

Wärtsilä low-speed engines  
Services 2-stroke

RT-148  
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## Cylinder lubrication at low load operation – use of intermediate BN lubricating oils

Information to all Owners and Operators of  
Wärtsilä RTA, RT-flex and W-X 2-stroke engines

### For immediate attention

#### Concerned products

Wärtsilä RTA, RT-flex and W-X 2-stroke engines operating continuously at low load (below 60% CMCR and down to extreme low loads).

#### Current situation

Many vessels are operating continuously at low load and are bunkering Heavy Fuel Oil (HFO) with sulphur content up to 3.50%. On the other hand the cylinder lubricating oil offer is very wide in terms of Base Number (BN) and a high number of cylinder lubricants with an intermediate BN (BN higher than 40 and BN lower than 70) are now being widely used. The classical BN 70 lubricant is still available and some high BN lubricants are emerging on the market (BN higher than 70). An even higher BN lubricant can also be obtained by using a Blending on Board package.

#### Problem

With the low load operation and use of high sulphur fuel, the risk of cylinder liner corrosion is significantly increased.

#### Solution

Regular checks of the piston underside drain oil and the use of cylinder lubricants with a BN 70 or higher are recommended. In any case, the application of lubrication recommendations listed in this Service Letter shall be strictly adhered to.

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## 1 Introduction

Wärtsilä provides a list of validated cylinder lubricating oils available in the market according to a standard procedure. This includes laboratory and field validation tests at typical operating conditions and after the successful completion of such tests Wärtsilä issues a “No Objection Letter” to the respective oil company regarding the use of the tested lubricating oil type.

Nevertheless the responsibility regarding the performance of these lubricating oils remains with the respective oil company.

### Liability

**The supplying oil company assumes all responsibility for the performance of the lubricating oils in service of all Wärtsilä 2-stroke engines to the exclusion of any liability of any Wärtsilä company belonging to the Wärtsilä group. The oil company along with other possible manufacturers and distributors of the products in question shall indemnify, compensate and hold harmless Wärtsilä and companies belonging to the Wärtsilä group from and against any claims, damages and losses caused by the lubricating oils in question.**

Wärtsilä's Data & Specification bulletin RT-138, entitled “Lubricating oils” with its Appendix 1, i.e. RT-138\_A1, entitled “Validated lubricating oils” lists all validated cylinder oil types from different suppliers.

An effective way to judge piston running performance and the correct setup of the cylinder lubrication is the piston underside drain oil analysis.

A trend of increased total iron (Fe) or chromium (Cr) content will indicate the occurrence of cold corrosion.

The residual Base Number (BN) of the piston underside drain oil gives a good indication of the effectiveness of the cylinder lubrication. BN refers to the lubricant Base Number expressed in mgKOH/g.

Long term experience and the analysis of hundreds of piston underside samples have led to the definitions as listed in Table 1 (see also Data & Specification bulletin RT-138, Chapter 3.2):

**Recommended piston underside residual BN**

| Value            | Description  |
|------------------|--|
| > 25 mgKOH/g     | <b>Safe</b> corrected piston underside residual BN to avoid piston ring and liner corrosion.   |
| about 15 mgKOH/g | <b>Alert</b> corrected limit for piston underside residual BN to avoid excessive corrosion.  |
| < 10 mgKOH/g     | <b>Danger</b> corrected limit for piston underside residual BN and is likely to lead to excessive corrosion and rapid piston ring and liner wear if not corrected. |

Table 1

In order to secure an optimal balance between lubrication feed rate and piston running performance for a given set of lubricating oil and fuel type, Wärtsilä recommends that piston underside drain oil samples are regularly taken from each cylinder for analysis.

## 2 Problem

Many vessels are operating continuously at low load and are bunkering HFO with sulphur content up to 3.50%. With the more frequent low load operation and especially in connection with the use of high sulphur fuel, the risk of cylinder liner corrosion is significantly increased and the importance of the lubricating oil BN is accentuated.

