WÄRTSILÄ

DATA & SPECIFICATIONS

Wärtsilä 4-stroke
Technical Services

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Issue 7, 02 March 2016

Lubricating oils for WÄRTSILÄ® 32 and 32GD engines

Information to Operators and Owners of installations concerned

For your information

Engines concerned
WÄRTSILÄ® 32 and 32GD engines.

Reference
02 Fuel, lubricating oil, cooling water

Introduction
Updated lubricating oil specification for WÄRTSILÄ® 32 and 32GD engines.

Validity / Issue
Until further notice. Replacing issue 6 dated 02 December 2014.

Wärtsilä Finland Oy Services
P.O. Box 252 (Tarhaajantie 2)
FIN-65101 Vaasa, Finland

24 hrs Tel: +358 10 709 080
Switchboard Tel: +358 10 709 0000
Fax: +358 6 356 7374

Enclosure

Requirements and oil quality 4V92A0645, revision r, 9 pages.

Contacts

For questions about the content of this bulletin, 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:
http://www.wartsila.com/contact

1.2.5 REQUIREMENTS AND OIL QUALITY

SYSTEM OIL REQUIREMENTS AND QUALITY FOR WÄRTSILÄ 32 AND WÄRTSILÄ 32GD ENGINES

Viscosity
Viscosity class SAE 40

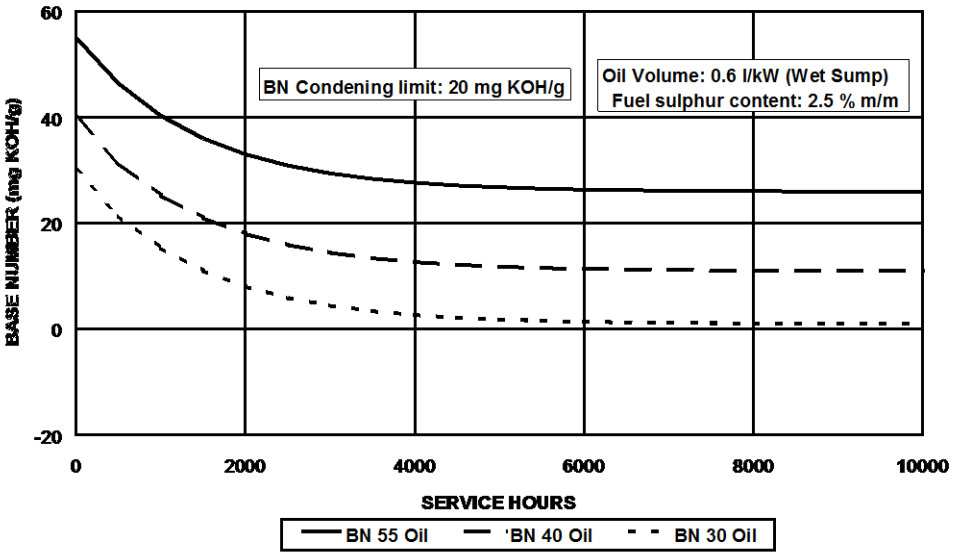
Viscosity Index (VI)
Min. 95

Alkalinity (BN)
The required lubricating oil alkalinity is tied to the fuel specified for the engine, which is shown in the table below.

FUEL STANDARDS AND LUBRICATING OIL REQUIREMENTS				
Category	Fuel standard		Lube oil BN	Fuel S content, [% m/m]
A	ASTM D 975-01 BS MA 100: 1996 CIMAC 2003 ISO 8217: 2012(E)	GRADE NO. 1-D, 2-D, 4-D DMX, DMA, DMB DX, DA, DB ISO-F-DMX - DMB	10 - 30	< 0,4
B	ASTM D 975-01 BS MA 100: 1996 CIMAC 2003 ISO 8217: 2012(E)	GRADE NO. 1-D, 2-D, 4-D DMX, DMA, DMB DX, DA, DB ISO-F-DMX - DMB	15 - 30	0,4 – 2,0
C	ASTM D 975-01, ASTM D 396-04, BS MA 100: 1996 CIMAC 2003 ISO 8217: 2012(E)	GRADE NO. 4-D GRADE NO. 5-6 DMC, RMA10-RMK55 DC, A30-K700 RMA 10-RMK 700	30 - 55	≤ 4,5
D	CRUDE OIL (CRO)		30 - 55	≤ 4,5
F	LIQUID BIO FUEL (LBF)		10 - 20	≤ 0,05
G	NATURAL GAS *)		10 - 55	~ 0

