

OPERATING & MAINTENANCE

PROCEDURES

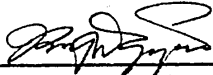
FOR


MAGNUM

MANUAL

GATE VALVE

Manual identification Number: OPM-003 Rev. 2

 7/16/09  
Prepared by / Date

 7/16/09  
Approval By / Date

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# **SECTION I**

	<b>OPERATING PROCEDURES</b>	OPM-003
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GATE VALVE		PAGE: 1 OF 2

Size: All

Pressure Class: All

Trims: All

Mode of operation: Manual only

Refer to the following as needed:

1. Assembly drawing of 'Magnum' manual gate valve (Appendix B)
2. Bill of material for valve (Appendix E)
3. Bill of material for spare parts (Appendix F). One set of spare parts is required per four manual valves.

Note: Wherever a reference is made to Table 1, please refer to Table 1 for that corresponding valve.


General Description:

The Magnum valve uses a "floating" slab gate. Magnum seals both upstream and downstream simultaneously. Magnum is bi-directional (no need to orient the valve in the line in one specific direction). Magnum has non-rising stem, elastomer assists metal-to-metal sealing at the gate-seat interface and metal-to-metal stem backseat.

Magnum also incorporates a de-energizing mechanism by which body cavity pressure continuously tries to equal the line pressure in bore. At zero line pressure Magnum will hold approximately 150 psi to 300 psi inside the body cavity. Precaution should be taken to bleed off this retained pressure by using bleed off plug provided on bonnet or by cycling the valve to bleed the body cavity pressure to the line.

General Instructions (applies to any gate valve):

1. Operate the valve as rapidly as possible. Although Magnum is "truly bi-directional sealing, the seats and gates of any gate valve are exposed to turbulence and excessive wear during the opening and closing processes.

	<b>OPERATING PROCEDURES</b>	OPM-003
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GATE VALVE		PAGE: 2 OF 2

Minimizing the time duration of the operating process also minimizes excessive wear exposure and prolongs service life.

2. Gate valves should never be used to "throttle" line fluid. Throttle any gate valve will result in seat and/or gate damage.
3. Follow the Magnum recommended preventive maintenance and lubrication procedures.


To Open:

1. Rotate the handwheel counter-clockwise until strong resistance is felt. Handwheel diameter can be found in Table 1. The torque pin in the valve is so sized that, if a high overload torque is applied to the handwheel, the pin will shear before any internal parts fail.
2. "Power-opening" (recommended by some manufacturers) is NOT recommended (or necessary) with the Magnum.
3. Do not back off the handwheel (to do so would move it away from the drift position and could cause flow stream damage to the gate and seats).
4. The number of turns required to open can be found in Table 1.

To Close:

1. Rotate the handwheel clockwise until substantial resistance is felt.
2. "Power-closing" (recommended by some manufacturers) is NOT recommended (or necessary) with the Magnum.
3. Back off handwheel 1/8-1/4 turn to assure gate is allowed to "float".
4. The number of turns required to close can be found in Table 1.

# SECTION II

	<b>PREVENTIVE MAINTENANCE &amp; LUBRICATION</b>	OPM-003
MAGNUM		REVISION: 2
MANUAL		SECTION: II
GATE VALVE		PAGE: 1 OF 5

Size: All

Pressure Class: All

Trims: All

Mode of operation: Manual only

Refer to the following as needed:

1. Assembly drawing of 'Magnum' manual gate valve (Appendix B)
2. Bill of material for valve (Appendix E)
3. Bill of material for spare parts (Appendix F). One set of spare parts is required per four manual valves.


Note: Wherever a reference is made to Table 1, please refer to Table 1 for that corresponding valve.

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The Magnum valve uses a "floating" slab gate. Magnum seals both upstream and downstream simultaneously. Magnum is bi-directional (no need to orient the valve in the line in one specific direction). Magnum has non-rising stem, elastomer assist metal-to-metal sealing at the gate-seat interface and metal-to-metal stem backseat.

Magnum also incorporates a de-energizing mechanism by which body cavity pressure continuously tries to equal the line pressure in bore. At zero line pressure Magnum will hold approximately 150 psi to 300 psi inside the body cavity. Precaution should be taken to bleed off this retained pressure by using bleed off plug provided on bonnet or by cycling the valve to bleed the body cavity pressure to the line.

The body cavity should be maintained with adequate lubricant at all times. Lubricant in the Magnum is only subjected to washing and contamination during opening and closing cycles. In the full open or full closed positions, body cavity lubricant is isolated from the flow stream.

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Least hostile condition - an example situation:

If a Magnum were used in the run of a christmas tree on a well producing clean, sweet, low-solids natural gas and the valve were operated once a day, lubrication and flush-out schedules could be least frequent--see Appendix A, Schedule I.

Most hostile condition - an example situation:

If, on the other hand, a Magnum were used in a choke and kill manifold handling heavy, fine mesh, weighted mud with many additives and cycled several times in day, lubrication and flush-out schedules could be most frequent--see Appendix A, Schedule III.


In general a guide:

Many applications will fall somewhere between these two extremes. Only on-site seasoned personnel and some trial and observation can determine the optimum lubrication and flush-out schedules. Therefore, this document deals mainly with the procedures recommended; frequency is a policy and practice decision of the operations and maintenance personnel.

General Instructions:

1. Preventive Maintenance and Lubrication is mainly a function of the following factors:
  - type fluid and "relative" cleanliness of fluid being handled
  - "relative" corrosion/erosion properties of line fluid
  - frequency of valve operation
  - line pressure during operation of the valve relative to its rating
2. Operate the valve as rapidly as possible. Although Magnum is "truly bi-directional sealing", the seats and gates of any gate valve are exposed to turbulence and excessive wear during the opening and closing processes. Minimizing the time of the operating process also minimizes the excessive wear exposure and prolongs service life.



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3. Gate valves should never be used to "throttle" line fluid. Throttling any gate valve will result in seat and/or gate damage.
4. Lubrication loss for stem bearings is far less severe than body cavity lubrication. Good practice would be to lubricate bearings every time body cavity lubrication is done. The same lubricant can be used for both.

Recommended Lubricant:

1. "Magnaseal" is the result of extensive testing and will maximize service life.
2. Only in emergencies, if Magnaseal is not available, a high viscosity all-purpose grease lubrication frequency should be shortened to compensate the limited characteristics of all-purpose grease. Magnaseal will increase service life substantially.


