



# GLOBAL TRIBOLOGY SERVICES

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Right Solutions • Right Partner



**15,000+**  
**Staff**  
**350+**  
**Locations**  
**65**  
**Countries**

# Welcome to ALS

ALS has over 15,000 staff, operates over 350 laboratories in 65 countries and is the one of the largest independent analytical groups in the world, providing fluids analysis, minerals, coal, environmental and nondestructive testing services. As one of the world's largest and most diversified testing services providers, ALS has sites strategically located to provide accurate and timely services. The company has teams of experts around the world available to provide specialized business solutions that align with client needs. Major hub facilities are located in Australia, Asia, North America, South America, Europe, the Middle East and Africa.

## Tribology Overview

ALS offers a unique combination of testing and analytical solutions. Our operations provide comprehensive oil, fuel, coolant, and metalworking fluid testing services. With the largest global laboratory network in the industry, ALS has an international customer base that includes:

Construction

Original equipment manufacturers (OEMs)

Oil exploration corporations

Marine

Manufacturing

Over-the-road transportation

Lubricant suppliers

Fortune 500 companies

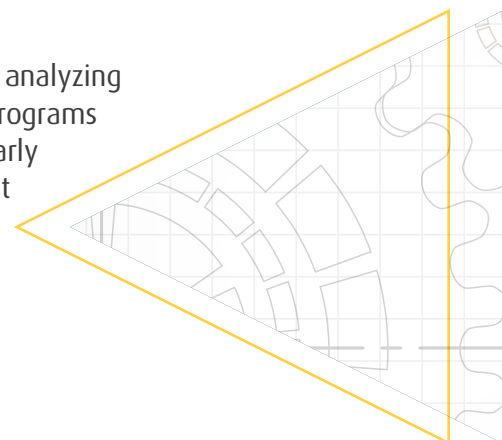
Mining


Our dedication to the highest levels of customer service and excellence is unmatched in the industry. Whether you want to extend oil drains, reduce downtime, increase equipment availability, or monitor engine and product performance, ALS has the testing solutions to help improve your maintenance practices. Our technicians, chemists, and quality control experts service over 20 different industries, making ALS the leading operating entity in the industry.

**ALS offers standard analysis packages and over 150 different specialized ASTM tests covering any combination of conditions, fluids and applications. Our areas of expertise include:**

- ▶ In-service lubricant analysis
- ▶ Diesel fuel analysis
- ▶ Wear debris analysis
- ▶ Transformer fluid analysis
- ▶ Coolant analysis
- ▶ Metalworking fluid analysis
- ▶ Training and consulting

Whether you regularly test a few samples or need our help analyzing thousands of samples, ALS can help. We tailor our testing programs to meet our customers' individual needs. Our experts regularly make recommendations that help our customers implement successful, cost-effective fluid analysis programs.





**Regular oil testing  
provides information  
essential to determining  
the condition of your  
equipment.**



# Tribology Services

## Oil Analysis

Monitor equipment lubricants through oil analysis to detect potential threats before they cause downtime. Maintenance personnel work proactively, not reactively, to keep equipment running at optimum levels.

## Transformer Fluid Analysis

Transformer fluid acts as an electrical insulating media and helps protect the components. Analysis of this fluid is used to monitor transformer operating condition and fluid health to ensure safety & environmental compliance, reliability & continuous production, and optimal maintenance practices.

## Turbine Oil Suitability Testing

ALS provides in-depth analysis of a lubricant's key properties, contamination, and irregular component wear affecting turbine performance and oil suitability for continued use.

## Wear Debris Analysis

Take oil analysis to a higher level. Analysis of particles generated within lubricating systems can determine the source of wear and how the wear is generated. This takes into account the metallurgy of the wear particle and the physical mechanisms involved in causing the wear.

## WEBTRIEVE™

Webtrieve™ is a secure, internet-based program that allows clients access to data from anywhere in the world. With Webtrieve™, customers have direct entry into our real-time global database of all samples processed by ALS regardless of laboratory location.

## Diesel Fuel Testing

Diesel fuel testing is indispensable for monitoring auxiliary and standby power systems in commercial and industrial applications. Testing diesel fuel for long term storage helps predict remaining service life.

## Coolant Testing

Testing monitors the condition of your coolant to ensure proper system operation. Early detection of potential problems helps determine when additives are needed to maintain necessary protective levels.

## Metalworking Fluids Analysis

Contaminated and degraded metalworking fluids can cause serious health, environmental, tooling, and product quality problems. Testing provides information essential for uninterrupted business operations.

## Training & Consulting

Our consultants and expert trainers will work with your maintenance department to ensure your fluids analysis program meets your organizational goals. We offer on-site training, instructional webinars and regionally scheduled workshops to help clients realize the best returns possible.



# Global Presence

**ALS provides services on a global scale.** All Tribology laboratories provide routine analysis, and select laboratories offer more in-depth and specialized testing for lubricants, coolants and fuels. In addition, ALS has bilingual personnel for our Czech, Bahasa Melayu, Mandarin, French, Portuguese and Spanish speaking clients. Certified and registered in each region, our labs follow global standard procedures and undergo audits to maintain standard practice throughout the network.

ALS embraces a client-focused attitude facilitated by listening to our customers and tailoring our programs to help them achieve results. We draw upon the varied knowledge and ability of our culturally diverse global staff to service and find solutions to meet the highly specialized needs of our global customer base. One such identified need is the ability to offer privately branded products.

