

# WELLHEAD MAINTENANCE STANDARD OPERATING PROCEDURES

MANUAL



## SUMMIT INTERNATIONAL

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## DOCUMENT NO:

Issue Date:	Revision Date	Revision No:

Prepared By:	Endorsed By:	Approved By:





# WHM STANDARD OPERATING PROCEDURES

## MANUAL



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## **1. INTRODUCTION**

This document describes the Wellhead Inspections and Maintenance procedures undertaken by the Wellhead Maintenance Division. This manual has been compiled to document the procedures necessary to properly inspect, test and maintain wellhead assemblies including the Christmas Trees and Annulus Valves to applicable API Standards.

Ref: Minimum Standard for Pressure Testing  
Minimum Standard Barriers for Breaking Containment  
Well Integrity Management System Standard (WIMS)  
API 16A Latest Edition

## **2. DEFINITIONS**

- **LOWER MASTER GATE VALVE**

The Lower Master Valve is utilized on all X-mas trees to shut-in a well. This valve is usually Operated manually. As its name implies, the master is the most important valve on the X-mas tree. When closed, this valve should keep the well pressure under full control and therefore should be in optimum condition – it should never be used as working valve.

- **UPPER MASTER GATE VALVE**

The Upper Master Valve is used on moderate to high pressure wells as the primary barrier for use when rigging equipment above the Swab valve or onto the flow wing valve.

- **FLOW WING VALVE**

The Flow Wing Valve permits the passage of well fluids to the choke valve. This valve can be operated manually.

- **CHOKER**

The Choke is used to restrict, control or regulate the flow of hydrocarbons to the Production facilities. This valve is operated manually or automatically and may be of the fixed Positive or adjustable type. It is the only valve on the X-mas tree that is used to control flow.

- **SWAB VALVE**

The Swab Valve permits vertical entry into the well for well intervention such as coiled tubing Operations. This valve is operated manually.

- **X-MAS TREE CAP**

The X-mas Tree cap provides the appropriate connection for well control equipment when conducting well interventions and is installed directly above the swab valve. When closed, this valve should keep the well pressure under full control and therefore should be in optimum condition – it should be used sparingly as a working valve.

- **ANNULUS A RIGHT OUTER VALVE**

The annulus “A” Right outer valve is the working valve to be used for isolation during intervention operations.

- **ANNULUS A LEFT INNER/OUTER**

The annulus “A” inner and outer valves are used to monitor the annulus pressure and can be utilized as a kill wing.

### **3. SAFETY**

- Before commencing any work a work permit shall be opened.
- A flowing well shall only be closed in by a operator.
- All personnel should have full PPE as well as an individual H2S monitor.
- Only certified intrinsically safe phones to be used on location.
- Upon arrival on location a safe muster point must be established and a site access control system established.
- Gas readings should be noted at the 1m around the wellhead
- Breathing apparatus should be deployed both at the wellhead and the muster point.
- Material Safety Data Sheets must be available for all grease, flushing fluid and any other chemicals used in the operation.
- Unit should be placed a minimum of 15 meters from wellhead
- A pre job inspection shall be made of the work area and any problems noted discussed at the toolbox talk and resolved where practical.
- Fire extinguishers are positioned in place.
- Pre-job toolbox talk/safety meeting prior to the rigging up of equipment and starting the operation.  
During this meeting, all safety concerns will be reviewed and the tasks to be performed for the day. If any change is made in operations, another toolbox talk shall be conducted.
- Place the grating or cellar cover as required.
- Erect scaffolding and place the ladder down into cellar if required.
- If the cellar is full of liquid this liquid shall be pumped out first.
- If the wellhead surface is not clean, slippery/greasy, this surface should be cleaned and washed first.
- Check for any visual or audible leaks. If any anomaly, report to wellhead maintenance coordinator.
- Check the functioning of the valves and record number of turns as per attached list.

Refer to appendix 2.

### **4. SCOUTING**

The purpose is to record the full details of the well. The information captured will be recorded on a Wellhead Scouting Template and a wellhead passport created on the WHM database.

Refer to appendix 1.

The following information to be recorded.

- Road condition.
- Well pad size and condition.
- Availability of flare pit, size and distance from the well pad.
- H2S, O2, CO, LEL levels
- Wellhead cellar size and condition.
- Well status and type (Flowing/not flowing: producer/injector/unknown: single/dual/ESP)
- Wellhead flowing/shut in pressures.
- Any external leaks.
- Pressure rating, configuration and manufacturer of wellhead components
- Flow line status (connected/ not connected)
- Well coordinate and ground level reading from GPS.
- Any anomaly found at the well site or on well.

## **5. FLUSHING AND LUBRICATING XMAS TREE VALVES**

Connect flush pump to valve and flush into it while it is being stroked simultaneously. The supervisor on the pump must have the pressure gauge in view at all times and must not exceed the working pressure of the valve. Return the valve to the closed position flushing is finished; flushing will only be regarded as finished when least amount of flushing fluid volume has been pumped in as per the tables specified. Repeat this operation for all the Xmas tree valves. Once complete lubricate as per steps described in 4.3.

Use this table as reference for flushing volume required.

Valve Size	Volume
2"	1/2 liters
3"	3/4 liters
4"	1 1/2 liters

Note:

Once flushing and greasing completed proceed to wash and clean the wellhead surface.

