

SEALING SENSE

How Do I Troubleshoot Compression Packing?

As plants continue to consolidate and streamline operations in the search for greater efficiency, one unintended consequence is that installation and troubleshooting knowledge can be lost as maintenance personnel retire or relocate to new jobs.

In most plants and mills around the world, maintenance personnel are typically responsible for installing and troubleshooting compression packing, a reliable and economical means of controlling leakage in pumps and other mechanical equipment. This article serves as a guide describing the best way to troubleshoot and solve common compression packing problems in order to improve the performance of the packing and prolong the life of the equipment that it seals.

When troubleshooting packing, three areas typically cause problems:

- The type of packing in use
- The condition of the equipment
- The installation technique

Type of Packing

As you troubleshoot packing, first investigate the type of packing that is installed in the equipment. The acronym "STAMPS" can be applied to ensure that the packing being used meets the service specifications:

S – Size: What are the stuffing box dimensions?

T – Temperature: What is the temperature of the fluid?

A – Application: What type of equipment is it?

M – Media: What is the fluid being sealed?

P – Pressure: What is the pressure of the fluid?

S – Shaft Speed: What is the surface speed of the shaft?

Packing often does not work because it does not meet the size, media, or shaft speed specifications. Size is important because an undersized packing causes excess leakage and an oversized packing causes premature failure due to a build up of friction near the shaft. Media is important because some fluids chemically attack the packing and cause premature failure. Make sure your packing is compatible with the fluid it must seal. Finally, check your shaft speed and the rating of your packing. Not all packings can handle the friction and heat generated by a fast moving shaft.

To ensure the right type of packing is being used, exam-



Figure 1. A typical pump packing failure.

ine the packing you have removed from the stuffing box. Packing that has glazed has not been able to handle the heat generated inside the stuffing box. You should ensure that your packing can handle the fluid temperature "T" as well as the shaft speed "S." Also check that your packing is correctly sized "S," as an oversized packing can lead to excess friction.

Packing that is heavily worn may not have been able to withstand the abrasion of solids in the liquid. Make sure your packing is rated to handle the media "M" and the pressure "P" of the fluid. Finally, softening, swelling or shrinking of packing often indicates chemical attack. Ensure your packing can survive the media "M" being sealed.

Condition of Equipment

If you are satisfied the packing being used meets the STAMPS criteria, then investigate the condition of the equipment. Equipment condition is important because even the highest quality packings cannot make up for damaged or severely worn equipment.

Upon removing the packing from the equipment, inspect the shaft or sleeve. First, make sure it is not heavily scored or chipped. Scoring can create leak paths that even the best packings cannot seal. Second, measure the concentricity of the shaft or sleeve. Out-of-round shafts can damage packing. Third, check that the shaft run-out and shaft concentricity with the housing are within specifications. If not, they can

shorten the life of the packing.

If the shaft or sleeve is damaged, have it repaired. If the shaft looks to be in good condition, the next areas to inspect are the flush water or flush fluid ports. These should be clear and free from debris to ensure the flushing fluid properly lubricates the system. Finally, check that the clearances of the pump throat and gland are within the manufacturer's specifications. Evidence of extruded packing upon removal of the old rings is a clue that this could be the problem.

Installation Technique

Installation of compression packing is a critical part of performance. Improper installation can lead to premature failure of properly specified packing running on well-maintained equipment. If installation problems arise, they usually occur during the following steps:

- *Cutting the rings:* It is essential that the packing rings are cut on a mandrel having the same diameter as the shaft, to ensure proper fit. An improperly cut ring can lead to excess leakage if its length is too small or overheating if its length is too large.
- *Incorrect position of the lantern ring:* Should your system have a lantern ring, installing it in the wrong position blocks flow of the flush and prevents effective cooling of the packing. Take extra care to ensure the ring is located in the proper location.
- *Tightening the gland follower:* Over tightening of the gland follower during installation can lead to excessive heat on the

shaft and stop the fluid flow necessary to cool the system. When packing is first installed, the nuts on the gland bolts should only be adjusted to finger tight. Once the system runs for 15 minutes, it is okay to tighten nuts one flat at a time until proper leakage is observed.

For a more complete description on installing pump packing please refer to the March 2006 *Sealing Sense* article: "What are the best pump packing installation techniques?" The FSA publications listed in the end of this article also provide guidance on proper selection and installation of packing to ensure effective sealing and maximum safety.

The Complete System

Using this guide should enable you to troubleshoot and solve most packing problems. Reliable and long lasting packing helps improve the productivity of your facility. To achieve maximum efficiency, ensure that you have the complete system: well maintained equipment, with properly specified packing that is installed properly. With this system in place, you should be ready for trouble free performance.

Next Month: *What are the methods for successfully sealing slurries?*

We invite your questions on sealing issues and will provide best efforts answers based on FSA publications. Please direct your questions to: sealingquestions@fluidsealing.com.

P&S

Fluid Sealing Association

Sealing Sense is produced by the **Fluid Sealing Association** as part of our commitment to industry consensus technical education for pump users, contractors, distributors, OEMs, and reps. *This month's Sealing Sense was prepared by FSA Member Matthew Rosa.* As a source of technical information on sealing systems and devices, and in cooperation with the **European Sealing Association**, the FSA also supports development of harmonized standards in all areas of fluid sealing technology. The education is provided in the public interest to enable a balanced assessment of the most effective solutions to pump technology issues on rational Total Life Cycle Cost (LCC) principles.

The **Compression Packing Division** of the FSA is one of five with a specific product technology focus. As part of their mission they develop publications such as the joint FSA/ESA *Guidelines for the Use of Compression Packings* and *Pump & the Valve Packing Installation Procedures* pamphlet. These are primers intended to complement the more detailed manufacturer's documents produced by the member companies. In addition to English they are available in a number of other languages, including Spanish and German.

The following members of the **Compression Packing Division** sponsor this *Sealing Sense* series:

Advanced Energy Technology, Inc.
Carbon Etc.
A. W. Chesterton Co.
Daikin America, Inc.
DuPont Performance Elastomers L.L.C.
Empak Spirotallic Mexicana SA de CV
Garlock Sealing Technologies
W.L. Gore & Associates, Inc.
Greene, Tweed & Co. /Palmetto, Inc.
John Crane
KC America
Latty International S.A
Leader Global Technologies
Lenzing Plastics GmbH
Manufacturas Multiples Industriales SA
Nippon Pillar Corporation of America
SEPCO - Sealing Equipment Products Co., Inc.
SGL Technic Polycarbon Division
Simrit – Div. of Freudenberg-NOK
Slade, Inc.
Teadit International
Teijin Aramid USA, Inc.