4 TECH TIPS

to seal LOW E valves

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Ron has held positions in application engineering, research and development, and global training before accepting a position with marketing as a Field Product Manager in 2013. Ron is currently responsible for Chesterton's Valve packing, pump packing, and gasketing marketing including product line management and new product introduction.

Ron has presented at many conferences including the Electric Power Research Institute (EPRI), the American Society of Mechanical Engineers (ASME), and Valve World in Europe and America. Ron is also currently the Vice Chair for both the Packing and Gasketing divisions of the Fluid Sealing Association (FSA).

Introduction

We want you to have the best success in sealing your Low E valves to the required emission levels. For this reason, we have prepared this eBook as a guide to help you in reaching this goal.

In this eBook, you will learn:

1. How to correctly cut packing
2. How to install packing rings into the stuffing box
3. Best practices for bolt tightening and lubrication
4. How to tighten and consolidate valve packing

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Tech Tip 1: How to Correctly Cut Packing

**If you absolutely have to do it yourself*

The best option is to NOT CUT packing yourself. Cutting packing rings takes a great deal of experience to do well. A substantial amount of material can be wasted if packing rings are not cut properly the first time. If possible, get the packing rings pre-cut by the packing manufacturer to your specific sizes; this is the best way to avoid any errors that can occur when cutting packing rings yourself.

If you need to install Low E Valve packing, and you haven't received your packing rings pre-cut by the packing manufacturer, you need to know how to cut valve packing correctly to achieve low industrial emissions. ***Follow these steps.***

Step 1 – Assemble Your Materials

- Mandrel

— The mandrel must be the same size (outer diameter) as the stem that you have already carefully measured

— The mandrel can be made of any material, such as metal or wood. The critical attribute is not so much the material, but the tolerance. The tolerance has to be the exact size diameter of the stem.

- Vice

— To hold the mandrel as you cut the rings

- Very Sharp Knife

— The goal is to have a very 'clean' cut – no frayed ends

— Using a very sharp knife is critical to the overall success of creating an effective seal

- Knife Sharpener

— Most high temperature Low E packing has a small amount of Inconel wire that will wear down the knife quickly, so be sure to sharpen the knife after each set of packing rings has been cut

SAFETY FIRST

Make sure you are wearing the proper PPE (personal protective equipment), such as safety goggles to protect your eyes and gloves designed to safeguard hands during the cutting process.

Step 2 – Wrap the Packing

Look at the spool of packing, and you will see there is a natural curl in the packing. Use that natural curl to wrap the packing around the mandrel two full turns (make that curl work to your advantage).

Step 3 – Score the Packing

While holding the rings tight, score a straight line across both wraps of the rings so you can identify where the score mark is

Step 4 – Cut the Packing

Take the packing and lay it down on a clean surface; then cut a 45° angle right in the center of both straight cuts. This should be a forceful cut using the entire knife blade - not just the tip of the knife. Much like you see in cooking shows, apply pressure to the entire length of the blade and make the cut with a fast, forceful downward motion to get a clean cut with no frayed ends.

Step 5 – Check Your Cut Rings

Take the freshly cut packing rings and wrap them around the mandrel. Double check to see if they fit snuggly on the mandrel. There should be no gaps between the ring and the mandrel. If there is a gap, you need to scrap that material and start over, repeating the entire process.

Tech Tip 2: How to Install Packing Rings into the Stuffing Box

Once you've cut the packing rings, it's time to install them. This Tech Tip provides detailed instruction and best practices for properly installing Low E valve packing to reduce methane emissions.

Before You Begin…

- We are assuming that the valve has been sized to only have five rings of packing room in the stuffing box. If there is more, use a carbon bushing to reduce the stuffing box depth to only five rings.
- The valve should be completely unpacked, with no rings left at the bottom. Make sure the valve is completely empty.

- Double check your packing rings. If you cut them yourself, then you have already checked the cut using your mandrel (per Part 1 of this guide). If a valve packing manufacturer supplied you with pre-cut packing rings, put them on your mandrel to double check they were cut to your specific size and have no frayed edges. It never hurts to double and triple check.

- Place your five perfectly cut packing rings in your work area so you have them ready for the installation procedure.

- Prepare your external tamping tool(s). A tamping tool is an extruded piece of plastic that has been cut to a specific size so it can be used to push the packing rings all the way down into the bottom of the stuffing box. It is very important that the packing rings fit down into the bottom of the box, and since most gland noses are not deep enough to help push the packing rings down, an external tamping tool will be required. **PRO TIP: Make sure to trim the height of the tamping tool so it can get around the gland.**

Step 1 – Place Ring on Stem

Place the first packing ring around the stem, making sure to align the cut at the 12 o'clock position.

BEST PRACTICE!

Stagger the rings so that the cuts are rotated 90° away from neighbouring cuts. Use the clock analogy to help visualize the placements – think of the 12 o'clock position, then a 90° turn to the 3 o'clock position, then again to 6, to 9, and back to 12 again.

Step 2 – Push Packing Ring Down

Start pushing the packing ring down into the stuffing box. Keep in mind this is not going to be easy. The rings are hard and a little oversized to make sure they create a good seal on the stuffing box.

Step 3 – Move Gland Down

Once you get the ring in so it is completely into the stuffing box, move the gland down to push the ring deeper into the stuffing box.

Step 4 – Tamping Packing Ring

Remember, it is critical that the packing ring be fully grounded into the bottom of the box, so get your external tamping tool. As you put the tamping tool into the box, make sure when you bring the gland down that the ring is filling in the bottom of the box. In some cases, the gland may be so short that you might need to add another tamping tool.

