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SternWay Bio 100

Environmentally adapted oil for marine applications

Friction Fighters™

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1 Product Introduction and Applications

Statoil SternWay Bio 100 is a dedicated sterntube oil developed for the most modern and demanding systems found today.

SternWay Bio 100 has been approved by Deep Sea Seals, Wärtsilä Propulsion and Cedervall & Söner AB for both NBR (nitrile rubber) and FKM (viton or fluoro rubber). SternWay Bio 100 has been field tested with excellent results.

Challenge

The concern for our living environment is ever increasing. Through the use of legislation, ship owners are encouraged to use “clean ships”. The expression “clean ship” implies overall reduction of the environmental impact when using the ship. This involves using less toxic paints for the ship, reducing emissions, using electricity in harbours instead of using auxiliary engines and changing to an environmentally adapted stern tube oil.

Environmentally adapted lubricants are preferably based on synthetic ester technology. Seal swell will occur when using synthetic esters. The seal volume increase depends on the chemistry of the synthetic esters as well as the elastomer of the seal. In SternWay Bio 100 special synthetic ester chemistry has been selected to pass the seal requirements. SternWay Bio 100 passes Deep Sea Seal requirements for both NBR and FKM.

Environmentally adapted lubricants have so far caused lead corrosion. Therefore, an intense research effort was put into solving the common corrosion problem. In SternWay Bio 100 hydrolytically stable synthetic esters have been chosen to avoid lead and tin corrosion in bearing material. The acid number of SternWay Bio 100 increases with 1.2 mg KOH/g oil in a 5-day-test carried out at 90 °C with 10% water present. This is considered a low acid value increase in a highly stressed test environment.

The life of SternWay Bio 100 shows good values. Tests in the RPVOT (Rotary Pressurized Vessel Oxidation Test) have reached results of 400 minutes at temperatures of 150 °C with 10% water and a copper catalyst present. Values above 100 minutes are considered to correspond to very high oxidation stability.

SternWay Bio 100 is based on a good balance between base fluids and additives. This has resulted in a fail load stage of 12 in the FZG test. This implies that SternWay Bio 100 also can be used in most gears.

Water Quality

SternWay Bio 100 is built upon biodegradable synthetic esters. The synthetic esters are easily biodegradable. This means that a SternWay Bio 100 leakage will biodegrade much faster in the water than a sterntube oil based on mineral base oils. Therefore, the local impact on the marine life will be reduced. Additionally, low toxic additive technology has been used to further reduce the impact on marine life from a leakage.

Maintenance

SternWay Bio 100 is formulated and tested to minimise maintenance and to improve oil change intervals if or when necessary. A special performance of the oil keeps the stern tube clean and functional. A laboratory test will easily show the condition of the oil.

2 Advantages and Features

SternWay Bio 100 has the following general properties.

Properties	Values
Kinematic viscosity at 40 °C	100 cSt
Kinematic viscosity at 100 °C	15 cSt
Density at 15 °C	920 kg/m³
VI	154

Table 1 *General properties for SternWay Bio 100.*

Biodegradability

SternWay Bio 100 is built upon biodegradable synthetic esters. The synthetic esters are readily biodegradable according to OECD 301B. This is a major advantage if SternWay Bio 100 is leaked to the environment. A leakage is quickly degraded in nature by the naturally occurring bacterias. Therefore, by using SternWay Bio 100 instead of a mineral based stern tube oil a positive decision for the environment is made.

Renewability

SternWay Bio 100 is formulated with renewable base fluids. The renewability is as high as 85% in the synthetic esters used in SternWay Bio 100. Therefore, by selecting SternWay Bio 100 the user is contributing efficiently to a sustainable environment.

Hydrolytic and oxidative stability

SternWay Bio 100 is based upon hydrolytically and oxidative stable synthetic esters giving the product its good hydrolytic and oxidative properties.

Foaming tendency

SternWay Bio 100 shows low foaming tendencies at both 24 °C and at 50 °C. Only 20 ml of foam is formed when air is bubbled through the oil. The foam settles very quickly when the air flow is stopped. Low foaming is important for oxidation stability and for availability.

Demulsibility

To totally avoid water in the stern tube oil is a good target but often not possible. To manage the good lubrication as well as the good corrosion performance the oil is designed to take up a decent amount of water in an emulsion.

