QUALITY LUBRICATES.

Change over & oil analysis as a maintenance tool

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Anderol®

QUALITY WORKS.

LANXESS
Energizing Chemistry

OIL SAMPLING & CHANGE OVER PROCEDURES

What can used oil analysis tell you?

Used oil analysis is designed to reduce cost by converting maintenance programs from breakdown maintenance to preventative maintenance. It is used to extend equipment life and evaluate lubricants and filters. It also gives an overview of maintenance management. Secondary benefits of oil analysis include extensions of drain intervals and minimization of unscheduled maintenance.

So what is oil analysis and how is it accomplished? Oil analysis is a series of laboratory tests used to determine the condition of used lubricants and equipment components. Primarily, this is possible because of the cause and effect relationship between the condition of the lubricant and the condition of the component involved.

- Has the product been contaminated?
- What is the remaining useful life?
- Is there a risk of imminent failure?

How to take oil samples

To properly evaluate machine condition, the oil samples submitted for analysis must be representative of the system from which they are taken. For best results, follow these guidelines:

- The machine being sampled should be brought to normal operating temperature. Oil should be circulated, if appropriate. This will ensure that insoluble and semi-soluble contaminants are uniformly dispersed throughout the system.
- Each oil sample should always be taken in the same manner and from the same sampling point.

Changing over compressors to Anderol® synthetic lubricants

Anderol® has developed compressor lubricants specifically formulated for the lubrication of rotary screw and rotary vane compressors. In order to enjoy the full trouble-free, long-life performance that they offer, certain procedures are recommended when changing over compressors which have been operated with other types of lubricants.

Basically, all compressor components in contact with the Anderol® oils should be as clean and as free of the previously used oil as much as possible. Follow the compressor manufacturers recommended procedures including the following:

Draining

1. Drain all old oil from the unit in the normal oil change method. For best results, drain when unit is warm.
2. Open manual condensate drain valve and drain out all liquid.
3. Remove pipe plug from bottom of the separator/receiver tank and drain out all liquid.
4. Remove pipe plug from bottom of oil cooler and completely drain.
5. Completely clean oil filter or replace.
6. Disconnect all oil piping which could trap oil and drain the pipes.

Cleaning

In some cases of severely lacquered or varnished machines, where the deposits cannot be wiped or scraped out from the compressor. Please consult with Anderol BV or an authorized distributor.

Sample information

The sample information form allows the laboratory to match the current sample with historical data from each piece of equipment. Therefore the following information is needed:

- Customer information
- Sample date
- Lubricant used
- Hours on oil / operating time since last oil change
- Hours on unit / the clock time of the unit
- Equipment Manufacturer
- Equipment Model
- Serial Number
- Additional info when necessary

Sampling oil intervals for field trials

Always set sample intervals to catch problems early.

1. Take a sample BEFORE the oil is changed = current condition of machine.
2. Take a picture of the equipment before starting any field trial.
3. Take a zero hours Anderol® sample, immediately after the Anderol® lubricant has been filled into the equipment.
4. Initially take samples after 500 hours: at 500 hrs, 1000 hrs, 1500 hrs.
5. Afterwards take sample every 1000 hrs: at 2500 hrs, 3500 hrs,…6500 hrs.
6. At the final stage again use 500 hours intervals until reaching the maximum drain interval: e.g., samples at 7000 hrs, 7500 hrs…
7. Again take a picture of the equipment after finishing the field trial.

EVALUATING TESTS USED FOR SYNTHETIC LUBRICANTS

Appearance (visual)

The lubricant should be clear and clean. Color normally ranges from light amber to extremely dark amber-brown, however it is not a reliable indicator of oil condition. Changes to other colors (e.g. green or red) usually indicate contamination. Cloudiness may indicate high levels of water.

Kinematic viscosity (ASTM D445)

The viscosity at 40°C in centistokes of Anderol® lubricants can change with the type of use and length of service. It normally increases slowly with use. An increase of more than 25% usually indicates that the oil should be replaced. If the increase is sudden, a mechanical problem may be present in the compressor, or the oil may have been contaminated. Oil viscosity decreases usually result from shear or contamination (from lighter viscosity oils, solvents, dissolved gases, etc.) and should be limited to ten (10) percent.

Acid Number (ASTM D664)

The acid number of a synthetic lubricant does not have the same significance, as does that of a mineral oil. Whereas an acid number of 2 in a mineral oil indicates considerable degradation, the same degree of degradation in an Anderol® synthetic lubricant is not reached until the acid number is more than 4. The acid number normally increases slowly and continually with use.

A typical acid number after one year (or approximately 8000 hours) in most rotary equipment applications is 1 to 2. The mechanical condition of the compressor should be examined if the acid number increases suddenly.

The oil should be changed when the acid number becomes greater than 4. Continuation of the use of the oil after it reaches an acid number of 4 may be considered under the following conditions: the rate of acid number rise has been low, (i.e. > 1 year to reach acidnumber 4), the oil condition is monitored periodically, no other oil condemning limits have been reached. The oil should be changed before the acid number reaches 6.

Contamination (FTIR)

Since every chemical substance absorbs infrared energy differently, this technique provides a unique fingerprint of each product. The FTIR spectrum can readily differentiate between different types of oils, between oils and other types of liquids and detect small amounts of contamination material in oil. In addition, since degradation or oxidation of the oil due to overheating or other factors results in changes in the chemical structure of the oil, these changes are also readily detected in the FTIR spectrum. Water and its source can range from atmospheric condensation to internal coolant leaks in liquid cooled systems. Excessive water, together with oil and heat, can accelerate the formation of acids.

Moisture (ASTM D1744 or equivalent)

Excessive moisture (> 1 %) may cause a decrease in lubricating effectiveness of the oil. Water should be drained off periodically.

Wear Metals (Atomic Absorption, ICP-Emission Spectroscopy, PIXE, ASTM D5185)

Dirt (silicon) and Wear metals such as iron, aluminum and copper may be determined instrumentally; however, care should be exercised in interpretation of results. Sample-to-sample variation is expected due to sampling and analytical problems. Normal levels for each element must be determined for each machine. Sudden increases can indicate an incipient wear problem. The presence of silicon indicates dirty oil, frequently caused by a bad intake air filter. This will also lead to rapid wear. The following are suggested condemning limit guidelines:

Metal, ppm	Normal	Moderate (requiresmonitoring)	High (action required)
Iron	<20	20-75	>75
Copper	<20	20-75	>75
Aluminum	<20	20-75	>75
Chromium	<20	20-75	>75
Silicon	<20	20-75	>75

Possible sources

- Aluminum: bearings, pump vanes, pump bushings, housings
- Chromium: rings, roller taper bearings, exhaust valves, cylinders, shaft, gears
- Copper: bearings, bushings, pistons, cooling
- Iron: cylinders, pistons, gears, bearings, pumps
- Nickel: gear plating, valves, rings
- Silicon: dirt
- Tin: bearings, piston platting
- Zinc: anti-wear friction modifier, contamination arising from corrosion of galvanized components

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