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MARINTEK

Report

Tests with White Diesel on a marine diesel engine.

ECO Energy Holding AS

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MARINTEK RAPPORT

TITTEL

Tests with White Diesel on a marine diesel engine.

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SAMMENDRAG

On comission by Eco Energy Holding AS, MARINTEK have conducted test with White Diesel in different mixtures with water and mapped the changes in exhaust emissions and fuel consumption. Of special interest is the reduction of NOx emission caused by adding water to the fuel in different mixing ratios. The tests comprice one reference fuel and four emulsified fuel qualities based on the reference fuel with water added: 8, 10, 12 and 15 % water.

The average NOx reduction factor is measured and calculated to be 0.88. This means that The NOx emission is reduced by 0.88 % for each percent of water that was added to the fuel (within the tested range (8 to 15 % water).

The average CO reduction is found to be 39 %. The average reduction of THC emission is found to be 12 %. The smoke emission is significantly reduced with emulsified fuel. The average smoke reduction is found to be about 50 %. Particulate emission is, on average, reduced by about 21 %.

STIKKORD	NORSK	ENGELSK
GRUPPE 1	Avgassutlipp	Exhaust emission
GRUPPE 2	Marint drivstoff	Marine fuels
EGENVALGTE	Skipsfart	Ship operations

INNHOLDSFORTEGNELSE

1. Introduction

During a test periode in 2008, MARINTEK performed a number of tests with water emulsified diesel (White Diesel) on a marine diesel engine. These tests were conducted on comission by Eco Energy Holding AS. White Diesel is an emulsified fuel made of diesel oil added with water and an emulsifying agent. Additives to improve ignition might also be added as an option.

The purpose of the test was to verify the effect of water content with respect to exhaust emissions and fuel consumption. The engine used in these tests is a Rolls-Royce KR3 marine diesel engine, installed in the laboratory of MARINTEK in Trondheim.

The emulsified fuel qualities were prepared by the client (Eco Energy Holding AS) and supplied to MARINTEK in 1m3 containers.

2. Description of test

Prior to testing the emulsified fuel, a reference test was run with standard MGO, to establish the actual reference parameters (emissions and fuel consumption). The 4 emulsified fuel tests started with 8 % water, and increasing to 15 % in the last test (8, 10, 12 and finally 15 % water).

2.1 Engine data

Actual data for the Rolls Royce K-type engine in MARINTEK's laboratory.

Engine data:

Cylinders	: 3
Engine bore	: 250 mm
Svept volume pr.cylinder	: 14.7 dm3
Engine speed	: 750 rpm
Nominal power at 750 rpm	: 500 kW

2.2 Test Fuel

The reference test is run on standard MGO. The White Diesel is produced from the same fuel quality by adding water and activator (emulsifying agent).

2.3 Engine test cycles

The engine tests are performed according to the following test cycles: E2 and E3 (ISO 8178). These test cycles use 4 different load conditions (modes). In table 2.0.1 and 2.0.2 the details regarding test cycles E2 and E3 are shown.

Mode no.	1	2	3	4
Speed	Rated speed (750 rpm)			
Torque (%)	*)100	75	50	25
Torque (Nm)	6370	4778	3185	1593
Weighting factor	0,2	0,5	0,15	0,15

Tabell 3.0.1. Test cycle E2 (generatorcurve).

Mode no.	1	2	3	4
Speed (%)	100	91	80	63
Speed (rpm)	750	682	600	474
Torque (%)				
Torque (Nm)				
Weighting factor	0,2	0,5	0,15	0,15

Tabell 3.0.2. Test cycle E3 (propellercurve).

2.4 Engine test data – Logging

The following measuring points are included in the engine test records:

- Ambient temperature
- Ambient pressure
- Ambient Relative humidity
- Engine speed
- Engine torque
- Fuel consumption
- Air consumption
- Air temperature before turbocharger
- Air temperature after turbocharger
- Charge air receiver temperaure
- Charge air receiver pressure
- Fuel temperature
- Exhaust temperatures after cylinders 1, 2, and 3
- Exhaust temperature before exhaust turbine
- Exhaust temperature after exhaust turbine.
- Jacket water temperature
- Lubricating oil temperature

In addition to the traditional measuring points listed abowe, cylinder no. 3 is equipped with a combustion pressure transducer. The dynamic cylinder pressure is recorded and stored in engine test data folders.

- Exhaust emission instrument: NOx, CO, CO_2 og O_2.
  Horiba PG 250, measuring principles and accuracy according to ISO 8178.
  NOx - CLD
  CO og CO_2 - NDIR
  O2 - Paramagnetic
  Calibration gases are supplied by AGA (with a certificate of gas quality).
  These measurements have a relative accuracy better than ± 2%.

- Exhaust emission instrument: THC (Total Hydro Carbone).
  JUM HC-analycer with FID. Measuring principle and accuracy according to ISO 8178.
  Calibration gas is supplied by AGA (with a certificate of gas quality).
  These measurements have a relative accuracy better than ± 2%.

- Smoke emission FSN (filter smoke number): AVL instrument

- Particulate emission is measured by the use of a dilution tunnel according to ISO 8178. A partial flow of the engine's exhaust is led through this tunnel. This flow is diluted by air in a ratio of 10 to 1 (1 part exhaust to 10 parts of air). A measured volume of this diluted exhaust is pumped through a ceramic filter where the particulates are trapped. The weight of the trapped partikles is measured, and then used as input to a calculation routine to produce the specific particulate emission.

3. Test results

Table 3.0.1 to 3.0.4 show the weighted specific emissions of particles, NOx, CO and THC from the five tests. The actual weighing-factors are shown in table 3.0.1 and 3.0.2

The table below contain the results from the engine tests.

Weighted emissions				
Propellercurve	Particles [g/kWh]	NOx [g/kWh]	CO [g/kWh]	THC [g/kWh]
Reference diesel	0.1364	12.8	4.54	0.197
White Diesel 8%	0.1055	11.99	2.60	0.192
White Diesel 10%	0.1081	11.49	3.02	0.170
White Diesel 12%	0.1090	11.21	3.47	0.183
White Diesel 15%	0.1099	11.24	2.75	0.163
Generator curve				
Reference diesel	0.1139	12.25	2.45	0.215
White Diesel 8%	0.0917	11.57	1.28	0.195
White Diesel 10%	0.0916	11.09	1.53	0.181
White Diesel 12%	0.09	10.91	1.46	0.20
White Diesel 15%	0.089	10.73	1.33	0.163

Table 3.1. Weighted test results.

Comparison of weighted results in relation to reference test results				
Propellercurve	Particles Change in %	NOx Change in %	CO Change in %	THC Change in %
Reference diesel	0	0	0	0
White Diesel 8%	-22.7	-6.33	-42.7	-2.5
White Diesel 10%	-20.8	-10.23	-33.5	-13.7
White Diesel 12%	-20	-12.42	-23.6	-7.1
White Diesel 15%	-19.4	-12.19	-39.4	-17.3
Generator curve				
Reference diesel	0	0	0	0
White Diesel 8%	-19.5	-5.55	-47.8	-9.3
White Diesel 10%	-19.6	-9.47	-37.6	-15.8
White Diesel 12%	-21.0	-10.94	-40.4	-7.0
White Diesel 15%	-21.9	-12.41	-45.7	-24.2

Table 3.2. Comparison of test-results, weighted values.

Summary test results.
The reduction in NOx emission is nearly proportional to the content of water. The proportional factor is found to be 0.88 on average (within the tests range, from 8 to 15 % water). This means that the reduction in NOx is 0.88 % when adding 1 % water to the fuel.

All the measured exhaust emissions show a reduction when water is added to the fuel, to a larger or lesser degree. Of particular interest is the significant reduction in smoke, and its contribution to the reduction of particulate emission.

3.1 Fuel consumption

Figure 3.1.1 to 3.1.4 shows the specific fuel consumption, with reference fuel and the emulsified fuel qualities (White Diesel).

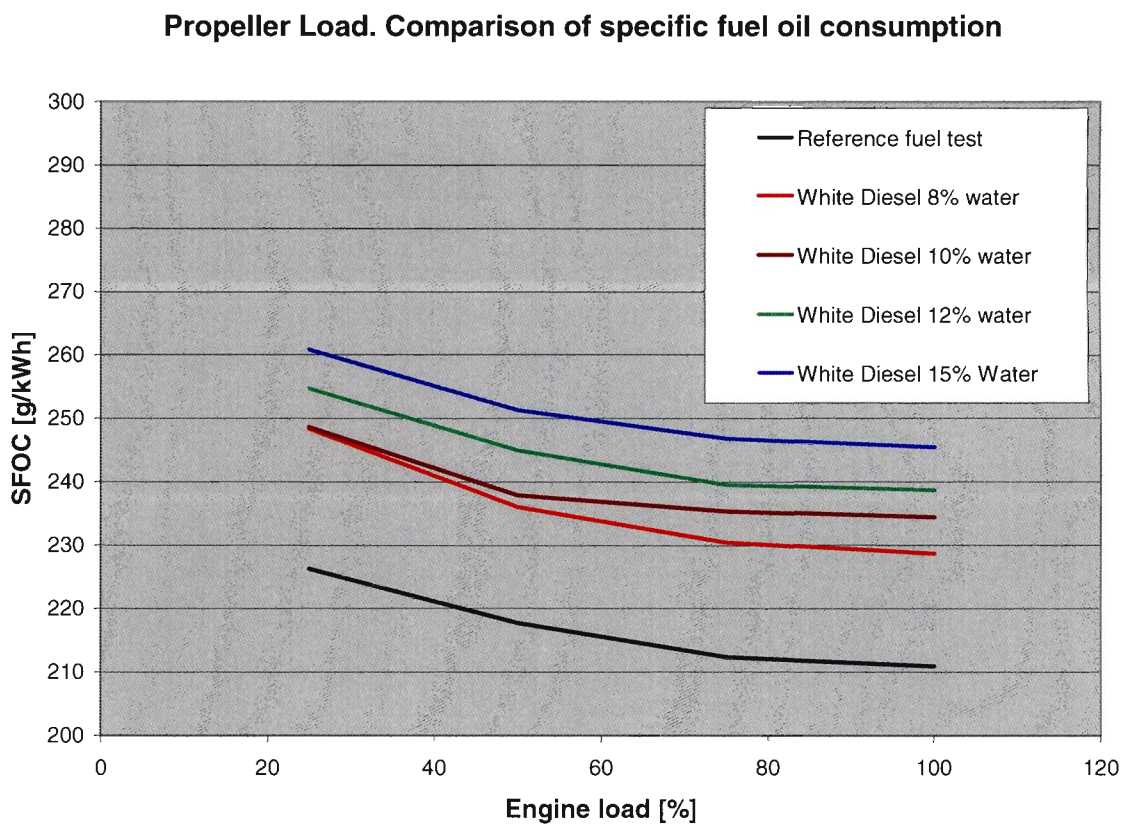
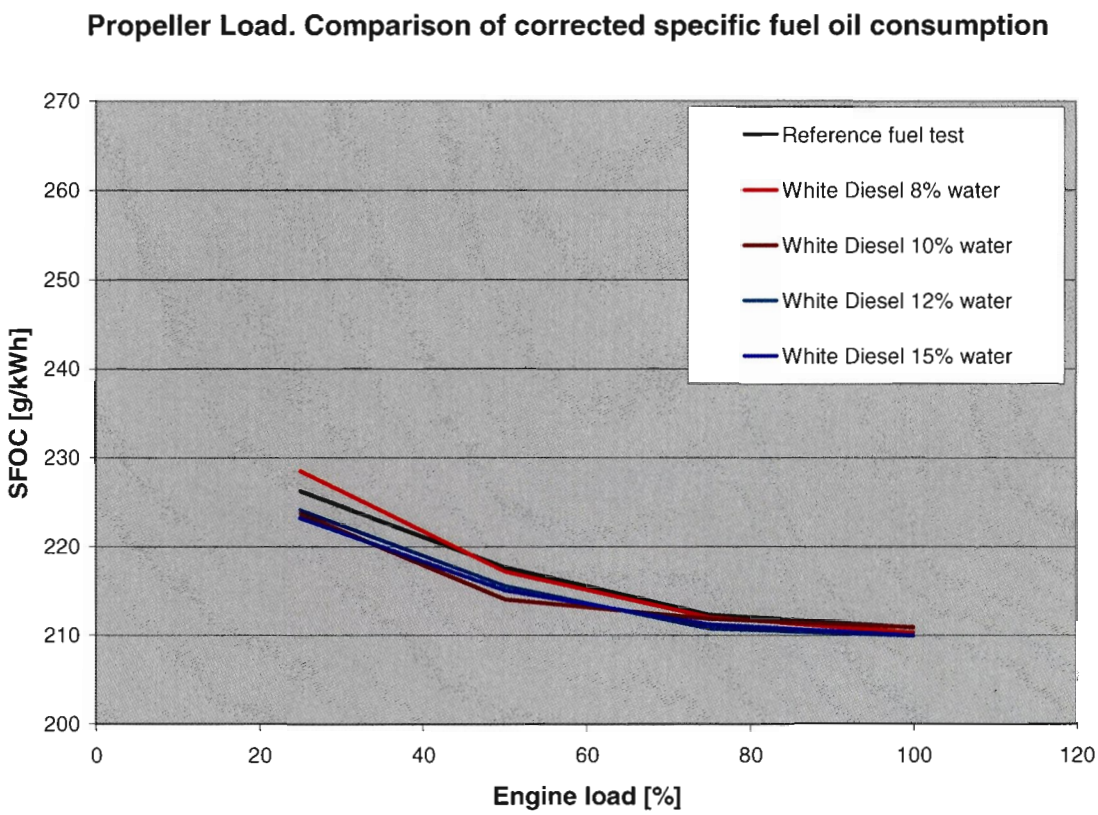


Figure 3.1.1. Specific fuel oil consumption - propeller load.



Figur 3.1.2. Corrected specific fuel oil consumption - propeller load..

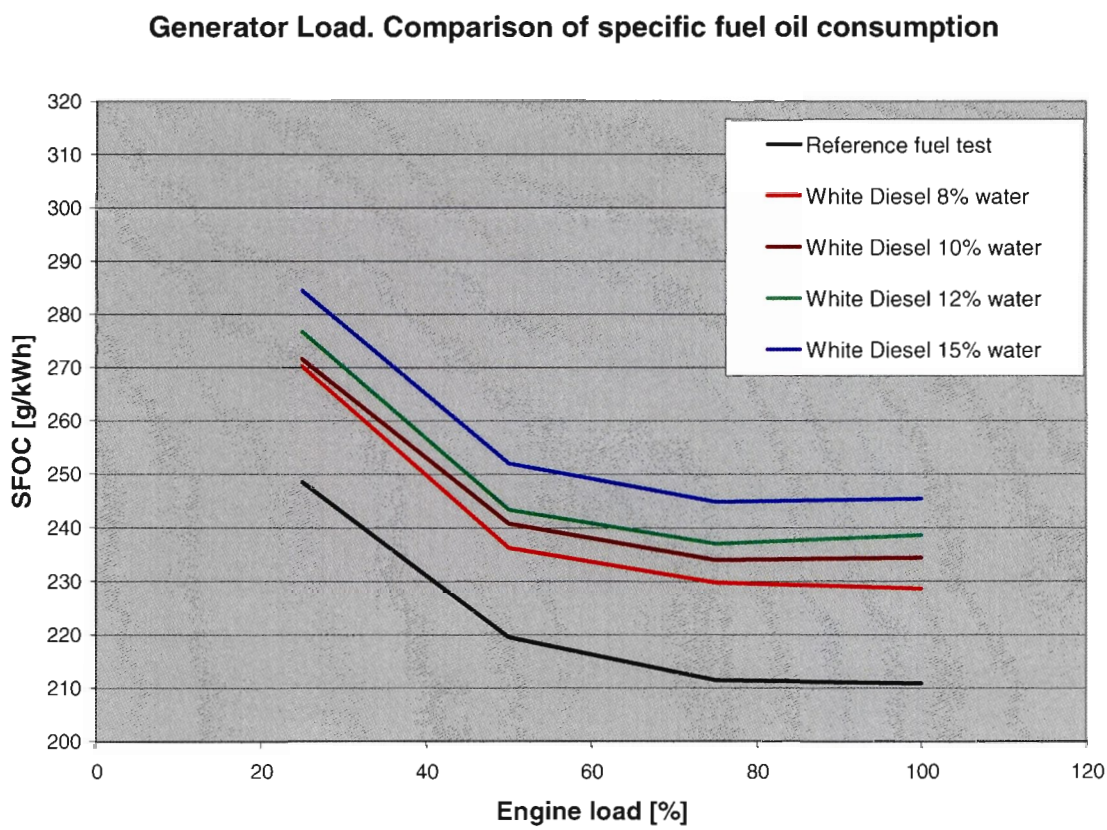


Figure 3.1.3. Specific fuel oil consumption – generator load.

