Pressure Balanced Manually Operated Lubricator Operation & Maintenance Manual

H-OMM-0001

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Revision History

Revision A

Original Issue of Operating Manual

Safety Hazard Indicators

Indicates a hazardous situation which, if not avoided, could result in injury.

Indicates a hazardous situation which, if not avoided, could result in death or serious injury.

Indicates a hazardous situation which, if not avoided, will result in death.

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General Safety Guidelines

Read and understand all instructions herein prior to operating any equipment. Failure to follow may result in serious personal injury and damage not only to the equipment but also the environment.

1. Stay alert, use common sense and experience when using oilfield equipment.
2. Operators should be trained and exhibited a level of competency running this equipment in a facility prior to running in the field.
3. Always use proper PPE and the correct tools during the operation.
4. It is recommended that a Job Safety Analysis be performed prior to work commencing.
5. Be aware of unexpected circumstances that may arise during operations. Stop work and assess the hazards that may be posed and develop a plan to mitigate them.
6. When handling and lifting equipment always be sure to use the correct lifting devices and follow company rules when lifting heavy equipment.

Warning

The purpose of this document is to describe the correct process for running and retrieving a BPV or TWCV with PBMO Lubricator through the tree or BOP stack.

Running and Retrieving should be operated by a reputable service company and with qualified personnel.

Several factors are particularly important to consider prior to performing this potentially dangerous procedure.

- Always conduct a Job Safety Analysis on the rig and prior to starting the job.
- If working on an offshore platform or workover rig never place yourself in a tight space when checking for trapped pressure
- When working on land always have a man basket to work from.
- Always have proper lifting and holding devices to enable the safe manipulation of the lubricator.

1.0 Introduction

The information and procedures that follow serve as a guide for the installation and retrieval of Back Pressure (BPV) and Two-Way Check Valves (TWCV) utilizing the appropriate tools supplied by HESHKA Oil LLC.

A BPV is a device that seats in a tubing/mandrel hanger or coupling to seal the well while the Blowout Preventers are removed, and the Wellhead Tree installed. BPV's are also used to temporarily isolate the tree from pressure enabling repairs to be made to a tree component, typically a gate valve.

Note: BPV's are not intended to be used as the primary sealing device when isolating a tree component from pressure.

A Two-Way Check Valve is a device that seats in the Tubing Hanger enabling the Wellhead Tree to be tested. It is designed to hold pressure from above and below and is the reason it should not be used to pressure test BOP's. Should pressure build up there is no way to kill the well since you cannot pump through it.

Note: BPV's and TWCV's should not be left in the well for extended periods of time as it could affect the retrieval of the component due to corrosion effects, leading to utilization of more complex and potentially dangerous procedures to recover control of the well.

: It is possible for grease and or other fluids to freeze causing the bleed through features of the TWCV to become inoperable. Pressure may not escape in certain severe conditions. Should such a condition arise Heshka Oil would recommend always utilizing a PBMO Lubricator be used to retrieve BPV's & TWCV's. Never run manually open hole if there is a concern over knowing what the pressure condition is.

2.0 BPV/TWC Features

2.1 The Running & Retrieving Tools

The Running/Retrieving tool is attached to the end of the polished rod and is used to hold the BPV during installation and removal.

