MARINE DIESEL SPECIALISTS, INC
SURVEY REPORT

February 20, 2026

Lauderdale Marine Services / Mark Rose Innes
10524 N.W. 36th St.
Coral Springs, FL. 33065

M/Y LIVE MAS 2017 85' OCEAN ALEXANDER HULL# OAX85E12J617

MTU 12V 2000 M96L – 1920 HP (1432 KW) at 2450 RPM
Port Engine Number: 544 100 251 Operating Hours: 2286
Stbd. Engine Number: 544 100 250 Operating Hours: 2291
Marine Gears: ZF 2075A Port: 50037493 Stbd. 50037494 Reduction: 2.952/1

DESCRIPTION

The 12V2000 is a 12-cylinder 90-degree V configuration engine. The cylinder bore diameter is 135 mm with a 156 mm stroke. The engine is of four-cycle design with the high-pressure common rail fuel injection, closed circuit liquid cooling, charge air cooling and exhaust turbochargers. Displacement is 2.23 liters per cylinder with a total displacement of 26.8 liters. Individual cylinder heads with two exhaust valves and two intake valves per cylinder are one of the design features of this engine. Charge air cooling is accomplished through the large cooler that is mounted in the middle of the V of the engine. Charge air cooling serves to make the combustion air more dense which enables the engine to efficiently burn more fuel and therefore increasing the horsepower output when combined with exhaust gas driven, sequential turbochargers. The turbochargers are mounted in a jacketed exhaust housing that connects to both A and B bank exhaust manifolds and they pressurize and deliver combustion air to the engine. Both the exhaust manifolds and the turbochargers are jacket water cooled. The cooling system is of split circuit design meaning that the system is split up into a charge air coolant circuit (low temperature circuit) and a high temperature circuit. Thermostatic control of the charge air coolant flow as a function of engine load, determines the air temperature to the cylinders. The advantages of this system are reduced smoke emissions at low load operation and elimination of possible hazards from raw water contamination. The titanium plate type heat exchanger located at the front of the engine is designed for ease of maintenance and durability and minimizes the risk of leakage as in welded tubular type coolers. Engine starting is accomplished through a 24-volt starter, and the batteries are charged by an engine driven 24-volt alternator. Engine monitoring consists of MTU multifunction display panels for engine/gearbox with indicators, controls, and annunciators. Remote control is accomplished from main and slave single lever controls, indicators, and control elements.

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The engines have a manufacturer's rating of IDS which applies to fast yachts having low load factors. The maximum attainable RPM should be 2450 and we are of the opinion that the cruising speed should be approximately 2000 RPM or 80% load.

MAIN ENGINE PERFORMANCE

The engines were slowly brought up to an operating speed of 2000 RPM in order to allow pressures and temperatures to stabilize. All temperature and pressure readings were within normal parameters for this engine application at 2000 RPM. The engines were then brought up to maximum RPM 2366 port and 2374 starboard. Periodic full load operation is necessary in order to test cooling system efficiency as well as general engine performance characteristics since potential problems may not always be detected at lower engine speeds. Full load RPM should be 2450 for this engine application. The engines did not achieve full load RPM and therefore are overloaded.

AIR FILTRATION

The combustion air is supplied to the engines through Donaldson Duralite paper element type air filters installed on the A and B bank turbochargers. This application utilizes engine room air supply. The air filters look clean at the time of survey.

TURBOCHARGERS

The compressor wheels on the A and B bank turbos were inspected where possible and there was no obvious damage noted. The axial and radial play was normal at the time of inspection. The compressor housings are clean at this time. All sequential turbo flaps and actuators are functioning properly at the time of the survey.

FUEL SYSTEM

Fuel is supplied to the engines from the fuel tanks through a double Primary fuel filtration system manufactured by Racor that act as primary filter and water separator. The primary filters do not have water-in-filter sensors installed. The fuel is routed from the primary filters to the engine supply pump then through engine mounted double spin on secondary fuel filters and on to the high-pressure fuel pump. This is a common rail system with an electronically controlled high pressure pump providing pressure to the fuel rails and electronically controlled injectors. The injection pressures at wide open throttle can approach 32,000 PSI. The fuel system appears to be free of leaks, and the fuel condition appears to be good. The engine do not have an external priming system only standard hand prime pump.

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INTERCOOLER

The intercoolers were visually inspected, and it was noted that the port and starboard engines have no obvious problems noted nor were any leaks seen during the time of the sea trial. The charge air temperatures and pressures were within manufacturer's specifications.

COOLING SYSTEM

The engine cooling systems consist of titanium plate heat exchangers mounted to the front of the engine. Sea water is supplied to the heat exchanger through a bronze impeller MTU supplied pump which is gear driven from the front of the engine. The steel impeller freshwater pumps are also gear driven from the front of the engine. Zinc anodes are not used in the cooling system. The coolant temperatures were within manufacturer's specification. The cooling system is free of leaks at this time.

STARTER / ALTERNATOR

The engines are equipped with 24-volt Prestolite electric starters and Prestolite Leese/Neville alternators. The starters and alternators appear to be in good condition and are functioning properly at this time. The alternator outputs are 24.6 volts.

MARINE GEARS – Zahnradfabrik Friedrichshafen (ZF) 2075A

The marine gears are manufactured in Germany. They utilize a cast aluminum housing and are hydraulically operated through electric solenoid valves. The internal parts consist of an input shaft, output shaft, reversing shaft, related gearing, and a forward and reverse clutch pack. The gearbox is a reduction and a reversing unit with replaceable clutch packs. The selector valve serves to direct oil flow to the clutch packs thereby providing forward, neutral, or reverse depending upon direction of oil flow. The marine gears were visually inspected, and they appear to be in good condition at this time. There was no slippage noted and the drive oil temperature, pressure, and shifting were normal. The marine gear is supplied with an oil cooler and oil filter which require periodic inspection and maintenance. This application utilizes flange mounted gears set up in a conventional drive configuration. The reduction ratio is 2.467:1A. Both marine gears feature a hydraulic pump driven from each marine gear.

COUPLING

The flywheel to marine gear coupling is a rubber torsional coupling manufactured by Vulcan and it appears to be in good operational condition, however, disassembly for full inspection was not performed.

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CONTROLS

The engine throttle and shifting controls are manufactured by MTU. There are two control stations onboard the vessel plus a remote control. This includes the main helm station and upper station with one remote control wireless Yacht Controller. The main helm station control head features single lever control for port and starboard. The control head features push button control for command and synchronization. The main helm station, upper station and the remote control were functioning properly at the time of the survey.

ELECTRONICS

Both port and starboard engines were supplied with the standard MTU ADEC ECU 9 electronic control units (ECU). These units measure parameters and control injection timing on the engines. The vessel is equipped with port and starboard engine display units at the main helm to physically monitor engine parameters and alarms. The displays are manufactured by MTU. All the associated engine electronics are functioning properly at this time.

ENGINE MOUNTS

The engines are resiliently mounted with front mounts attached to the engine front cover and rear mounts attached to the transmission case. The gear boxes are flange mounted to the flywheel housing set in a conventional drive configuration. The mounts are manufactured by Rubber Design Co. All mounts appear to be in good condition at this time and there was no excessive movement noted while maneuvering the vessel.

EXHAUST SYSTEM

The exhaust system is connected to each exhaust outlet housing through a flexible compensator and risers. The risers incorporate a cooling spray ring and connect to a fiberglass collector that exits the exhaust stream through the hull bottom in the engine room. There are bypasses that act to reduce exhaust back pressure. The bypass exits the transom at the waterline. The risers have a hard fiberglass wrap, and the compensators have soft fiberglass blanket wraps to protect against heat. The riser is supported from the engine room overhead with spring isolators that are in good condition. The risers connect to the fiberglass collector via hump hose and clamps. All related hoses and clamps are in good condition at this time.

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MAIN ENGINE DISCREPANCIES

PORT

1. Oil leak at right bank turbo compressor housing flange to charge air cooler.
2. Oil leak at center turbo compressor housing flange to charge air cooler.
3. Transmission oil cooler end caps have corrosion.
4. Exhaust riser spray ring has some rust stains but not leaking at this time.
5. Engine did not achieve full load RPM and is overloaded.
6. Exhaust flap actuators leaking oil at seals.

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STARBOARD

1. Engine did not achieve full load RPM and is overloaded.
2. Transmission oil cooler end caps corroded.
3. Oil leak at turbo compressor housing outlet.
4. Exhaust flap housing actuators leaking oil..

MANUFACTURER'S RECOMMENDATION IDS Application

The manufacturer recommends that you adhere to the specific maintenance echelon schedule. An extended version of the schedule should be found on board in the vessel's engine catalogs. The engines should be serviced every 500 hours changing oil, filters, primary and secondary fuel filters.

GENERATORS KOHLER 32 KW

PORT		**STBD**	
Model:	32EOZD	**Model:**	32 EOZD
Serial:	SGM32CHXR	**Serial:**	SGM32CHXP
KW:	32	**KW:**	32
KVA:	32	**KVA:**	32
Hours:	2655	**Hours:**	2633
Amps:	133	**Amps:**	133
Volts:	120/240	**Volts:**	120/240
RPM:	1800	**RPM:**	1800
Batt V:	12	**Batt V:**	12
Freq:	60 HZ	**Freq:**	60 HZ
Oil Press.	**inoperative**	Oil **press:**	**inoperative**
Temp:	185 Fº	**Temp:**	204 Fº

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The generator performed well and carried the vessels' electronic load. The generators feature dual Racor 500 series primary fuel filters assemblies with bowl shields that look clean and appear to be in good condition. There are no water in fuel sensors in the bowls.

GENERATOR DISCREPANCIES:

1. Starboard generator exhaust riser has rust and corrosion on mixing elbow.
2. Oil pressure indicator on electronic screen is inoperative both generators..

OIL SAMPLES

Oil samples were drawn from the main engines, marine gears and generators. Results will be available in a few days.

GENERAL COMMENTS

The main engines, marine gears, and generators were found to be in good condition at this time.

NOTE:

The comments as stated in this report are based on engine inspections that were performed to the best of our ability and with as much attention to detail as possible. The results are believed to be an accurate evaluation as to the general condition of the engines at this time.

However, Marine Diesel Specialists, Inc. offers no warranty either express or implied on the engines of **M/Y LIVE MAS**. Survey results are intended to represent the physical condition of the vessel only on the day of the survey, based on the facts presented and discovered, in the opinion of the surveyor. This report will not specify or imply any type of warranty of the vessel or the vessel's machinery.

This report is issued subject to the condition that it is understood and agreed that neither this office, nor any surveyor or employee thereof is under any circumstances whatsoever to be held responsible in any way for any error in judgment, default or negligence, nor for any inaccuracy, omission, misrepresentation or misstatement in this report, and that the use of this report shall be construed to be an acceptance of the foregoing conditions.

This report is issued without prejudice to the rights of whom it may concern.

Thank you for the opportunity to be of service and if you have any questions, please call.

Sincerely,

Peter Angel
President

Time for right cursor:12:05:10

Sensor	Unit	Left	Right	Difference
[0]1 1.0100.001 P-Lube Oil after Filter	bar		7.11000	
[1]1 1.0100.015 L1L P-Lube Oil (ECU)	bar		4.26604	
[2]1 1.0100.016 L2L P-Lube Oil (ECU)	bar		3.70692	
[3]1 1.0102.001 P-Fuel	bar		8.45250	
[4]1 1.0102.015 L1L P-Fuel	bar		4.86604	
[5]1 1.0102.016 L2L P-Fuel	bar		4.36604	
[6]1 1.0106.001 P-CrankCase	mbar		7.52	
[7]1 1.0106.016 U1L P-CrankCase	mbar		45.00	
[8]1 1.0106.018 U2L P-CrankCase	mbar		65.00	
[9]1 1.0108.001 P-Ambient Air	bar		1.01300	
[10]1 1.0120.001 T-Coolant	degC		72.82	
[11]1 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[12]1 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[13]1 1.0121.001 T-Charge Air	degC		59.92	
[14]1 1.0121.017 U1L T-Charge Air	degC		75.00	
[15]1 1.0121.018 U2L T-Charge Air	degC		80.00	
[16]1 1.0121.050 T-Charge Air Final	degC		59.92	
[17]1 1.0122.001 T-Fuel	degC		68.61	
[18]1 1.0122.017 U1L T-Fuel	degC		90.00	
[19]1 1.0122.018 U2L T-Fuel	degC		95.00	
[20]1 1.0123.001 T-Intake Air	degC		41.79	
[21]1 1.0125.001 T-Lube Oil	degC		70.69	
[22]1 1.0125.017 U1L T-Lube Oil	degC		92.00	
[23]1 1.0125.018 U2L T-Lube Oil	degC		95.00	
[24]1 1.0125.050 T-Lube Oil Final	degC		70.69	
[25]1 1.0126.001 T-Exhaust A	degC		419.22	
[26]1 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[27]1 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[28]1 1.0127.001 T-Exhaust B	degC		408.45	
[29]1 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[30]1 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[31]1 1.0132.001 T-ECU	degC		53.70	
[32]1 1.0132.017 U1L T-ECU	degC		95.00	
[33]1 1.1005.012 Engine Power	kW		214.640	
[34]1 1.1005.021 Rated Power	kW		1432.000	
[35]1 1.1005.023 Engine Optimized	digit		16	
[36]1 1.1005.101 Trip Idle Time (SPN1037)	sec		206	
[37]1 1.1020.202 Act. Torque in Relation to DBR	%		30.850	
[38]1 1.1020.514 Injection Active			1	
[39]1 1.1300.332 Total Number of active Cylinders	digit		12	
[40]1 1.1300.333 Total Fuel Consumption Demand	l/min		0.999	
[41]1 1.2500.044 Engine Speed (ECU)	rpm		1223.9	
[42]1 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[43]1 1.3010.001 ETC 1 Speed	krpm		59.3178	
[44]1 1.3010.002 ETC 2 Speed	krpm		0	
[45]1 1.3010.006 ETC 3 Speed	krpm		0	
[46]1 1.3010.007 ETC 4 Speed	krpm		0	
[47]1 1.3010.031 Number Of Active Chargers	digit		1	
[48]1 1.8009.011 Actual Fuel Consumption	l/h		58.121	
[49]1 1.8009.012 Actual Fuel Consumption 2	mm3/s		16000.000	
[50]1 1.8009.016 Total Fuel Consumption	l		168909.0	
[51]1 1.8009.017 Trip Fuel Consumption	l		8569.8	
[52]1 1.8009.018 Fuel Consumption Idle Total	l		2005.4	
[53]1 1.8009.020 Mean Trip Fuel Consumption	l/h		41.677	
[54]1 1.8009.026 ECU Operating Hours Trip Sec	sec		740239	
[55]1 1.8009.027 Trip Operating hours	h		205	
[56]1 1.8009.029 Idle Time Total Seconds	sec		1478912	
[57]1 1.8009.070 ECU Mechanical Energy Counter	MWh		749.098	
[58]1 2.0280.001 Speed Demand ECU	rpm		1218.4	
[59]1 2.1000.041 Speed Demand (Speed Governor)	rpm		1218.4	
[60]1 2.1000.048 Maximum Requested Torque	Nm		3842.1	
[61]1 2.1000.049 Requested Torque	Nm		1677.3	
[62]1 2.1060.002 Speed Demand	rpm		1218.4	

