Technical Circular

0199-99-01119/6 EN

This Circular supersedes: 0199-99-01119/5

Date: 02.09.2020
Author: Winkler, VE-TA1/Rill, MP-II

DEUTZ engines

- All DEUTZ engines

DEUTZ Oil Check

(Lubricating oil change after analysis)

Alterations

In comparison to TR 0199-99-01119/5, the following changes have been made:

- Updates
  - New partner laboratory
  - Editorial changes

General

Together with its service partners and a prominent partner laboratory, DEUTZ offers its customers the option of diagnosing the engine state via lubricating oil analysis. In the sales region America, the oil diagnostics system is sold under the brand DEUTZ Engine TRAC.

The DEUTZ Oil Check System provides early indications for increased wear to engine components and imminent device failures before these disrupt operations. After sending in the sample to the analysis laboratory, you will receive a comprehensive analysis report with specific recommended actions for preventive service measures. Regular lubricating oil analyses can prevent costly consequential damage and increase the availability of the machine.

The following irregularities an be diagnosed by the DEUTZ Oil Check:

- Atypically increased engine wear
- Too high dust penetration
- Coolant intrusion
- Too high soot infiltration
- Too high fuel content
- Increased wear due to acids from high sulphur content of the fuel

Serious consequences of the diagnosed problems can be avoided by taking prompt countermeasures; the customer therefore has important advantages (longer engine service life, higher equipment availability).

The costs for the DEUTZ Oil Check System will pay off for the customer over the life cycle of the engine due to savings on lubricating oil, working time and reductions in equipment failure times.

Lubricating oil change after analysis

Values for the lubricating oil change intervals are indicated in operating hours in the Technical Circular 0199-99-01217. The dependencies of the change intervals on the exact engine type, certain performance limits, the oil quality and the engine workload are considered here.

The oil change intervals specified in TR 0199-99-01217 can be extended by up to 100 % with regular use of the DEUTZ Oil Check System on the engine concerned if the total evaluation in the analysis report is green. When using lubricating oils which do not satisfy the DEUTZ quality classes DQC IV and DQC IV LA, the change intervals according to TR 0199-99-01217 must be observed. Furthermore, the used oil tolerances in TR 0199-99-01187 must be observed.

ATTENTION
1000 operating hours within one year is the maximum oil change interval for all DEUTZ compact engines. That means an extension is not possible for engines with a standard interval of 1000 operating hours.

For some engine series, DEUTZ offers the engine configuration of a 1000 operating hour lubricating oil change interval ex works. Here a lubricating oil and oil filter change of up to 2 years is permissible if a long-life oil filter is available.

Extended oil change intervals are only accepted for the warranty when using the DEUTZ Oil Check and when using corresponding DEUTZ original service parts (e.g. long-life oil filters) as well as the use of corresponding oil quality according to DQC IV and DQC IV LA. The customer must be able to seamlessly document in warranty cases that an extension of the oil change interval corresponds to the requirements of this Technical Circular.

DEUTZ recommends the use of original DEUTZ engine oils. Further information is available from your responsible DEUTZ partner.

The following table indicates typical times at which oil samples are to be taken:

Standard interval	Intermediate analysis		Final analysis
500	475-525	725-775	950-1000
250	200-250	350-400	450-500

T1: Oil sampling (data in operating hours since the last oil change)

The right-hand column of this table is omitted if the intended extension of the oil change interval is not 100 % but only 50 %.
No extension may be applied for the first oil change interval. The table above must be used from the second oil change interval.

If there is no green evaluated oil diagnosis, the desired extended interval cannot be achieved and an oil change must be made. If this case also occurs at the next change interval, it can be assumed that the engine type concerned in combination with the prevailing operating conditions already stresses the oil to such an extent that longer oil change intervals are not possible.

Not all engines need to be analysed in case of larger equipment fleets with engines of identical construction and emissions level, which are operated under comparable conditions and application profiles. In this case, the regular analysis of 10 % of the engines according to the above table is sufficient, whereby the minimum number of 5 engines must not be fallen below.

From the third oil change interval, only the analysis after 950-1000 operating hours (or shorter corresponding to the standard interval) needs to be documented.

DEUTZ recommends that its customers use the DEUTZ Oil Check for the whole service life of the engine. In particular, for older engines or during use under difficult conditions, an early damage detection is advantageous.

– TR 0199-99-01187
Used oil limit values

Irregularities of individual diagnosis parameters may also occur during the standard oil change interval. The use of the standard intervals is ensured by the stricter test bench continuous runs during the DEUTZ release procedures. If the oil diagnosis system recommends a premature oil change, however, (e.g. penetration by cooling water or dust damage), the recommendation must be followed and the cause of the damage searched for.