*) For Wärtsilä 32GD. Required BN depends on pilot / back-up fuel quality.

In case a low sulphur (S max. 0,2 % m/m) distillate fuel is used, it's recommended to use a lubricating oil with BN of 10 – 15.



It is recommended to use in the first place BN 50 - 55 lubricants when operating on heavy fuel. This recommendation is valid especially for engines having wet lubricating oil sump and using heavy fuel with sulphur content above 2,0 % mass. BN 40 lubricants can be used when operating on heavy fuel as well if experience shows that the lubricating oil BN equilibrium remains at an acceptable level.

In heavy fuel operation BN 30 lubricants are recommended to be used only in special cases, like e.g. such as installations equipped with an SCR catalyst. Lower BN products eventually have a positive influence on cleanliness of the SCR catalyst.

With BN 30 oils lubricating oil change intervals may be rather short, but lower total operating costs may be achieved because of better plant availability provided that the maintenance intervals of the SCR catalyst can be increased.

BN 30 oils are also a recommended alternative when operating on crude oil having low sulphur content. Though crude oils many times have low sulphur content, they can contain other acid compounds and thus an adequate alkali reserve is important. With crude oils having higher sulphur content BN 40 – 55 lubricating oils should be used.

If both distillate fuel and residual fuel are used in turn as fuel, lubricating oil quality has to be chosen according to instructions being valid for residual fuel operation, i.e. BN 30 is the minimum. Optimum BN in this kind of operation depends on the length of operating periods on both fuel qualities as well as of sulphur content of fuels in question. Thus in particular cases BN 40 or even higher BN lubricating oils should be used.

In the Wärtsilä 32GD engine type lubricating oil BN shall be chosen according to pilot / back-up fuel quality. If only distillate fuel is used as pilot / back-up fuel, lubricating oils with BN of 10 – 20 shall be used. If heavy fuel or crude oil is used as pilot / back-up fuel, lubricating oils with BN of min. 30 shall be used. Optimum BN level depends on engine's lubricating oil consumption, sulphur content of liquid fuels and the lengths of the periods operated on different fuel qualities.

The intervals between lubricating oil changes may be extended by adding oil frequently (even daily) to keep the oil level constantly close to the maximum level.

An example of BN depletion curve with different BN lubricating oils is shown below.

Additives
The oils shall contain additives that give good oxidation stability, corrosion protection, load carrying capacity, neutralisation of acid combustion and oxidation residues and should prevent deposit formation on internal engine parts (piston cooling gallery, piston ring zone and bearing surfaces in particular).

Foaming characteristics
Fresh lubricating oil shall meet the following limits for foaming tendency and stability, according to the ASTM D 892-92 test method:

Sequence I: 100/0 ml
Sequence II: 100/0 ml
Sequence III: 100/0 ml

Base oils
Use of virgin base stocks only is allowed, i.e. recycled or re-refined base oils are not allowed.

CONDEMNING LIMITS FOR USED LUBRICATING OIL

When estimating the condition of used lubricating oil, the following properties along with the corresponding limit values must be noted. If the limits are exceeded, measures must be taken. Compare also with guidance values for fresh lubricating of the brand used.

