

# Oil cleaning

– the pleasant truth



**EUROPAFILTER**

OIL LIFE SAVER

# A simple solution for an invisible problem

There are certain vexations we are so used to that we don't consider them to be a problem. Light bulbs fail, batteries lose power and oil has to be changed regularly. That's just the way things are, but new inventions show that this doesn't have to be the case. Low energy bulbs last longer, batteries can be recharged and there are filters that clean oil during operation so that the oil never gets dirty, doesn't need to be changed and above all prevents expensive down time. These are simple solutions to problems that we didn't even see before.



## History

Europafilter's history is closely connected with the sea and maritime industries. In the early 80's the Icelandic naval captain Aegir Björnsson came across an undeveloped idea for a new and improved oil filter.

This aroused the innovator in him. He built a workshop and started experimenting in order to create the perfect oil filtering and cleaning system. Hans Storebø, a Norwegian salmon farmer and mechanical engineer, quickly saw the potential of the product. He sold his salmon farm in order to become an agent and obtained the rights to sell the system in Norway. Together the two men devoted over ten years to refining and improving the patented product before they were ready to launch it on the market.



## The oil sector was early customers

The first to discover the advantages were the fishing industry and companies within the oil gas extraction industries, who were well aware of the cost of production downtime.

Since then many sectors have started to use Europafilter for ultra cleaning of oil and by doing so have reduced the risk of machine failure. Nowadays Europafilter's customers can be found in all branches of industry. Manufacturing industry, the offshore industry, shipping, heavy vehicles and energy are only a few of the sectors which have discovered the advantages of really clean oil.

Manufacturing is still carried out at Smögen and the products are found throughout the world. The earth's reserves of oil are gradually being used up. Saving resources and the environment is a consideration that falls on fertile ground the world over. Europafilter's products make it possible to reduce the waste of oil that is extremely dangerous for the environment.



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## The invisible problem

Oil needs to be changed regularly and machine parts continue to break down. We are so used to this that we don't think it can be in any other way. But if oil can be kept 100% clean then in theory it should never degrade or require changing. Machine parts could be used indefinitely and the risk of breakdown and production stops would be drastically reduced.

### Large and small particles

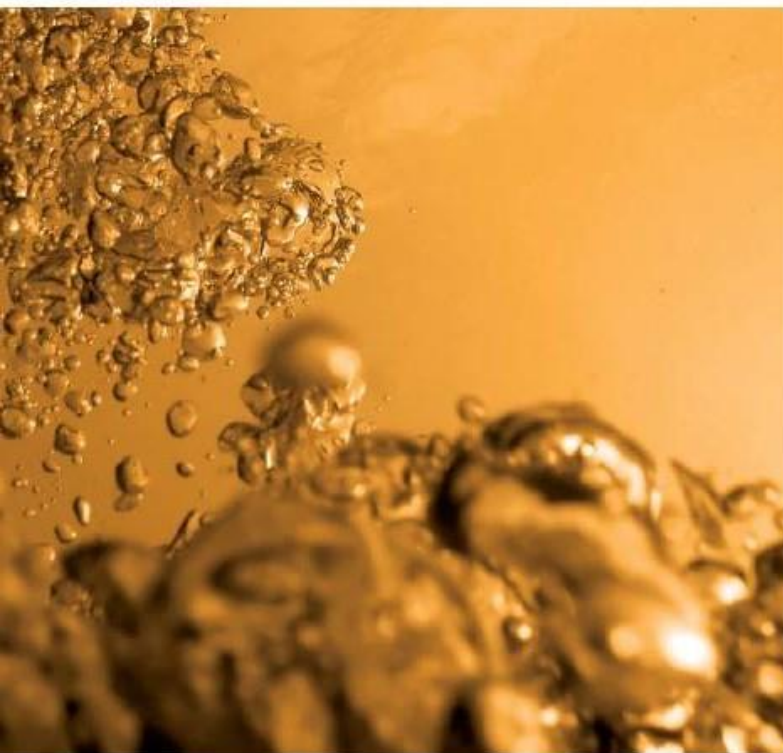
The built-in online filter which most machines are equipped with provide protection against large particles that can cause direct damage to machine components. But these large, dangerous particles are few in number. Most of the particles in the oil are very small. Tests have shown that 70% of the total weight of particles in oils in general consists of particles that are smaller than 1 µm.