DEUTZ Oil Check procedure

1 Order the DEUTZ Oil Check Kit with parts number 01091254 via your DEUTZ dealer
2 Take a representative lubricating oil sample. 3
3 Close the sample vessel properly and attach the enclosed QR code to it.
4 Fill out the sample accompanying note fully (also possible online). 3
5 Send the lubricating oil sample. 4
6 The analysis report is sent to the email address indicated on the sample accompanying form. 5

Oil sampling

The customer can take the lubricating oil sample himself or together with the responsible DEUTZ partner, e.g. during maintenance. Potential errors may occur during the sampling, on account of which the analysis results and diagnoses can be considerably falsified. It must always be ensured that a representative sample is taken. In order to avoid sampling errors, the customer must observe the following rules:

- The pertinent safety precautions must be taken when sampling.
- The lubricating oil must be at operating temperature when taking the sample.
- The sample should be taken when the engine is idle.
  – In order to get a representative lubricating oil sample, the sampling must be carried out immediately after the engine is turned off.
- The sample is taken, for example, with a syringe or sampling pump.

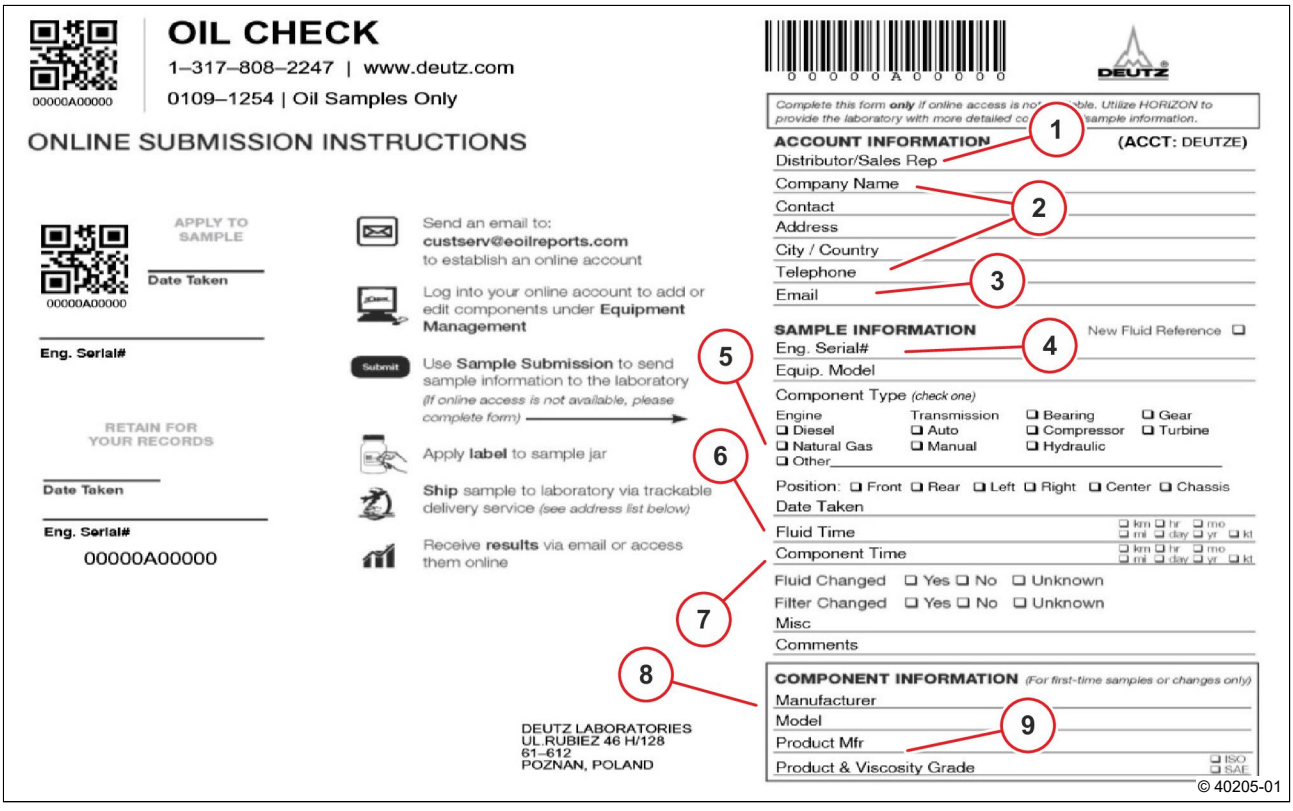
ATTENTION
Ensure utmost cleanliness.