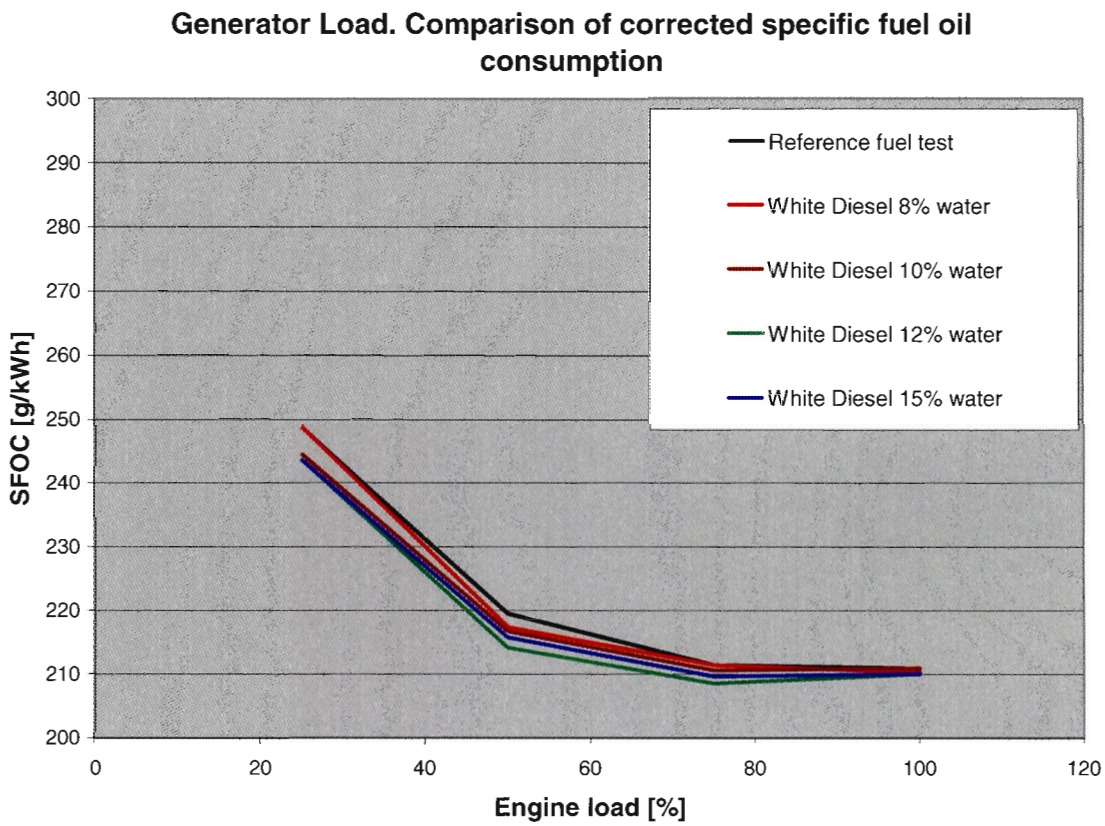


Figure 3.1.4. Corrected specific fuel oil consumption - generator load.

Comments to results

As expected there is an increase of the fuel consumption when the fuel is mixed with water.This increase is caused by the reduction in specific heating value.

By introducing a correction factor based on the water content, we can eliminate the water fraction to find the true diesel fuel consumption. This corrected consumption is found to be nearly the same as the reference fuel consumption. There is an indication that the corrected SFOC with emulsified fuel is slightly lower compared to the reference fuel, in the range of 0 to 2 g/kWh. This amounts to about 1 % of specific fuel consumption. However, any deviation in the water content from the declared persentage must be considered, as it will affect the corrected values.

Any real reduction in corrected SFOC can be explained by the measured reductions of the CO emission and the reduction in smoke emission (unburnt carbon).

3.2 NOx emissions

Figure 3.2.1 and 3.2.2 shows the specific NOx emissions with reference fuel and the emulsified fuel qualities (White Diesel).

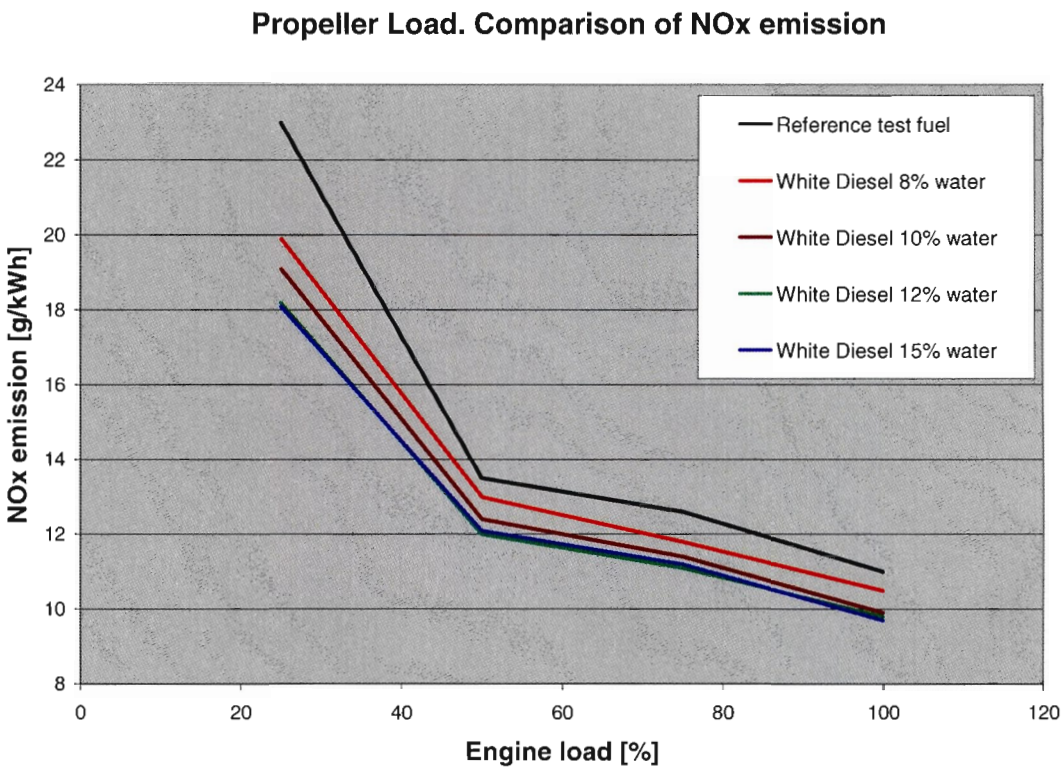


Figure 3.2.1. Specific NOx emissions – propeller load.

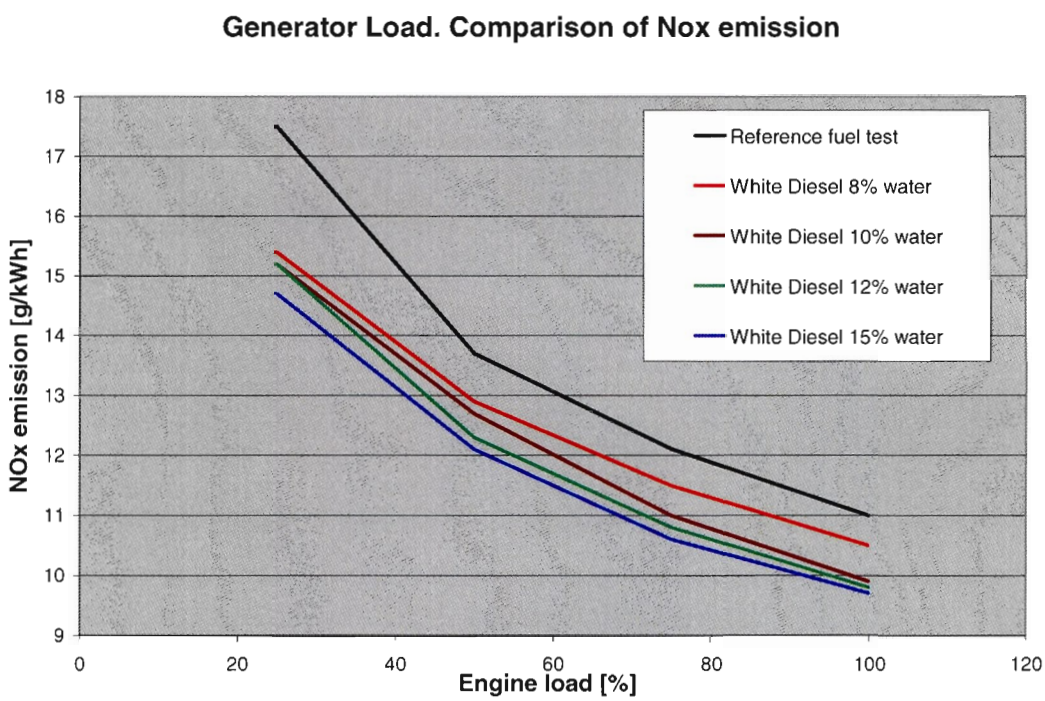


Figure 3.2.2. Specific NOx emissions – generator load.

Comments to testresults

The graphs in figure 3.2.1 and 3.2.2 show the reduction in NOx emission when mixing water into the fuel. The reduction in NOx emission is dependant of the water content.

3.3 CO emission

Figure 3.3.1 and 3.3.2 shows the specific emissions of CO with reference fuel and the emulsified fuel qualities.

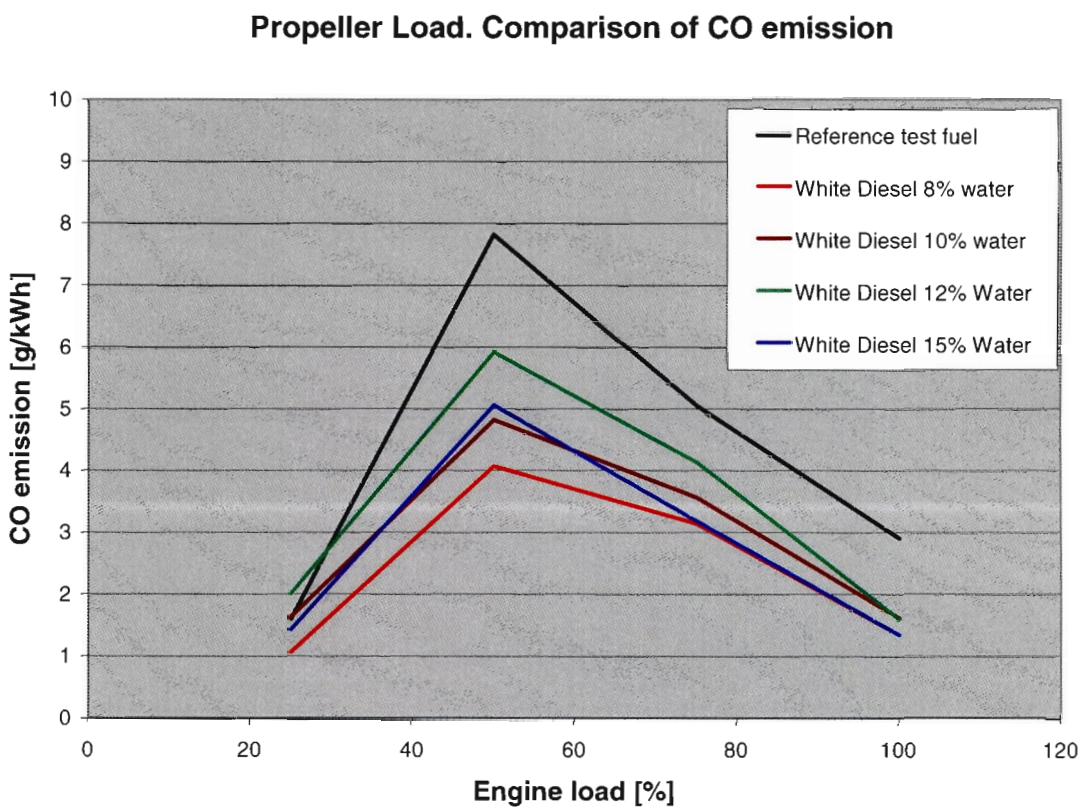


Figure 3.3.1. Specific CO emission - propeller load.

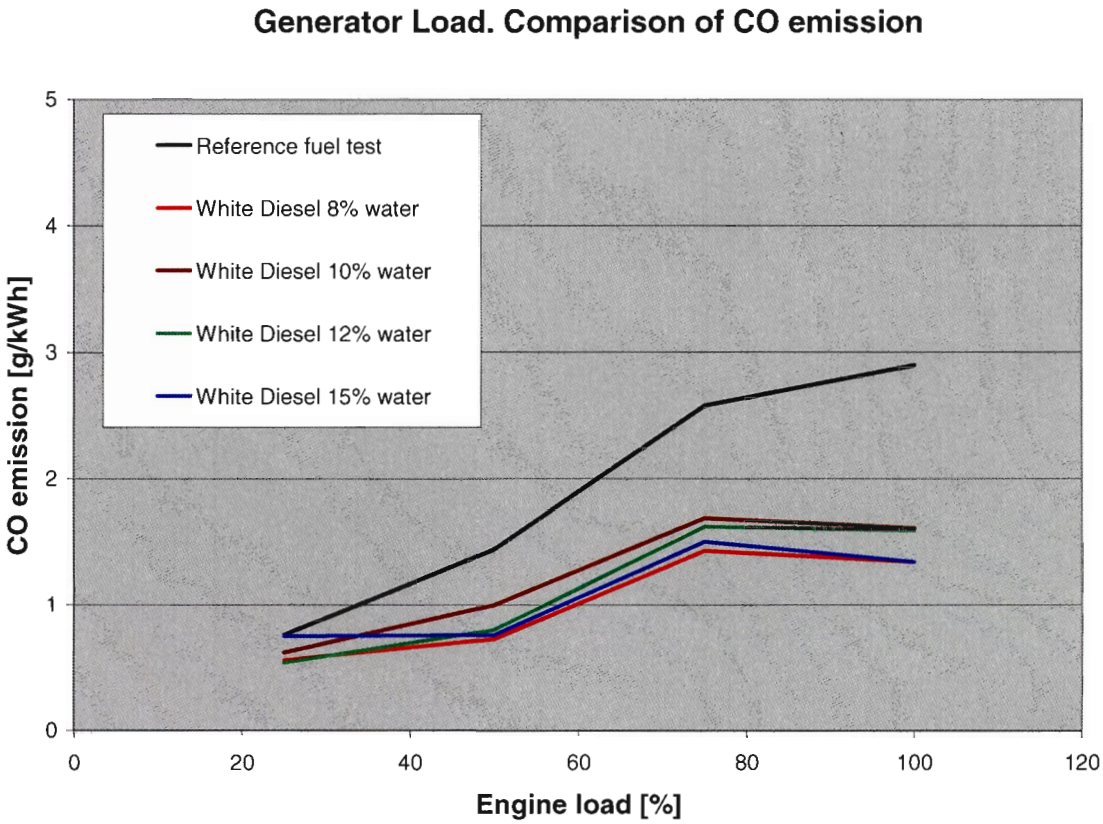


Figure 3.3.2. Specific CO emission – generator load.

Comments to results

There is a significant reduction in CO emission with emulsified fuels, particularly at high load in generator mode, where the emission is reduced by approximately 50 %.

The CO emission with propeller load shows the largest reduction with the lowest water content.

3.4 Emission of hydrocarbones - THC

Figure 3.4.1 and 3.4.2 the specific emissions of Total Hydro-Carbone (THC) from tests with reference fuel and emulsified fuels are shown.

