Spectro Scientific

Confidence in knowing

Fleet Solutions for Lubricant & Fluid Analysis



Oil Analysis for Vehicle Preventative Maintenance





The reliable operation of vehicles in a fleet is critical in virtually every industry that depends on equipment powered by engines including:

- Automotive
- Trucking
- Energy
- Mining
- Construction
- Government (military and municipal)

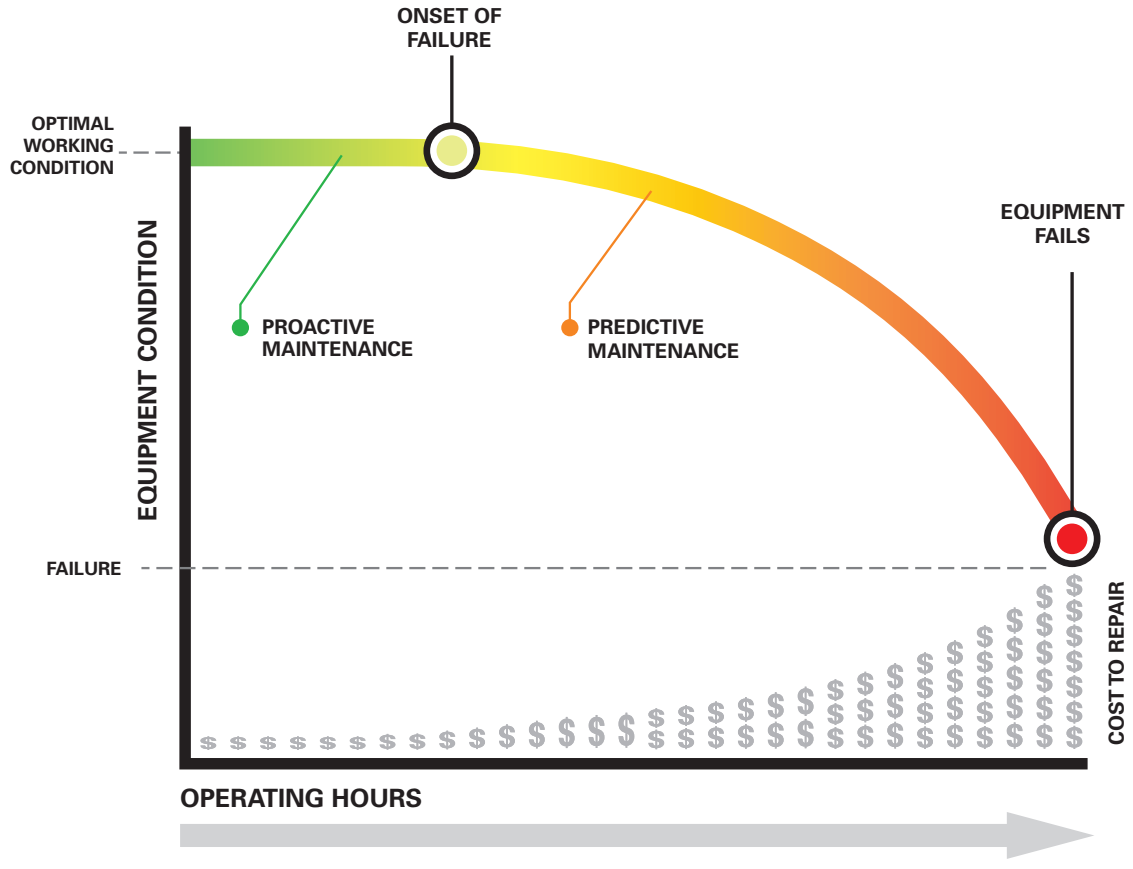
Maintenance programs are implemented to keep this equipment operating and performing its required work. Downtime not only costs money to repair the equipment but also lost productivity and loss of customer confidence.

Oil analysis is a critical part of vehicle maintenance, providing valuable information on the condition of the oil and the health of the vehicle. To be most effective, oil analysis must be used when the mechanic is working on the vehicle so the technician can take immediate action and, if necessary, retest the oil for confirmation. An oil analysis program lowers the risk of a vehicle roadside failure and eliminates the costs involved with having equipment out of service.