- In the course of changing the lubricating oil, the lubricating oil sample can be taken from the lubricating oil drain plug (first a sufficient amount of the warm lubricating oil must run out and then the sample must be taken from the midstream).
- Alternatively, the DEUTZ operating media kit can be used to extract the lubricating oil sample (see TR 0199-49-01223).

  The sample should be taken through the dipstick opening.
  – The probe is inserted into the dipstick opening so that its lower end is at least 10 mm below the minimum filling level. The minimum filling level corresponds to the "MIN" dipstick mark.
- The lubricating oil sample is filled directly up to the “Fill Line” mark. Only clean and dry original oil diagnostic sample bottles may be used here.
- Further information can be found in DIN 51574 (Testing of lubricants – Sampling of lubricating oils from combustion engines) or EN ISO 3170 (Liquid mineral oil products – Manual sampling).

Sample accompanying note

The more information you provide, the more comparison values can be utilised for analysis in the laboratory.



A1: Sample accompanying note

Please enter the following information:

(1) Your DEUTZ dealer
(2) Your company details
(3) Email address of the person who is to receive the analysis report
(4) Engine number
Please indicate the engine manufacturer below this
(5) Fuel used (diesel, natural gas (CNG), liquefied petroleum gas (LPG), biogas, other)
(6) Running time of the lubricating oil after the last lubricating oil change
(7) Total running time of your engine
(8) Device manufacturer and model type of your machine
(9) Lubricating oil manufacturer, lubricating oil type and viscosity class

Shipment of the lubricating oil sample

Send the lubricating oil sample in the envelopment provided to:

DEUTZ Laboratories
UL.Rubiez 46 H/128
61-612
Poznan, Poland

or

Dörrenhaus GmbH
z. Hdn. Frau Kröll
Auf der Kaiserbitz 3
D-51147 Köln
Deutschland / Germany

The fees for shipping shall be borne by the sender. Please note that only appropriately stamped envelopes will be received by the addressee.

The lubricating oil sample can also be sent to the responsible DEUTZ service partner, who will then initiate the forwarding.

The customer also significantly influences the total time until the diagnostic results are available via the type and hence also speed of the shipping.

Sending the analysis report

The results are sent to the email address indicated on the sample accompanying form. The indicated email address must be verified once for reasons of data protection law.

All your analysis reports are archived in encrypted form at https://www.eoilreports.com and available to you online.

Explanation of the analysis report

The diagnosis comprises the following sections:

- Total result (green, orange, red)
- Administrative data, colour coding of the diagnosis
- Customer data on device, oil sample
- Wearing elements and evaluation
- Foreign substances and evaluation
- Characteristic values of the oil and evaluation
- Information that the customer has communicated to comments by the oil diagnostics expert

Each analysis value is evaluated by a following coloured box, so that the customer can record the result at a glance:

- **Green**

  No irregularity.