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Sensor	Unit	Left	Right	Difference
[63]1 2.1060.003 Effective Engine Speed Demand	rpm		1218.4	
[64]1 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[65]1 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[66]1 2.1060.040 Rated Speed	rpm		2455.0	
[67]1 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[68]1 2.1060.050 Speed Demand before Ramp	rpm		1218.4	
[69]1 2.1060.051 Speed Demand Selected	rpm		1218.4	
[70]1 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1223.9	
[71]1 2.1060.203 Speed Demand before Droop	rpm		1218.4	
[72]1 2.1060.206 MCR[Nm] at Speed Demand	Nm		4192.9	
[73]1 2.1060.523 Speed/Torque Demand in %	%		24.368	
[74]1 2.1075.012 Actual Engine-Torque % (SPN513)	%		31.800	
[75]1 2.1075.016 Drivers Engine %Torque (SPN512)	%		3.842	
[76]1 2.1075.018 Engine Demand Torque % (SPN2432)	%		30.000	
[77]1 2.7000.004 Engine Load Reserve	%		56.300	
[78]2 1.0100.001 P-Lube Oil after Filter	bar		6.86250	
[79]2 1.0100.015 L1L P-Lube Oil (ECU)	bar		4.22680	
[80]2 1.0100.016 L2L P-Lube Oil (ECU)	bar		3.67640	
[81]2 1.0102.001 P-Fuel	bar		8.45625	
[82]2 1.0102.015 L1L P-Fuel	bar		4.82680	
[83]2 1.0102.016 L2L P-Fuel	bar		4.32680	
[84]2 1.0106.001 P-CrankCase	mbar		5.53	
[85]2 1.0106.016 U1L P-CrankCase	mbar		45.00	
[86]2 1.0106.018 U2L P-CrankCase	mbar		65.00	
[87]2 1.0108.001 P-Ambient Air	bar		1.01100	
[88]2 1.0120.001 T-Coolant	degC		73.17	
[89]2 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[90]2 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[91]2 1.0121.001 T-Charge Air	degC		60.60	
[92]2 1.0121.017 U1L T-Charge Air	degC		75.00	
[93]2 1.0121.018 U2L T-Charge Air	degC		80.00	
[94]2 1.0121.050 T-Charge Air Final	degC		60.60	
[95]2 1.0122.001 T-Fuel	degC		67.87	
[96]2 1.0122.017 U1L T-Fuel	degC		90.00	
[97]2 1.0122.018 U2L T-Fuel	degC		95.00	
[98]2 1.0123.001 T-Intake Air	degC		40.83	
[99]2 1.0123.053 T-Intake Air Final	degC		40.83	
[100]2 1.0125.001 T-Lube Oil	degC		71.09	
[101]2 1.0125.017 U1L T-Lube Oil	degC		92.00	
[102]2 1.0125.018 U2L T-Lube Oil	degC		95.00	
[103]2 1.0125.050 T-Lube Oil Final	degC		71.09	
[104]2 1.0126.001 T-Exhaust A	degC		428.45	
[105]2 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[106]2 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[107]2 1.0127.001 T-Exhaust B	degC		417.42	
[108]2 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[109]2 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[110]2 1.0132.001 T-ECU	degC		54.20	
[111]2 1.0132.017 U1L T-ECU	degC		95.00	
[112]2 1.1005.012 Engine Power	kW		218.180	
[113]2 1.1005.021 Rated Power	kW		1432.000	
[114]2 1.1005.101 Trip Idle Time (SPN1037)	sec		532	
[115]2 1.1020.202 Act. Torque in Relation to DBR	%		31.800	
[116]2 1.1300.332 Total Number of active Cylinders	digit		12	
[117]2 1.1300.333 Total Fuel Consumption Demand	l/min		1.002	
[118]2 1.2500.026 Idle Speed	rpm		550.0	
[119]2 1.2500.044 Engine Speed (ECU)	rpm		1213.0	
[120]2 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[121]2 1.3010.001 ETC 1 Speed	krpm		59.9700	
[122]2 1.3010.002 ETC 2 Speed	krpm		0	
[123]2 1.3010.003 ETC 2 Cut In			0	
[124]2 1.3010.031 Number Of Active Chargers	digit		1	
[125]2 1.8009.011 Actual Fuel Consumption	l/h		55.969	

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Sensor	Unit	Left	Right	Difference
[126]2 1.8009.012 Actual Fuel Consumption 2	mm3/s		15000.000	
[127]2 1.8009.016 Total Fuel Consumption	l		161479.5	
[128]2 1.8009.017 Trip Fuel Consumption	l		3177.7	
[129]2 1.8009.018 Fuel Consumption Idle Total	l		1788.7	
[130]2 1.8009.020 Mean Trip Fuel Consumption	l/h		23.249	
[131]2 1.8009.026 ECU Operating Hours Trip Sec	sec		492043	
[132]2 1.8009.027 Trip Operating hours	h		136	
[133]2 1.8009.029 Idle Time Total Seconds	sec		1487057	
[134]2 1.8009.070 ECU Mechanical Energy Counter	MWh		717.469	
[135]2 2.0280.001 Speed Demand ECU	rpm		1214.4	
[136]2 2.1000.041 Speed Demand (Speed Governor)	rpm		1214.4	
[137]2 2.1000.048 Maximum Requested Torque	Nm		3879.9	
[138]2 2.1000.049 Requested Torque	Nm		1717.5	
[139]2 2.1060.002 Speed Demand	rpm		1214.4	
[140]2 2.1060.003 Effective Engine Speed Demand	rpm		1214.4	
[141]2 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[142]2 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[143]2 2.1060.040 Rated Speed	rpm		2455.0	
[144]2 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[145]2 2.1060.050 Speed Demand before Ramp	rpm		1214.4	
[146]2 2.1060.051 Speed Demand Selected	rpm		1214.4	
[147]2 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1213.0	
[148]2 2.1060.203 Speed Demand before Droop	rpm		1214.4	
[149]2 2.1060.206 MCR[Nm] at Speed Demand	Nm		4183.6	
[150]2 2.1060.523 Speed/Torque Demand in %	%		24.288	
[151]2 2.1075.012 Actual Engine-Torque % (SPN513)	%		32.500	
[152]2 2.1075.016 Drivers Engine %Torque (SPN512)	%		3.879	
[153]2 2.1075.018 Engine Demand Torque % (SPN2432)	%		30.700	
[154]2 2.7000.004 Engine Load Reserve	%		55.700	

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Sensor	Unit	Left	Right	Difference
[0]1 1.0100.001 P-Lube Oil after Filter	bar		7.54125	
[1]1 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.50000	
[2]1 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.80867	
[3]1 1.0102.001 P-Fuel	bar		9.09375	
[4]1 1.0102.015 L1L P-Fuel	bar		6.02169	
[5]1 1.0102.016 L2L P-Fuel	bar		5.52169	
[6]1 1.0106.001 P-CrankCase	mbar		8.82	
[7]1 1.0106.016 U1L P-CrankCase	mbar		45.00	
[8]1 1.0106.018 U2L P-CrankCase	mbar		65.00	
[9]1 1.0108.001 P-Ambient Air	bar		1.01300	
[10]1 1.0120.001 T-Coolant	degC		75.01	
[11]1 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[12]1 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[13]1 1.0121.001 T-Charge Air	degC		45.10	
[14]1 1.0121.017 U1L T-Charge Air	degC		61.46	
[15]1 1.0121.018 U2L T-Charge Air	degC		66.46	
[16]1 1.0121.050 T-Charge Air Final	degC		45.10	
[17]1 1.0122.001 T-Fuel	degC		70.75	
[18]1 1.0122.017 U1L T-Fuel	degC		90.00	
[19]1 1.0122.018 U2L T-Fuel	degC		95.00	
[20]1 1.0123.001 T-Intake Air	degC		40.32	
[21]1 1.0125.001 T-Lube Oil	degC		72.15	
[22]1 1.0125.017 U1L T-Lube Oil	degC		92.00	
[23]1 1.0125.018 U2L T-Lube Oil	degC		95.00	
[24]1 1.0125.050 T-Lube Oil Final	degC		72.15	
[25]1 1.0126.001 T-Exhaust A	degC		543.31	
[26]1 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[27]1 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[28]1 1.0127.001 T-Exhaust B	degC		543.13	
[29]1 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[30]1 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[31]1 1.0132.001 T-ECU	degC		53.60	
[32]1 1.0132.017 U1L T-ECU	degC		95.00	
[33]1 1.1005.012 Engine Power	kW		570.820	
[34]1 1.1005.021 Rated Power	kW		1432.000	
[35]1 1.1005.023 Engine Optimized	digit		16	
[36]1 1.1005.101 Trip Idle Time (SPN1037)	sec		206	
[37]1 1.1020.202 Act. Torque in Relation to DBR	%		52.300	
[38]1 1.1020.514 Injection Active			1	
[39]1 1.1300.332 Total Number of active Cylinders	digit		12	
[40]1 1.1300.333 Total Fuel Consumption Demand	l/min		2.375	
[41]1 1.2500.044 Engine Speed (ECU)	rpm		1628.2	
[42]1 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[43]1 1.3010.001 ETC 1 Speed	krpm		66.3349	
[44]1 1.3010.002 ETC 2 Speed	krpm		0	
[45]1 1.3010.006 ETC 3 Speed	krpm		0	
[46]1 1.3010.007 ETC 4 Speed	krpm		0	
[47]1 1.3010.031 Number Of Active Chargers	digit		2	
[48]1 1.8009.011 Actual Fuel Consumption	l/h		129.231	
[49]1 1.8009.012 Actual Fuel Consumption 2	mm3/s		35000.000	
[50]1 1.8009.016 Total Fuel Consumption	l		168913.2	
[51]1 1.8009.017 Trip Fuel Consumption	l		8574.0	
[52]1 1.8009.018 Fuel Consumption Idle Total	l		2005.4	
[53]1 1.8009.020 Mean Trip Fuel Consumption	l/h		41.687	
[54]1 1.8009.026 ECU Operating Hours Trip Sec	sec		740421	
[55]1 1.8009.027 Trip Operating hours	h		205	
[56]1 1.8009.029 Idle Time Total Seconds	sec		1478912	
[57]1 1.8009.070 ECU Mechanical Energy Counter	MWh		749.114	
[58]1 2.0280.001 Speed Demand ECU	rpm		1637.6	
[59]1 2.1000.041 Speed Demand (Speed Governor)	rpm		1637.6	
[60]1 2.1000.048 Maximum Requested Torque	Nm		6162.3	
[61]1 2.1000.049 Requested Torque	Nm		3349.4	
[62]1 2.1060.002 Speed Demand	rpm		1637.6	

