KEG AND VALVE MAINTENANCE AND REPAIR STANDARDS

April 2015

KEG MAINTENANCE

KEG REPAIR OVERVIEW

Qualified keg repair achieves the following benefits:

- Mitigates safety risks for the public and brewery employees
- Extends the life of a brewery's existing float and reduces future keg needs
- Insures that the keg is "fit for fill" and will not damage keg processing equipment
- Eliminates costly returns of defective kegs from wholesalers or retailers for defective kegs
- Reduces risk of "off taste" product

Kegs and valves should always be repaired to their original dimensional specifications by a qualified technician.

Keg repair should never be attempted without specifically designed tools and training.

If repairs are performed by untrained staff without the specifically designed repair tools, the repair process and the repaired kegs and valves all pose a significant safety risk to the public and brewery employees.

KEG FAILURE MODES

Body damage includes the following:

- Bent or deformed neck
- Dents
- Holes
- Frozen/expanded vessel
- Beer stone
- Weld damage
- Damage to the top or bottom chimb
  - Chimb damage can be hazardous due to keg instability

VALVE FAILURE MODES

Valve failure includes the following:

- Damaged CO2 valve
- Bent valve body lugs
- Loss of tension in the springs
- Scratched ball valve or damaged poppet
- Obvious body damage such as bent downtube
- Organic or inorganic contamination
- Improperly installed lock ring
  - An improperly installed lock ring can be hazardous and lead to unintentional ejection of the valve

If a keg is identified as having a damaged lock ring, the keg should be de-pressurized immediately

KEG REPAIR SPECIFICATIONS

Chimb Damage

- Bent chimbs can make a keg unstable, creating a potential hazard.
- Chimbs must be reformed so that the keg can stand straight, be stacked without tipping over, and so that the chimb protects the neck and valve.

Bent or Deformed Neck

- The top of the neck must be .33” from the top of the chimb.
- Necks must be within 2 degrees of being perpendicular with the keg.

Dents or Body Damage

- Dents to the keg body must be removed so that the keg will hold its stated capacity.
- Dent removal is a process that should only be performed in controlled facility using a process specifically designed to remove dents.

KEG REPAIR SPECIFICATIONS

Holes/Pinholes

- Holes prevent a keg from maintaining pressure or product
- Pinholes are caused by improper welding techniques
- Pinholes can harbor bacteria that can effect product flavor

Frozen/Expanded Kegs

- When a keg freezes, the vessel expands
- Once the steel has expanded, the integrity of the material is compromised and the keg is no longer qualified for use
- The keg no longer holds the same volume
- The downtube of the valve is not long enough to properly clean or draw all of the contents from the keg
- Expansion on the top or bottom domes make the keg unstable

KEG REPAIR SPECIFICATIONS

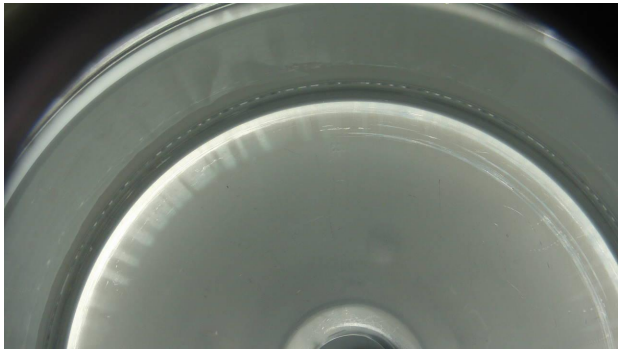
Beer Stone

- The interior surface of the keg must be clean to the metal, with no organic or inorganic residue, and no surface damage such as scratches, cracks, crevices, pinholes, scale, projections, staining, and splatter.
- Any imperfections (lack of smoothness) on the inside of the keg can hide micro-organisms that can contaminate the product, and can possibly spread to the entire brewery.