  Value in the normal spread of all engines of this type
- **Orange**

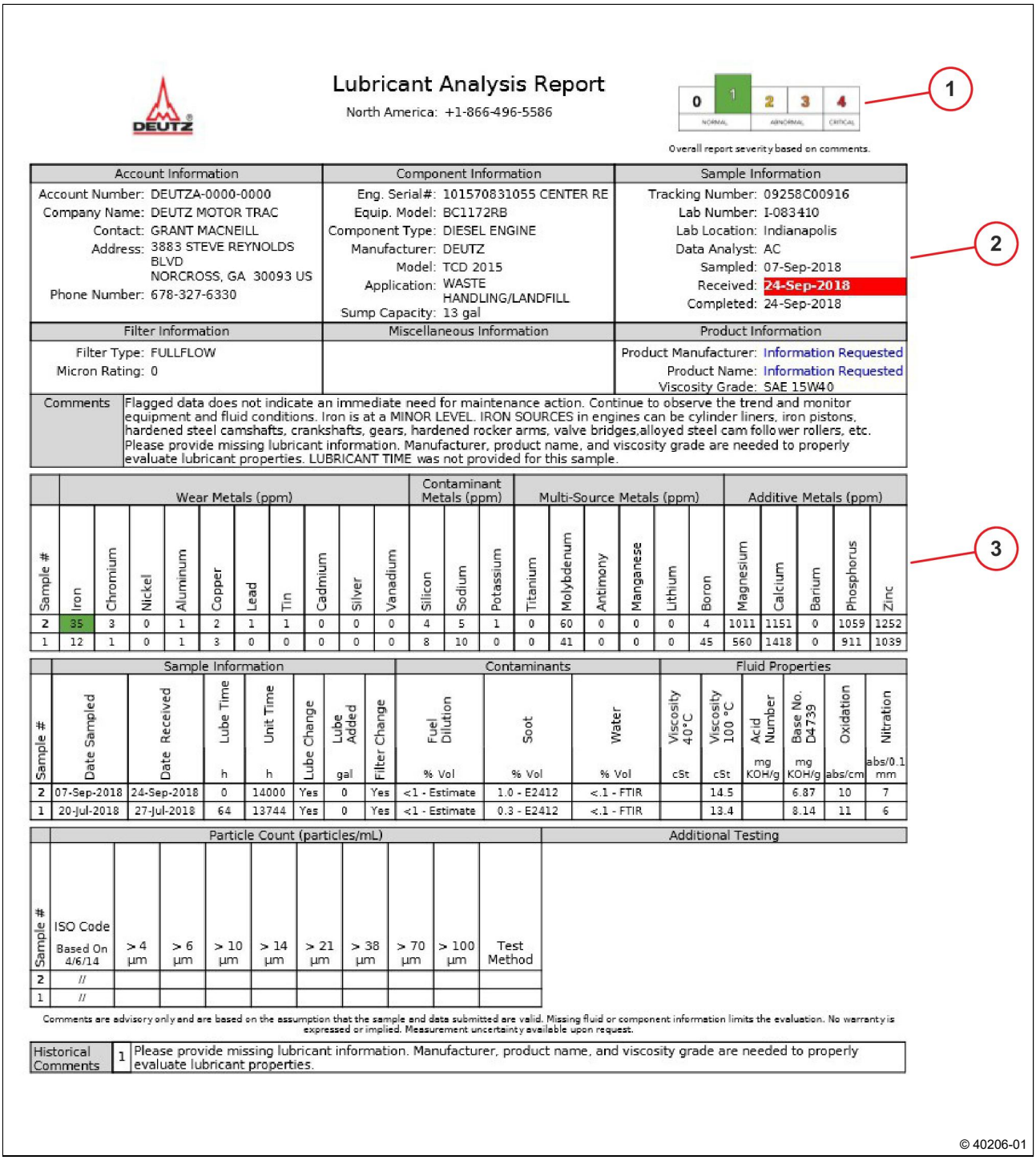
  Minor irregularity, which must be observed further.

  There is still no need for action.
- **Red**

  Major irregularity.

  The measures suggested in the analysis report must be observed, if necessary consultation with the DEUTZ partner.

This colour coding is primarily oriented to whether the ratios of the various measured wear and contamination parameters to one another correspond to those from the collective of already measured engines of the same type or exhibit clear or even major discrepancies.



Lubricant Analysis Report

North America: +1-866-496-5586

0 | 1 | 2 | 3 | 4 (NORMAL / ABNORMAL / CRITICAL) — 1

Overall report severity based on comments.

Account Information		Component Information		Sample Information	
Account Number:	DEUTZA-0000-0000	Eng. Serial#:	101570831055 CENTER RE	Tracking Number:	09258C00916
Company Name:	DEUTZ MOTOR TRAC	Equip. Model:	BC1172RB	Lab Number:	I-083410
Contact:	GRANT MACNEILL	Component Type:	DIESEL ENGINE	Lab Location:	Indianapolis
Address:	3883 STEVE REYNOLDS BLVD NORCROSS, GA 30093 US	Manufacturer:	DEUTZ	Data Analyst:	AC
		Model:	TCD 2015	Sampled:	07-Sep-2018
		Application:	WASTE HANDLING/LANDFILL	Received:	24-Sep-2018
Phone Number:	678-327-6330	Sump Capacity:	13 gal	Completed:	24-Sep-2018

2

Filter Information		Miscellaneous Information	Product Information	
Filter Type:	FULLFLOW		Product Manufacturer:	Information Requested
Micron Rating:	0		Product Name:	Information Requested
			Viscosity Grade:	SAE 15W40

Comments	Flagged data does not indicate an immediate need for maintenance action. Continue to observe the trend and monitor equipment and fluid conditions. Iron is at a MINOR LEVEL. IRON SOURCES in engines can be cylinder liners, iron pistons, hardened steel camshafts, crankshafts, gears, hardened rocker arms, valve bridges,alloyed steel cam follower rollers, etc. Please provide missing lubricant information. Manufacturer, product name, and viscosity grade are needed to properly evaluate lubricant properties. LUBRICANT TIME was not provided for this sample.

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)				
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
2	35	3	0	1	2	1	1	0	0	0	4	5	1	0	60	0	0	0	4	1011	1151	0	1059	1252
1	12	1	0	1	3	0	0	0	0	0	8	10	0	0	41	0	0	0	45	560	1418	0	911	1039

3

	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time h	Unit Time h	Lube Change	Lube Added gal	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base No. D4739 mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
2	07-Sep-2018	24-Sep-2018	0	14000	Yes	0	Yes	<1 - Estimate	1.0 - E2412	<.1 - FTIR		14.5		6.87	10	7
1	20-Jul-2018	27-Jul-2018	64	13744	Yes	0	Yes	<1 - Estimate	0.3 - E2412	<.1 - FTIR		13.4		8.14	11	6

	Particle Count (particles/mL)										Additional Testing
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	
2	//										
1	//										

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied. Measurement uncertainty available upon request.