## **6. VALVE GREASING PROCEDURE**

The following procedure establishes the minimum requirements to ensure that the integrity and reliability of equipment, safety and health of personnel, and the environment is not compromised due to activities performed.

This procedure is developed to perform the preventive maintenance activities on x-mas tree wellhead valves. It covers requirements and detailed procedures to cover all types of x-mas tree wellhead valve greasing as per manufacturer recommendations and Procedures / Standing Instructions.

All API gate valves require preventive maintenance with the passage of time and as per their usage requirement. Poorly scheduled maintenance or neglecting any preventive maintenance of gate valves will result in mechanical failures. Such failures increase downtime and man-hours. The result is unplanned production losses. Preventive Maintenance strategy is the best technique and tool to limit failures and increase production and efficiency. The intent of this procedure is to improve overall operation and efficiency of wellhead valves through greasing under this Preventive Maintenance procedure.

This section of procedure describes steps and references to perform preventive maintenance activities of x-mas tree and wellhead gate valves safely, effectively and efficiently.

### **A. Wellhead Valves Types**

There are different types, sizes and makes of gate valves installed at wellhead locations. These include but not limited to:

- Cameron
- McEvoy
- WKM
- Anson
- Canada Works
- FMC
- Weatherford

The valve types are broken into two categories, floating gate (which includes split gate McEvoy valves) and wedge gate. For identification purposes the wedge gate valves have a taper stem profile for locating the hand wheel which is retained by a nut. The hand wheel is uniquely shaped with triangular section at one end and an upright handle at the other.

When operating floating gate valves the handle should be backed off  $\frac{1}{4}$  to  $\frac{1}{2}$  turn in the fully open or fully closed position. The Wedge gate type valves should be fully tightened in the open and closed position.

The scope of this procedure covers all types of wellhead valves installed on wells. All wellhead valves have to be greased during the Preventive Maintenance activity as per defined frequency. These valves include swab valve, wing valve, master valve (1 or 2), safety shutdown valve, tubing head spool valve and casing head spool valve. A wellhead valve, which cannot be properly greased due to any reason, must be promptly reported to WHM Coordinator.

### **B. Wellhead Valves Greasing Frequency**

Ideally the wellhead valve greasing frequency should be based, besides other factors, on the well type, net producing or injection days & operating pressures.

Valves should be greased after 10 cycles or as per below, whichever comes first:

- All Wells      Annual Frequency
- New wells      Soon after commissioning newly drilled well

At any time if the wellhead valves are exposed to acid due to well acidizing, the valve body must be lubricated immediately or as soon as possible to eliminate the possibility of internal corrosion.

### **C. Wellhead Greasing Steps**

Carry out wellhead valves greasing activity as per following step by step procedure.

- Fully open or close the valve if there is pressure in the line (Do not close any valve if the well is flowing. This should only be done by operator).
- Remove safety caps from the grease fittings, only if no pressure is showing.

**Note:** There are several configurations of gate valve grease nipples in the field.

**The single grease fitting:** This is located in the bonnet.

**Two Grease Fittings:** One in the bonnet and one in the body.

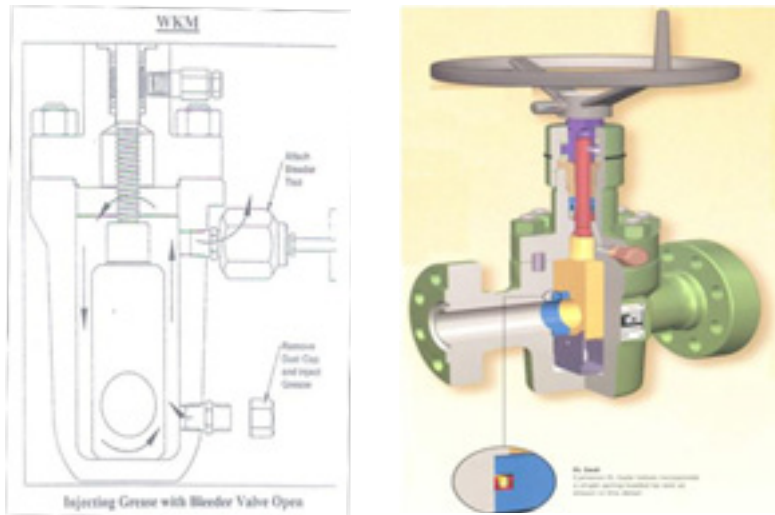
**Three Grease fittings:** These are fitted to McEvoy valves and are two different sizes. The sealant injection ports are standard 1" fittings and the body filler is 7/8". This requires a separate fitting and is installed to prevent regular grease being injected into the body which could cause pressure locking.

**Four Grease Fitting:** One is located in the bonnet and 3 in the body.

### **D. Single Grease Fitting**

- Cycle valve until it is partially open.
- If no pressure present remove grease cap and install grease injection fitting. Note: the grease fitting assembly must have a check valve installed to allow the safe removal in case of failure of the grease fitting ball failing to re-seat itself
- Inject grease as per the table below.
  - Note:** Greasing pressure MUST NOT exceed the well surface pressure by more than 100 psig. The well pressure is measured at the treetop gauge. Excessive pressure may damage the valve.
- Cycle valve to the fully open position to the fully closed position a minimum of 4 times and return to the fully open or closed position as required.
- Remove grease injection fitting, clean and reinstall grease cap.