Threads

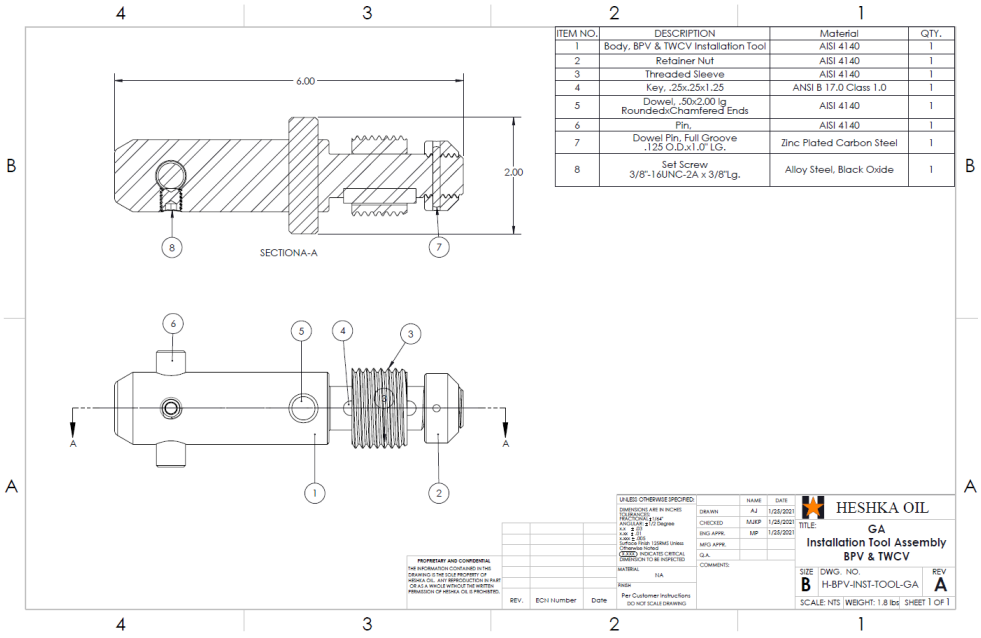
They are externally threaded on one end, which makes up to the internal thread in the BPV/TWCV

Set Screw

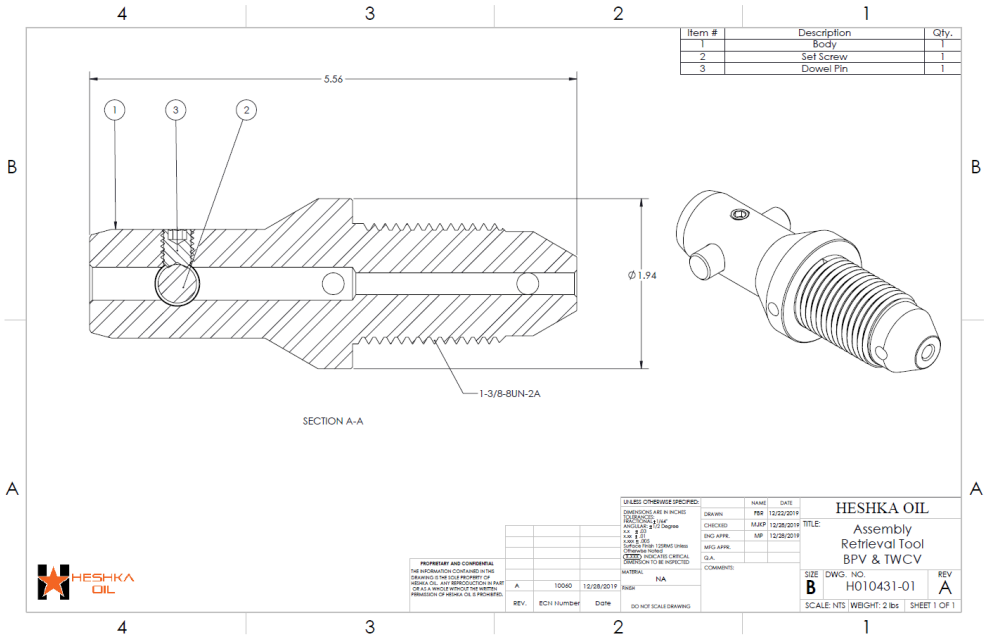
The R/R Tool is held in place on the polished rod with a retaining solid pin and a socket set screw.

Installation Tool/Stinger

This is the lower tip of the tool. It pushes the poppet, or check valve, of the BPV down to equalize the pressure from the well.



