Selecting the Right Breathers for Bath-Lubricated Systems

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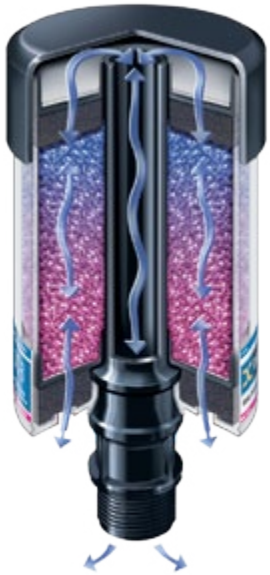
Introduction

To achieve a world-class lubrication program, standards must be developed for how to modify each common type of machine for lubrication, contamination control, inspections and oil sampling. While traditional desiccant breathers work quite well for most applications, they may not always be the best choice.

Why Breathers?



Traditional desiccant breathers filter the entering air with two 3 micron mechanical filtration element and reduce the relative humidity in the air to around 30% preventing condensation in the sump.

Traditional desiccant breathers include both a mechanical filtration system to strip particles from the air down to 3 microns or less and a desiccant stage to lower the relative humidity of the air to a level that prevents condensation and even removes water from the oil in many cases. Additional considerations are the materials the breather is constructed from and the use of a standpipe, which allows some oil coalescing protection and helps ensure the desiccant stays where it's supposed to—in the breather.

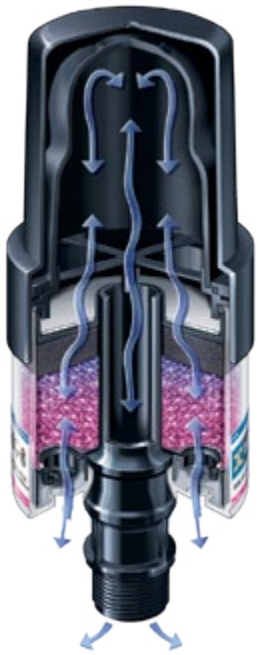
Because they are so effective, the use of desiccant breathers has increased dramatically over the past decade. As maintenance professionals have come to understand the value of these devices, they have expanded their use to all sorts of oil lubricated systems beyond their traditional use in hydraulic and other circulating systems. It is now quite common to see desiccant breathers installed on most types of bath-lubricated systems like gearboxes, pump housings, and others. While traditional desiccant breathers work quite well for these applications, they may not always be the best choice.

Selecting the Right Breather for Low-Flow Applications

Bath-lubricated systems don't normally breathe very much, therefore placing only a moderate demand on the breather with respect to dehumidification. The problem with using a traditional disposable desiccant breather for such an application is

that they are always exposed to the ambient environment and are always stripping moisture whether the system is breathing or not. As a result, the life of the breather is unnecessarily curtailed, potentially requiring frequent replacement. Many users choose to continue with the use of standard breathers in these circumstances as the value is still there, but there is a better way: seal the breather when the system is not breathing. That's the idea behind hybrid breather technology.

Most oil reservoirs breathe due to thermal expansion and contraction in the head space or by changing oil levels in the sump. The air entering the system is often the primary ingression source for both particle and moisture contamination. Replacing standard breather caps with high quality desiccant breathers can effective eliminate particle ingression and moisture condensation. While many maintenance professionals have come to realize the value of using high quality breathers to minimize contamination in oil lubricated machinery, mistakes are commonly made when it comes to choosing the right breather for a particular system. By choosing the most appropriate breather for a given machine type and operating environment, breather life, performance and overall value can be optimized.

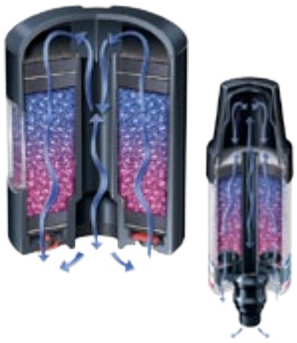


A diaphragm allows for expansion and contraction of air within the casing as a result of temperature variation during steady state operations. Enclosed filter media protects down to 3µ, while the desiccant stack prohibits moisture entry.

Hybrid breathers combine the features of traditional desiccant breathers with expansion chambers and/or low-pressure check valves so that the system is effectively sealed until it needs to breathe due to expansion or contraction in the headspace. With the desiccant stage protected from the ambient environment, the breather only dehumidifies the incoming air, thereby increasing the life of the breather significantly. In humid environments it is common for hybrid breathers to last five or more times longer than traditional desiccant breathers.

When volumetric changes are relatively small, the bladder system in a hybrid breather – such as Des-Case's Hydroguard™ breather – inflates or deflates. When this volume is exceeded, the low-pressure check valves on the bottom

of the breather open to allow the exchange of air with the environment where it is filtered and dehumidified as it is with a typical desiccant breather.



Hybrid breathers are available in different sizes for varying applications.

For any system that breathes intermittently and has an airflow rate requirement below 2.5 cfm, the hybrid breather is by far the best option. The use of these breathers, combined with good seals and good oil handling practices, will often reduce the frequency of need for periodic offline filtration — allowing cleanliness targets to be met with minimum effort.

Summary

When it comes to selecting breathers, the “one size fits all” approach is not really ideal. Today, there are many different designs available and there is definitely a best fit for each particular application. Breather selection is an important part of the process of developing a world-class lubrication program and should not be over-simplified.

About the Author

Jarrod Potteiger is Product and Educational Services Manager for Des-Case Corporation, Goodlettsville (Nashville), TN. Prior to joining Des-Case, Jarrod was a leading consultant and trainer for Noria Corporation. Jarrod helped to pioneer Noria's world-class Lubrication Program Design (LPD) and other services. In addition to designing world-class lubrication programs, Jarrod has published a variety of technical articles on condition monitoring, contamination control, bearing lubrication, and lubricant consolidation to name a few. Jarrod has trained thousands of maintenance and reliability professionals in Noria's public and onsite seminars with great success and has presented workshops and papers at a variety of technical conferences including; Noria's Lubrication Excellence, SMRP, IDCON, AIST, and UE Systems. Jarrod holds a Bachelor of Science degree in chemical engineering from the University of South Alabama.

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