**With ALS Tribology global private label programs, our best work is invisible!** If you want to brand your fluid analysis services with your corporate identity, we have more experience and scope to accomplish this task than any other competitor. Our private label programs give companies an additional marketing vehicle and provide users with a dependable maintenance tool. We conduct the analysis and provide you with complete, customized materials to implement the program with your customer base. In addition, you will receive:

- Test report forms
- Software programs
- Customized websites
- Training materials & marketing manuals
- Sample ID tags
- Field sales support & training
- Packaging—sample bottles, return mailing containers, case packs

All products come with your name and identity prominently displayed. Our key strength is providing the technical and marketing support to successfully grow your branded program. Our private label program partners find that our services are the perfect way to build stronger relationships within their own particular distribution network and with end users.





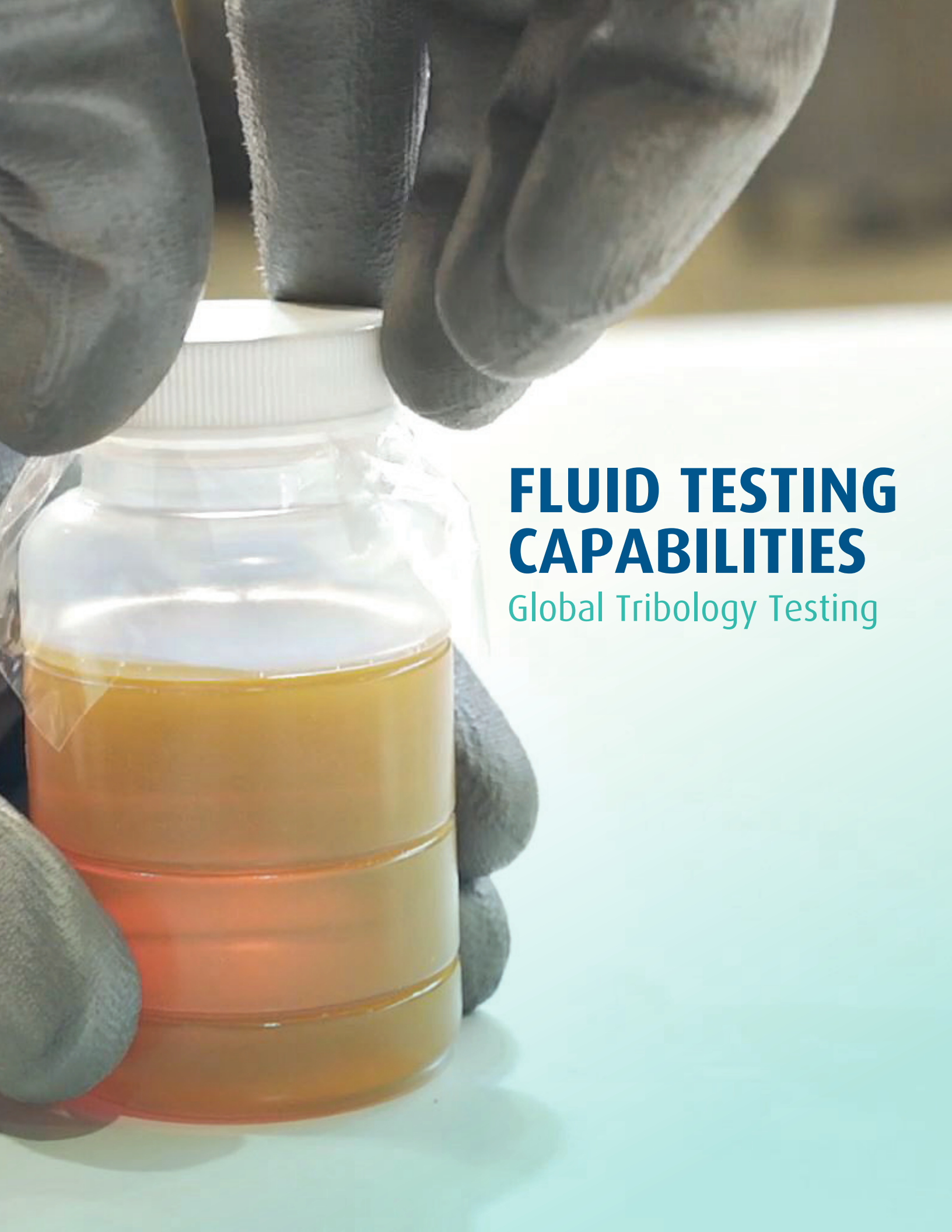
## Protecting Your Assets

Just as a physician can determine what's happening inside your body by examining the toxins in your blood, oil analysis can determine the condition of your equipment by examining the contaminants in used oil—the equipment's life blood. Just as early detection of toxins in your blood can prevent potentially fatal illnesses, early detection of contaminants in your equipment can prevent potentially disastrous problems.

Companies typically spend at least 10 percent of their revenues on maintenance and equipment repair. Add to this the cost of equipment downtime, decreased productivity and devalued used machines, and this can easily add up to thousands of dollars per year. Oil analysis can provide early detection of:

- ▶ Problems in the initial stages of development
- ▶ Component's source of wear
- ▶ Contaminants such as dirt, water, coolant, nitration, incorrect oil
- ▶ Dilution of lubricants
- ▶ Lubricant's suitability for further service time
- ▶ Misapplication of lubricants

At a cost of just pennies per operating hour, fluid testing and analysis provides the information needed to predict machine wear and allows companies to schedule preventative maintenance—before that equipment is compromised.