### Small particles cause much damage

Previously it was thought that small particles were not dangerous for machines, but research has shown that these micro-particles bind together other contamination and accelerate oxidation in the oil. This causes the oil to lose its lubricating qualities and leads to the formation of resins and deposits. These form a sticky surface that eventually causes valves and moving mechanical parts to jam and seize up. Tests show, for example, that 85% of all breakdowns in hydraulic systems are caused by contaminated oil.

### Modern machines get problems

New machines are manufactured to far stricter tolerances than older machines. Tolerances and fault margins are much smaller, which means there are many advantages. The products are more uniform and of a higher quality. At the same time the new machines are more sensitive. Modern machines require a much cleaner oil and regular cleaning of the system so that they are not affected by breakdowns during production.



## The simple solution

The offline filter provides deep filtering of the oil during operation. As the flow through the offline filter is low it is possible to catch micro-particles that the online filter must allow to pass in order to operate effectively. Every time the oil passes through the offline filter it becomes cleaner. When the cleaned oil then passes through the machine it cleans the system and removes sediment and resins. The oil is cleaned whilst the machine is operating. After a time not only the oil is completely clean – the machine is as well.

### Don't change the oil – change the filter

When the oil is ultra cleaned oxidation ceases. This requires particles and water to be removed from the oil. Without oxidation the oil retains all its desired qualities and in theory never needs to be changed.

### Europafilter with unsurpassed cleaning

Since 70% of the damaging particles in oil, based on weight, are less than 1 µm it is important that the filter can remove these. Measurements show that the Europafilter is able to trap particles all the way down to 0.1 µm.\*

### Europafilter with high capacity

Where others deal in grams Europafilter prides itself on handling kilos. Up to 3 kg contamination can be trapped in our filter insert EF500HY. This makes the Europafilter both cost effective and environmentally friendly.

### Remove the water

Water accelerates oxidation and adversely affects the quality of the oil. Europafilters cellulose filter has a high capacity for absorbing water from oil. The EF500HY filter can absorb as much as 2 litres of water before requiring changing.

### Retain additives

Additives that are added to the oil to give it special qualities are not affected by filtering. So long as the additives are effective and fresh they are chemically combined in the oil so strongly that they cannot be filtered away. Only when they have done their job and have been used does the molecular structure change. So the previously effective additives become dangerous contamination that is trapped by the filter.



## Small contributions save a large outlay

Not having to change the oil saves money of course, but the large savings are found in another quarter. The cost of a few litres of oil is often inconsequential compared to the loss of income and the repair costs that arise when a machine is not working.

Studies by Electric Power Research Institute have concluded that over half of the forced outage hours related to bearings, journals and lube oil systems were due to contaminated oil. This contamination comes in the form of particulate matter and water.

## Cost effective

Completely clean oil also reduces wear on valves, cylinders, bearings and other affected components in a machine. Over time this can lead to a saving in maintenance costs of up to 80%.

The fact that the filter inserts have such a high contamination absorption capacity means that the price per gram of contamination trapped is very low compared to other filters on the market.

Investment in a system from Europafilter costs most of times considerably less than a single hour of production downtime.



## Fewer stops and more uniform quality

It is simple to work out what can be saved by not having to change the oil. The most difficult thing is to work out what machine breakdowns and production stoppages cost.

How much money does the company save when technical hitches do not occur?

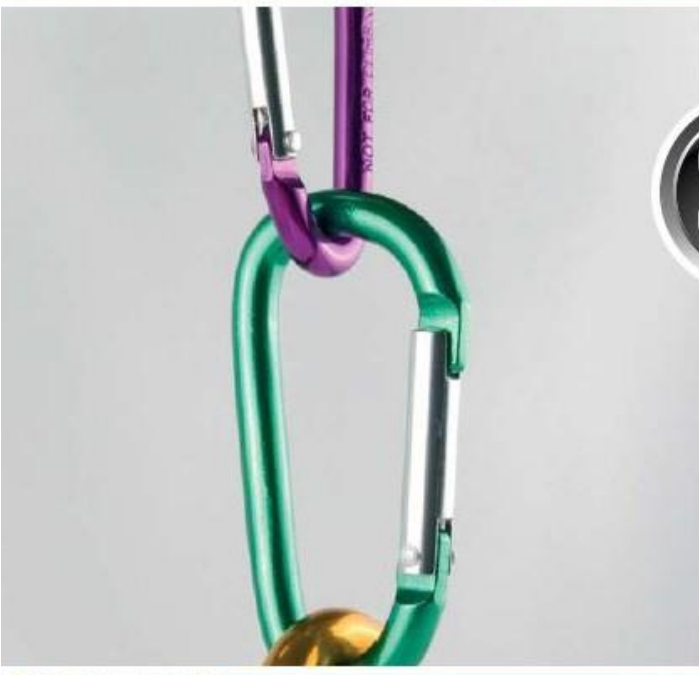
Each period of production downtime costs money. To be able to change a filter without stopping production is an additional advantage with Europafilter's system.