Property	Unit	Limit	Test method
Viscosity	cSt at 40 °C	max. 25% decrease max. 45% increase	ASTM D 445
Viscosity	cSt at 100 °C	max. 20% decrease max. 25% increase	ASTM D 445
Water	% v/v or % m/m	max. 0,30	ASTM D 95 or D 6304C
Base Number	mg KOH/g	min. 20 in HFO operation, max. 50% depletion in LFO operation	ASTM D 2896
Insolubles	% m/m in n-Pentane	max. 2,0	ASTM D 893b
Flash Point, PMCC Flash Point, COC	°C °C	min. 170 min. 190	ASTM D 93 ASTM D 92

CHANGE OF LUBRICATING OIL BRAND

Top-up with another lubricating oil brand than being filled to the system is not allowed, except if the both two lubricating oils originate from the same manufacturer. E.g. if company A's BN 40 oil is filled into the oil system and top-up with same Company A's BN 50 oil is desired, that can be done provided that both products are based on same base oils and additive technology. Otherwise the lubricating oil system has to be drained and then filled with another brand by following the procedure described here below.

In order to minimize the risk of lubricating oil foaming, deposit formation, blocking of lubricating oil filters, damage of engine components, etc., the following procedure should be followed when lubricating oil brand is changed from one to another:

- If possible, change the lubricating oil brand in connection with an engine (piston) overhaul

- Drain old lubricating oil from the lubricating oil system
- Clean the lubricating oil system in case of an excessive amount of deposits on the surfaces of engine components, like crankcase, camshaft compartment, etc.
- Fill the lubricating oil system with fresh lubricating oil

If the procedure described above is not followed, responsibility of possible damage and malfunctions caused by lubricating oil change should always be agreed between the oil company and customer.

VALIDATED LUBRICATING OIL QUALITIES FOR WÄRTSILÄ 32 AND WÄRTSILÄ 32GD ENGINES

Should a non-validated lubricating oil be used during the engine warranty period, and there exist no agreement with the engine manufacturer about testing, the engine guarantee does not hold.

WÄRTSILÄ 32: OPERATION ON DISTILLATE FUEL OR LIQUID BIO FUEL

If gas oil, marine diesel oil or liquid bio fuel is used as fuel, lubricating oils with a BN of 10 - 20 are recommended to be used. Lubricating oils having fresh oil BN below 15 can be used only if fuel sulphur content is below 0,4 % m/m. Also BN 30 lubricating oils included in Table 3 can be used on distillate fuel operation, though not preferred in the first place.

WÄRTSILÄ 32GD: OPERATION ON NATURAL GAS OR DISTILLATE FUEL AS MAIN FUEL AND DISTILLATE FUEL AS PILOT FUEL

If distillate fuel is used as pilot / back-up fuel in the Wärtsilä 32GD engine, lubricating oils with BN of 10 – 20 shall be used. Note that the use of liquid bio fuels (LBF) is not released for Wärtsilä 32GD.

Table 1.

Validated system oils - fuel categories A, B, F and G, recommended in the first place when operating on distillate fuel or liquid bio fuel and when distillate fuel in Wärtsilä 32GD is used as a pilot fuel:

SUPPLIER	BRAND NAME	VISCOSITY	BN	FUEL CATEG.
Aegean Marine Petroleum S.A.	Alfagen 414	SAE 40	14	A,B,F,G
BP	Energol HPDX 40	SAE 40	12	A,B,F,G
	Energol DS3-154	SAE 40	15	A,B,F,G
	Energol IC-HFX 204	SAE 40	20	A,B,F,G
Castrol	HLX 40	SAE 40	12	A,B,F,G
	MHP 154	SAE 40	15	A,B,F,G
	Seamax Extra 40	SAE 40	15	A,B,F,G
	TLX Plus 204	SAE 40	20	A,B,F,G