# **FLUID TESTING CAPABILITIES**

Global Tribology Testing





## Australia & New Zealand Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Brisbane	Muswellbrook	Perth	Sydney	Wellington	Sample Size		TAT
4 Ball - wear Scar (Grease)	ASTM D2266						X						X		100	mls	5 Days
4 Ball - Wear Scar (Oil)	ASTM D4172								X				X		100	mls	5 Days
4 Ball - Weld Point / Load wear Index (Oil)	ASTM D2783								X				X		100	mls	5 Days
4 Ball-Weld Point/Load wear Index (Grease)	ASTM D2596						X						X		100	mls	5 Days
Acid Number	ASTM D664/D974					X		X	X	X	X	X	X	X	10	mls	48 Hrs
Analytical Ferrography (MPE)	In-House				X		X		X			X	X		10	mls	5 Days
Aniline Point	ASTM D611								X				X		10	mls	3 Days
Ash	ASTM D482								X				X		50	mls	3 Days
Ash, Sulphated	ASTM D874								X				X		50	mls	3 Days
Asphaltenes, Heptane Insolubles	ASTM D6560/IP 316					X			X	X			X		50	mls	3 Days
Base Number	ASTM D2896								X	X	X	X	X	X	10	mls	48 Hrs
Calculated Cetane Index	ASTM D4737								X				X		200	mls	3 Days
Carbon Residue, micro carbon	ASTM D4530					X			X				X	X	20	mls	3 Days
Clarity	Visual		X							X	X	X	X	X	50	mls	48 Hrs
Cloud Point	ASTM D2500					X							X		50	mls	3 Days
Cold filter Plugging Point	ASTM D6371					X							X		50	mls	3 Days
Colour	ASTM D1500/In-House					X			X	X	X	X	X		50	mls	48 Hrs
Conductivity	Alpha 19th (2510)		X							X	X	X	X	X	50	mls	48 Hrs
Cone Penetration 1/4 Scale	ASTM D1403						X						X		500	mls	5 Days
cone Penetration Full Scale	ASTM D217						X						X		500	mls	5 Days
Copper Corrosion	ASTM D130								X				X		50	mls	5 Days



## Australia & New Zealand Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Brisbane	Muswellbrook	Perth	Sydney	Wellington	Sample Size		TAT
Demulsification Number	IP19								X				X		100	mls	5 Days
Density	ASTM D4052 / D7777					X			X			X	X		100	mls	48hr
Density by Hydrometer	ASTM D1298					X			X				X		100	mls	48hr
Dispersancy	In-house								X	X	X	X	X	X	10	mls	48hr
Distillation at Atmospheric Pressure	ASTM D86					X			X				X		120	mls	3 Days
Distillation by GC (Simulated)	ASTM D7500					X			X				X		50	mls	3 Days
Dropping Point	ASTM D566								X				X		200	mls	5 Days
Dropping Point (Wide Range)	ASTM D2265								X				X		200	mls	5 Days
Fire Point, COC	ASTM D92								X				X		150	mls	3 Days
Flash Point by Abel	IP170								X				X		150	mls	3 Days
Flash Point by Seta	ASTM D3828					X			X			X	X		50	mls	3 Days
Flash Point, COC	ASTM D92								X				X	X	150	mls	3 Days
Flash Point, PMCC	ASTM D93					X						X	X	X	150	mls	3 Days
Flash Point, Small scale CC	ASTM D6450					X			X			X			50	mls	3 Days
Foaming Seq 1	ASTM D892								X				X		200	mls	5 Days
Foaming Seq 2	ASTM D892								X				X		200	mls	5 Days
Foaming Seq 3	ASTM D892								X				X		200	mls	5 Days
Freezing Point	ASTM D2386					X							X		100	mls	3 Days
FSII	ASTM D5006					X							X		100	mls	5 Days
FTIR	ASTM D2413 / JOAP					X			X	X	X	X	X	X	10	mls	48hr
Fuel Dilution in Used Engine Oil	Viscosity / Seta Flash								X	X	X	X	X	X	20	mls	48hr



## Australia & New Zealand Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Brisbane	Muswellbrook	Perth	Sydney	Wellington	Sample Size		TAT
Fuel Dilution in Used Engine Oil, GC	ASTM D3524/D7593								X	X		X	X		10	mls	48hr
Fuel Dilution, Petrol Distillation	ASTM D322								X	X	X		X		100	mls	3 Days
Glycol % in Coolant	ASTM D3321		X							X	X	X	X	X	10	mls	48hr
Heptane Insolubles, Asphaltenes	IP 316					X			X	X			X		100	mls	3 Days
Hexane Insolubles									X				X		100	mls	3 Days
Insolubles / Retained Solids	Inhouse		X			X		X	X			X	X		50	mls	48hr
i-pH - Initial pH	ASTM D1287/D7946								X	X		X	X		50	mls	48hr
Membrane Patch Colorimetry (MPC)	ASTM D7843								X				X		120	mls	3 Days
Membrane Patch Colorimetry Modified (MPC modified)	Inhouse								X			X			50	mls	3 Days
Metals Analysis in Petrol Products, ICP-Solv Dilutn	ASTM D5185					X	X	X	X	X	X	X	X	X	10	mls	48hr
Micro Carbon Residue	ASTM D4530								X				X	X	15	mls	3 Days
Micro Carbon Residue 10% Distillation	ASTM D4530								X				X		120	mls	3 Days
Microbial Growth	ASTM D6974					X				X	X	X	X	X	50	mls	5 Days
Microscopic Patch Examination (Analytical Ferrography)	Inhouse				X		X		X			X	X		10	mls	5 Days
Nitrate			X										X	X	10	mls	3 Days
Nitration Crankcase Oils by FTIR	Joap								X	X	X	X	X	X	20	mls	48hr
Nitrite	Inhouse		X							X	X	X	X		10	mls	48hr
Odour	Inhouse		X							X	X	X	X	X	20	mls	48hr
Oil Content in Refrigerating Oils	Inhouse								X				X		50	mls	3 Days
Oxidation Crankcase Oils by FTIR	Joap								X	X	X	X	X	X	20	mls	48hr
Particle Count, Filter Patch Analysis	ISO 4406					X			X	X		X	X		100	mls	48hr



