



TEXACO

SERVICES & SOLUTIONS // **LUBEWATCH**

LubeWatch Oil Analysis Programme



LubeWatch[®]
Oil Analysis Program

enduring
performance

Increase productivity and help optimise equipment performance

LubeWatch oil analysis enables you to track the performance of equipment that is the lifeblood of your business. By analysing oil samples on a regular basis, you can help optimise equipment life and oil replacement intervals, identify lubricant-related needs and understand the changing environment within a piece of equipment.

This knowledge helps in the precise scheduling of maintenance work that can reduce downtime or even eliminate the risk of catastrophic failure.

Texaco's LubeWatch Oil Analysis Programme provides:

- > Accurate results on basic test packages and a wide variety of specialised testing procedures
- > Reliable interpretation of test results and actionable recommendations based on the data, accessible online or via the Texaco® LubeWatch app
- > Advanced technical services including component failure and/or wear particle analysis
- > Added assurance of oil and system integrity when running on an extended oil drain interval programme
- > Seamless import of sampling data into your existing ERP Systems via DataConnect, providing a more integrated overview of your operational efficiency
- > Expert training and in-field advice and support.

LubeWatch® Oil Analysis Program

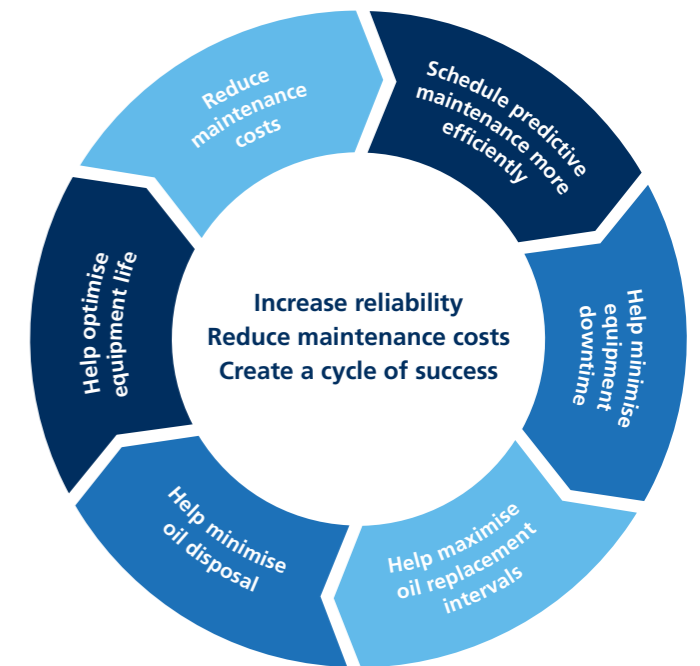


LubeWatch® can help reduce downtime and improve operational efficiency

Many businesses practice 'preventative maintenance', scheduling regular service intervals to help identify any problems before they become too costly or lead to prolonged equipment downtime. However, preventative maintenance schedules, based on generic timescales or usage figures by equipment type, can lead to oil drain intervals that are shorter than necessary and parts being changed or replaced before they need to be.

As a result, the industry is moving to a more 'predictive' model, where maintenance is scheduled as required, based on the condition of the equipment. Through regular testing, our Texaco LubeWatch oil analysis can help you track the performance of your vehicles or equipment and identify when a service is required.

General guidelines for the sampling of propulsion machinery and auxiliary equipment are given in the tables below, unless specified differently by the OEM.



Oil sampling – recommended frequency*

On-Highway & Off-Highway vehicles: Agriculture, Automotive, Construction, Forestry, Public Transport, Mining & Quarrying, Railways, Truck & Bus

Heavy duty diesel engines	250-500 hours	OR	30,000-100,000 km / 20,000-60,000 miles
Passenger car engines (petrol or diesel)	Annually	OR	15,000 km / 10,000 miles
Transmissions	300 hours	OR	30,000 km / 20,000 miles
Gears, differentials & final drives	300 hours	OR	30,000 km / 20,000 miles
Hydraulics	300 hours	OR	30,000 km / 20,000 miles

Manufacturing, Processing & Inland Marine: Cement, Food & Beverage, Marine Equipment, Natural Gas Distribution, Oil & Gas Exploration, Power Generation, Pulp & Paper, Sugar Mills

Heavy duty diesel engines	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Natural gas engines	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Gas turbines	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Steam turbines	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Air / Gas compressors	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Refrigeration compressors	Normal use: Monthly / 500 hours	Intermittent use: Quarterly
Gears / Bearings	Normal use: Monthly / 500 hours	Intermittent use: Quarterly

* Except for special circumstances where there is a good reason to believe that a potential problem could exist (such as accidental contamination), the number of samples submitted for analysis per piece of equipment are restricted to those that are technically necessary and economically justified.