## Higher quality in production

Current production machines are highly developed and over time are more sensitive to contamination in oil. Contamination that did not affect older machines causes problems for current production machinery. In hydraulically controlled machines repeatability and precision is affected by the quality of the oil. Coatings on moving parts and valves reduce the precision and in time the quality of the product.

## Fewer rejects

Non-uniform production quality and a large number of rejects are costs that few companies will be able to bear in the future. In a competitive situation the capability to do the right thing from the outset is a pre-condition for creating secure and long-term customer relations.



### Security

The fact that recurring production stoppages vanish completely and the oil is so clean that it does not need to be changed sounds too good to be true. Europafilter has practical experience, tests and statistics on its side, but to ensure extra security for you as the customer you can do the tests yourself without risk.

### Money back guarantee – unique for the sector

Test Europafilter's cleaning system with full security and ninety days money back guarantee. If you are not satisfied with one or all of the systems, for whatever reason, contact us within ninety days, return the system and get your money back.



### An effective environmental consideration

We can't close our eyes to it any longer. Nobody can ignore the increasing environmental problems that could in time threaten to destroy conditions for life on this planet. It is time for us to act. Nobody is able to do everything, but every little improvement is a step in the right direction!

Waste oil is poisonous. It is up to a thousand times more poisonous than new oil and can have a mutating effect on the smallest organisms in the food chain. Each litre of discharged oil gives rise to both costs and negative environmental effects.

With Europafilter's cleaning systems, oil consumption can be reduced by up to 90%. The amount of poisonous discharged oil can be reduced to the same extent if clean oil continues in use.

By installing an oil cleaning system from Europafilter the company will not only make an instant financial saving, but will also be blessed with a good environmental conscience. Each positive environmental action that we undertake increases the possibilities of bringing about developments and leaving a better environment as an inheritance for our children and grandchildren.



## Simple to install and change filter

To install the Europafilter cleaning system takes about half an hour. How often you need to change the filter depends on how much contamination occurs in the system on a regular basis. Normally the EF systems are dimensioned so that a filter changes are carried out once or twice a year.

The filter change takes ten minutes and can be carried out whilst the machine is in operation. The used filter insert can be sent to destruction without needing to press out the oil or separate it.

## Simple filter with advanced functioning

The filter insert is made of cellulose that is able to absorb water out of the oil. This is possible because cellulose is 30% more effective in absorbing water molecules than oil. The filter can adsorb particles as small as  $0.1\ \mu\text{m}$ . As the system is a continuous circulating process these particles are adsorbed when the oil passes through the filter over and over again. An EF500HY filter insert can adsorb up to 3 kg of particles and water before it needs to be changed.



## Flow and dimensioning

To make the oil in a system clean, the oil has to be cleaned in a faster speed than contaminations arises. The EF-system should therefore be dimensioned with the right number of filter inserts so that the whole oil amount in a machine or system passes through the oil cleanings system EF2000 at least once a week. The flow through one EF500HY filter insert varies from 0.1 to 5 litres per minute depending on the temperature and viscosity of the oil. The oil cleaning system operates best at a pressure of 2 to 4.5 bar.

## Saving in maintenance

In the long term the company can reduce its maintenance costs by up to 80% and reduce oil consumption by up to 90%. The risk of unplanned production stops are also drastically reduced when using an Europafilter system.

