



# OIL MAINTENANCE

In order to maintain the service level of oil, particles and emulsified water must be continuously removed



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# 25 years of supplying technical solutions and maintenance to Norwegian business and industry



Since 1976, the company has worked with technical products for industry, shipping, offshore and construction. Quality and a high service level have been decisive factors in our development and success. Our company is typified by a highly skilled staff, knowledge of our products and first class service.

We prefer  
Quality to  
quantity.

## **WE SEE A GREAT CHALLENGE IN THE MAINTENANCE OF OIL, WHICH HAS BECOME ONE OF OUR AREAS OF ACTIVITY OVER THE LAST FEW YEARS.**

As one of our oil purification equipment customers so rightly says: "It's not the few drops of oil that are expensive, it's the high cost of maintaining mechanical equipment that represent the really high costs".

No one in industry can say with certainty how much money is lost every year through polluted oil. Some have provided us with an indication of the enormous savings that can be achieved by using clean oil. Clean oil not only extends the oil's working life, it also helps to avoid stops, low utilization of machinery and plant, wear over time and major maintenance costs.

## **THERE IS A LOT OF MONEY IN CLEAN OIL.**

### **Two causes of polluted oil.**

There are two main types of pollution in oil, solid particles, and chemical pollution, usually water, in free or combined form.

#### *Solid particles.*

Solid particles can originate from external pollution and enter the hydraulic oil via the breather air, lubricating oil from piston rods, topping up with dirty oil or during maintenance work. Solid particles can also form in the system itself through metal surface wear over long period of use.

Oil usually contains a high volume of iron (Fe), a result of wear occurring on steel surfaces in the system. Other metal content due to wear are silicon (Si), copper (Cu), lead (Pb) and tin (Sn). The Pb, Sn, and Cu content originates from anti-wear additives that decompose in use and from mechanical wear of machine parts.

#### *Chemical pollution.*

This is mainly water, together with some decomposed particles from the oil, cutting fluids, anti-corrosives cleaning products. One knows from experience that water in either free or combined form is the biggest problem with chemical pollution. Approximately 30 –40% of all breakdowns are caused either directly or indirectly by water in the oil.

## **A COMBINATION OF POLLUTION.**

Almost without exception, one knows from experience that hydraulic oil becomes polluted by a combination of particles and water and the rate at which the oil decomposes if one fails to remove the pollutants efficiently.

Product Manager Nina Enger, AS Norske Shell, gave a good description of the importance of clean oil; the damage that occurs in hydraulic plants and



environmental damage in her article "Have clean hydraulic oil". Over 80% of all faults that occur in hydraulic plants are caused by impurities in the oil.

**CONTINUOUS MAINTENANCE OF THE OIL IS THE MOST EFFECTIVE REMEDY, AND GIVES THE BEST LONG-TERM RESULTS.**

There is not much help in an "all out effort" once the oil has become polluted. If one attempts to clean the oil in the shortest possible time, the result may be reasonably good, but the oil rapidly becomes polluted again within a very short time in use. Hydraulic oil is subject to a continuous stream of pollutants and this must be dealt with continuously in order to avoid decomposition.

Effective by-pass filtering is the best long-term solution, where part of the oil in the system is cleaned by passing it through an in-situ filter that is in continuous operation. The slower the flow of oil through the filter, the better the result in removing particles. Viscosity affects the time it takes to remove water from the oil, and the higher the viscosity of the oil the longer it takes to filter out the water. Temperature also affects the time, the higher the oil temperature, the shorter the time required to achieve a good result. Water content is another factor that affects the time required. It takes twice as long to reduce water content from 0.1% to 0.01% as it does to reduce water content from 1.0% to 0.1%.

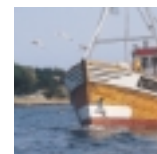
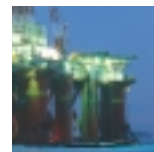
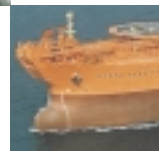
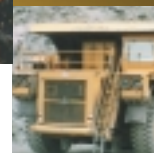
**INCREASINGLY HIGHER STANDARDS OF PURITY DEMANDED FOR HYDRAULIC OIL.**

More and more manufacturers of equipment used in hydraulics, valves, pumps, gear control systems, gaskets and similar, stipulate exact specifications for the cleanliness of hydraulic oil. These specifications show that future requirements for oil purity will be as low as NAS 4 or ISO 13/10 (NAS 1638, ISO 4406). (This degree of purity indicates particles per ml  $>10\mu = 14$ ).

