, however, have Zerk fittings under the Arcron cover for lubricating the operator. Sealweld No. 911 lubricant should be used to grease these fittings.

(e) Prior to installing any TK or Grove ball valves, all body reliefs should be removed and plugged. These are only necessary for valves in liquid service. Use a steel plug with a pressure rating at least equal to that of the valve. Also, the **shipping tabs** and **lifting eyes** should be removed and **all** body bolts tightened.

5. WKM Dynaseal Ball Valves

(a) The WKM Dynaseal ball valves are designed to require no lubrication for bubble tight shutoff. However, it may be necessary to inject lubricant (Emergency Seat Renewal), if the seats become damaged. The recommended lubricant for shutoff is WKM Lubricant No. 103, or an approved equivalent, such as Rockwell No. 386 or No. 1033. Close the valve and inject lubricant at both seats under block and bleed conditions.

(b) Should a leak develop around the stem, it can be stopped under pressure by injecting WKM plastic stem packing No. 107.

6. Cameron Ball Valves

(a) The Cameron all welded ball valve does not require lubrication or any maintenance. The valve is sealed for life. Seals and stem bearings are self–lubricating and are designed for the life of the valve. Although lubricant injection is not normally necessary, periodic injection of lubricant helps maintain the valve in good operating condition and minimizes wear and abrasion on the seats and ball.

(b) The valve has lubrication injection ports with check valves to provide a backup seat seal should the sealing surfaces become damaged and tight shutoff cannot be obtained.

Note: 2" to 4" valves have a smaller button head fitting requiring a 5/8" coupling on the hand gun.

(c) The injection system can also be used for flushing of the seat ring area when this may be required.

(d) If the primary seats become damaged, it may be necessary to inject lubricant through the lubricant injection fittings. The recommended lubricant for Cameron ball valves is Sealweld 911 (Cartridge Code No. 015571).

(e) For Cameron valves 14" and larger, the rotating seat design creates an increased torque for the last 15° of operation.

7. Ball Valve Lubricants

(a) The recommended types of general purpose lubricant for ball valves are summarized in Tables 4 and 5. Use only the manufacturer's recommended lubricant, as shown in the tables, for each valve. Standard sizes and packages of approved lubricants are available by specifying the code numbers shown.

(b) The specified lubricant for TK, Grove and Cameron ball valves is Sealweld No. 911. Sealweld No. 911 contains micro–fine Teflon particles which can cause serious problems if used in plug valves and other valves requiring more frequent lubrication or larger quantities of lubricant. However, the limited amount of Teflon bearing lubricant used in TK, Grove and Cameron ball valves should not cause a problem.

Table 4 Recommended Lubricants for WKM Dynaseal & Rockwell Hypresphere Valves [1]

Lubricant Fitting Type	Thread Size (Inches)	Lubricant form Designation (Units per Box)	Code Numbers for Specified Lubricants [2]	
			386	1033
Threaded	1/2	B (24) Stick	503072	Not Available
	3/8	C (24) Stick	503073	Not Available
	1/2	D (24) Stick	503074	Not Available
	3/4	G (24) Stick	015596	Not Available
Button Head Fitting [3]		K (12) Stick GP (6) Gun Pack [4]	015597 015594	015585 015593
		GP (6) Gun Pack J (6) Stick Cartridge (4) [5]	015594 503076 015579	015593 015540 015564
		Bulk (1) 5 Quart can [6]	503100	034873

1 Lubricants for Dynaseal & Rockwell Valves:
No. 386 ⇒ Cream Color
No. 1033 ⇒ Green Color
2 See Paragraph 3.B.17 for a comparison of Rockwell lubricants
3 Requires lubricant hand gun
4 Use with No. 400A hand gun
5 Use with No. 400D hand gun
6 Use with Hypregun

Table 5 Recommended Lubricant for Grove BVR-4 & BVR-5 Valve Regulators, TK & Grove Model B-4 & B-5 Valves and Cameron Valves [1, 2]

Cartridge Designation (Units per case)	Code Number
#1 Gun Cartridge (16) 12 ounce [3]	015571

1 Lubricant: Sealweld Total Lube #911 (See footnote 2);
⇒ Color: White
2 Sealweld #911 contains micro–fine Teflon particles (40 microns or smaller) and must only be used on approved ball valves.
3 Can be used with Rockwell 4000 hand gun.