Bearing Lubrication:

1. Magnum uses two sets of bearings. Alemite fitting is provided just under the handwheel.
2. Use a standard grease gun for Alemite fitting, to pump lubricant.
3. There is a vent (under the outside O-ring near Alemite fitting) where surplus grease will escape; continue adding grease until surplus grease appears.

Body Cavity Lubrication:

1. The body can be lubricated with the valve in either the full open or full closed position; fully open position is preferred. In the closed position the stem may not be lubricated; when thoroughly lubricated the valve can be cycled to the open position, lubrication should be completed at the first opportunity--see sequence to assure maximum lubrication of the stem threads (see Stem Lubrication section).
2. The valve can be in service during lubrication, shut down is not required.

**Caution:** There will be some trapped pressure in the body cavity (from the last open/close cycling), which must be bled off by cycling the valve without any pressure in the line. If the valve is handling H<sub>2</sub>S or similar toxic materials,


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appropriate safety precautions and protective equipment should be used. Consult your safety coordinator if unsure.

3. Follow this sequence:
  - A. Bleed off fitting may be an Autoclave plug or Allen head fitting. Loosen bleed off fitting on OD of bonnet flange by turning counter-clockwise 2-3 full turns to vent trapped body pressure to zero. Do not remove this plug, only loosen.
  - B. When body cavity is completely vented, remove the cap (only) off the body greasing fitting. Do not remove the grease fitting body (a check valve inside prevents pressure loss, but will accept grease input).
  - C. Connect grease gun to grease fitting in the body of the valve.
  - D. Pump lubricant into the valve body and allow old lubricant to vent through the bonnet fitting.
4. If valve is used in service where much line contamination is present, it is recommended that new grease replace old grease each time the body is lubricated. Consult 'general lubrication policy and procedures' for your particular application and installation.
5. Remove grease gun.
6. Replace cap on body grease fitting and tighten.
7. If valve is in the open position, go on to the stem thread lubrication sequence following. If valve is in the closed position, and cannot be closed due to operational considerations, the full recommended lubrication schedule cannot be completed.


Stem Lubrication:

1. Optimum lubrication of the Magnum includes a third lubrication step. This step can only be accomplished with the valve in the open position.
2. If not previously loosened, loosen the bleed off fitting in the OD of the bonnet two or three full turns (not the fitting on the bonnet neck). Loosening this fitting will act as a vent to greasing the stem threads.

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3. Remove cap (only) on grease fitting on bonnet neck (a check valve inside prevents pressure loss, but will accept grease input).
4. Connect grease gun and pump grease. Please note: grease is passing between (very tight tolerances) stem and T-Nut, therefore grease will pump slowly. Allow at least a few minutes; stem has been fully lubricated when grease exits the vent fitting on the bonnet OD.
5. Old grease will be displaced out vent connection on OD of bonnet.
6. When contaminated grease is fully displaced, discontinue pumping.
7. Disconnect grease gun.
8. Tighten bleed off fitting (vent) on OD of bonnet.
9. Replace and tighten cap on grease fitting on neck of bonnet.

# **SECTION III**

	<b>TROUBLE SHOOTING IN THE FIELD &amp; ROUTINE FUNCTIONAL TESTING</b>	OPM-003
MAGNUM		REVISION: 2
MANUAL		SECTION: III
GATE VALVE		PAGE: 1 OF 5

Size: All

Pressure Class: All

Trims: All

Mode of operation: Manual only

Refer to the following as needed:

1. Assembly drawing of 'Magnum' manual gate valve (Appendix B)
2. Bill of material for valve (Appendix E)
3. Bill of material for spare parts (Appendix F). One set of spare parts is required per four manual valves.

Note: Wherever a reference is made to Table 1, please refer to Table 1 for that corresponding valve.


General Description:

The Magnum valve uses a "floating" slab gate. Magnum seals both upstream and downstream simultaneously. Magnum is bi-directional (no need to orient the valve in the line in one specific direction). Magnum has non-rising stem, elastomer assist metal-to-metal sealing at the gate-seat interface and metal-to-metal stem backseat.

Magnum also incorporates a de-energizing mechanism by which body cavity pressure continuously tries to equal the line pressure in bore. At zero line pressure Magnum will hold approximately 150 psi to 300 psi inside the body cavity. Precaution should be taken to bleed off this retained pressure by using bleed off plug provided on bonnet or by cycling the valve to bleed the body cavity pressure to the line.

Recommended things to pay close attention to:

1. Was the valve used to throttle?
2. When was the last scheduled preventative maintenance check and lubrication?
3. Are there signs on the handwheel that excessive force has been used to operate the valve?

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In the event of stem packing leakage:

**Note:** refer to drawing in Appendix C for stem packing arrangement. Stem packing assembly part number is specified on the bill of material (Appendix E). It consists of modular bearing and stem packings. The drawing shows clearly the orientation and location of every item.

1. Backseat the stem and leave it in the back seated position.
2. If the valve is in the closed position, proceed to step 3. If valve is in the open position, rotate the hand wheel clockwise to the full-closed position.

**Caution:** There will be some trapped pressure in the body cavity (from the last open/close cycling), which must be bled off. If the valve is handling H<sub>2</sub>S or similar toxic materials, appropriate safety precautions and protective equipment should be used. Consult your safety coordinator if unsure.

3. Loosen the bearing cap one full turn.
4. Turn the handwheel clockwise approximately 1/2 turn (in so doing, the gate is driven against the bottom of the valve body and the additional handwheel rotation causes the stem to rise in the bonnet to affect the backseat).
5. Remove the handwheel by removing the pin in the handwheel.
6. Remove the bearing cap by turning counter-clockwise (as observed from above the handwheel).
7. Remove the stem adapter. Drive out the stem pin with a small drift (smaller in diameter than the pin). The stem adapter will then simply lift off the stem.
8. Remove the packing gland by turning counter-clockwise with a standard open-end wrench.
9. Connect a grease gun to the upper external bonnet grease fitting found on the bonnet neck. Stem should have been left in the back seated position. Pump out the modular bearing and packing stack elements with the grease gun.

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In the event of gate/seat leakage:

Excessive wear to the seats and/or gate may occur from rigorous usage and/or improper preventive maintenance. The seats and gate for the Magnum valve can often be repaired without removal of the valve from the line.

To repair in line, see following steps. Shop repairs follow the same procedure as below, beginning at step 1B.

1. To repair the Magnum while in the line, follow these steps:
  - A. Isolate the valve in the system by blocking with valves upstream and downstream.


**Caution:** If the valve has been in H<sub>2</sub>S or similar toxic service, personal hazard protection prevention measures should be observed.