SUPPLIER	BRAND NAME	VISCOSITY	BN	FUEL CATEG.
Chevron (Texaco + Caltex)	Delo 1000 Marine 40	SAE 40	12	A,B,F,G
	Taro 12 XD 40	SAE 40	12	A,B,F,G
	Taro 20 DP 40	SAE 40	20	A,B,F,G
	Taro 20 DP 40X	SAE 40	20	A,B,F,G
ENI S.p.A.	Cladium 140 S	SAE 40	14	A,B,F,G
ExxonMobil	Delvac 1640	SAE 40	12	A,B,F,G
	Mobilgard ADL 40	SAE 40	12	A,B,F,G
	Mobilgard 412	SAE 40	15	A,B,F,G
	Mobilgard 1 SHC	SAE 40	15	A,B,F,G
Indian Oil Corporation	Servo Marine 1040	SAE 40	10	A,B,F,G
	Servo Marine 1540	SAE 40	15	A,B,F,G
	Servo Marine 2040	SAE 40	20	A,B,F,G
Irving Blending & Packaging	Irving Marine MTX 1540	SAE 40	15	A,B,F,G
	Irving Marine MTX 2040	SAE 40	20	A,B,F,G
Petrobras	Marbrax CCD-415	SAE 40	15	A,B,F,G
	Marbrax CCD-420	SAE 40	20	A,B,F,G
Shell	Gadinia Oil 40	SAE 40	12	A,B,F,G
Statoil	MarWay 1040	SAE 40	10,6	A,B,F,G
Total / Lubmarine	Disola M 4012	SAE 40	12	A,B,F,G
	Disola M 4015	SAE 40	14	A,B,F,G
	Disola M 4020	SAE 40	20	A,B,F,G
	Caprano M 40	SAE 40	14	A,B,F,G
	Disola SGS 40 *)	SAE 40	14	A,B

*) Use is limited to EDG applications only

WÄRTSILÄ 32: OPERATION ON HEAVY FUEL OR CRUDE OIL

Modern trunk piston diesel engines are stressing lubricating oil heavily e.g. due to low specific lubricating oil consumption. Also ingress of residual fuel combustion products into the lubricating oil can cause deposit formation on the surface of certain engine components resulting in severe operating problems. Due to these facts it is essential to use only lubricating oils with modern additive technologies having good compatibility between fuel and lubricating oil.

WÄRTSILÄ 32GD: OPERATION ON NATURAL GAS, HEAVY FUEL OR CRUDE OIL AS MAIN FUEL AND HEAVY FUEL OR CRUDE AS PILOT FUEL

If heavy fuel or crude oil is used as pilot / back-up fuel even only occasionally in the Wärtsilä 32GD engine, lubricating oils with BN of 30 – 55 shall be used.

Table 2.

Validated system oils - fuel categories C, D and G, included in the Table 2 are recommended in the first place when operating Wärtsilä 32 engine on heavy fuel and or on crude oil having high sulphur content in order to reach full service intervals. BN 50-55 lubricating oils are preferred in the first place. The oils included in the Table 2 or 3 shall also be used in the Wärtsilä 32GD engine if heavy fuel or crude oil is used as pilot / back-up fuel.