## 3 Recommendation update

### 3.1 General recommendations

Service experience has shown that when operating below 60% CMCR, the engine corrosion behaviour can vary significantly. Therefore Wärtsilä is recommending the following:



In any case, if the engine is to be operated at continuous low load (i.e. more than 24 hours of operation below 60% CMCR) and use of HFO with sulphur content above 2.50%, **Wärtsilä strongly recommends the use of cylinder lubricating oil with a minimum BN of 70, but preferably higher.** BN 70 lubricants as well as higher BN lubricants are available with most of the lubrication oil suppliers (see Technical Bulletin RT-138 Appendix 1). A high BN lubricant adapted to the piston running and corrosion condition of the engine can also be achieved by using the Blending on Board package. This product allows the flexible onboard production of a “fit for purpose” cylinder lubricant when it comes to the BN needed to overcome the cold corrosion or to operate with low sulphur residual fuels.

In every case, as the operating conditions can be more severe than anticipated by the sulphur adjustment factors, it is important to monitor the corrected residual BN on a regular basis and to ensure that the value is met as stated in Table 1.

An onboard monitoring programme should at least permit the assessment of the residual BN from piston underside drain oil. The measurement of total Fe and Cr in the piston underside oil is also recommended. A sudden increase of the values of Fe or Cr would indicate the occurrence of significant cold corrosion and appropriate countermeasures should be applied (see also Service Letter RT-93).

### 3.2 Use of intermediate BN lubricating oils

Taking into account the experience made in the field when operating engines using intermediate BN oils running permanently at low load the recommended application range for such oils had to be reviewed.

As a consequence the “No Objection Letters” to the lubricant suppliers were re-issued during May 2013.

Recommendations for use of intermediate BN lubricating oils:

- Also when using intermediate BN oils Wärtsilä strongly recommends the application of an **onboard** monitoring programme for piston underside drain oil in order to assess at least the residual BN of the piston underside drain oil. The recommended frequency of piston underside drain oil sampling is:
  - At every bunker change, especially when using HFO with sulphur content above 2.50%
  - At change of the average load (24 hours) of 10% CMCR or higher
  - At least once per week



- If an onboard monitoring programme is in place, then any of the lubricants that have been validated and are listed in the Data & Specification bulletin RT-138 can be used. However, Wärtsilä wants to reinforce the sulphur dependency principle for the intermediate BN oils in accordance with Service Bulletin RT-113. **The intermediate BN oil has to be considered in the sulphur dependency guideline according to its nominal BN level.**

If the residual BN value is below the alert limit, then the recommendations of Service Letter RT-93 apply and consideration as to the change of lubricant for a higher BN lubricant should be made.

- Alternatively, if there is no onboard monitoring, Wärtsilä has to impose the following restrictions:

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**Attention:**

For all RTA, RT-flex and W-X engines, the intermediate BN oils (BN higher than 40 and BN lower than 70) may only be used with HFO in the sulphur range 0.50% to **2.50%** if the engine is going to be continuously operated at low load (i.e. more than 24 hours of operation below 60% CMCR).

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## 4 Contacts

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### 4.1 How to contact Wärtsilä

For questions about the content of this Service Letter, or if you need Wärtsilä assistance, services, spare parts and/or tools, please contact your nearest Wärtsilä representative.

If you don't have the contact details at hand, please follow the link "Contact us" – "24h Services" on the Wärtsilä webpage:

[www.wartsila.com](http://www.wartsila.com)

### 4.2 Contact details for emergency issues

#### Operational support

For questions concerning operational issues, please send your enquiry to:

[technicalsupport.chts@wartsila.com](mailto:technicalsupport.chts@wartsila.com)

or phone 24hrs support: +41 52 262 80 10.

#### Field service

If you need Wärtsilä Field Service, please send your enquiry to:

[Ch.Fieldservice@wartsila.com](mailto:Ch.Fieldservice@wartsila.com)

or phone 24hrs support: +41 79 255 68 80.

#### Spare parts

If you need Wärtsilä spare parts and/or tools, please send you enquiry to:

[ch.spareparts.wgls@wartsila.com](mailto:ch.spareparts.wgls@wartsila.com)

or phone 24hrs support: +41 52 262 24 02

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