

Service Bulletin

RD-4

Technical Information to all the Owners
of Sulzer RD and RND Type Engines

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Lubricating Oil Requirements / Running-in

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INTRODUCTION

The Sulzer R type diesel engines have separate systems for the lubrication.

One system serves the running gear and the bearings, another one is intended for the cylinder liner lubrication.

Hydraulic governors, turning gears and most turbochargers have their own self-contained oil charge

Each system demands for specific requirements of the lubricant for that respective purpose.

In principle, Sulzer specifies oil types and not specially oil brands. Thus the selection of the oil supplier is left to the owner of the engine.

A number of oils is listed on the enclosure to aid the owner in selecting the lube oil for the specific purpose.

The oils shown have proven well in practice and normally are available worldwide.

1. SYSTEM OIL

This oil serves all the moving parts of the running gear and the control system of the engine.

For such purpose, a rust- and oxidation inhibited (R+0) oil of SAE 30 viscosity grade is recommended. If desired also a light- alkaline, detergent type oil can be used. Such an oil must have good water-shedding properties to remove any water contamination by the oil separator.

In order to maintain the system oil in good condition over a long working period, it is essential to remove water and solid particles as much as possible.

Therefore, we recommend to treat the system oil in a self-cleaning centrifugal separator, operated in by-pass from and to the lube oil sump tank.

With water contaminated system oil (particularly with sea water) there is always the risk of corrosion on engine components.

The water content in the system oil should not exceed 0,5% –vol. for longer periods of time. In case of higher content, special measures have to be applied for water removal. Respective samples of system oil should be taken while the oil is hot about every 3000 hours and analyzed. Oil suppliers generally offer such services.

As a guide, the following parameters of the oil in use should be kept within the indicated limits:

| | | |
|--|---------|---------------|
| flash point | above | 180°C |
| viscosity change | between | -10% and +20% |
| total insolubles (pentane and benzene) | below | 0,5% |
| water content | below | 0,5% |
| SAN (Strong Acid Number) | nil | |

2. CYLINDER OIL

2.1 Selection of Cylinder Oil for Normal Operation

For normal operation a cylinder oil of SAE 50 viscosity grade with sufficient alkalinity and a minimum kinematic viscosity of 18,5 cSt at 100°C is to be applied.

The alkalinity of the oil is indicated by its BN (Base Number) and must be selected with regard to the sulphur content of the fuel used.

High sulphur content of the fuel calls for high BN of the lube oil.

The following indication may serve as a guide:

| | | |
|------------------------------|--------|----------|
| Sulphur content of the fuel: | 0,5–1% | above 1% |
| BN of the lube oil: | 15–40 | 70 |

When a fuel is used predominantly with a sulphur content of above about 3,5%, the application of a cylinder lube oil with a BN of more than 70 might be considered.

In case of continuous operation with a low-sulphur fuel, i.e. below 0,5%, it is recommended to use lube oils of lower BN (about 15–20). Such lube oils have proved in practice to give good results as the risk of scuffing of piston rings and cylinder liner will be kept at a minimum.

2.2 Selection of Cylinder Oil for Running-in

Running-in of new piston rings and cylinder liners should not be done with a high alkaline cylinder oil. We recommend to use a mineral oil of SAE 50 viscosity grade without any alkalinity (BN ~ 0) for the first running hours according to following guide:

For a fuel with more than 1% sulphur content about 10 to 20 hours.

For a fuel with 0,5 to 1% sulphur content about 20 to 50 hours.

For a fuel with less than 0,5% sulphur content about 50 to 100 hours.

When running-in an engine which had been submitted to workshop trials, after re-erection in the ship, use as well such a mineral oil for dock- and sea trial during the first few hours.

The purpose of the running-in process is getting the piston rings to seal as quickly and as well as possible.

Within about 5 hours, 75% load should be reached and thereafter, the output should gradually be increased up to normal service load.

The following program should be followed:

| | | |
|---------|-----|---------------------------|
| 1 hour | 70% | } of normal service r.p.m |
| 1 hour | 75% | |
| 1 hour | 80% | |
| 2 hours | 85% | |
| 3 hours | 90% | |
| 6 hours | 95% | |

For running—in new cylinder liners and/or piston rings the lubricator, feeding the cylinder concerned (and in most cases also the adjacent one), is to be filled with a straight mineral oil as mentioned before.

The lube oil feed rate is to be increased to 0,8–1,0 g/BHP_h referred to full load for the first 12 hours and thereafter, gradually be reduced in small steps back to the normal value within about 200 hours.

In case the engine, after re—entering service, must for compelling reasons reach full service load quickly (so that consequently the guideline can not be observed), then as an exception the fuel quantity to the cylinder in question must be reduced for at least 12 hours by fitting the special spacer under the suction valve push rod of the fuel pump serving the appropriate cylinder (see Service Instructions, section 550 resp. 551 pages 11 and 27).

