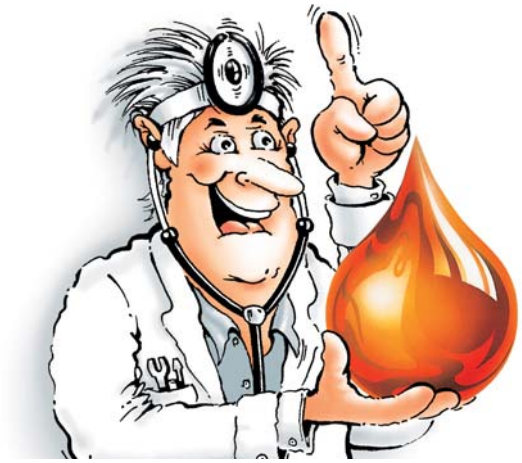
SUMMER 2011

OEL CHECK®

Circulation: 9,000, 3 editions per year since 1998

ÖlChecker

INSIDER INFO – PARTNER FORUM – TECHNOLOGY FOCUS



CONTENTS

ESS – natural gas and biogas thermal power stations generate electricity and heat

ESS thermal plants impress through their reliability and efficiency.

The thermal power plants of ESS Energie Systeme & Service GmbH are tailor-made for applications in the medium capacity range, in municipalities, businesses and in industry, as well as in agricultural enterprises. Since 2008, ESS has been a member of the Viessmann Group, which operates the power plants manufactured by ESS under the „Vitobloc“ brand.

The idea of decentralised, heat-led thermal power plants is at the forefront of ESS installations. In the compact units, on the one hand, electricity is generated for internal needs and, on the other, the incidental exhaust heat of the engine is used largely without loss for heating and is not discharged into the environment. Electricity which is not required is fed into the public network.

Thermal plants are extremely efficient. While conventional power plants achieve overall efficiency of barely 40%, for thermal plants, this figure is over 90%. Through the deployment of a thermal plant, primary energy consumption is reduced by well over 30% and CO_2 emissions by up to one third. A thermal plant can be operated with biogas or with biomethane (raw biogas which is processed and fed into the natural gas network) in a particularly environmentally friendly way, since it works on a CO_2-neutral basis. Through it, agricultural enterprises can become independent of fossil fuels such as natural gas, since the biogas can be generated from raw materials which grow in the region. The „Vitobloc“ thermal plants produced by ESS are available with electricity generating capacities of 20 to 401 kW and with heat generating capacities of 39 to 549 kW.

At AGRITECHNICA in Autumn 2011, ESS will offer a biogas-fuelled thermal plant in the 75 kW capacity class, which is extremely attractive for many farmers. The new installation is specially designed for deployment close to farms and for enhanced fermentation of liquid manure. The Renewable Energies Law (EEG) 2012 codifies the promotion of small biogas installations fuelled by liquid manure, with capacities of up to 75 kW. The remuneration for feeding in electricity through this installation will rise in 2012 to an attractive 25 cents/kWh.

ESS delivers each individual installation in turnkey condition. The customer can also assemble a tailor-made service package, ranging from commissioning to training to complete operation. ESS

Check-up

Taste the Waste – on 8 September, the widely anticipated documentary began showing in cinemas. What could already be read in the book „Die Essensvernichter“ [The Food Destroyers], is now available in moving pictures. It is not a pretty sight when mountains of still good food are destroyed, because its appearance does not correspond to some questionable regulations or its recommended sell-by date, which is incorrectly interpreted as the final expiry date, is approaching. According to estimates, around 50% of food in industrialised countries goes into the dustbin. in Germany alone, this is 20 million tonnes per year!

Taste the Waste seeks to deliver a wake-up call and hopes to encourage as many people as possible to change their way of thinking. It is high time that we handle all resources in a significantly more responsible way. Throwing away food horrifies all of us, but we act in an entirely similar way with other things. With regard to the handling of lubricants, Dr. Markus Söder, Bavarian Minister of State for the Environment and Health, went to the heart of the matter in his greeting to our OilDoc Conference and Exhibition 2011: „If oil were only changed when essential, then at least 30% of the 630,000 tons or so used in Germany could be saved, with this equivalent to 200,000 tons or 200 million litres.“

It is up to us to change the world. Before we dispose of something, we must act as most of our customers already do with regard to their lubricants. They only change the oil deployed in their machines when an OELCHECK oil analysis shows that this is absolutely necessary. In this way, they are a model for all „lubricant destroyers“ who will perhaps at some point be required by law to act responsibly. If this means that oil from a machine, gear unit or installation which contains more than e.g. 500 litres of oil shall only be changed when the need for an oil change has been proven through an analysis! But nobody likes such a degree of government interference. So let‘s make sure that it doesn‘t come to this. An analysis costs less than new oil and shows what is still usable and for how long!