Before Cleaning

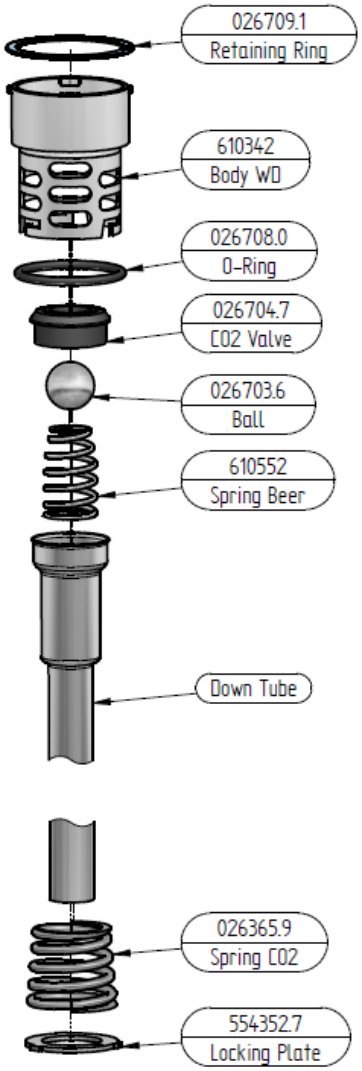
Weld Repairs

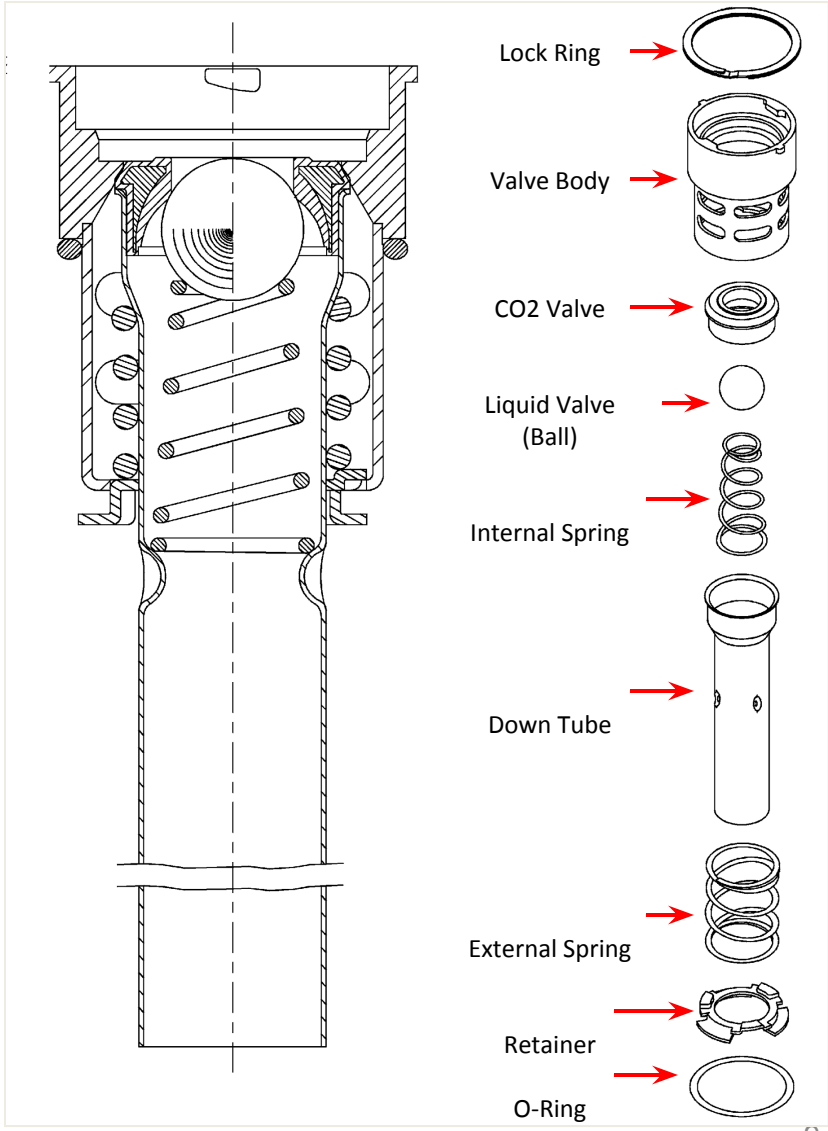
- Welds must achieve full material penetration with no stains or rust marks around weld areas.
- All welds must be smooth and free of cracks, crevices, pinholes, scale, projections, staining, and splatter.