## Australia & New Zealand Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Brisbane	Muswellbrook	Perth	Sydney	Wellington	Sample Size		TAT
Particle Count, ISO Cleanliness	ISO11500/ISO4406					X			X	X	X	X	X	X	50	mls	48hr
Particulate and Insolubles Examination by Debris Patch	ISO 4407 / In-house						X		X		X	X			100	mls	48hrs
Particulate Contamination , Gravimetric	ASTM D4898/D6217/D5452					X							X	X	100	mls	3 Days
Pentane Insolubles	ASTM D4055								X				X		100	mls	3 Days
Pentane Insolubles by Centrifuge	ASTM D893					X			X				X		100	mls	3 Days
PH	ASTM D1287		X					X	X	X	X	X	X	X	50	mls	48hr
PQ INDEX	WK56077						X		X	X	X	X	X	X	20	mls	48hr
Reserve Alkalinity	ASTM D1121		X							X	X		X		20	mls	3 Days
RPVOT	ASTM D2272								X				X		100	mls	5 Days
RULER	ASTM D6810 / D6971						X		X			X	X		20	mls	3 Days
Rust Prevention	ASTM D665								X				X		500	mls	5 Days
Saponification Value	ASTM D94					X			X				X		20	mls	5 Days
Soot	Joap								X	X	X	X	X	X	20	mls	48hr
Sulphation Crankcase Oils by FTIR	Joap								X	X	X	X	X	X	20	mls	48hr
TDS, TOTAL DISSOLVED SOLIDS	D1125MOD		X							X	X	X	X	X	10	mls	48hr
TGA, THERMO GRAVIMETRIC ANALYSES									X					X	100		5 Days
Varnish Potential by Membrane Patch Colorimetry (MPC)	ASTM D7843 / In-house								X			X	X		30	mls	3 Days
Viscosity @ 100C	ASTM D445 / D7279								X	X	X	X	X	X	20	mls	48hr
Viscosity @ 40C	ASTM D445 / D7279					X			X	X	X	X	X	X	20	mls	48hr
Viscosity Index	ASTM D2270								X	X	X	X	X	X	20	mls	48hr
Water & Sediments (Distillates)	ASTM D2709					X							X		100	mls	3 Days



## Australia & New Zealand Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Brisbane	Muswellbrook	Perth	Sydney	Wellington	Sample Size		TAT
Water & Sediments (Fuel Oils)	ASTM D1796					X							X		100	mls	3 Days
Water by Crackle	In-house								X	X	X	X	X	X	20	mls	48hr
Water By Distillation	ASTM D95					X			X				X		100	mls	3 Days
Water by Karl Fischer Titration	ASTM D6304					X	X		X	X		X	X	X	20	mls	48hr
Water Separability	ASTM D1401								X				X		50	mls	3 Days



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Acid Number	D664/D974	X								X	X	X	X	X	X	X	X	60 ml	96 Hrs
Acid Split/Tramp Oil Determination	Volumetric								X			X						60 ml	48 Hrs
Acidity / Distillation Residue	D1093						X						X					120 ml	48 Hrs
Alkalinity by Auto-Titrator	D1067MOD								X			X						60 ml	48 Hrs
Aniline Point	D611									X			X					30 ml	48 Hrs
Analytical Ferrography						X	X		X	X	X				X			30 ml	48 Hrs
Analytical Ferrography Add On						X	X		X	X	X				X			30 ml	48 Hrs
Aniline Point	D611									X			X					30 ml	48 Hrs
API Gravity of Petroleum Products	D287/D1298						X			X	X	X	X	X	X	X	X	500 ml	72 Hrs
API Gravity of Diesel Fuels	D287/D1298						X				X		X		X			500 ml	48 Hrs
Appearance	D4176/Inhouse		X	X			X				X	X	X	X	X	X	X	20 ml	48 Hrs
Ash Content	D482						X	X		X	X		X					100 ml	48 Hrs
Asphaltenes	D3279/6560						X						X					30 ml	72 Hrs
Base Number	D4739									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Base Number	D2896									X			X					30 ml	48 Hrs
Biodiesel Blend Content	FTIR						X				X		X		X			60 ml	48 Hrs
Blending Charge	Blending									X	X	X	X	X	X	X	X		48 Hrs
Blending Compatibility of Lubricating Oil	D7155									X	X		X					500 ml	2 Weeks
Boiling Point	D3321		X	X							X	X	X	X	X	X	X	60 ml	48 Hrs
BZT Content and Tolytriazole	D6156MOD								X			X						60 ml	24 Hrs
Calculated BTU/Gal (Incl Sulfur/Ash/Water/API Gravity)	D4868						X			X	X		X					480 ml	4 Days