Special Note: You can bleed down the line from some vent other than the Magnum or with the Magnum valve itself. To bleed the line through the Magnum, rotate the handwheel to the half open / closed position. Loosen the bleed off fitting on the OD of the bonnet to vent.

- B. If the line is not bled off through the Magnum, the body cavity must be bled off separately. Bleed off is accomplished by loosening the bleed off fitting on the OD of the bonnet.
2. Loosen and remove all bonnet bolts or nuts as applicable.
3. Turn the handwheel in the clockwise direction until the gate bottoms out in the bottom of the body. Continue clockwise rotation. This should lift the bonnet away from the body of the valve. If the valve has been in service for some time, it may be necessary to hit the bonnet flange with a hammer to help break the bonnet seal.

**Caution:** Be careful not to damage studs or grease fittings.


4. When the handwheel rotation can go no further, lift entire bonnet assembly straight up off the body through a distance as mentioned in table 1, the gate will come along. A lifting device is recommended.

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5. Remove each seal assembly one at a time from the valve body with a screwdriver. Seat retainers are a close-tolerance slip fit, but should slide out easily. Do not attempt to separate the seat from the seat retainer while still in the valve body.
6. Cleanout seat retainer recesses thoroughly.
7. Refer to Bill of Material for 'Magnum' Manual gate valve (Appendix E). Seal assembly part no. is shown in the bill of material. This includes the following:
  1. Seats
  2. Seals for seats
  3. Back up rings for seat seals
  4. Seat retainers
  5. Seals for seat retainer
  6. Back up rings for seat retainer seals.

Refer to drawing in Appendix D, which shows the arrangement of seals and their backup rings in seal assembly. Lightly lubricate the new seal assemblies and install one at a time. It is not necessary to use excess force, presses or special tools.
8. Lightly lubricate the new gate. Replace the gate by hand (with the T-nut) by sliding the new gate all the way down (to the closed position). Do not attempt to assemble the new gate already attached to the bonnet assembly. To start the leading edge of the gate between the seal assemblies, a slight rocking motion may be needed. Light bumping with a wood mallet is okay, but care should be taken not to damage gate.
9. Replace the bonnet gasket with a new one. Do not attempt to reuse an old bonnet gasket. Place studs in place if applicable.
10. To remount the bonnet assembly, position the stem on top of the T-Nut and rotate the handwheel counter clockwise until bonnet contacts the bonnet gasket. Further rotation will simply begin raising the gate toward the open position.



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<p style="text-align: center;">MANUAL</p>		<p style="text-align: center;">SECTION: III</p>
<p style="text-align: center;">GATE VALVE</p>	<p style="text-align: center;">PAGE: 5 OF 5</p>	

11. Complete the assembly by installing the bonnet bolt, or nuts as applicable, and torque to specification (refer to table 1) alternating tightening diagonally from one side of the bonnet circle to the opposite side.

# APPENDIX A

# MAINTENANCE SCHEDULE I

## FOR VALVES IN

### OIL SERVICE

LUBRICATION & GENERAL MAINTENANCE	NO. OF CYCLES	WEEKL Y	BI-WEEKLY	MONTHLY	AFTER COMPLETION	AFTER RUNNING TOOLS	AFTER CHEMICALS	EMERGENCY ONLY
1. Lubricate Body			X		X	X	X	
2. Pressure Test			X		X	X		
3. Inspect for Stem Packing Leaks			X		X	X	X	
4. Inspect for Smooth Valve Operation				X	X	X	X	
5. Inspect Flanges for Leaks			X		X			
6. Inspect Grease Fitting & Inj. Ports			X		X	X	X	

A. In order to maintain the W.O.M. warranty, the above maintenance schedule should be followed.

B. In the event of abnormalities, see Troubleshooting Guide for possible cause and recommended repair.

## MAINTENANCE SCHEDULE II

### FOR VALVES IN

### GAS SERVICE

LUBRICATION & GENERAL MAINTENANCE	NO. OF CYCLES	WEEKLY	BI-WEEKLY	MONTHLY	AFTER COMPLETION	AFTER RUNNING TOOLS	AFTER METHANOL	EMERGENCY ONLY
1. Lubricate Body		X			X	X	X	
2. Pressure Test		X			X	X		
3. Inspect for Stem Packing Leaks		X			X	X	X	
4. Inspect for Smooth Valve Operation				X	X	X		
5. Inspect Flanges for Leaks				X	X			
6. Inspect Stem Adapter & Bearings				X				
7. Inspect Grease Fittings & Inj. Ports		X			X	X	X	

A. In order to maintain the W.O.M. warranty, the above maintenance schedule should be followed.

B. In the event of abnormalities, see Troubleshooting Guide for possible cause and recommended repair.

## MAINTENANCE SCHEDULE III

### FOR VALVES IN

#### DRILLING SERVICE

LUBRICATION & GENERAL MAINTENANCE	NO. OF CYCLES	WEEKLY	BI-WEEKLY	MONTHLY	AFTER GATE CIRCULATION	AFTER CEMENT CIRCULATION	AFTER KICK	EMERGENCY ONLY
1. Flush With Clean Fluid	10			X	X	X	X	
2. Lubricate Body	10				X	X	X	
3 Pressure Test		X					X	
4. Inspect for Smooth Valve Operation				X			X	
5. Inspect Flanges for Leaks				X			X	
6. Inspect Grease Fittings & Inj. Ports		X						