The oil companies' average calculations for deliveries of new oil are as follows:

Normal for oil in standard tanks, unfiltered	ISO 19/16	NAS 10
Average of new oil	ISO 17/14	NAS 8
Average of hydraulic oil	ISO 16/13	NAS 7

There is an obvious need to filter new oil prior to taking it into use, but this does not help much as the new oil is mixed with various residues and remains of old oil that has previously been in the system. This results in the oil being polluted, in spite of having changed to new. As a general rule, there are also remnants of water or other chemical pollution in the system that are impossible to remove during oil changes.



BEFORE TREATMENT

AFTER



# Purifiner oil filters are simple, but incredibly effective

*The Purifiner by-pass oil filter is a World patent from the USA, which can point to sensational results in the degree of purity of oil when in continuous use.*

*Purifiner is designed for the Continuous maintenance Of oil, not for fast filtering.*

The design is simple but highly efficient, where two techniques are used in combination to provide pure oil.

Purifiner has a 100 % cotton filter that removes particles down to 1 µm from the oil. Water in the oil (combined), is evaporated off in the filter's upper chamber. The oil passes through the cotton filter and passes through nozzles in a spreader where a heating evaporates the water content from the oil through an evaporation valve.

**SEVERAL HUNDRED DELIVERIES AND INSTALLATIONS DURING THE LAST FEW YEARS HAVE PROVIDED US WITH BROAD EXPERIENCE FROM ALMOST ALL TYPES OF HYDRAULIC MACHINERY AND PLANTS.**

The only way we can be 100% sure that our customers are satisfied is by analysing the treated oil to check the excellent results. We pay a careful care and attention to this, and results of analyses from the majority of installations, together with tests carried out by independent institutions prove that Purifiner filters and cleans oil down to NAS 4 or ISO 13/10, and evaporates combined oil from oil down to 100 ppm or 0.01% water content.

Purifiner cleans only 600 litres per 24-hours in continuous operation. Depending on the initial oil analysis, we estimate that the oil in the system must pass through the Purifiner 6-8 times before being completely clean.

Consumption of filter cartridges is minimal. Only 6-8% of the water content of the oil is absorbed by the cotton filter. After primary start up on installation of Purifiner, expect to use 2-3 filter cartridges to get the oil completely clean, but once this has been done normal usage is between 3-4 cartridges per year for a standard hydraulic plant.



*Technical specifications of the individual filters:*

Model	TF40P	TF60P	TF240P
Maximum oil capacity in engine including litres	22.7	56.8	227
Maximum oil capacity in hydraulic plant litres.	380	1900	3800
Dimensions height / diameter in cm.	30.5/25.5	41.0/25.5	71.1/25.5
Weight in kg.	12.0	14.0	23.5

*Amp. Consumption of heating element is 0.5 amp. EX approved NEMKO Ex97D311X*

## PRESSURISED AND NON-PRESSURISED HYDRAULIC SYSTEMS.

In order to achieve efficient evaporation in Purifier's top chamber, it is necessary that evaporation chamber is not pressurised. In other words, the oil must be able to flow back from the filter to the system with no backpressure from the plant.

This has created a number of challenges, as the majority of hydraulic systems work under some pressure, and we had to overcome this in order to return the clean oil to the system.

## WE CONSTRUCT COMPLETE PURIFINER OIL CLEANERS FOR BOTH TYPES OF HYDRAULIC SYSTEMS, NON-PRESSURISED AND PRESSURISED.

We have developed and offer two standard Purifiner oil-cleaning systems, a single unit for a pressure free system and a unit for systems under pressure.

### Type TF5060PUH

*TF-non-pressurised without pre-heater.*

The unit is built on a stainless steel chassis with a suction pump that returns the oil to the system with no backpressure. The lifting height of the pump is 8 metres, as the most usual method used is to pump the oil up from the system and return it to a pressure free tank.