Historical Comments	1	Please provide missing lubricant information. Manufacturer, product name, and viscosity grade are needed to properly evaluate lubricant properties.

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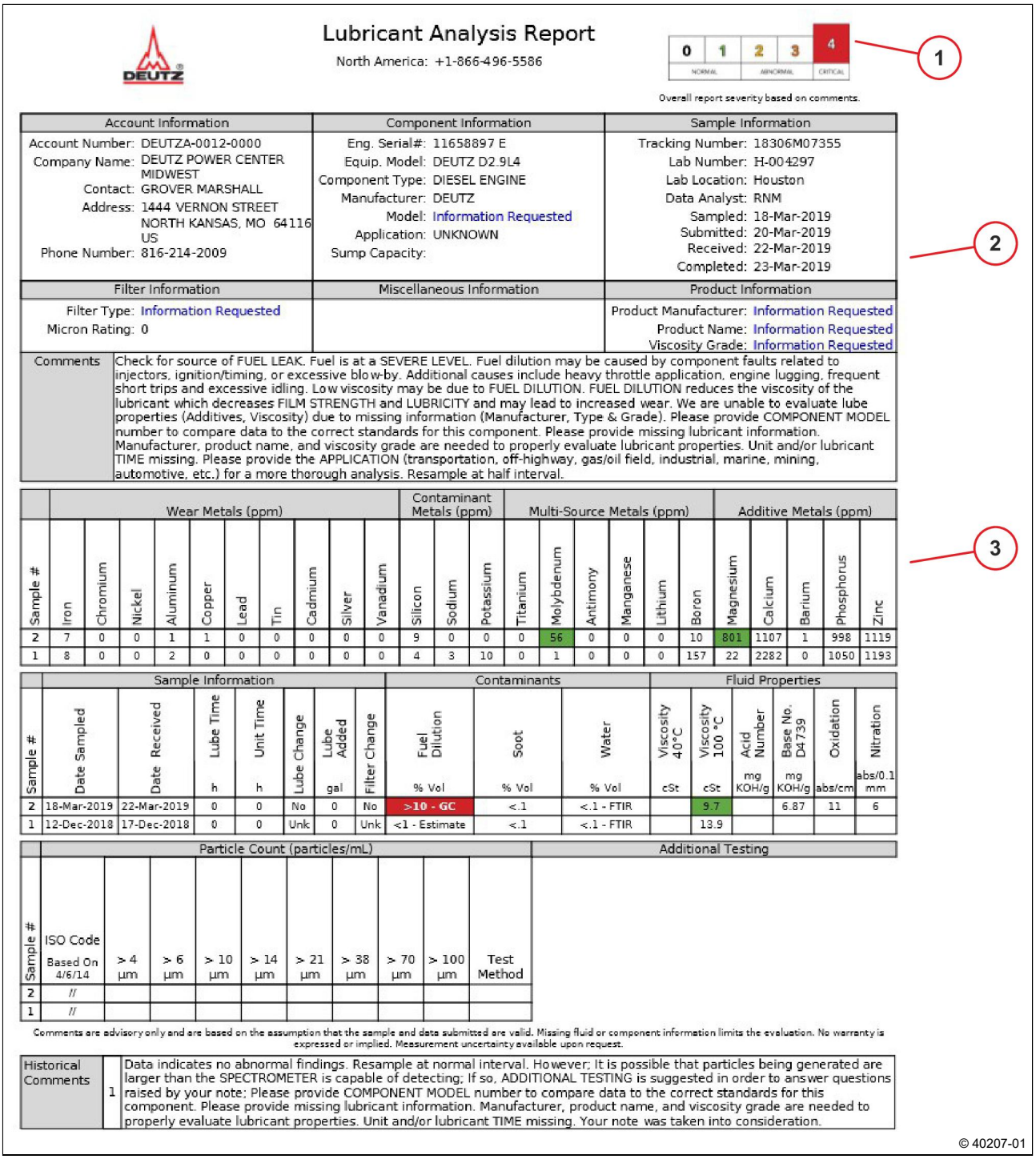
A2: Inconspicuous lubricating oil analysis (example)



Lubricant Analysis Report

North America: +1-866-496-5586

0 1 2 3 4 (NORMAL / ABNORMAL / CRITICAL) — 1

Overall report severity based on comments.