A. In order to maintain the W.O.M. warranty, the above maintenance schedule should be followed.

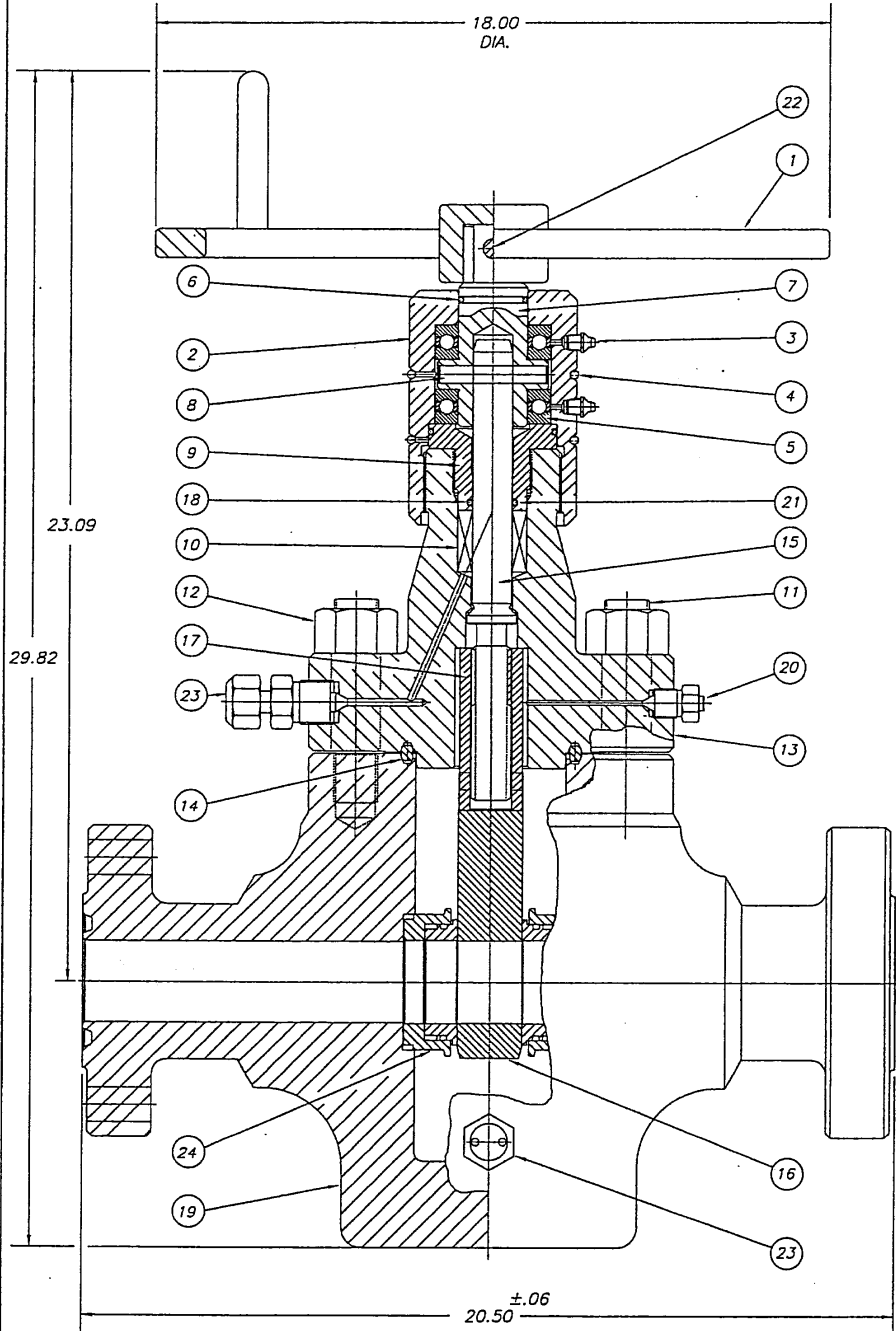
B. In the event of abnormalities, see Troubleshooting Guide for possible cause and recommended repair.

# **APPENDIX B**


THIS DRAWING AND DESIGN, INCLUDING PATENTABLE FEATURES, IS BEING ISSUED IN CONFIDENCE AND IS THE PROPERTY OF W.O.M. INC. THEY ARE NOT TO BE REPRODUCED OR USED BY OTHERS FOR ANY PURPOSE OTHER THAN THOSE AUTHORIZED. THIS IS ISSUED SUBJECT TO RETURN ON COMPLETION OF THE INTENDED USE OR ON DEMAND TO WORLDWIDE OILFIELD MACHINE, INC.

ALL RIGHTS RESERVED

ITEM	DESCRIPTION	QTY.
1	HANDWHEEL	1
2	BEARING CAP	1
3	ALEMITE FITTING	2
4	SEAL RING	2
5	THRUST BEARING	2
6	SEAL RING	1
7	STEM ADAPTER	1
8	STEM PIN	1
9	PACKING GLAND	1
10	PACKING ASSY.	1
11	STUD	8
12	HEX NUT	8
13	BONNET	1
14	BONNET GASKET	1
15	OPERATING STEM	1
16	GATE	1
17	T-NUT	1
18	SEAL RING	1
19	BODY	1
20	BLEEDER PLUG	1
21	SEAL RING	1
22	BOLT W/NUT	1
23	GREASE FITTING	2
24	SEAL ASSEMBLY	1




REVISIONS			TOLERANCES (EXCEPT WHERE NOTED)	
NO	DATE	BY	FRACTION	±1/64
0	6/02/09	LA	DECIMAL O.X	±.030
			O.XX	±.015
			O.XXX	±.005
			ANGULAR	±1/2
			M/C FINISH	125
BREAK ALL SHARP CORNERS				


**WORLDWIDE OILFIELD MACHINE INC.**  
 11809 CANEMONT, HOUSTON, TX 77035.

SCALE: NONE  
 DATE: 6/02/09

APPROVED BY: *[Signature]*  
 DRAWN BY: LA  
 CHK. BY:

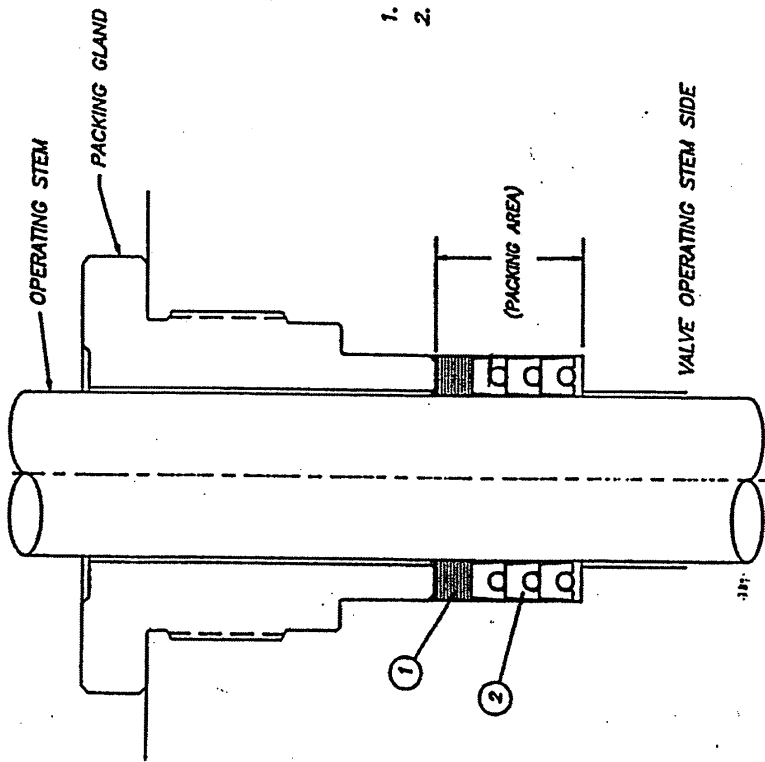
2 1/16" - 10M 'MAGNUM' MANUAL GATE VALVE F.E.