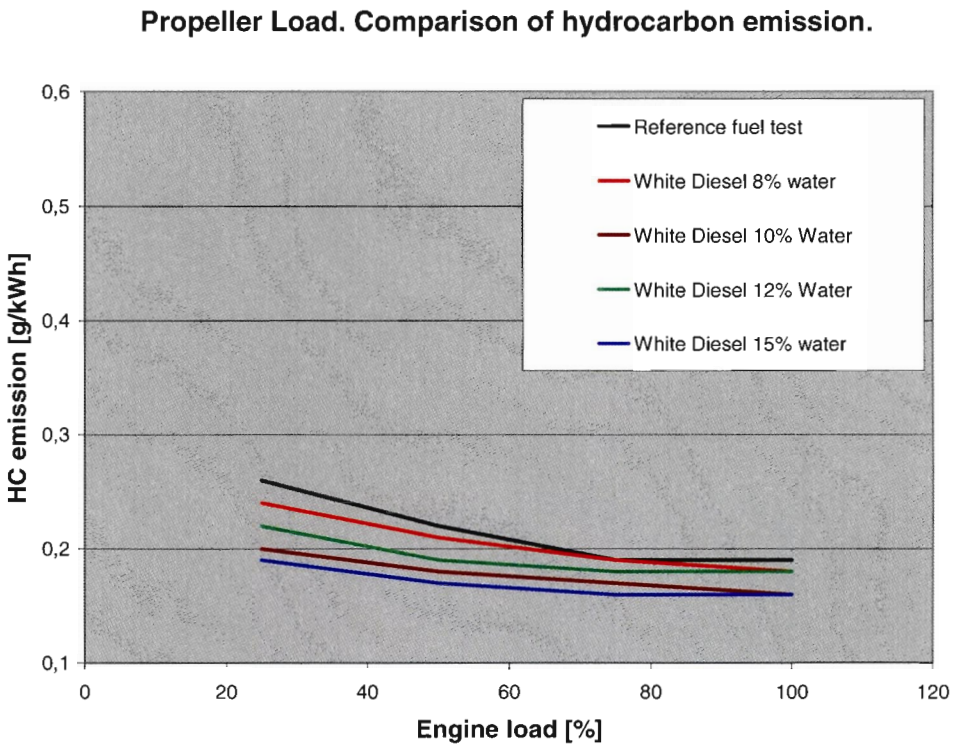


Figure 3.4.1. Specific emission of THC - propeller load.

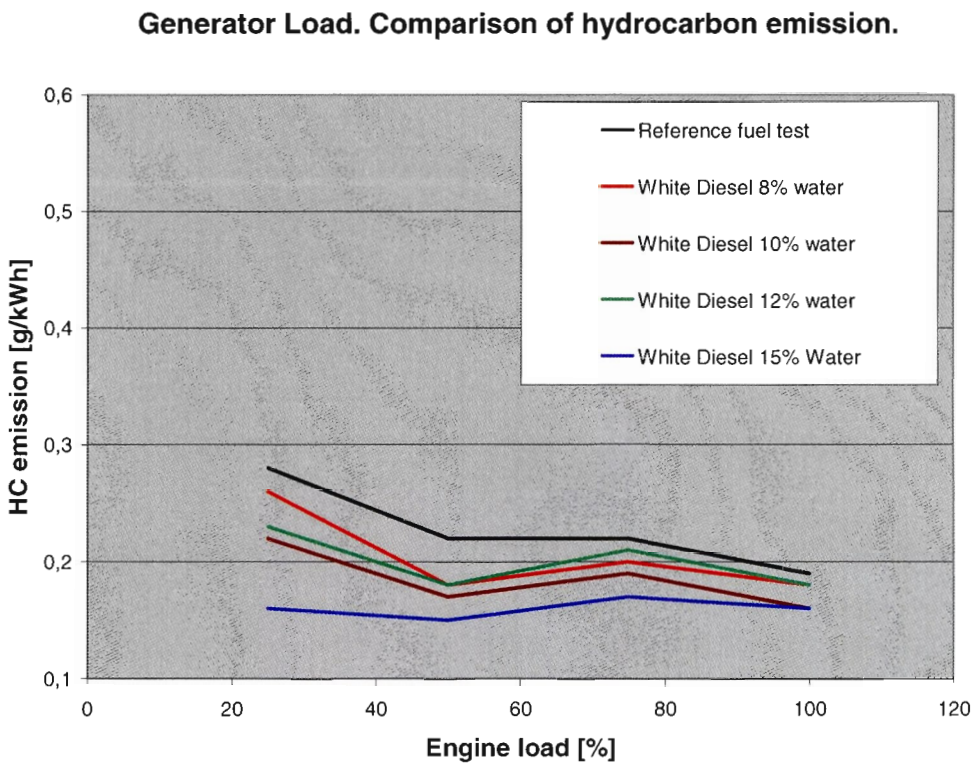


Figure 3.4.1. Specific emission of THC – generator load.

Comments to the results

The THC emission is reduced when adding water to the fuel. The largest reduction is found at low load. The actual THC emissions measured in these tests, are however of relatively low level, below 0.3 g/kWh.

3.5 Particulate emissions

Measurements of particulate emission in engine exhaust, is a relative labour intensive task. In this project we have chosen to perform a limited number of measurements. The measurements are distributed on different engine load points and with different water content (0 -12- 17 % water). In all 14 different combinations.

These results are the input to a regression analysisis, to find the correlation between smoke emission and particulate emission. Considering all fuel qualities are based on the same reference fuel, MGO, this can be done with high confidence.

The results fron the regression analysis is shown in figure 3.5.0

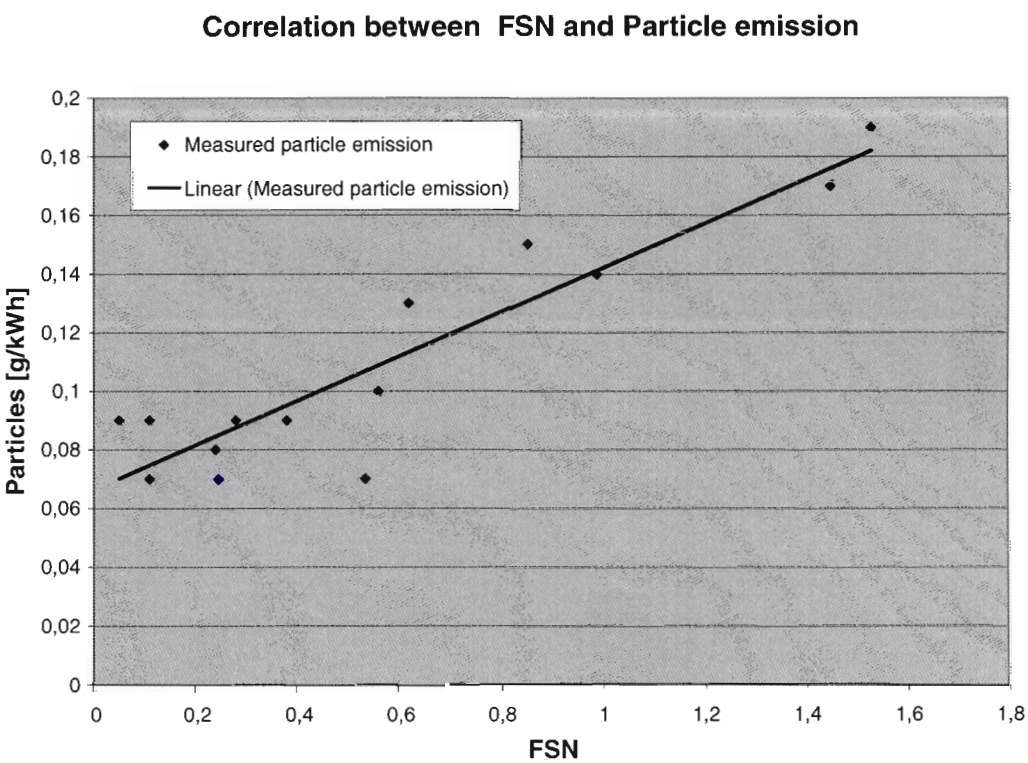


Figure 3.5.0 show the correlation between smoke emission and particulate emission. The input data to this diagram is based on measurements from MGO and emulsified fuel (White Diesel) tests.

The particulate emission in the following tests, are calculated based on this established correlation.
Figure 3.5.1 and 3.5.2 show the specific particulate emission from the reference fuel and the emulsified fuel qualities.

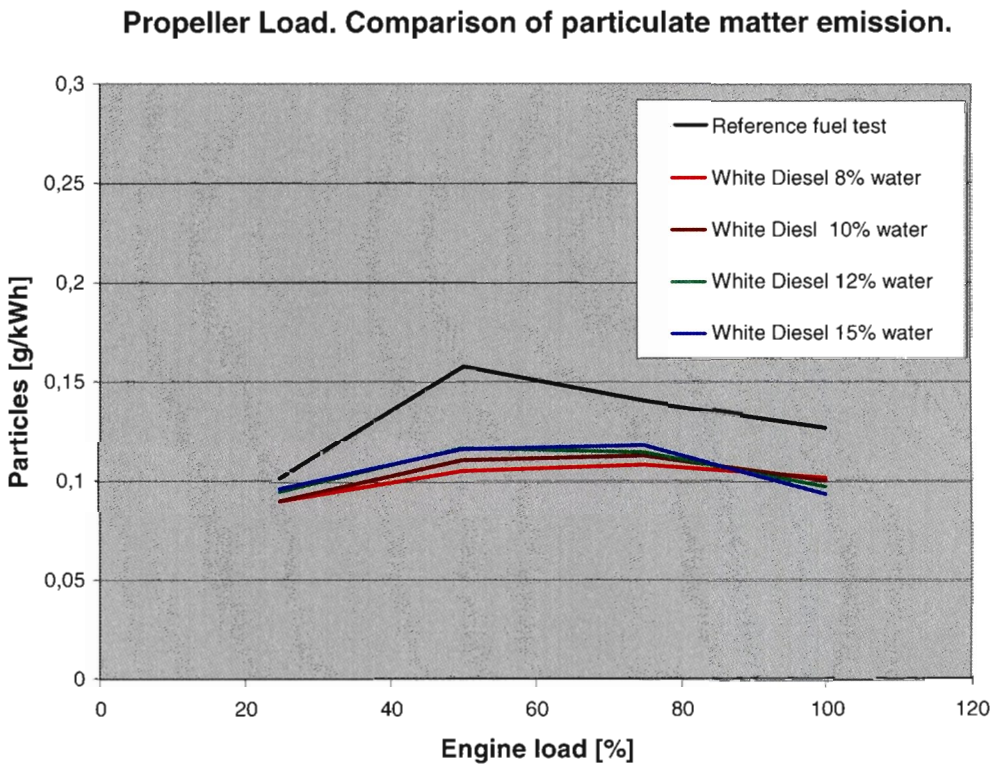


Figure 3.5.1. Particulate emissions – propeller load.

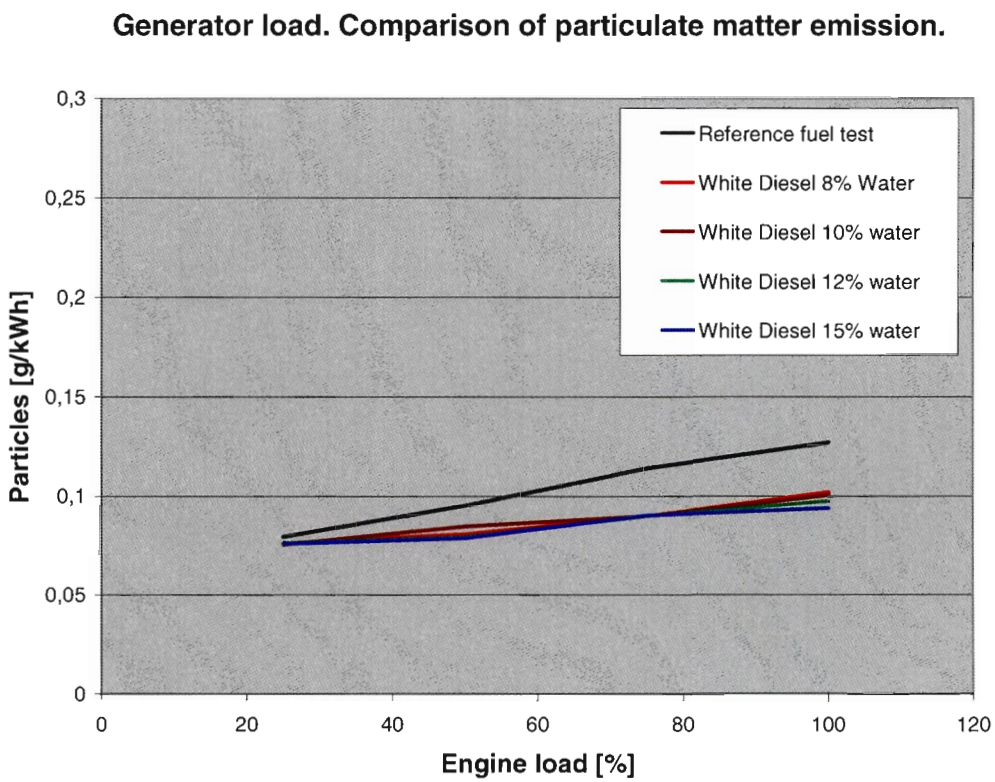


Figure 3.5.2. Particulate emissions - generator load.

Comments to results

The particulate emission is reduced due to the reduction in smoke emission. The graphs show the reduction in emission with emulsified fuels. The propeller load shows the largest reductions in emissions. The generator load has a different particulate characteristic, with the largest reduction at high load.

3.6 Smoke emission - Filter Smoke Number (FSN)

Figure 3.6.1 and 3.6.2 show the smoke emission from the reference fuel and the four emulsified fuel qualities.

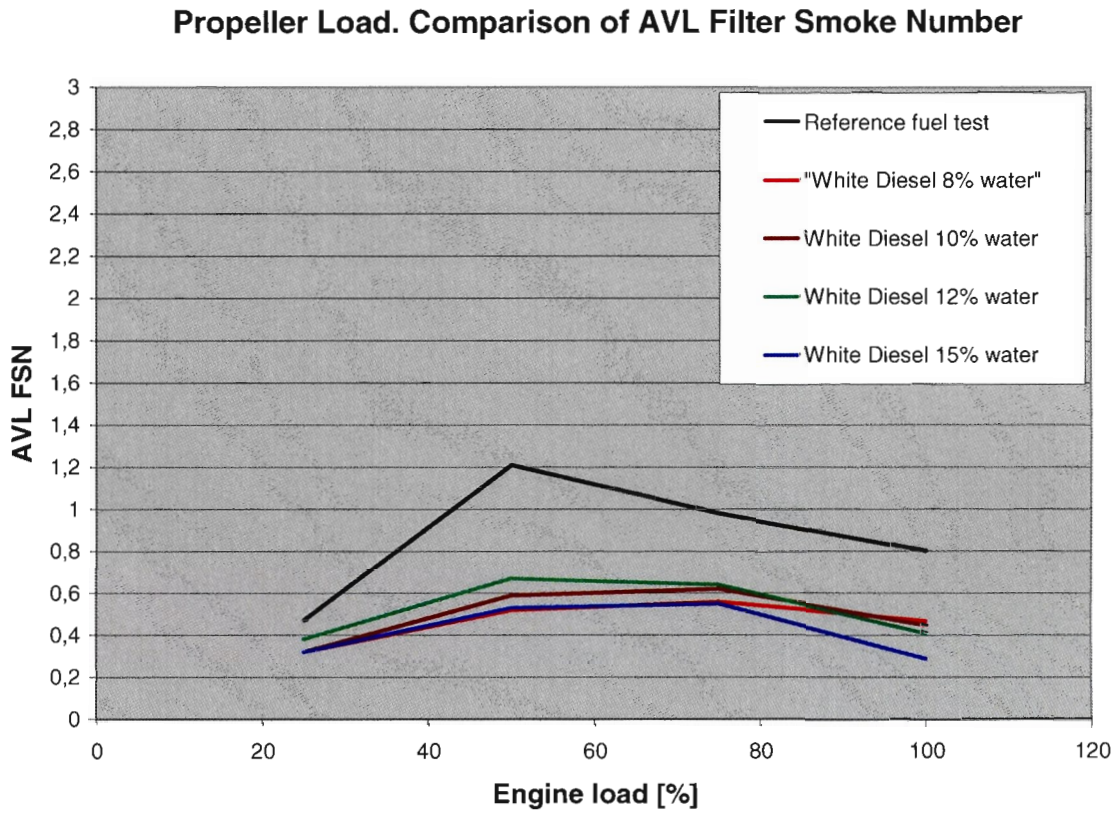


Figure 3.6.1. Filter Smoke Number (FSN) - propeller load.