Nominal Bore Size	Grease Quantity
2"	1 kg
2 9/16"	1 1/2 kg
3"	2 1/2 kg
4"	4 kg
5"	5 kg
6 3/8" Cameron Type F	2 kg



## **E. Two and Four Grease Fittings**

- Install a pressure release tool on either of the fitting, usually lower fitting located in the valve body.  
**Note:**  
For safety purposes, a male by female 1/2" needle valve must be threaded into the outlet of the pressure releasing tool. In the event that the ball check in the lubrication fitting does not reset itself, the needle valve can be used to shut-off the flow.
- Thread the pressure releasing tool stinger into the valve body lubrication fitting. The stinger will push the ball-check in the lubrication fitting off its seat, allowing the valve body pressure to escape. Note that further movement of the stinger will seal off the fitting.
- Attach the grease fitting assembly to the other upper fitting located in the bonnet.  
**Note:**  
If the valve body pressure continues to flow and the ball-check does not reset itself after you back out the releasing tool stinger, shut-in the flow by the 1/2" needle valve and inform WHM Coordinator.
- Inject grease into the valve body until it flows clear and uncontaminated from the pressure- releasing tool.  
**Note:**  
Greasing pressure **MUST NOT** exceed the well surface pressure by more than 100 psig. The well pressure is measured at the treetop gauge. Excessive pressure may damage the valve.
- Stop bleeding, and pump grease 1-2 strokes more to keep the body cavity completely filled up with grease.
- Release pressure, remove grease injecting apparatus & bleeder tool and re-cap the fittings.



- If valve is fitted with 4 grease ports then, if no pressure present, remove grease cap and install grease injection assembly. Inject grease until a small increase in pressure is note. Bleed off pressure, remove grease injection assembly and replace cap.

### **F. Three Grease Fittings**

- For McEvoy valves the valve should be cycled to the half open position. The two sealant reservoirs should be cleaned using valve flush. The reservoirs should be filled with **Summit International Master Lube & Seal 1601 ( for Low H<sub>2</sub>S/CO<sub>2</sub> or 1607 (for High H<sub>2</sub>S / CO<sub>2</sub>) grease.**
- To stop over filling the cavity it should be greased in the half open position. Once the volume of grease as per table in 4.3.1 has been pumped the valve should be cycled minimum of 4 times. If any increase in torque is noted then if safe to do so the pressure should be vented using the pressure relief screw in bonnet.

## **7. EMERGENCY SEALANT INJECTION PROCEDURE**

### **Test Medium:**

- Pressure Locking shall be conducted using Summit International Master Lube & Seal 1601 ( for Low H<sub>2</sub>S/CO<sub>2</sub> or 1607 (for High H<sub>2</sub>S / CO<sub>2</sub>)

### **Test Equipment:**

- Unless otherwise specified by the customer, the tests shall be conducted using a test pump, Grease pump: (Lincoln Pump), chart recorder, and gauge of appropriate range. The measuring equipment shall be calibrated, and calibration equipment shall be traceable to International Standards.

### **Pressure locking and Duration:**

- Pressure locks on Gate Valves should be classed as isolation when the pressure is monitored over a period of time that satisfies the client.

### **Pressure Locking:**

- Ensure the Valve Gate is fully closed
- Rig up suitable Manifold to the body fitting, if Adaptors are needed for Grease fitting make sure correct Adaptor is used.
- Attach the Manifold to Body fitting using suitable sacrificial adaptor as safety precaution, in case fitting check valve fails after completing Procedure.
- Attach suitable pump to Manifold. Pump to required pressure, this must not exceed the maximum working pressure of the valve. Monitor pressure.
- To release Pressure Lock vent pressure through the Manifold, once vented, remove Manifold and replace Fitting Cap.
- Leave work place clean and tidy and advise the Customer Representative of the completed task.



## **8. STEM BEARING GREASING PROCEDURE**

To minimize friction, the stem bearing on valves should also be lubricated with automotive-type grease gun. Standard grease fitting for stem bearing lubrication is located on the valve bearing cap.

- Attach automotive-type grease gun to the standard fitting.
- Inject approximately 4 strokes of lubricant through the standard fitting.
- Remove grease gun and stroke valve few times.

5"	2 liters
6 3/8 Cameron Type F	1 liter
6 3/8 Mc	3 liters

## **9. TESTING**

All tests will be charted and test information will be logged onto a Wellhead maintenance template and subsequently entered into the WHM data base well passport.

The preferred method is the inflow test and should be utilized where possible.

### **A. Hydrostatic Seat / Gate Test**

- If required install a test flange using a new gasket. Alternatively the X mas' tree cap can be used if testing tree. Confirm tree cap is tight.
- Attach the appropriate test apparatus and chart recorder to the valve and tighten.
- Test apparatus to 250 PSI and maximum test pressure against closed needle valve.
- Cycle the valve to manufacturers recommended closed position. Count number of turns.
- Fill valve with water.
- Pressure up to 250 PSI and hold for 5 minutes.
- Increase the pressure to the specified test pressure (see chart below for pressure). Hold pressure for a minimum of 10 minutes after pressure stabilized. (Defined as stable or decreasing pressure fall off of less than 10 PSI/min).
- Check the chart for any pressure reduction, which would indicate a leak.
- Follow safe accepted test practices to verify that there is no water leakage past the gate or from between the seats and gates.
- If a leak is observed, carefully bleed off test pressure from both valve and test equipment. Cycle valve, flush as per section 4.5 and grease as per section 4.3 then retest.
- After testing all the valves they are to be cycled fully open and fully closed to fully open again to ensure there is no trapped pressure in the valve body.
- Remove test equipment and flange if fitted.