The longer it takes to identify a problem along the failure curve, the more expensive it becomes to fix the equipment.

Oil analysis is used for **proactive maintenance** to help prevent the onset of failures.

In the **predictive maintenance** stage, oil analysis can identify problems before they become catastrophic failures.



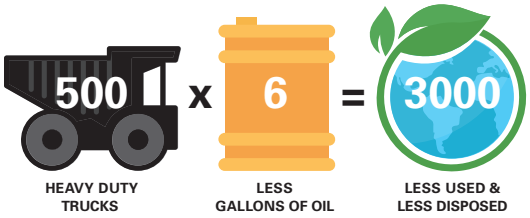
As part of a proactive maintenance program, on-site oil analysis delivers rapid results with immediate decision making to:

- Lower operating costs
- Reduce unscheduled downtime
- Increase vehicle availability and extend vehicle life

Achieving green initiatives with oil analysis

Reduction in new oil fill and used oil disposal by extending oil drains can greatly contribute to achieving eco-goals. On-site oil analysis provides information about the oil health while the equipment is being serviced so the mechanic knows instantly if the oil can be safely extended.

Extending just one oil drain per vehicle per year can have a significant impact on oil usage and disposal across an entire fleet.



EXAMPLE: With an average oil drain of 6 gallons per vehicle, reduction of 1 oil drain per vehicle in a fleet of 500 heavy duty trucks **saves 3000 gallons** of oil per year.

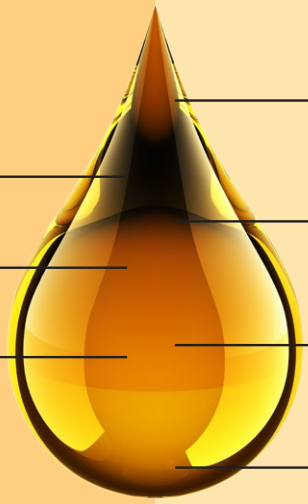
Oil analysis can help answer the following questions

SERVICEABLE LIFE OF THE OIL

Is it the right oil?
(Right viscosity and additive package)

Is the oil clean?
(No dirt or dust)

Can the oil drain be extended?
(Degradation of viscosity or oil chemistry)



MECHANICAL ISSUES WITH THE EQUIPMENT

Is there mechanical failure allowing contamination to enter?
(Coolant or dirt)

Are the vehicle components in good condition?
(Free of abnormal wear debris)

Can I predict when a component will fail?
(Wear metals present)

Is there a coolant or a fuel leak?
(Elemental contamination or degradation of viscosity)

MicroLab® Series

FULLY AUTOMATED OIL ANALYSIS

The MicroLab® combines automation and artificial intelligence in an all-in-one oil analysis tool.

15 minutes to comprehensive oil analysis

- Can be operated by maintenance staff, no chemist required
- Fully automated operation and cleaning
- Easy to understand reports with color-coded alarm limits and diagnostic statements



Four automated oil tests

CHEMISTRY

The MicroLab Infrared Spectrometer measures six key parameters which indicate potential oil degradation and contamination.

Both the MicroLab 30 and 40 provide:

- Oil degradation: oxidation, nitration, total base number
- Oil contamination: soot, water, glycol

VISCOSITY

The MicroLab Dual Temperature Viscometer provides kinematic viscosity analysis which can help identify potential oil degradation or contamination.

Both the MicroLab 30 and 40 provide:

- Kinematic viscosity at 40°C and 100°C
- Viscosity Index (VI)

ELEMENTAL ANALYSIS

The MicroLab Optical Emission Spectrometer quantifies wear metals cause from mechanical components, as well as other elements from oil additives or sources of contamination.

- MicroLab 30 analyzes 10 basic metals: aluminum, chromium, copper, iron, lead, molybdenum, potassium, silicon, sodium, and tin. It is upgradable to include all 20 elements.
- MicroLab 40 analyzes 20 elements including the basic metals listed above and the extended metals: barium, boron, calcium, magnesium, manganese, nickel, phosphorous, titanium, vanadium, and zinc.