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Sensor	Unit	Left	Right	Difference
[63]1 2.1060.003 Effective Engine Speed Demand	rpm		1637.6	
[64]1 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[65]1 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[66]1 2.1060.040 Rated Speed	rpm		2455.0	
[67]1 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[68]1 2.1060.050 Speed Demand before Ramp	rpm		1637.6	
[69]1 2.1060.051 Speed Demand Selected	rpm		1637.6	
[70]1 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1628.2	
[71]1 2.1060.203 Speed Demand before Droop	rpm		1637.6	
[72]1 2.1060.206 MCR[Nm] at Speed Demand	Nm		5106.3	
[73]1 2.1060.523 Speed/Torque Demand in %	%		32.752	
[74]1 2.1075.012 Actual Engine-Torque % (SPN513)	%		61.800	
[75]1 2.1075.016 Drivers Engine %Torque (SPN512)	%		6.162	
[76]1 2.1075.018 Engine Demand Torque % (SPN2432)	%		60.000	
[77]1 2.7000.004 Engine Load Reserve	%		45.600	
[78]2 1.0100.001 P-Lube Oil after Filter	bar		7.24875	
[79]2 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.44780	
[80]2 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.74780	
[81]2 1.0102.001 P-Fuel	bar		8.98875	
[82]2 1.0102.015 L1L P-Fuel	bar		5.95650	
[83]2 1.0102.016 L2L P-Fuel	bar		5.45650	
[84]2 1.0106.001 P-CrankCase	mbar		7.03	
[85]2 1.0106.016 U1L P-CrankCase	mbar		45.00	
[86]2 1.0106.018 U2L P-CrankCase	mbar		65.00	
[87]2 1.0108.001 P-Ambient Air	bar		1.01100	
[88]2 1.0120.001 T-Coolant	degC		75.37	
[89]2 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[90]2 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[91]2 1.0121.001 T-Charge Air	degC		45.51	
[92]2 1.0121.017 U1L T-Charge Air	degC		64.76	
[93]2 1.0121.018 U2L T-Charge Air	degC		69.76	
[94]2 1.0121.050 T-Charge Air Final	degC		45.51	
[95]2 1.0122.001 T-Fuel	degC		70.09	
[96]2 1.0122.017 U1L T-Fuel	degC		90.00	
[97]2 1.0122.018 U2L T-Fuel	degC		95.00	
[98]2 1.0123.001 T-Intake Air	degC		38.49	
[99]2 1.0123.053 T-Intake Air Final	degC		38.49	
[100]2 1.0125.001 T-Lube Oil	degC		72.47	
[101]2 1.0125.017 U1L T-Lube Oil	degC		92.00	
[102]2 1.0125.018 U2L T-Lube Oil	degC		95.00	
[103]2 1.0125.050 T-Lube Oil Final	degC		72.47	
[104]2 1.0126.001 T-Exhaust A	degC		554.71	
[105]2 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[106]2 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[107]2 1.0127.001 T-Exhaust B	degC		553.59	
[108]2 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[109]2 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[110]2 1.0132.001 T-ECU	degC		54.20	
[111]2 1.0132.017 U1L T-ECU	degC		95.00	
[112]2 1.1005.012 Engine Power	kW		504.870	
[113]2 1.1005.021 Rated Power	kW		1432.000	
[114]2 1.1005.101 Trip Idle Time (SPN1037)	sec		532	
[115]2 1.1020.202 Act. Torque in Relation to DBR	%		47.600	
[116]2 1.1300.332 Total Number of active Cylinders	digit		12	
[117]2 1.1300.333 Total Fuel Consumption Demand	l/min		2.110	
[118]2 1.2500.026 Idle Speed	rpm		550.0	
[119]2 1.2500.044 Engine Speed (ECU)	rpm		1582.6	
[120]2 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[121]2 1.3010.001 ETC 1 Speed	krpm		65.5737	
[122]2 1.3010.002 ETC 2 Speed	krpm		0	
[123]2 1.3010.003 ETC 2 Cut In			1	
[124]2 1.3010.031 Number Of Active Chargers	digit		2	
[125]2 1.8009.011 Actual Fuel Consumption	l/h		126.810	

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Sensor	Unit	Left	Right	Difference
[126]2 1.8009.012 Actual Fuel Consumption 2	mm3/s		35000.000	
[127]2 1.8009.016 Total Fuel Consumption	l		161483.7	
[128]2 1.8009.017 Trip Fuel Consumption	l		3181.9	
[129]2 1.8009.018 Fuel Consumption Idle Total	l		1788.7	
[130]2 1.8009.020 Mean Trip Fuel Consumption	l/h		23.271	
[131]2 1.8009.026 ECU Operating Hours Trip Sec	sec		492224	
[132]2 1.8009.027 Trip Operating hours	h		136	
[133]2 1.8009.029 Idle Time Total Seconds	sec		1487057	
[134]2 1.8009.070 ECU Mechanical Energy Counter	MWh		717.484	
[135]2 2.0280.001 Speed Demand ECU	rpm		1585.1	
[136]2 2.1000.041 Speed Demand (Speed Governor)	rpm		1585.1	
[137]2 2.1000.048 Maximum Requested Torque	Nm		5998.9	
[138]2 2.1000.049 Requested Torque	Nm		3046.9	
[139]2 2.1060.002 Speed Demand	rpm		1585.1	
[140]2 2.1060.003 Effective Engine Speed Demand	rpm		1585.1	
[141]2 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[142]2 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[143]2 2.1060.040 Rated Speed	rpm		2455.0	
[144]2 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[145]2 2.1060.050 Speed Demand before Ramp	rpm		1585.1	
[146]2 2.1060.051 Speed Demand Selected	rpm		1585.1	
[147]2 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1582.6	
[148]2 2.1060.203 Speed Demand before Droop	rpm		1585.1	
[149]2 2.1060.206 MCR[Nm] at Speed Demand	Nm		5008.5	
[150]2 2.1060.523 Speed/Torque Demand in %	%		31.700	
[151]2 2.1075.012 Actual Engine-Torque % (SPN513)	%		56.300	
[152]2 2.1075.016 Drivers Engine %Torque (SPN512)	%		5.998	
[153]2 2.1075.018 Engine Demand Torque % (SPN2432)	%		54.500	
[154]2 2.7000.004 Engine Load Reserve	%		49.200	

Time for right cursor:12:10:59

Sensor	Unit	Left	Right	Difference
[0]1 1.0100.001 P-Lube Oil after Filter	bar		7.53375	
[1]1 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.50000	
[2]1 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.86267	
[3]1 1.0102.001 P-Fuel	bar		9.31500	
[4]1 1.0102.015 L1L P-Fuel	bar		6.15669	
[5]1 1.0102.016 L2L P-Fuel	bar		5.65669	
[6]1 1.0106.001 P-CrankCase	mbar		8.22	
[7]1 1.0106.016 U1L P-CrankCase	mbar		45.00	
[8]1 1.0106.018 U2L P-CrankCase	mbar		65.00	
[9]1 1.0108.001 P-Ambient Air	bar		1.01300	
[10]1 1.0120.001 T-Coolant	degC		79.73	
[11]1 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[12]1 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[13]1 1.0121.001 T-Charge Air	degC		36.69	
[14]1 1.0121.017 U1L T-Charge Air	degC		54.68	
[15]1 1.0121.018 U2L T-Charge Air	degC		59.56	
[16]1 1.0121.050 T-Charge Air Final	degC		36.69	
[17]1 1.0122.001 T-Fuel	degC		70.76	
[18]1 1.0122.017 U1L T-Fuel	degC		90.00	
[19]1 1.0122.018 U2L T-Fuel	degC		95.00	
[20]1 1.0123.001 T-Intake Air	degC		36.63	
[21]1 1.0125.001 T-Lube Oil	degC		76.44	
[22]1 1.0125.017 U1L T-Lube Oil	degC		92.00	
[23]1 1.0125.018 U2L T-Lube Oil	degC		95.00	
[24]1 1.0125.050 T-Lube Oil Final	degC		76.44	
[25]1 1.0126.001 T-Exhaust A	degC		576.50	
[26]1 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[27]1 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[28]1 1.0127.001 T-Exhaust B	degC		582.99	
[29]1 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[30]1 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[31]1 1.0132.001 T-ECU	degC		52.50	
[32]1 1.0132.017 U1L T-ECU	degC		95.00	
[33]1 1.1005.012 Engine Power	kW		706.410	
[34]1 1.1005.021 Rated Power	kW		1432.000	
[35]1 1.1005.023 Engine Optimized	digit		16	
[36]1 1.1005.101 Trip Idle Time (SPN1037)	sec		206	
[37]1 1.1020.202 Act. Torque in Relation to DBR	%		58.150	
[38]1 1.1020.514 Injection Active			1	
[39]1 1.1300.332 Total Number of active Cylinders	digit		12	
[40]1 1.1300.333 Total Fuel Consumption Demand	l/min		3.094	
[41]1 1.2500.044 Engine Speed (ECU)	rpm		1803.7	
[42]1 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[43]1 1.3010.001 ETC 1 Speed	krpm		74.4878	
[44]1 1.3010.002 ETC 2 Speed	krpm		0	
[45]1 1.3010.006 ETC 3 Speed	krpm		0	
[46]1 1.3010.007 ETC 4 Speed	krpm		0	
[47]1 1.3010.031 Number Of Active Chargers	digit		2	
[48]1 1.8009.011 Actual Fuel Consumption	l/h		187.664	
[49]1 1.8009.012 Actual Fuel Consumption 2	mm3/s		52000.000	
[50]1 1.8009.016 Total Fuel Consumption	l		168920.6	
[51]1 1.8009.017 Trip Fuel Consumption	l		8581.4	
[52]1 1.8009.018 Fuel Consumption Idle Total	l		2005.4	
[53]1 1.8009.020 Mean Trip Fuel Consumption	l/h		41.714	
[54]1 1.8009.026 ECU Operating Hours Trip Sec	sec		740586	
[55]1 1.8009.027 Trip Operating hours	h		205	
[56]1 1.8009.029 Idle Time Total Seconds	sec		1478912	
[57]1 1.8009.070 ECU Mechanical Energy Counter	MWh		749.143	
[58]1 2.0280.001 Speed Demand ECU	rpm		1804.0	
[59]1 2.1000.041 Speed Demand (Speed Governor)	rpm		1804.0	
[60]1 2.1000.048 Maximum Requested Torque	Nm		6432.3	
[61]1 2.1000.049 Requested Torque	Nm		3742.5	
[62]1 2.1060.002 Speed Demand	rpm		1804.0	

Time for right cursor:12:10:59

Sensor	Unit	Left	Right	Difference
[63]1 2.1060.003 Effective Engine Speed Demand	rpm		1804.0	
[64]1 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[65]1 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[66]1 2.1060.040 Rated Speed	rpm		2455.0	
[67]1 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[68]1 2.1060.050 Speed Demand before Ramp	rpm		1804.0	
[69]1 2.1060.051 Speed Demand Selected	rpm		1804.0	
[70]1 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1803.7	
[71]1 2.1060.203 Speed Demand before Droop	rpm		1804.0	
[72]1 2.1060.206 MCR[Nm] at Speed Demand	Nm		5416.3	
[73]1 2.1060.523 Speed/Torque Demand in %	%		36.080	
[74]1 2.1075.012 Actual Engine-Torque % (SPN513)	%		68.800	
[75]1 2.1075.016 Drivers Engine %Torque (SPN512)	%		6.432	
[76]1 2.1075.018 Engine Demand Torque % (SPN2432)	%		67.000	
[77]1 2.7000.004 Engine Load Reserve	%		41.800	
[78]2 1.0100.001 P-Lube Oil after Filter	bar		7.27875	
[79]2 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.50000	
[80]2 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.86196	
[81]2 1.0102.001 P-Fuel	bar		9.18375	
[82]2 1.0102.015 L1L P-Fuel	bar		6.15492	
[83]2 1.0102.016 L2L P-Fuel	bar		5.65492	
[84]2 1.0106.001 P-CrankCase	mbar		4.30	
[85]2 1.0106.016 U1L P-CrankCase	mbar		45.00	
[86]2 1.0106.018 U2L P-CrankCase	mbar		65.00	
[87]2 1.0108.001 P-Ambient Air	bar		1.01100	
[88]2 1.0120.001 T-Coolant	degC		80.05	
[89]2 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[90]2 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[91]2 1.0121.001 T-Charge Air	degC		36.64	
[92]2 1.0121.017 U1L T-Charge Air	degC		54.51	
[93]2 1.0121.018 U2L T-Charge Air	degC		59.31	
[94]2 1.0121.050 T-Charge Air Final	degC		36.64	
[95]2 1.0122.001 T-Fuel	degC		72.16	
[96]2 1.0122.017 U1L T-Fuel	degC		90.00	
[97]2 1.0122.018 U2L T-Fuel	degC		95.00	
[98]2 1.0123.001 T-Intake Air	degC		34.71	
[99]2 1.0123.053 T-Intake Air Final	degC		34.71	
[100]2 1.0125.001 T-Lube Oil	degC		76.81	
[101]2 1.0125.017 U1L T-Lube Oil	degC		92.00	
[102]2 1.0125.018 U2L T-Lube Oil	degC		95.00	
[103]2 1.0125.050 T-Lube Oil Final	degC		76.81	
[104]2 1.0126.001 T-Exhaust A	degC		574.75	
[105]2 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[106]2 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[107]2 1.0127.001 T-Exhaust B	degC		577.76	
[108]2 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[109]2 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[110]2 1.0132.001 T-ECU	degC		53.50	
[111]2 1.0132.017 U1L T-ECU	degC		95.00	
[112]2 1.1005.012 Engine Power	kW		709.920	
[113]2 1.1005.021 Rated Power	kW		1432.000	
[114]2 1.1005.101 Trip Idle Time (SPN1037)	sec		532	
[115]2 1.1020.202 Act. Torque in Relation to DBR	%		58.500	
[116]2 1.1300.332 Total Number of active Cylinders	digit		12	
[117]2 1.1300.333 Total Fuel Consumption Demand	l/min		3.085	
[118]2 1.2500.026 Idle Speed	rpm		550.0	
[119]2 1.2500.044 Engine Speed (ECU)	rpm		1801.4	
[120]2 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[121]2 1.3010.001 ETC 1 Speed	krpm		75.4716	
[122]2 1.3010.002 ETC 2 Speed	krpm		0	
[123]2 1.3010.003 ETC 2 Cut In			1	
[124]2 1.3010.031 Number Of Active Chargers	digit		2	
[125]2 1.8009.011 Actual Fuel Consumption	l/h		185.660	