Yours, Barbara Weissmann

staff are always happy to help when it comes to commissioning, maintenance, service, repair work or overhauling of engines. Various maintenance contracts provide a balanced price to performance relationship and risk-free all-round service. All central power plants can be monitored and controlled remotely by the ESS service. Within Germany, ESS maintains a factory service with some 30 support points. Outside it, the service is carried out by reliable partner firms.

Vitobloc 200 mini-thermal plant with utilisation of calorific value

ESS thermal plants deploy gas engines of leading manufacturers, such as MAN or Toyota. The engines should be operated exclusively with a gas engine oil with special additives, approved by the OEM. According to the type of engine and gas, the overall or volume ranges from 35 to 220 litres. For engines operated with natural gas, oil is predominantly changed at fixed intervals. In biogas installations and in turbo systems with heavy loads, ESS recommends changing the engine oil as a function of its condition. The optimal time is defined by OELCHECK with analyses of lubricants.

Gas engines represent a genuine challenge for their engine oils. Ultimately, the facilities operate on a continuous basis, at high process temperatures and frequently under full load. For operation with biogases, individual and highly variable qualities of gas are added. The composition of biogas depends on the respective fermented organic material. In addition, it is hardly ever pure. In addition to 50-75% methane, biogas contains nitrogen, carbon dioxide, water and oxygen. Very frequently, mainly for the fermentation of liquid manure, hydrogen sulphide is also present and can form aggressive hydrogen sulphide (H_2S). This can generate corrosive wear and tear on pistons, cylinders and in the valve train. A further risk for gas engines and a major challenge for engine oil is posed by sulphuric acid, generated in the combustion process for the gas. The gas engine oil must have a high alkaline performance reserve in order to neutralize these acid components, as well as to neutralise the hydrogen sulphide. The acid-buffering additives must be ash-poor and cannot be added in excessively high doses, since otherwise, the performance of the catalyst will be impaired. If it does not succeed in striking a balance between few additives and good neutralisation capacity, the oil can no longer lubricate the engine reliably and protect against wear and tear, corrosion and deposits.

ESS deploys regular lubricant analyses by OELCHECK to monitor the gas engine oil and to determine the condition-dependent oil changing interval. Analysis set 4 was specially devised for gas engine oils, deployed in engines powered by biogas, landfill gas or sewage gas. In this way, fractions of wear metals, any impurities and additives, as well as the general condition of the oil are determined. On combustion of the gases, acidic products accrue, which must be neutralised by the engine oil. If the oil is incapable of this task due to its performance or an urgently due oil change is not carried out, the extremely aggressive acids attack the components of the engine. This predetermines corresponding damage and even the complete failure of the engine. In order to exclude such risks, the degree of acidity of the oil is monitored. For this purpose, the values of the BN, AN, i-pH and if necessary, the SAN as well, are displayed in the laboratory report for biogas engine oils, under the heading „supplementary tests“. The BN (base number) states the alkaline reserve of a lubricant for the neutralisation of acids. By comparison with the new oil values, the AN (acid number) permits conclusions to be drawn regarding the oxidation of the oil and the breakdown of oil additives. In gas engines operated with variable gas qualities, the i-pH value (initial or original pH value) provides supplementary information on the degree of acidification of the gas engine oil. The SAN (Strong Acid Number) is only determined if, as is made clear by an i-pH of below 4, exceptionally aggressive acids are present in the oil.

See our also Technology Focus

Thanks to the regular deployment of OELCHECK lubricant analyses, the gas engine oils in thermal plants fuelled by biogas are changed by ESS depending on their condition. The operator thereby benefits from reduced maintenance costs and the maximum operating safety of their installation.

New service! OELCHECK evaluates analytical data from external laboratories for you!