PARTICLE COUNT

The MicroLab 40 model is equipped with a particle counter to measure particle contamination which is crucial for maintaining hydraulic systems, compressors and turbines.

The MicroLab 40 measures:

- Gross particle count
- ISO particle size

Monitoring equipment and oil health with oil analysis

The four automated MicroLab tests provide a complete look at equipment and oil condition.

Mechanical condition parameters indicate potential equipment failure:

- Wear metal analysis
- Contamination (glycol, dirt, water)

Oil condition parameters indicate potential degradation and contamination:

- Viscosity
- Oil chemistry (Total Base Number, oxidation, nitration)
- Contamination (glycol, water, soot, particle count)
- Oil additive levels

	MicroLab 40 For engines, transmissions, power steering, generators, hydraulics, gear oils	**MicroLab 30** For engines, transmissions, power steering, generators
Infrared spectrometer	✔	✔
Kinematic viscometer	✔	✔
OES elemental analyzer	✔	✔
Particle counter	✔	

Converting Test Data into Maintenance Actions



Comprehensive MicroLab report includes color-coded alarm limits, diagnostic statements and trending history.

MicroLab Reports

The MicroLab has an embedded expert system that translates chemistry results into diagnostic statements specific to the type of equipment and guides the technician on necessary maintenance actions. The diagnostic statements can indicate whether an oil change is required or if the oil drain interval can be extended. It can also direct the technician to potential mechanical problems to investigate.

The comprehensive reports:

- Save time – compiles and analyzes all test data
- Take the guess work out of interpreting results – provides suggested maintenance actions
- Save money – no need to hire an analytical resource

Spectro Scientific
Confidence in knowing

Account:	**MICROLAB SYSTEM TEST**
Address:	**1 EXECUTIVE DR**
	CHELMSFORD MA 01824
Phone:	
Email:	
Vehicle ID:	OVER-ROAD
Vehicle Make:	FORD
Vehicle Model:	EXPLORER LIMITED
Vehicle Year :	2017
Component ID:	OVER-ROADGSGENERAL
Component Type :	GASOLINE ENGINE
Oil Brand:	MOBIL
Oil Type:	MOBIL 1 FORMULA
Oil Weight:	5W30
Sump Capacity:	6 QUARTS
Viscosity Limit 40 Deg C	50 - 68
Viscosity Limit 100 Deg C	9.3 - 12.5

Diagnosis for current sample

HEAVY CONCENTRATION OF WATER PRESENT. CHECK FOR SOURCE OF WATER ENTRY. OIL DRAIN AND REFILL MAY BE NECESSARY. CONSULT SERVICE PROVIDER FOR FURTHER RECOMMENDATIONS. TO CONFIRM, RESAMPLE AT 5,000 MILES (8,000 KM) OR 100 HOURS.

