



WELL MASTER
Produce more. Spend less.

Plunger & Lubricator INSPECTION & REPLACEMENT GUIDELINES





WELL MASTER
Produce more. Spend less.

INTRODUCTION

PLUNGER LIFT INSPECTION AND REPLACEMENT RECOMMENDED GUIDELINES

This packet outlines general recommended methods for inspecting each type of Well Master plunger. Well Master recognizes that many plunger inspection methods are used in the field, but suggests each operator consider the variables presented for each plunger type. The goal of this guideline packet is for the operator to get the best and longest use out of each plunger while maintaining optimal production.

Plunger Inspection and Replacement is Key for Well Performance

The plunger is a tool that is part of the plunger lift system which experiences movement throughout the well and is constantly exposed to the damaging downhole environment. It is recommended plungers are inspected every 30 – 90 days depending on well characteristics and plunger type. The most successful plunger lift operators have a plunger inspection and replacement schedule which is optimal for their field and well environments. Operators have reduced inspection and replacement costs during downturns by allowing the plunger to run past its' time, but this results in major revenue losses due to inefficient seal of the plungers or intervention costs.

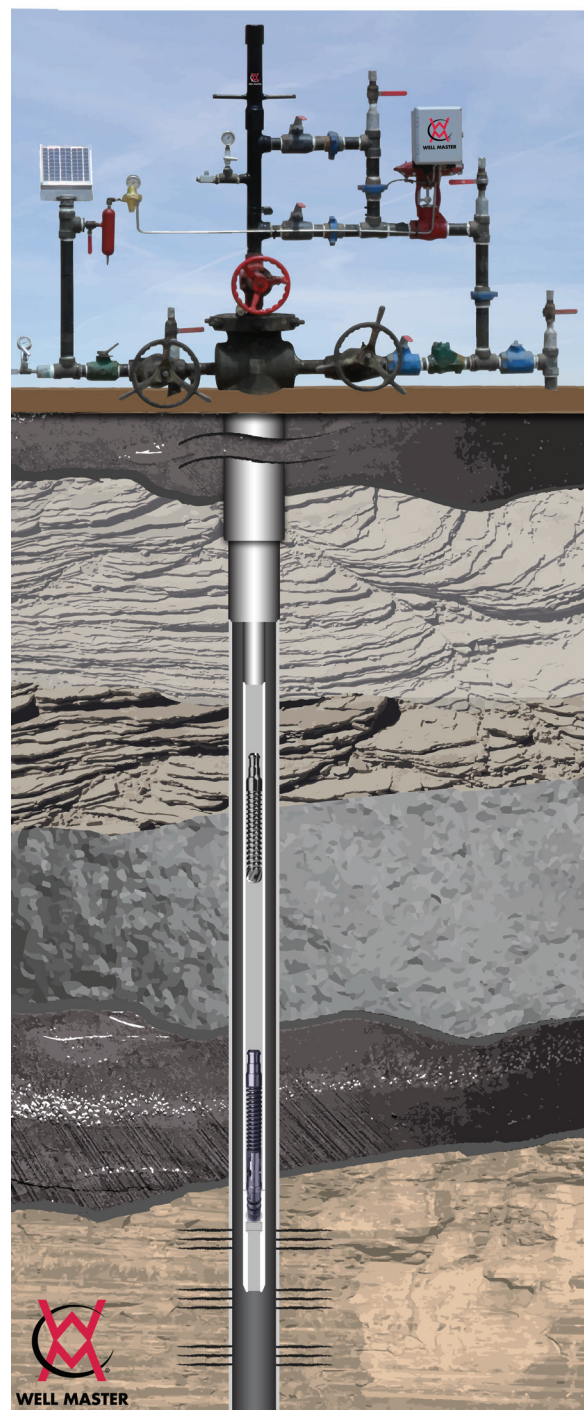
The Most Common Benefits of Regular Plunger Replacement:

- Helps maintain the well's production at the natural decline curve.
- Ensures a better seal for optimal lift.
- Results in significantly higher revenues to justify plunger replacement costs.
- Helps removal of paraffin, scale, and other damaging solids.
- Decreases risk of damage on downhole and surface equipment.
- Decreases risk of expensive fishing jobs.