Have you received results from another laboratory without comments? Would you simply like a second independent opinion on an existing report?
Now OELCHECK also assesses the analytical values of other laboratories.

You simply and quickly input the data on your sample via our data portal at www.laborberichte.com. If you do not yet have access, we will set up and send you your personal password. We will soon after complete an activation, which is necessary in addition to your existing account.
After activation, you can input data immediately. Start with a click on the button „Insert sample". This is immediately followed by „Generate laboratory number". Following this, please enter all of your sample data which are important for a diagnosis of the values and which you will then find in our laboratory report. Enter the results of the external laboratories in the provided fields under „Sample test results".

Please note values for testing methods which you cannot find in our comprehensive list in the field „Observations".
Any photos or IR diagrams which are significant for the evaluation can easily be added. Before you send us the data, please check it again and print it out.
Our new service is already available. For a diagnosis of analytical values which were not determined by OELCHECK, we charge EUR 50 plus VAT.
Please contact us if you wish to make use of our service. We will be happy to advise you on our direct line 08034/9047-215.

DIN EN ISO 9001 and 14001 – Re-audit passed with flying colours!

Our high quality standards extend to every area of the company. OELCHECK GmbH's proven quality management system has thus had DIN EN ISO 9001 certification since 1995. In 2001, it then secured DIN EN ISO 14001 certification for its environmental management system.

Since 2009, the company and a number of testing methods have had DIN EN ISO/IEC 17025:2005 accreditation.

Compliance with its own guidelines on quality and organisation of company processes, as well as the implementation of provisions of national and international law are an absolute must for us. In each case, a thorough inspection of both quality management and the environmental management system is carried out at three-year intervals. In July 2011, both standards were once again submitted to a re-audit by ALL-CERT Gesellschaft für Zertifizierungen mbH. The auditor, Mr. Ernst Christoph, focused intensively on every department. In the audit, almost every process and the associated documentation was examined, with a great deal subjected to critical scrutiny. The reaudit took a lot of effort from us. But it was worth it. Once again, we passed with flying colours and received two new certificates, valid until summer 2014.

In addition, we received many valuable suggestions from Mr. Christoph, who is a member of the team of experts which awards the Bavarian quality prize, to consider a number of processes from another perspective. We would like to thank him again for this!

We are of course also very grateful to our staff. After the final discussion with Mr. Christoph, we met for an agreeable barbecue evening on the big terrace of the new OilDoc house. Since each reaudit requires not only a great deal of work but also causes us some nerves and anxiety, we genuinely earned this fine evening!

Presses and more – Dieffenbacher wooden board and forming technology

CPS endless presses for the manufacturing of chipboard

The Dieffenbacher group of companies is one of the leading international manufacturers of press systems and complete production systems for the wooden board industry. Also in the field of forming presses, e.g. for glass fibre reinforced plastics for the automobile and supply industry, the hydraulic presses, with their short cycle times, are at the forefront.

The family business founded in 1873 has more than 1,600 employees worldwide. In accordance with the slogan „presses and more", Dieffenbacher delivers everything from a single source. Over 70% of production is exported. With a worldwide distribution and service network, Dieffenbacher is always accessible to its customers.

For the wood processing industry, complete production lines are delivered for the manufacture of chipboard, MDF, OSB and LVL boards, as well as for wood fibre insulation boards and door leaves. In manufacturing, the basic material, for chipboard, e.g. wood in the form of chips, wetted with glue and processed in single opening presses or in continuous operation CPS endless presses into plates. In the CPS, the glued chips are scattered in three different layers onto a continuous belt. This transports the so-called chip cake into the press, which is heated to over 200°C. Here, the wood chips are pressed to the desired thickness between an upper and lower steel belt and hardened. At the end of the CPS, the plates, which are up to 2.5 m wide, are sawn and frequently also laminated immediately.

For the lubrication of the complex high-tech machines, only high-quality lubricants authorised by Dieffenbacher may be used. A synthetic high-temperature oil, which protects the roller bars continuously moving through the press at temperatures of over 200°C and their guide chains against wear, is important for the CPS presses. High demands are also made on the greasing of the slow-moving spherical roller bearings in the return pulleys. The filterability of the hydraulic fluid in the presses, which run in a very dusty environment, can be key to achieving optimised production.