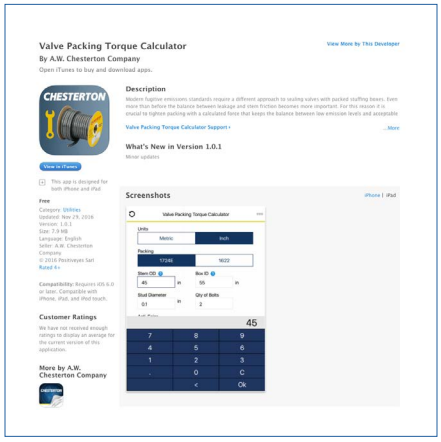
Step 5 – Repeat with Remaining Rings

Now that you have fully seated the bottom ring into the stuffing box, repeat these steps with the remaining rings. Make sure to rotate the remaining rings 90 degrees each time.

Now the packing rings have been inserted, and you are ready to start tightening them.

Tech Tip 3: Best Practices for Bolt Tightening and Lubrication

If you want to create a good seal to reduce emissions in your valve, not only do you need to know the best practices for tightening bolts and applying lubrication, you must put those best practices into practice.

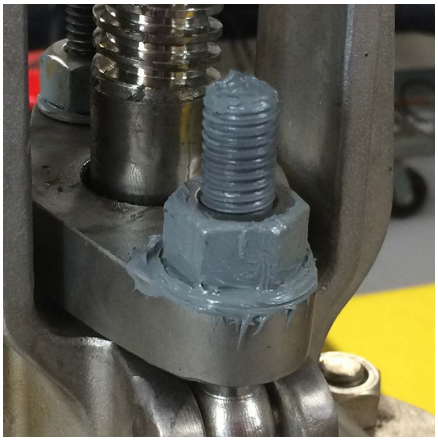


▪ Use a Torque Calculator

The reason valve packing seals is due to a specific gland load (this is the force the gland puts on the packing). Each manufacturer will have a specific value defined for a pressure valve – either in pounds force (lbs) or kilograms (Kg). You will need to know the gland load in order to calculate torque.

Torque is a mechanical process that has inherent errors based on efficiencies. These errors include an estimate of friction between the nut, washer, and bolt. Let's say you acquire a torque value that is based on a nut factor of an anti-seize, but this is not the one you are using—don't use it or you will be adding an error.

Best practice is to use a valve packing torque calculator that specifically calls out a nut factor to be used, and make sure your anti-seize also has a nut factor! Download our Torque Calculator to help calculate the gland bolt torque for your valves.



▪ Check Out Those Studs

Used bolting (even bolting that has been chased) will still not give you perfect friction on tightening. The more critical the application, the more scrutiny should be applied to the bolting. For critical applications, always replace the bolting. Remember, a torque wrench will still click when it reaches the limit it was set to, but it will not guarantee it's at the correct gland load.

▪ Use the Right Washers

When do you need washers? ALL THE TIME. Without a washer under a bolt you can get 30+% error in torque because of an unsmooth surface on the top of an uneven gland. Also, not all washers are the same. The type of washer is important—if not hardened, they will slightly deform and take away needed gland load - which could result in leaks.

▪ Put Anti-seize Lubricant Everywhere

Start with the threads and the inside threads of the nut, then apply anti-seize lubricant onto the bottom of the nut and the top of the flat washer. Keep in mind that while there are two sides of a nut, the smooth side without the letters should be put on against the washer.

Now you are ready to tighten your valve packing.

Tech Tip 4: How to Tighten & Consolidate Valve Packing

You now have a torque value from your packing vendor with the measurements from your valve and the reference of the anti-seize you are using, so now you are ready to tighten and consolidate your valve packing for best Low E results. ***Follow these steps.***

Step 1 – Move Nuts Down Bolt

The first step is to take the nuts down the bolt onto the gland until they are finger tight.

Step 2 – Break the Torque Value Into Smaller Pieces

The number of pieces depends on the size of the torque value. If you have a small valve and small torque value, you can break it into 2 parts. If you have a larger valve and larger torque value, break it up into 3 or 4 smaller parts. For example, let's create a scenario where we have a torque value of 90 ft-lbs. In this case, we would break this up into 3 steps of 30 ft-lbs. (30, 60, 90 ft-lbs.).

Step 3 – Set Torque Wrench

In this scenario, we would first set the torque wrench to 30 ft-lbs and then tighten both sides until it clicks. Keep an eye on the gland as it goes into the box, making sure it goes evenly into the stuffing box. **PRO TIP: You can use a straight edge to check that the gland is going in straight into the stuffing box.**

Step 4 – Move Torque Wrench to Next Level

After both sides have been tightened and the torque wrench has clicked, move the torque wrench up to the 2nd level (in our example, it would be 60 ft-lbs). Again, watch the gland to make sure it's going even into the box.

Step 5 – Final Torque Level

After both sides have been tightened and the torque wrench has clicked, perform the final torque to the third level (this will be 90 ft-lbs in our scenario). Once the final torque of 90 ft-lbs is applied on both bolts, you are ready for the next and most important step.

Step 6 – Consolidate the Packing

This step is one of the most important and often overlooked! Consolidating the packing is done by moving the stem fully up and down multiple times (known as cycling) to get the packing to seat in place. Cycling should be done between 5-7 times. After you are done cycling, put the torque wrench back on the stud and see if the nut moves. Depending on the size of the packing, you should get some consolidation. If you have ANY movement, you need to re-consolidate by doing the 5 cycles again! Keep doing this until there is no movement from the studs with the same torque value.

We hope you found this eBook on Low E valve packing installation to be helpful!

If you have any questions, contact me at Ron.Frisard@chesterton.com or call 781-481-3993.

— Ron Frisard, Field Product Manager

To watch our Tech Tip video series, check us out on YouTube!

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