Legend

ABNORMAL | SEVERE | X = NOT TESTED / NOT APPLICABLE | - = NOT DETECTED

NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

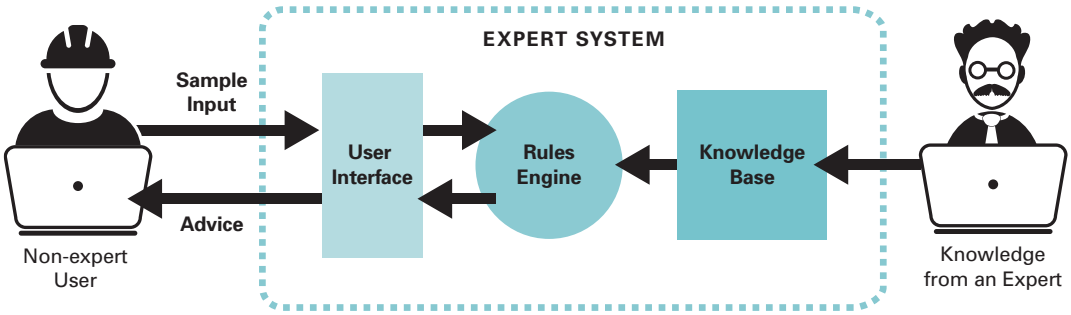
Analysis Results:	***Units***	***Current Sample***			
Sample ID		6	5	4	3
Date Analyzed		9/19/2017	9/19/2017	9/19/2017	9/19/2017
Date Sample Taken		9/19/2017	9/19/2017	9/19/2017	9/19/2017
Top Up	qt/gal/L				
Miles on Oil		7500	2500	7500	3850
Miles on Component		15000	10000	7500	3850
Oil Changed	Y/N	No	Yes	No	No
Oil Condition:					
Nitration	abs	<2.0	<2.0	8.1	-
Oxidation	abs	<2.0	<2.0	8.1	-
Total Base Number	mg KOH/g	8.9	9.4	3.9	3.9
Viscosity @ 100°C (M)	cSt	10.3	11.0	7.6	8.2
Viscosity @ 40°C (M)	cSt	64	65	46	48
Viscosity Index		148	162	132	145
Contamination:					
Glycol	%	-	-	-	-
Potassium	ppm	<2	<2	<2	<2
Silicon	ppm	<2	<2	<2	3
Sodium	ppm	<2	<2	31	24
Soot	%	<0.1	<0.1	<0.1	<0.1
Water	%	2.0	<0.1	3.0	>3
Wear Metals:					
Aluminium	ppm	<2	<2	<2	<2
Chromium	ppm	<2	<2	<2	<2
Copper	ppm	<2	3	8	12
Iron	ppm	<2	<2	15	17
Manganese	ppm	0	0	0	1
Molybdenum	ppm	<2	<2	52	59
Nickel	ppm	0	1	6	0
Lead	ppm	<2	<2	<2	<2
Tin	ppm	<2	<2	<2	<2
Titanium	ppm	0	0	0	0
Vanadium	ppm	1	0	0	0
Additives:					
Barium	ppm	0	0	0	0
Boron	ppm	41	31	25	27
Calcium	ppm	1524	1162	1508	1360
Magnesium	ppm	41	22	0	0
Phosphorus	ppm	744	663	814	756
Zinc	ppm	1004	779	1243	877
Additional Tests:					
Fuel Dilution	%	0.7	1.0	4.8	4.5
Total Acid Number	mg KOH/g	5.0	3.0	6.0	6.2
Total Ferrous	ppm	250.0	200.0	925.0	920.0
Water	%	2.0	0.0	3.0	3.2

Sample history for trending analysis

Color-coded alarm limits

Diagnostic statements with maintenance recommendations

Results from external devices



The user inputs information about: the equpment, the component and the oil being tested . . . The Expert System does the rest.

Embedded Expert System

The Expert System is the "brains" of the MicroLab, translating analytical data into maintenance actions so the technician or mechanic do not need to interpret the chemistry behind the report; they simply read the service recommendations on the report. Built from over 20 years of industry knowledge and more than 10,000 individual software scripts, the MicroLab's Expert System generates diagnostics that are specific to the:

- equipment application (e.g., automotive, on-road trucking, off-road trucking, generators)
- component type (e.g., diesel engine, gasoline engine, hydraulic)
- and often the equipment manufacturer

The Expert System utilizes Rule Sets which are specific to each component type. These Rule Sets contain the threshold levels and diagnostic scripts that are applied to sample results to generate diagnostic statements. The Expert System grades individual sample results as Normal, Abnormal or Severe, using color-coding of the results on the report.

Before comparing the results to custom threshold levels stored in the system's database, the system automatically factors in:

- usage time on the component
- time on the oil
- break-in periods

FOR EXAMPLE

Report Results: **25 ppm Lead, 20 ppm Tin**

Time on Engine	Time on Oil	Alarm	Diagnostic Statement
35,000 miles	15,000 miles		NORMAL WEAR METALS DETECTED FOR BREAK-IN OR OVERHAUL PERIOD
375,000 miles	15,000 miles		ABNORMAL BEARING WEAR DETECTED
375,000 miles	5,000 miles		SEVERE BEARING WEAR DETECTED

Given the same results for wear metals but varying the time on the component and oil, the resulting diagnostic statements will be different.