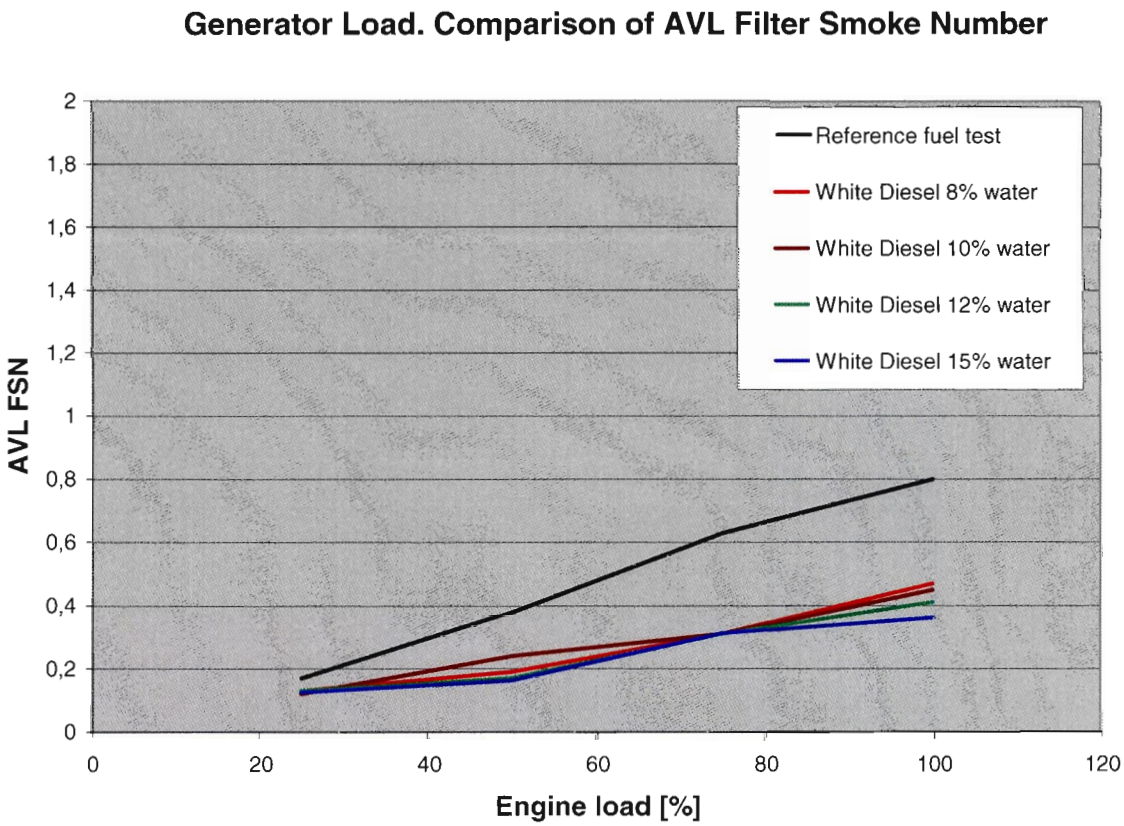


Figure 3.6.2. Filter Smoke Number (FSN) - generator load.

Comments to results

As the figure show the smoke emission is significantly reduced when water is mixed into the fuel. The smoke FSN is reduced to less than 50 % with the highest water content, compared to reference test. However the variation in smoke emission from the four emulsified fuels is relatively small. The small variation leads to the assumption that even a small quantity of water has a great impact on smoke emission. The effect of the water is diminishing with increasing water content (up to the testet 15 %).

4. Summary – Conclusions

On commission by Eco Energy Holding, MARINTEK have tested 4 emulsified fuel qualities (White Diesel) with different water content, from 8 to 15 % (8, 10, 12, and 15 %). The tests have primarily focused on the reduction of NOx emissions from the different water fuel ratios, but also included the other important parameters like fuel consumption, smoke, CO-THC emissions and emissions of particulate matter.

The average NOx reduction factor is measured and calculated to be 0.88. This means that The NOx emission is reduced by 0.88 % for each percent of water that was added to the fuel (within the tested range (8 to 15 % water). .

The CO emission is significantly reduced by the water mixed in fuel. The average CO reduction is calculated to 39 %. The largest reductions is obtained with the lowest water content.

The average reduction of THC emission is found to be 12 %. However there are relatively large variations in measured from about 2.5 % and up to about 24 %.

The smoke emission is significantly reduced with emulsified fuel. The average smoke reduction is found to be about 50 %. There are little variation in smoke emissions between the emulsified fuels.

Particulate emission is, on average, reduced by about 21 %. The particulate emission is linked to the smoke emission and will therefore show the same trend, and with relatively small variations between the different emulsified fuel qualities.

Appendix
Testdata

Reference diesel fuel

Engine Test Data KR3

Filename: Date: 11-04-2008 Time: 11:48

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	29,5
Torque	[Nm]	6404	Fuel Cons_s	[g/kWh]	210,9
Power	[kW]	503	Energy Cons_s	[MJ/kWh]	9,07
Power_ISO	[kW]	491,2	Energy Cons_s_ISO	[MJ/kWh]	8,86
BMEP	[bar]	18,2			
Effective_eff	[%]	39,7			
Vol_eff	[%]	128,6			
Adiabatic Eff Comp	[%]	71,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	37071			

Air - Exhaust

Temp b Compressor	[C]	25,1	DP Air Throttle	[mbar]	21,42
Temp a Compressor	[C]	154,9	Press Airreceiver	[bara]	2,55
Temp Airreceiver	[C]	47,5			
			Air Cons	[kg/s]	1,05
Exhaust Temp Cyl 1	[C]	443	Air Cons_s	[kg/kWh]	7,55
Exhaust Temp Cyl 2	[C]	439			
Exhaust Temp Cyl 3	[C]	429	Exhaust Flow_s	[kg/kWh]	7,76
			Exhaust Flow	[kg/s]	1,08
Exhaust Temp b Turbine	[C]	554			
Exhaust Temp a Turbine	[C]	374	Humidity	[%]	24,4
			Ambient Press	[mbar]	991,3
			Ambient Temp	[C]	25,3

Emission

O2	[%]	12,81	O2_s	[g/kWh]	1031,7
CO	[ppm]	412	CO_s	[g/kWh]	2,9
CO2	[%]	5,72	CO2_s	[g/kWh]	633,3
HC	[ppm]	17	HC_s	[g/kWh]	0,19
NOx	[ppm]	966	NOx_s	[g/kWh]	11,2
			NOx_s_corr	[g/kWh]	11
CO 5% O2	[mg/nm3]	1009,5			
HC 5% O2	[mg/nm3]	60,6	NOxCorrection	[]	0,99
NOx 5% O2	[mg/nm3]	3883,4	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,8	Lambda_tot	[]	2,53
			Lambda_MFlow	[]	2,44

Cooling water/Lub Oil

Water Temp b Engine	[C]	81,6
Water Temp a Engine	[C]	84,9
Sea Water Temp b Engine	[C]	29,4
Sea Water Temp a Engine	[C]	40
Lub Oil Temp b Engine	[C]	56,9
Lub Oil Temp a Engine	[C]	63,4

Comments: 750 RPM 100% Gen/Prop- load

Engine Test Data KR3

Filename: Date: 11-04-2008 Time: 11:58

Engine Performance

Engine Speed	[rpm]	682	Fuel Cons	[g/s]	22,1
Torque	[Nm]	5250	Fuel Cons_s	[g/kWh]	212,3
Power	[kW]	374,9	Energy Cons_s	[MJ/kWh]	9,13
Power_ISO	[kW]	367,3	Energy Cons_s_ISO	[MJ/kWh]	8,94
BMEP	[bar]	15			
Effective_eff	[%]	39,4			
Vol_eff	[%]	133,3			
Adiabatic Eff Comp	[%]	70,9	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31112			

Air - Exhaust

Temp b Compressor	[C]	24,8	DP Air Throttle	[mbar]	11,66
Temp a Compressor	[C]	118,4	Press Airreceiver	[bara]	2
Temp Airreceiver	[C]	41			
			Air Cons	[kg/s]	0,78
Exhaust Temp Cyl 1	[C]	430	Air Cons_s	[kg/kWh]	7,52
Exhaust Temp Cyl 2	[C]	421			
Exhaust Temp Cyl 3	[C]	407	Exhaust Flow_s	[kg/kWh]	7,73
			Exhaust Flow	[kg/s]	0,81
Exhaust Temp b Turbine	[C]	536			
Exhaust Temp a Turbine	[C]	383	Humidity	[%]	24,2
			Ambient Press	[mbar]	991,4
			Ambient Temp	[C]	25

Emission

O2	[%]	12,25	O2_s	[g/kWh]	979,2
CO	[ppm]	723	CO_s	[g/kWh]	5,05
CO2	[%]	6,09	CO2_s	[g/kWh]	669,2
HC	[ppm]	17	HC_s	[g/kWh]	0,19
NOx	[ppm]	1116	NOx_s	[g/kWh]	12,8
			NOx_s_corr	[g/kWh]	12,6
CO 5% O2	[mg/nm3]	1655			
HC 5% O2	[mg/nm3]	59	NOxCorrection	[]	0,99
NOx 5% O2	[mg/nm3]	4191	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,98	Lambda_tot	[]	2,38
			Lambda_MFlow	[]	2,41

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,6
Water Temp a Engine	[C]	82,6
Sea Water Temp b Engine	[C]	28,9
Sea Water Temp a Engine	[C]	36,9
Lub Oil Temp b Engine	[C]	55,9
Lub Oil Temp a Engine	[C]	62,9

Comments: 680 RPM 75% Propload

Engine Test Data KR3

Filename:		Date: 11-04-2008		Time: 12:13

Engine Performance

Engine Speed	[rpm]	596	Fuel Cons	[g/s]	15,3
Torque	[Nm]	4057	Fuel Cons_s	[g/kWh]	217,7
Power	[kW]	253,2	Energy Cons_s	[MJ/kWh]	9,36
Power_ISO	[kW]	248,8	Energy Cons_s_ISO	[MJ/kWh]	9,2
BMEP	[bar]	11,6			
Effective_eff	[%]	38,5			
Vol_eff	[%]	136,2			
Adiabatic Eff Comp	[%]	70,6	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24367			

Air - Exhaust

Temp b Compressor	[C]	24,4	DP Air Throttle	[mbar]	5,7
Temp a Compressor	[C]	83,8	Press Airreceiver	[bara]	1,57
Temp Airreceiver	[C]	36,3			
			Air Cons	[kg/s]	0,55
Exhaust Temp Cyl 1	[C]	401	Air Cons_s	[kg/kWh]	7,82
Exhaust Temp Cyl 2	[C]	406			
Exhaust Temp Cyl 3	[C]	382	Exhaust Flow_s	[kg/kWh]	8,03
			Exhaust Flow	[kg/s]	0,57
Exhaust Temp b Turbine	[C]	506			
Exhaust Temp a Turbine	[C]	379	Humidity	[%]	22,1
			Ambient Press	[mbar]	991,4
			Ambient Temp	[C]	24,6

Emission

O2	[%]	12,3	O2_s	[g/kWh]	1023,5
CO	[ppm]	1074	CO_s	[g/kWh]	7,82
CO2	[%]	5,97	CO2_s	[g/kWh]	683
HC	[ppm]	19	HC_s	[g/kWh]	0,22
NOx	[ppm]	1152	NOx_s	[g/kWh]	13,8
			NOx_s_corr	[g/kWh]	13,5
CO 5% O2	[mg/nm3]	2474,8			
HC 5% O2	[mg/nm3]	64	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	4355,7	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	1,21	Lambda_tot	[]	2,43
			Lambda_MFlow	[]	2,44

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,4
Water Temp a Engine	[C]	82,1
Sea Water Temp b Engine	[C]	28,5
Sea Water Temp a Engine	[C]	33,8
Lub Oil Temp b Engine	[C]	55,3
Lub Oil Temp a Engine	[C]	61,7

Comments: 596 RPM50% Propload

Engine Test Data KR3

Filename: Date: 11-04-2008 Time: 12:24

Engine Performance

Engine Speed	[rpm]	473	Fuel Cons	[g/s]	7,9
Torque	[Nm]	2525	Fuel Cons_s	[g/kWh]	226,2
Power	[kW]	125	Energy Cons_s	[MJ/kWh]	9,73
Power_ISO	[kW]	123,3	Energy Cons_s_ISO	[MJ/kWh]	9,6
BMEP	[bar]	7,2			
Effective_eff	[%]	37			
Vol_eff	[%]	133			
Adiabatic Eff Comp	[%]	61	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	14796			

Air - Exhaust

Temp b Compressor	[C]	23,7	DP Air Throttle	[mbar]	1,96
Temp a Compressor	[C]	50,2	Press Airreceiver	[bara]	1,19
Temp Airreceiver	[C]	32,4			
			Air Cons	[kg/s]	0,32
Exhaust Temp Cyl 1	[C]	315	Air Cons_s	[kg/kWh]	9,32
Exhaust Temp Cyl 2	[C]	319			
Exhaust Temp Cyl 3	[C]	289	Exhaust Flow_s	[kg/kWh]	9,55
			Exhaust Flow	[kg/s]	0,33
Exhaust Temp b Turbine	[C]	398			
Exhaust Temp a Turbine	[C]	311	Humidity	[%]	21,2
			Ambient Press	[mbar]	991,4
			Ambient Temp	[C]	24

Emission

O2	[%]	13,78	O2_s	[g/kWh]	1378,5
CO	[ppm]	182	CO_s	[g/kWh]	1,59
CO2	[%]	4,89	CO2_s	[g/kWh]	672,2
HC	[ppm]	19	HC_s	[g/kWh]	0,26
NOx	[ppm]	1634	NOx_s	[g/kWh]	23,5
			NOx_s_corr	[g/kWh]	23
CO 5% O2	[mg/nm3]	506,1			
HC 5% O2	[mg/nm3]	77,1	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	7450,2	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,47	Lambda_tot	[]	2,96
			Lambda_MFlow	[]	2,8

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,3
Water Temp a Engine	[C]	81,6
Sea Water Temp b Engine	[C]	28,2
Sea Water Temp a Engine	[C]	31,2
Lub Oil Temp b Engine	[C]	54,8
Lub Oil Temp a Engine	[C]	61,2

Comments: 473 RPM 25% Propload

Engine Test Data KR3

Filename:		Date: 11-04-2008		Time: 11:37

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	22,1
Torque	[Nm]	4792	Fuel Cons_s	[g/kWh]	211,4
Power	[kW]	376,5	Energy Cons_s	[MJ/kWh]	9,09
Power_ISO	[kW]	369,2	Energy Cons_s_ISO	[MJ/kWh]	8,92
BMEP	[bar]	13,7			
Effective_eff	[%]	39,6			
Vol_eff	[%]	128,2			
Adiabatic Eff Comp	[%]	70,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31645			

Air - Exhaust

Temp b Compressor	[C]	24,2	DP Air Throttle	[mbar]	13,26
Temp a Compressor	[C]	119,2	Press Airreceiver	[bara]	2,01
Temp Airreceiver	[C]	41,8			
			Air Cons	[kg/s]	0,84
Exhaust Temp Cyl 1	[C]	393	Air Cons_s	[kg/kWh]	7,98
Exhaust Temp Cyl 2	[C]	403			
Exhaust Temp Cyl 3	[C]	387	Exhaust Flow_s	[kg/kWh]	8,2
			Exhaust Flow	[kg/s]	0,86
Exhaust Temp b Turbine	[C]	506			
Exhaust Temp a Turbine	[C]	360	Humidity	[%]	26,5
			Ambient Press	[mbar]	991,3
			Ambient Temp	[C]	24,4

Emission

O2	[%]	13,07	O2_s	[g/kWh]	1112,9
CO	[ppm]	346	CO_s	[g/kWh]	2,58
CO2	[%]	5,57	CO2_s	[g/kWh]	651,7
HC	[ppm]	19	HC_s	[g/kWh]	0,22
NOx	[ppm]	995	NOx_s	[g/kWh]	12,2
			NOx_s_corr	[g/kWh]	12,1
CO 5% O2	[mg/nm3]	875,3			
HC 5% O2	[mg/nm3]	71,2	NOxCorrection	[]	0,99
NOx 5% O2	[mg/nm3]	4128,7	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,63	Lambda_tot	[]	2,6
			Lambda_MFlow	[]	2,57