Time for right cursor:12:10:59

Sensor	Unit	Left	Right	Difference
[126]2 1.8009.012 Actual Fuel Consumption 2	mm3/s		51000.000	
[127]2 1.8009.016 Total Fuel Consumption	l		161491.1	
[128]2 1.8009.017 Trip Fuel Consumption	l		3189.3	
[129]2 1.8009.018 Fuel Consumption Idle Total	l		1788.7	
[130]2 1.8009.020 Mean Trip Fuel Consumption	l/h		23.317	
[131]2 1.8009.026 ECU Operating Hours Trip Sec	sec		492390	
[132]2 1.8009.027 Trip Operating hours	h		136	
[133]2 1.8009.029 Idle Time Total Seconds	sec		1487057	
[134]2 1.8009.070 ECU Mechanical Energy Counter	MWh		717.513	
[135]2 2.0280.001 Speed Demand ECU	rpm		1799.8	
[136]2 2.1000.041 Speed Demand (Speed Governor)	rpm		1799.8	
[137]2 2.1000.048 Maximum Requested Torque	Nm		6432.7	
[138]2 2.1000.049 Requested Torque	Nm		3766.0	
[139]2 2.1060.002 Speed Demand	rpm		1799.8	
[140]2 2.1060.003 Effective Engine Speed Demand	rpm		1799.8	
[141]2 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[142]2 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[143]2 2.1060.040 Rated Speed	rpm		2455.0	
[144]2 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[145]2 2.1060.050 Speed Demand before Ramp	rpm		1799.8	
[146]2 2.1060.051 Speed Demand Selected	rpm		1799.8	
[147]2 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1801.4	
[148]2 2.1060.203 Speed Demand before Droop	rpm		1799.8	
[149]2 2.1060.206 MCR[Nm] at Speed Demand	Nm		5408.4	
[150]2 2.1060.523 Speed/Torque Demand in %	%		35.996	
[151]2 2.1075.012 Actual Engine-Torque % (SPN513)	%		69.200	
[152]2 2.1075.016 Drivers Engine %Torque (SPN512)	%		6.432	
[153]2 2.1075.018 Engine Demand Torque % (SPN2432)	%		67.400	
[154]2 2.7000.004 Engine Load Reserve	%		41.450	

Time for right cursor:12:13:18

Sensor	Unit	Left	Right	Difference
[0]1 1.0100.001 P-Lube Oil after Filter	bar		7.65375	
[1]1 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.50000	
[2]1 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.92350	
[3]1 1.0102.001 P-Fuel	bar		9.55875	
[4]1 1.0102.015 L1L P-Fuel	bar		6.30876	
[5]1 1.0102.016 L2L P-Fuel	bar		5.80876	
[6]1 1.0106.001 P-CrankCase	mbar		5.74	
[7]1 1.0106.016 U1L P-CrankCase	mbar		45.00	
[8]1 1.0106.018 U2L P-CrankCase	mbar		65.00	
[9]1 1.0108.001 P-Ambient Air	bar		1.01300	
[10]1 1.0120.001 T-Coolant	degC		81.88	
[11]1 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[12]1 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[13]1 1.0121.001 T-Charge Air	degC		36.31	
[14]1 1.0121.017 U1L T-Charge Air	degC		50.00	
[15]1 1.0121.018 U2L T-Charge Air	degC		53.00	
[16]1 1.0121.050 T-Charge Air Final	degC		36.31	
[17]1 1.0122.001 T-Fuel	degC		70.76	
[18]1 1.0122.017 U1L T-Fuel	degC		90.00	
[19]1 1.0122.018 U2L T-Fuel	degC		95.00	
[20]1 1.0123.001 T-Intake Air	degC		35.04	
[21]1 1.0125.001 T-Lube Oil	degC		77.89	
[22]1 1.0125.017 U1L T-Lube Oil	degC		92.00	
[23]1 1.0125.018 U2L T-Lube Oil	degC		95.00	
[24]1 1.0125.050 T-Lube Oil Final	degC		77.89	
[25]1 1.0126.001 T-Exhaust A	degC		699.84	
[26]1 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[27]1 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[28]1 1.0127.001 T-Exhaust B	degC		708.90	
[29]1 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[30]1 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[31]1 1.0132.001 T-ECU	degC		51.20	
[32]1 1.0132.017 U1L T-ECU	degC		95.00	
[33]1 1.1005.012 Engine Power	kW		909.840	
[34]1 1.1005.021 Rated Power	kW		1432.000	
[35]1 1.1005.023 Engine Optimized	digit		16	
[36]1 1.1005.101 Trip Idle Time (SPN1037)	sec		206	
[37]1 1.1020.202 Act. Torque in Relation to DBR	%		67.300	
[38]1 1.1020.514 Injection Active			1	
[39]1 1.1300.332 Total Number of active Cylinders	digit		12	
[40]1 1.1300.333 Total Fuel Consumption Demand	l/min		4.249	
[41]1 1.2500.044 Engine Speed (ECU)	rpm		2001.4	
[42]1 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[43]1 1.3010.001 ETC 1 Speed	krpm		78.2268	
[44]1 1.3010.002 ETC 2 Speed	krpm		0	
[45]1 1.3010.006 ETC 3 Speed	krpm		0	
[46]1 1.3010.007 ETC 4 Speed	krpm		0	
[47]1 1.3010.031 Number Of Active Chargers	digit		2	
[48]1 1.8009.011 Actual Fuel Consumption	l/h		256.161	
[49]1 1.8009.012 Actual Fuel Consumption 2	mm3/s		71000.000	
[50]1 1.8009.016 Total Fuel Consumption	l		168929.9	
[51]1 1.8009.017 Trip Fuel Consumption	l		8590.7	
[52]1 1.8009.018 Fuel Consumption Idle Total	l		2005.4	
[53]1 1.8009.020 Mean Trip Fuel Consumption	l/h		41.751	
[54]1 1.8009.026 ECU Operating Hours Trip Sec	sec		740723	
[55]1 1.8009.027 Trip Operating hours	h		205	
[56]1 1.8009.029 Idle Time Total Seconds	sec		1478912	
[57]1 1.8009.070 ECU Mechanical Energy Counter	MWh		749.177	
[58]1 2.0280.001 Speed Demand ECU	rpm		2004.2	
[59]1 2.1000.041 Speed Demand (Speed Governor)	rpm		2004.2	
[60]1 2.1000.048 Maximum Requested Torque	Nm		6448.0	
[61]1 2.1000.049 Requested Torque	Nm		4340.4	
[62]1 2.1060.002 Speed Demand	rpm		2004.2	

Time for right cursor:12:13:18

Sensor	Unit	Left	Right	Difference
[63]1 2.1060.003 Effective Engine Speed Demand	rpm		2004.2	
[64]1 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[65]1 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[66]1 2.1060.040 Rated Speed	rpm		2455.0	
[67]1 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[68]1 2.1060.050 Speed Demand before Ramp	rpm		2004.2	
[69]1 2.1060.051 Speed Demand Selected	rpm		2004.2	
[70]1 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		2001.4	
[71]1 2.1060.203 Speed Demand before Droop	rpm		2004.2	
[72]1 2.1060.206 MCR[Nm] at Speed Demand	Nm		5750.5	
[73]1 2.1060.523 Speed/Torque Demand in %	%		40.084	
[74]1 2.1075.012 Actual Engine-Torque % (SPN513)	%		79.500	
[75]1 2.1075.016 Drivers Engine %Torque (SPN512)	%		6.448	
[76]1 2.1075.018 Engine Demand Torque % (SPN2432)	%		77.700	
[77]1 2.7000.004 Engine Load Reserve	%		32.650	
[78]2 1.0100.001 P-Lube Oil after Filter	bar		7.39500	
[79]2 1.0100.015 L1L P-Lube Oil (ECU)	bar		5.50000	
[80]2 1.0100.016 L2L P-Lube Oil (ECU)	bar		4.92196	
[81]2 1.0102.001 P-Fuel	bar		9.35250	
[82]2 1.0102.015 L1L P-Fuel	bar		6.30492	
[83]2 1.0102.016 L2L P-Fuel	bar		5.80492	
[84]2 1.0106.001 P-CrankCase	mbar		2.73	
[85]2 1.0106.016 U1L P-CrankCase	mbar		45.00	
[86]2 1.0106.018 U2L P-CrankCase	mbar		65.00	
[87]2 1.0108.001 P-Ambient Air	bar		1.01100	
[88]2 1.0120.001 T-Coolant	degC		81.88	
[89]2 1.0120.017 U1L T-Coolant (ECU)	degC		94.00	
[90]2 1.0120.018 U2L T-Coolant (ECU)	degC		98.00	
[91]2 1.0121.001 T-Charge Air	degC		36.31	
[92]2 1.0121.017 U1L T-Charge Air	degC		50.00	
[93]2 1.0121.018 U2L T-Charge Air	degC		53.00	
[94]2 1.0121.050 T-Charge Air Final	degC		36.31	
[95]2 1.0122.001 T-Fuel	degC		74.94	
[96]2 1.0122.017 U1L T-Fuel	degC		90.00	
[97]2 1.0122.018 U2L T-Fuel	degC		95.00	
[98]2 1.0123.001 T-Intake Air	degC		33.13	
[99]2 1.0123.053 T-Intake Air Final	degC		33.13	
[100]2 1.0125.001 T-Lube Oil	degC		77.96	
[101]2 1.0125.017 U1L T-Lube Oil	degC		92.00	
[102]2 1.0125.018 U2L T-Lube Oil	degC		95.00	
[103]2 1.0125.050 T-Lube Oil Final	degC		77.96	
[104]2 1.0126.001 T-Exhaust A	degC		695.77	
[105]2 1.0126.017 U1L T-Exhaust Combined A	degC		780.00	
[106]2 1.0126.018 U2L T-Exhaust Combined A	degC		800.00	
[107]2 1.0127.001 T-Exhaust B	degC		702.19	
[108]2 1.0127.017 U1L T-Exhaust Combined B	degC		780.00	
[109]2 1.0127.018 U2L T-Exhaust Combined B	degC		800.00	
[110]2 1.0132.001 T-ECU	degC		52.40	
[111]2 1.0132.017 U1L T-ECU	degC		95.00	
[112]2 1.1005.012 Engine Power	kW		924.630	
[113]2 1.1005.021 Rated Power	kW		1432.000	
[114]2 1.1005.101 Trip Idle Time (SPN1037)	sec		532	
[115]2 1.1020.202 Act. Torque in Relation to DBR	%		68.600	
[116]2 1.1300.332 Total Number of active Cylinders	digit		12	
[117]2 1.1300.333 Total Fuel Consumption Demand	l/min		4.282	
[118]2 1.2500.026 Idle Speed	rpm		550.0	
[119]2 1.2500.044 Engine Speed (ECU)	rpm		1996.4	
[120]2 1.2510.001 Actual Engine Overspeed Limit	rpm		2818.0	
[121]2 1.3010.001 ETC 1 Speed	krpm		79.6284	
[122]2 1.3010.002 ETC 2 Speed	krpm		0	
[123]2 1.3010.003 ETC 2 Cut In			1	
[124]2 1.3010.031 Number Of Active Chargers	digit		2	
[125]2 1.8009.011 Actual Fuel Consumption	l/h		252.303	

Time for right cursor:12:13:18

Sensor	Unit	Left	Right	Difference
[126]2 1.8009.012 Actual Fuel Consumption 2	mm3/s		70000.000	
[127]2 1.8009.016 Total Fuel Consumption	l		161500.1	
[128]2 1.8009.017 Trip Fuel Consumption	l		3198.3	
[129]2 1.8009.018 Fuel Consumption Idle Total	l		1788.7	
[130]2 1.8009.020 Mean Trip Fuel Consumption	l/h		23.377	
[131]2 1.8009.026 ECU Operating Hours Trip Sec	sec		492526	
[132]2 1.8009.027 Trip Operating hours	h		136	
[133]2 1.8009.029 Idle Time Total Seconds	sec		1487057	
[134]2 1.8009.070 ECU Mechanical Energy Counter	MWh		717.546	
[135]2 2.0280.001 Speed Demand ECU	rpm		1999.8	
[136]2 2.1000.041 Speed Demand (Speed Governor)	rpm		1999.8	
[137]2 2.1000.048 Maximum Requested Torque	Nm		6449.7	
[138]2 2.1000.049 Requested Torque	Nm		4425.4	
[139]2 2.1060.002 Speed Demand	rpm		1999.8	
[140]2 2.1060.003 Effective Engine Speed Demand	rpm		1999.8	
[141]2 2.1060.004 Max. Eff. Engine Speed Demand	rpm		2720.0	
[142]2 2.1060.005 Min. Eff. Engine Speed Demand	rpm		550.0	
[143]2 2.1060.040 Rated Speed	rpm		2455.0	
[144]2 2.1060.049 Actual Engine Idle Speed	rpm		550.0	
[145]2 2.1060.050 Speed Demand before Ramp	rpm		1999.8	
[146]2 2.1060.051 Speed Demand Selected	rpm		1999.8	
[147]2 2.1060.075 Virtual Ramp Value (act.Speed)	rpm		1996.4	
[148]2 2.1060.203 Speed Demand before Droop	rpm		1999.8	
[149]2 2.1060.206 MCR[Nm] at Speed Demand	Nm		5744.6	
[150]2 2.1060.523 Speed/Torque Demand in %	%		39.996	
[151]2 2.1075.012 Actual Engine-Torque % (SPN513)	%		81.000	
[152]2 2.1075.016 Drivers Engine %Torque (SPN512)	%		6.449	
[153]2 2.1075.018 Engine Demand Torque % (SPN2432)	%		79.200	
[154]2 2.7000.004 Engine Load Reserve	%		31.350	