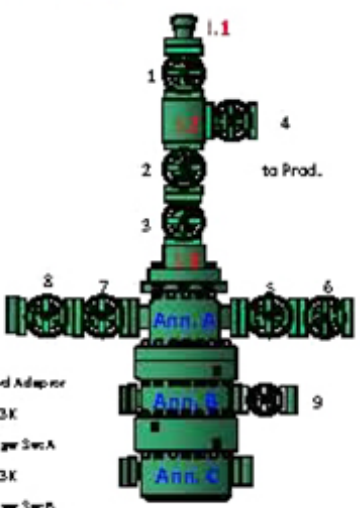
Wellhead Type	Location	Pressure
Producer/EFT	Xmas Tree A Annulus	1500 PSI
Injection	Xmas Tree A Annulus	3000 PSI
All Wells	B Annulus	1000 PSI
All Wells	C Annulus	500 I

## **B. Inflow Test**

This test is conducted using the well pressure as test medium.

- Install test apparatus on tie in point in flow line between production wing valve and isolation valve.
- Test apparatus to 250 PSI and maximum test pressure against closed needle valve.
- Cycle upper master and swab valves to manufacturers recommended open position. Count number of turns.
- Note shut in wellhead pressure (this may have increased/decreased since initial reading)
- If shut in pressure is less than 400 PSI inform WHM Coordinator.
- Close lower master valve and bleed off pressure above to 100 PSI. Close flow line isolation valve followed by production wing valve. Production annulus valves should also be in the closed position.
- This will give you an effective test pressure of SIWP – 100 PSI. Monitor for buildup of pressure on chart and gauge for minimum of 15 minutes. If pressure build up is observed then cycle valve, flush as per section 4.5 and grease as per section 4.3 then retest.
- Remove test apparatus from tie in point and install gauge. Install test apparatus on tree cap and test.
- Note pressure. If any build up bleed back to 100 PSI. Test lower master valve.
- Close upper master valve and open lower master valve. Repeat test.
- Close swab valve and open upper master valve. Repeat test.
- Bleed down pressure above swab valve and remove test apparatus

**APPENDIX 1: WELL PASSPORT SCHEMATIC**

	<b>OLD WELL</b>	DATE : .....
		FIELD : .....
		DGS : .....
		RIG : .....
WELL STATUS : <b>FLOWING</b>	<b>WELL CONNECTED TO PROD. LINE</b>	WELL CONDITION CATEGORY
WELL TYPE : <b>PRODUCTION</b>	<b>Y TUBING Y ANNULUS</b>	<b>L4</b> Schedule as required
COMPLETION : <b>SINGLE</b>	Last visited date : .....	
<b>OPERATIONS REQUEST AND TIME DEFINITION</b>		<b>ONSITE PRESSURE CHECK</b>
Requested Operation: <b>Non Routine Maintenance</b>	Time Definition	WHSIP : <b>400</b> Psi 27.4 Bar
Install valve inactive Ann-A & test all valves	Man-Demob : <b>2:30</b>	Ann. Sec. A : <b>300</b> Psi 20.5 Bar
POST operation status: <b>Job Completed</b>	NPT: <b>0:00</b>	Ann. Sec. B : <b>N/C</b> Psi N/C Bar
Well sign placed: <b>Y</b> Road sign placed: <b>N</b>	Operating Time : <b>3:45</b>	Ann. Sec. C : <b>N/C</b> Psi N/C Bar
	Total Time : <b>6:15</b>	Prod. Line : <b>N/C</b> Psi N/C Bar
		Other : Psi Bar
Requirements :		<b>GAS TESTING RESULT</b>
		Range
		H2S ppm O2 % CO ppm LEL %
		1 m around Wellhead : <b>0</b> <b>20.8</b> <b>0</b> <b>0</b>
		Sample from the well : <b>0</b> <b>20.8</b> <b>0</b> <b>0</b>
<b>VALVES STATUS SUMMARY</b> <b>Y</b> Operable <b>N</b> NOT Operable <b>U</b> Unknown		<b>Valves Inflow / Pressure Test Status</b>
# Valves Operating Flange Type Press.(Psi) Test status & remarks		<b>Good</b> <b>Failed/passing</b> <b>NOT tested</b>
1 <b>SWAB</b> <b>Y</b> <b>3-1/8" 3K R31</b> 300 Inflow tested - Holding OK		<b>NEW TREE</b> <b>Ann A Valves NEW</b> <b>Specific Problem</b>
Noafturns 18 <b>CAMERON</b>		
2 <b>UPPER MASTER</b> <b>Y</b> <b>3-1/8" 3K R31</b> 200 Inflow tested - Holding OK		
Noafturns 18 <b>CAMERON</b>		
3 <b>LOWER MASTER</b> <b>Y</b> <b>3-1/8" 3K R31</b> 250 Inflow tested - Holding OK		
Noafturns 18 <b>CAMERON</b>		
4 <b>PROD. WING</b> <b>Y</b> <b>3-1/8" 3K R31</b> 250 Inflow tested - Holding OK		
Noafturns 18 <b>CAMERON</b>		
5 <b>ANN. A RIGHT IN.</b> <b>Y</b> <b>3-1/8" 3K R31</b> 150 Inflow tested - Holding OK		
Noafturns 18 <b>CAMERON</b>		
6 <b>ANN. A RIGHT OUT.</b> <b>Y</b> <b>3-1/8" 3K R31</b> 150 Inflow tested - Holding OK		
Noafturns 18 <b>CAMERON</b>		
7 <b>ANN. A LEFT IN.</b> <b>Y</b> <b>2-1/16" 5K R24</b> 200 Inflow tested - Holding OK		
Noafturns 13 <b>CAMERON</b>		
8 <b>ANN. B LEFT</b> <b>U</b> <b>2-1/16" 5K R24</b> Not tested		
Noafturns 13 <b>CAMERON</b>		
9 <b>ANN. A LEFT OUT.</b> <b>Y</b> <b>2-1/16" 5K R24</b> 200 Inflow tested - Holding OK		
Noafturns 13 <b>WKM</b>		
<b>External Leak</b> <b>N</b>		
		<b>WELL CONNECTED TO PROD. LINE on Tubing &amp; Annulus</b>
Well Coordinate		
GL-MSL Elevation		
Road Access		Good for Truck / Trailer
Well pad condition		Good for Truck / Trailer
Cellar Size		3 x 2 x 2 m
Cellar condition		Ha if covered by sand
Flare pit size		25 M Dal
Flare pit distance		250 m
Next Service		
Type of Service / Maintenance performed : <input type="checkbox"/> INSPECTIONS <input type="checkbox"/> ROUTINE <input checked="" type="checkbox"/> NON ROUTINE <input type="checkbox"/> WELL INTERVENTION SUPPORT		