## A system for many sectors

Europafilter's system for the ultra cleaning of oil is currently used within the most sectors of industry. Customers are found everywhere – from small workshops with a limited number of machines to large companies within the manufacturing and processing industries, power generation companies, marine, transport and oil and gas concerns. Wind power companies have also discovered that great deal of money can be saved on maintenance and repair costs by using completely clean oil.



# The invisible problem

## Permanent risk of breakdown

Built-in full flow filters protect the machine components from large particles, but do not clean the oil system of water and small particles that damage the machine in the long term. Tests show that the majority of all machine breakdowns in oil systems are due to contamination of the oil.

### Oil system

Hydraulics, gears, lubrication etc Here is a production and circulation of a great amount of particles and contamination. They get caught up and are crushed down in the system so more and more contamination builds up and oxidation in the oil accelerates.

### Air valve

Contamination and moisture from the air enter the oil system via air valves

### Inline filter

Full flow filters are not able to remove water and oxidation particles

### System pump

### Return

Contamination from the oil system enters the oil tank

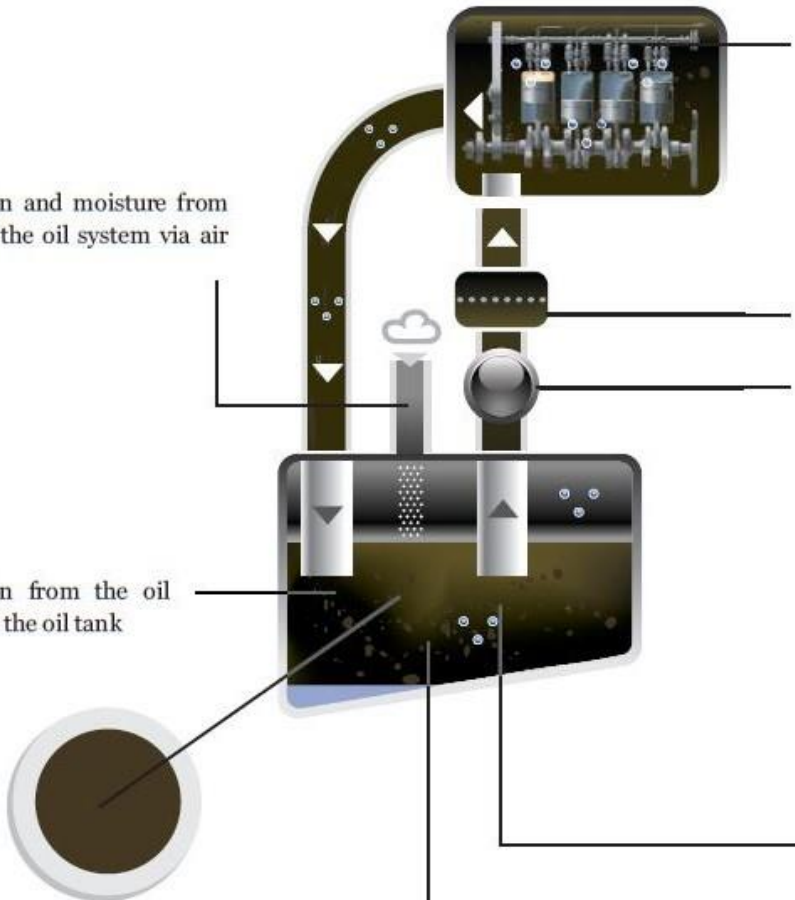
### Oil tank

Contamination from the oil tank flows out into the oil system

Oil sample before installation of an oil cleaning system from Europafilter

### Contamination

Resins, micro-particles and water are found throughout the system, and large quantities gather at the bottom and sidewalls of the tank



## Common types of damage caused by contamination in the oil



### Oxidation

Arises when the oil reacts chemically with water, oxygen or particles. The more particles there are the larger the contact surface with the oil, which affects it negatively. Oxidation residue appears in the form of a sticky mass that adheres to valves and bearings. Oxidation also gives rise to varnish, which reduces specified clearances and as a consequence causing non-uniform running, local heating and wear.



### Wear

When hard particles are squeezed between moving metal parts they damage metal surfaces. More and more particles are formed which in turn also activates and wear out the additives in the oil.



### Erosion

Particles suspended in the oil, which is moving at high speed, collide with the metal parts in the machine, destroying metal surfaces and forming more particles.