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	83,1
Sea Water Temp b Engine	[C]	29,3
Sea Water Temp a Engine	[C]	36,2
Lub Oil Temp b Engine	[C]	56,5
Lub Oil Temp a Engine	[C]	62,1

Comments: 750 RPM 75% Genload

Engine Test Data KR3

Filename: Date: 11-04-2008 Time: 12:48

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	15,3
Torque	[Nm]	3197	Fuel Cons_s	[g/kWh]	219,5
Power	[kW]	251,2	Energy Cons_s	[MJ/kWh]	9,44
Power_ISO	[kW]	246,3	Energy Cons_s_ISO	[MJ/kWh]	9,26
BMEP	[bar]	9,1			
Effective_eff	[%]	38,1			
Vol_eff	[%]	124,6			
Adiabatic Eff Comp	[%]	68,5	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24878			

Air - Exhaust

Temp b Compressor	[C]	24,7	DP Air Throttle	[mbar]	7,32
Temp a Compressor	[C]	83,6	Press Airreceiver	[bara]	1,55
Temp Airreceiver	[C]	37,1			
			Air Cons	[kg/s]	0,62
Exhaust Temp Cyl 1	[C]	352	Air Cons_s	[kg/kWh]	8,92
Exhaust Temp Cyl 2	[C]	356			
Exhaust Temp Cyl 3	[C]	343	Exhaust Flow_s	[kg/kWh]	9,14
			Exhaust Flow	[kg/s]	0,64
Exhaust Temp b Turbine	[C]	450			
Exhaust Temp a Turbine	[C]	336	Humidity	[%]	22
			Ambient Press	[mbar]	991,6
			Ambient Temp	[C]	25

Emission

O2	[%]	13,54	O2_s	[g/kWh]	1293,2
CO	[ppm]	172	CO_s	[g/kWh]	1,44
CO2	[%]	5,05	CO2_s	[g/kWh]	663
HC	[ppm]	17	HC_s	[g/kWh]	0,22
NOx	[ppm]	1016	NOx_s	[g/kWh]	13,9
			NOx_s_corr	[g/kWh]	13,7
CO 5% O2	[mg/nm3]	462,3			
HC 5% O2	[mg/nm3]	68,3	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	4484,2	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,38	Lambda_tot	[]	2,86
			Lambda_MFlow	[]	2,76

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	82,4
Sea Water Temp b Engine	[C]	28,7
Sea Water Temp a Engine	[C]	33,5
Lub Oil Temp b Engine	[C]	55,9
Lub Oil Temp a Engine	[C]	61

Comments: 750 RPM 50% Genload

Engine Test Data KR3

Filename:			Date: 11-04-2008		Time: 12:40
Engine Performance					
Engine Speed	[rpm]	751	Fuel Cons	[g/s]	8,7
Torque	[Nm]	1595	Fuel Cons_s	[g/kWh]	248,6
Power	[kW]	125,4	Energy Cons_s	[MJ/kWh]	10,69
Power_ISO	[kW]	123,3	Energy Cons_s_ISO	[MJ/kWh]	10,51
BMEP	[bar]	4,5			
Effective_eff	[%]	33,7			
Vol_eff	[%]	107,9			
Adiabatic Eff Comp	[%]	57	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	16125			
Air - Exhaust					
Temp b Compressor	[C]	24,1	DP Air Throttle	[mbar]	3,21
Temp a Compressor	[C]	51,3	Press Airreceiver	[bara]	1,18
Temp Airreceiver	[C]	33,5			
			Air Cons	[kg/s]	0,41
Exhaust Temp Cyl 1	[C]	300	Air Cons_s	[kg/kWh]	11,87
Exhaust Temp Cyl 2	[C]	315			
Exhaust Temp Cyl 3	[C]	299	Exhaust Flow_s	[kg/kWh]	12,12
			Exhaust Flow	[kg/s]	0,42
Exhaust Temp b Turbine	[C]	348			
Exhaust Temp a Turbine	[C]	280	Humidity	[%]	21,4
			Ambient Press	[mbar]	991,5
			Ambient Temp	[C]	24,5
Emission					
O2	[%]	14,92	O2_s	[g/kWh]	1907,3
CO	[ppm]	68	CO_s	[g/kWh]	0,76
CO2	[%]	4,1	CO2_s	[g/kWh]	720,4
HC	[ppm]	16	HC_s	[g/kWh]	0,28
NOx	[ppm]	974	NOx_s	[g/kWh]	17,9
			NOx_s_corr	[g/kWh]	17,5
CO 5% O2	[mg/nm3]	225,7			
HC 5% O2	[mg/nm3]	77,6	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	5277,8	Dry2WetCorr	[]	0,96
AVL FSN (M)	[]	0,17	Lambda_tot	[]	3,51
			Lambda_MFlow	[]	3,25
Cooling water/Lub Oil					
Water Temp b Engine	[C]	77,8			
Water Temp a Engine	[C]	79,2			
Sea Water Temp b Engine	[C]	28,5			
Sea Water Temp a Engine	[C]	31,7			
Lub Oil Temp b Engine	[C]	55,5			
Lub Oil Temp a Engine	[C]	60			

Comments: 750 RPM 25%Genload

White Diesel 8 % water

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 13:55

Engine Performance

Engine Speed	[rpm]	749	Fuel Cons	[g/s]	31,8
Torque	[Nm]	6389	Fuel Cons_s	[g/kWh]	228,6
Power	[kW]	501,4	Energy Cons_s	[MJ/kWh]	9,83
Power_ISO	[kW]	496,2	Energy Cons_s_ISO	[MJ/kWh]	9,73
BMEP	[bar]	18,2			
Effective_eff	[%]	36,6			
Vol_eff	[%]	128,5			
Adiabatic Eff Comp	[%]	71,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	36518			

Air - Exhaust

Temp b Compressor	[C]	25,2	DP Air Throttle	[mbar]	20,82
Temp a Compressor	[C]	151,2	Press Airreceiver	[bara]	2,54
Temp Airreceiver	[C]	47,5			
			Air Cons	[kg/s]	1,05
Exhaust Temp Cyl 1	[C]	436	Air Cons_s	[kg/kWh]	7,55
Exhaust Temp Cyl 2	[C]	431			
Exhaust Temp Cyl 3	[C]	421	Exhaust Flow_s	[kg/kWh]	7,77
			Exhaust Flow	[kg/s]	1,08
Exhaust Temp b Turbine	[C]	544			
Exhaust Temp a Turbine	[C]	370	Humidity	[%]	20,3
			Ambient Press	[mbar]	1011,6
			Ambient Temp	[C]	25,4

Emission

O2	[%]	12,72	O2_s	[g/kWh]	1026,7
CO	[ppm]	190	CO_s	[g/kWh]	1,34
CO2	[%]	5,86	CO2_s	[g/kWh]	650
HC	[ppm]	16	HC_s	[g/kWh]	0,18
NOx	[ppm]	926	NOx_s	[g/kWh]	10,7
			NOx_s_corr	[g/kWh]	10,5
CO 5% O2	[mg/nm3]	460,6			
HC 5% O2	[mg/nm3]	57,3	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	3678	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,47	Lambda_tot	[]	2,48
			Lambda_MFlow	[]	2,25

Cooling water/Lub Oil

Water Temp b Engine	[C]	81,6
Water Temp a Engine	[C]	84,8
Sea Water Temp b Engine	[C]	29,9
Sea Water Temp a Engine	[C]	40,1
Lub Oil Temp b Engine	[C]	56,9
Lub Oil Temp a Engine	[C]	63,1

Comments: 750 RPM 100%Gen/Prop-Load HD Kval1

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 14:05

Engine Performance

Engine Speed	[rpm]	682	Fuel Cons	[g/s]	24
Torque	[Nm]	5237	Fuel Cons_s	[g/kWh]	230,5
Power	[kW]	374	Energy Cons_s	[MJ/kWh]	9,92
Power_ISO	[kW]	368,7	Energy Cons_s_ISO	[MJ/kWh]	9,78
BMEP	[bar]	14,9			
Effective_eff	[%]	36,3			
Vol_eff	[%]	132,6			
Adiabatic Eff Comp	[%]	71	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	30588			

Air - Exhaust

Temp b Compressor	[C]	24,7	DP Air Throttle	[mbar]	11,3
Temp a Compressor	[C]	115,2	Press Airreceiver	[bara]	2
Temp Airreceiver	[C]	42,7			
			Air Cons	[kg/s]	0,78
Exhaust Temp Cyl 1	[C]	425	Air Cons_s	[kg/kWh]	7,5
Exhaust Temp Cyl 2	[C]	418			
Exhaust Temp Cyl 3	[C]	402	Exhaust Flow_s	[kg/kWh]	7,73
			Exhaust Flow	[kg/s]	0,8
Exhaust Temp b Turbine	[C]	529			
Exhaust Temp a Turbine	[C]	380	Humidity	[%]	18,8
			Ambient Press	[mbar]	1011,5
			Ambient Temp	[C]	24,9

Emission

O2	[%]	12,06	O2_s	[g/kWh]	964
CO	[ppm]	449	CO_s	[g/kWh]	3,14
CO2	[%]	6,35	CO2_s	[g/kWh]	697,5
HC	[ppm]	17	HC_s	[g/kWh]	0,19
NOx	[ppm]	1055	NOx_s	[g/kWh]	12,1
			NOx_s_corr	[g/kWh]	11,8
CO 5% O2	[mg/nm3]	1005,8			
HC 5% O2	[mg/nm3]	56,3	NOxCorrection	[]	0,97
NOx 5% O2	[mg/nm3]	3881,5	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,56	Lambda_tot	[]	2,29
			Lambda_MFlow	[]	2,21

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,2
Water Temp a Engine	[C]	83,2
Sea Water Temp b Engine	[C]	31,5
Sea Water Temp a Engine	[C]	39,1
Lub Oil Temp b Engine	[C]	56,5
Lub Oil Temp a Engine	[C]	62,9

Comments: 682 RPM 75% Propload HD Kval1

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 14:15

Engine Performance

Engine Speed	[rpm]	597	Fuel Cons	[g/s]	16,6
Torque	[Nm]	4041	Fuel Cons_s	[g/kWh]	236,1
Power	[kW]	252,6	Energy Cons_s	[MJ/kWh]	10,15
Power_ISO	[kW]	250	Energy Cons_s_ISO	[MJ/kWh]	10,04
BMEP	[bar]	11,5			
Effective_eff	[%]	35,5			
Vol_eff	[%]	134,3			
Adiabatic Eff Comp	[%]	69,8	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	23853			

Air - Exhaust

Temp b Compressor	[C]	24,4	DP Air Throttle	[mbar]	5,46
Temp a Compressor	[C]	81,9	Press Airreceiver	[bara]	1,57
Temp Airreceiver	[C]	38,2			
			Air Cons	[kg/s]	0,54
Exhaust Temp Cyl 1	[C]	381	Air Cons_s	[kg/kWh]	7,75
Exhaust Temp Cyl 2	[C]	400			
Exhaust Temp Cyl 3	[C]	398	Exhaust Flow_s	[kg/kWh]	7,98
			Exhaust Flow	[kg/s]	0,56
Exhaust Temp b Turbine	[C]	496			
Exhaust Temp a Turbine	[C]	373	Humidity	[%]	17,6
			Ambient Press	[mbar]	1011,5
			Ambient Temp	[C]	24,6

Emission

O2	[%]	12,21	O2_s	[g/kWh]	1009,4
CO	[ppm]	563	CO_s	[g/kWh]	4,07
CO2	[%]	6,23	CO2_s	[g/kWh]	707,5
HC	[ppm]	18	HC_s	[g/kWh]	0,21
NOx	[ppm]	1126	NOx_s	[g/kWh]	13,4
			NOx_s_corr	[g/kWh]	13
CO 5% O2	[mg/nm3]	1282,7			
HC 5% O2	[mg/nm3]	60,6	NOxCorrection	[]	0,97
NOx 5% O2	[mg/nm3]	4212,3	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,52	Lambda_tot	[]	2,33
			Lambda_MFlow	[]	2,23

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,5
Water Temp a Engine	[C]	82,2
Sea Water Temp b Engine	[C]	30,8
Sea Water Temp a Engine	[C]	36,2
Lub Oil Temp b Engine	[C]	55,8
Lub Oil Temp a Engine	[C]	62,2

Comments: 595 RPM 50%Propload HD Kval1

Engine Test Data KR3

Filename:			Date: 16-04-2008		Time: 14:27
Engine Performance					
Engine Speed	[rpm]	474	Fuel Cons	[g/s]	8,5
Torque	[Nm]	2496	Fuel Cons_s	[g/kWh]	248,4
Power	[kW]	123,9	Energy Cons_s	[MJ/kWh]	10,68
Power_ISO	[kW]	123,1	Energy Cons_s_ISO	[MJ/kWh]	10,61
BMEP	[bar]	7,1			
Effective_eff	[%]	33,7			
Vol_eff	[%]	130,5			
Adiabatic Eff Comp	[%]	60,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	14549			
Air - Exhaust					
Temp b Compressor	[C]	23,8	DP Air Throttle	[mbar]	1,91
Temp a Compressor	[C]	49,4	Press Airreceiver	[bara]	1,21
Temp Airreceiver	[C]	34,4			
			Air Cons	[kg/s]	0,32
Exhaust Temp Cyl 1	[C]	298	Air Cons_s	[kg/kWh]	9,37
Exhaust Temp Cyl 2	[C]	323			
Exhaust Temp Cyl 3	[C]	294	Exhaust Flow_s	[kg/kWh]	9,61
			Exhaust Flow	[kg/s]	0,33
Exhaust Temp b Turbine	[C]	391			
Exhaust Temp a Turbine	[C]	306	Humidity	[%]	16,9
			Ambient Press	[mbar]	1011,5
			Ambient Temp	[C]	24
Emission					
O2	[%]	13,68	O2_s	[g/kWh]	1376,6
CO	[ppm]	121	CO_s	[g/kWh]	1,06
CO2	[%]	5,15	CO2_s	[g/kWh]	713,1
HC	[ppm]	17	HC_s	[g/kWh]	0,24
NOx	[ppm]	1420	NOx_s	[g/kWh]	20,5
			NOx_s_corr	[g/kWh]	19,9
CO 5% O2	[mg/nm3]	331,4			
HC 5% O2	[mg/nm3]	69,6	NOxCorrection	[]	0,97
NOx 5% O2	[mg/nm3]	6386,3	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,32	Lambda_tot	[]	2,81
			Lambda_MFlow	[]	2,57
Cooling water/Lub Oil					
Water Temp b Engine	[C]	79,4			
Water Temp a Engine	[C]	81,7			
Sea Water Temp b Engine	[C]	30,4			
Sea Water Temp a Engine	[C]	33,5			
Lub Oil Temp b Engine	[C]	55,2			
Lub Oil Temp a Engine	[C]	61,4			

Comments: 473 RPM 25% Propload HD Kval1

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 14:36

Engine Performance

Engine Speed	[rpm]	751	Fuel Cons	[g/s]	9,5
Torque	[Nm]	1605	Fuel Cons_s	[g/kWh]	270,3
Power	[kW]	126,2	Energy Cons_s	[MJ/kWh]	11,62
Power_ISO	[kW]	124,7	Energy Cons_s_ISO	[MJ/kWh]	11,49
BMEP	[bar]	4,6			
Effective_eff	[%]	31			
Vol_eff	[%]	107,3			
Adiabatic Eff Comp	[%]	56	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	15974			

Air - Exhaust

Temp b Compressor	[C]	25,1	DP Air Throttle	[mbar]	3,19
Temp a Compressor	[C]	51,8	Press Airreceiver	[bara]	1,2
Temp Airreceiver	[C]	35,2			
			Air Cons	[kg/s]	0,42
Exhaust Temp Cyl 1	[C]	298	Air Cons_s	[kg/kWh]	11,85
Exhaust Temp Cyl 2	[C]	315			
Exhaust Temp Cyl 3	[C]	299	Exhaust Flow_s	[kg/kWh]	12,12
			Exhaust Flow	[kg/s]	0,42
Exhaust Temp b Turbine	[C]	345			
Exhaust Temp a Turbine	[C]	279	Humidity	[%]	16,8
			Ambient Press	[mbar]	1011,6
			Ambient Temp	[C]	25,2

