Case study: Kaydon Ring & Seal [K•MRC] seals exceed expectations in FCC wet gas compressor

Successful application of gas buffered carbon ring seals in centrifugal compressor

In an oil refinery, compressors are vital mechanical equipment needed to complete or enhance various refining processes. As such, they are expected to run safely and reliably for years without interrupted service or maintenance. Shaft seals—which separate internal pressurized gas from the surrounding ambient environment—are critical to ensuring safe, reliable operation of centrifugal compressors. Degradation or failure of a shaft seal can lead to the release of hazardous gasses, mechanical upset of the machine, or both. FCC wet gas compressors in particular present several unique challenges for seals, given their inherently dirty process gas and the presence of H_2S.

Proven reliability

A major US refinery has successfully operated Kaydon Ring & Seal [K•**MRC**] seals in an FCC wet gas compressor for 14 years—**more than double the originally expected maintenance cycle.** Kaydon Ring & Seal custom-designed the NACE-compliant, single-buffer [K•**MRC**] assembly to replace abradable labyrinth seals that had experienced excessive leakage rates caused by increased operating clearances that result from high vibration and chemical attack. During the 14-year operation of the [K•**MRC**] seals, buffer gas leakage rates remained within allowable levels and there were no instances of process gas escape.

A different kind of dry gas seal

The [K•**MRC**] seal type is a gas-buffered carbon ring seal that consists of several segmented carbon rings in a stationary cartridge that make light radial contact with a rotating shaft sleeve. Sealing is achieved by introduction of a buffer gas to the seal cartridge at a pressure several PSI greater than the process gas. A small amount of buffer gas is leaked to the process and also to the atmosphere or vent.

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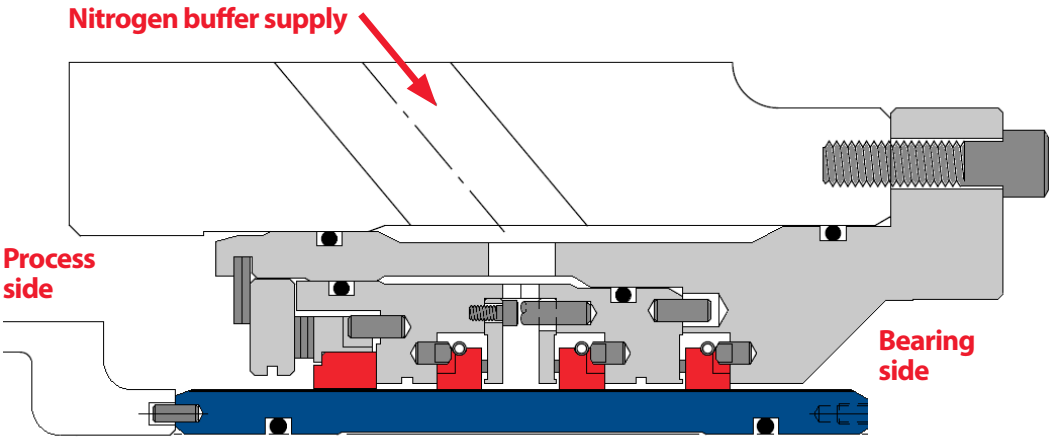

Section view of single-buffer [K•**MRC**] assembly

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A different kind of dry gas seal–*continued*

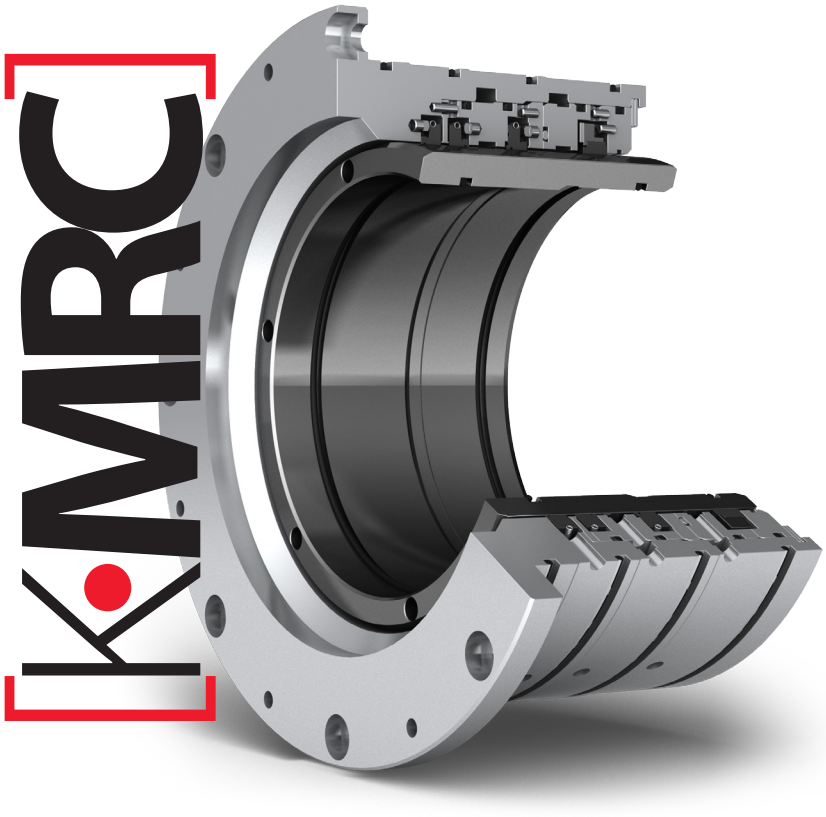
The seal rings can be configured to support a number of buffer gas arrangements. Typically, a single nitrogen buffer is used for [K•**MRC**] in a wet gas compressor application, where the process is tolerant of added nitrogen and where the process gas pressure is relatively low. For applications where insufficient nitrogen pressure is available, an alternate seal gas may be used as a primary buffer and nitrogen as a secondary separation between vent and atmosphere. This is sometimes the case for a two-body wet gas compressor train where the second body compressor operates at higher pressure than the available plant nitrogen source.

The greatest virtue of the [K•**MRC**] is its **demonstrated tolerance to contamination and misalignment.** Unlike self-acting dry gas face seals (DGS) that employ carbide seal faces, the [K•**MRC**] seal has no catastrophic failure mode. The [K•**MRC**] can experience liquid and solid contamination with only minor fluctuations in buffer gas leakage rates. This allows a single [K•**MRC**] unit to perform both the primary seal and the bearing oil separation seal functions of a DGS system, thereby **reducing seal and seal system complexity and cost.** The [K•**MRC**] can also withstand large axial and radial shaft deflections during installation and operation. This simplifies the seal installation process and eliminates a common failure mode associated with DGS.

Other applications

[K•**MRC**] seals can and have been applied to other refinery process compressors with similar results. Single-buffered arrangements are best applied to coker off-gas, crude unit, and vapor recovery compressors, while dual-buffered configurations are recommended for alkylation processes. The [K•**MRC**] is also suitable for numerous petrochemical and refrigeration applications.

For more information, visit www.krs.us or contact us at sales@krs.us



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