Converting Oil Reports into Fleet Decisions



LUBETRAK
From Spectro Scientific

LubeTrak™ Data Management Software

LubeTrak compiles individual oil reports into a consolidated database of historical information. This allows fleet managers to view and manage the oil analysis results across the entire fleet. This fleet-level view can be used to assess the health of the entire fleet to optimize maintenance program and practices.

LubeTrak's web-based, subscription data management system provides pre-configured reports and the option to custom-design reports. LubeTrak offers companies an on-line reporting solution to view, track, trend and share oil analysis results throughout your organization. The dashboard graphics provide an equipment overview, consolidates the latest results, and shows 'red-flag' problems.

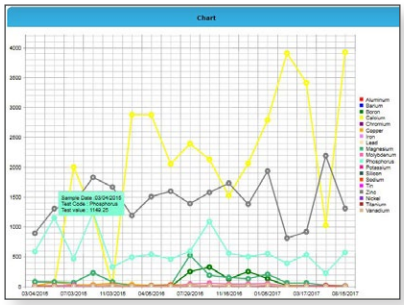
Data from MicroLab and CoolCheck instruments can be uploaded to LubeTrak.

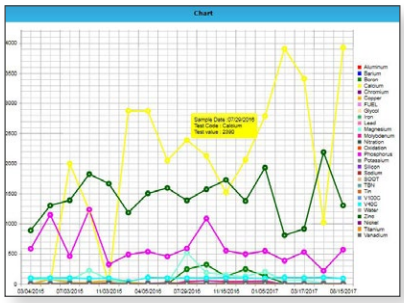
COMPLETE SAMPLE HISTORY IN ONE PLACE

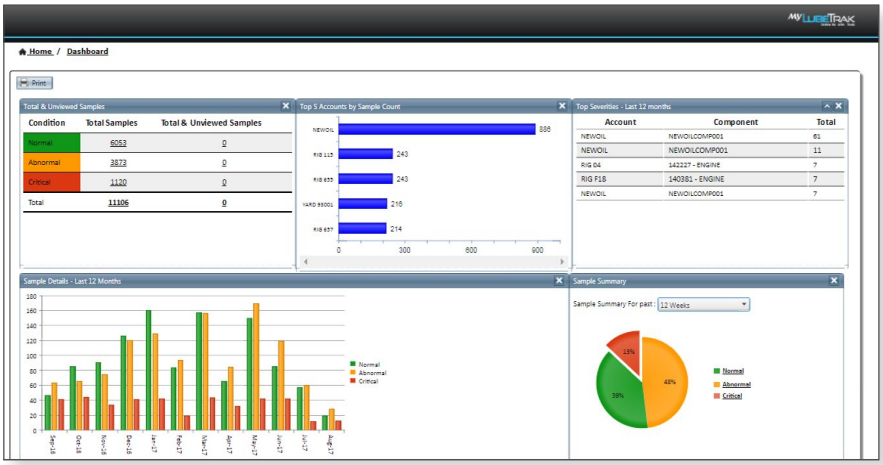
- Dashboard summary data for quick assessments
- Sort by date, equipment type, condition (severity) or site
- Mobile access