TEST PACKAGES

LubeWatch simplifies the process of testing by creating standard test packages for frequent, typical applications

C1: LUBRICATION BASIC	Method
Viscosity 40°C or 100°C*	ASTM D445
Trace elements	ASTM D5185
Water content	Crackle^
Viscosity Index	ASTM D2270

C2: DIESEL CRANKCASE	Method
Viscosity at 100°C*	ASTM D445
Trace elements	ASTM D5185
Water content	Crackle^
Glycol	ASTM D2982
Fuel dilution	ASTM D3628
Soot content	FTIR ASTM E2412
Oxidation / Nitration	FTIR ASTM E2412

C3: GAS ENGINE OILS	Method
Viscosity 40°C	ASTM D445
Viscosity 100°C	ASTM D445
Trace elements	ASTM D5185
Water content	Crackle^
Oxidation	FTIR ASTM E2412
Nitration	FTIR ASTM E2412
Acid Number	ASTM D664
Base Number	ASTM D2896
Glycol	ASTM D2982
Soot	FTIR
ipH	ASTM D7946
SAN~	ASTM D664

C4: INDUSTRIAL OILS	Method
Viscosity 40°C or 100°C*	ASTM D445
Trace elements	ASTM D5185
Water content	Crackle^
Appearance	IHM
Filtration residue 0,8 µ	ASTM D4055
Particle Quantifier†	In-house test method

C5: TURBINE OILS‡	Method
Viscosity 40°C	ASTM D445
Trace elements	ASTM D5185
Water content	Karl Fischer
Particle count	ISO 4406 (99)
Total Acid Number	ASTM D664
Appearance	IHM

CA: COOLANTS	Method
Elemental Metals	ASTM D6130 (mod.)
Contaminates & Inhibitors (Sulfate, Chloride, Nitrate, Nitrite, Phosphate)	ASTM D5827
Degradation acids (Glycolate, Acetate, Formate, Oxalate)	ASTM D5827
pH	ASTM D1287
Glycol %	In-house test method (refrac.)
Freeze Point	ASTM D3321 (mod.)
Boil Point	In-house test method
Nitrite	In-house test method
SCA Number	In-house test method
Total Dissolved Solids	Meter measurement
Specific Conductance	Meter measurement
Total Hardness	In-house test method
Visuals (colour, oil, fuel, magnetic precipitate, non-magnetic precipitate, odour, & foam)	In-house test method
HPLC (Benzotriazole, Tolytriazole, Mercaptobenzothiazole, Benzoic Acid, Sebacic Acid, 2-Ethylhexanoic Acid, Octonoic Acid, P-Toluic Acid)	In-house test method

* 40°C for ISO; 100°C for SAE grades

^ If positive: Karl Fischer

† Gear oils & hydraulic oils

‡ Additional turbine oil tests available

~ Test only performed in cases where ipH is low (<4)

OIL & COOLANT SAMPLING

LubeWatch® Oil Analysis Program

- 1. Set up an online account** to send sample information directly to the LubeWatch laboratory.
- 2. Order sampling kits** through Chevron Business Point (CBP).
- 3. Take the sample and submit sample information via the app;** this can be done when online or offline, providing the correct records for your equipment have been downloaded.
- 4. Send the sample back to the lab** in the pre-addressed LubeWatch envelope supplied.
- 5. Receive results** via push notification, by email or you can access online.



The LubeWatch process

Submitting oil or coolant for LubeWatch analysis is straightforward. Analysis kits are available to make sampling convenient and simple, and include sample bottles, tubing, pre-addressed shipping labels and paperwork.

Sample information can be submitted online or via the Texaco® LubeWatch app. It is also possible to submit without an internet connection, providing the correct records for your equipment have already been downloaded before going offline. Pre-registering samples is the most efficient way to get them logged and tested, reducing paperwork and minimising errors.

Since LubeWatch analysis requires relatively small quantities of fluid, it's important that samples are of the best quality possible. There are several different methods for gathering samples, but the accuracy of the test results will depend on the quality of the sample. Collecting from the wrong place or at the wrong time will alter the test results and could mask any damage occurring inside the equipment or lead to incorrect guidance.

Always make sure the sample bottle is clean and free of contaminants before starting.

Taking oil samples

Different system pressures and accessibility may require different equipment and methods to collect samples, so ensure you establish the right sampling process for each piece of machinery.

- > Taking samples via a Sampling Valve that is permanently installed on the equipment is the most efficient method for collecting the fluid and will provide the most representative samples possible. For pressurised systems, the KP Series 'Push Button' and the KST Series 'Probe' valves are the most common. For non-pressurised systems, L-style or LT-style valves are recommended.
- > The way to collect samples from Sampling Valves will differ based on system pressure, operating environment and device clearances (access to the sampling port).
- > Other sampling methods can be used, such as extracting the oil with a vacuum pump or draining, but the samples provided will be less representative of the fluid circulating in the machine.
- > To capture the best oil samples possible, refer to the 'Lubewatch: Oil Sampling Best Practice' guideline, which can be found on CBP.