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Calculated BTU/lb (Incl Sulfur/Ash/Water/API Gravity)	D4868						X			X	X	X	X					480 ml	4 Days
Calculated Carbon Aromaticity Index (CCAI)	CCAI						X							X				500 ml	48 Hrs
Carbon Residue -- Conradson	D189						X			X	X	X	X					30 ml	4 Days
Carbon Residue -- Conradson on 10% Residue	D86/D189						X				X	X	X					120 ml	4 Days
Carbon Residue -- Micro Method	D4530						X			X			X					30 ml	4 Days
Carbon Residue -- Ramsbottom	D524						X			X			X					120 ml	4 Days
Carbon Residue, Ramsbottom on 10% Residue	D86/D524						X						X					120 ml	4 Days
Cetane Index, Calculated (Includes Dist & Gravity)	D4737						X				X	X	X	X	X			500 ml	4 Days
Chloride in Metalworking Fluids	Potentiometric								X		X							60 ml	24 Hrs
Chlorides by IC	D5827		X								X							30 ml	48 Hrs
Chlorine % by WDXRF	D6443									X	X							50 ml	48 Hrs
Cloud Point	D2500						X				X	X	X	X	X	X	X	100 ml	48 Hrs
Cold Filter Plugging Point	IP309/D6371						X				X	X	X					60 ml	48 Hrs
Color Test	D1500						X			X	X	X	X	X	X	X	X	100 ml	48 Hrs
Conductivity of Coolants	D1125			X					X		X	X	X	X	X	X	X	60 ml	48 Hrs
Copper Corrosion @ 100C	D130									X	X	X	X					60 ml	48 Hrs
Copper Corrosion @ 50C	D130			X			X			X	X	X	X					60 ml	48 Hrs
Denatonium Benzoate in Coolant by HPLC	HPLC		X								X							500 ml	48 Hrs
Density	D1298						X			X	X	X	X	X	X	X	X	500 ml	48 Hrs
Dewatering	Cast Iron Chip								X		X							60 ml	48 Hrs
Dielectric Strength	D877									X	X							120 ml	48 Hrs

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Dielectric Breakdown (Dielectric Strength) Transformer Fluid	D186	X										X				X		120 ml	96 Hrs
Dielectric Constant (Relative Permittivity)	D924	X										X				X		120 ml	96 Hrs
Dirt Filtration	D5907MOD								X		X							180 ml	48 Hrs
Dissolved Gases	D3612	X							X		X					X		120 ml	96 Hrs
Dissolved Metals Transformer Fluid	D3635	X									X					X		120 ml	96 Hrs
Distillation of Petroleum Products	D86/D7344/7345						X				X		X		X	X		120 ml	48 Hrs
Extraction Test for Fuel/Oil Contamination	Extraction		X		X						X	X	X	X	X	X		60 ml	4 Days
Fat Content, Percent by FTIR	FTIR									X	X							10 ml	72 Hrs
Fatty Acid Content									X		X							50 ml	4 Days
Filter Patch Microscopic Analysis - Add on	Microscope					X	X	X		X	X		X	X	X	X		100 ml	48 Hrs
Filter Prep for Analysis Only (each filter)						X					X		X					N/A	72 Hrs
Fire Point	D92									X	X	X	X					240 ml	48 Hrs
Flash Point -- Cleveland Open Cup	D92									X	X	X	X	X				240 ml	48 Hrs
Flash Point -- Tag Closed Cup	D56						X				X		X					120 ml	48 Hrs
Flash Point (MCCC)- Modified Continuous Closed Cup	D7094						X			X			X					50 ml	48 Hrs
Flash Point (PMCC) - Pensky-Marten Closed Cup	D93						X				X		X		X			240 ml	48 Hrs
Foam Sequence I	D892									X			X	X				250 ml	48 Hrs
Foam Sequence II	D892									X			X	X				250 ml	48 Hrs
Foam Sequence III - Includes sequence II	D892									X			X	X				250 ml	48 Hrs
Foaming Sequence I, II, & III	D892									X			X	X				500 ml	48 Hrs
Foaming Sequence IV, High Temperature Foaming Characteristics	D6082-12									X			X					250 ml	48 Hrs

\* Transformer Fluid Analysis performed in Cleveland and Burlington





## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size		TAT
Free Oil Determination	Visual								X			X		X				90	ml	48 Hrs
Freezing Point (Coolant)	D3321			X							X	X	X	X	X	X	X	60	ml	48 Hrs
Fuel Accelerated Stability, Oxidation Stability	D2274						X					X						350	mL	4 Days
Fuel Accelerated Stability, % Reflectance	D6468						X							X				60	ml	48 Hrs
Fuel Accelerated Stability, Pad Rating	F21-61						X					X		X		X		60	ml	4 Days
Fuel Dilution by Gas Chromatography	D3524									X	X	X						30	ml	48 Hrs
Fuel Dilution in Used Engine Oil	Calculated Vis/Flashpoint									X	X	X	X	X	X	X	X	60	ml	48 Hrs
Fuel Rush Charge						X						X		X						
Fuel Soot by Infrared	Infrared									X	X	X	X	X	X	X	X	30	ml	48 Hrs
Furans (Furanic Compounds)	D5837											X				X				
Glycol Content in Coolant, Percent	D3321			X							X	X	X	X	X	X	X	10	ml	48 Hrs
Coolant Contamination in Used Engine Oil	D5185									X	X	X	X	X	X	X	X	10	ml	48 Hrs
Glycolate Determination in Coolant by IC	D5827			X								X						50	ml	72 Hrs
Infrared Analytical Analysis (Interpreted)	FTIR						X		X		X		X					30	ml	48 Hrs
Infrared Scan (Non Interpreted)	FTIR						X		X		X		X					30	ml	48 Hrs
Inhibitor Content	D2668	X										X				X		120	ml	96 Hrs
Interfacial Tension	D971	X										X				X		120	ml	96 Hrs
i-pH (Initial pH)	D7946									X	X	X	X	X	X	X	X	30	ml	48 Hrs
Lasernet Fines	Optical Imaging									X		X						120	ml	48 Hrs
Lube Analysis by Gas Chromatography								X				X						50	ml	4 Days
Lubricity, High Frequency Reciprocating Rig (HFRR)	D6079						X					X						40	mL	4 Days