SUPPLIER	BRAND NAME	VISCOS-ITY	BN	FUEL CATEG.
Aegean Marine Petroleum S.A.	Alfamar 440	SAE 40	40	C,D,G
	Alfamar 450	SAE 40	50	C,D,G
	Alfamar 455	SAE 40	55	C,D,G
	Alfamar GII 440	SAE 40	40	C,D,G
	Alfamar GII 450	SAE 40	50	C,D,G
	Alfamar GII 455	SAE 40	55	C,D,G
BP	Energol IC-HFX 404	SAE 40	40	C,D,G
	Energol IC-HFX 504	SAE 40	50	C,D,G
Castrol	TLX Plus 404	SAE 40	40	C,D,G
	TLX Plus 504	SAE 40	50	C,D,G
	TLX Plus 554	SAE 40	55	C,D,G
Cepsa	Troncoil 4040 PLUS	SAE 40	40	C,D,G
	Troncoil 5040 PLUS	SAE 40	50	C,D,G
	Larus 4040	SAE 40	40	C,D,G
	Larus 5040	SAE 40	50	C,D,G
Chevron (Texaco + Caltex)	Taro 40 XL 40	SAE 40	40	C,D,G
	Taro 50 XL 40	SAE 40	50	C,D,G
	Taro 40 XL 40X	SAE 40	40	C,D,G
	Taro 50 XL 40X	SAE 40	50	C,D,G
Chinese Petroleum Corporation	Marilube Oil W 404	SAE 40	40	C,D,G
	Marilube Oil W 504	SAE 40	50	C,D,G
ENI S.p.A.	Cladium 400 S SAE 40	SAE 40	40	C,D,G
	Cladium 500 S SAE 40	SAE 40	50	C,D,G
	Cladium 550 S SAE 40	SAE 40	55	C,D,G
ENOC	Strata MSD 440	SAE 40	40	C,D,G
	Strata MSD 450	SAE 40	50	C,D,G
	Strata MSD 455	SAE 40	55	C,D,G
	EPPCO Bahri MSD 440	SAE 40	40	C,D,G
	EPPCO Bahri MSD 450	SAE 40	50	C,D,G
	EPPCO Bahri MSD 455	SAE 40	55	C,D,G
ExxonMobil	Mobilgard M 440	SAE 40	40	C,D,G
	Mobilgard M50	SAE 40	50	C,D,G
Fuchs	Titan PSW 40 SAE 40	SAE 40	40	C,D,G
	Titan PSW 55 SAE 40	SAE 40	55	C,D,G
Gulf Oil International	Gulfgen Supreme 440	SAE 40	40	C,D,G
	Gulfgen Supreme 455	SAE 40	55	C,D,G
	Gulfgen Supreme Plus 440	SAE 40	40	C,D,G
	Gulfgen Supreme Plus 455	SAE 40	55	C,D,G
Gulf Oil Marine / Sealub Alliance	GulfSea Power 4040	SAE 40	40	C,D,G
	GulfSea Power 4055	SAE 40	55	C,D,G
	GulfSea Power II 4040	SAE 40	40	C,D,G
	GulfSea Power II 4055	SAE 40	55	C,D,G
Indian Oil Corporation	Servo Marine K-4040	SAE 40	40	C,D,G
	Servo Marine K-5040	SAE 40	50	C,D,G
	Servo Marine K-5540	SAE 40	55	C,D,G
Irving Blending & Packaging	Irving Marine MTX 4040	SAE 40	40	C,D,G
	Irving Marine MTX 5040	SAE 40	50	C,D,G

SUPPLIER	BRAND NAME	VISCOS-ITY	BN	FUEL CATEG.
JX Nippon Oil & Energy Corporation	Marine T404	SAE 40	40	C,D,G
	Marine T504	SAE 40	50	C,D,G
Lukoil	Navigo TPEO 40/40	SAE 40	40	C,D,G
	Navigo TPEO 50/40	SAE 40	50	C,D,G
	Navigo TPEO 55/40	SAE 40	55	C,D,G
Morris Lubricants	Aquamor 140MD	SAE 40	40	C,D,G
	Aquamor 150MD	SAE 40	50	C,D,G
Pertamina	Martron 440	SAE 40	40	C,D,G
	Martron 450	SAE 40	50	C,D,G
	Medripal 440	SAE 40	40	C,D,G
	Medripal 450	SAE 40	50	C,D,G
	Salyx 440	SAE 40	40	C,D,G
	Salyx 450	SAE 40	50	C,D,G
Petrobras	Marbrax CCD-440	SAE 40	40	C,D,G
	Marbrax CCD-450	SAE 40	50	C,D,G
Petromin Corporation	Petromin Petropower Plus 3-40	SAE 40	40	C,D,G
	Petromin Petropower Plus 4-40	SAE 40	50	C,D,G
	Petromin Petropower Plus 5-40	SAE 40	55	C,D,G
	Petromin Petropower 3-40	SAE 40	40	C,D,G
	Petromin Petropower 4-40	SAE 40	55	C,D,G
	Petromin Petroshield 3-40	SAE 40	40	C,D,G
	Petromin Petroshield 4-40	SAE 40	55	C,D,G
Petron	Petromar XC 4040	SAE 40	40	C,D,G
	Petromar XC 5540	SAE 40	55	C,D,G
	Petromar HF 4040	SAE 40	40	C,D,G
	Petromar HF 5040	SAE 40	50	C,D,G
	Petromar HF 5540	SAE 40	55	C,D,G
Petronas International Lubricants	Disrol 400 SAE 40	SAE 40	40	C,D,G
	Disrol 500 SAE 40	SAE 40	50	C,D,G
	MAEO 4040	SAE 40	40	C,D,G
	MAEO 4050	SAE 40	50	C,D,G
Repsol YPF	Neptuno W NT 4000 SAE 40	SAE 40	40	C,D,G
	Neptuno W NT 5500 SAE 40	SAE 40	55	C,D,G
Shell	Argina X 40	SAE 40	40	C,D,G
	Argina XL 40	SAE 40	50	C,D,G
	Argina XX 40	SAE 40	55	C,D,G
Sinopec	TPEO 4040	SAE 40	40	C,D,G
	TPEO 4050	SAE 40	50	C,D,G
Total / Lubmarine	Aurelia TI 4040	SAE 40	40	C,D,G
	Aurelia TI 4055	SAE 40	55	C,D,G