Running Tool – 2” And Larger Sizes

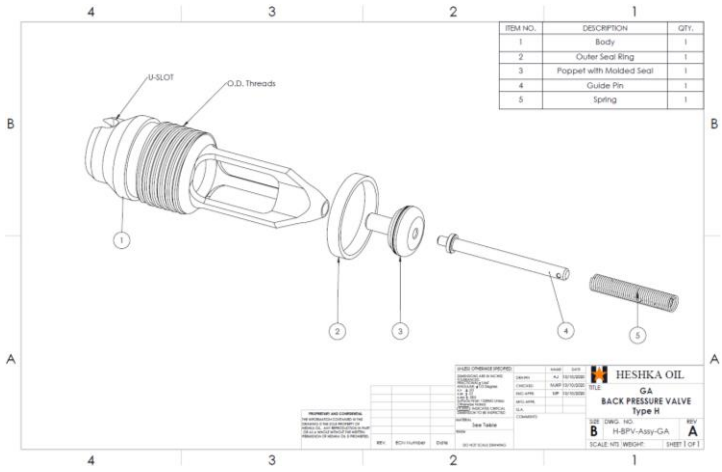


Retrieval Tool – 2” and Larger Sizes

2.2 Back Pressure Valve Features

The BPV consists of a body, Seal, Plunger/Poppet with Molded seal, Guide Pin(stem) and Spring. Not shown is the I.D. Thread that the Running/Retrieving Tools thread into.

The outside thread is a special 90° LH and is what is made up in the Tubing Hanger.

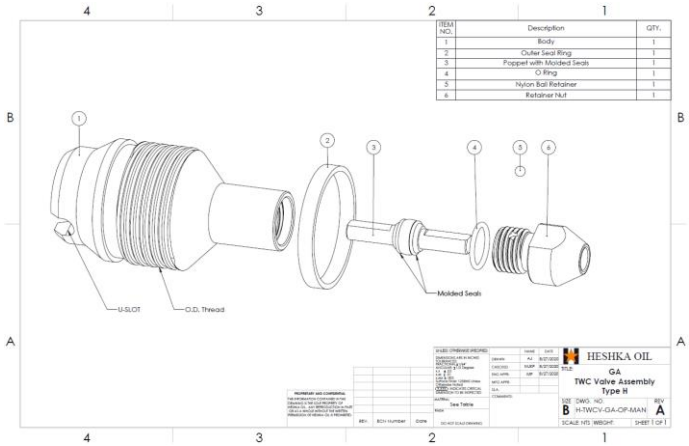


2.3 Two Way Check Valve Features

The Two-Way Check Valve has a body with U-Slot, outer seal ring, Plunger/Poppet with Molded Seals, Retainer Nut, Nylon Ball and O-Ring.

Not shown is the I.D. Thread that the Running/Retrieving Tools thread into.

The outside thread is a special 90° LH and is what is made up in the Tubing Hanger.



3.0 Specifications

BPV/TWCV Thread Size	Pressure Rating BPV	Pressure Rating TWCV
2”	20,000 psi	15,000 psi
2-1/2”	20,000 psi	15,000 psi
3”	20,000 psi	15,000 psi
3-1/2”	20,000 psi	15,000 psi
4”	20,000psi	15,000 psi
5”	20,000 psi	10,000 psi

Pressure Ratings are based on the receiving material having the correct thread length and minimum material mechanical properties of the BPV or TWCV.

4.0 Lubricator

4.1 The Heshka Oil LLC. Pressure Balanced Manually Operated (PBMO) lubricator is designed to run and retrieve threaded type back pressure valves. The following are the features of this lubricator.