After Cleaning

VALVE DESIGNS





VALVE REPAIR SPECIFICATIONS

- The valve removal and installation processes pose the greatest risk to the public and brewery employees.
- Valves should never be removed or installed by anyone without qualified training and tools.
- Before removing any valve, all pressure must be released from the interior of the keg.
- When installing a new or rebuilt valve, always use new o-rings and lock rings.
- Always use parts supplied by the manufacturer.
- When servicing keg spears it is important that all replaceable parts used are supplied or approved by the keg spear manufacturer.
- Use of non-approved components could cause serious damage to associated equipment or jeopardize public safety.

VALVE REPAIR SPECIFICATIONS

CO2 Valves

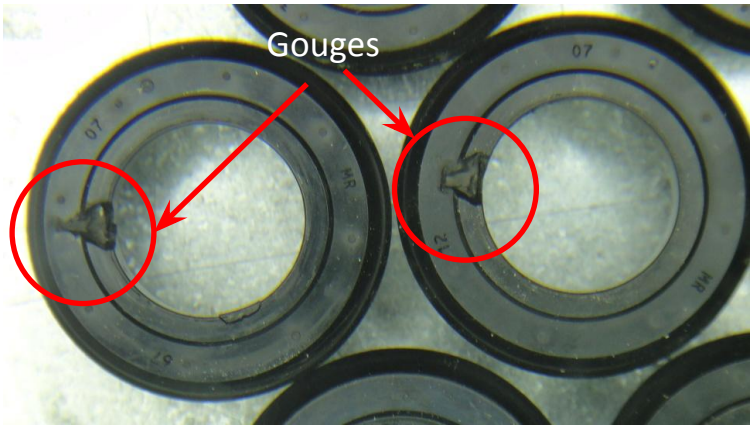
All damaged CO2 valves must be replaced. Damaged CO2 valves can be identified visually based on the following criteria:

- Radial cracking on the rubber exterior
- Cuts or gouges on the surface
- Bubbling or delamination

Show radial cracking photo- enlarge all photos for better viewing

Spring Replacement

- Springs that do not retain the tension specified by the manufacturer should be replaced.



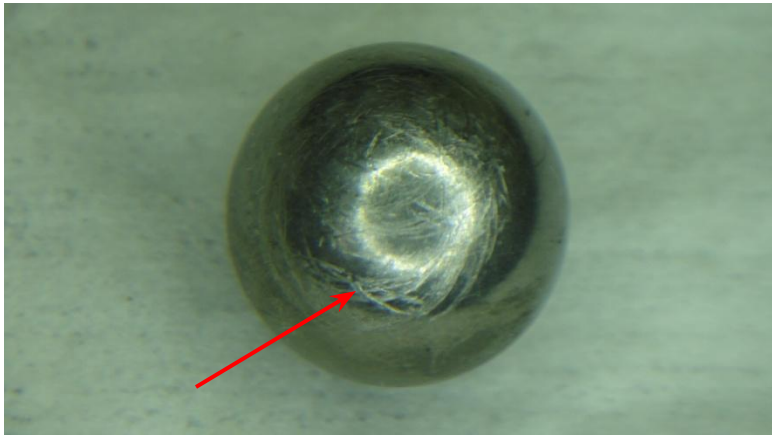
VALVE REPAIR SPECIFICATIONS

Bent Lugs

- Lugs must be visually inspected for defects.
- If lugs are damaged, then the valve body will not fit into the neck properly and the valve body should be replaced
- It is not possible to repair lugs

Scratched Liquid (Ball) Valve or Damaged Poppet

- All ball valves and poppets should be visually inspected for defects.
- Defective ball valves and poppets should be replaced with new parts. Damaged parts should never be repaired.