3. TURBOCHARGER OIL (in case of self—contained oil charge)

In principle, the instructions of the manufacturer are to be followed.

As general guidance, a turbine oil with a viscosity of between 68 and 78 cSt at 40°C is recommended.

4. HYDRAULIC GOVERNOR OIL

For the use in the hydraulic governor a mineral oil with a viscosity of about 25 to 50 cSt at operating temperature is recommended.

Practically in every case the lube oil used in the turbocharger can also be used in the governor. The oil is by all means to be kept clean!

5. TURNING GEAR OIL

For the turning gear a high grade gear box oil should be used with a viscosity of about 220 cSt at 40°C. Such an oil should have satisfactory high—pressure properties, it should not foam and provide adequate protection against corrosion.

We therefore recommend an EP gear oil with FZG load test stage pass 12 and a viscosity grade ISO VG 220.

For further information please contact New Sulzer Diesel Ltd. Winterthur.

ENCLOSURE: as mentioned

LUBRICATING OILS FOR RD, RND AND RND..M, TYPE ENGINES

| Oil Supplier 1 | System Oil 2 | Cylinder Oil for running-in 3 | Cylinder Oil fuel sulphur above 1% 4 | Cylinder Oil fuel sulphur 0.5 to 1% 5 | Turbocharger Governor 6 |
|-----------------------|--|---|---|--|-------------------------------|
| Agip | Acer 100 Cladium 50 SAE30 | Acer 220 | Punica 570 | MCL 18 | OTE 68 |
| BP | OE-30M OE-HT 30 | CS 220 | CLO 50M | CL 155 | THB 68 |
| Caltex | Diesel Engine Oil R&O RPM 800 Marine Oil | Ursa Oil P 220 | Super DCL Special | RPM Delo 2000 Marine Oil | Regal Oil R&O 68 |
| Castrol | Marine MPX 30 Marine CDX 30 | Marine S | Marine S/DZ65 Cyltech 80 | 225 MXD | Perfecto T68 |
| Chevron | Veritas Marine R&O Veritas 800 Marine 30 | Veritas Marine R&O 50 | Delo Cyloil Special | Delo 2000 | GST Oil 68 |
| Elf | Atlanta Marine 30 or D 3005 | Atlanta Marine 60 | Talusia XT70 | Disola M5015 | Turbine T 68 Misola H 68 |
| Exxon Esso | Exxmar XP Exxmar XA | Nuto 220 Teresso 220 Terestic 220 | Exxmar X70 | Exxmar 12TP50 | Tro-Mar T |
| Mobil | DET Oil No 3 Mobilgard 300 | DTE Oil No 5 DTE Oil BB | Mobilgard 570 | Mobilgard 512 | DTE Oil Heavy |
| Shell | Melina S Oil 30 Melina Oil 30 | Vitreia Oil 220 | Alexia Oil 50 Alexia Oil X | Alexia Oil D | Turbo Oil T 68 |
| Texaco | Doro AR 30 | Ursa Oil P 220 Regal Oil R&O 220 | Taro Special | Taro XD 50 | Regal Oil R&O 68 |

All cylinder oils must be of SAE 50 viscosity grade with a minimum viscosity of 18.5 cSt at 100°C.

Running-in oils shown in column 3 are straight mineral oils of the SAE 50 viscosity grade without alkalinity i.e. no BN. If, during running-in, a fuel with a sulphur content of 0.5% or more is used, detergent type oil as shown in column 5 can be used.

The products listed were selected in cooperation with the various oil suppliers and are considered the appropriately suitable lubricants of their respective product lines for the application indicated. However, New Sulzer Diesel Ltd. does not take any liability as to the quality of the supplied lubricating oil or its performance in actual service.

In addition to the oils shown on this list, there are other brands which might be suitable for the use in Sulzer diesel engines. Informations concerning such brands may be obtained on request from New Sulzer Diesel Ltd., Winterthur.

Some of the oils listed, especially those shown under the heading of "cylinder oil, sulphur content of fuel 0.5 to 1% (column 5) might be available from the oil suppliers only by special request.

For engines equipped with PTO or a power turbine, the system oil selected must meet a minimum load carrying capacity requirement, specified by the FZG gear machine method IP 334/90, load stage pass 8.

When using a fuel with sulphur content of less than 0.5% for prolonged periods of operation, a cylinder oil of the SAE 50 viscosity grade with a moderate level of alkalinity, i.e. BN in the range of about 15 to 20 should be selected. Reference is also made to the respective chapters in the engine operating manual and to "Lubricating oil requirements for Sulzer diesel engines".

Running-in new piston rings and cylinder liners is a critical process in engine operation influencing the performance and the life time of these components. Appropriate procedures are outlined also in the instruction manual and should be carefully observed. Lubricating oils recommended for running-in are shown on the lubricating oil list.