

NOTE #06-15

VACUUM DEGASSING HYDRAULIC AND OTHER OILS

SCOPE

This application note covers the vacuum degassing process used for hydraulic and other oils.

BACKGROUND

Vacuum degassing of oils (hydraulic oil, hydrocarbon oil, transformer oil, turbine oil, brake fluid, hydraulic brake oil, etc.) is a common process to improve purity and remove dissolved air. The working fluid in hydraulic systems typically absorbs or dissolves air readily through pressure seals and pumps suction lines, as well as during system flushing and filling. Air introduced into such a system is dissolved or entrained in the oil. Any significant accumulation of air in a hydraulic system adversely affects various physical properties of the oil and can result in sudden and often disastrous failure of hydraulically operated components.

DESCRIPTION

Air can be present in four forms in oils:

- Free air: such as a pocket of air trapped in part of a system.
- Dissolved air: hydraulic fluid contains between 6 and 12 percent by volume of dissolved air.
- Entrained air: air bubbles typically less than 1 mm in diameter dispersed in the fluid.
- Foam: air bubbles typically greater than 1 mm in diameter that congregate on the surface of the fluid.

In hydraulics, dissolved air which can easily exceed levels of 10 percent by volume, causes the oil to become spongy. This can cause problems with actuator response, especially in critical applications. Typically, the dissolved air is removed in high vacuum loops or chambers in a method called vacuum degassing. Vacuum degassing removes dissolved air from the solution.

Various devices have been developed to “degas” hydraulic or electrical insulation systems, many using vacuum chambers and a vacuum pump. Such systems are needed because (1) hydraulic oil has an affinity for air, typically containing between 10 and 15 volume percent of air and (2) in the original application for which these systems were built, there is a requirement to keep the proportion of dissolved air below 1 volume percent because a greater proportion can lead to pump cavitation and excessive softness in hydraulic-actuator force-versus-displacement characteristics.

BENEFITS

Vacuum technology used in degassing applications can improve the quality of oils by reducing the volume percent of dissolved air.

RELATED PRODUCTS

LACO Technologies offers a vacuum chamber setup used for degassing of hydraulic oils as well as several standard batch vacuum degassing systems:

- Table top Vacuum Degas System
- Cart mounted Vacuum Degas System
- Vacuum Degassing chamber with mixer

REFERENCES

- Vacuum Degassing Chambers Manual
- Application Note 06-14: Vacuum Degassing Epoxy & Silicone