Time for left cursor:12:15:46 - 220693us
Time for right cursor:12:16:23 - 933904us
Difference in time:00:00:37 - 713211us

Sensor	Unit	Left	Right	Difference
[0]1 1.0100.001 P-Lube Oil after Filter	bar	7.85625	7.78500	-0.07125
[1]1 1.0100.015 L1L P-Lube Oil (ECU)	bar	5.50000	5.50000	0
[2]1 1.0100.016 L2L P-Lube Oil (ECU)	bar	5.00000	5.00000	0
[3]1 1.0102.001 P-Fuel	bar	9.83250	9.91125	0.07875
[4]1 1.0102.015 L1L P-Fuel	bar	6.50000	6.50000	0
[5]1 1.0102.016 L2L P-Fuel	bar	6.00000	6.00000	0
[6]1 1.0106.001 P-CrankCase	mbar	3.99	3.71	-0.28
[7]1 1.0106.016 U1L P-CrankCase	mbar	45.00	45.00	0
[8]1 1.0106.018 U2L P-CrankCase	mbar	65.00	65.00	0
[9]1 1.0108.001 P-Ambient Air	bar	1.01300	1.01300	0
[10]1 1.0120.001 T-Coolant	degC	83.35	83.35	0
[11]1 1.0120.017 U1L T-Coolant (ECU)	degC	94.00	94.00	0
[12]1 1.0120.018 U2L T-Coolant (ECU)	degC	98.00	98.00	0
[13]1 1.0121.001 T-Charge Air	degC	39.87	39.27	-0.60
[14]1 1.0121.017 U1L T-Charge Air	degC	50.00	50.00	0
[15]1 1.0121.018 U2L T-Charge Air	degC	53.00	53.00	0
[16]1 1.0121.050 T-Charge Air Final	degC	39.87	39.27	-0.60
[17]1 1.0122.001 T-Fuel	degC	71.45	71.78	0.33
[18]1 1.0122.017 U1L T-Fuel	degC	90.00	90.00	0
[19]1 1.0122.018 U2L T-Fuel	degC	95.00	95.00	0
[20]1 1.0123.001 T-Intake Air	degC	34.40	34.40	0
[21]1 1.0125.001 T-Lube Oil	degC	81.50	81.50	0
[22]1 1.0125.017 U1L T-Lube Oil	degC	92.00	92.00	0
[23]1 1.0125.018 U2L T-Lube Oil	degC	95.00	95.00	0
[24]1 1.0125.050 T-Lube Oil Final	degC	81.50	81.50	0
[25]1 1.0126.001 T-Exhaust A	degC	745.47	747.82	2.35
[26]1 1.0126.017 U1L T-Exhaust Combined A	degC	780.00	780.00	0
[27]1 1.0126.018 U2L T-Exhaust Combined A	degC	800.00	800.00	0
[28]1 1.0127.001 T-Exhaust B	degC	752.57	754.92	2.35
[29]1 1.0127.017 U1L T-Exhaust Combined B	degC	780.00	780.00	0
[30]1 1.0127.018 U2L T-Exhaust Combined B	degC	800.00	800.00	0
[31]1 1.0132.001 T-ECU	degC	49.80	49.60	-0.20
[32]1 1.0132.017 U1L T-ECU	degC	95.00	95.00	0
[33]1 1.1005.012 Engine Power	kW	1432.630	1375.760	-56.870
[34]1 1.1005.021 Rated Power	kW	1432.000	1432.000	0
[35]1 1.1005.023 Engine Optimized	digit	16	16	0
[36]1 1.1005.101 Trip Idle Time (SPN1037)	sec	206	206	0
[37]1 1.1020.202 Act. Torque in Relation to DBR	%	100.000	96.150	-3.850
[38]1 1.1020.514 Injection Active		1	1	0
[39]1 1.1300.332 Total Number of active Cylinders	digit	12	12	0
[40]1 1.1300.333 Total Fuel Consumption Demand	l/min	6.339	6.037	-0.302
[41]1 1.2500.044 Engine Speed (ECU)	rpm	2362.0	2358.9	-3.1
[42]1 1.2510.001 Actual Engine Overspeed Limit	rpm	2818.0	2818.0	0
[43]1 1.3010.001 ETC 1 Speed	krpm	82.3610	82.4175	0.0565
[44]1 1.3010.002 ETC 2 Speed	krpm	0	0	0
[45]1 1.3010.006 ETC 3 Speed	krpm	0	0	0
[46]1 1.3010.007 ETC 4 Speed	krpm	0	0	0
[47]1 1.3010.031 Number Of Active Chargers	digit	3	3	0
[48]1 1.8009.011 Actual Fuel Consumption	l/h	378.736	378.807	0.071
[49]1 1.8009.012 Actual Fuel Consumption 2	mm3/s	105000.000	105000.000	0
[50]1 1.8009.016 Total Fuel Consumption	l	168944.3	168947.9	3.6
[51]1 1.8009.017 Trip Fuel Consumption	l	8605.1	8608.7	3.6
[52]1 1.8009.018 Fuel Consumption Idle Total	l	2005.4	2005.4	0
[53]1 1.8009.020 Mean Trip Fuel Consumption	l/h	41.813	41.828	0.015
[54]1 1.8009.026 ECU Operating Hours Trip Sec	sec	740877	740911	34
[55]1 1.8009.027 Trip Operating hours	h	205	205	0
[56]1 1.8009.029 Idle Time Total Seconds	sec	1478912	1478912	0
[57]1 1.8009.070 ECU Mechanical Energy Counter	MWh	749.232	749.245	0.013
[58]1 2.0280.001 Speed Demand ECU	rpm	2450.0	2347.8	-102.2
[59]1 2.1000.041 Speed Demand (Speed Governor)	rpm	2412.0	2347.8	-64.2
[60]1 2.1000.048 Maximum Requested Torque	Nm	5792.9	5800.4	7.5

Time for left cursor:12:15:46 - 220693us
Time for right cursor:12:16:23 - 933904us
Difference in time:00:00:37 - 713211us

Sensor	Unit	Left	Right	Difference
[61]1 2.1000.049 Requested Torque	Nm	5792.9	5578.3	-214.6
[62]1 2.1060.002 Speed Demand	rpm	2412.0	2347.8	-64.2
[63]1 2.1060.003 Effective Engine Speed Demand	rpm	2412.0	2347.8	-64.2
[64]1 2.1060.004 Max. Eff. Engine Speed Demand	rpm	2720.0	2720.0	0
[65]1 2.1060.005 Min. Eff. Engine Speed Demand	rpm	550.0	550.0	0
[66]1 2.1060.040 Rated Speed	rpm	2455.0	2455.0	0
[67]1 2.1060.049 Actual Engine Idle Speed	rpm	550.0	550.0	0
[68]1 2.1060.050 Speed Demand before Ramp	rpm	2450.0	2347.8	-102.2
[69]1 2.1060.051 Speed Demand Selected	rpm	2450.0	2347.8	-102.2
[70]1 2.1060.075 Virtual Ramp Value (act.Speed)	rpm	2362.0	2358.9	-3.1
[71]1 2.1060.203 Speed Demand before Droop	rpm	2412.0	2347.8	-64.2
[72]1 2.1060.206 MCR[Nm] at Speed Demand	Nm	5672.5	5827.1	154.6
[73]1 2.1060.523 Speed/Torque Demand in %	%	49.000	46.956	-2.044
[74]1 2.1075.012 Actual Engine-Torque % (SPN513)	%	105.500	101.700	-3.800
[75]1 2.1075.016 Drivers Engine %Torque (SPN512)	%	5.792	5.800	0.008
[76]1 2.1075.018 Engine Demand Torque % (SPN2432)	%	103.700	99.900	-3.800
[77]1 2.7000.004 Engine Load Reserve	%	0	3.800	3.800
[78]2 1.0100.001 P-Lube Oil after Filter	bar	7.53375	7.49625	-0.03750
[79]2 1.0100.015 L1L P-Lube Oil (ECU)	bar	5.50000	5.50000	0
[80]2 1.0100.016 L2L P-Lube Oil (ECU)	bar	5.00000	5.00000	0
[81]2 1.0102.001 P-Fuel	bar	9.62625	9.73125	0.10500
[82]2 1.0102.015 L1L P-Fuel	bar	6.50000	6.50000	0
[83]2 1.0102.016 L2L P-Fuel	bar	6.00000	6.00000	0
[84]2 1.0106.001 P-CrankCase	mbar	0.98	0.98	0
[85]2 1.0106.016 U1L P-CrankCase	mbar	45.00	45.00	0
[86]2 1.0106.018 U2L P-CrankCase	mbar	65.00	65.00	0
[87]2 1.0108.001 P-Ambient Air	bar	1.01000	1.01100	0.00100
[88]2 1.0120.001 T-Coolant	degC	83.70	83.36	-0.34
[89]2 1.0120.017 U1L T-Coolant (ECU)	degC	94.00	94.00	0
[90]2 1.0120.018 U2L T-Coolant (ECU)	degC	98.00	98.00	0
[91]2 1.0121.001 T-Charge Air	degC	39.87	39.53	-0.34
[92]2 1.0121.017 U1L T-Charge Air	degC	50.00	50.00	0
[93]2 1.0121.018 U2L T-Charge Air	degC	53.00	53.00	0
[94]2 1.0121.050 T-Charge Air Final	degC	39.87	39.53	-0.34
[95]2 1.0122.001 T-Fuel	degC	77.88	78.59	0.71
[96]2 1.0122.017 U1L T-Fuel	degC	90.00	90.00	0
[97]2 1.0122.018 U2L T-Fuel	degC	95.00	95.00	0
[98]2 1.0123.001 T-Intake Air	degC	33.98	33.57	-0.41
[99]2 1.0123.053 T-Intake Air Final	degC	33.98	33.57	-0.41
[100]2 1.0125.001 T-Lube Oil	degC	81.90	82.23	0.33
[101]2 1.0125.017 U1L T-Lube Oil	degC	92.00	92.00	0
[102]2 1.0125.018 U2L T-Lube Oil	degC	95.00	95.00	0
[103]2 1.0125.050 T-Lube Oil Final	degC	81.90	82.23	0.33
[104]2 1.0126.001 T-Exhaust A	degC	738.52	738.76	0.24
[105]2 1.0126.017 U1L T-Exhaust Combined A	degC	780.00	780.00	0
[106]2 1.0126.018 U2L T-Exhaust Combined A	degC	800.00	800.00	0
[107]2 1.0127.001 T-Exhaust B	degC	747.82	747.95	0.13
[108]2 1.0127.017 U1L T-Exhaust Combined B	degC	780.00	780.00	0
[109]2 1.0127.018 U2L T-Exhaust Combined B	degC	800.00	800.00	0
[110]2 1.0132.001 T-ECU	degC	51.10	50.70	-0.40
[111]2 1.0132.017 U1L T-ECU	degC	95.00	95.00	0
[112]2 1.1005.012 Engine Power	kW	1432.320	1288.990	-143.330
[113]2 1.1005.021 Rated Power	kW	1432.000	1432.000	0
[114]2 1.1005.101 Trip Idle Time (SPN1037)	sec	532	532	0
[115]2 1.1020.202 Act. Torque in Relation to DBR	%	100.000	89.950	-10.050
[116]2 1.1300.332 Total Number of active Cylinders	digit	12	12	0
[117]2 1.1300.333 Total Fuel Consumption Demand	l/min	6.276	5.532	-0.744
[118]2 1.2500.026 Idle Speed	rpm	550.0	550.0	0
[119]2 1.2500.044 Engine Speed (ECU)	rpm	2373.0	2333.0	-40.0
[120]2 1.2510.001 Actual Engine Overspeed Limit	rpm	2818.0	2818.0	0
[121]2 1.3010.001 ETC 1 Speed	krpm	82.9875	82.1355	-0.8520

Time for left cursor:12:15:46 - 220693us
Time for right cursor:12:16:23 - 933904us
Difference in time:00:00:37 - 713211us

