LACO TECHNOLOGIES

APPLICATION NOTE

NOTE #12-01

OIL MIST EXHAUST FILTRATION AND EXHAUST CONTROL

SCOPE

This application note covers oil mist exhaust filtration and exhaust control for two-stage, oil-sealed rotary vane vacuum pumps.

BACKGROUND

Oil-sealed vacuum pumps exhaust oil vapor or mist (smoke) during normal operation, and particularly during evacuation pump down. Generally, an oil mist eliminator (OME) is built into the housing of a single-stage, oil-sealed rotary vane vacuum pump (RVP), while two-stage oil sealed rotary vane vacuum pumps require an external oil mist eliminator housing mounted on the pump outlet port.

High oil mist exhaust vapor is normally generated in different degrees, depending on use. The most common source of high oil mist exhaust vapor is 1) pump operation with an open gas ballast knob or valve, or 2) when the pump experiences high gas throughputs, such as during an initial pumpdown. Excessive vapors also occur when a pump is not able to pump down a system due to leakage and air ingress. While vapor contains mostly hydrocarbon-based pump oil, it can also capture other organic chemicals during pump evacuation.

To mitigate chemical vapor odors and prevent health and environmental concerns, special precautions should be taken to prevent and control the exhaust of both oil vapor and organic chemicals oil into the atmosphere.

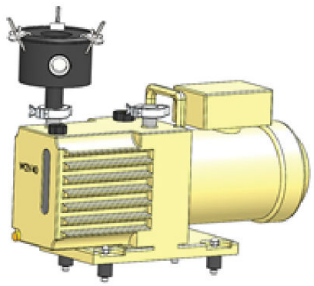

Figure 1: Rotary vane pump with oil mist eliminator

DESCRIPTION

There are several options for oil mist filtration and exhaust control for two-stage oil sealed vacuum pumps. Adding an OME is an effective way to capture a large portion of the oil vapor exhaust from the pump. However, the use of an OME alone is not always completely effective in capturing oil vapor exhaust.

During pump operation, oil mist is captured from the exhaust stream by the internal element (cartridge). To control oil exhaust, an OME is placed directly onto the exhaust with a KF/NW flange connection. As the element becomes saturated with oil, it travels down the filter and collects in a reservoir at the base of the OME housing. Over time, the cartridge in contact with the bulk oil will become saturated, and if not drained off and will no longer be effective, causing oil mist to exhaust out the OME housing. Some oil mist eliminators have the ability to drain the

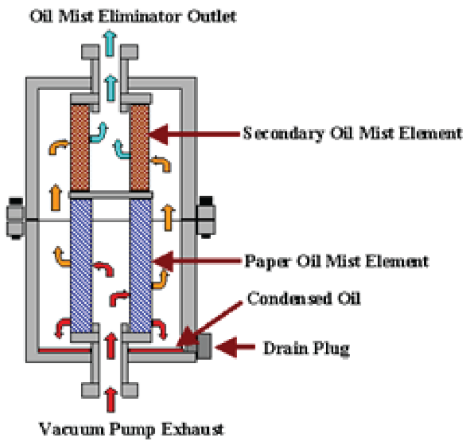

Figure 2: Two-stage oil mist eliminator diagram

DESCRIPTION (CONTINUED)

accumulated oil by 1) removing a drain plug or opening the housing, 2) removing the cartridge, and 3) draining off the oil. Replacing the internal cartridge will restore ideal OME performance but is not always necessary as long as bulk oil is removed around the cartridge.

Oil trapped in the mist filter can be automatically returned back to the pump oil reservoir when the pump is off. This can be done with the use of an auto oil drain with a check valve setup. The auto drain assembly is ideal for applications that experience medium to heavy usage (high cycle rates).

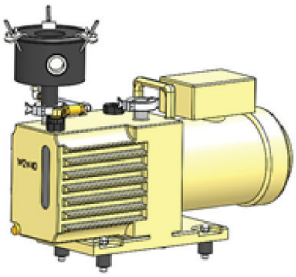

Figure 3: Rotary vane pump with oil mist eliminator and auto oil drain

Figure 4: Auto oil drain

If the oil vapors hold toxic or carcinogenic organic chemicals absorbed during pump down, it will be necessary to remove the vapors to avoid serious environmental health problems. While OMEs are effective in capturing oil vapors, additional steps must be taken to capture volatile organics. In most applications, controlling chemical exhaust can be accomplished by venting the exhaust line away from operators through an exhaust hood. If facility restrictions prevent you from running an exhaust line to a hood, an alternative is to either 1) implement a two-stage OME (with mist and odor/charcoal elements), or 2) add another charcoal trap to the outlet of a standard OME. Charcoal traps can be added onto an OME to run in series with it, and are designed to capture a wide range of volatile organics. Charcoal traps require replacement as the charcoal becomes saturated. Because charcoal elements often require more frequent replacement than cartridges, they must be evaluated frequently.

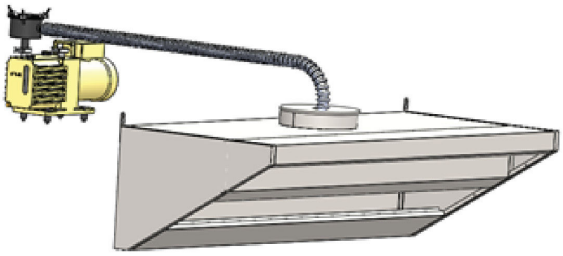

Figure 5: Rotary vane pump with oil mist eliminator and exhaust line to venting hood

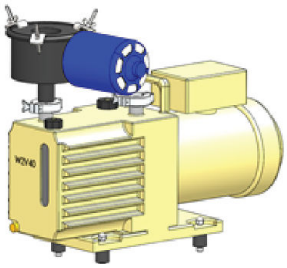

Figure 6: Rotary vane pump with oil mist eliminator and carbon trap

BENEFITS

Choosing the appropriate OME and supporting exhaust accessories for your application can protect the pump and environment from oil vapors and potentially harmful organic contaminates.

SUMMARY

Oil vapor filtration and exhaust control is recommended for all two-stage oil-sealed rotary vacuum pump applications.

To ensure the capture and proper exhaust of volatile organices, pump operators must implement proper exhaust procedures and charcoal elements to control vapor exhaust. Pump operators must frequently monitor the oil saturation of OME elements and cartridges, and replace components when needed, for optimal prevention of oil exhaust.