- Polished rod offered in 2 diameters – 1-1/8” and 1-1/4”
- Tree Connection either Flanged, Weco or API Acme style
- High Pressure Needle Valves
- Manifold for managing any pressure that may be in the well during operations.
- Swivel Lifting Eye
- 10,000 psi rated components (Flanged or Heshka Slik Connect style 15,000 psi)
- H2S/CO2 or General/Sweet Service

4.2 This lubricator is designed to attach to the top of the Wellhead tree or other pressure containing devises via a threaded or flanged connection. The needle valves are to enable the isolation and monitoring of pressure both in the well and the lubricator. It is an open yoke design allowing for the manipulation of the rod up and down as well as rotation even with pressure in the system. The yokes house the low friction seals that contain the pressure. The upper portion of the lubricator is made up of tubular sections connected by means of couplings (WECO/Slik Connect) or API flanges. This modularity of the system can accommodate stroke lengths up to 18’.

5.0 Running Procedure

5.1 PBMO Lubricator

5.1.1 Pre-Run Checks

- Lubricator was tested prior to shipping to site.
- Ensure all tools are on hand.
- Determine the size of the BPV/TWCV.

- Inspect BPV Threads for damage
- Dry Fit BPV/TWC Before Installation (before running Tubing Hanger). Note number of turns to make up.
- Confirm material of Hanger is sufficient for rating of BPV or TWCV.
- Install running tool in BPV to be sure they mate together correctly.
- If the hanger has just been landed and made up to the tubing head mark the landing joint at the rotary table.
- Measure the landing joint from the mark to the end of the pin and confirm you have sufficient stroke in the lubricator to install the BPV/TWCV.
- Ensure all safety checks have been completed prior to installing the lubricator and running the BPV/TWCV.
- Examine the running tool and verify,
    - Threads are free from damage.
    - Key is installed correctly.
    - Threaded sleeve moves and turns freely.
    - Pin and set screw are installed correctly.

5.2 Running Threaded BPV/TWCV (Refer to Drawing PBMO-GA-OP-MAN)

- Close Master valve and Wing valves on Wellhead tree and bleed down pressure. Wing Valves should be locked in closed position.
- Once confirmed that there is no pressure in the tree the Wellhead Tree Cap can be removed.
- Remove 3/8” Set screw and Pin from installation tool.
- Pick up lubricator using Lift Eye (23) and set down on a flanged spool (if available)
- Manipulate the rod out the bottom until the Coupling (1) is exposed. If fitted, the polished rod shaft collar (9) will need to be loosened or removed. Replace Shaft collar (9) after coupling is exposed.
- Close Valves A & B and open Valves C & D.
- Install hydraulic jumper line to the available port on Valve D.
- Lift Lubricator and insert top end of running tool into the BPV coupling (1) aligning the holes enabling the fitting of the pin.
- Lock the pin in place with the 3/8” set screw.
- Make up BPV/TWCV to the Installation tool. Note number of turns to make up.
- Install lubricator onto the Wellhead Tree and Make up the connection pressure tight.
- Connect the hydraulic jumper to the tubing head or whatever setup you have for running the lubricator.

- If pressure is known to be in the wellhead/tree, pressure system to well pressure through the hydraulic line attached to valve D on the lubricator. Monitor for leaks. If leaks present, bleed down pressure and repair.