Obvious Body Damage

- All damaged body parts should be replaced with new parts. Damaged parts should never be repaired

VALVES AND VALVE SAFETY

OVERVIEW

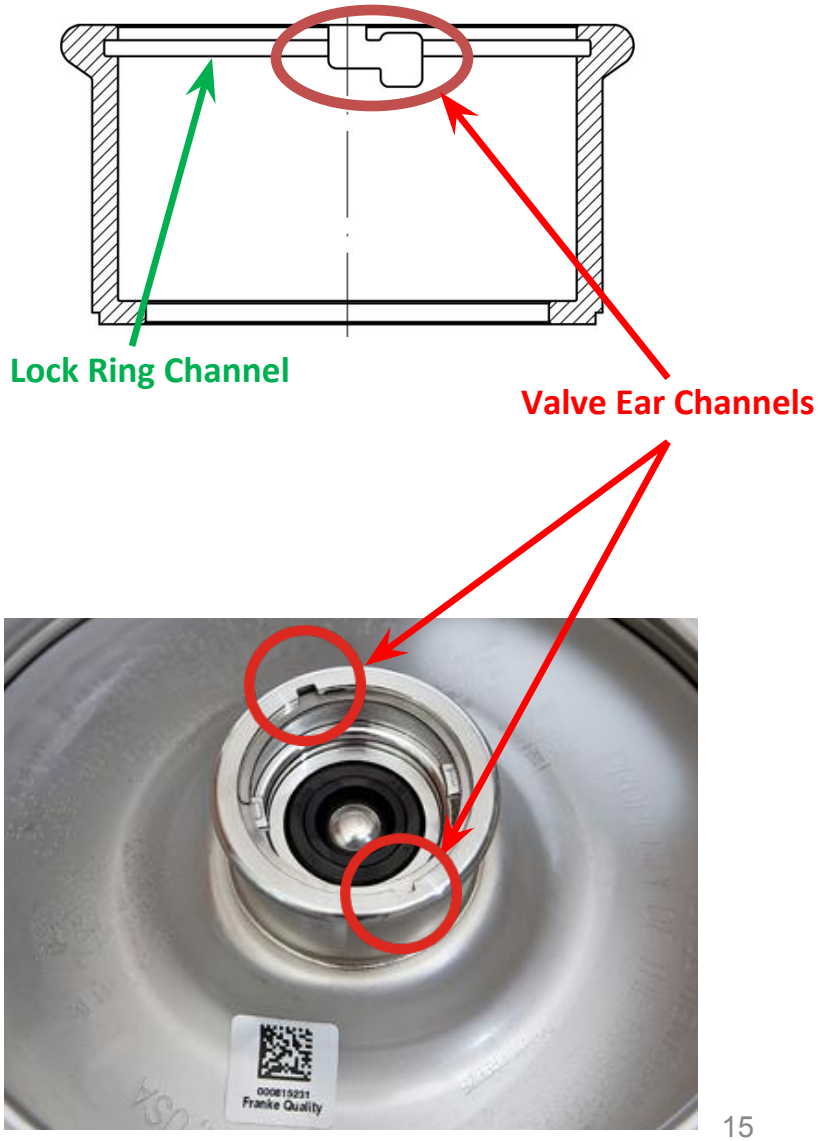
- The purpose of this document is to help field personnel who handle kegs to identify kegs that may present a safety hazard to brewery employees or consumers.
- Kegs that show evidence of tampering or are potentially hazardous should be set aside and quarantined until the keg can be inspected by a qualified technician.
- If a keg is identified in which tampering is suspected, please contact Franke Beverage Systems at (615) 462-4335.

VALVES DESIGN

Kegs in North America have a specifically designed 304 stainless steel neck that aligns with a specially designed valve.

The valve and neck have two safety features:

- A 304 stainless steel lock ring that fits into a channel of the neck and prevents the valve from ejecting under pressure.
- Valves have 2 lugs, or “ears”, on the top that fit into two channels and prevent the valve from ejecting



VALVE EJECTION

In order for the valve to be ejected from the keg, three things need to occur at the same time:

- Lock ring compromised or no longer in place
- Keg still under pressure with O-ring and CO2 valve maintaining their seal
- The 2-ear valve body aligns with the ear channels in the neck

The valve will only eject if all three circumstances occur simultaneously.

Any potentially hazardous keg should be depressurized if it can be done in a safe manner.