*Dimensions: (LxBxH) 450 x 470 x 580 mm*

*Weight: 35 kg*

*Designed for systems up to 2000 litres.*

### Type TS5060PMH

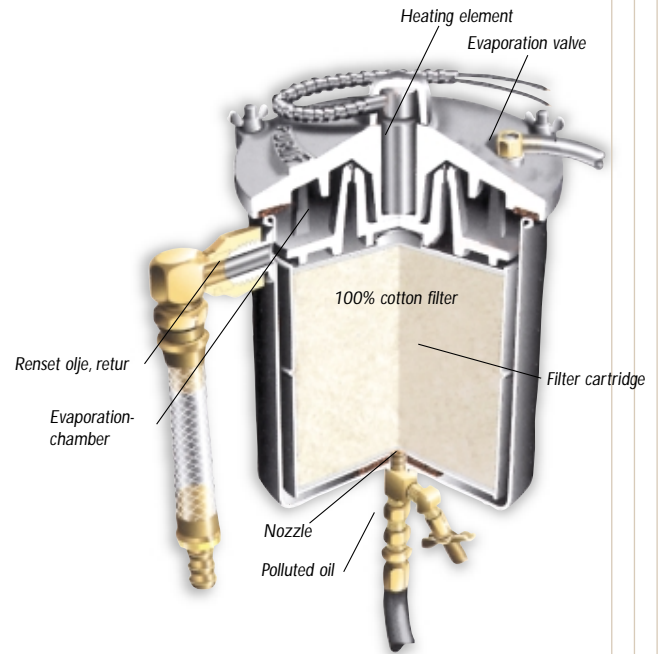
*TS-pressurised system with pre-heater.*

If the hydraulic system is working under pressure, this must be overcome in order to be able to return the cleaned oil to the system. Delta Pumpefabrikk AS Haugesund, have developed a twin-chambered pump especially for Purifiner where the first chamber pumps the oil up from the system and the second chamber returns it to the system at up to 8 bars pressure. Purifiner can be installed at any point in the hydraulic system circuit.

*Dimensions: (LxBxH) 450 x 470 x 580 mm*

*Weight: 45 kg*

*Designed for systems up to 2000 litres.*



# Purifiners for

# a wide variety of applications



## **PURIFINER FOR THE SHIPPING INDUSTRY.**

On board vessels of all types one is faced with a variety of oil pollutions including those caused by wear, sludge formation in the oil, various types of leakages and condensation, which causes water to accumulate in the oil. We have provided solutions for many ship owners, and have received recommendations from a large number of vessels that now have clean oil.

Purifiner has been installed on thrusters, propeller housings, steering engines, deck machinery and some auxiliary engines



## **PURIFINER FOR THE FISHING FLEET.**

We have installed Purifiner in central hydraulic systems on all types of vessels from the largest factory ships to the smallest fishing smacks as well as in propulsion systems on smaller vessels. We pay special attention to oil analysis, and can refer to engines that have run for over 4000 hours on the same oil.



## **PURIFINER FOR THE OFFSHORE INDUSTRY.**

Purifiner is EX approved for deliveries offshore, where we enjoy very close co-operation with IKM-Gruppen AS and IKM-Laboratorium AS in Stavanger in the design and construction of complete oil cleaning systems for this demanding industry.

Our systems have been installed on all types of fixed and floating platforms and rigs in the North Sea. One of the areas we have concentrated on in the offshore is ROV installations, and we have achieved excellent results here also.



## **PURIFINER FOR LAND-BASED INDUSTRIES.**

Purifiner has been installed in all types of equipment from the smallest plastics machine with a 50 litres of oil to paper manufacturing machines using 2000 litres of oil. We have delivered Purifiner to the fishing and fish-farming industries for a variety of hydraulic plants as well as cooling and refrigeration compressors.

### PURIFINER FOR CONSTRUCTION SITE MACHINERY.

The building industry was the first of many to recognise the need for continuous maintenance of oil quality, and this was where the first Purifiners were installed. We have delivered purifiners for motors and engines, all kinds of hydraulic plant for large drilling rigs and other types of construction site machinery and plant. Purifiner is supplied with 12 or 24-volt heating elements. Many construction companies choose a stationary Purifiner, and clean the oil when the machine is being serviced and repaired.