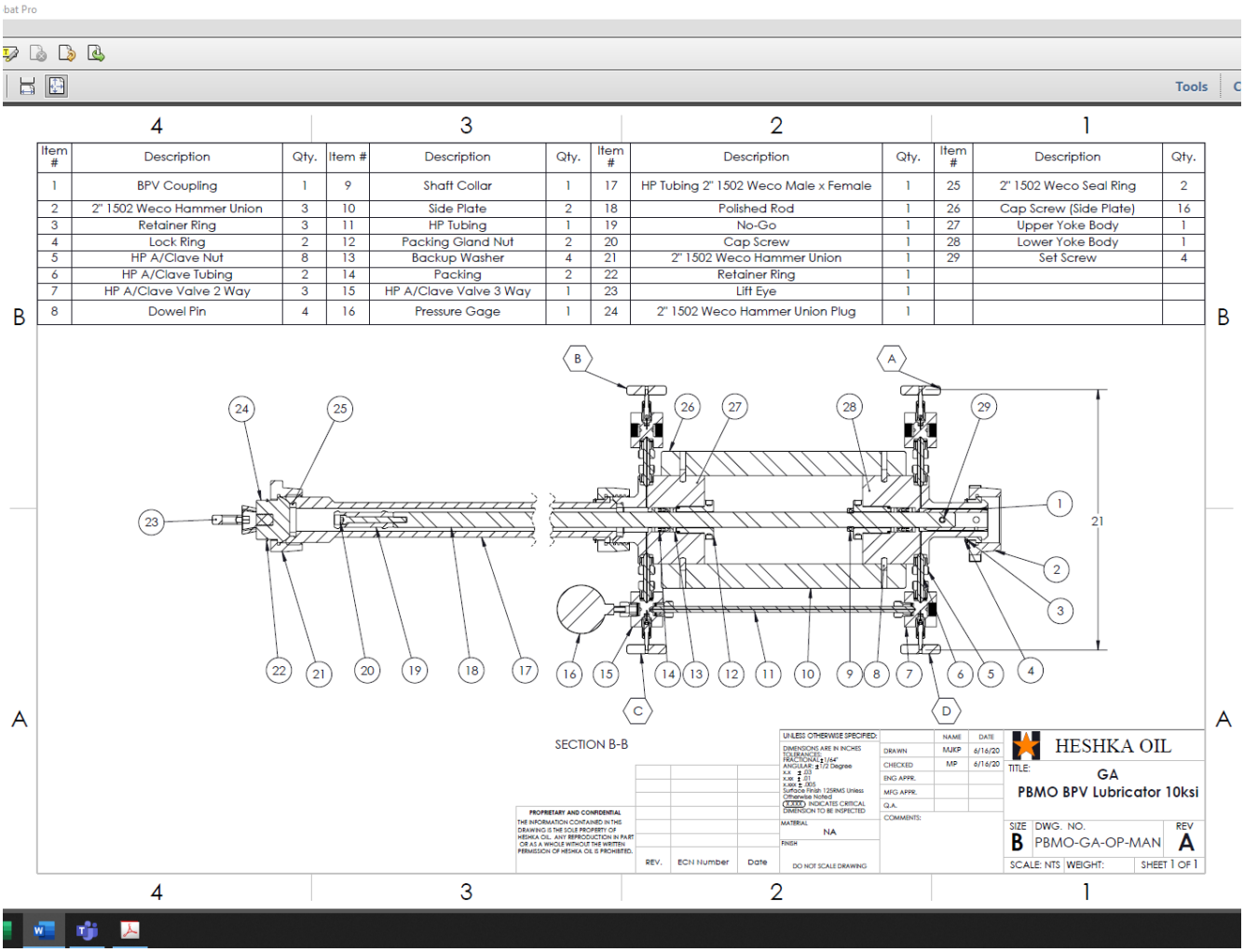
  Note: If there is the possibility of there being gas condensate present on the well it is recommended to use a solution of glycol and water or other freeze resistant fluid in the lubricator. This will assist in eliminating the freezing of the lines.