Account Information		Component Information		Sample Information	
Account Number:	DEUTZA-0012-0000	Eng. Serial#:	11658897 E	Tracking Number:	18306M07355
Company Name:	DEUTZ POWER CENTER MIDWEST	Equip. Model:	DEUTZ D2.9L4	Lab Number:	H-004297
Contact:	GROVER MARSHALL	Component Type:	DIESEL ENGINE	Lab Location:	Houston
Address:	1444 VERNON STREET NORTH KANSAS, MO 64116 US	Manufacturer:	DEUTZ	Data Analyst:	RNM
Phone Number:	816-214-2009	Model:	Information Requested	Sampled:	18-Mar-2019
		Application:	UNKNOWN	Submitted:	20-Mar-2019
		Sump Capacity:		Received:	22-Mar-2019
				Completed:	23-Mar-2019

Filter Information		Miscellaneous Information	Product Information	
Filter Type:	Information Requested		Product Manufacturer:	Information Requested
Micron Rating:	0		Product Name:	Information Requested
			Viscosity Grade:	Information Requested

2

Comments	Check for source of FUEL LEAK. Fuel is at a SEVERE LEVEL. Fuel dilution may be caused by component faults related to injectors, ignition/timing, or excessive blow-by. Additional causes include heavy throttle application, engine lugging, frequent short trips and excessive idling. Low viscosity may be due to FUEL DILUTION. FUEL DILUTION reduces the viscosity of the lubricant which decreases FILM STRENGTH and LUBRICITY and may lead to increased wear. We are unable to evaluate lube properties (Additives, Viscosity) due to missing information (Manufacturer, Type & Grade). Please provide COMPONENT MODEL number to compare data to the correct standards for this component. Please provide missing lubricant information. Manufacturer, product name, and viscosity grade are needed to properly evaluate lubricant properties. Unit and/or lubricant TIME missing. Please provide the APPLICATION (transportation, off-highway, gas/oil field, industrial, marine, mining, automotive, etc.) for a more thorough analysis. Resample at half interval.

3

	Wear Metals (ppm)										Contaminant Metals (ppm)			Multi-Source Metals (ppm)						Additive Metals (ppm)					
Sample #	Iron	Chromium	Nickel	Aluminum	Copper	Lead	Tin	Cadmium	Silver	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Antimony	Manganese	Lithium	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
2	7	0	0	1	1	0	0	0	0	0	9	0	0	0	56	0	0	0	10	801	1107	1	998	1115
1	8	0	0	2	0	0	0	0	0	0	4	3	10	0	1	0	0	0	157	22	2282	0	1050	1193

	Sample Information							Contaminants			Fluid Properties					
Sample #	Date Sampled	Date Received	Lube Time h	Unit Time h	Lube Change	Lube Added gal	Filter Change	Fuel Dilution % Vol	Soot % Vol	Water % Vol	Viscosity 40°C cSt	Viscosity 100 °C cSt	Acid Number mg KOH/g	Base No. D4739 mg KOH/g	Oxidation abs/cm	Nitration abs/0.1 mm
2	18-Mar-2019	22-Mar-2019	0	0	No	0	No	>10 - GC	<.1	<.1 - FTIR		9.7		6.87	11	6
1	12-Dec-2018	17-Dec-2018	0	0	Unk	0	Unk	<1 - Estimate	<.1	<.1 - FTIR		13.9				

	Particle Count (particles/mL)										Additional Testing
Sample #	ISO Code Based On 4/6/14	> 4 µm	> 6 µm	> 10 µm	> 14 µm	> 21 µm	> 38 µm	> 70 µm	> 100 µm	Test Method	
2	//										
1	//										

Comments are advisory only and are based on the assumption that the sample and data submitted are valid. Missing fluid or component information limits the evaluation. No warranty is expressed or implied. Measurement uncertainty available upon request.

Historical Comments	1	Data indicates no abnormal findings. Resample at normal interval. However; It is possible that particles being generated are larger than the SPECTROMETER is capable of detecting; If so, ADDITIONAL TESTING is suggested in order to answer questions raised by your note; Please provide COMPONENT MODEL number to compare data to the correct standards for this component. Please provide missing lubricant information. Manufacturer, product name, and viscosity grade are needed to properly evaluate lubricant properties. Unit and/or lubricant TIME missing. Your note was taken into consideration.

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A3: Critical lubricating oil analysis (example)

Total result of the analysis (1)

All results are summarised in one of five degrees of severity in the top right corner of the report. This is meant to provide an overview of the overall condition of the oil and describe, together with the comments by the analyst, the need for an intervention:

- **0 normal (white)**

  All values are inconspicuous. No intervention is necessary.
- **1 normal (green)**

At least one value shows irregularities, but is to be recorded as harmless.