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Membrane Patch Colorimetry (MPC)	ASTM D7843									X			X					60 ml	4 Days
Metals Analysis in Petrol Products, ICP-Solv Dilutn	D5185									X	X	X	X	X	X	X		60 ml	48 Hrs
Metals: ICP (Aqueous)			X	X	X				X			X		X				60 ml	48 Hrs
Metals: ICP (Ash Fusion Digestion prep)	D5184					X	X	X		X				X				60 ml	48 Hrs
Metals: ICP (Ash-Acid Digestion prep)	Ash, ICP		X		X	X	X	X		X		X		X				60 ml	48 Hrs
Metals: ICP (Solvent Dilution, Fuels)	D5708						X							X		X		60 ml	48 Hrs
Microorganism Test	Liquid Culture/Dip Slide									X	X	X	X	X	X	X		60 ml	48 Hrs
Microorganism Test, Fuel	Liquid Culture/Dip Slide						X					X		X		X		60 ml	48 Hrs
Nitrates by IC	D5827			X								X						30 ml	48 Hrs
Nitration Crankcase Oils by FTIR	E2412/JOAP									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Nitrites by IC	D5827			X								X						30 ml	48 Hrs
Nitrites by Titration	Titration			X							X	X	X	X	X	X	X	30 ml	3 days
NO POSTAGE WITH SAMPLE											X	X	X	X	X	X	X		
Organic Acid Inhibitors in Coolants, Cumulative Total	UPLC			X							X	X						30 ml	48 Hrs
Organic Acid Inhibitors in Coolants, Individual Determination Acid Compounds	UPLC			X							X	X						30 ml	72 Hrs
Oxidation Crankcase Oils by FTIR	E2412/JOAP									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Particle Count AS4059 Cleanliness Class	11500											X		X	X			500 ml	48 Hrs
Particle Count, ISO11500/4406	ISO11500/4406									X	X	X	X	X	X	X	X	120 ml	48 Hrs
Particulate Contamination of Biodiesel Blends	D7321						X							X				400 ml	48 Hrs
Particulate Contamination, by weight (Gravimetric)	D6217/5452		X		X		X			X		X		X	X	X	X	120 ml	48 Hrs
Pentane Insolubles --% by Weight (w/out Coagulant)	D893									X		X		X				50 ml	4 Days

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Pentane Insolubles (Coagulated) -- % by Weight	D893/D7317									X	X		X			X		50 ml	4 Days
Pentane Insolubles by Filtration	D4055									X	X	X	X					200 ml	48 Hrs
pH	D1287		X	X	X						X	X	X	X	X	X	X	60 ml	48 Hrs
pH by Auto-Titrator	D1067MOD								X		X							60 ml	48 Hrs
Polychlorinated Biphenyl Content (PCB's)	D4059	X										X				X		120 ml	96 Hrs
Phosphates by IC	D5827			X								X						50 ml	72 Hrs
Photo of a Filter Patch Only	Camera Microscope			X		X	X	X		X	X	X	X	X	X	X	X	10 ml	48 Hrs
Pour Point in Centigrade	D97						X			X		X						100 ml	48 Hrs
Pour Point in Fahrenheit	D97						X			X		X						100 ml	48 Hrs
Power Factor (Dissipation Factor)	D924	X										X				X		120 ml	96 Hrs
PQI - Ferrous Metal Quantifier	PQI									X	X	X	X	X	X	X	X	50 ml	48 Hrs
Quench Time/Speed	D3520MOD								X			X						60 ml	48 Hrs
Refractive Index Rating	Refractometer									X	X	X	X	X	X	X	X	50 ml	48 Hrs
Refractometer	Refractometer								X			X						60 ml	48 Hrs
Reserve Alkalinity	D1121			X							X	X			X			30 ml	48 Hrs
Rotating Pressure Vessel Oxidation Test, RPVOT	D2272									X			X					500 ml	4 Days
Ruler Test	D6971/D6810							X		X			X					100 ml	48 Hrs
Rust Test A	D665A									X			X					600 ml	72 Hrs
Rust Test B	D665B									X			X					600 ml	72 Hrs
Rust Testing by Cast Iron Chips (CIC)	Cast Iron Chip								X			X						60 ml	48 Hrs
SAE Rating Determination	Calc Visc									X	X	X	X	X	X	X	X	30 ml	48 Hrs

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT
Saponification Number	D94								X			X						30 ml	48 Hrs
Sediment by Extraction	D473						X							X				120 ml	72 Hrs
Sediment by Hot Filtration	D4870						X							X				120 ml	72 Hrs
Sediment Potential After Aging	D4870						X							X				120 ml	72 Hrs
Sediment & Soluble Sludge Transformer Fluids	D1698	X										X				X		120 ml	96 Hrs
Seta Flash							X			X	X	X	X	X	X	X	X	30 ml	72 Hrs
Silicates by IC	D5827			X								X						30 ml	48 Hrs
Silicates by ICP, Calculated	D6595/5185			X								X		X				25 ml	48 Hrs
Solids			X		X							X		X				30 ml	48 Hrs
Soot Crankcase Oils by FTIR	E2412/JOAP									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Specific Gravity @ 60 F	D1298						X			X		X	X	X	X	X	X	500 ml	72 Hrs
Specific Gravity of Coolants and MWFs	D1122			X					X			X		X	X	X		500 ml	48 Hrs
Stability & Compatibility of Residual Fuel Oil	D4740						X							X				60 ml	48 Hrs
Sugar Content	Anthrone Indicator						X					X		X		X		30 ml	48 Hrs
Sulfated Ash	D874									X		X		X				30 ml	48 Hrs
Sulfates by IC	D5827			X								X						30 ml	48 Hrs
Sulfation Crankcase Oils by FTIR	E2412/JOAP									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Sulfur Determination by XRF	D5453/D7039						X			X		X		X				30 ml	48 Hrs
Sulfur Determination by XRF	D5453/D7039						X			X		X		X				30 ml	48 Hrs
Sulphation Crankcase Oils by FTIR	E2412/JOAP									X	X	X	X	X	X	X	X	30 ml	48 Hrs
Technical Services Hourly Charge - Technician Rate											X	X	X	X	X	X	X		