Emission

O2	[%]	14,76	O2_s	[g/kWh]	1886,2
CO	[ppm]	51	CO_s	[g/kWh]	0,56
CO2	[%]	4,36	CO2_s	[g/kWh]	766,6
HC	[ppm]	15	HC_s	[g/kWh]	0,26
NOx	[ppm]	867	NOx_s	[g/kWh]	15,9
			NOx_s_corr	[g/kWh]	15,4
CO 5% O2	[mg/nm3]	162,4			
HC 5% O2	[mg/nm3]	71,7	NOxCorrection	[]	0,97
NOx 5% O2	[mg/nm3]	4577,8	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,13	Lambda_tot	[]	3,3
			Lambda_MFlow	[]	2,98

Cooling water/Lub Oil

Water Temp b Engine	[C]	77,6
Water Temp a Engine	[C]	79
Sea Water Temp b Engine	[C]	30,4
Sea Water Temp a Engine	[C]	33,6
Lub Oil Temp b Engine	[C]	55,6
Lub Oil Temp a Engine	[C]	60,2

Comments: 750RPM 25% Genload HD Kval1

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 13:30

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	16,5
Torque	[Nm]	3193	Fuel Cons_s	[g/kWh]	236,3
Power	[kW]	250,7	Energy Cons_s	[MJ/kWh]	10,16
Power_ISO	[kW]	252,1	Energy Cons_s_ISO	[MJ/kWh]	10,22
BMEP	[bar]	9,1			
Effective_eff	[%]	35,4			
Vol_eff	[%]	122,8			
Adiabatic Eff Comp	[%]	67	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24441			

Air - Exhaust

Temp b Compressor	[C]	22,6	DP Air Throttle	[mbar]	7,1
Temp a Compressor	[C]	80,3	Press Airreceiver	[bara]	1,56
Temp Airreceiver	[C]	36,8			
			Air Cons	[kg/s]	0,62
Exhaust Temp Cyl 1	[C]	344	Air Cons_s	[kg/kWh]	8,91
Exhaust Temp Cyl 2	[C]	345			
Exhaust Temp Cyl 3	[C]	333	Exhaust Flow_s	[kg/kWh]	9,15
			Exhaust Flow	[kg/s]	0,64
Exhaust Temp b Turbine	[C]	440			
Exhaust Temp a Turbine	[C]	331	Humidity	[%]	20,1
			Ambient Press	[mbar]	1011,6
			Ambient Temp	[C]	23,1

Emission

O2	[%]	13,49	O2_s	[g/kWh]	1290
CO	[ppm]	87	CO_s	[g/kWh]	0,73
CO2	[%]	5,26	CO2_s	[g/kWh]	690,9
HC	[ppm]	14	HC_s	[g/kWh]	0,18
NOx	[ppm]	967	NOx_s	[g/kWh]	13,3
			NOx_s_corr	[g/kWh]	12,9
CO 5% O2	[mg/nm3]	233			
HC 5% O2	[mg/nm3]	54,1	NOxCorrection	[]	0,97
NOx 5% O2	[mg/nm3]	4240,7	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,19	Lambda_tot	[]	2,75
			Lambda_MFlow	[]	2,57

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	82,3
Sea Water Temp b Engine	[C]	28,1
Sea Water Temp a Engine	[C]	32,1
Lub Oil Temp b Engine	[C]	55,5
Lub Oil Temp a Engine	[C]	59,5

Comments: 750 RPM 50% Genload

Engine Test Data KR3

Filename: Date: 16-04-2008 Time: 13:46

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	23,9
Torque	[Nm]	4770	Fuel Cons_s	[g/kWh]	229,8
Power	[kW]	374,4	Energy Cons_s	[MJ/kWh]	9,88
Power_ISO	[kW]	372,5	Energy Cons_s_ISO	[MJ/kWh]	9,83
BMEP	[bar]	13,6			
Effective_eff	[%]	36,4			
Vol_eff	[%]	127,7			
Adiabatic Eff Comp	[%]	70,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31075			

Air - Exhaust

Temp b Compressor	[C]	24,1	DP Air Throttle	[mbar]	12,83
Temp a Compressor	[C]	116,1	Press Airreceiver	[bara]	2,01
Temp Airreceiver	[C]	42			
			Air Cons	[kg/s]	0,83
Exhaust Temp Cyl 1	[C]	388	Air Cons_s	[kg/kWh]	7,98
Exhaust Temp Cyl 2	[C]	392			
Exhaust Temp Cyl 3	[C]	381	Exhaust Flow_s	[kg/kWh]	8,21
			Exhaust Flow	[kg/s]	0,85
Exhaust Temp b Turbine	[C]	498			
Exhaust Temp a Turbine	[C]	355	Humidity	[%]	20,3
			Ambient Press	[mbar]	1011,6
			Ambient Temp	[C]	24,5

Emission

O2	[%]	12,98	O2_s	[g/kWh]	1107,9
CO	[ppm]	192	CO_s	[g/kWh]	1,43
CO2	[%]	5,68	CO2_s	[g/kWh]	667
HC	[ppm]	17	HC_s	[g/kWh]	0,2
NOx	[ppm]	962	NOx_s	[g/kWh]	11,8
			NOx_s_corr	[g/kWh]	11,5
CO 5% O2	[mg/nm3]	478,7			
HC 5% O2	[mg/nm3]	63,7	NOxCorrection	[]	0,98
NOx 5% O2	[mg/nm3]	3943,4	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,31	Lambda_tot	[]	2,55
			Lambda_MFlow	[]	2,36

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	83,1
Sea Water Temp b Engine	[C]	29,4
Sea Water Temp a Engine	[C]	36,4
Lub Oil Temp b Engine	[C]	56,4
Lub Oil Temp a Engine	[C]	61,7

Comments: 750 RPM 75% Genload HD Kval1

White Diesel 10 % Water

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 14:14

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	32,7
Torque	[Nm]	6391	Fuel Cons_s	[g/kWh]	234,4
Power	[kW]	502,1	Energy Cons_s	[MJ/kWh]	10,08
Power_ISO	[kW]	482,6	Energy Cons_s_ISO	[MJ/kWh]	9,69
BMEP	[bar]	18,2			
Effective_eff	[%]	35,7			
Vol_eff	[%]	128,7			
Adiabatic Eff Comp	[%]	71,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	36600			

Air - Exhaust

Temp b Compressor	[C]	29,5	DP Air Throttle	[mbar]	20,13
Temp a Compressor	[C]	156	Press Airreceiver	[bara]	2,5
Temp Airreceiver	[C]	49			
			Air Cons	[kg/s]	1,02
Exhaust Temp Cyl 1	[C]	449	Air Cons_s	[kg/kWh]	7,34
Exhaust Temp Cyl 2	[C]	443			
Exhaust Temp Cyl 3	[C]	428	Exhaust Flow_s	[kg/kWh]	7,58
			Exhaust Flow	[kg/s]	1,06
Exhaust Temp b Turbine	[C]	555			
Exhaust Temp a Turbine	[C]	378	Humidity	[%]	25,7
			Ambient Press	[mbar]	1006,8
			Ambient Temp	[C]	29,7

Emission

O2	[%]	12,58	O2_s	[g/kWh]	983,5
CO	[ppm]	236	CO_s	[g/kWh]	1,61
CO2	[%]	6,05	CO2_s	[g/kWh]	649,9
HC	[ppm]	15	HC_s	[g/kWh]	0,16
NOx	[ppm]	871	NOx_s	[g/kWh]	9,8
			NOx_s_corr	[g/kWh]	9,9
CO 5% O2	[mg/nm3]	561,5			
HC 5% O2	[mg/nm3]	53,2	NOxCorrection	[]	1,01
NOx 5% O2	[mg/nm3]	3401,9	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,45	Lambda_tot	[]	2,4
			Lambda_MFlow	[]	2,13

Cooling water/Lub Oil

Water Temp b Engine	[C]	82,3
Water Temp a Engine	[C]	85,8
Sea Water Temp b Engine	[C]	31,8
Sea Water Temp a Engine	[C]	42,7
Lub Oil Temp b Engine	[C]	57,6
Lub Oil Temp a Engine	[C]	64

Comments: 750RPM 100% load HD10%

Engine Test Data KR3

Filename:		Date:		Time: 14:06

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	24,3
Torque	[Nm]	4762	Fuel Cons_s	[g/kWh]	234
Power	[kW]	374,2	Energy Cons_s	[MJ/kWh]	10,06
Power_ISO	[kW]	362,3	Energy Cons_s_ISO	[MJ/kWh]	9,74
BMEP	[bar]	13,6			
Effective_eff	[%]	35,8			
Vol_eff	[%]	127,6			
Adiabatic Eff Comp	[%]	69,9	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31021			

Air - Exhaust

Temp b Compressor	[C]	28	DP Air Throttle	[mbar]	12,29
Temp a Compressor	[C]	119,6	Press Airreceiver	[bara]	1,98
Temp Airreceiver	[C]	43,5			
			Air Cons	[kg/s]	0,81
Exhaust Temp Cyl 1	[C]	401	Air Cons_s	[kg/kWh]	7,75
Exhaust Temp Cyl 2	[C]	404			
Exhaust Temp Cyl 3	[C]	387	Exhaust Flow_s	[kg/kWh]	7,99
			Exhaust Flow	[kg/s]	0,83
Exhaust Temp b Turbine	[C]	506			
Exhaust Temp a Turbine	[C]	362	Humidity	[%]	26,6
			Ambient Press	[mbar]	1006,9
			Ambient Temp	[C]	28

Emission

O2	[%]	12,69	O2_s	[g/kWh]	1048,2
CO	[ppm]	234	CO_s	[g/kWh]	1,69
CO2	[%]	5,92	CO2_s	[g/kWh]	672
HC	[ppm]	17	HC_s	[g/kWh]	0,19
NOx	[ppm]	927	NOx_s	[g/kWh]	11
			NOx_s_corr	[g/kWh]	11
CO 5% O2	[mg/nm3]	563,7			
HC 5% O2	[mg/nm3]	59,7	NOxCorrection	[]	1
NOx 5% O2	[mg/nm3]	3672	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,31	Lambda_tot	[]	2,45
			Lambda_MFlow	[]	2,25

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,6
Water Temp a Engine	[C]	83,3
Sea Water Temp b Engine	[C]	31,9
Sea Water Temp a Engine	[C]	39,3
Lub Oil Temp b Engine	[C]	57,2
Lub Oil Temp a Engine	[C]	62,8

Comments: 750RPM 75% load

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 13:52

Engine Performance

Engine Speed	[rpm]	750	Fuel Cons	[g/s]	16,8
Torque	[Nm]	3196	Fuel Cons_s	[g/kWh]	240,8
Power	[kW]	251,1	Energy Cons_s	[MJ/kWh]	10,36
Power_ISO	[kW]	242,3	Energy Cons_s_ISO	[MJ/kWh]	9,99
BMEP	[bar]	9,1			
Effective_eff	[%]	34,8			
Vol_eff	[%]	124,8			
Adiabatic Eff Comp	[%]	67,7	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24385			

Air - Exhaust

Temp b Compressor	[C]	30	DP Air Throttle	[mbar]	6,95
Temp a Compressor	[C]	86,8	Press Airreceiver	[bara]	1,53
Temp Airreceiver	[C]	38,3			
			Air Cons	[kg/s]	0,61
Exhaust Temp Cyl 1	[C]	352	Air Cons_s	[kg/kWh]	8,68
Exhaust Temp Cyl 2	[C]	358			
Exhaust Temp Cyl 3	[C]	345	Exhaust Flow_s	[kg/kWh]	8,92
			Exhaust Flow	[kg/s]	0,62
Exhaust Temp b Turbine	[C]	451			
Exhaust Temp a Turbine	[C]	341	Humidity	[%]	27,4
			Ambient Press	[mbar]	1007
			Ambient Temp	[C]	30,3

Emission

O2	[%]	13,34	O2_s	[g/kWh]	1233,1
CO	[ppm]	124	CO_s	[g/kWh]	1
CO2	[%]	5,49	CO2_s	[g/kWh]	697,7
HC	[ppm]	14	HC_s	[g/kWh]	0,17
NOx	[ppm]	940	NOx_s	[g/kWh]	12,5
			NOx_s_corr	[g/kWh]	12,7
CO 5% O2	[mg/nm3]	324,4			
HC 5% O2	[mg/nm3]	52,8	NOxCorrection	[]	1,02
NOx 5% O2	[mg/nm3]	4041,2	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,24	Lambda_tot	[]	2,64
			Lambda_MFlow	[]	2,45

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,6
Water Temp a Engine	[C]	82,5
Sea Water Temp b Engine	[C]	30
Sea Water Temp a Engine	[C]	34,9
Lub Oil Temp b Engine	[C]	56,3
Lub Oil Temp a Engine	[C]	61,4

Comments: 750RPM 50% Load

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 14:56

Engine Performance

Engine Speed	[rpm]	749	Fuel Cons	[g/s]	9,4
Torque	[Nm]	1594	Fuel Cons_s	[g/kWh]	271,6
Power	[kW]	125,1	Energy Cons_s	[MJ/kWh]	11,68
Power_ISO	[kW]	122,1	Energy Cons_s_ISO	[MJ/kWh]	11,4
BMEP	[bar]	4,5			
Effective_eff	[%]	30,8			
Vol_eff	[%]	104,1			
Adiabatic Eff Comp	[%]	55,5	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	15764			

Air - Exhaust

Temp b Compressor	[C]	27,6	DP Air Throttle	[mbar]	2,92
Temp a Compressor	[C]	54	Press Airreceiver	[bara]	1,19
Temp Airreceiver	[C]	35,3			
			Air Cons	[kg/s]	0,4
Exhaust Temp Cyl 1	[C]	299	Air Cons_s	[kg/kWh]	11,37
Exhaust Temp Cyl 2	[C]	317			
Exhaust Temp Cyl 3	[C]	303	Exhaust Flow_s	[kg/kWh]	11,64
			Exhaust Flow	[kg/s]	0,4
Exhaust Temp b Turbine	[C]	345			
Exhaust Temp a Turbine	[C]	280	Humidity	[%]	21,8
			Ambient Press	[mbar]	1006,6
			Ambient Temp	[C]	27,4

Emission

O2	[%]	14,78	O2_s	[g/kWh]	1808
CO	[ppm]	58	CO_s	[g/kWh]	0,62
CO2	[%]	4,4	CO2_s	[g/kWh]	740,6
HC	[ppm]	13	HC_s	[g/kWh]	0,22
NOx	[ppm]	879	NOx_s	[g/kWh]	15,4
			NOx_s_corr	[g/kWh]	15,2
CO 5% O2	[mg/nm3]	185,7			
HC 5% O2	[mg/nm3]	62,6	NOxCorrection	[]	0,99
NOx 5% O2	[mg/nm3]	4653,3	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,12	Lambda_tot	[]	3,27
			Lambda_MFlow	[]	2,85

Cooling water/Lub Oil

Water Temp b Engine	[C]	78
Water Temp a Engine	[C]	79,6
Sea Water Temp b Engine	[C]	30,2
Sea Water Temp a Engine	[C]	33,5
Lub Oil Temp b Engine	[C]	55,8
Lub Oil Temp a Engine	[C]	60,3

Comments: 750RPM 25%Genload HD10%

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 14:23

Engine Performance

Engine Speed	[rpm]	682	Fuel Cons	[g/s]	24,6
Torque	[Nm]	5277	Fuel Cons_s	[g/kWh]	235,4
Power	[kW]	376,8	Energy Cons_s	[MJ/kWh]	10,12
Power_ISO	[kW]	363,8	Energy Cons_s_ISO	[MJ/kWh]	9,77
BMEP	[bar]	15			
Effective_eff	[%]	35,6			
Vol_eff	[%]	132,6			
Adiabatic Eff Comp	[%]	71	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	30662			

Air - Exhaust

Temp b Compressor	[C]	28,9	DP Air Throttle	[mbar]	10,97
Temp a Compressor	[C]	119,9	Press Airreceiver	[bara]	1,98
Temp Airreceiver	[C]	42,7			
			Air Cons	[kg/s]	0,76
Exhaust Temp Cyl 1	[C]	432	Air Cons_s	[kg/kWh]	7,27
Exhaust Temp Cyl 2	[C]	427			
Exhaust Temp Cyl 3	[C]	417	Exhaust Flow_s	[kg/kWh]	7,5
			Exhaust Flow	[kg/s]	0,79
Exhaust Temp b Turbine	[C]	537			
Exhaust Temp a Turbine	[C]	387	Humidity	[%]	24,2
			Ambient Press	[mbar]	1006,7
			Ambient Temp	[C]	28,9