With fully automated presses for the manufacture of fibre-reinforced plastic components, e.g. whole vehicle floor plates are produced in a single operation in the automobile and auto supplier industries. With an active servo-controlled parallel motion system as a high-precision press and the corresponding heating of moulds and blanks, it is possible to manufacture fibre-reinforced plastic components suitable for the outer shell of vehicles.

Dieffenbacher only permits a number of zinc-free hydraulic oils of HLP46 type for use in the presses during the guarantee period, pursuant to DIN 51524-2. One of these presses can contain up to 10,000 litres of hydraulic oil. With consistent care and maintenance, it achieves lifetimes of up to 40,000 hours or over 5 years of operation.

By way of preventive maintenance, the service experts of the company recommend the following to operators of installations:

- Only pour oil into the installations through one filter, including new oil.
- Carry out an analysis of the oil of the newly filled installation during commissioning as a starting sample. In this way, any impurities can be recognised in advance and suitable elimination measures taken.
- Carry out hydraulic oil analyses at recurrent intervals, for a normal 3-shift operation, every 2,000 hours.
- For a necessary oil change, flush the hydraulic system and clean the tank thoroughly.

By regular monitoring of hydraulic fluid, the optimal time for an oil change can be planned. In the long term, oil analyses have a cost reducing effect on the overall amount of hydraulic oil and the work load. But the analyses also help avoid production disruptions to the press hydraulics. Impure, oxidised hydraulic oil or hydraulic oil with insufficient additives can ultimately lead, after a short period, to disturbances in one of the many installed control valves and thereby lead to the halting of the entire line. If the causes of sticky deposits are unknown and corresponding replacement components are not immediately available, extremely high costs will be incurred.

Among other things, the oil analyses consider oil purity, aging and the condition of the additives. The oil purity indicated in the purity classes is important for undisturbed functioning of the hydraulics and of the large number of servo- and control valves. During production of chipboard, the surrounding air is often polluted with fine wood particles. Both the ventilation filters for the hydraulic oil tank and the main and bypass filters of the installation are designed correspondingly. If dirt particles nevertheless get into the oil, they can also be deposited on the control edges of the valves or cause sticking. Fine wear particles may also pollute the oil and lead to leakages within the valves, causing increased losses and higher oil temperatures. When subjected to the shearing forces arising in a leakage split, important additives become sheared and ineffective. On the basis of the IR spectrum, of the increase in the AN or the NN and the change in viscosity, the oxidation and condition of the oil are observed. In this way, depending on the oil deployment time, an indication of the oil change extension can be given.

In addition to the operators of the Dieffenbacher installations, its own construction and service experts use OELCHECK's lubricant analyses, albeit in general only when a cause of damage has to be clarified. As a rule, it transpires here that zinc-free hydraulic oil has been mixed with hydraulic oil containing zinc. The accompanying zinc soap formation then leads to gummed up control valves, leakages

An oil can withstand a great deal, but it should never become genuinely acidic!

If the oil becomes overloaded with acids, then a single value is already a basis for recommending an immediate oil change. Ultimately, this represents a high risk to the component to be lubricated and to the entire installation. For this reason, in our lubricant analyses, the potential acidification of the oil is meticulously investigated. In the laboratory report, according to the type of lubricant or measurement method, we provide values such as the NN (Neutralisation Number), the AN (Acid Number), or the SAN (Strong Acid Number), the i-pH value (initial or original pH-value) or the Basic Number. After this, you discover what the individual values reveal and how they are determined.

Mineral oil-based or synthetic base oils are neither acid nor alkaline. With very few exceptions, they are neutral, i.e they have a pH-value which, on a scale of 0 (extremely acid) to 14 (extremely alkaline), is around 7 in most cases. The additives and active substances which are added to the basic oil nevertheless influence the pH value. Some compounds, such as wear and corrosion protection additives, may have a slightly acidic reaction and already cause a change in the pH value of new oil. During the practical deployment, the content of acid compounds in the oil continues to increase. On the one hand, the cause of this is the unavoidable oxidation of the basic oil itself. The oxygen which accumulates in the oil molecules makes the oil „acidic“. The longer the deployment of the oil, the higher the operating temperatures and the more impurities in the oil, the more the acid-forming oil oxidation increases. But the decomposition products of many additives also form metal salts in the desired reaction with metal surfaces, which reacidify the oil and further reduce its pH value.