- With pressure maintained on the system open the Master Valves and any other Valves that may be closed in the vertical run of the tree. The lubricator pressure should now be the same as the well pressure.
- Attach the Parmalee Wrench to the polished rod. Remove the Shaft collar (9) and commence lowering the BPV/TWCV down using the Parmalee wrench into the tree until it contacts the threads in the tubing hanger.
  Note: The distance from the face of the top Packing Gland Nut (PGN) (12) to the face of the bottom PGN is approximately 11.50". By marking the polished rod at the start of each stroke and counting the number of strokes it took to reach the hanger threads and comparing with the known measurement from earlier will give an indication of whether you are at the correct depth.
-  Warning: Never allow any part of your body to be placed above or below the Parmalee (or Gear) wrench or its handle. Should the polished rod move up or down suddenly the wrench could result in serious injury or death to personnel.
- After confirming you are in the right place, pull down on the Parmalee Wrench and rotate counterclockwise at the same time. Watch for a ½" downward movement of the rod as the torque pin in the running tool drops into the U-Slot of the BPV/TWCV. Continue to rotate and count the turns and distance required to completely make up the BPV/TWCV into the hanger. The BPV/TWC should get tight at approximately 5-1/2 to 6 turns. Apply approximately 50-65 ft-lbs at the end to be sure the seal is correctly seated in the seal diameter of the hanger.

  Note: prior to rotating the rod mark a vertical line on the polished rod. This will be used to count the rotations.

- Once the BPV/TWCV is installed in the Hanger, lift the polished rod approximately ½" to disengage the tool. Rotate polished rod counterclockwise 8-1/2 to 9 turns to fully disengage the installation tool from the BPV/TWCV.

- The rod complete with tool can be retrieved back to a position above the Master valve. Monitor the number of strokes to be sure you have cleared the master valve.
- On reaching the correct position attach the Polished Rod Shaft collar (9). This will prevent the rod from sliding back into the Wellhead Tree.
- Bleed pressure from manifold on Lubricator by opening Valve A. This bleeds pressure from Tree also. If there is a Bleed Point on the Wellhead Tree it can be used also.
- Monitor (5minutes) for leakage past the BPV by watching for fluid coming from the open port of Valve A.
- On completion of a successful test, close the Master Valve.
- Remove Lubricator assembly and replace tree cap as required.



Item #	Description	Qty.	Item #	Description	Qty.	Item #	Description	Qty.	Item #	Description	Qty.
1	BPV Coupling	1	9	Shaft Collar	1	17	HP Tubing 2" 1502 Weco Male x Female	1	25	2" 1502 Weco Seal Ring	2
2	2" 1502 Weco Hammer Union	3	10	Side Plate	2	18	Polished Rod	1	26	Cap Screw (Side Plate)	16
3	Retainer Ring	3	11	HP Tubing	1	19	No-Go	1	27	Upper Yoke Body	1
4	Lock Ring	2	12	Packing Gland Nut	2	20	Cap Screw	1	28	Lower Yoke Body	1
5	HP A/Clave Nut	8	13	Backup Washer	4	21	2" 1502 Weco Hammer Union	1	29	Set Screw	4
6	HP A/Clave Tubing	2	14	Packing	2	22	Retainer Ring	1			
7	HP A/Clave Valve 2 Way	3	15	HP A/Clave Valve 3 Way	1	23	Lift Eye	1			
8	Dowel Pin	4	16	Pressure Gage	1	24	2" 1502 Weco Hammer Union Plug	1			

6.0 Retrieval Procedure – Type H BPV & TWCV

- Inspect the Retrieval tool threads for signs of damage.
- Measure and record the distance from the Tree Cap or attachment point to the BPV thread. This will give an indication of how many strokes (11.50”) of the rod are required to reach the BPV/TWCV.
- Close the Master Valve and Wing Valves on the Wellhead Tree and bleed off all pressure. Wing Valves should be locked in closed position.
- Once confirmed that there is no pressure in the tree the Wellhead Tree Cap can be removed.
- Remove 3/8” Set screw and Pin from the retrieval tool.
- Pick up the Lubricator to the vertical position using the Lift Eye (23) provided.
- Pull the rod out the bottom until the Coupling (1) is exposed. If fitted, the polished rod shaft collar (9) will need to be loosened or removed. Replace Shaft collar (9) after coupling is exposed.
- Close Valves A & B and open Valves C & D.
- Install hydraulic jumper line to the available port on Valve D.
- Insert top end of retrieval tool into the BPV coupling (1) aligning the holes enabling the fitting of the pin.
- Lock the pin in place with the 3/8” set screw.
- Install lubricator onto the Wellhead Tree and make up the connection pressure tight.
- If pressure is known to be in the wellhead/tree, pressure system to well pressure through the hydraulic line attached to valve D on the lubricator. Monitor for leaks. If leaks present, bleed down pressure and repair.