Emission

O2	[%]	11,94	O2_s	[g/kWh]	921,2
CO	[ppm]	528	CO_s	[g/kWh]	3,56
CO2	[%]	6,5	CO2_s	[g/kWh]	690
HC	[ppm]	15	HC_s	[g/kWh]	0,17
NOx	[ppm]	1025	NOx_s	[g/kWh]	11,4
			NOx_s_corr	[g/kWh]	11,4
CO 5% O2	[mg/nm3]	1167,7			
HC 5% O2	[mg/nm3]	50,3	NOxCorrection	[]	1
NOx 5% O2	[mg/nm3]	3719,3	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,62	Lambda_tot	[]	2,24
			Lambda_MFlow	[]	2,1

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,6
Water Temp a Engine	[C]	82,8
Sea Water Temp b Engine	[C]	31,5
Sea Water Temp a Engine	[C]	39,5
Lub Oil Temp b Engine	[C]	56,5
Lub Oil Temp a Engine	[C]	63,4

Comments: 750RPM 75%prop HD 10%

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 14:34

Engine Performance

Engine Speed	[rpm]	597	Fuel Cons	[g/s]	16,7
Torque	[Nm]	4047	Fuel Cons_s	[g/kWh]	237,9
Power	[kW]	252,8	Energy Cons_s	[MJ/kWh]	10,23
Power_ISO	[kW]	244,6	Energy Cons_s_ISO	[MJ/kWh]	9,89
BMEP	[bar]	11,5			
Effective_eff	[%]	35,2			
Vol_eff	[%]	133,9			
Adiabatic Eff Comp	[%]	70,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	23824			

Air - Exhaust

Temp b Compressor	[C]	29,2	DP Air Throttle	[mbar]	5,24
Temp a Compressor	[C]	86,5	Press Airreceiver	[bara]	1,56
Temp Airreceiver	[C]	38,3			
			Air Cons	[kg/s]	0,53
Exhaust Temp Cyl 1	[C]	394	Air Cons_s	[kg/kWh]	7,51
Exhaust Temp Cyl 2	[C]	400			
Exhaust Temp Cyl 3	[C]	396	Exhaust Flow_s	[kg/kWh]	7,75
			Exhaust Flow	[kg/s]	0,54
Exhaust Temp b Turbine	[C]	500			
Exhaust Temp a Turbine	[C]	377	Humidity	[%]	22,8
			Ambient Press	[mbar]	1006,6
			Ambient Temp	[C]	29,1

Emission

O2	[%]	12,21	O2_s	[g/kWh]	974,8
CO	[ppm]	691	CO_s	[g/kWh]	4,82
CO2	[%]	6,29	CO2_s	[g/kWh]	690,4
HC	[ppm]	16	HC_s	[g/kWh]	0,18
NOx	[ppm]	1087	NOx_s	[g/kWh]	12,5
			NOx_s_corr	[g/kWh]	12,4
CO 5% O2	[mg/nm3]	1573,6			
HC 5% O2	[mg/nm3]	53,7	NOxCorrection	[]	1
NOx 5% O2	[mg/nm3]	4065	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,59	Lambda_tot	[]	2,31
			Lambda_MFlow	[]	2,15

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,3
Water Temp a Engine	[C]	82,2
Sea Water Temp b Engine	[C]	30,7
Sea Water Temp a Engine	[C]	36,2
Lub Oil Temp b Engine	[C]	55,7
Lub Oil Temp a Engine	[C]	62,3

Comments: 750RPM 50%Propload HD10%

Engine Test Data KR3

Filename: Date: 29-05-2008 Time: 14:44

Engine Performance

Engine Speed	[rpm]	473	Fuel Cons	[g/s]	8,7
Torque	[Nm]	2528	Fuel Cons_s	[g/kWh]	248,6
Power	[kW]	125,3	Energy Cons_s	[MJ/kWh]	10,69
Power_ISO	[kW]	122,5	Energy Cons_s_ISO	[MJ/kWh]	10,45
BMEP	[bar]	7,2			
Effective_eff	[%]	33,7			
Vol_eff	[%]	126,7			
Adiabatic Eff Comp	[%]	61,1	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	14618			

Air - Exhaust

Temp b Compressor	[C]	27,6	DP Air Throttle	[mbar]	1,77
Temp a Compressor	[C]	53,7	Press Airreceiver	[bara]	1,21
Temp Airreceiver	[C]	34,5			
			Air Cons	[kg/s]	0,31
Exhaust Temp Cyl 1	[C]	316	Air Cons_s	[kg/kWh]	8,84
Exhaust Temp Cyl 2	[C]	320			
Exhaust Temp Cyl 3	[C]	288	Exhaust Flow_s	[kg/kWh]	9,09
			Exhaust Flow	[kg/s]	0,32
Exhaust Temp b Turbine	[C]	396			
Exhaust Temp a Turbine	[C]	311	Humidity	[%]	22,2
			Ambient Press	[mbar]	1006,6
			Ambient Temp	[C]	27,3

Emission

O2	[%]	13,68	O2_s	[g/kWh]	1297,5
CO	[ppm]	197	CO_s	[g/kWh]	1,63
CO2	[%]	5,22	CO2_s	[g/kWh]	680
HC	[ppm]	15	HC_s	[g/kWh]	0,2
NOx	[ppm]	1417	NOx_s	[g/kWh]	19,3
			NOx_s_corr	[g/kWh]	19,1
CO 5% O2	[mg/nm3]	538,7			
HC 5% O2	[mg/nm3]	62,7	NOxCorrection	[]	0,99
NOx 5% O2	[mg/nm3]	6374,1	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,32	Lambda_tot	[]	2,77
			Lambda_MFlow	[]	2,42

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,4
Water Temp a Engine	[C]	81,7
Sea Water Temp b Engine	[C]	30
Sea Water Temp a Engine	[C]	33,2
Lub Oil Temp b Engine	[C]	55,1
Lub Oil Temp a Engine	[C]	61,5

Comments: 750RPM25% Propload HD10%

White Diesel 12 % Water

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 12:42

Engine Performance

Engine Speed	[rpm]	748	Fuel Cons	[g/s]	9,6
Torque	[Nm]	1599	Fuel Cons_s	[g/kWh]	276,8
Power	[kW]	125,3	Energy Cons_s	[MJ/kWh]	11,9
Power_ISO	[kW]	116,9	Energy Cons_s_ISO	[MJ/kWh]	11,11
BMEP	[bar]	4,6			
Effective_eff	[%]	30,2			
Vol_eff	[%]	99,9			
Adiabatic Eff Comp	[%]	57,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	15935			

Air - Exhaust

Temp b Compressor	[C]	27,2	DP Air Throttle	[mbar]	2,69
Temp a Compressor	[C]	54	Press Airreceiver	[bara]	1,18
Temp Airreceiver	[C]	43,8			
			Air Cons	[kg/s]	0,38
Exhaust Temp Cyl 1	[C]	303	Air Cons_s	[kg/kWh]	10,83
Exhaust Temp Cyl 2	[C]	319			
Exhaust Temp Cyl 3	[C]	310	Exhaust Flow_s	[kg/kWh]	11,11
			Exhaust Flow	[kg/s]	0,39
Exhaust Temp b Turbine	[C]	355			
Exhaust Temp a Turbine	[C]	288	Humidity	[%]	33,2
			Ambient Press	[mbar]	992,8
			Ambient Temp	[C]	26,7

Emission

O2	[%]	14,58	O2_s	[g/kWh]	1692,8
CO	[ppm]	53	CO_s	[g/kWh]	0,54
CO2	[%]	4,54	CO2_s	[g/kWh]	724,6
HC	[ppm]	15	HC_s	[g/kWh]	0,23
NOx	[ppm]	895	NOx_s	[g/kWh]	14,9
			NOx_s_corr	[g/kWh]	15,2
CO 5% O2	[mg/nm3]	165,8			
HC 5% O2	[mg/nm3]	67,7	NOxCorrection	[]	1,02
NOx 5% O2	[mg/nm3]	4592,5	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,13	Lambda_tot	[]	3,18
			Lambda_MFlow	[]	2,66

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,7
Water Temp a Engine	[C]	81
Sea Water Temp b Engine	[C]	40,9
Sea Water Temp a Engine	[C]	43,7
Lub Oil Temp b Engine	[C]	57,6
Lub Oil Temp a Engine	[C]	62

Comments: 750RPM 25% Genload HD 12% vann

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 11:18

Engine Performance

Engine Speed	[rpm]	747	Fuel Cons	[g/s]	16,7
Torque	[Nm]	3161	Fuel Cons_s	[g/kWh]	243,4
Power	[kW]	247,4	Energy Cons_s	[MJ/kWh]	10,47
Power_ISO	[kW]	243,7	Energy Cons_s_ISO	[MJ/kWh]	10,31
BMEP	[bar]	9			
Effective_eff	[%]	34,4			
Vol_eff	[%]	120,4			
Adiabatic Eff Comp	[%]	67,6	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24324			

Air - Exhaust

Temp b Compressor	[C]	24,9	DP Air Throttle	[mbar]	6,51
Temp a Compressor	[C]	81,7	Press Airreceiver	[bara]	1,52
Temp Airreceiver	[C]	36,4			
			Air Cons	[kg/s]	0,59
Exhaust Temp Cyl 1	[C]	343	Air Cons_s	[kg/kWh]	8,55
Exhaust Temp Cyl 2	[C]	346			
Exhaust Temp Cyl 3	[C]	341	Exhaust Flow_s	[kg/kWh]	8,79
			Exhaust Flow	[kg/s]	0,6
Exhaust Temp b Turbine	[C]	440			
Exhaust Temp a Turbine	[C]	330	Humidity	[%]	42,8
			Ambient Press	[mbar]	992,8
			Ambient Temp	[C]	24,6

Emission

O2	[%]	13,28	O2_s	[g/kWh]	1208,4
CO	[ppm]	100	CO_s	[g/kWh]	0,8
CO2	[%]	5,47	CO2_s	[g/kWh]	683,9
HC	[ppm]	14	HC_s	[g/kWh]	0,18
NOx	[ppm]	917	NOx_s	[g/kWh]	12
			NOx_s_corr	[g/kWh]	12,3
CO 5% O2	[mg/nm3]	260,3			
HC 5% O2	[mg/nm3]	55	NOxCorrection	[]	1,03
NOx 5% O2	[mg/nm3]	3912,5	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,17	Lambda_tot	[]	2,65
			Lambda_MFlow	[]	2,39

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,4
Water Temp a Engine	[C]	82,2
Sea Water Temp b Engine	[C]	28,1
Sea Water Temp a Engine	[C]	31,8
Lub Oil Temp b Engine	[C]	55,4
Lub Oil Temp a Engine	[C]	59,8

Comments: Hvit diesel 50% last 12% vann

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 11:37

Engine Performance					
Engine Speed	[rpm]	749	Fuel Cons	[g/s]	24,8
Torque	[Nm]	4813	Fuel Cons_s	[g/kWh]	237
Power	[kW]	377,4	Energy Cons_s	[MJ/kWh]	10,19
Power_ISO	[kW]	365,1	Energy Cons_s_ISO	[MJ/kWh]	9,86
BMEP	[bar]	13,7			
Effective_eff	[%]	35,3			
Vol_eff	[%]	126,7			
Adiabatic Eff Comp	[%]	70,4	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31373			

Air - Exhaust					
Temp b Compressor	[C]	26,7	DP Air Throttle	[mbar]	12,39
Temp a Compressor	[C]	120,1	Press Airreceiver	[bara]	1,99
Temp Airreceiver	[C]	42,6			
			Air Cons	[kg/s]	0,81
Exhaust Temp Cyl 1	[C]	400	Air Cons_s	[kg/kWh]	7,68
Exhaust Temp Cyl 2	[C]	396			
Exhaust Temp Cyl 3	[C]	389	Exhaust Flow_s	[kg/kWh]	7,92
			Exhaust Flow	[kg/s]	0,83
Exhaust Temp b Turbine	[C]	504			
Exhaust Temp a Turbine	[C]	358	Humidity	[%]	41,6
			Ambient Press	[mbar]	992,8
			Ambient Temp	[C]	26,6

Emission					
O2	[%]	12,59	O2_s	[g/kWh]	1024,6
CO	[ppm]	228	CO_s	[g/kWh]	1,62
CO2	[%]	6,01	CO2_s	[g/kWh]	672,5
HC	[ppm]	18	HC_s	[g/kWh]	0,21
NOx	[ppm]	888	NOx_s	[g/kWh]	10,4
			NOx_s_corr	[g/kWh]	10,8
CO 5% O2	[mg/nm3]	543,2			
HC 5% O2	[mg/nm3]	64,2	NOxCorrection	[]	1,04
NOx 5% O2	[mg/nm3]	3475,7	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,31	Lambda_tot	[]	2,42
			Lambda_MFlow	[]	2,21

Cooling water/Lub Oil		
Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	83,1
Sea Water Temp b Engine	[C]	30,7
Sea Water Temp a Engine	[C]	37,3
Lub Oil Temp b Engine	[C]	56,5
Lub Oil Temp a Engine	[C]	62,2

Comments: 750RPM 50% load 12 % vann ver2

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 11:48

Engine Performance

Engine Speed	[rpm]	749	Fuel Cons	[g/s]	33,2
Torque	[Nm]	6384	Fuel Cons_s	[g/kWh]	238,6
Power	[kW]	500,8	Energy Cons_s	[MJ/kWh]	10,26
Power_ISO	[kW]	477	Energy Cons_s_ISO	[MJ/kWh]	9,77
BMEP	[bar]	18,2			
Effective_eff	[%]	35,1			
Vol_eff	[%]	128			
Adiabatic Eff Comp	[%]	71,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	36793			

Air - Exhaust

Temp b Compressor	[C]	28,5	DP Air Throttle	[mbar]	20,02
Temp a Compressor	[C]	155,9	Press Airreceiver	[bara]	2,49
Temp Airreceiver	[C]	49			
			Air Cons	[kg/s]	1,02
Exhaust Temp Cyl 1	[C]	446	Air Cons_s	[kg/kWh]	7,3
Exhaust Temp Cyl 2	[C]	442			
Exhaust Temp Cyl 3	[C]	429	Exhaust Flow_s	[kg/kWh]	7,54
			Exhaust Flow	[kg/s]	1,05
Exhaust Temp b Turbine	[C]	553			
Exhaust Temp a Turbine	[C]	376	Humidity	[%]	40,5
			Ambient Press	[mbar]	992,7
			Ambient Temp	[C]	28,6

Emission

O2	[%]	12,5	O2_s	[g/kWh]	967,2
CO	[ppm]	235	CO_s	[g/kWh]	1,59
CO2	[%]	6,05	CO2_s	[g/kWh]	643,2
HC	[ppm]	17	HC_s	[g/kWh]	0,18
NOx	[ppm]	835	NOx_s	[g/kWh]	9,3
			NOx_s_corr	[g/kWh]	9,8
CO 5% O2	[mg/nm3]	553,5			
HC 5% O2	[mg/nm3]	58,6	NOxCorrection	[]	1,05
NOx 5% O2	[mg/nm3]	3233,5	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,41	Lambda_tot	[]	2,4
			Lambda_MFlow	[]	2,08

Cooling water/Lub Oil

Water Temp b Engine	[C]	82
Water Temp a Engine	[C]	85,3
Sea Water Temp b Engine	[C]	32,7
Sea Water Temp a Engine	[C]	42,5
Lub Oil Temp b Engine	[C]	57,3
Lub Oil Temp a Engine	[C]	64

Comments: 750RPM 100% load 12% vann

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 12:00

Engine Performance

Engine Speed	[rpm]	679	Fuel Cons	[g/s]	24,8
Torque	[Nm]	5244	Fuel Cons_s	[g/kWh]	239,5
Power	[kW]	373,1	Energy Cons_s	[MJ/kWh]	10,3
Power_ISO	[kW]	352,6	Energy Cons_s_ISO	[MJ/kWh]	9,73
BMEP	[bar]	14,9			
Effective_eff	[%]	35			
Vol_eff	[%]	130,3			
Adiabatic Eff Comp	[%]	71,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	30792			