A concentration of acids in the oil has disadvantageous effects. Initially, the oxidation is accelerated. By increasing the proportion of oxygen and the oxidising effect, the viscosity can increase significantly. In the extreme case, the oil which has become too thick is no longer conveyed in sufficient quantities to the lubrication point. If free acids are present and the corrosion inhibitors are used up, this may lead to corrosion of all oil-covered surfaces. This particularly affects non-ferrous metals, such as copper and copper alloys, but also iron. The useful lives of plastics and sealants are also reduced by acidic oil. Whether and to what extent an oil has become acidic by comparison with its initial condition, and for how long it will still be fully functional can be determined during the analysis with various procedures.

Determination of the NN in the OELCHECK laboratory - always with most modern methods of investigation

NN (neutralisation number) or AN (acid number)

The definition of the acid component is an important parameter in assessing all types of waste oils. According to the type of oil, different analytical methods have been established. The definition procedure is always very similar. A sample of lubricant oil with a weight (2-20 g), which is dependent on the expected result, is intensively agitated with a solvent with a low water content. In so doing, the acids present in the oil are „washed“ into the water component of the solvent. These may then be detected in titrations. In this way potassium hydroxide (KOH), used as a strong base, is added to the sample a drop at a time until the oil becomes „neutral“. When all of the acids have been neutralised by the potassium hydroxide, the next added drop of base causes a sudden increase in the pH value. The acid content of the sample can then be calculated from the consumption of KOH until this „transition point“ and stated in mg of KOH/g of oil.

NN (Neutralisation number) Determination with a colour indicator

DIN 51558, ASTM D974

The oldest technique for the determination of acids in oil is the NN (neutralisation number). In addition to the water-solvent mixture, a colour indicator is also added to the sample. This changes colour at the precise transition point. The NN is determined manually pursuant to the standard. OELCHECK has automated the procedure. A phototrode is incorporated into the titrator, which recognises the transition point better than the human eye. In general, the colour transition may only be observed with bright or transparent hydraulic, gear or turbine oils. For almost completely black samples from diesel or gas engines, no change in colour of the indicator can be observed.

on cylinders, thermal problems or disturbances to piston accumulators. With the results of the analyses, Dieffenbacher can support customers with targeted recommendations for the necessary maintenance actions. In addition, these are a valuable aid in testing the effectiveness of the filter design or even for gauging possibilities for improving the assembly and commissioning of the installations.

AN (acid number)
Potentiometric determination with an electrode DIN EN 12634, ASTM D664

For dark oil samples, potassium hydroxide is added in small steps via a burette to the same solvent mixture in a beaker, albeit without an indicator, until an electrode which permanently records the pH value indicates the transition point. The result is indicated as the AN (acid number). The procedure can be applied to all oils and to many greases. pH electrodes filled with an electrolyte are very sensitive. These must be cleaned after every sample and then regenerated. Moreover, these always react with a slight delay to the change of the pH value in the sample. The base must therefore be added in particularly small steps and with pauses between every individual step. The oil determination for the same assertion therefore takes significantly longer for the AN than the NN.

AN (acid number)
Determination with thermometry

With a third, still very new method, the advantages of the two previous procedures may be combined. For thermometry, a procedure presented by OELCHECK for the DIN and the ASTM as a draft standard, a special indicator is added to the solvent-sample mixture before the start of the titration. At the neutral point, however, this indicator does not change its colour but reacts with vigorous release of heat. An especially sensitive temperature sensor records this jump in temperature. The result is analogous to the change in colour and also to the electrode AN. The temperature sensor responds with similar speed to the change in colour. It does not require any elaborate monitoring or care of electrodes. The same jump in temperature occurs with all oils and is not limited to bright and transparent oils, as is the case for NN.

For all three methods of acid determination, the same solvent mixture and the same potassium hydroxide are used in the same quantities.

The same chemical reaction occurs for all of the procedures. The results and their interpretation are hence comparable. The difference between the procedures lies in the recognition of the transition point and hence of the endpoint of the reaction.