Table 3.

Validated system oils - fuel categories A, B, C, D and G. Lubricating oils with BN 30 included in the Table 3 are designed to be used when operating Wärtsilä 32 engine on crude oil with low sulphur content (<1,0 % m/m). Further, on heavy fuelled installations BN 30 lubricants have eventually a positive influence on cleanliness of the SCR catalyst.

However, due to low lubricating oil consumption oil change intervals with BN 30 lubricating oils will be shorter than with higher BN lubricating oils. Lubricating oils included in Table 3 can

also be used in the Wärtsilä 32GD engine, if low sulphur heavy fuel or crude oil is used as a pilot / back-up fuel.

SUPPLIER	BRAND NAME	VISCOS-ITY	BN	FUEL CATEG.
Aegean Marine Petroleum S.A.	Alfamar 430	SAE 40	30	A,B,C,D,G
	Alfamar GII 430	SAE 40	30	A,B,C,D,G
BP	Energol IC-HFX 304	SAE 40	30	A,B,C,D,G
Castrol	TLX Plus 304	SAE 40	30	A,B,C,D,G
Cepsa	Troncoil 3040 PLUS	SAE 40	30	A,B,C,D,G
	Larus 3040	SAE 40	30	A,B,C,D,G
Chevron (Texaco + Caltex)	Taro 30 DP 40	SAE 40	30	A,B,C,D,G
	Taro 30 DP 40X	SAE 40	30	A,B,C,D,G
Chinese Petroleum Corporation	Marilube Oil W 304	SAE 40	30	A,B,C,D,G
ENI S.p.A.	Cladium 300 S SAE 40	SAE 40	30	A,B,C,D,G
ENOC	Strata MSD 430	SAE 40	30	A,B,C,D,G
	EPPCO Bahri MSD 430	SAE 40	30	A,B,C,D,G
ExxonMobil	Mobilgard M 430	SAE 40	30	A,B,C,D,G
Fuchs	Titan PSW 30 SAE 40	SAE 40	30	A,B,C,D,G
Gulf Oil International	Gulfgen Supreme 430	SAE 40	30	A,B,C,D,G
	Gulfgen Supreme Plus 430	SAE 40	30	A,B,C,D,G
Gulf Oil Marine / Sealub Alliance	GulfSea Power 4030	SAE 40	30	A,B,C,D,G
	GulfSea Power II 4030	SAE 40	30	A,B,C,D,G
Indian Oil Corporation	Servo Marine K-3040	SAE 40	30	A,B,C,D,G
Irving Blending & Packaging	Irving Marine MTX 3040	SAE 40	30	A,B,C,D,G
JX Nippon Oil & Energy Corp.	Marine T304	SAE 40	30	A,B,C,D,G
Lukoil	Navigo TPEO 30/40	SAE 40	30	A,B,C,D,G
Morris Lubricants	Aquamor 130MD	SAE 40	30	A,B,C,D,G
Pertamina	Martron 430	SAE 40	30	A,B,C,D,G
	Medripal 430	SAE 40	30	A,B,C,D,G
	Salyx 430	SAE 40	30	A,B,C,D,G
Petrobras	Marbrax CCD-430	SAE 40	30	A,B,C,D,G
Petromin Corporation	Petromin Petropower Plus 2-40	SAE 40	30	A,B,C,D,G
	Petromin Petropower 2-40	SAE 40	30	A,B,C,D,G
	Petromin Petroshield 2-40	SAE 40	30	A,B,C,D,G
Petron	Petromar XC 3040	SAE 40	30	A,B,C,D,G
	Petromar HF 3040	SAE 40	30	A,B,C,D,G
Petronas International Lubricants	Disrol 300 SAE 40	SAE 40	30	A,B,C,D,G
Shell	Argina T 40	SAE 40	30	A,B,C,D,G
Sinopec	TPEO 4030	SAE 40	30	A,B,C,D,G
Total / Lubmarine	Aurelia TI 4030	SAE 40	30	A,B,C,D,G