### PURIFINER FOR PUBLIC BODIES.

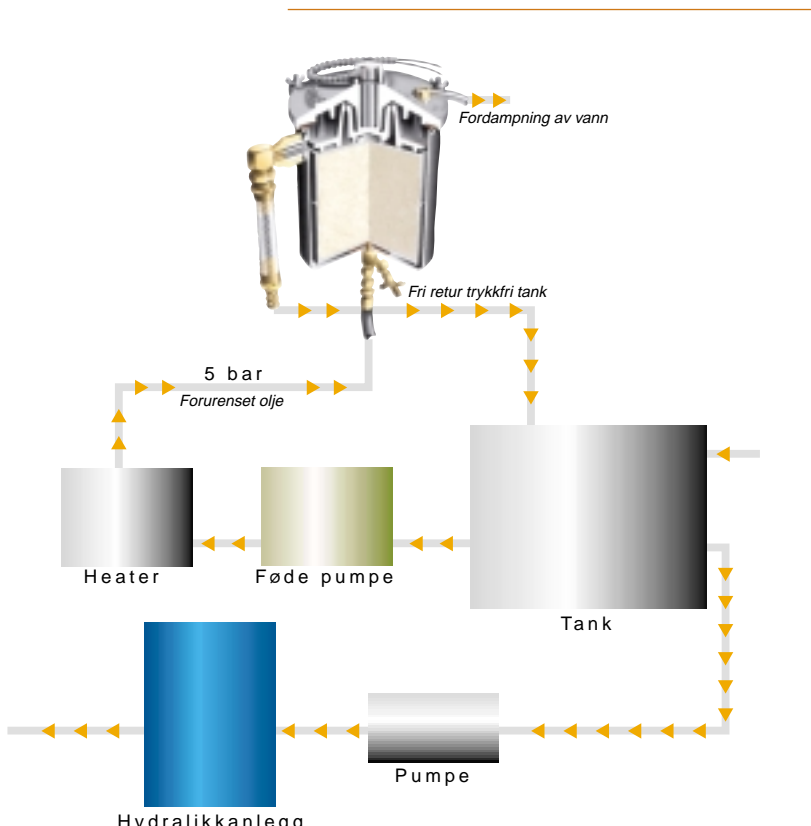
Purifiners have been installed under the auspices of Statens Vegvesen (The Norwegian Roads Authority) to keep oil in hydraulic ferry quay plants free from water. The armed forces are major users of Purifiner, where we have installed units in a variety of hydraulic plants, sweeping machines and loading ramps on Hercules transport aircraft.



### INTEGRATION OF PURIFINER IN VARIOUS MACHINES USING HYDRAULIC OILS.

Our first class results in ensuring clean oil at so many different installations has resulted in that design engineers have integrated Purifiner in their designs where hydraulic oil is used.

We can supply references from almost all branches of trade and industry.



Principle for Purifiner hydraulic plant, non-pressurised tank with pre-heating of oil

# Oil analyses are of prime importance



We take the utmost care with very single delivery, whether it be for large or small volumes of oil, the type of oil, viscosity, pressurised hydraulic systems where the oil must be returned to the system and the type of hydraulic system employed.

Further, we request a sample of the last sample of oil taken, which tells us about metal content, particle content and water content or other chemical pollution. Based on this analysis we can tell the customer how long it will take to clean the oil using a Purifiner. After installation of a Purifiner, we request that the customer retrieves oil samples over a given period to enable us to check that the oil is clean.

We have customers for whom we have assumed total responsibility for clean oil, and it is our responsibility if the oil is not clean. Excepted from this are of course plants where there are large volumes of water caused by leakage, or plants where bearing and valve wear is high or the plant is in a state of near breakdown. In cases like these, the customer has a problem that we cannot solve.

## **PURIFINER - A SMALL INVESTMENT THAT ENSURES GOOD ECONOMY IN THE LONG TERM.**

Our experience with reports from users is that Purifiner is a minimum investment that offers savings over the short term. In the longer term, Purifiner ensures good economy as intervals between oil changes are extended and maintenance costs reduced. Minimum consumption of filter cartridges as water is not absorbed in the actual filter cartridge but is evaporated out of the system.

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