## APPENDIX 2: VALVE IDENTIFICATION

### A. ANSON GATE VALVE (SLAB TYPE)



ANSON VALVE

**B. CAMERON GATE VALVE (SLAB TYPE)**





**C. OCT GATE VALVE (SLAB TYPE)**



**D. WELLHEAD INC GATE VALVE (SLAB TYPE)**





**E. FMC GATE VALVE (SLAB TYPE)**





**F. WEATHERFORD GATE VALVE (SLAB TYPE)**





**G. WKM GATE VALVE (WEDGE GATE TYPE)**





**H. MCEVOY GATE VALVE (SPLIT GATE TYPE)**



## LUBRICANTS AND SEALANTS IDENTIFICATIONS AND INFORMATION

Summit Oilfield Valve Lubricants and Sealants are proudly manufactured in USA using the latest technology and the proprietary materials. All products are tested and certified to meet and exceed the harshest- high pressure / high H2S / High CO2 wells and guarantying maximum valve performance.



# Master Valve Flush 1611- MVF (Liquid Valve Clean)



Made in USA

- Nonflammable
- Prevents rust and corrosion
- Resistant to most chemicals
- Eliminates costly shut down and valve repair
- Removes residual gum, lacquer, and rust deposits left by valve lubricants

HP Valve Flush increases the efficiency of your operation by allowing easy valve breakout whereby valves operating freely for months. HP Valve Flush both penetrates and cleans valves that are difficult to operate or stuck. This product is very effective at removing deposits such as rust, lacquer or gum which can be the result of residual valve lubricants. This left over lubricant can shut down valves. HP Valve Flush should not be used on oxygen service and is effective with most valve lubricants and sealants. Over time it will make your job run smoother.

This product can be used on all lubricated valves that are hard to operate. Use conventional lubricating equipment to apply HP Valve Flush. After the product is pumped into the valve, wait about 10 minutes then slowly turn the valve. The process should be repeated until the valve opens freely.

This product is available in Net Weight of 40 lbs (18.1 KGS)

### TYPICAL OBSERVATIONS

Color .....	Clear
Physical State .....	Liquid
Odor .....	Hydrocarbon Like
Density lb/gal, @ 77°F (25°C) .....	7.30
Specific Gravity @ 77°F (25°C) .....	0.876
Flash Point, ASTM D-92 .....	144°F
Evaporation Loss ASTM D-972 @ 210°F (98°C) .....	116 (Ethyl Ether)
Shelf Life (unopened container): .....	Three Years



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 sales@summititc.com                      www.summititc.com





# Lube/Seal Master 1600

(All Purpose Valve Lube & Storage)



Economical  
Minimizes friction during operation  
Provides excellent leak resistance  
Extends lifetime and performance of valves

Waterproof  
Contains no bentonite or soap  
Protects against rust and corrosion  
Non-separating

**Lube/Seal Master 1600** is a synthetic biodegradable lubricant and sealant that is both outstanding and economical which minimizes metal on metal contact during the operation of valves. **1600** is resistant to crude oil, hydrogen sulfide, saltwater, and oilfield brine water. This product outperforms others because it is insoluble in water, does not separate or melt, is leak resistant, does not contain soap, and contains the best rust and corrosion inhibitors available. **Lube/Seal Master** services temperatures to 400°F (204°C).

This product is available in Net Weight of 5 gal - 40 lbs, 16 gal - 118 lbs, and 55 gal - 420 lbs.