DRAWING NUMBER  
 WB4 

# APPENDIX C





REVISIONS		
NO	DATE	BY
0	7/24/92	GS



- PACKING MATERIAL  
 ASSY. P/N : REF. B.O.M.
1. MODULAR BEARING - QTY. REQ'D. -1
  2. STEM PACKING - QTY. REQ'D. (5/10M PSI) -2  
 QTY. REQ'D. (15M PSI) -3

|||||  
 PRESSURE  
 FROM BODY CAVITY

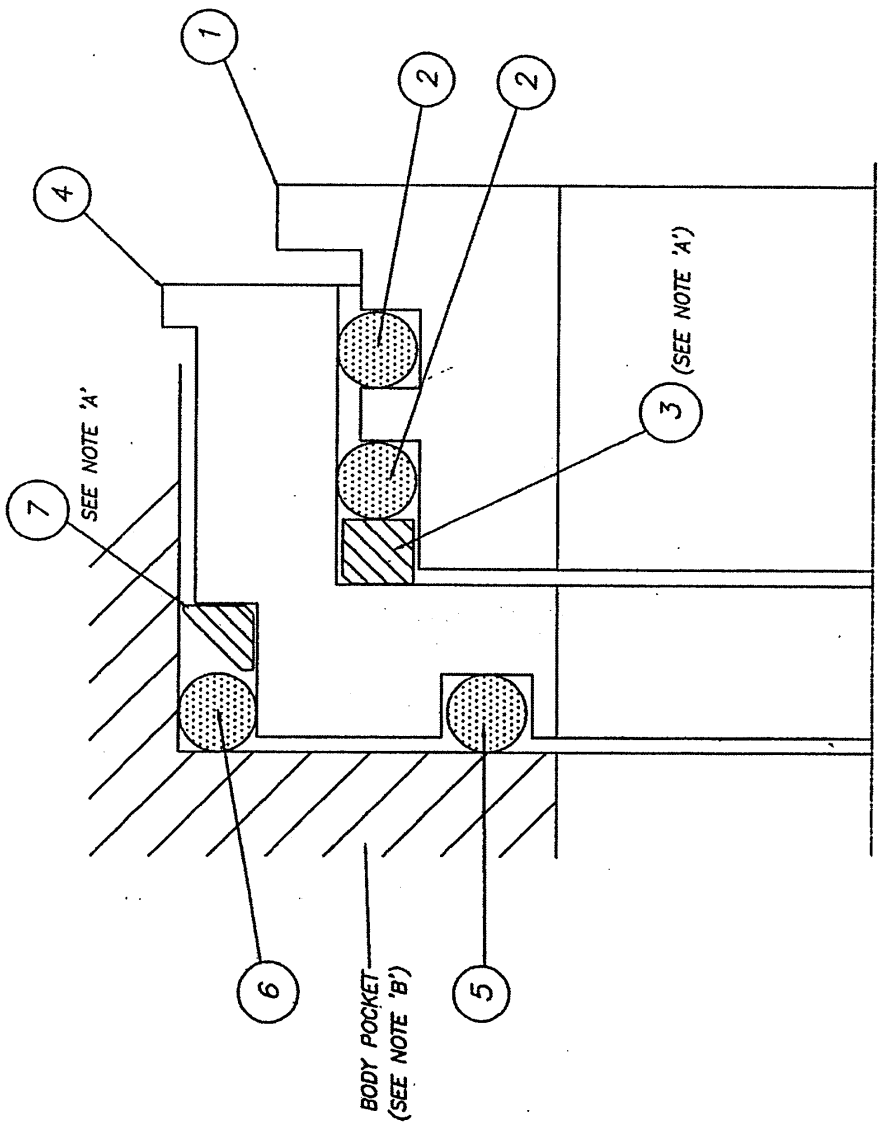
STEM PACKING LOCATION

 WORLDWIDE OILFIELD MACHINE INC. 11809 CARRINGTON, HOUSTON, TX 77036.		DRAWN BY: GS CHECK BY: VC
SCALE: NONE DATE: 7/24/92	APPROVED BY: <i>[Signature]</i>	
STEM PACKING -- 'MAGNUM' MANUAL GATE VALVE		
DRAWING NUMBER V 1108		


# APPENDIX D

REVISIONS		
NO	DATE	BY
0	4/19/01	AD
1	9/17/01	AD

SQ.	QTY.	ITEM
1	2	SEAT
2	4	SEAL RING
3	2	BACKUP RING
4	2	SEAT RETAINER
5	2	SEAL RING
6	2	SEAL RING
7	2	BACKUP RING



NOTES:  
 A. NOTCHES ON THE BACK UP RINGS TO BE ON OPPOSITE SIDE OF SEAL RING  
 B. BEFORE INSTALLATION, LIGHTLY LUBRICATE BODY POCKET AND WIPE IT CLEAN TO MAKE SURE NO LUBRICANT IS LEFT IN BODY POCKET.


**WORLDWIDE OILFIELD MACHINE INC.**  
 11009 CARMON, HOUSTON, TX 77036.

SCALE: NONE  
 DATE: 4/19/01  
 APPROVED BY: *Robert [Signature]*  
 CHECKED BY: AD

**TYPICAL 'MAGNUM' SEAL ASSEMBLY**

PART NUMBER: **V1486**

# **APPENDIX E**

# Single Level Bill of Material Report with WOM Specs



6/15/2012 2:49:33PM

VALVE, GATE

2-1/16"-10K MAGNUM MANUAL F.E.

