

Compressor Oil Analysis Sampling Procedure

1.0 Maintenance Objective & Frequency

The objective of this procedure is to collect a representative oil sample from the compressor lubrication system for laboratory analysis. Regular oil analysis detects wear metals, coolant or water ingress, fuel dilution, soot loading, and additive depletion, enabling condition-based maintenance and preventing catastrophic failure. This procedure applies to rotary screw and reciprocating compressors using mineral or synthetic lubricants.

Frequency: Every 500 operating hours or quarterly, whichever comes first. More frequent sampling (every 250 hours) is recommended during initial commissioning, after major repairs, or if previous analysis indicated abnormal wear or contamination.

2.0 Lockout/Tagout (LOTO) & Safety

- **Electrical Isolation:** Disconnect and lock out the compressor main disconnect switch. Verify zero voltage with a rated voltmeter.
- **Pneumatic Isolation:** Close the compressor discharge isolation valve. Bleed all residual pressure from the receiver tank and oil separator to 0 psig.
- **Thermal Hazard:** Allow the compressor to cool for a minimum of 30 minutes after shutdown. Oil temperature must be below 60°C (140°F) to prevent burns and sample degradation.
- **Mandatory PPE:** Safety glasses, heat-resistant gloves (rated for 150°C), steel-toed boots, and long-sleeve flame-resistant clothing. Have a spill kit and fire extinguisher nearby.

3.0 Required Tools, Parts & Lubricants

- Clean, dry oil sample bottle (250 mL or 500 mL, supplied by the laboratory) – do not reuse bottles.
- Vacuum sampling pump (hand-operated or battery-powered) with clean tubing.
- Sample valve adapter (if compressor is not equipped with a dedicated sample port).
- Lint-free wipes (Kimwipes or equivalent).
- Permanent marker and laboratory-supplied chain-of-custody form or label.
- Spill containment pad and absorbent material.
- Personal protective equipment as listed in Section 2.0.

4.0 Step-by-Step Maintenance Procedure

1. Perform full Lockout/Tagout as per Section 2.0. Confirm zero energy state and allow the compressor to cool to below 60°C.
2. Locate the dedicated oil sample port. If none exists, identify a suitable location on the oil return line or downstream of the oil filter, ensuring the sample is taken from a turbulent flow zone (not a dead leg).
3. Clean the exterior of the sample port and surrounding area with a lint-free wipe to remove dirt and debris. Do not use solvents that could contaminate the sample.

4. Attach the vacuum sampling pump tubing to the sample port. If using a valve adapter, ensure it is clean and tightly sealed.
5. Flush the sample port and tubing by drawing approximately 50 mL of oil into a waste container. Discard this flush oil properly. This step ensures the sample represents the system oil, not stagnant oil in the port.
6. Insert the clean sample bottle into the vacuum pump assembly. Operate the pump to draw oil directly into the bottle. Fill the bottle to 80-90% capacity (do not overfill). Avoid introducing air bubbles.
7. Immediately cap the sample bottle tightly. Wipe any external oil off the bottle with a clean lint-free wipe.
8. Label the bottle with the following information using a permanent marker: compressor ID, date, time, operating hours, oil brand and grade, and sampler initials. Complete the laboratory chain-of-custody form.
9. Store the sample bottle upright in a clean, cool, dark location (not in direct sunlight or near heat sources). Ship to the laboratory within 24 hours or refrigerate if a delay is unavoidable.
10. Remove the sampling apparatus. Clean the sample port and area with a lint-free wipe. Inspect the port for leaks. If the port is a quick-connect type, replace the dust cap.

5.0 Verification & Return to Service

1. Remove all lockout/tagout devices in accordance with your facility's LOTO procedure. Ensure all personnel are clear of the compressor.
2. Restore electrical power and open the compressor discharge isolation valve. Start the compressor and allow it to reach normal operating temperature and pressure.
3. Visually inspect the sample port and all connections for oil leaks. Tighten any fittings if necessary. Verify the compressor operates without alarms or abnormal noise.
4. Record the oil sample submission in the maintenance log or CMMS (ServiceGrid). Note the operating hours at the time of sampling and the laboratory tracking number.
5. When the laboratory analysis is received, review the results against OEM limits for wear metals (Fe, Cu, Pb, Al, Cr), viscosity, acid number, water content, and particle count. File the report in the compressor's maintenance history.

Regulatory Disclaimer: This document is a generic maintenance template provided for educational and informational purposes only. It does not constitute professional engineering or reliability advice. The end-user assumes all liability for validating all step sequences, torque specs, and LOTO protocols against specific machinery OEM manuals before deployment to a live production floor.