D. Gate Valves

1. Kerotest M–1 Gate Valves

(a) The Kerotest M–1 gate valve does not require lubrication or gland tightening. A stem leak requires replacement of the packing seals and gland gasket. Repack valve and lubricate as described in Kerotest's procedure for "Primary or Secondary" repacking. The primary repacking procedures may be done with the line pressurized. See Kerotest M–1 Gate Valve Operations Manual.

(b) If the bonnet gasket leaks, the bonnet screws should be retightened per torque specifications found in the Kerotest operations manual. If leakage persists, remove the valve from service, disassemble, and inspect for damage to the gasket or sealing area. Replace the gasket and/or polish sealing area with very fine emery cloth. Coat the bonnet gasket with a light film of multipurpose grease, and reassemble.

(c) Caution should be taken if the valves are in the open position in a pipeline for a period of time. Sediment or dirt can collect inside the valve and block the wedge from fully closing. When these valves are to be closed, it should be done slowly. The valve should not be closed completely, but "throttled" for a short period of time in order that the turbulence created will flush away any sediment or dirt that might have settled in the valve. In the event of an emergency, the valve should be closed as quickly as possible.

(d) If complete shutoff is not obtained, the valve may be reseated using the following procedure. Throttle to flush out loose sediment. Close valve with moderate effort. This will force the wedge partially into the seat and loosen accumulated sediment. Open the valve one or two turns to retract the wedge from the seat. Repeat procedure if necessary.

2. Kerotest Model EV–11 "Stirrup" Gate Valve

   (a) The EV–11 gate valve requires no lubrication for a bubble tight seal. Lubrication is required only during cleaning and inspection, as specified in Kerotest's maintenance procedures.

   (b) If a leak develops in the bonnet, the capscrews should be retightened to Kerotest's torque specifications. If leakage persists, replacement of the bonnet O–Ring will be necessary.

   (c) A stem leak will require replacement of the stem seal and gland bushing O–Rings. The replacement of the stem seal and gland bushings O–Rings can be done under pressure if Kerotest's repair procedure is followed.

   (d) If complete shutoff cannot be obtained, it may be necessary to disassemble the valve and clean or replace the wedge seals.

   (e) Refer to EV–11 gate valve maintenance instructions for repair procedures and torque requirement when repairs are necessary.

3. RMI Weld Patent Gate Valve

   (a) The Weld Patent gate valve requires no lubrication for a bubble tight seal.

   (b) A stem leak will require replacement of the stem O–RIngs. The replacement of the stem O–rings can be done under pressure if WPV's repair procedure is followed.

   (c) The WPV gate valve is an all welded design, therefore, the valve cannot be disassembled to replace the stem or wedge.

4. Flushing Procedures

A. Plug valves that are seized or difficult to turn and leaking ball valves and gate valves should be injected with an approved cleaning solvent to soften old lubricants and to purge grease grooves. The valve should then be lubricated with the manufacturer's recommended lubricant to provide proper lubrication on the mating surfaces when the valve is operated.

B. The valve flush manufacturers' procedures shall be followed when performing any valve cleaning operation.

C. The following valve flushes can be used on any brand of valve and with existing valve lubrication equipment, and are approved for use:

   1. Rockwell Valve Purge VPX

      Gun Pak (6 per box) – Code 015565

      Cartridges (4 per box) – Code 015566

      Can (5 quarts) – Code 015567

   2. Sealweld Valve Cleaner

      16 oz. cartridge – Code 015568

      Can (5 quarts) – Code 015569

   3. Val–Tex Valve Flush

      1 Quart Bottle (4 per box) – Code 015570

      Can (5 quarts) – Code 05602.

D. **Caution:** *Valve flush materials can have a deleterious effect on elastomers if left in contact for extended periods of time.* Minimize contact time with rubber sealant gun components by cleaning valve flush out of the gun by pumping sealant through the hand gun. When the softening process is completed, always inject fresh lubricant (as recommended by the valve manufacturer) into the valve.

   Note: A Material Safety Data Sheet should be on file in each Operating Department for each valve flush and lubricant being used.