Assembly No. WM800

Revision No. 4

Revision Date

03/12/2008

Seq	Description	Part No	Qty	Spec No	Material Description
1	HANDWHEEL	WM-1901C	1	4.6.70	ASTM A-487-4N
2	CAP, BEARING	WM-802	1	4.6.50	LOW CARBON STEEL
3	FITTING, GREASE	WM-703	2	4.6.11	4130, 75K
4	SEAL RING	PN-3459	2	331	BUNA
5	BEARING, THRUST	2546	2		N/A
6	SEAL RING	PN-2229	1	331	NITRILE
7	ADAPTER, STEM	WM-808	1	4.6.50	LOW CARBON STEEL
8	PIN, STEM	WM-809	1	4.6.29	ETD-150 MATERIAL
9	GLAND, PACKING	WM-810	1	4.6.50	LOW CARBON STEEL
10	PACKING ASSEMBLY	SP-800	1		
11	STUD	DB-1155	8	4.6.18	A193 / A194 BOLTING
12	NUT, HEX	B-11	8		
13	BONNET	CM-814	1	4.6.10	4130, 60K
14	GASKET, BONNET	3453	1	4.6.17/13	304/316 SS
15	STEM, OPERATING	WM-818	1	4.6.15	17-4 PH
16	GATE (#5)	CM-819	1	4.6.11/10 HF	4130, 75K/60K
17	T-NUT	WM-820	1	4.6.11	4130, 75K
18	SEAL RING	PT-2149	1	4.6.21	VITON 90 DUROMETER
19	BODY	CM-826	1	4.6.11/10	4130, 75K/60K
20	PLUG, BLEEDER	AC-3750	1	4.6.13	316 STAINLESS STEEL
21	SEAL RING	PT-2349	1	4.6.21	VITON 90
22	BOLT, HEX HEAD	WM-732	1	4.6.62	GRADE 8 HEX
23	FITTING, GREASE	AG-9160	2	4.6.13	STAINLESS STEEL
24	SEAL ASSEMBLY (#5)	WM-MGA2010	1		
19A	BODY	CM1836-26	1	4.6.11/10	4130, 75K/60K
	NUT, GALVANIZED	B-11G	8	4.6.18	A194 BOLTING
	STUD	DB-1155G	8	4.6.18	A193 / A194 BOLTING, B7(GALVANIZ

# Single Level Bill of Material Report with WOM Specs



6/15/2012 2:50:54PM

PACKING ASSEMBLY

2"-10K MAGNUM F.E., H2S (PRECEDED BY SP-400)

Assembly No. SP-800

Revision No. 0

Revision Date

06/15/2011

Seq	Description	Part No	Qty	Spec No	Material Description
1	PACKING, STEM	TE10009	3	4.6.21	VITON 70 & 90 DUROMETER
2	BEARING, MODULAR	WM-815	1	4.6.35	NYLATRON

# Single Level Bill of Material Report with WOM Specs



6/15/2012 2:51:58PM

SEAL ASSEMBLY (#5)

2" 10/15K MAGNUM MANUAL

Assembly No. WM-MGA2010

Revision No.

Revision Date

03/03/1997

Seq	Description	Part No	Qty	Spec No	Material Description
1	SEAT (#5)	WM-821	2	4.6.11 HF	4130, 75K
2	SEAL	PT-2315	4	4.6.74	
3	BACK UP RING	BS-2010	2	4.6.50	LOW CARBON STEEL
4	SEAL	PT-2295	2	4.6.74	
5	SEAL	PT-2355	2	4.6.74	
6	BACK UP RING	BT-2015	2	4.6.50	LOW CARBO STEEL
7	RETAINER, SEAT	WM-824	2	4.6.15	17-4 PH

# APPENDIX F



## Recommended Spare Parts Report

6/15/2012 2:50:13PM

VALVE, GATE 2-1/16"-10K MAGNUM MANUAL F.E.

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Assembly No.	WM800	Revision No.	4	Revision Date	03/12/2008
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Seq	Description	Part No	Qty
4	SEAL RING	PN-3459	2
5	BEARING, THRUST	2546	2
6	SEAL RING	PN-2229	1
10	PACKING ASSEMBLY	SP-800	1
14	GASKET, BONNET	3453	1
16	GATE (#5)	CM-819	1
18	SEAL RING	PT-2149	1
20	PLUG, BLEEDER	AC-3750	1
21	SEAL RING	PT-2349	1
24	SEAL ASSEMBLY (#5)	WM-MGA2010	1

## Recommended Spare Parts Report

6/15/2012 2:52:33PM

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SEAL ASSEMBLY (#5) 2" 10/15K MAGNUM MANUAL

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Assembly No. WM-MGA2010 Revision No. Revision Date 03/03/1997

---

Seq	Description	Part No	Qty
2	SEAL	PT-2315	4
3	BACK UP RING	BS-2010	2
4	SEAL	PT-2295	2
5	SEAL	PT-2355	2
6	BACK UP RING	BT-2015	2

# APPENDIX G

## MAGNUM GATE VALVE AND CONVERTED GATE VALVE GENERAL HYDROTESTING PROCEDURES

Magnum seals both upstream and downstream during full open and full closed position. Hence, the seal assemblies can be under operation only when the gate is fully open or fully closed.

When the valve needs to be Shell tested, it has to be in PARTIAL OPEN position. If Shell testing is done in full open or full closed position, there is a possibility the seal assemblies may get damaged.

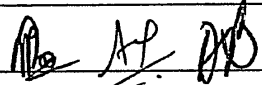
To have the gate valve partially opened:

1. In the case of manual gate valve, handwheel can be used to keep the valve in any desired position.
2. In case of hydraulic gate valve (double-acting), a manual override is provided to close the valve. This can be used to leave the valve in partial open position.

Care must be taken to rotate the handwheel completely anti-clockwise before the valve is put in service or before it is actuated.

3. In case of hydraulic fail-safe (spring return) gate valves, hydraulic pressure can be used to keep the valve in partial open position.

If a manual override is provided, then handwheel can be used to keep the valve in partial open position.

<b>WOM</b> Worldwide Oilfield Machine <del>INCORPORATED</del> 11809 Canemont St. Houston, Texas 77035 USA	UNCONTROLLED Oilfield Standards	Revision	18.0
		Effective Date	07.24.98
		Revision Date	09.08.11
		approvals	
Title: <b>4.10.1 Testing of Valves, Actuators, and Chokes to API 6A (Latest Edition)</b>			
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## 1.0 Scope

This procedure outlines the steps to be taken to test new and repaired Valves, Actuators, and Chokes in accordance with API 6A (Latest Edition) (Reference: API 10.16.6.2 – Functional Testing & Operational Test)

## 2.0 Applicable Documents and Standards

WOM Inc. Quality Manual                      ISO 9001 (Latest Edition)                      API 6A (Latest Edition)

## 3.0 Procedure

**NOTE: For the Shell Test, PSL 1 through PSL 4, the valve is to be in the HALF OPEN POSITION. This applies for single valves assemblies and manifolds.**