  Note: If there is the possibility of there being gas condensate present on the well it is recommended to use a solution of glycol and water or other freeze resistant fluid in the lubricator. This will assist in eliminating the freezing of the lines.

- With pressure maintained on the system open the Master Valves and any other Valves that may be closed in the vertical run of the tree. The lubricator pressure should now be the same as the well pressure.
- Attach the Parmalee Wrench to the polished rod. Remove the Shaft collar (9) and commence lowering the retrieval tool down into the Wellhead Tree using the Parmalee wrench. Continue lowering until contact is made with the threads in the BPV/TWCV.
  Note: The distance from the face of the top Packing Gland Nut (12) to the face of the bottom PGN is approximately 11.50”. By marking the polished rod at the start of each stroke and counting the number of strokes it took to reach the

hanger threads and comparing with the known measurement from earlier will give an indication of whether you are at the correct depth.

-  Warning: Never allow any part of your body to be placed above or below the Parmalee (or Gear) wrench or its handle. Should the polished rod move up or down suddenly the wrench could result in serious injury or death to personnel.
- After contact has been made, pull down on the Parmalee wrench and at the same time rotate the polished rod clockwise (right). Check for downward movement of the rod as you rotate (8-9 turns) and thread the tool into the BPV/TWCV. Once bottomed out apply approximately 50-65 ft-lbs through the retrieval tool and BPV at the same time. This should cause the BPV/TWCV to begin turning

  : The polished rod moves down as the retrieval tool engages the BPV or TWCV. At full engagement, the BPV or TWCV begins to disengage from its threads. It is important to monitor the number of turns applied while downward movement is occurring. If full number of turns is not achieved before the device begins to disengage it is an indication that there may be an obstruction. More importantly it may be an indication that pressure has built up below the BPV/TWCV. It is possible that pressure is holding the stinger up and not allowing the retrieval tool to move down and become fully engaged. Failure to recognize pressure build up below the BPV/TWCV could result in unplanned release of the device which could cause severe injury or death to personnel. Always count turns and measure engagement or disengagement while running or retrieving the BPV/TWCV.

  If pressure is suspected below the BPV/TWCV pressure up the Wellhead Tree through the Lubricator to equalize across the BPV/TWCV.
- Continue rotating the required number of turns clockwise to disengage the BPV/TWCV from the Hanger.
- The rod complete with tool can be retrieved back to a position above the Master valve using the Parmalee Wrench. Monitor the number of strokes to be sure you have cleared the master valve.
- On reaching the correct position attach the Polished Rod Shaft collar (9). This will prevent the rod from sliding back into the Wellhead Tree.
- Close Master Valve
- Bleed pressure from manifold on Lubricator by opening Valve A. This bleeds pressure from Tree also.

- Once pressure is confirmed to be 0 psi, remove Lubricator assembly, and replace tree cap as required.

DANGER **UNDER NO CIRCUMSTANCES IS A TWCV TO BE LEFT IN A HANGER LONGER THAN THE PERIOD OF TIME NEEDED TO CONDUCT A TEST. NOT TO EXCEED AN HOUR INTERVAL. UNDER NO CIRCUMSTANCES IS THE TWCV TO BE LEFT IN THE WELL OVERNIGHT.**

UNDER NO CIRCUMSTANCES IS A TWCV TO SET IN A WELL WHERE PRESSURE IS KNOWN TO BE PRESENT. THE SMALL AREA THAT THE POPPET IS ALLOWED TO TRAVEL WITHIN THE VALVE CAN BECOME CLOGGED WITH THE SMALLEST OF DEBRIS MAKING IT DIFFICULT OR IMPOSSIBLE TO OFFSET.