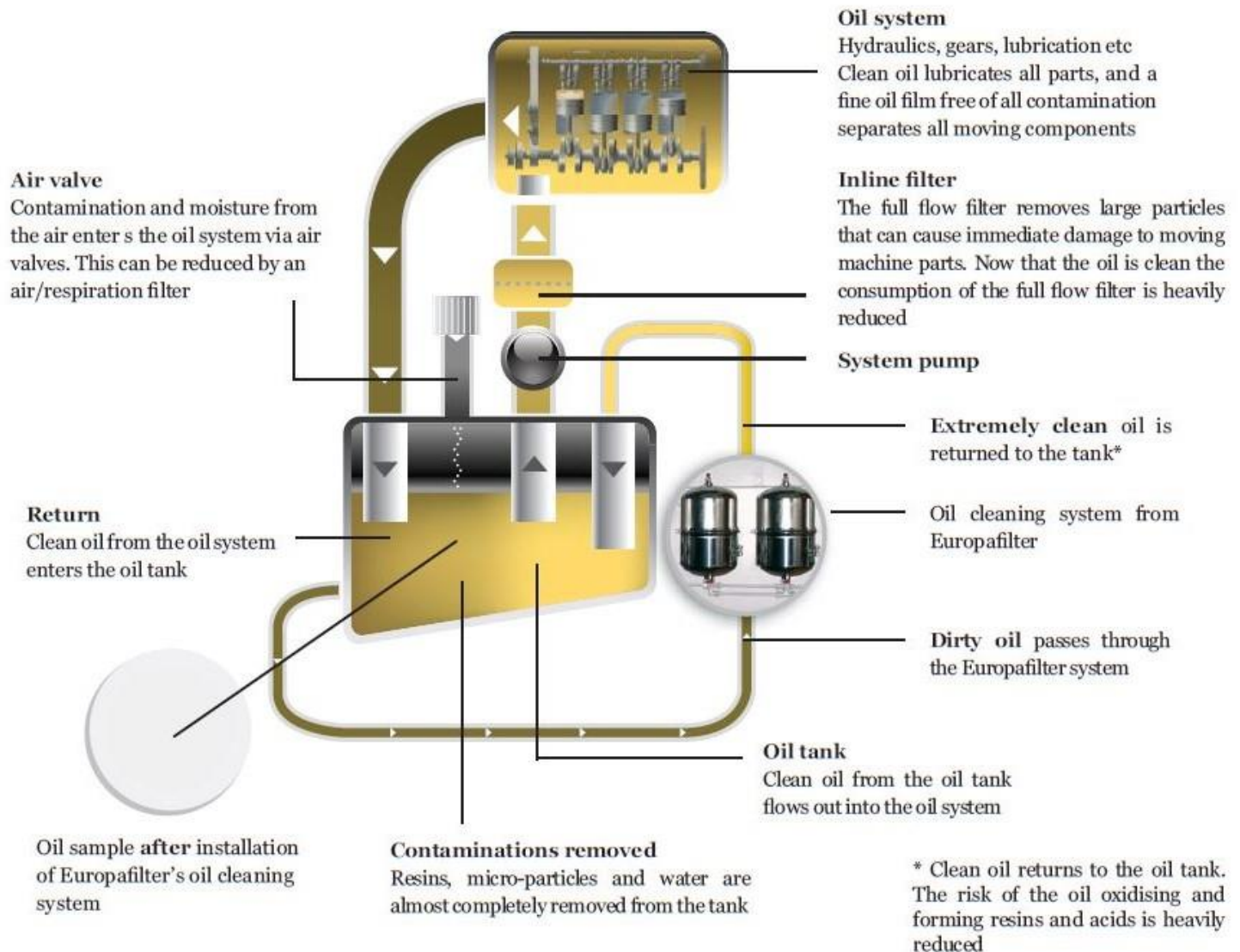


# The simple solution

## Safe operation

All oil has been cleaned by Europafilter's oil cleaning system and the clean oil has in turn cleaned lines, components and tank. The oxidation is down to a minimum. The process is very safe operate.

Europafilter's offline filter absorbs water and particles from the oil. At the same time the machine is cleaned as the clean oil carries away deposits from the system interior – while the machine is still operating.



## One filter – three functions



**Reducing water**  
The same filter that traps particles also absorbs all types of water from the oil: bound, free and emulsified.