Before using a lubricating oil not listed in Tables 1-3, the engine manufacturer must be contacted. Lubricating oils that are not validated have to be tested according to engine manufacturer's procedures.

Lubricating oil companies listed above along with other possible manufacturers and distributors undertake all responsibility for the performance of their validated lubricating oils in service to the exclusion of any liability of any Wärtsilä company belonging to Wärtsilä group. Further, they shall indemnify, compensate and hold harmless Wärtsilä and companies belonging to Wärtsilä group from and against any claims, damages and losses caused by the lubricating oils in question.

LUBRICATING OILS FOR ENGINE TURNING DEVICE

Based on the turning device manufacturer's instructions EP-gear oils having viscosity of 414 - 506 cSt at 40 °C = ISO VG 460 are normally considered as suitable lubricating oils for turning device. The following products are fulfilling the requirements:

LUBRICATING OILS FOR ENGINE TURNING DEVICE				
SUPPLIER	**BRAND NAME**	**VISCOSITY cSt at 40 °C**	**VISCOSITY cSt at 100 °C**	**VISCOSITY INDEX (VI)**
BP	**Energol GR-XP 460**	**460**	**30,5**	**95**
Castrol	**Alpha SP 460**	**460**	**30,5**	**95**
Chevron (Texaco + Caltex)	**Meropa 460**	**460**	**31,2**	**97**
ENI S.p.A.	**Blasia 320**	**300**	**23,0**	**95**
ExxonMobil	**Mobilgear 600 XP 460**	**460**	**30,6**	**96**
Fuchs	**Renolin CLP 460**	**460**	**30,4**	**95**
RN-Lubricants	**TNK Reductor CLP 460**	**429**	**27,7**	**87**
Shell	**Omala S2 G 460**	**460**	**30,8**	**97**
Total / Lubmarine	**Carter EP 460**	**470**	**30,3**	**93**

LUBRICATING OILS FOR GOVERNOR / ACTUATOR

An oil of viscosity class SAE 30 or SAE 40 is suitable and usually the same oil can be used as in the engine. Turbocharger oil can also be used in the governor. At cold ambient conditions it may be necessary to use a multigrade oil (e.g. SAE 5W-40) for better governor response during start-up. Oil change interval: 2000 service hours.

Note 1: Monograde engine oils, multigrade oils or turbocharger oils etc. are not compatible with each other and shall not be mixed. Thus it's important to drain and flush with the new oil both the governor and booster properly if changing the oil quality.

Note 2: In EDG applications the use of multigrade oil (e.g. SAE 10W-30) is mandatory. Oil change interval: See engine Operation and Maintenance Manual.