Sensor	Unit	Left	Right	Difference
[122]2 1.3010.002 ETC 2 Speed	krpm	0	0	0
[123]2 1.3010.003 ETC 2 Cut In		1	1	0
[124]2 1.3010.031 Number Of Active Chargers	digit	3	3	0
[125]2 1.8009.011 Actual Fuel Consumption	l/h	371.777	371.684	-0.093
[126]2 1.8009.012 Actual Fuel Consumption 2	mm3/s	103000.000	103000.000	0
[127]2 1.8009.016 Total Fuel Consumption	l	161514.3	161517.8	3.5
[128]2 1.8009.017 Trip Fuel Consumption	l	3212.5	3216.0	3.5
[129]2 1.8009.018 Fuel Consumption Idle Total	l	1788.7	1788.7	0
[130]2 1.8009.020 Mean Trip Fuel Consumption	l/h	23.473	23.497	0.024
[131]2 1.8009.026 ECU Operating Hours Trip Sec	sec	492681	492715	34
[132]2 1.8009.027 Trip Operating hours	h	136	136	0
[133]2 1.8009.029 Idle Time Total Seconds	sec	1487057	1487057	0
[134]2 1.8009.070 ECU Mechanical Energy Counter	MWh	717.602	717.615	0.013
[135]2 2.0280.001 Speed Demand ECU	rpm	2450.0	2303.6	-146.4
[136]2 2.1000.041 Speed Demand (Speed Governor)	rpm	2423.0	2303.6	-119.4
[137]2 2.1000.048 Maximum Requested Torque	Nm	5766.4	5862.7	96.3
[138]2 2.1000.049 Requested Torque	Nm	5766.4	5276.1	-490.3
[139]2 2.1060.002 Speed Demand	rpm	2423.0	2303.6	-119.4
[140]2 2.1060.003 Effective Engine Speed Demand	rpm	2423.0	2303.6	-119.4
[141]2 2.1060.004 Max. Eff. Engine Speed Demand	rpm	2720.0	2720.0	0
[142]2 2.1060.005 Min. Eff. Engine Speed Demand	rpm	550.0	550.0	0
[143]2 2.1060.040 Rated Speed	rpm	2455.0	2455.0	0
[144]2 2.1060.049 Actual Engine Idle Speed	rpm	550.0	550.0	0
[145]2 2.1060.050 Speed Demand before Ramp	rpm	2450.0	2303.6	-146.4
[146]2 2.1060.051 Speed Demand Selected	rpm	2450.0	2303.6	-146.4
[147]2 2.1060.075 Virtual Ramp Value (act.Speed)	rpm	2373.0	2333.0	-40.0
[148]2 2.1060.203 Speed Demand before Droop	rpm	2423.0	2303.6	-119.4
[149]2 2.1060.206 MCR[Nm] at Speed Demand	Nm	5646.1	5937.2	291.1
[150]2 2.1060.523 Speed/Torque Demand in %	%	49.000	46.072	-2.928
[151]2 2.1075.012 Actual Engine-Torque % (SPN513)	%	105.100	96.300	-8.800
[152]2 2.1075.016 Drivers Engine %Torque (SPN512)	%	5.766	5.862	0.096
[153]2 2.1075.018 Engine Demand Torque % (SPN2432)	%	103.300	94.500	-8.800
[154]2 2.7000.004 Engine Load Reserve	%	0	10.000	10.000

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** LIVE MAS **Machine Year :** NA **Component Description:**	**Component ID:** SGM32CHXR **Component Make:** KOHLER **Component Model:** 32 EOZD **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** PORT GENERATOR **Sump Capacity:** 10 Litres	M✓C **MOTORCHECK LAB** **2000 N FLORIDA MANGO RD UNIT 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7793	2/20/2026	2655	65	15W40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	ALL ENGINE WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7793	<2	<2	<2	<2	<2	<2	X	5	<2	<2	X	<2	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7793	-	0.2	<0.1	-	<2.0	10.5	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** LIVE MAS **Machine Year :** NA **Component Description:**	**Component ID:** SGM32CHXP **Component Make:** KOHLER **Component Model:** 32 EOZD **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** STARBOARD GENERATOR **Sump Capacity:** 10 Litres	M✓C **MOTORCHECK LAB** **2000 N FLORIDA MANGO RD UNIT 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7794	2/20/2026	2633	50	15W40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	ALL ENGINE WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7794	<2	<2	<2	<2	<2	4	X	5	<2	<2	X	<2	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7794	-	0.2	<0.1	-	<2.0	11.0	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** LIVE MAS **Machine Year :** NA **Component Description:**	**Component ID:** 544100251 **Component Make:** MTU **Component Model:** 12V2000 M96L **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** PORT MAIN **Sump Capacity:** 80 Litres	M✓C **MOTORCHECK LAB** **2000 N FLORIDA MANGO RD UNIT 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7795	2/20/2026	2286	30	15W40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	ALL ENGINE WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7795	<2	<2	<2	<2	<2	<2	X	5	<2	<2	X	<2	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7795	-	0.2	<0.1	-	<2.0	11.1	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** LIVE MAS **Machine Year :** NA **Component Description:**	**Component ID:** 544100250 **Component Make:** MTU **Component Model:** 12V2000 M96L **Component Year:** NA **Component Type :** DIESEL ENGINE **Component Location:** STARBOARD MAIN **Sump Capacity:** 80 Litres	M✓C **MOTORCHECK LAB** **2000 N FLORIDA MANGO RD UNIT 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7796	2/20/2026	2291	30	15W40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	ALL ENGINE WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7796	<2	<2	<2	<2	<2	3	X	4	<2	<2	X	<2	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7796	-	0.2	<0.1	-	<2.0	11.3	<2.0	108	14.4	136	92 - 124	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST **Phone:** **Email:** **Fax:** ___-___-____	**Machine ID:** LIVE MAS **Machine Year :** NA **Component Description:**	**Component ID:** 50037493 **Component Make:** ZF **Component Model:** 2075-A **Component Year:** NA **Component Type :** GEARBOX **Component Location:** PORT **Sump Capacity:** 21 Litres	M✓C **MOTORCHECK LAB** **2000 N FLORIDA MANGO RD UNIT 104** **WEST PALM BEACH FL 33409** **561-684-7799**

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7797	2/20/2026	2286	340	SAE 40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	GEAR UNIT WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7797	<2	<2	<2	20	<2	<2	X	5	<2	<2	X	25	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7797	X	X	<0.1	X	X	X	<2.0	158	14.4	88	133 - 181	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

MARINE DIESEL SPECIALIST

Phone:

Email:

Fax: ___-___-____

Machine ID: LIVE MAS

Machine Year : NA

Component Description:

Component ID: 50037494

Component Make: ZF

Component Model: 2075-A

Component Year: NA

Component Type : GEARBOX

Component Location: STARBOARD

Sump Capacity: 21 Litres

MOTORCHECK LAB

2000 N FLORIDA MANGO RD UNIT 104
WEST PALM BEACH FL 33409
561-684-7799

Sample ID	Date Taken	Hours on Component	Hours on Oil	Oil Weight	Oil Brand	Oil Type	Oil Changed	Date Analyzed	User Sample ID
7798	2/20/2026	2291	340	SAE 40	UNKNOWN	UNKNOWN	No	2/20/2026	
Comments	GEAR UNIT WEAR RATES NORMAL. SAMPLE APPEARS FREE OF EXTERNAL CONTAMINATION. ANALYSIS INDICATES PROPER PERFORMANCE OF THE LUBRICANT AND UNIT.								

	Wear Metals(ppm)							*Contaminant Metals (ppm)*			*Multi-Source Metals (ppm)*					*Additives (ppm)*				
Sample ID	Iron	Chromium	Aluminum	Copper	Lead	Tin	Vanadium	Silicon	Sodium	Potassium	Titanium	Molybdenum	Nickel	Manganese	Boron	Magnesium	Calcium	Barium	Phosphorus	Zinc
7798	<2	3	<2	17	<2	<2	X	5	<2	<2	X	8	X	X	X	X	X	X	X	X

	Contaminants				*Physical Properties*								
Sample ID	Fuel	Soot	Water	Glycol	Nitration	TBN	Oxidation	V40C	V100C	VIndex	V40C Limit	V100C Limit	Visc Mode
7798	X	X	<0.1	X	X	X	<2.0	157	14.4	88	133 - 181	12.5 - 16.3	C

ABNORMAL | SEVERE | D = DETECTED | - = NOT DETECTED | X = NOT TESTED / NOT APPLICABLE | NA = NOT AVAILABLE | C = CALCULATED | M = MEASURED

M✓C™ *UNDERSTANDING YOUR REPORT*

	ENGINES	TRANSMISSIONS
ALUMINUM:	PISTONS, BEARINGS, HOUSINGS, THRUST WASHERS, BUSHINGS	TORQUE CONVERTER, THE CASE, THRUST WASHERS, HOUSINGS, GEAR AND VANE PUMPS
CHROMIUM:	COMPRESSION RINGS, LOW FRICTION BEARINGS, LINERS, CHROMATE COOLING SYSTEM	BALL AND ROLLER BEARINGS, ALLOY OF STEEL PARTS
COPPER:	BEARINGS, BUSHINGS, THRUST WASHERS, OIL COOLER, CLUTCHES, AND AN OIL ADDITIVE IN SOME GASOLINE ENGINE OILS.	CLUTCH PLATES, BRONZE BUSHINGS, OIL COOLER OXIDES, BRASS FITTINGS
IRON:	CRANKSHAFT, CYLINDERS, PISTONS, LINERS, BEARINGS, VALVE TRAIN	GEARS, BEARINGS, SHAFTS, SOME CASES, CLUTCH PLATES
LEAD:	BEARINGS, CONTAMINATION FROM LEADED GASOLINE	GEARS
TIN:	PISTON SKIRTS, BEARINGS, AND BUSHINGS.	SOME BEARING CAGES
SILICON:	AIRBORN DIRT, SEAL MATERIAL, GASKETS, USED IN SOME OIL ADDITIVES, SPRAY LUBRICANTS, WHEN FOUND WITH POTASSIUM INDICATES GLYCOL ISSUE	AIRBORN DIRT, SEALERS, GASKETS, USED IN SOME OIL ADDITIVES, SPRAY LUBRICANTS, WHEN FOUND WITH POTASSIUM INDICATES GLYCOL ISSUE, SAND-CASTED PARTS
POTASSIUM:	INDICATION OF GLYCOL OR SALTWATER INTRUSION, ADDITIVE IN SOME OILS	INDICATION OF GLYCOL OR SALTWATER INTRUSION, ADDITIVE IN SOME OILS
SODIUM:	FOUND IN SOME OIL ADDITIVES, GLYCOL, ENVIRONMENTAL COMTAMINANT OR SALT WATER	FOUND IN SOME OIL ADDITIVES, GLYCOL, ENVIRONMENTAL COMTAMINANT OR SALT WATER
WATER:	MEASURED IN % VOLUME, CAN BE INDICATION OF CONDENSATION, COOLING SYSTEM LEAK, OR OUTSIDE CONTAMINATION	
GLYCOL:	MEASURED IN % VOLUME, IN THE FORMULATION OF MOST COMMERCIAL COOLANTS	
OXIDATION:	THIS IS THE RESULTS OF OXYGEN IN THE AIR REACTING WITH THE OIL AT ELEVATED TEMPERATURES. THIS IS A NORMAL PROCESS AS THE OIL AGES. IF AN ENGINE IS OPERATED CONTINUOUSLY AT A HIGH TEMPERATURE FOR EXTENDED PERIODS, OR IF DRAIN INTERVAL IS OVER EXTENDED, OIL CHANGE IS RECOMMENDED.	
NITRATION:	FORMED DURING COMBUSTION PROCESS, LEADS TO ACCELERATED OIL DETERIORATION.	
SOOT:	NORMAL COMBUSTION BY PRODUCT OF DIESEL FUEL AND APPEARS AS CONTAMINANT IN THE OIL CAUSING AN INCREASE IN VISCOSITY. INDICATE AN INPROPER AIR/FUEL RATIO, DEFECTIVE AIR INTAKE, FAULTY INJECTORS, OR BLOW-BY	
VISCOSITY:	CALCULATED MEASUREMENT OF THE OIL'S ABILITY TO FLOW AND LUBRICATE, INDICATES IF OIL IS TOO THICK OR THIN	
TBN:	MEASUREMENT OF OIL'S ALKALINE BASE RESERVE, ADDITIVE IN OIL CAPABLE OF NEUTRALIZING ACIDIC CONTAMINANTS, WHEN TBN IS BELOW 3, IT IS AN INDICATION THE OIL IS NO LONGER SERVICEABLE	
FUEL DILUTION:	MEASURED IN % VOLUME, CAN INDICATE FAULTY COMBUSTION, RICH AIR/FUEL MIXTURE WHEN PRESENT BETWEEN 2%-5%. INJECTOR PROPBLEM OR INTERNAL FUEL LINE LEAK IS TYPICALLY INDICATED WHEN FUEL IS DETECTED AT HIGH LEVELS	

Maintenance Schedule

Diesel Engine
12V/16V2000M96L
Application Group 1DS

MS50248/00E

Power. Passion. Partnership.

Engine model	kW/cyl.	Application group
12V2000M96L	119,3 kW/cyl.	1DS, Continuous operation, variable, low load
16V2000M96L	121,2 kW/cyl.	1DS, Continuous operation, variable, low load

Table 1: Applicability

Table of Contents

1 Maintenance Schedule

1.1 Preface

In the case of emission-certified products, nonobservance of the maintenance instructions can result in violation of the statutory specifications. Modification or removal of mechanical or electronic components or the installation of additional mechanical or electronic components as well as the execution of calibration processes that might affect the emission characteristics of the engine are prohibited by emission regulations. Components relevant to emissions may only be serviced, replaced or repaired if components approved by MTU are used. Components relevant to emissions include e.g. control units, data records, sensors, injectors, exhaust flaps and all components of exhaust after-treatment systems.