THE TWCV SHOULD NOT BE LEFT IN THE HANGER DURING BOP INSTALLATION. ALWAYS REMOVE IT AND REPLACE WITH A BPV.

USING A TWCV FOR ANY PURPOSE OTHER THAN TESTING OR IN THE PRESENCE OF KNOW WELL PRESSURE IS UNSAFE AND NOT APPROVED BY HESHKA OIL LLC.

7.0 Maintenance

The following section describes maintenance guidelines that will extend the life of the lubricator and ensure it works reliably and safely during each use.
The following steps should be taken on completion of a job. Refer to the GA drawing for your lubricator.

i. Visual inspection of external components. Ensure all Valves and Hydraulic Tubing are free from damage. If any of the tubing should be bent or kinked it should be replaced. If the Valve handles are bent, they should be replaced. Inspect the condition of the rod around the window to ensure it is damage free. If any signs of gouges, deep scratches, or sharp edges appear in the rod, it should be removed for a complete inspection.
ii. Drain system of all fluids. This can be done by removing the top connection from the extended pipe spools and raising the lower end off the ground.
iii. Before replacing the weco plug or flange on the spool fill the assembly using a 50/50 water/glycol mix. This will protect the carbon steel components from internal corrosion.

iv. Replace the end connection and pressure test unit to operating pressure for your lubricator to evaluate the effectiveness of the sealing elements, valves, and manifold system.
v. If the unit holds pressure steady for 3-5 minutes without any visible leaks from the connections, packing or valves the unit can be stored safely for the next job.
vi. **Heshka Oil LLC. Strongly recommends the use of a Maintenance Form for each lubricator in use. An example can be found at the end of this document.**
vii. If there are any issues with equipment leaking, go to section 8 for instructions to inspect and replace the failed components.

8.0 Disassembly/Assembly Instructions

Note: this section covers Polished Rod and Packing removal and replacement. Refer to the GA drawing for your lubricator.

i. If Polished Rod Shaft collar is attached to the rod, remove it.
ii. Remove the Weco Hammer Union Plug or Blind flange from the top end of the pipe spool.
iii. Pull the rod out of the lower yoke of the lubricator until the No Go meets the upper yoke and cannot be removed anymore.
iv. Remove the high-pressure tubing connected to the upper yoke.
v. Remove BPV/TWCV No Go attached to the top of the polished rod, manually move the rod out enough to remove the No Go. You will need to hold the rod with a Parmelee wrench to keep it from rotating as you remove the No Go.
vi. Manipulate the rod downwards/out the bottom end of the lubricator.
vii. Pull the rod completely out and place it on a suitable surface for inspection. If there are no signs of gouging or deep scratches and the overall surface is smooth, set the rod aside until needed.
viii. Unscrew the Packing Gland Nuts and set them aside.
ix. Remove the Backup washers.
x. Using a pick remove the packing elements individually taking care not to scratch the sealing surface in the Yoke Body.
xi. Inspect the seal bore in the Yoke Body for damage. Should there be significant scratching or gouging it will be necessary to rework or replace the component.
xii. Assembly of new packing is done by placing it in the seal bore of the YOKE then using the Packing Gland Nut to install it. You will need to leave the backup washer out until packing has been installed.
xiii. With packing installed remove Packing Gland Nut and insert backup washer and hold it in place with the Packing Gland Nut.
xiv. Repeat process for second seal set.

xv. Replace polished rod by inserting through the lower yoke and pushing it through until it passes both sets of packing. Extending it out the top sufficiently to install the No Go.
xvi. Make up any spools that were removed replacing seal gaskets, as necessary.
xvii. Unit is now ready for testing.