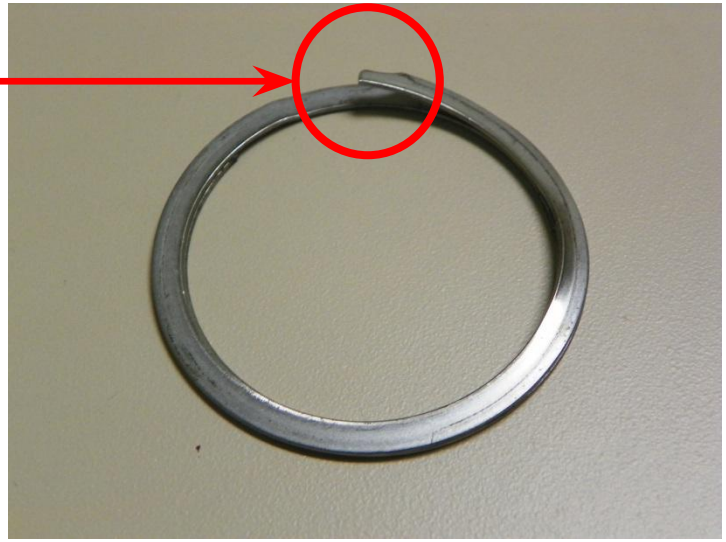
LOCK RING REMOVAL AND INSTALLATION

- **Proper Lock Ring Installation**

The end of the lock ring should always be located approximately 45 degrees from the ear channels. This prevents the lock ring from becoming accidentally dislodged when the coupler is being installed or removed

- **Lock Ring Damage**

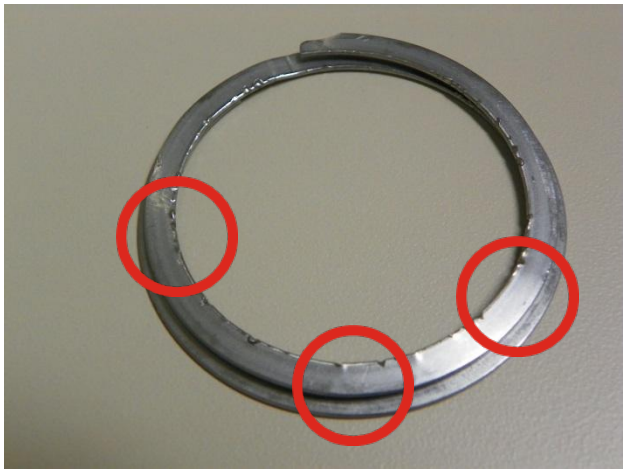
When removed from the neck, the lock ring becomes damaged and unsafe for future use. The end of the lock ring will usually bend up, which makes the lock ring more likely to come out of its channel with frequent use.



LOCK RING DAMAGE

- New lock ring

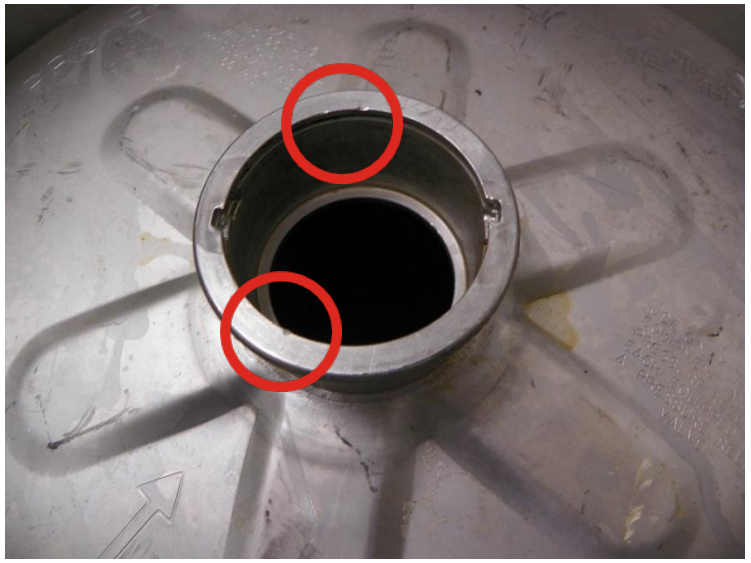
- Lock ring with evidence of tampering. Note the multiple impact points similar to those made by a flathead screwdriver. In addition, the overlapping sections of the lock ring are no longer flush