### TYPICAL OBSERVATIONS

	NLGI 3	NLGI 4	NLGI 6
Color	Brown	Brown	Brown
Texture	Smooth Paste	Smooth Paste	Sticks
Density, lb/gal @ 77°F (25°C)	8.05	8.25	8.00
Specific Gravity, @ 77°F (25°C)	0.965	0.988	0.959
Dropping Point, ASTM, D-2265	Up to 500°F (260°C)	Up to 500°F (260°C)	Up to 500°F (260°C)
Flash Point, ASTM D-92	445°F (229°C)	445°F (229°C)	445°F (229°C)
Penetration, ASTM D-217 worked @ 77°F (25°C)	240	175 - 205	100
NLGI Grade	3	4	6
Blend Base Oil Viscosity, @ 40°C cst	2319	2241	4689
Oil Separation, ASTM D-1742 % wt. loss	<5.0	<5.0	<5.0
Corrosion Preventive Properties, ASTM D1742 @ 125°F (51°C)	Pass	Pass	Pass
Rust Preventative Test, ASTM D-1743	Pass	Pass	Pass
Water Washout Characteristics, ASTM D-1264 @ 100°F (37°C)	Nil	Nil	Nil
Oxidation Stability, ASTM D-942 @ 210°F (98°C), 72 hrs. PSI Loss	10	10	10
Temperature Range	-28°F to >400°F (-33°C to 204°C)	-28°F to >400°F (-33°C to 204°C)	-28°F to >400°F (-33°C to 204°C)
Shelf Life (unopened container)	Three Years	Three Years	Three Years



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# Lube / Seal Master 1601

(For Low CO<sub>2</sub> & H<sub>2</sub>S Valve Service)



**Lube / Seal Master 1601** is a heavy duty lubricant for valves that is both synthetic and high quality. **1601** protects metal surfaces against rust and corrosion allowing valves to operate freely which extends the life of all moving parts. This product can be used on ball, gate, and plug valves to reduce friction during operation of the valve.

**1601** is highly resistant to wash out by harsh chemicals such as H<sub>2</sub>S and CO<sub>2</sub>, acids, caustics, and saltwater solutions. **Lube / Seal Master 1601** forms a seal providing leak free operation for extended service intervals. **1601** services a wide range of temperatures, 50° F > 450° F (10° C to >232° C).

This product is available in Net Weight of 5 gal - 40 lbs, 16 gal - 118 lbs, and 55 gal - 420 lbs.

## TYPICAL OBSERVATIONS

Color	Yellow
Appearance	Smooth
Thickener	Non-soap
Density, lb/gal @ 77°F (25°C)	7.60
Specific Gravity @ 77°F (25°C)	0.911
Dropping Point, ASTM D-2265	>500°F (>260°C)
Flash Point, ASTM D-92	>400°F (204°C)
Penetration, ASTM D-217 worked @ 77°F (25°C)	220
Corrosion Preventive Properties, ASTM D-1743 @ 125°F (51°C)	Pass
Evaporation Loss, ASTM D-972 @ 210°F (98°C)	Nil
Oil Separation, ASTM D-1742 @ 210°F (98°C)	3%
Oxidation Stability, ASTM D-942 @ 210°F (98°C), 100 hrs. PSI Loss	10
Water Washout Characteristics ASTM D-1264 @ 100°F (37°C)	Nil
Shelf Life (unopened container)	Three Years



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**Seal CO<sub>2</sub> Master  
1607  
(For High CO<sub>2</sub> & H<sub>2</sub>S Valve Service)  
Made In USA**



- Non-melting, non-separating
- Temperature range of -30 to >550°F (-34°C to >288°C)
- Resists CO<sub>2</sub> (carbon dioxide) and H<sub>2</sub>S (hydrogen sulfide)
- Insoluble in water, oilfield brine, and hydrochloric acid
- Contains no bentonite or soaps
- Excellent leak resistance

Seal CO<sub>2</sub> Master 1607 is an excellent, heavy-duty valve lubricant and sealant that contains a special ingredient that provides the best lubricity preventing metal on metal wear. This sealant is so durable that it will continue to seal valves exposed to downhole gases and is insoluble in water, oilfield brine, and hydrochloric acid. 1607 will not absorb moisture and is non-separating. When Seal CO<sub>2</sub> Master is exposed to hydrogen sulfide, carbon dioxide, gasoline, diesel, or crude oil it will continue to be leak resistant. There are no bentonite or soap thickeners in this product. 1607 services a wide range of temperatures from -30°F to >550°F (-34°C to >288°C).

Valve Rebuilders, Valve Manufacturers, Chemical Processing Companies, Pipe Line Companies, Refineries, and Utilities are the type of industries that can use this product. 1607 can also be applied to plug valves, gate valves, ball valves, gathering systems valves, crude oil pipe line valves, high and low pressure valves, motor and hand operated valves.

This product is available in 40 LB (18.1KG) pails.