Air release

Entrained air is quickly removed from SternWay Bio 100. An air release value of 7 minutes is measured at 75 °C. A quick air release reduces cavitations and improves oxidation stability of the product.

Rust prevention and corrosion resistance

A good selection of base fluids and additives give SternWay Bio 100 the superb anti corrosion properties it has. SternWay Bio 100 passes Rust B, which implies that SternWay Bio 100 can be used in sea water without corrosion problems on iron details. Also, the recipe of SternWay Bio 100 results in very low soft metal corrosion even in highly stressed laboratory tests.

Elastomer

Elastomers are used to seal the stern tube from sea water. It is important to reduce the leakage of oil to the sea as well as the leakage of water to the stern tube. When the seal is affected by either the water or the oil the seal may change volume or shape. A change in volume may give rise to leakage. Therefore, the formulation has been selected to minimise the seal swell of both NBR and FKM.

Babbitt bearing material

It is known that synthetic esters may give rise to soft metal corrosion from Babbitt bearing material. This is avoided by using SternWay Bio 100. The reason for that is the good selection of base fluids in combination with a good balance of additives, which has been done at our R&D department.

FZG

The same lubricant is usually used in both the stern tube and the gear driving the propeller. Therefore, SternWay Bio 100 has been developed to cope with the requirements in most gears. A fail load stage of 12 has been achieved in the FZG test.

3 Field Test

Figure 1 *M/S Bithav.*

SternWay Bio 100 has been successfully tested in M/S Bithav. M/S Bithav is one of Tarbit Shipping´s bitumen, oil and chemical tanker. It is 115 m long and has a dead weight of 6,400 MT.

SternWay Bio 100 was selected for its supreme environmental properties together with its technical performance. The field test was carried out with excellent results in as different climate zones as northern Europe and mid-Africa.

SternWay Bio 100 was closely followed during the whole field test. The properties of SternWay Bio 100 remained well during the two months testing period. For instance, the results show that the acid number does not increase in SternWay Bio 100 during the field test.

During the field test the levels of copper, iron, lead, tin and zinc were monitored, also. The levels of all monitored metals were extremely low even after two months of field testing.

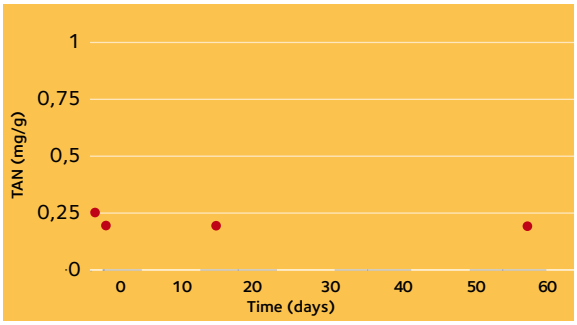

Figure 2 *The acid value remains constant during the field test.*

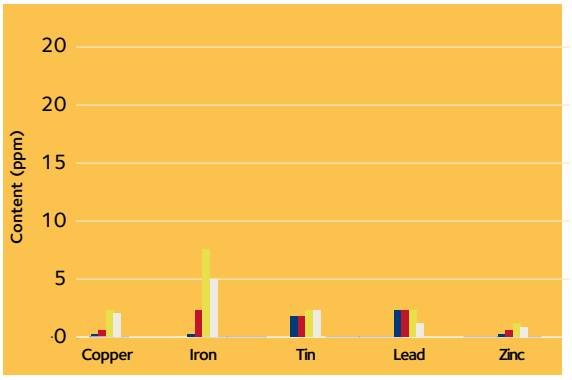

Figure 3 *The levels of all soft metals remained very low during the field test.*

After the field test the propeller and the bearings were examined closely without any noticeable changes. It was observed that both the propeller and the bearings were more easily cleaned when SternWay Bio 100 was used instead of regular mineral oil based stern tube lubricants.

Figure 4 *The Babbitt bearing after the two months field test.*

4 Approvals

SternWay Bio 100 has been approved by Deep Sea Seal, Wärtsilä Propulsion and Cedervall & Söner AB for both NBR (nitrile rubber) and FKM (fluoro rubber).