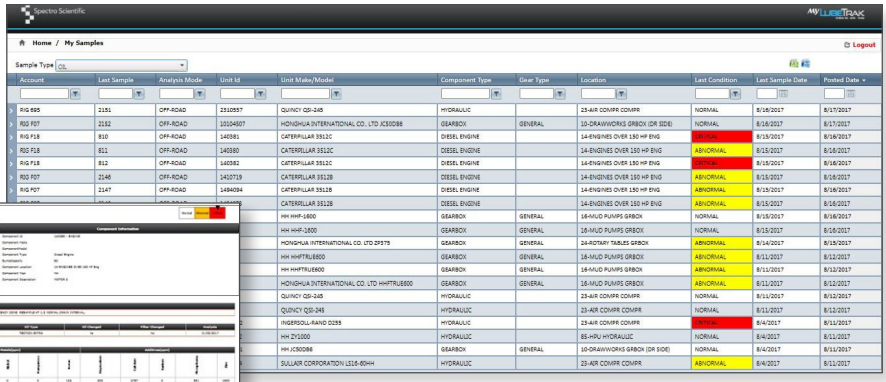
CUSTOMIZABLE

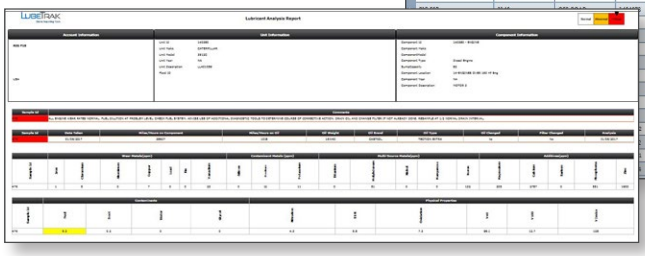
- Email alerts
- Customized reports













Fleet and Enterprise Solutions

Oil analysis with the MicroLab can help fleets to achieve an effective maintenance program which plays a critical role in asset management goals to:

- Optimize the lifecycle of the vehicles
- Minimize equipment downtime
- Control the costs of replacement parts and service
- Ensure the safety of the equipment and operators

Network solutions for multi-site fleets

When a fleet is managing assets across multiple sites, it is important to have an overall view of the entire maintenance program. Some fleets also may have vehicles that access any of their service locations; in those cases it is important that the vehicle's oil analysis history is accessible regardless of which site they visit.

Our network solutions allow multiple MicroLabs to be connected via a central server and LubeTrak to provide fleets the ability to:

- Generate reports locally at each site
- Synchronize assets and oil history across all sites
- Upload data from all sites to compare maintenance activities and issues across locations

These network solutions are customized to meet the needs and configurations of many types of fleets to ensure information on the entire fleet is available whenever and wherever it is needed.

MicroLab Network Solution



MICROLAB COMPANION TOOLS

The MicroLab is truly an all-in-one solution designed to provide a complete oil analysis with one sample, however, for some specific situations an additional instrument may provide more information as a step two analysis. There are three companion products that fleets might consider depending on their needs.

- The MicroLab can screen for fuel dilution through a drop in viscosity, however, if a specific fuel dilution amount is needed then the **Fuel Dilution Meter** can be added to the analysis.
- The MicroLab detects iron wear particles below 10µm, however, when larger iron wear particles need to be detected such as in transmissions and gearboxes the **FerroCheck** can be added.
- The MicroLab can detect contamination from a coolant leak but it cannot be used to test coolants. The **CoolCheck 2** provides analysis on coolant condition as well as DEF purity.
- Results from external devices for fuel dilution, TAN, water and total ferrous can be manually entered to consolidate data into the MicroLab report.



FDM 6000 Series

AUTOMATED FUEL DILUTION METER

Fuel dilution in lubrication oil can cause serious engine damage. In diesel engine crankcases, for example, fuel contamination can be caused by excessive idling, defective injectors or loose connections.

The Fuel Dilution Meter 6000 Series detects fuel contamination in minutes which allows for rapid maintenance actions. The device requires just a small sample size in a disposable vial. In addition, the touchscreen and audio prompts guide the operator through the testing process making it simple for any operator to use.

- Result in % fuel (0.2 to 15%)
- Small sample required in disposable vial – no solvents needed for cleaning
- Test results within a minute for direct measurement of fuel dilution.



FerroCheck 2000 Series

AUTOMATED FERROUS WEAR ANALYZER

Magnetic wear metal measurement in lubricants can be useful in determining the condition of the gearbox itself. Oil analysis can be used to determine wear conditions in the gears or bearings so corrective actions can be taken to prevent premature failures.