**TYPICAL OBSERVATIONS**

Color	Golden
Texture	Smooth Paste
Density, lb/gal @ 77°F (25°C)	7.90
Specific Gravity, @ 77°F (25°C)	0.946
Dropping Point, ASTM D-2265	570°F (298°C)
Flash Point, ASTM D-92 based on oil	None
Viscosity of Base Oil, cSt @ 40°C (104°F)	2400
Penetration, ASTM D-217 worked @ 77°F (25°C)	280
Corrosion Preventive Properties, ASTM D-1743 @ 125°F (51°C)	Pass
Water Washout Characteristics, ASTM D-1264 @ 100°F (37°C)	Nil
Oil Separation, ASTM D-1742 @ 77°F (25°C)	<5.0%
Evaporation Loss, ASTM D-972 @ 210°F (98°C)	0.3%
Shelf Life (unopened container)	Three years



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# Seal Master 1603

**(High Viscosity Emergency Valve Sealant)**

Made In USA



Biodegradable  
Excellent sealing properties  
Keeps valves free from freezing  
Water resistant  
Combats corrosion  
Eliminates waste

Resists acids, caustics, and harsh chemicals  
Keeps liquid or gas from escaping  
Non-toxic  
Retains consistency  
Prevents scoring and galling

**Seal Master 1603** is a synthetic biodegradable high viscosity plug valve lubricant that will prevent valves from freezing. Because **1603** contains a special ingredient for lubricity it is especially effective in heavy duty applications. The versatility of **Seal Master** is unsurpassed since it can be used in a variety of applications in nearly all industrial applications. This product is unaffected by acids, harsh chemicals, and caustics will not dissolve in the presence of aliphatic hydrocarbon. **1603** prevents scoring and galling on precision valves, liquid gas from escaping and is insoluble in water. **Seal Master** also combats corrosion and eliminates waste. The special formulation makes **1603** the ultimate solution for sealing valves carrying natural gas, crude oil (sweet or sour), water and condensates. **1603** resists H<sub>2</sub>S and CO<sub>2</sub>.

**1603** is primarily used to keep valves free of freezing in all types of industrial areas. Aliphatic hydrocarbons and aqueous solutions is where **1603** is recommended. This product should not be used for steam service or with hydrogen peroxide or sulfuric acid.

This product is available in Net Weight of 5 gl - 40 lbs and 55 gl - 400 lbs.

### TYPICAL OBSERVATIONS

Color	Pale Green
Texture	Slightly Rough
Active Component	Proprietary Component
Manufacturing Process	Fluoromation
Density, lbs/gal @ 77°F (25°C)	9.20
Specific Gravity, @ 77°F (25°C)	1.102
Dropping Point, ASTM D-2265	>500°F (>260°C)
Flash Point	445°F (229°C)
Penetration, ASTM D-217 worked @ 77°F (25°C)	Bulk 145
	Stick 100
NLGI Grade	5
Corrosion Preventive Properties, ASTM D-1743 @ 125°F (52°C)	Pass
Water Washout Characteristics, ASTM D-1264 @ 77°F (25°C)	Nil
Oxidation Stability, ASTM D-942 # 210°F (98°C), 100 hrs, PSI Loss	8
Temperature Range	-40°F to >450°F (-40°C to >232°C)
Shelf Life (unopened container)	Three Years



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# SUMMIT LUBRICATION SYSTEMS & REPAIR KIT

## A. SUMMIT 15000 PSI SKID UNIT LUBRICATOR MODEL: SLS-15K-3P-5G

Summit High Pressure- High Volume Lubrication Systems are designed and fabricated (Made in USA) to meet the toughest and challenging of WHM jobs in desert or Arctic environment to pump light or heavy lubricants and sealants, cleaners or packing using highest quality pumps, compressors, and other components. Summit Skid Mounted Lubrication Systems with ample space and smart design makes the operators jobs easy and efficient with ease of moving / transporting from one job site to another job site using the forklift slots or by lifting the System via the lifting eyes.



\*ACTUAL PRODUCT MAY VARY PER CUSTOMER REQUIREMENTS

**MADE IN U.S.A.**



1. Lubrication Assembly Mounted on a steel powder-coated skid, 6 ft. W x 8 ft. L x 5 ft. T, with smooth deck plate, with drip edge/spill containment around pumps.

Features: portable, with forklift slots, corner post with lifting eyes with Double Rack Stack for hose reels.

2. One Diesel Air Compressor with shut off valve and key start.

- a. 10 HP Diesel Engine
- b. Piston Air Compressor
- c. Pilot Valve
- d. 30 Gallon, 80 Gallon, 120 Gallon Air Storage Tank (or per customer specifications)
- e. Drain Valve
- f. Idle Down Switch
- g. Tank Pressure Indicator
- h. Air Manifold Module, (1) 1/2" NPT inlet x (5) 1/2" NPT outlets
- i. One Air Filter, Regulator, and Air Lubricator Set

3. Battery, Battery Box, Battery Cables and Clamps

4. Three Lincoln High Volume, High Pressure 5 gallon Air-Operated Pump Assembly with mechanical grease pump stroke counter, containing:

- a. Lincoln Air Motor 140:1
- b. Lincoln Pump Tube
- c. Lincoln Pressure Primer

5. Three Heavy-duty steel painted hose reel with 50 ft., of 0.390" I.D., 15,000 psi working pressure lubricant supply hose, and control valve/discharge hose assembly with 10,000 psi wp ball valve\*\*

6. One Heavy-duty steel painted hose reel with 50 ft., of 1/2" I.D., 300 psi working pressure air hose.\*\*

7. One Heavy-duty steel painted hose reel with 50 ft., of 3/8" I.D., 300 psi working pressure air hose.\*\*

8. Giant Button Head Coupler outlet connection.

9. Screw Connection Coupler outlet connection, option.

10. One Equipment Operation and Maintenance manual in English

11. One Valve Lubrication Adaptor Kit

\*\* Note: All Hose Reels are Automatic Spring Rewind.\*\*



**B. SUMMIT 15000 PSI CART UNIT LUBRICATOR MODEL: SLC-15K-1P-5G**

Summit Cart Unit Lubricator is designed to be as strong and versatile as the Skid unit, but using wheels for smaller jobs and mobility.