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## North America Individual Tests

Description	Method	Transformer Fluid**	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Atlanta	Cleveland	Kansas City	Portland	Phoenix	Burlington	Edmonton	Sample Size	TAT	
Technical Services Hourly Charge - Chemist/Engineer Rate											X	X	X	X	X	X	X			
Toluene Insolubles % by Weight	D893									X		X		X				50	ml	4 Days
Total Dissolved Solids by Conductivity Meter, TDS	D1125MOD			X							X	X	X	X	X	X	X	30	ml	48 Hrs
UC Sediment Rating	MM1169									X			X					80	ml	48 Hrs
Urea Content	Refractometer				X							X		X				30	ml	48 Hrs
Varnish Potential	Varnish Potential Rating Package									X			X					500	ml	4 Days
Viscosity @ 100C	D445/D7279									X	X	X	X	X	X	X	X	60	ml	48 Hrs
Viscosity @ 40C	D445/D7279						X			X	X	X	X	X	X	X	X	60	ml	48 Hrs
Viscosity @ 50C cSt	D445/D7279						X							X				60	ml	48 Hrs
Viscosity Index -Includes V40 &V100	D2270									X	X	X	X	X	X	X	X	120	ml	48 Hrs
Visual Appearance, Distillate Fuel	D4176						X					X		X		X		20	ml	48 Hrs
Water & Sediment in Crude & Fuel Oils	D1796						X					X		X		X		120	ml	48 Hrs
Water & Sediment in Distillate fuel oil	D2709						X					X		X		X		120	ml	48 Hrs
Water by Distillation	D95						X	X		X		X		X				120	ml	48 Hrs
Water by Karl Fischer %	E203/D6304		X				X			X	X	X	X	X	X	X	X	30	ml	48 Hrs
Water by Karl Fischer ppm	E203/D6304									X	X	X	X	X	X	X	X	30	ml	48 Hrs
Water by Karl Fischer ppm, Fuels	E203/D6304						X					X		X				30	ml	48 Hrs
Water Content Transformer Fluids	D1533	X										X				X		120	ml	96 Hrs
Water Hardness	D1126MOD								X			X						60	ml	48 Hrs
Water Separability	D1401									X			X	X				100	ml	48 Hrs

\* Transformer Fluid Analysis performed in Cleveland and Burlington



## South America Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Belo Horizonte	Sao Paulo	Santiago	Sample Size	TAT	
Acid Number	ASTM D664/D974								X	X	X	x	10	mls	48Hrs
Alkalinity	PE119		X									X	50	mls	48Hrs
Appearance	ASTM D4176/In-House	X	X		X		X		X	X	X	X	50	mls	48Hrs
Base Number	ASTM D2896/D4749								X	X	X	X	10	mls	48Hrs
Biodiesel content	FTIR					X				X			50	mls	3Days
Boiling point	ASTM D3321		X							X			50	mls	48Hrs
Chlorides	PE132		X									X	50	mls	48Hrs
Color, coolants	Visual		X								X		50	mls	48Hrs
Conductivity	PE129		X									X	100	mls	48Hrs
Conductivity of Coolants	ASTM D1125		X							X			100	mls	48Hrs
Density/ Specific Gravity/API	ASTM D1298/PE962					X			X		X	X	150	mls	48Hrs
Dielectric strength	ASTM D877								X		X		1000	mls	3Days
Dispersancy	In-House								X			X	10	mls	48Hrs
Dissolved Gas Analysis	ASTM D3612								X		X		100	mls	3Days
Dissolved Solids	PE133		X								X	X	50	mls	48Hrs
Ferrography	WC38						X		X		X	X	50	mls	3Days
Flashpoint COC	ASTM D92								X		X		120	mls	3Days
Flashpoint, PMCC	ASTM D93					X					X		120	mls	3Days
Flashpoint, Setflash	PE 113					X			X			X	10	mls	3Days
Freezing Point (Coolant)	ASTM D3321		X							X	X	X	50	mls	48Hrs
Fuel Dilution in Used Engine Oil	Calculated Vis/Flashpoint								X	X	X	X	50	mls	48Hrs



## South America Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	Metalworking Fluid	Oil	Belo Horizonte	Sao Paulo	Santiago	Sample Size	TAT	
Glycol Content in Coolant, Percent	ASTM D3321		X							X	X	X	50	mls	48Hrs
Interfacial Tension	ASTM D971								X		X		1000	mls	3Days
Metals Analysis in Petrol Products, ICP-Solve Dilution	ASTM D5185		X				X		X	X	X	X	50	mls	48Hrs
Nitration Crankcase Oils by FTIR	ASTM E2412/JOAP								X	X	X	X	50	mls	48Hrs
Nitrites	Titration		X							X	X	X	50	mls	48Hrs
Odor	In-House		X			X			X	X	X	X	50	mls	48Hrs
Oxidation Crankcase Oils by FTIR	ASTM E2412/JOAP								X	X	X	X	50	mls	48Hrs
Particle Count, ISO Cleanliness	ISO11500/4406								X	X	X	X	50	mls	48Hrs
PCB Content	ASTM D4059								X		X		50	mls	3Days
Pentane Insolubles - % by Weight	ASTM D893								X		X		100	mls	3Days
Pentane Insolubles by Filtration	ASTM D4955								X		X		100	mls	3Days
pH	ASTM D1287		X							X	X	X	50	mls	48Hrs
PQ Index	In-House						X		X	X	X	X	50	mls	48Hrs
Soot Crankcase Oils by FTIR	ASTM E2412/JOAP								X	X	X	X	50	mls	48Hrs
Sulphation Crankcase Oils by FTIR	ASTM E2412/JOAP								X	X	X	X	50	mls	48Hrs
Varnish Potential by Membrane Patch Colorimetry	ASTM D7843								X		X		150	mls	48Hrs
Viscosity @ 100C	ASTM D445/D7279								X	X	X	X	50	mls	48Hrs
Viscosity @ 40C	ASTM D445/D7279					X			X	X	X	X	50	mls	48Hrs
Viscosity Index	ASTM D2270								x			x	50	mls	48Hrs
Water by Karl Fischer Titration	ASTM D6304/ E203					X	X		X	X	X	X	50	mls	48Hrs
Water Screening by Crackle Test	PE121								X			X	50	mls	48Hrs