The maintenance system for MTU products is based on a preventive maintenance concept. Preventive maintenance facilitates advance operational planning and ensures a high level of equipment availability. The maintenance intervals as well as the required scopes of maintenance tasks are based on operational experience and therefore to be considered as recommendations. Additional maintenance work and/or changes to the maintenance intervals may be required in the case of difficult operational and ambient conditions.

Adherence to the specified maintenance intervals is essential to maintain product safety.

The intervals according to which the maintenance tasks have to be carried out are specified as operating hours and time limits. Whichever value is reached first shall apply.

The individual maintenance intervals are assigned to the qualification levels QL1 to QL4.

QL1: Operational monitoring and maintenance work which does not require disassembly of the product.
QL2: Exchange of components and parts (corrective only, not part of the maintenance schedule).
QL3: Maintenance work which requires partial disassembly of the product.
QL4: Maintenance work which requires complete disassembly of the product.

Additional notes on maintenance and preservation:

For the change intervals for fluids and lubricants and for information on preservation, refer to the relevant specifications of the component manufacturers and the MTU Fluids and Lubricants Specifications. The latest version for drive systems is available at: http://www.mtu-online.com, for power generation at: http://www.mtuonsiteenergy.com.

Components which are not listed in this maintenance schedule must be serviced in accordance with Manufacturer's Instructions.

This maintenance schedule does not apply to engines with an EPA/CARB emissions certificate.

1.2 Allocation matrix application group 1DS

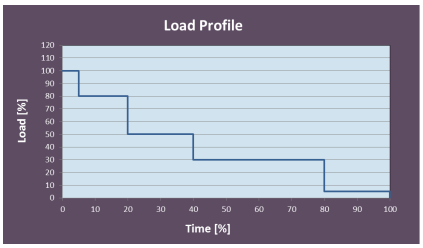
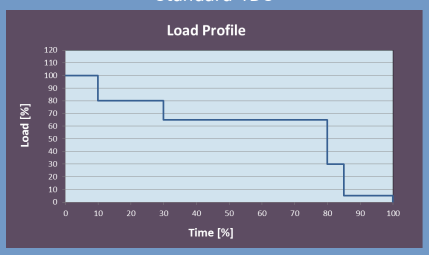
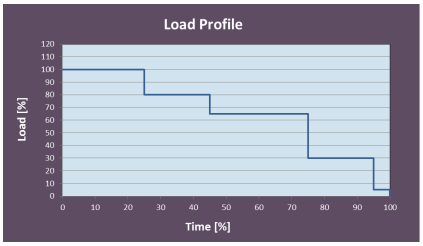
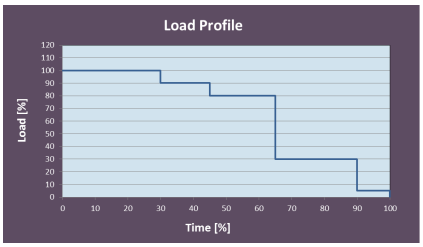
V2000M96L								
Load profile		Load factor %	Load indicator %	113 to 122 kW/cyl.	–	–	–	
Load %	Time %							
110 (100-110)	–	0 to 40	≤ 8	7,500	–	–	–	
100 (90-100)	5							
90 (80-90)	–							
80 (65-80)	15							
65 (50-65)	–							
50 (30-50)	20							
30 (5-30)	40							
Idle Speed (0-5)	20							
110 (100-110)	–	41 to 61	≤ 13	6,000	–	–	–	Standard 1DS 
100 (90-100)	10							
90 (80-90)	–							
80 (65-80)	20							
65 (50-65)	50							
50 (30-50)	–							
30 (5-30)	5							
Idle Speed (0-5)	15							
110 (100-110)	–	62 to 68	≤ 28	5,000	–	–	–	
100 (90-100)	25							
90 (80-90)	–							
80 (65-80)	20							
65 (50-65)	30							
50 (30-50)	–							
30 (5-30)	20							
Idle Speed (0-5)	5							
110 (100-110)	–	62 to 68	≤ 38	4,000	–	–	–	
100 (90-100)	30							
90 (80-90)	15							
80 (65-80)	20							
65 (50-65)	–							
50 (30-50)	–							
30 (5-30)	25							
Idle Speed (0-5)	10							

Table 2: Zuordnungsmatrix Anwendungsgruppe 1DS

1.3 Maintenance schedule matrix 7,500 h

0 to 7,500 Operating hours

Task	Limit	Operating hours [h]																
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	3,750	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500
Engine																		
W1828	1 a																	
W1245	1 a																	
W1246	1 a																	
W1244	2 a																	
W4126	2 a																	
W1008	2 a																	
W1453	3 a																	
W0500	-	X																
W0501	-	X																
W0502	-	X																
W0503	-	X																
W0505	-	X																
W0506	-	X																
W0507	-	X																
W0508	-	X																
W1001	2 a		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
W1675	2 a		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
W1193	18 a		X	X	X	X	X	X	X		X	X	X	X	X	X	X	X
W4172	1 a			X		X		X			X		X		X		X	
W1002	2 a			X		X		X			X		X		X		X	
W1005	3 a									X								X
W1296	3 a									X								X
W1519	5 a									X								X
W1011	18 a									X								X
W1006	18 a									X								X
W1636	18 a									X								X
W1298	6 a																	X
W1477	18 a																	X
W4150	5 a									X								X
W4170	5 a									X								X
W1250	6 a									X								X
W1251	6 a									X								X
W1055	18 a									X								X
W1038	18 a									X								X
W1472	18 a									X								X
W2000	18 a																	X
W2002	18 a																	X
W2003	18 a																	X
W2006	18 a																	X
W2017	18 a																	X
W2018	18 a																	X
W2059	18 a																	X

w = weeks
m = months
a = years

TIM-ID: 0000074832 - 001

Task	Limit	Operating hours [h]																														
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	3,750	4,000	4,500	5,000	5,500	6,000	6,500	7,000	7,500														
W2062	18 a																	X														
W2074	18 a																	X														
W2110	18 a																	X														
W2111	18 a																	X														
W2112	18 a																	X														
W2166	18 a																	X														
W1134	18 a																	X														
W3000	18 a																	X														
W3001	18 a																	X														
W3004	18 a																	X														
W3006	18 a																	X														
W3007	18 a																	X														
W3011	18 a																	X														
W3012	18 a																	X														
W3013	18 a																	X														
W3021	18 a																	X														
W3041	18 a																	X														
W3042	18 a																	X														
W3056	18 a																	X														
W3057	18 a																	X														
W3106	18 a																	X														
W3107	18 a																	X														
W3108	18 a																	X														
W3152	18 a																	X														
W3177	18 a																	X														
W3182	18 a																	X														
W3186	18 a																	X														
W1083	18 a																	X														
W1084	18 a																	X														
W1082	18 a																	X														
W4173	18 a																	X														
W4171	18 a																	X														
W4146	18 a																	X														
X3504	18 a																	X														
w = weeks m = months a = years																																

TIM-ID: 0000074832 - 001

1.4 Maintenance tasks 7,500 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	1 a	Preheater / Jacket water heater	Check operation and inspect for leaks.	X	W1828
QL1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL1	-	3 a	Preheater / Jacket water heater	Replace thermostat.	X	W1453
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	500	18 a	Drive shaft	Lubricate drive shaft at lubrication points.	X	W1193
QL1	1000	1 a	Engine mounts	Check general condition of resilient mount (visual inspection).		W4172
QL1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL1	3750	3 a	Air filters	Fit new air filters.		W1005
QL1	3750	3 a	Coolant expansion tank	Replace valve.		W1296
QL1	3750	5 a	Engine mounts	Check tightness of securing screws.		W1519
QL1	3750	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	3750	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	3750	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL1	7500	6 a	HP fuel lines	Fit new HP fuel lines.		W1298
QL1	7500	18 a	Preheater / Jacket water heater	Overhaul preheater / jacket water heater.	X	W1477
QL3	3750	5 a	Engine mounts	Measure height of rubber element.		W4150
				Measure buffer clearance, adjust if needed.	X	W4170
QL3	3750	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	3750	6 a	Hose lines	Replace all hose lines.		W1251
QL3	3750	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL3	3750	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL3	7500	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017

w = weeks
m = months
a = years

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL3	7500	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL4	7500	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new crankshaft bearings.		W3004
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Replace oil replenishment pump.	X	W3106
				Replace oil-level regulating pump.	X	W3107
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
				Replace air flap bearings.		W3186
QL4	7500	18 a	Conrod bearings	Fit new conrod bearings.		W1083
QL4	7500	18 a	Cylinder liners	Fit new cylinder liners.		W1084
QL4	7500	18 a	Pistons	Fit new pistons.		W1082
QL4	7500	18 a	Engine mounts	Replace rubber element of resilient mounts.		W4173
QL4	7500	18 a	Shaft misalignment coupling	Replace diaphragm.	X	W4171
QL4	7500	18 a	Flexible/torsional resilient coupling	Replace rubber element.		W4146
QL4	7500	18 a	Drive shaft	Overhaul drive shaft.	X	X3504

w = weeks
m = months
a = years

1.5 Maintenance schedule matrix 6,000 h

0 to 6,000 Operating hours

Task	Limit	Operating hours [h]												
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000
Engine														
W1828	1 a													
W1245	1 a													
W1246	1 a													
W1244	2 a													
W4126	2 a													
W1008	2 a													
W1453	3 a													
W0500	-	X												
W0501	-	X												
W0502	-	X												
W0503	-	X												
W0505	-	X												
W0506	-	X												
W0507	-	X												
W0508	-	X												
W1001	2 a		X	X	X	X	X	X	X	X	X	X	X	X
W1675	2 a		X	X	X	X	X	X	X	X	X	X	X	X
W1193	18 a		X	X	X	X	X	X	X	X	X	X	X	X
W4172	1 a			X		X		X		X		X		X
W1002	2 a			X		X		X		X		X		X
W1005	3 a							X						X
W1296	3 a							X						X
W1519	5 a							X						X
W1011	18 a							X						X
W1006	18 a							X						X
W1636	18 a							X						X
W1298	6 a													X
W1477	18 a													X
W4150	5 a							X						X
W4170	5 a							X						X
W1250	6 a							X						X
W1251	6 a							X						X
W2000	18 a													X
W2002	18 a													X
W2003	18 a													X
W2006	18 a													X
W2017	18 a													X
W2018	18 a													X
W2059	18 a													X
W2062	18 a													X
W2074	18 a													X
W2110	18 a													X

w = weeks
m = months
a = years

Task	Limit	Operating hours [h]												
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000	5,500	6,000
W2111	18 a													X
W2112	18 a													X
W2166	18 a													X
W1134	18 a													X
W1055	18 a													X
W1038	18 a													X
W1472	18 a													X
W3000	18 a													X
W3001	18 a													X
W3004	18 a													X
W3006	18 a													X
W3007	18 a													X
W3011	18 a													X
W3012	18 a													X
W3013	18 a													X
W3021	18 a													X
W3041	18 a													X
W3042	18 a													X
W3056	18 a													X
W3057	18 a													X
W3106	18 a													X
W3107	18 a													X
W3108	18 a													X
W3152	18 a													X
W3177	18 a													X
W3182	18 a													X
W3186	18 a													X
W1083	18 a													X
W1084	18 a													X
W1082	18 a													X
W4173	18 a													X
W4171	18 a													X
W4146	18 a													X
X3504	18 a													X

w = weeks
m = months
a = years

1.6 Maintenance tasks 6,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	1 a	Preheater / Jacket water heater	Check operation and inspect for leaks.	X	W1828
QL1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL1	-	3 a	Preheater / Jacket water heater	Replace thermostat.	X	W1453
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	500	18 a	Drive shaft	Lubricate drive shaft at lubrication points.	X	W1193
QL1	1000	1 a	Engine mounts	Check general condition of resilient mount (visual inspection).		W4172
QL1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL1	3000	3 a	Air filters	Fit new air filters.		W1005
QL1	3000	3 a	Coolant expansion tank	Replace valve.		W1296
QL1	3000	5 a	Engine mounts	Check tightness of securing screws.		W1519
QL1	3000	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	3000	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	3000	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL1	6000	6 a	HP fuel lines	Fit new HP fuel lines.		W1298
QL1	6000	18 a	Preheater / Jacket water heater	Overhaul preheater / jacket water heater.	X	W1477
QL3	3000	5 a	Engine mounts	Measure height of rubber element.		W4150
				Measure buffer clearance, adjust if needed.	X	W4170
QL3	3000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	3000	6 a	Hose lines	Replace all hose lines.		W1251
QL3	6000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062

w = weeks
m = months
a = years

TIM-ID: 0000047656 - 005

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL3	6000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL3	6000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL3	6000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL4	6000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new crankshaft bearings.		W3004
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Replace oil replenishment pump.	X	W3106
				Replace oil-level regulating pump.	X	W3107
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
				Replace air flap bearings.		W3186
QL4	6000	18 a	Conrod bearings	Fit new conrod bearings.		W1083
QL4	6000	18 a	Cylinder liners	Fit new cylinder liners.		W1084
QL4	6000	18 a	Pistons	Fit new pistons.		W1082
QL4	6000	18 a	Engine mounts	Replace rubber element of resilient mounts.		W4173
QL4	6000	18 a	Shaft misalignment coupling	Replace diaphragm.	X	W4171
QL4	6000	18 a	Flexible/torsional resilient coupling	Replace rubber element.		W4146
QL4	6000	18 a	Drive shaft	Overhaul drive shaft.	X	X3504