AN or NN
Determination with a chemometric model

The acid content of oil can nevertheless be determined without the reaction with a base. Provided that sufficient titrations are carried out for one type of oil, i.e. normally more than 5,000 conventionally executed titrations and detailed infrared spectra are taken at the same time, a so-called chemometric model can be correlated from this data. The widest variety of acids are created in the oil through the aging, oxidation and degradation of additives. All of these change the infrared spectrum of an oil sample. This change cannot be measured, however, as e.g. for the determination of oxidation, by a very specific band of the spectrum, but affects wide ranges. For a chemometric calculation of the AN or NN, all variable parts of the spectrum are determined in the first step. After this, the changes are calibrated against the acid numbers determined with the conventional titration. This model (statistical calculation formula) can then be used to determine the acid number from the infrared spectrum for the types of oil for which the model was developed.

The advantage lies in the considerably simpler execution on the basis of an IR spectrum that is in any case available. Several thousand reliably executed titrations and the associated infrared spectra are nevertheless a precondition for the preparation of the sustainable model.

Since the infrared spectra are slightly different for all of the oils, even if they have the same application, a separate model must also be drawn up for each type of oil.

Which values for which oils

- **AN (acid number) or NN (neutralisation number) for all oils and fluids.**
  The higher the neutralisation number in comparison to the new oil, the worse the oil is.
- **BN (base number) for diesel, petrol, and natural gas engines.**
  The greater the fall in the base number in comparison to the new oil, the worse the engine oil is.
- **i-pH value, BN (base number) and AN (acid number) for all gas engines.**
  The interplay of these three values implies impurities in the fuel gas.
- **SAN (Strong Acid Number) for oils in special gas engines.**
  These show exceedingly aggressive acids, occurring for pH values of below 4. Immediate oil change!

Engine oils
BN (base number) and i-pH value

Engine oils are a special case. In addition to aging and oxidation, they are also exposed to especially aggressive acids formed from fuel combustion. If, for example, these enter the engine oil as blow-by gases, then they may cause a drastic acidification within a very short time. In order to prevent this, engine oils contain a high content of additives which act as a base, as well as the active wear protection agents which react with acids This type of alkaline active agent primarily neutralises the acids which are introduced with the fuel or generated. In this case, the additive combination is continuously consumed.

If their content is exhausted, the level of acids drastically increases. This leads to an increase in viscosity and a strengthened corrosive attack.

Hence, for the assessment of the used engine oils, usually only the residual content of alkaline additive, the so-called BN (base number) is defined.

For this purpose as well, a titration is again carried out, albeit in the opposite direction: To the oil sample, which is blended with a solvent in similar fashion to the determination of the acid, a very strong acid is added (perchloric acid or acetic acid and previously often hydrochloric acid as well). The acid is neutralised by the basic additive until the latter is fully used up. The addition of acid beyond the transition point leads to a sharp drop in the pH value. Various methods are again available for detecting the endpoint.

BN (base number)
Potentiometric determination with an electrode DIN ISO 3771, ASTM D4739

The observation of a colour change was not successful in the determination of the BN, since used oils from engines do not permit the recognition of a colour change, and a separate standard is not worth the effort for the sake of new oil analysis. A titration via pH electrodes is the most widespread due to the often dark engine oils.

In principle, the procedure functions like the AN titration. Electrode maintenance is equally expensive. The titration time depends on the level of the BN and can take up to 30 minutes.

BN (base number)
Determination with thermometry

In the very recent thermometry procedure, as with the AN, isobutyl vinyl ether is added to the solvent-sample mixture as an indicator before the start of titration. This reacts at the neutral or transition point with an explicit jump in temperature, which

is recorded with a temperature sensor. The result is analogous to the BN electrode. The temperature sensor reacts in 2-5 minutes and after a short rinsing process is ready for the next sample.

BN (base number)
Determination with a chemometric model

Assuming the corresponding number of conventionally executed titrations and infrared spectra, a chemometric model may be created for the BN. Since, for the degradation of additives by acids in the fuel, other active agents may be responsible in every type of oil and low-ash „low SAPS“ oils behave differently from diesel engine oils with high levels of additives, a separate model must be developed for each variety of oil.

For a chemometric calculation, as with the AN model, all areas of the spectrum are determined here as well, with these changing depending the BN. After this, the changes are calibrated against the basic numbers, which are determined by using the conventional titration. With the model so developed, the BN can then be determined for the corresponding varieties of oil from the infrared spectrum.

i-pH value (starting pH value), Determination with an electrode

Even if, as shown by the BN, alkaline active agents are still present in the engine oil, acids deriving primarily from the impurities may already have been concentrated. The alkaline additive indeed reacts particularly effectively with the strong, predominantly sulphurous acids which result from combustion.