## Prague Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	MWF	Oil	Sample Size	TAT
Acid Number	ČSN ISO 6619					X			X	20 mls	1 Day
Aniline point	ČSN 65 6180					X			X	30 mls	1 Day
Antioxidants by FTIR	in-house								X	10 mls	1 Day
Appearance	in-house		X			X	X	X	X	10 mls	1 Day
Ash	ČSN EN ISO 62 Days45					X			X	20 mls	1 Day
Bacteria, Yeast, Fungi	Dip Slide							X		100 mls	3 Days
Base Number	ČSN ISO 3771								X	20 mls	1 Day
Boiling point (ERBP)	in-house	X								60 mls	1 Day
Cetane Index, calculated	ČSN EN ISO 42 Days64					X				150 mls	1 Day
CFPP	ČSN EN 116					X				80 mls	1 Day
Chlorides	ČSN 03852 Days6							X		50 mls	2 Days
Cloud Point	in-house					X				100 mls	1 Day
Conductivity	ČSN EN 2 Days7888		X					X		50 mls	2 Days
Conradson Carbon Residue	ČSN ISO 6615					X			X	20 mls	1 Day
Contamination of Engine Oils	DIN 51365								X	20 mls	1 Day
Contamination on Membrane	ČSN EN 12 Days662 Days					X		X	X	350 mls	1 Day
Copper Strip Test	ČSN EN ISO 2 Days160					X			X	50 mls	1 Day
Corrosion Properties	ČSN 656074								X	50 mls	1 Day
Demulsibility	ČSN ISO 6614								X	80 mls	1 Day
Density by Pycnometer	in-house					X			X	20 mls	1 Day
Distillation Characteristic	ČSN EN ISO 3405					X				100 mls	1 Day





## Prague Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	MWF	Oil	Sample Size	TAT (working days)
Dropping point	in-house						X			10 mls	1 Day
Emulsion-Oil Content (Acid Split)	ČSN 6562 Days39							X		100 mls	2 Days
Emulsion-Oil Content (Refractometer)	in-house							X		10 mls	1 Day
Emulsion-Oil Content (Titration)	in-house							X		50 mls	1 Day
FAME Content	ČSN EN 14078					X				20 mls	1 Day
Flash Point Cleveland	ČSN EN ISO 2 Days592 Days					X			X	150 mls	1 Day
Flash Point Pensky-Martens	ČSN EN ISO 2 Days719					X			X	150 mls	1 Day
Foaming of emulsion	in-house							X		50 mls	1 Day
Freezing point	in-house		X							100 mls	1 Day
FTIR	ASTM E 2 Days412 Days						X		X	10 mls	1 Day
Glycol %	in-house		X							10 mls	1 Day
Glycol Presence	in-house								X	10 mls	1 Day
Hardness	calculation		X					X		10 mls	2 Days
Herbert Test (corrosion)	in-house							X		10 mls	2 Days
ICP	ASTM D 5185								X	10 mls	1 Day
ICP-Elements in Water and Mixtures	ISO 11885		X					X		20 mls	2 Days
I-pH	ASTM D 7946								X	10 mls	1 Day
Membrane Patch Colorimetry	ASTM D7843								X	50 mls	4 Days
Nitrates	ČSN ISO 10304-1		X							20 mls	1 Day
Nitration Crankcase Oils by FTIR	E2 Days412 Days/JOAP									10 mls	1 Day



## Prague Individual Tests

Description	Method	Brake Fluid	Coolant	DEF	Filter	Fuel	Grease	MWF	Oil	Sample Size		TAT (working days)
Nitrites	ČSN ISO 10304-1		X							20	mls	1 Day
Oxidation Crankcase Oils by FTIR	E2 Days412 Days/JOAP									10	mls	1 Day
Particle Counting	ISO 4406					X			X	100	mls	1 Day
Penetration	in-house						X			600	mls	1 Day
pH of emulsion	ČSN 6562 Days99		X					X		100	mls	1 Day
Pour Point	ČSN ISO 3016		X			X			X	100	mls	1 Day
RULER	ASTM D6810, ASTM D6971						X		X	20	mls	1 Day
Saponification Number	in-house					X			X	60	mls	2 Days
Soot	DIN 51452 Days								X	10	mls	1 Day
Sulphated Ash	ČSN ISO 3987								X	20	mls	1 Day
Sulphates	ČSN 03852 Days6							X		50	mls	2 Days
Sulphation Crankcase Oils by FTIR	E2 Days412 Days/JOAP									10	mls	1 Day
Tramp Oil	in-house							X		100	mls	2 Days
Visc@100	ČSN EN ISO 3104					X			X	10	mls	1 Day
Visc@40	ČSN EN ISO 3104					X			X	10	mls	1 Day
Viscosity Index	ČSN ISO 2 Days909								X		mls	1 Day
Viscosity of Base Oil	in-house						X			10	mls	1 Day
Water by Crackle	in-house								X	10	mls	1 Day
Water KF Titration	ASTM D 6304								X	10	mls	1 Day





# GLOBAL LOCATIONS

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