Quick and easy measurements with a lightweight, battery operated system make the FerroCheck 2000 Series an essential tool for measurements in the field.

- Highly repeatable (3 ppm)
- Reports 0-10,000 ppm iron concentrations
- Rapid response (30 seconds)
- Small sample requirement (2 ml)
- No sample prep or solvents required



CoolCheck 2

AUTOMATED COOLANT AND DIESEL EXHAUST FLUIDS ANALYSIS SYSTEM

Coolant Analyzer

Cooling systems play a vital role in preserving the overall engine heat balance and in protecting engine components against corrosion and other problems. CoolCheck offers an easy and fast way to test a fleet's coolant to ensure optimum performance of the cooling system by identifying the most common problems such as, mixed fluid types, depletion of key performance additives and system contamination.

Testing coolant and maintaining systems at optimum levels will help prevent corrosion, overheating, engine seize up, and engine damage from freezing.

The automated analyzer performs 8 different tests in less than a minute with a simple user interface designed to be run by non-laboratory personnel.

The CoolCheck confirms:

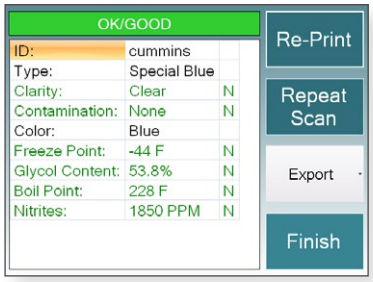
- Glycol%
- Boil point and freeze point
- Nitrites
- Coolant type
- Color
- Contamination and clarity



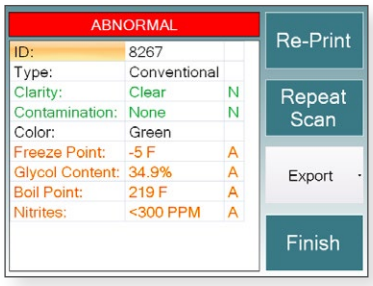
Diesel Exhaust Fluid (DEF) Analyzer

As an added benefit, CoolCheck tests for correct DEF levels. An incorrect DEF mixture can reduce engine efficiency and negate emission reduction systems.

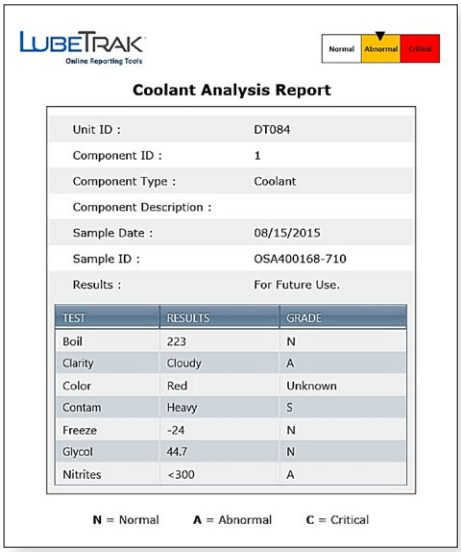
The CoolCheck DEF test confirms % urea and total % DEF.



Normal Sample –
All readings within acceptable range



Abnormal Sample –
Freeze Point, Glycol Content and Boil Point all below acceptable range – additives depleted