DAMAGED NECK

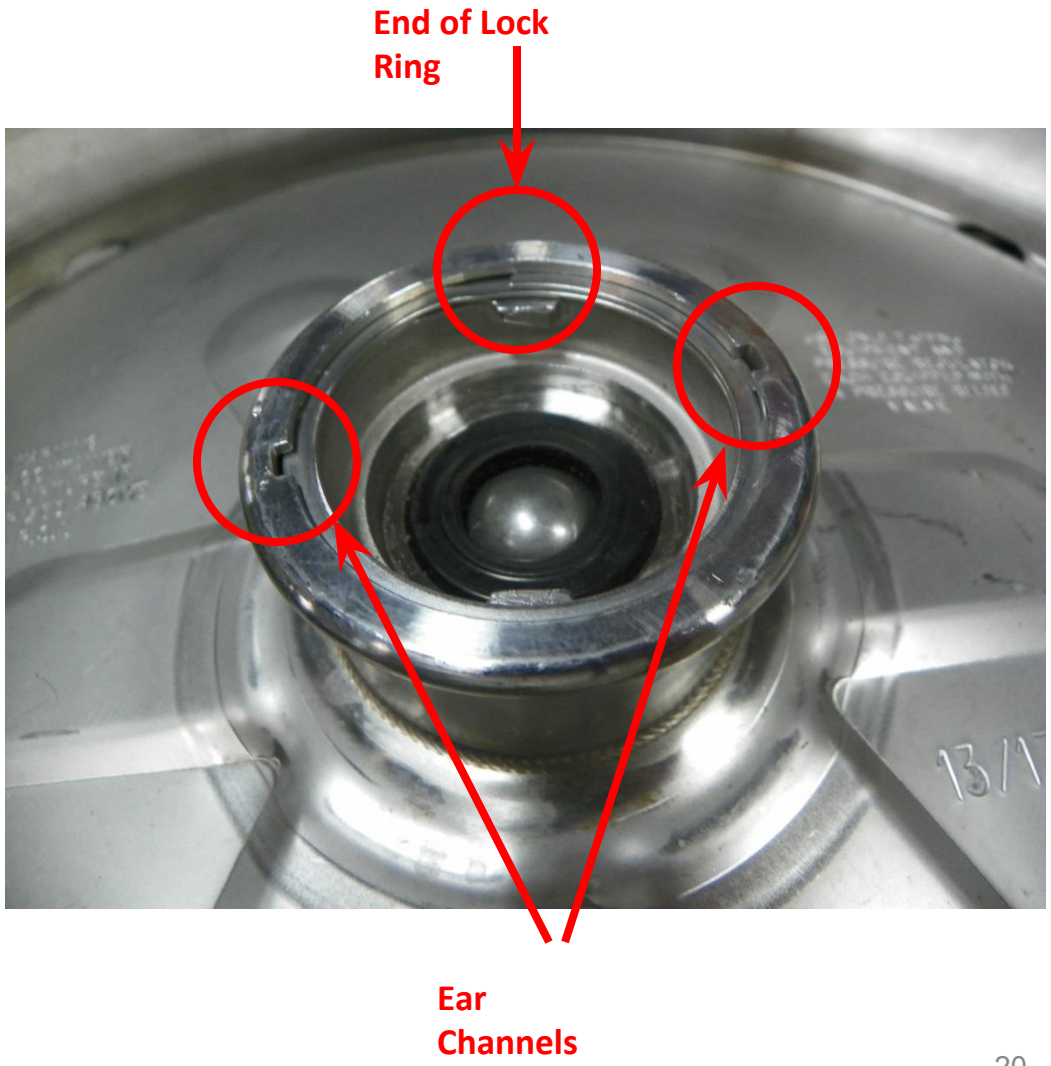
- Normal Neck

- Neck with signs of tampering. Note the multiple impact points similar to those made by a flathead screwdriver