High Volume, High Pressure 5 gallon Air-Operated Pump Assembly on Wheels containing:

- a. Lincoln Air Motor 140:1
- b. Lincoln Pump Tube
- c. Lincoln Pressure Primer
- d. Lincoln Portability Kit
- e. 25 ft. or 50 ft. lubricant supply hose
- f. Discharge hose assembly
- g. Lube Adaptor

\*ACTUAL PRODUCT MAY VARY PER CUSTOMER REQUIREMENTS

**SUMMIT WHM VALVE ADAPTOR KIT MODEL:S-VAK-15**



**MADE IN U.S.A.**



# SUMMIT VAULT™ CHEMICAL INJECTION SYSTEMS

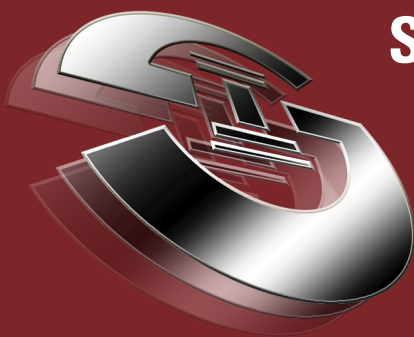
**Summit Solar 9000-VSM Series**



**MADE IN U.S.A.**



**ENVIRONMENT PROTECTED - DESERT OR ARCTIC CONDITIONS**



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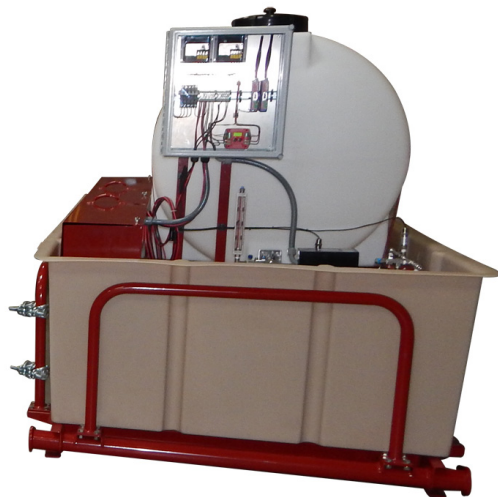
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## Systems Overview

**“SUMMIT VAULT™” Chemical Injection Systems** 2 Piece Cover for Technician Convenience & Molded Reservoir/Skidded Solar, Electric, and Pneumatic Powered Chemical Injection System offers precise injection rates by means of Class 1 Division 2 Summit PLC Controller and Calibration settings. Summit offers many pump variations including Class1 Div 2 Solar with Electric and Pneumatic options. Our Class 1 Division 2 Solar Panels are made in USA with best in class performance when compared with other brands. Summit sealed deep-cycle Batteries offer up to 1000Ah with optional battery backup of an additional 750Ah. NEMA 4X Electrical enclosure offers added environmental protection for electrical systems. Electrical systems offer isolation breakers instead of fuse for critical components. Large Heavy duty battery enclosure that offers system protection in case of battery burst. **Exceeds in Power and Performance!**

◆ <b>Completely Enclosed - Desert/Arctic Conditions</b> ◆ <b>Skid Mounted</b>
◆ <b>Fully Assembled</b> ◆ <b>No Installation Required</b> ◆ <b>Plug &amp; Play</b>
◆ <b>Solar, Pneumatic, &amp; Electric pump options</b>
◆ <b>Suitable for Hazardous (C1D2) Environments</b>
◆ <b>State of the Art PLC controller - Summit SMC-9000</b>
◆ <b>Wireless Communication (Modbus/RS-232/422/485) SCADA systems</b>
◆ <b>Continuous or intermittent injection</b>
◆ <b>Available with power backup Redundancy System</b>
◆ <b>Eliminates need for generator</b>

**A versatile and rugged system designed and built for applications in the oil and gas industry suitable for desert or arctic conditions.**



# Notes



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# ABOUT US

*Summit International, an American based company, is a manufacturer and supplier of quality oilfield and industrial products. Our company has proudly provided products and services to oil & gas companies, rig manufacturers, drilling contractors, casing & service companies, refineries, petrochemical and power generation plants, exploration and production operations, marine industries, engineering & construction companies, and bio-remediation projects for many decades.*

## Summit **FR** Work Apparel



## Summit Vault™ Chemical Injection Systems and Summit Chemicals



## Summit Oilfield Lubes/Seals and WHM Lubrication Systems



## Oilfield & Refineries Tools, Equipment, & Technologies



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**Summit International**, an American based company, is a manufacturer and supplier of quality oilfield and industrial products. Our company has proudly provided products and services to oil & gas companies, rig manufacturers, drilling contractors, casing & service companies, refineries, petrochemical and power generation plants, exploration and production operations, marine industries. engineering & construction companies, and bio-remediation projects for many decades.

Our decades of experience in oilfield and industrial supply and services is available to our valued customers and prospective clients worldwide. We welcome the opportunity to be of service on all your requirements.



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