Against this, weaker acids are neutralised less effectively. In order to make a separate judgement of the condition of used gas engine oil, not only are AN and BN (acid and based numbers) measured, but also the i-pH value of the oil. Unlike for AN and BN titrations, there is only one way of taking this measurement; a direct determination using a pH electrode.

Already the smallest amounts of a strong and aggressive acid lead to a measurable fall in this i-pH value, while the AN (acid number) may not have risen by much. Conversely, a high acid number can in itself be used as an alarm signal, while only a small change in the i-pH value demonstrates that it relates to predominantly weak acids which hardly cause corrosion.

The measurement of the i-pH value has already been applied in different laboratories for many years, but to date has not been standardised. OELCHECK is playing a leading role in the DIN and ASTM standardisation, which is currently in progress.

Statements on the optimal point for a change of oil

OELCHECK engineers always make an accurate diagnosis of the change in the BN or AN compared to new oil or to the trend. In this case, it makes no difference as to how the acid or base numbers presented in the laboratory report are determined:

- Potentiometrically via an electrode filled with electrolyte
- Thermometrically after the addition of a reactive indicator
- Photometrically after the addition of a colour indicator
- Chemometrically modelled from the IR spectrum

Determination of the AN or NN with comparable methods

Unit mg KOH/g

Used oil type, different operating hours	**AN** ASTM D664, DIN EN 12634	**NN** DIN 51558, ASTM D974	**AN, NN** Thermometry	**AN, NN** Chemometry
Mineral oil-based gas engine oil	1.78	1.60	1.71	1.69
Synthetic gas engine oil (PAO)	1.98	1.97	1.98	2.00
HC basis gas engine oil	2.96	2.88	2.92	2.78
HC basis gas engine oil	2.53	2.54	2.46	2.67
Mineral oil-based gas engine oil	2.75	2.78	2.61	2.87
Ester-based gas engine oil	3.35	3.24	3.44	3.10
MO organic gear oil (PAO ester)	3.02	2.99	3.06	2.74
MO organic gear oil (PAO)	2.68	2.76	2.63	2.82
Transmission oil (PAO) with S-P additives	1.91	1.86	1.90	1.88
Gear oil (minimal) S-P additives	1.39	1.36	1.39	1.42
Gear oil (minimal) S-P additives	0.98	1.00	1.03	1.08
HVLP type hydraulic oil (minimal)	0.16	0.17	0.15	0.17
HEES type bio-oil (full ester)	0.82	0.80	0.86	0.83
HL type hydraulic oil (minimal)	0.11	0.13	0.10	0.11
HVLPD type hydraulic oil (minimal)	0.53	0.66	0.62	0.58
HLPD type hydraulic oil (minimal)	1.47	1.27	1.38	1.33
Comparability pursuant to DIN/ ASTM	14.1%	15%		

Determination of the BN (base number) with comparable methods

Unit mg KOH/g

Used oil type, different operating hours	**BN** ISO 3771, ASTM D4739	**BN** Thermometry	**BN** Chemometry
Synthetic gas engine oil (PAO)	8.94	9.11	9.03
Synthetic gas engine oil (PAO, ester)	3.01	3.01	3.20
Synthetic gas engine oil (PAO, ester)	1.53	1.51	1.53
Biogas engine oil (HC synthesis)	2.65	2.45	2.70
Diesel engine oil (partially synthetic)	7.46	7.18	7.44
Diesel engine oil (Low SAPPS)	7.17	6.99	7.01
Diesel engine oil (synthetic)	7.00	6.83	6.87
Petrol engine oil (synthetic)	5.66	5.45	5.60
Comparability pursuant to DIN/ASTM	15%		

SUMMER 2011

OEL CHECK®

ÖlChecker

IMPRINT

ÖlChecker – a magazine of OELCHECK GmbH

Kerschelweg 28 · 83098 Brannenburg · Germany
info@oelcheck.de · www.oelcheck.de
All rights reserved. Reproduction without permission prohibited.
Concept and text: Astrid Hackländer, Marketing & PR, A-4600 Thalheim, Austria
www.astridhacklaender.com
Layout and design: Segel Setzen Agency, Petra Bots, www.segel-setzen.com
Photos: OELCHECK GmbH · OilDoc GmbH · Dieffenbacher · ESS · fotolia

QUESTION TIME

Why does OELCHECK only still execute individual investigations which, pursuant to the price list, may be ordered separately, in connection with an analysis of the analytical set 1? For years, we have allowed you to determine the chlorine and acid content of oil or also the content of elements during individual investigations. Now these individual tests are only carried out in combination with an analytical set, making the investigation more expensive.