- **2 unusual (yellow)**

  Initial trends are identifiable. Further information can be found in the comments.
- **3 unusual (orange)**

  Simple maintenance measures or further diagnostics are necessary.
- **4 critical (red)**

  Damage to or even failure of the unit is imminent unless an intervention is undertaken.

ATTENTION
Extended oil change intervals are only permissible after a normal diagnosis (0 or 1).

Conspicuous individual values are highlighted in colour corresponding to the overall result: from white to green for harmless values to red for critical values.

An unusual diagnosis does not always mean that an intervention is necessary. But it does require special attention. Before you become active, you yourself should answer some questions if these have not been covered in more detail in the comments field of the analysis report:

- Is the engine in the running-in phase (first oil change interval)?
- Was there a temporary overloading of the engine ?
- Were the oil change intervals extended ?
- Have there been any changes in the engine maintenance behaviour ?

Consult your DEUTZ partner before deciding to open the engine.

Information field (2)

The top field of the report shows all important information on the sampled unit, as well as the oil that was transferred together with the sample and hence incorporated in the evaluation of the analysis. The following information should be submitted for a better evaluation of the analysis results.

Furthermore, data for processing the sample, such as its identification number, which is used to identify the sample in case of queries, as well as the arrival and processing time of the sample are specified here.

The comment field with a written explanation of the analysis results can be found below the general information. Initial measures for action are also indicated here, if required.

Individual value (3)

The general information and comments are followed by the individual measuring results, which are divided into several categories. If several samples are provided for the same unit, the values of all analyses are merged in order to provide an overview of their development. The sample number is indicated at the left of the field respectively. Conspicuous values are colour coded as described above.

This also includes further information on individual samples, such as the lubricating oil time and unit time, which indicate the times the oil or unit was in operation at the time the sample was taken. Indication of these values is indispensable for the evaluation of the results and for extending the oil change interval.

Explanation of essential lubricating oil properties

Elemental analysis

The elemental analysis serves to determine the metal or element concentrations in the examined lubricating oil sample, expressed in parts per million (ppm = mg/kg). The elements are classified according to their origin.

Wear metals

The wear metals can originate from all moving parts which are lubricated with the oil. The sub-units of the same oil circuit are also included (compressor, injection pump).
Engines in the running-in phase may exhibit increased metal concentrations. This is not unusual and does not influence the life expectancy of the engine.

Combinations of wearing metal can provide information on components of the unit undergoing mechanical wear, e.g. abrasion. It is indispensable for the elemental analysis to know which components comprise which metals.

The origin and concentration of the wear metals is typical for an engine series and engine type. The following list therefore provides only an outline of the most frequent origin of some metals.

Iron

Cylinder liners, valve train, cylinder block, oil pump, etc.

Lead

Connecting rod bearings, main bearings (new engines usually no longer any lead components)

Copper

Connecting rod bearings, main bearings (together with lead), liners, axial bearings, turbo bearings, oil coolers, etc.

Tin

Connecting rod bearings, main bearings, liners, etc.

Chrome

piston ring

Aluminium

Pistons, connecting rod bearings (in some engine series), etc.

Nickel

Piston pins, camshaft, tappets, seat rings

Impurity metals

This category comprises elements that do not originate directly from the unit but from its working environment instead. Excess amounts of dust and dirt (e.g. sand dust) can lead to increased wear due to abrasion.

The application range of the unit can lead to various extents and should be incorporated in the choice of oil change interval.

Silicon

The foreign silicon (silicon not originating from the engine) is determined by subtracting the silicon from the wear of certain piston alloys from the Si value whereby appropriate correlations with other wear metals are used.

Possible causes of the silicon contamination:

- Silicon with increased wear
  - No contamination due to coolant

    Presence of dust in the oil, usually caused by leaks in the air aspiration system You should look there first.

Oil diagnoses from the first oil change interval may exhibit both increased silicon values (original dirt from the manufacturing process) and increased wear. This has no great effect on the life of the engine. Customers who give high priority to maximum life endurance of their engines are recommended to use a shorter first oil change interval even if this is no longer prescribed by DEUTZ for some time.

– With contamination by coolant (water or antifreeze)

  The silicon comes from the additives of the antifreeze. The cause of the penetration by coolant must be found.

- Silicon without increased wear

  Were silicone pastes used for sealing the engine during an engine repair?

  Have you added an additive to the lubricating oil?

Sodium or potassium

An increased sodium or potassium content generally indicates a coolant intrusion. Sodium is also found as a contaminant in fresh oil in small quantities (<10 mg/kg).

Further elements and additives

These elements can occur in the analysis report for various reasons. Most are added to the lubricating oil as metal organic additives, in order to optimise the properties of the lubricating oil. The additive element composition is characteristic for each oil and conclusions can be drawn concerning the oil actually used.