### PSL1/ RL1

#### -Shell Test

- Primary - 3 Minutes
- Reduce Pressure to zero
- Secondary - 3 Minutes

*Note: Shell Test Pressure Shall Be In Accordance With Table 31 Of This Procedure.*

- Seat Test (A Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero
  - Seat Test (A Side), Secondary - 3 Minutes at Design Working Pressure
- Seat Test (B Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero
  - Seat Test (B Side), Secondary - 3 Minutes at Design Working Pressure

**NOTE: A Low Pressure Seat Test at 250-300 psi for a minimum hold period of three (3) minutes shall be performed after the Designed Working Pressure Test's have been completed on Side "A" and the process repeated for Side "B", unless otherwise specified.**

Acceptance Criteria - No Visible Leaks or Loss in Pressure  
Documentation Required - Hydrostatic Test Certificate  
(Note: Test Fluid shall be cold tap water)

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PSL2/ RL2

- Shell Test
  - Primary - 3 Minutes
  - Reduce pressure to zero
  - Secondary - 3 Minutes

*Note: Shell Test Pressure Shall Be In Accordance With Table 31 Of This Procedure.*

- Seat Test (A Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure.
- Seat Test (A Side), Secondary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure
  - Final - 3 Minutes at Design Working Pressure
- Seat Test (B Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero. Opening Valve while under pressure
- Seat Test (B Side), Secondary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure
  - Final - 3 Minutes at Design Working Pressure

**NOTE:** A Low Pressure Seat Test at 250-300 psi for a minimum hold period of three (3) minutes shall be performed after the Designed Working Pressure Test's have been completed on both "A" & "B" sides, unless otherwise specified.

Acceptance Criteria - No Visible Leaks or Loss in Pressure  
Documentation Required - Hydrostatic Test Certificate  
*Note: Test Fluid shall be cold tap water.*

PSL3/ RL3

- Shell Test
  - Primary - 3 Minutes
  - Reduce pressure to zero
  - Secondary - 15 Minutes

*Note: Shell Test Pressure Shall Be In Accordance With Table 31 Of This Procedure.*

- Seat Test (A Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure
- Seat Test (A Side), Secondary - 15 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure
  - Final - 15 Minutes at Design Working Pressure

- Seat Test (B Side), Primary - 3 Minutes at Design Working Pressure
  - Reduce pressure to zero Opening Valve while under pressure
- Seat Test (B Side), Secondary - 15 Minutes at Design Working Pressure
  - Reduce pressure to zero by Opening Valve while under pressure
  - Final - 15 Minutes at Design Working pressure

**NOTE:** A Low Pressure Seat Test at 250-300 psi for a minimum hold period of three (3) minutes shall be performed after the Designed Working Pressure Test's have been completed on Side "A" and the process repeated for side "B, unless otherwise specified.

Acceptance Criteria - No Visible Leaks or Loss in Pressure  
Documentation Required - Hydrostatic Chart Certificate

### PSL3 (G)

#### **Gas Body Test-Individual Equipment**

In addition to a hydrostatic body test (extended) for individual equipment a gas body test shall be performed as follows:

Test method: Conduct the test at ambient temperatures using nitrogen as the test medium. Conduct the test with the equipment completely submerged in water bath.

*Note: Valves and chokes shall be in the partially open position during testing.*

The gas body test for assembled equipment shall consist of a single pressure-holding period of no less than fifteen (15) minutes.

*Note: Do not start timing until the test pressure has been reached and the equipment and the pressure-monitoring gauge have been isolated from the pressure source.*

Test pressure shall equal the rated working pressure of the equipment.

*Note: Special considerations for Hydrostatic Body Test shall also apply, if appropriate to the Gas Body Test.*

Acceptance Criteria - No Visible bubbles shall appear in the water during the holding period.

Documentation Required - Hydrostatic Chart Certificate

#### **Gas Seat Test for Valves:**

Test method: Apply gas pressure on each side of the gate (or plug) of bi-directional valves with the other side open to atmosphere

Test the valve at ambient temperatures using nitrogen as the test medium. Submerge the valve completely in a water bath.

Testing should consist of TWO (2), monitored holding periods.

Primary test pressure shall be the rated working pressure.

Primary holding period shall be 15 minutes minimum.

Reduce pressure to zero between the primary and secondary test.

Secondary test pressure shall be 300 psi.

Secondary holding period 15 minutes minimum.

The valves shall be fully opened and fully closed between tests.

Acceptance Criteria - No Visible bubbles shall appear in the water during the holding period.

Documentation Required - Hydrostatic Chart Certificate

PSL4/ RL4

Shell Test

**UNCONTROLLED**

- Primary - 3 Minutes
- Reduce pressure to zero
- Secondary - 3 Minutes

*Note: Shell Test Pressure Shall be in accordance with Table 31 of this Procedure.*

Seat Test (A Side), Primary - 3 Minutes at Design Working Pressure

- Reduce pressure to zero by Opening Valve while under pressure
- Seat Test (A Side), Secondary - 15 Minutes at Design Working Pressure
- Reduce pressure to zero by Opening Valve while under pressure
- Final - 15 Minutes at Design Working Pressure

Seat Test (B Side), Primary - 3 Minutes at Design Working Pressure

- Reduce pressure to zero Opening Valve while under pressure
- Seat Test (B Side), Secondary - 15 Minutes at Design Working Pressure
- Reduce pressure to zero by Opening Valve while under pressure
- Final - 15 Minutes at Design Working Pressure

*Note: Test Fluid shall be cold tap water*

Nitrogen Test

A Nitrogen Test shall be performed of the Shell and Seat at Ambient Temperature and submerged as follows:

- Shell - 15 Minutes at Working Pressure
- Seat (A Side), Primary - 60 Minutes at Design Working Pressure
- Reduce Pressure to zero
- Seat (A Side), Secondary - 60 Minutes at >5% and <10% of Design Working Pressure
- Seat (B Side), Primary - 60 Minutes at Design Working Pressure
- Reduce Pressure to zero
- Seat (B Side), Secondary - 60 Minutes at >5% and <10% of Design Working Pressure

**NOTE: VALVE IS TO BE FULLY OPENED AND FULLY CLOSED BETWEEN EACH TEST.**

Acceptance Criteria - No Visible Leaks or Loss in Pressure

Documentation Required - Hydrostatic Test and Nitrogen Test Chart

Gas Back Seat Test - Gate Valves

The Seat Back or other means provided for repacking shall be gas tested.

The test shall be conducted at ambient temperatures. The Test medium shall be Nitrogen.