w = weeks
m = months
a = years

TIM-ID: 0000047656 - 005

1.7 Maintenance schedule matrix 5,000 h

0 to 5,000 Operating hours

Task	Limit	Operating hours [h]										
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000
Engine												
W1828	1 a											
W1245	1 a											
W1246	1 a											
W1244	2 a											
W4126	2 a											
W1008	2 a											
W1453	3 a											
W0500	-	X										
W0501	-	X										
W0502	-	X										
W0503	-	X										
W0505	-	X										
W0506	-	X										
W0507	-	X										
W0508	-	X										
W1001	2 a		X	X	X	X	X	X	X	X	X	X
W1675	2 a		X	X	X	X	X	X	X	X	X	X
W1193	18 a		X	X	X	X	X	X	X	X	X	X
W4172	1 a			X		X		X		X		X
W1002	2 a			X		X		X		X		X
W1005	3 a						X					X
W1296	3 a						X					X
W1519	5 a						X					X
W1011	18 a						X					X
W1006	18 a						X					X
W1636	18 a						X					X
W1298	6 a											X
W1477	18 a											X
W4150	5 a						X					X
W4170	5 a						X					X
W1250	6 a						X					X
W1251	6 a						X					X
W2000	18 a											X
W2002	18 a											X
W2003	18 a											X
W2006	18 a											X
W2017	18 a											X
W2018	18 a											X
W2059	18 a											X
W2062	18 a											X
W2074	18 a											X
W2110	18 a											X

w = weeks
m = months
a = years

TIM-ID: 0000074838 - 001

Task		Operating hours [h]																													
	Limit	Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000	4,500	5,000																			
W2111	18 a											X																			
W2112	18 a											X																			
W2166	18 a											X																			
W1134	18 a											X																			
W1055	18 a											X																			
W1038	18 a											X																			
W1472	18 a											X																			
W1083	18 a						X					X																			
W1084	18 a						X					X																			
W1082	18 a						X					X																			
W3000	18 a											X																			
W3001	18 a											X																			
W3004	18 a											X																			
W3006	18 a											X																			
W3007	18 a											X																			
W3011	18 a											X																			
W3012	18 a											X																			
W3013	18 a											X																			
W3021	18 a											X																			
W3041	18 a											X																			
W3042	18 a											X																			
W3056	18 a											X																			
W3057	18 a											X																			
W3106	18 a											X																			
W3107	18 a											X																			
W3108	18 a											X																			
W3152	18 a											X																			
W3177	18 a											X																			
W3182	18 a											X																			
W3186	18 a											X																			
W4173	18 a											X																			
W4171	18 a											X																			
W4146	18 a											X																			
X3504	18 a											X																			

w = weeks
m = months
a = years

TIM-ID: 0000074838 - 001

1.8 Maintenance tasks 5,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	1 a	Preheater / Jacket water heater	Check operation and inspect for leaks.	X	W1828
QL1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL1	-	3 a	Preheater / Jacket water heater	Replace thermostat.	X	W1453
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	500	18 a	Drive shaft	Lubricate drive shaft at lubrication points.	X	W1193
QL1	1000	1 a	Engine mounts	Check general condition of resilient mount (visual inspection).		W4172
QL1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL1	2500	3 a	Air filters	Fit new air filters.		W1005
QL1	2500	3 a	Coolant expansion tank	Replace valve.		W1296
QL1	2500	5 a	Engine mounts	Check tightness of securing screws.		W1519
QL1	2500	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	2500	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	2500	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL1	5000	6 a	HP fuel lines	Fit new HP fuel lines.		W1298
QL1	5000	18 a	Preheater / Jacket water heater	Overhaul preheater / jacket water heater.	X	W1477
QL3	2500	5 a	Engine mounts	Measure height of rubber element.		W4150
				Measure buffer clearance, adjust if needed.	X	W4170
QL3	2500	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	2500	6 a	Hose lines	Replace all hose lines.		W1251
QL3	5000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062

w = weeks
m = months
a = years

TIM-ID: 0000074839 - 001

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL3	5000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL3	5000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL3	5000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL4	2500	18 a	Conrod bearings	Fit new conrod bearings.		W1083
QL4	2500	18 a	Cylinder liners	Fit new cylinder liners.		W1084
QL4	2500	18 a	Pistons	Fit new pistons.		W1082
QL4	5000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new crankshaft bearings.		W3004
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Replace oil replenishment pump.	X	W3106
				Replace oil-level regulating pump.	X	W3107
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
				Replace air flap bearings.		W3186
QL4	5000	18 a	Engine mounts	Replace rubber element of resilient mounts.		W4173
QL4	5000	18 a	Shaft misalignment coupling	Replace diaphragm.	X	W4171
QL4	5000	18 a	Flexible/torsional resilient coupling	Replace rubber element.		W4146
QL4	5000	18 a	Drive shaft	Overhaul drive shaft.	X	X3504

w = weeks
m = months
a = years

1.9 Maintenance schedule matrix 4,000 h

0 to 4,000 Operating hours

Task	Limit	Operating hours [h]								
		Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000
Engine										
W1828	1 a									
W1245	1 a									
W1246	1 a									
W1244	2 a									
W4126	2 a									
W1008	2 a									
W1453	3 a									
W0500	-	X								
W0501	-	X								
W0502	-	X								
W0503	-	X								
W0505	-	X								
W0506	-	X								
W0507	-	X								
W0508	-	X								
W1001	2 a		X	X	X	X	X	X	X	X
W1675	2 a		X	X	X	X	X	X	X	X
W1193	18 a		X	X	X	X	X	X	X	X
W4172	1 a			X		X		X		X
W1002	2 a			X		X		X		X
W1005	3 a					X				X
W1296	3 a					X				X
W1519	5 a					X				X
W1011	18 a					X				X
W1006	18 a					X				X
W1636	18 a					X				X
W1298	6 a									X
W1477	18 a									X
W4150	5 a					X				X
W4170	5 a					X				X
W1250	6 a					X				X
W1251	6 a					X				X
W2000	18 a									X
W2002	18 a									X
W2003	18 a									X
W2006	18 a									X
W2017	18 a									X
W2018	18 a									X
W2059	18 a									X
W2062	18 a									X
W2074	18 a									X
W2110	18 a									X

w = weeks
m = months
a = years

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Task	Limit	Daily	500	1,000	1,500	2,000	2,500	3,000	3,500	4,000
		Operating hours [h]								
W2111	18 a									X
W2112	18 a									X
W2166	18 a									X
W1134	18 a									X
W1055	18 a									X
W1038	18 a									X
W1472	18 a									X
W1083	18 a					X				X
W1084	18 a					X				X
W1082	18 a					X				X
W3000	18 a									X
W3001	18 a									X
W3004	18 a									X
W3006	18 a									X
W3007	18 a									X
W3011	18 a									X
W3012	18 a									X
W3013	18 a									X
W3021	18 a									X
W3041	18 a									X
W3042	18 a									X
W3056	18 a									X
W3057	18 a									X
W3106	18 a									X
W3107	18 a									X
W3108	18 a									X
W3152	18 a									X
W3177	18 a									X
W3182	18 a									X
W3186	18 a									X
W4173	18 a									X
W4171	18 a									X
W4146	18 a									X
X3504	18 a									X

w = weeks
m = months
a = years

TIM-ID: 0000074836 - 001

1.10 Maintenance tasks 4,000 h

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
Engine						
QL1	-	1 a	Preheater / Jacket water heater	Check operation and inspect for leaks.	X	W1828
QL1	-	1 a	Fuel servicing plant	Check alarm function of differential pressure gauge.	X	W1245
				Check pump capacity.	X	W1246
QL1	-	2 a	Fuel servicing plant	Check function of bar electrode.	X	W1244
				Replace filter elements.	X	W4126
QL1	-	2 a	Engine oil filter	Fit new engine oil filters each time the engine oil is changed or, at the latest, on expiry of the time limit (given in years).		W1008
QL1	-	3 a	Preheater / Jacket water heater	Replace thermostat.	X	W1453
QL1	Daily	-	Engine operation	Check engine oil level.		W0500
				Carry out visual inspection of engine for general condition and leaks.		W0501
				Inspect intercooler drain system.		W0502
				Inspect service indicator of air filter.		W0503
				Check relief bores of coolant pump(s).		W0505
				Check for abnormal running noises, exhaust gas color and vibration.		W0506
				Drain off water and contamination from fuel prefilter.	X	W0507
				Check differential pressure gauge of fuel prefilter.	X	W0508
QL1	500	2 a	Fuel filter	Fit new fuel filter or new fuel filter insert.		W1001
QL1	500	2 a	Fuel prefilter	Fit new fuel prefilter or new fuel prefilter insert.	X	W1675
QL1	500	18 a	Drive shaft	Lubricate drive shaft at lubrication points.	X	W1193
QL1	1000	1 a	Engine mounts	Check general condition of resilient mount (visual inspection).		W4172
QL1	1000	2 a	Valve gear	Check valve clearance, adjust if necessary.		W1002
QL1	2000	3 a	Air filters	Fit new air filters.		W1005
QL1	2000	3 a	Coolant expansion tank	Replace valve.		W1296
QL1	2000	5 a	Engine mounts	Check tightness of securing screws.		W1519
QL1	2000	18 a	Combustion chambers	Inspect cylinder chambers using endoscope.		W1011
QL1	2000	18 a	Fuel injectors	Replace fuel injectors.		W1006
QL1	2000	18 a	Engine governor	Reset parameters of drift correction (CDC) and enter injector coding (IIG).		W1636
QL1	4000	6 a	HP fuel lines	Fit new HP fuel lines.		W1298
QL1	4000	18 a	Preheater / Jacket water heater	Overhaul preheater / jacket water heater.	X	W1477
QL3	2000	5 a	Engine mounts	Measure height of rubber element.		W4150
				Measure buffer clearance, adjust if needed.	X	W4170
QL3	2000	6 a	Rubber sleeves	Replace all rubber sleeves.		W1250
QL3	2000	6 a	Hose lines	Replace all hose lines.		W1251
QL3	4000	18 a	Component maintenance	Before starting maintenance work, drain the coolant and flush the cooling systems.		W2000
				Clean air ducting.		W2002
				Clean intercooler and inspect for leakage.		W2003
				Check engine coolant thermostat and fit new thermal actuator.		W2006
				Clean engine coolant cooler and inspect it for leaks.		W2017
				Clean engine oil cooler and inspect it for leaks.		W2018
				Clean fuel cooler.		W2059
				Fit new seals/sealing materials for all disassembled components.		W2062

w = weeks
m = months
a = years

Qualification level	Interval [h]	Limit	Item	Maintenance tasks	Option	Task
				Inspect rocker arms, valve bridges, pushrods and ball joints for wear.		W2074
				Overhaul engine coolant pump.		W2110
				Overhaul raw-water pump.		W2111
				Overhaul bilge pump.	X	W2112
				Clean raw-water based intercooler and check for leaks.		W2166
QL3	4000	18 a	Cylinder heads	Overhaul cylinder heads.		W1134
QL3	4000	18 a	Crankcase breathers	Fit new oil separators.		W1055
QL3	4000	18 a	Turbochargers	Overhaul turbochargers.		W1038
				Fit new compressor wheels for turbochargers.		W1472
QL4	2000	18 a	Conrod bearings	Fit new conrod bearings.		W1083
QL4	2000	18 a	Cylinder liners	Fit new cylinder liners.		W1084
QL4	2000	18 a	Pistons	Fit new pistons.		W1082
QL4	4000	18 a	Extended component maintenance	Completely disassemble the engine. Inspect engine components as per assembly instructions and repair or fit new components as required.		W3000
				Replace all elastomeric parts and seals with new ones.		W3001
				Fit new crankshaft bearings.		W3004
				Fit new antifriction bearings for auxiliary PTOs.	X	W3006
				Fit new high-pressure fuel pump.		W3007
				Fit new actuating cylinders for air flow control flaps.		W3011
				Fit new actuator cylinders for exhaust flaps.		W3012
				Fit new exhaust flap bearings.		W3013
				Fit new pressure relief valve in high-pressure fuel system.		W3021
				Overhaul starter.		W3041
				Overhaul battery-charging generator.	X	W3042
				Fit new wire meshes for crankcase ventilation system.		W3056
				Fit new high-pressure fuel sensor.		W3057
				Replace oil replenishment pump.	X	W3106
				Replace oil-level regulating pump.	X	W3107
				Check vibration damper, fit new one if necessary.		W3108
				Replace diverter valve.	X	W3152
				Check engine oil pump, replace if necessary.		W3177
				Gear train: Check tooth flanks for wear (visual inspection), replace bearing bushings.		W3182
				Replace air flap bearings.		W3186
QL4	4000	18 a	Engine mounts	Replace rubber element of resilient mounts.		W4173
QL4	4000	18 a	Shaft misalignment coupling	Replace diaphragm.	X	W4171
QL4	4000	18 a	Flexible/torsional resilient coupling	Replace rubber element.		W4146
QL4	4000	18 a	Drive shaft	Overhaul drive shaft.	X	X3504

w = weeks
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