OELCHECK:

This procedure evidently makes the individual investigation more cost-effective and faster and is to your advantage. In addition, we thereby guarantee the availability of investigation devices.

In the past, individual analytical values ordered by the customer often failed to deliver the expected result, despite requests made by telephone, because information was lacking. We often received the order for an individual test, including without a specification of the type of oil. In this case, for some procedures, the weight is nevertheless dependent on the viscosity or the expected concentration. Only after laborious approximation to the measured value could we then initiate a standardised operation.

With silicon oils or glycols, we contaminate our devices. They can then only be used again after time-consuming dismantling and a thorough cleaning. We would actually have to charge you for such downtime.

Through individual tests carried out for the analysis set, we now guarantee that we have obtained all of the data which we require for a standardised determination. This is the only way that we can also determine whether this individual test is genuinely significant. In addition, we can draw up a commentary on it in the laboratory report. The results of an individual investigation can ultimately be analysed significantly better through an interaction with the IR spectrum, the values for wear metals, impurities and additives, as well as the viscosity.

A complete and correctly compiled test data sheet prevents disagreeable surprises, and an unknown liquid can no longer contaminate an investigation device which is not adjusted to or suitable for it to such a degree that a new calibration is necessary. This further guarantees the availability of testing devices, to the benefit of all of our customers.

In the meantime, OELCHECK offers more than 60 different individual investigations. You may find complete information on this under the „Prices“ button at www.oelcheck.de. To make your calculation, please add in each case the price for Analytical Set 1 to the price for the desired individual investigation. The processing time for the execution of an individual investigation is at most five days, with a few exceptions.

OELCHECK will also answer your questions on tribology and lubricant analyses.
Send us your questions by e-mail (info@oelcheck.de) or by fax (+49 8034/9047-47).

Welcome to the OELCHECK team!

In order to strengthen our successful team, we are looking for a communicative and highly motivated individual to work as a

Diagnosis engineer

Your tasks:

- You assess and comment on the investigation results determined in our laboratory and generate diagnoses for lubricants and aggregates.
- You use your expert knowledge of lubricants to provide technical advice to customers.
- You support our speakers at OilDoc seminars or speak yourself.

Our requirements:

- As a mechanical engineer or lubricant specialist, you must have sound knowledge of the application of lubricants, but also of the corresponding systems and machines.
- You must be a team player, resilient and flexible and be able to reorient yourself very rapidly to customers and to the widest range of questions.
- You will spend the majority of your time in front of a screen and will be fully conversant with standard PC programmes.
- OELCHECK is internationally active. You must thus have a good command of spoken and written English.
- You will draw up your diagnoses at our site in Brannenburg. You should thus be ready to relocate to one of the most beautiful areas in Bavaria.

Our offer:

- Activity in a receptive and friendly team with a high degree of personal autonomy.
- Fair, performance-based pay and a modern, well-equipped workplace.

OELCHECK is the leading laboratory for lubricant analyses in the German-speaking world. Founded 20 years ago under the name WEARCHECK, our company remains a family-run business and is hence completely independent. Since the founding of the company in 1991, the number of samples investigated by us has been growing at double-digit annual rates. The OELCHECK laboratory is state-of-the-art and we are constantly making significant investments in innovative testing devices and in intelligent software. Our customers profit from the consistently high quality of our services, from our know-how and from individual advice by our competent diagnostic engineers, the „**Oil doctors**“.

Seize your opportunity and send your significant application documents to:
Barbara Weismann, OELCHECK GmbH, Kerschelweg 28, 83098 Brannenburg. You will find the most important information about us on our website at www.oelcheck.de. If you would like to know more about us then look us up in the book „Traumfirmen - and ihr Geheimnis“ [Dream companies and their secret] We are one of them!