Choosing the Right Plunger For Your Well

Before choosing a plunger for your well, it is important to consider the well environment. Common factors for plunger selection include:

- **Corrosive Environments** – The nature of the well should be addressed to match the right metallurgy with the application. Wells with high CO₂ or H₂S require higher grade materials which the Well Master team can help identify.
- **Depth** – A deeper well means more feet traveled per cycle for your plunger. A high grade metallurgy may be recommended for deeper wells.
- **Deviation** – Well Master designs plunger specific for highly deviated, horizontal, and S – Shaped wells.
- **Production Goals** – Depending on your well's decline curve, sealing efficiency, fall time, and rise time can impact the well's gas and liquid production.





WELL MASTER
Produce more. Spend less.

PLUNGER WEAR INDICATIONS

Well performance indications or plunger wear indications that your plunger needs inspection or replacement.

Visible wear

Check the wear as indicated by the plunger's inspection guidelines. Common wear issues can include loose parts, deformities, cracks, rust, swollen fish neck, etc. depending on your plunger type.

Measurable Wear

Wear can be measured by tools such as calipers or gauge rings. Make sure to have a tolerance measurement table handy if you are using calipers. Gauge rings must be plunger size specific.

Missed Arrivals

Missed arrivals can indicate that the plunger is not sealing efficiently due to wear. It could also mean this type of plunger may no longer be sufficient depending on the decline curve of the well.

Fast or Slow Arrivals

Quick arrivals can cause damage to both downhole and surface equipment, which also causes safety concerns and expensive intervention costs. Slow arrivals can indicate a rise velocity decline as liquid loading increases.

Erratic Plunger Cycle Times

Understand your plunger's fall rate and travel history. Most controllers or automation systems track the history of plunger travel speeds.

Change in Pressures

Rising in casing pressures, and increases in casing/tubing differential indicates liquid loading is occurring and the plunger is not lifting enough fluid.

Decreasing Load Factor

An equation commonly used to determine if a well will lift a plunger is the load factor: $(\text{Casing} - \text{Tubing}) / (\text{Casing} - \text{Line}) \leq 0.5$.
If the load factor decreases, this indicates a sub-optimally performing well.



WELL MASTER
Produce more. Spend less.

PLUNGER WEAR INDICATIONS

EAGLE BYPASS PLUNGERS

- Recommended inspection schedule is every month.
- Inspect fishing neck for any unusual wear such as bending or compression.
- Test shift valves (or clutch if applicable) to ensure they are shifting properly.
- Twist each section to ensure the threads are tight.
- Eagle plungers may have a wear indicator ring above the cage, check for wear.
- Measure O.D. with calipers, micrometer, or gauge ring.

Screaming Eagle plunger wear indicator ring worn on top plunger.



SOLID PLUNGERS

- Recommended inspection schedule is every three months.
- Inspect fishing neck (if applicable) for any unusual wear such as bending or compression.
- Look for visible corrosion or rusting.
- Measure O.D. with calipers, micrometer, or gauge ring.





WELL MASTER
Produce more. Spend less.

PLUNGER WEAR INDICATIONS

PAD PLUNGERS

- Recommended inspection schedule is every three months.
- Inspect fishing neck for any unusual wear such as bending or compression.
- Look for visible corrosion or rusting.
- Inspect bottom mandrel for any deformities.
- Inspect pad shoulders for any wear or flatness.
- Pad plungers may have pad wear indicators, check for wear on all pads.
- Twist each section to ensure the threads are tight.
- Check tension of pad springs by squeezing pads together.

Pad Wear Indicator on left plunger worn down. Plunger should be replaced.