OIL & COOLANT SAMPLING

Download the LubeWatch app
for Android or iOS:



First-time users need to set up an online account by contacting their Chevron Representative; alternatively, email texlubtec@chevron.com for support.

The image shows a screenshot of the 'OIL ANALYSIS' online submission instructions form. It is divided into several sections: 'ONLINE SUBMISSION INSTRUCTIONS', 'APPLY TO SAMPLE', and 'RETAIN FOR YOUR RECORDS'. Section A highlights the 'APPLY TO SAMPLE' section, which includes instructions on how to apply the label to the sample jar. Section B highlights the 'RETAIN FOR YOUR RECORDS' section, which includes instructions on how to retain the sample jar. Section C highlights the 'Component ID' field, which is used to identify the sample.



Taking coolant samples

Most cooling systems operate under pressure to raise the boiling point of the coolant, but different system pressures and accessibility may require different equipment and methods to collect samples. So, always ensure you establish the right sampling process for each piece of machinery.

- > Taking samples via a Sampling Valve that is permanently installed on the equipment is the most efficient method for collecting the fluid and will provide the most representative samples possible. For pressurised systems, the KP Series 'Push Button' and the KST Series 'Probe' valves are the most common.
- > The way to collect samples from Sampling Valves will differ based on system pressure, operating environment and device clearances (access to the sampling port).
- > Other sampling methods can be used, such as extracting the coolant with a vacuum pump or draining, but the samples provided will be less representative of the fluid circulating in the machine. However, the vacuum pump method is recommended for non-pressurised systems.
- > **Hot coolant under pressure can cause severe burns. Always wait until the temperature is below 50°C (120°F) before removing the radiator cap to avoid injury from hot coolant spray or steam.**
- > It is also important to test the quality of the water that is being added to the radiator to ensure that levels of contaminants aren't too high.
- > To capture the best coolant samples possible, refer to the **'Lubewatch: Coolant Sampling Best Practice'** guideline, which can be found on CBP.

Submitting samples for testing

- > Screw the lid back onto the sample bottle and tighten securely before wiping the outside of the bottle with a clean cloth. This will allow for the sample label to adhere securely to the bottle.
- > **Bottle label:** complete the 'Component ID' and 'Date taken' fields in sections (A) and (B) of the Sample Label form supplied; peel off the QR coded section (A) and attach to the sample bottle. Keep section (B) for your records.
- > **Sample information:** send via the app or online in the 'Sample Submission' area of your account (C).

Fill out all equipment and fluid information completely and accurately; for coolants, include the time/distance for both the equipment and the coolant.

Once all details have been completed, ship your sample to the LubeWatch laboratory at the address shown on the Sample Label form.

MONITORING & PREVENTION



Maintaining a healthy lubricating system

Fluid monitoring and LubeWatch® oil analysis are excellent methods to help track the health of your lubricating system, however, some issues such as varnish in turbines can't usually be detected until it has already formed.

Therefore, in addition to regular health checks, look for the following signs of varnish and monitor for changes during your routine maintenance:

- > changes in oil colour
- > spiking temperatures
- > visible varnish deposits.

In addition, a number of other tests can be run to monitor the health of your lubricating system:

- > Membrane Patch Colorimetry (MPC), RPVOT and particle count testing can help you measure oil degradation and determine lubricant condemning limits
- > RULER-voltammetry testing can measure oxidation trends in your oil.

Best in Class tools and services to help Run Better Longer:

For further support, Texaco® Lubricants has developed advanced expertise, premium lubricants and targeted programmes for a broad array of industries, to help our customers' equipment and operations Run Better Longer. The RBL Programme is our commitment of business support and reliability.



The information that you provide will help LubeWatch labs conduct appropriate tests to accurately evaluate the used oil or coolant samples and provide tailored recommendations to improve your overall equipment effectiveness. Therefore, it is important to thoroughly fill out a LubeWatch oil analysis request for all samples – particularly on the initial round.

Great care and attention to detail were brought to every aspect of the LubeWatch Oil Analysis Programme development and lab evaluation process, to bring greater value through accurate and insightful data interpretation. Once we've created a detailed profile of your work environment, we can start to utilise the full predictive powers of LubeWatch and build reliability into your day-to-day business.

To find out more, contact your Texaco Representative, your Authorised Texaco Lubricants Distributor or visit texacolubricants.com/LubeWatch



Advanced technology Texaco® Services & Solutions.
Whatever the requirement – private and commercial vehicles through
to industrial plant and machinery operating in some of the world's
most challenging environments – customers trust Texaco.



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