CoolCheck reports can be uploaded to LubeTrak

MicroLab Series Product Information

PART NUMBER	
800-00033 (115v) 800-00034 (230v)	MicroLab 30 Requires 29837-00 Standard Accessory Kit
800-00043 (115v) 800-00044 (230v)	MicroLab 30, extended metals. Requires 29838-00 Standard Accessory Kit
800-00035 (115v) 800-00036 (230v)	MicroLab 40 Requires 29708-00 (115v) or 29847-00 (230v) Standard Accessory Kit
COMPANION KITS	
800-00103 (115v) 800-00104 (230v)	MicroLab 31 Includes: MicroLab 30, CoolCheck, 5YR LubeTrak License
800-00105 (115v) 800-00106 (230v)	MicroLab 42 Includes: MicroLab 40, FerroCheck, FDM6001, 5YR LubeTrak License
800-00107 (115v) 800-00108 (230v)	MicroLab 43 Includes: MicroLab 40, FerroCheck, FDM6001, CoolCheck, 5YR LubeTrak License
ACCESSORIES & CONSUMABLES	
29002-05-ABS	5 oz sample bottle w/cap (box of 300)
29823-00	Long sipper straw (350 pcs)
29824-00	Cleaning wipe for IR Cell (280 wipes)
29033-00	Clean swabs packages (100 pcs)
29034-00	Sample Extraction Tubing (100 foot roll)
23042-00	Upper Electrode
23076-00	Lower Electrode
22194-00	Filter Screen, 1/2 Dia, #60 x 60 MESH, 304S
29088-01	Check Flush (One Gallon)
29087-01	Basic Metal Test Standard Fluid High (32 oz) - Blue
29530-00	Extended Metal Low Test Standard (32 oz) LCS - Yellow
29531-00	Extended Metal High Test Standard (32 oz) HCS - Brown
29089-01	Low Viscosity Test Standard (32 oz) - Red
29090-01	High Viscosity Test Standard (32 oz) - Green
Accessories (Included with instrument and accessory kit)	Power conditioner/surge protector, universal cable kit, sample bottles (300), sample straws (1 box), Kimwipes (1 box), cleaning swabs (15 bags), waste bottle, sample extractor and tubing, best practices poster, metals test standards, high and low viscosity standards, check flush (8 gal), wire brush, filter screens (25), remote drain port, allen wrenches

PRODUCT INFORMATION	
Methodology	Per ASTM D7417
Repeatability	Per ASTM D7417
OPERATIONAL SPECIFICATIONS	
Sample Volume Required	1-5 oz. depending on analyses performed
Sample Time Required	5-15 minutes, depending on analyses selected
Oil range specs	Up to 680 cSt at 40C particle counter limited to 320cSt at 40C
Calibration	Standardization (analyzer metals detection) dependent on application – typically required every 50 samples (software-changeable)
Ambient Operating Temperature	0° to 25° C
Operational Humidity	0-85% non-condensing
Ambient Altitude	up to 3000 meters
USER INTERFACE SPECFICATIONS	
Computer OS	Win10 32-bit; SQL server database
Display	15" (diag.) touchscreen
Data Entry	Touchscreen / keyboard / USB port for computer mouse
Data Storage	512 GB hard drive; 32 GB MSATA drive for database backups
Data Transfer	FTP (for online reporting)
Security	AVG 2015
Communication	Network port 25 (email of reports) ; Port 21 (online reporting); Remote access software (LogMeIn) for support/training
POWER REQUIREMENTS	
Power	115/230V 50/60 Hz (single-phase) – Spec. by part number (top)
Power Consumption	1100 Watts continuous; 1700 Watts instantaneous max.
MECHANICAL SPECIFICATIONS	
Dimensions	29" (L) x 30" (W) x 26" (H) (74cm x 76cm x 66cm)
Weight	130 lbs (59 kg)
COMPLIANCE	
CE Mark / RoHS	



To keep your MicroLab running in top condition, it is important to use the recommended consumables including cleaning and standardization fluids.

Spectro Scientific certified consumables are selected and carefully tested with all our instruments to ensure consistent, repeatable results. Always use Spectro Scientific supplied consumables for best results.

CheckFlush is specially designed to clean the lines in the MicroLab between samples. This prevents cross-over contamination and keeps your instrument running its best.

Spectro Scientific
Confidence in knowing

Spectro Scientific | One Executive Drive, Suite 101, Chelmsford, MA 01824-2563
978-431-1120 | www.spectrosci.com | sales@spectrosci.com | An ISO 9001:2008 company

Copyright © 2017 Spectro Scientific. All rights reserved. While every effort is made to assure the information in this document is accurate, Spectro Scientific does not accept liability for any errors or mistakes that may arise. Specifications are subject to change without notice.
Fleet_BRv2_2017-09-26