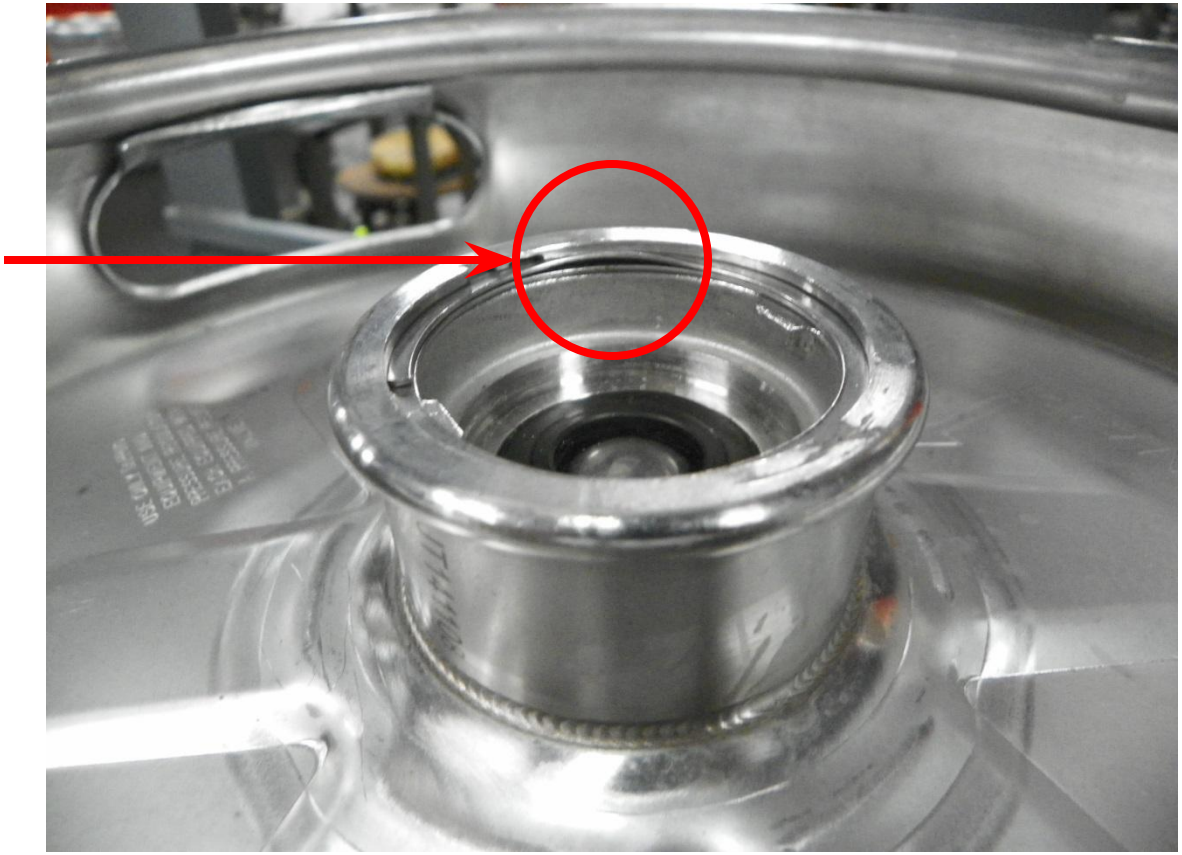
PROPERLY INSTALLED LOCK RING

- No noticeable deformation on the lock ring
- End of lock ring 45 degrees from the ear channels



PREVIOUSLY USED LOCK RING

- Deformation to the lock ring caused during the removal process prevents the lock ring from seating properly in the lock ring channel
- **Note the gap in the lock ring resulting from deformation caused during the lock ring removal process**



LOCK RING FROM INCIDENT

- The inside of the lock ring shows multiple impact points
- In addition to the impact marks, the bent ear prevents the lock ring from fitting all of the way into the lock ring channel

LOCK RING FROM INCIDENT

- In addition to the impact marks on the lock ring, the end of the lock ring is now protruding out of the ear channel

- With the lock ring protruding out of the ear channel, the lock ring can easily come out when installing or removing a coupler

THANK YOU
FOR YOUR ATTENTION.

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