**Ultra filtration**  
Europafilter traps all types of particles – both large and small down to 0.1 microns.



**Slows down oxidation**  
Not only does the EF2000 restrain the oxidation, it also traps deposits and resins that form when the oil oxidizes.



# Customers praise Europafilter's system

– Quotes from various of reports about Europafilter



"The description about how the filter worked and how it solved problems in other cases, seemed to be so simple that we just didn't believe it. However, we decided to go ahead and test it and after the oil cleaning system had been installed the machine functioned without problem."

Tord Larsson, Production Manager  
ABB Ludvika  
(Fluid Scandinavia nr 2. 2005)



"I was doubtful, but decided to try it and it worked well. Problems with resin formation disappeared."

Gerhard Carlberg, Construction Engineer  
Stora Enso, Hylte Bruk  
(Fluid Scandinavia nr 1. 2004)



## StatoilHydro

"An unscheduled compressor stop costs us one million crowns an hour. With this type of oil-maintenance we don't get any surprises."

Arild Undheim, Production Manager  
StatoilHydro Kollsnes Gas

"The oil proved to be cleaner than new even during operation, and the yearly costs has been reduced by approximately one million NOK per crane."

Olav Sverre Pedersen, Senior Mechanic  
StatoilHydro Oil Platform Gullfaks C  
(Aktuelt nr.2 feb. 2005)



"Previously we were accustomed to stoppages – nowadays they rarely happen."

Ingemar Dahlgren, Hydraulic Coordinator  
IAC Group (formerly Lear Corporation)



"It is an amazing difference! Taking the whole picture into consideration, we have actually made enormous savings, both with regards purchase and time. It would be a real understatement to say that we are satisfied, he says and laughs."

Göran Spännar, Tribology Technician, Korsnäs Frövi, (Underhåll & Driftsäkerhet, nr 5 2002)



## Other companies that have chosen Europafilter

Akzo Nobel, Arctic Paper AB, Arendal Fossekompagni ASA, Arla Food, AS Norske Shell, ASC South America, AstraZeneca, Austevoll Havfiske AS, Bagn Kraftverk DA, Barber Ship Management AS, Billerud Papper, Birkeland Br. Fiskebåtrederi AS, Bourbon Offshore Norway AS, C4 Energi AB, ConocoPhillips Norge, Daloc, DOF Rederi AS, Domsjö Fabriker, E.ON, E-CO Energi AS, Eidsiva Vannkraft, Eksjö Energi AB, Elkem Aluminium ANS, ESSO Ringhorne Platform, FordonsGas, Fortum, Färjerederiet, Gasell Profil AB, GE Energy AS, Getrag AB, Graphic Packaging AB, Gustavsberg AB, Gävle Energi AB, Göteborgs Hamn, Holmen Paper AB, Hydro Aluminium AS, Håkonsvern Orlogstasjon (Norske Forsvaret), Hässleholm Fjärrvärme AB, IAC Group AB, KCA Deutag Drilling Norge AS, Keter, Knauf Danogips AB, Knutsen OAS Shipping AS, Korsnäs Frövi AB, Kristiansund Taubåtstasjon AS, Leax Mekaniska AB, Lidköpings Värmeverk AB, Lindén International AB, Mondi Packaging AB, Naturkraft AS, Norska Forsvarets Forskningsinstitut, Norska Havsforsknings Instituttet, Norske Skogindustrier ASA, Odfjell Drillingmanagement AS, Odin AS, Outokumpu AB, Ovako Steel, Pipelife AB, Plasinject, Prosafe Drilling Services AS, Rana Gruber AS, Remøy Shipping AS, Roglaland Forkning, Rovde Supplyas, S.Ugelstads Rederi AS, SAAB, SAPA Profiler AB, SBS Marine, SCA, Scania, Sira-Kvina Kraftselskap, Skagerak Kraft AS, SKF, Solstad Shipping AS, SSAB, SSRS, Statkraft Energi AS, StatoilHydro Forskningscenter, StatoilHydro, Swedish Tissue AB, Teekay Marine Services AS, TIDE Sjø, Tinfos AS, Trollhättan Energi AB, Vattenfall, Volvo Cars, Volvo Powertrain, Vägverket, Växjö Energi AB, Årlifoss Kraft AS, Öresundskraft AB



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