The test shall be conducted with the equipment completely submerged in a water bath.

The area between the primary packing and the back seat or other means shall be vented during the test.

The test shall consist of two holding periods.

The monitored hold time for each period shall be sixty (60) minutes.

Reduce the pressure to zero

The secondary pressure holding period shall be at a pressure greater than 5% and less than 10%



of the rated working pressure.

The back seat or other means provided for repacking shall be disengaged between the high and low pressure holding periods.

**UNCONTROLLED**

Acceptance Criteria: No visible bubbles in the water bath during the holding periods.

#### 4.0 Drift Test

Pass a Drift Mandrel as described in **Table 30** of this procedure through the Valve Bore after the Valve has been Assembled, Operated, and Pressure Tested.

Acceptance Criteria: The Drift shall pass completely through the Valve Bore.

Documentation: The Drift Test shall be documented on the Test Certificate.

#### 5.0 Actuators

##### 5.1 Hydraulic Actuators

-Test at 1.5 x working pressure for two holding periods of three (3) minutes each.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Test at .20 x working pressure for one holding period of three (3) minutes.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Test at working pressure for one holding period of three (3) minutes.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Stroke the Actuator three (3) times to ensure smooth operation.

***NOTE: All Subsea Actuators shall be tested using Erifon 603 or equivalent oil. The Actuator housing shall be completely filled with the same fluid (as used in testing) after testing and before shipping.***

##### 5.1.1 PSL4 Actuators Gas Back Seat Testing

- Test for sixty (60) minutes at rated working pressure.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Cycle the Valve.

- Test at 5 to 10 % of rated working pressure and hold for 60 minutes.

*Acceptance Criteria - No visible bubbles in water bath.*

##### 5.2 Pneumatic Actuators

-Test at 1.5 x working pressure for two holding periods of three (3) minutes each.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Test at .20 x working pressure for one holding period of three (3) minutes.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Test at working pressure for one holding period of five (5) minutes.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Stroke the Actuator three (3) times to ensure smooth operation.

##### 5.2.1 PSL4 Actuators Gas Back Seat Testing

- Test for sixty (60) minutes at rated working pressure.

*Acceptance Criteria - No Leaks of Loss in Pressure.*

- Cycle the Valve.

- Test at 5 to 10 % of rated working pressure and hold for 60 minutes.

*Acceptance Criteria - No visible bubbles in water bath.*

**UNCONTROLLED**

## **6.0 Chokes**

The Positive and/or Adjustable chokes shall be shell hydro-tested at 1.5 times the working pressure. The hold periods shall be according to the PSL levels mentioned in this procedure.

For Chokes having an inlet connection of a higher pressure rating than the outlet connection, test the body hydrostatically, from the inlet connection to the body-to-bean seal point of the replaceable seat or flow bean, to the appropriate pressure for the inlet connection. Test the remainder of the body, downstream from the seal point, to the appropriate pressure for the outlet connection.

*Note: Temporary seat seals may be used to facilitate testing.*

Valves and Chokes shall be in the partially open position during testing.

## **7.0 Personnel Qualification**

Personnel involved in this procedure shall be familiar with the requirements of this procedure and shall report any Non-Conformances to Quality Control Manager and/ or to the Assembly and Test Manager.

## **8.0 Approvals**

This procedure and all revisions shall be reviewed and approved by personnel in the following positions.

**Engineering Manager**

**Quality Manager**

**Assembly & Testing Manager**

**UNCONTROLLED**

API 6A (Latest Edition) Table 31. The below chart is to be used for Hydrostatic Test Pressures.

**(\*) NOTE: The test pressures listed below are "minimal" values. API does not recognize 7,500 psi W.P. as a "normal" Working Pressure, however WOM, Inc. does for manufacturing and/or testing purposes.**

Working Pressure (psi)	End and Outlet Connections					
	Nominal Size of Flanges (inches)		Line-Pipe Tubing Threads (psi)	Casing Threads (inches)		
	13-5/8 & smaller	16-3/4 & larger		4-1/2 to 10-3/4	11-3/4 to 13-5/8	16 to 20
2,000	4,000	3,000	4,000	4,000	4,000	2,250
3,000	6,000	4,500	6,000	6,000	4,500	---
5,000	7,500	7,500	7,500	7,500	---	---
<b>(*) 7,500</b>	<b>11,250</b>	---	<b>11,250</b>	---	---	---
10,000	15,000	15,000	15,000	---	---	---
15,000	22,500	22,500	---	---	---	---
20,000	30,000	---	---	---	---	---

API 6A (Latest Edition) Table 30. The below chart is to be used for Drift Testing.

(Key: L-Drift Length. D1-Drift Diameter. D2-Handle Diameter.)

Drift Diameters for Individual Valves & Christmas Trees (inches)				
Nominal Flange Size	Nominal Bore Size	L (Minimum)	D1 (+.027/-0)	D2(+.027/-0)
1-13/16	1.81	3.00	1.78	1.52
2-1/16	1.81	3.00	1.78	1.52
2-1/16	2.06	3.00	2.03	1.90
2-9/16	2.56	3.00	2.53	2.35
3-1/16	3.06	3.06	3.03	2.88
3-1/8	3.12	3.12	3.09	2.88
4-1/16	4.06	4.06	4.03	3.83
5-1/8	5.12	5.12	5.09	4.97
7-1/16	6.00	6.00	5.97	5.85
7-1/16	6.12	6.12	6.09	5.97
7-1/16	6.38	6.38	6.34	6.22
7-1/16	6.62	6.62	6.59	6.47
7-1/16	7.06	7.06	7.03	6.91
9.00	9.00	9.00	8.97	8.85

# APPENDIX H

# TABLE 1

## FOR 2-1/16" 10K MAGNUM MANUAL GATE VALVE

Rev.1

No. of turns to close/ open (+-1/4)	13-1/8
Bonnet bolt torque (1-1/8" -8UN)	<ul style="list-style-type: none"><li>- 625 Ft-lbs (grease w/ Co-efficient of friction 0.13)</li><li>- 500 Ft-lbs (Moly w/ Co-efficient of friction 0.10)</li><li>- 375 Ft-lbs (grease w/ Co-efficient of friction 0.07)</li></ul>
Wrench for Bonnet Bolt/ Nut	1-13/16" Across Flat
Magnaseal grease requirements (dry valve)	2-1/2 Lbs. Approx.
Clearance for teardown of valve (To pull bonnet and gate up)	10"
Handwheel Diameter	18"