BRUSH PLUNGERS

- Recommended inspection schedule is every month.
- Inspect fishing neck for any unusual wear such as bending or compression.
- Twist each section to ensure the threads are tight.
- Check for abnormal wear on brush, including missing bristles, tears, and rips.
- Measure O.D. with calipers, micrometer, or gauge ring.

Brush plungers offer the highest sealing efficiency, but should be checked frequently for fraying.





WELL MASTER

Produce more. Spend less.

LUBRICATOR INSPECTION & PLUNGER WEAR INDICATIONS

LUBRICATOR INSPECTION

Lubricator inspection is important to maintain safety standards and optimal performance of the plunger lift system. The lubricator serves as the impact tool for plungers arriving on surface. If the lubricator is poorly maintained, there is a higher probability of a risky arrival for the plunger. When choosing a lubricator for installation, the proper pressure rating must be taken into consideration depending on the application.

Inspection recommendations:

- The lubricator should be inspected with every plunger inspection or change.
- Check inlet and all outlets (including catcher port) for any visible gas or liquid leaks before de-pressurizing.
- Check for leaking between flange connections.
- Identify if the lubricator spring is a steel spring or SUPER-E Spring.
- If the spring is steel, flip the lubricator top upside down and listen for rattling or any noise. The spring may be broken if excessive noise is detected in the housing.
- Make sure all O-rings are intact. There are typically O-rings in the cap, but can also be found on the lip of the lubricator top.
- Increase your inspection frequency if high levels of H₂S or CO₂ are present as there may be corrosion inside the lubricator body.



WEAR ALLOWANCES FOR EACH TYPE OF WELL MASTER PLUNGER

SOLID PLUNGERS -VIPER, VENTURI

Size	New Outside Dia.	Wear Allowance	Replace
1-1/2	1.500	0.03	1.470
2-1/16	1.641	0.03	1.611
2-3/8	1.890	0.03	1.860
2-7/8	2.335	0.03	2.305

PAD PLUNGERS

	Dual Pad Plunger	Single Pad Plunger
Size	New O.D. fully extended (in.)	New O.D. fully extended (in.)
2-1/16	1.820	N/A
2-3/8	2.10	2.10
2-7/8	2.53	2.53
After 0.03" of wear on pads, the plunger may still operate adequately but wear will be difficult to gauge. Well Master recommends replacement after wear indicators are gone.		

SOLID PLUNGERS - SIDEWINDER

Size	New Outside Dia.	Wear Allowance	Replace
1-1/4	1.265	0.03	1.235
1-1/2	1.500	0.03	1.470
2-1/16	1.646	0.03	1.611
2-3/8	1.900	0.03	1.870
2-7/8	2.335	0.03	2.305

BRUSH PLUNGERS

Size	New Outside Dia.	Wear Allowance	Replace
1-1/2	1.530	0.04	1.490
2-1/16	1.671	0.04	1.631
2-3/8	1.920	0.04	1.880
2-7/8	2.365	0.04	2.325