Contaminants

Soot, fuel and water enter the lubricating oil during operation and contaminate it.

Fuel

Infiltration by fuel into the lubricating oil can lead to a significant reduction in the viscosity and the lubricating behaviour of the lubricating oil. Because of ageing processes (polymerisation), especially in biofuels, the effect can be reversed again by a significant increase in the viscosity.

In engines which run under very specific operating conditions (low temperatures, extremely low workloads), a small amount of fuel in the lubricating oil may be normal.

Soot (important for diesel engines)

The soot content allows a statement to be made about the remaining dirt capacity of the used lubricating oil. The method is not suitable for determining other contaminations such as dust, metal chippings and calcium sulphate. Soot is always produced when burning diesel fuel.

An increased soot concentration can lead to a rise in viscosity and increased wear.

Too high a soot concentration may be a sign of

- poor function of the injection system (nozzles, injection pump, valves...),
- lack of air (blocked air filter),
- insufficient compression,
- overloading of the engine,
- poor function of the turbocharger,
- increased exhaust gas backpressure,

.

Water

When a leak occurs in the engine, coolant gets into the oil circuit; the water evaporates on coming into contact with the hot oil. There may then be no more water in the oil at the time it is sampled. In order to detect a possible leakage with certainty, the oil diagnosis evaluates the presence of antifreeze additives.

Contamination by water may occur, among other things, due to:

- penetration by coolant due to internal leakage
  for example
  - Cylinder head seal
  - O-rings
  - Oil cooler
  - Compressor
- Factors independent of the engine
  for example
  - Engine washing
  - Condensation due to sampling when lubricating oil is cold
  - contamination during sampling

Liquid properties

This category covers physical and chemical properties of the lubricating oil, which change over time due to ageing of the lubricating oil.

Kinematic viscosity

The kinematic viscosity is indicated in mm^2/s or cSt (Centistoke), at a definite temperature, usually at 100°C for used oils. Too high a viscosity can lead to engine starting difficulties and a higher fuel consumption, too low a viscosity can endanger the lubricating effect and result in a higher fuel consumption.

Possible causes:

- Too high viscosity
  - High soot infiltration
  - Lubricating oil ageing
  - Presence of antifreeze
  - High thermal load on the engine (increased evaporation loss)
- Too low viscosity
  - Presence of fuel
  - Degradation of additives

ATTENTION
If a strong deviation of the viscosity (too high or too low) is indicated, it is absolutely essential to change the oil (see limit values chapter Lubricating oil change after analysis).

Generally the viscosity should not be more than one SAE class higher or lower.

Please always specify the oil designation and viscosity class on the reply card to allow a precise evaluation of the viscosity.

BN (Base Number)

previously also TBN (Total Base Number)

The basic components contained in the lubricating oil serve to neutralise acids occurring in the combustion (sulphurous acids and sulphuric acid which are formed from the fuel sulphur but also nitrous acid which forms from nitric oxides and finally carbon acids caused by lubricating oil oxidation). The alkaline reserve of an engine oil is expressed by the base number (TBN = Total Base Number). This is gradually degraded during engine operation due to reactions with acids. Generally, the TBN should not drop by more than 50 % otherwise the damaging effects of the acid become too strong (corrosion with subsequent wear). The BN/TBN must always be considered in conjunction with the AN/TAN.

AN (Acid Number)

also TAN (Total Acid Number)

The acid number (also TAN = Total Acid Number) is a measure of the formation of acid components, fatty acids etc. especially as a result of increased sulphuric acid infiltration (due to sulphur from the fuel). The acid number rises with increasing operation and at the latest, if the values of AN/TAN and BN/TBN cross, an oil change must be made.

Oxidation/Nitration (important for LPG and CNG engines)

The oxidation provides an indication for the ageing of the lubricating oil e.g. by the formation of aldehydes, ketones, esters, lactones, organic acids or their salts. Nitration, in other words the formation of nitrates by blow-by gases, also causes the oil to age with similar effects as due to oxidation, ultimately the formation of acids, resulting in corrosion on the metal surfaces.

i-pH

The base number (TBN) does not record all information during the operation of gas engines with special fuel gases such as biogas. The i-pH value is therefore an additional indicator for evaluating the neutralisation capacity of acid products in oils.

Contact

If you have questions about any of the topics mentioned here, please contact us using the details given below:

e-mail: lubricants.de@deutz.com

or
DEUTZ Ticket System (DTS): https://www.dts-deutz.com (for registered users only)

or
Email: service-kompaktmotoren.de@deutz.com

For the America region:
e-mail: service.usa@deutz.com

For the Asia region:
e-mail: dapservice@deutz.com

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