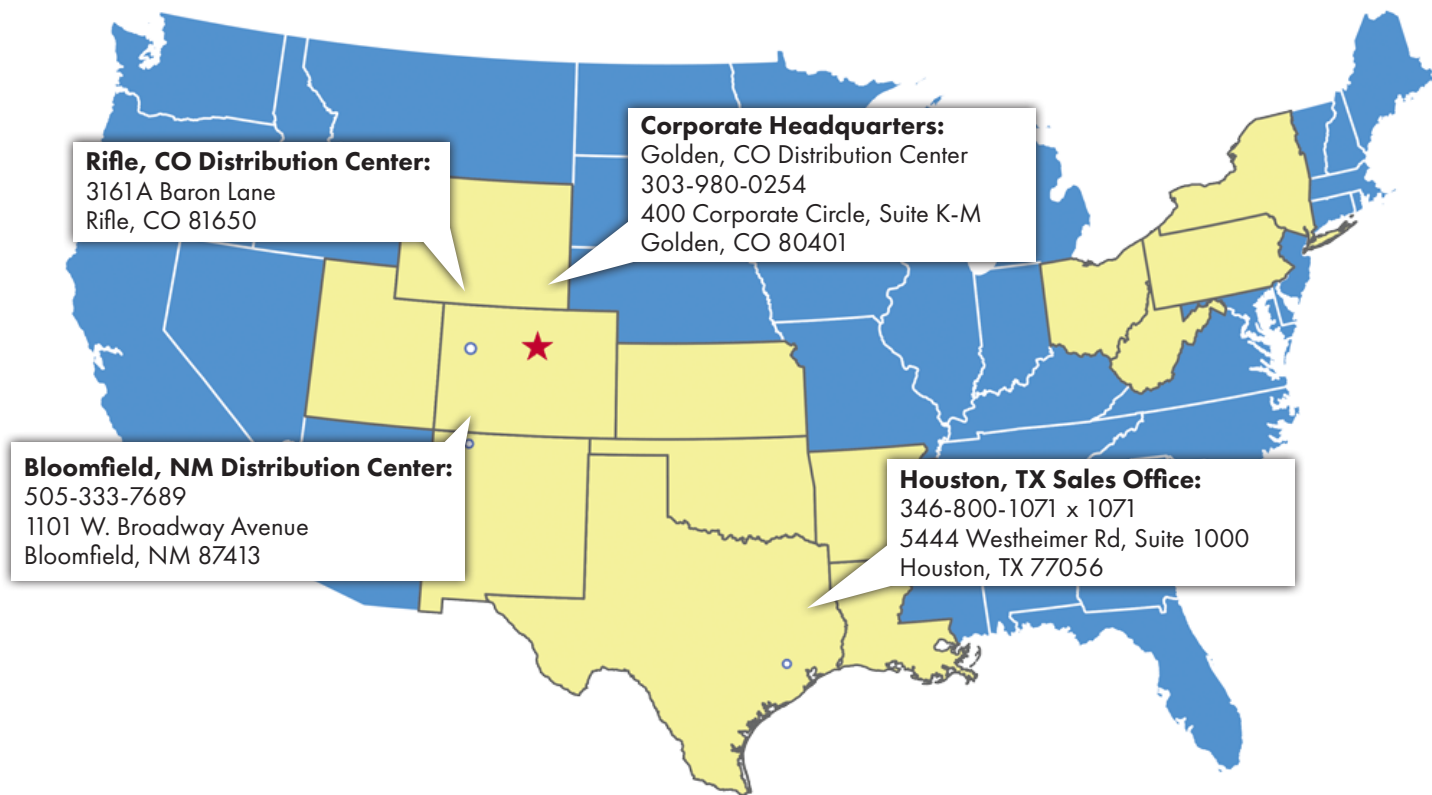
Inspection guidelines do not apply if any improper use, mishandling, faulty transportation, or incorrect installation occurs. Well Master makes no other warranty, express or implied, oral or written, concerning the aforementioned item's merchantability, fitness, purpose, or suitability.



WELL MASTER

Produce more. Spend less.

WELL MASTER SALES & SERVICE MAP



Rifle, CO Distribution Center:

3161A Baron Lane
Rifle, CO 81650

Corporate Headquarters:

Golden, CO Distribution Center
303-980-0254
400 Corporate Circle, Suite K-M
Golden, CO 80401

Bloomfield, NM Distribution Center:

505-333-7689
1101 W. Broadway Avenue
Bloomfield, NM 87413

Houston, TX Sales Office:

346-800-1071 x 1071
5444 Westheimer Rd, Suite 1000
Houston, TX 77056

Arkansas
Colorado
Kansas
Louisiana
New Mexico

Oklahoma
Pennsylvania/N.E.
Texas
Utah
Wyoming

Find us on LinkedIn & Facebook



Contact Well Master today to find out how we can help optimize your oil and gas well production.

Call **303.980.0254** | Email info@wellmaster.com | Visit www.wellmaster.com.

400 Corporate Circle, Ste. K-M | Golden, CO 80401 | Fax: 303.980.0355

©2016 Well Master Corporation, all rights reserved