Air - Exhaust

Temp b Compressor	[C]	28	DP Air Throttle	[mbar]	10,59
Temp a Compressor	[C]	119,9	Press Airreceiver	[bara]	1,98
Temp Airreceiver	[C]	45,6			
			Air Cons	[kg/s]	0,74
Exhaust Temp Cyl 1	[C]	434	Air Cons_s	[kg/kWh]	7,18
Exhaust Temp Cyl 2	[C]	433			
Exhaust Temp Cyl 3	[C]	424	Exhaust Flow_s	[kg/kWh]	7,42
			Exhaust Flow	[kg/s]	0,77
Exhaust Temp b Turbine	[C]	542			
Exhaust Temp a Turbine	[C]	390	Humidity	[%]	38,7
			Ambient Press	[mbar]	992,6
			Ambient Temp	[C]	27,7

Emission

O2	[%]	11,7	O2_s	[g/kWh]	886,6
CO	[ppm]	624	CO_s	[g/kWh]	4,13
CO2	[%]	6,63	CO2_s	[g/kWh]	690,4
HC	[ppm]	17	HC_s	[g/kWh]	0,18
NOx	[ppm]	985	NOx_s	[g/kWh]	10,7
			NOx_s_corr	[g/kWh]	11,1
CO 5% O2	[mg/nm3]	1343,3			
HC 5% O2	[mg/nm3]	54,5	NOxCorrection	[]	1,04
NOx 5% O2	[mg/nm3]	3483,3	Dry2WetCorr	[]	0,92
AVL FSN (M)	[]	0,64	Lambda_tot	[]	2,2
			Lambda_MFlow	[]	2,04

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,9
Water Temp a Engine	[C]	83
Sea Water Temp b Engine	[C]	36
Sea Water Temp a Engine	[C]	43,1
Lub Oil Temp b Engine	[C]	57,3
Lub Oil Temp a Engine	[C]	64,2

Comments: 680RPM 75% Propload HD 12%vann

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 12:20

Engine Performance

Engine Speed	[rpm]	593	Fuel Cons	[g/s]	17
Torque	[Nm]	4010	Fuel Cons_s	[g/kWh]	245
Power	[kW]	249,1	Energy Cons_s	[MJ/kWh]	10,53
Power_ISO	[kW]	232	Energy Cons_s_ISO	[MJ/kWh]	9,81
BMEP	[bar]	11,4			
Effective_eff	[%]	34,2			
Vol_eff	[%]	130,6			
Adiabatic Eff Comp	[%]	71,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	23937			

Air - Exhaust

Temp b Compressor	[C]	28,7	DP Air Throttle	[mbar]	4,92
Temp a Compressor	[C]	85,9	Press Airreceiver	[bara]	1,55
Temp Airreceiver	[C]	44,5			
			Air Cons	[kg/s]	0,51
Exhaust Temp Cyl 1	[C]	392	Air Cons_s	[kg/kWh]	7,34
Exhaust Temp Cyl 2	[C]	413			
Exhaust Temp Cyl 3	[C]	408	Exhaust Flow_s	[kg/kWh]	7,59
			Exhaust Flow	[kg/s]	0,53
Exhaust Temp b Turbine	[C]	507			
Exhaust Temp a Turbine	[C]	382	Humidity	[%]	36
			Ambient Press	[mbar]	992,7
			Ambient Temp	[C]	28,4

Emission

O2	[%]	11,83	O2_s	[g/kWh]	918,2
CO	[ppm]	873	CO_s	[g/kWh]	5,92
CO2	[%]	6,53	CO2_s	[g/kWh]	697,2
HC	[ppm]	18	HC_s	[g/kWh]	0,19
NOx	[ppm]	1042	NOx_s	[g/kWh]	11,6
			NOx_s_corr	[g/kWh]	12
CO 5% O2	[mg/nm3]	1906,5			
HC 5% O2	[mg/nm3]	57,4	NOxCorrection	[]	1,03
NOx 5% O2	[mg/nm3]	3735,7	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,67	Lambda_tot	[]	2,23
			Lambda_MFlow	[]	2,04

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,6
Water Temp a Engine	[C]	82,4
Sea Water Temp b Engine	[C]	39,4
Sea Water Temp a Engine	[C]	44,1
Lub Oil Temp b Engine	[C]	57,4
Lub Oil Temp a Engine	[C]	63,7

Comments: 593RPM 50% Propload HD 12% vann

Engine Test Data KR3

Filename: Date: 30-06-2008 Time: 12:34

Engine Performance

Engine Speed	[rpm]	472	Fuel Cons	[g/s]	8,8
Torque	[Nm]	2530	Fuel Cons_s	[g/kWh]	254,7
Power	[kW]	125	Energy Cons_s	[MJ/kWh]	10,95
Power_ISO	[kW]	117	Energy Cons_s_ISO	[MJ/kWh]	10,26
BMEP	[bar]	7,2			
Effective_eff	[%]	32,9			
Vol_eff	[%]	123,1			
Adiabatic Eff Comp	[%]	62,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	14789			

Air - Exhaust

Temp b Compressor	[C]	26,8	DP Air Throttle	[mbar]	1,65
Temp a Compressor	[C]	52,7	Press Airreceiver	[bara]	1,19
Temp Airreceiver	[C]	42,7			
			Air Cons	[kg/s]	0,3
Exhaust Temp Cyl 1	[C]	324	Air Cons_s	[kg/kWh]	8,52
Exhaust Temp Cyl 2	[C]	327			
Exhaust Temp Cyl 3	[C]	301	Exhaust Flow_s	[kg/kWh]	8,78
			Exhaust Flow	[kg/s]	0,3
Exhaust Temp b Turbine	[C]	406			
Exhaust Temp a Turbine	[C]	314	Humidity	[%]	34,7
			Ambient Press	[mbar]	992,8
			Ambient Temp	[C]	26,2

Emission

O2	[%]	13,36	O2_s	[g/kWh]	1215,8
CO	[ppm]	251	CO_s	[g/kWh]	2
CO2	[%]	5,42	CO2_s	[g/kWh]	677,4
HC	[ppm]	18	HC_s	[g/kWh]	0,22
NOx	[ppm]	1372	NOx_s	[g/kWh]	17,9
			NOx_s_corr	[g/kWh]	18,2
CO 5% O2	[mg/nm3]	659,3			
HC 5% O2	[mg/nm3]	68,8	NOxCorrection	[]	1,02
NOx 5% O2	[mg/nm3]	5913	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,38	Lambda_tot	[]	2,67
			Lambda_MFlow	[]	2,28

Cooling water/Lub Oil

Water Temp b Engine	[C]	80
Water Temp a Engine	[C]	82,3
Sea Water Temp b Engine	[C]	40,5
Sea Water Temp a Engine	[C]	43,2
Lub Oil Temp b Engine	[C]	56,9
Lub Oil Temp a Engine	[C]	62,8

Comments: 471RPM 25% Propload HD 12% vann

White Diesel 15 % water

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 13:44

Engine Performance

Engine Speed	[rpm]	751	Fuel Cons	[g/s]	9,9
Torque	[Nm]	1589	Fuel Cons_s	[g/kWh]	284,5
Power	[kW]	125	Energy Cons_s	[MJ/kWh]	12,23
Power_ISO	[kW]	123,9	Energy Cons_s_ISO	[MJ/kWh]	12,12
BMEP	[bar]	4,5			
Effective_eff	[%]	29,4			
Vol_eff	[%]	99,1			
Adiabatic Eff Comp	[%]	56,9	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	15600			

Air - Exhaust

Temp b Compressor	[C]	24,4	DP Air Throttle	[mbar]	2,65
Temp a Compressor	[C]	49,3	Press Airreceiver	[bara]	1,18
Temp Airreceiver	[C]	33			
			Air Cons	[kg/s]	0,38
Exhaust Temp Cyl 1	[C]	294	Air Cons_s	[kg/kWh]	10,87
Exhaust Temp Cyl 2	[C]	309			
Exhaust Temp Cyl 3	[C]	297	Exhaust Flow_s	[kg/kWh]	11,16
			Exhaust Flow	[kg/s]	0,39
Exhaust Temp b Turbine	[C]	336			
Exhaust Temp a Turbine	[C]	268	Humidity	[%]	31,9
			Ambient Press	[mbar]	1000,7
			Ambient Temp	[C]	24,2

Emission

O2	[%]	14,82	O2_s	[g/kWh]	1734,1
CO	[ppm]	74	CO_s	[g/kWh]	0,75
CO2	[%]	4,47	CO2_s	[g/kWh]	718,5
HC	[ppm]	10	HC_s	[g/kWh]	0,16
NOx	[ppm]	872	NOx_s	[g/kWh]	14,7
			NOx_s_corr	[g/kWh]	14,7
CO 5% O2	[mg/nm3]	239,5			
HC 5% O2	[mg/nm3]	48,4	NOxCorrection	[]	1
NOx 5% O2	[mg/nm3]	4656,1	Dry2WetCorr	[]	0,95
AVL FSN (M)	[]	0,1	Lambda_tot	[]	3,23
			Lambda_MFlow	[]	2,6

Cooling water/Lub Oil

Water Temp b Engine	[C]	75
Water Temp a Engine	[C]	76,1
Sea Water Temp b Engine	[C]	28,6
Sea Water Temp a Engine	[C]	30,6
Lub Oil Temp b Engine	[C]	55,4
Lub Oil Temp a Engine	[C]	59,3

Comments: 750RPM25%Load15%HD

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 13:55

Engine Performance

Engine Speed	[rpm]	751	Fuel Cons	[g/s]	17,6
Torque	[Nm]	3192	Fuel Cons_s	[g/kWh]	252,1
Power	[kW]	251,1	Energy Cons_s	[MJ/kWh]	10,85
Power_ISO	[kW]	247	Energy Cons_s_ISO	[MJ/kWh]	10,67
BMEP	[bar]	9,1			
Effective_eff	[%]	33,2			
Vol_eff	[%]	119,5			
Adiabatic Eff Comp	[%]	68,2	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	24251			

Air - Exhaust

Temp b Compressor	[C]	25,7	DP Air Throttle	[mbar]	6,46
Temp a Compressor	[C]	81,8	Press Airreceiver	[bara]	1,53
Temp Airreceiver	[C]	37,2			
			Air Cons	[kg/s]	0,59
Exhaust Temp Cyl 1	[C]	348	Air Cons_s	[kg/kWh]	8,41
Exhaust Temp Cyl 2	[C]	345			
Exhaust Temp Cyl 3	[C]	343	Exhaust Flow_s	[kg/kWh]	8,67
			Exhaust Flow	[kg/s]	0,6
Exhaust Temp b Turbine	[C]	439			
Exhaust Temp a Turbine	[C]	330	Humidity	[%]	32,2
			Ambient Press	[mbar]	1000,6
			Ambient Temp	[C]	25,6

Emission

O2	[%]	13,41	O2_s	[g/kWh]	1205,3
CO	[ppm]	97	CO_s	[g/kWh]	0,76
CO2	[%]	5,47	CO2_s	[g/kWh]	675,9
HC	[ppm]	12	HC_s	[g/kWh]	0,15
NOx	[ppm]	931	NOx_s	[g/kWh]	12
			NOx_s_corr	[g/kWh]	12,1
CO 5% O2	[mg/nm3]	256,4			
HC 5% O2	[mg/nm3]	47,7	NOxCorrection	[]	1,01
NOx 5% O2	[mg/nm3]	4034,5	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,13	Lambda_tot	[]	2,65
			Lambda_MFlow	[]	2,27

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	82,3
Sea Water Temp b Engine	[C]	29
Sea Water Temp a Engine	[C]	32,9
Lub Oil Temp b Engine	[C]	55,8
Lub Oil Temp a Engine	[C]	60,8

Comments: 750RPM50%Load 15%HD

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 14:09

Engine Performance

Engine Speed	[rpm]	751	Fuel Cons	[g/s]	25,8
Torque	[Nm]	4825	Fuel Cons_s	[g/kWh]	244,9
Power	[kW]	379,4	Energy Cons_s	[MJ/kWh]	10,53
Power_ISO	[kW]	368,9	Energy Cons_s_ISO	[MJ/kWh]	10,24
BMEP	[bar]	13,7			
Effective_eff	[%]	34,2			
Vol_eff	[%]	126,2			
Adiabatic Eff Comp	[%]	70,6	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	31216			

Air - Exhaust

Temp b Compressor	[C]	27,6	DP Air Throttle	[mbar]	12,24
Temp a Compressor	[C]	119,9	Press Airreceiver	[bara]	1,99
Temp Airreceiver	[C]	42,6			
			Air Cons	[kg/s]	0,8
Exhaust Temp Cyl 1	[C]	399	Air Cons_s	[kg/kWh]	7,61
Exhaust Temp Cyl 2	[C]	393			
Exhaust Temp Cyl 3	[C]	389	Exhaust Flow_s	[kg/kWh]	7,86
			Exhaust Flow	[kg/s]	0,83
Exhaust Temp b Turbine	[C]	502			
Exhaust Temp a Turbine	[C]	358	Humidity	[%]	31,8
			Ambient Press	[mbar]	1000,5
			Ambient Temp	[C]	27,5

Emission

O2	[%]	12,7	O2_s	[g/kWh]	1028,9
CO	[ppm]	211	CO_s	[g/kWh]	1,5
CO2	[%]	5,96	CO2_s	[g/kWh]	664,2
HC	[ppm]	15	HC_s	[g/kWh]	0,17
NOx	[ppm]	894	NOx_s	[g/kWh]	10,4
			NOx_s_corr	[g/kWh]	10,6
CO 5% O2	[mg/nm3]	509,8			
HC 5% O2	[mg/nm3]	53,7	NOxCorrection	[]	1,02
NOx 5% O2	[mg/nm3]	3541	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,25	Lambda_tot	[]	2,44
			Lambda_MFlow	[]	2,11

Cooling water/Lub Oil

Water Temp b Engine	[C]	80,5
Water Temp a Engine	[C]	83,1
Sea Water Temp b Engine	[C]	29,9
Sea Water Temp a Engine	[C]	37
Lub Oil Temp b Engine	[C]	56,4
Lub Oil Temp a Engine	[C]	62,5

Comments: 750RPM75%Load15%HD

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 14:21

Engine Performance

Engine Speed	[rpm]	751	Fuel Cons	[g/s]	34,2
Torque	[Nm]	6376	Fuel Cons_s	[g/kWh]	245,4
Power	[kW]	501,1	Energy Cons_s	[MJ/kWh]	10,55
Power_ISO	[kW]	479,4	Energy Cons_s_ISO	[MJ/kWh]	10,09
BMEP	[bar]	18,2			
Effective_eff	[%]	34,1			
Vol_eff	[%]	127,5			
Adiabatic Eff Comp	[%]	71,4	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	36578			

Air - Exhaust

Temp b Compressor	[C]	29,5	DP Air Throttle	[mbar]	19,63
Temp a Compressor	[C]	155,6	Press Airreceiver	[bara]	2,49
Temp Airreceiver	[C]	49,3			
			Air Cons	[kg/s]	1,01
Exhaust Temp Cyl 1	[C]	443	Air Cons_s	[kg/kWh]	7,24
Exhaust Temp Cyl 2	[C]	437			
Exhaust Temp Cyl 3	[C]	432	Exhaust Flow_s	[kg/kWh]	7,49
			Exhaust Flow	[kg/s]	1,04
Exhaust Temp b Turbine	[C]	551			
Exhaust Temp a Turbine	[C]	377	Humidity	[%]	32,3
			Ambient Press	[mbar]	1000,4
			Ambient Temp	[C]	29,6

Emission

O2	[%]	12,68	O2_s	[g/kWh]	977,4
CO	[ppm]	199	CO_s	[g/kWh]	1,34
CO2	[%]	5,98	CO2_s	[g/kWh]	634
HC	[ppm]	15	HC_s	[g/kWh]	0,16
NOx	[ppm]	850	NOx_s	[g/kWh]	9,4
			NOx_s_corr	[g/kWh]	9,7
CO 5% O2	[mg/nm3]	479,7			
HC 5% O2	[mg/nm3]	53,3	NOxCorrection	[]	1,03
NOx 5% O2	[mg/nm3]	3361,3	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,29	Lambda_tot	[]	2,43
			Lambda_MFlow	[]	2,01

Cooling water/Lub Oil

Water Temp b Engine	[C]	82,2
Water Temp a Engine	[C]	85,5
Sea Water Temp b Engine	[C]	32
Sea Water Temp a Engine	[C]	42,6
Lub Oil Temp b Engine	[C]	57,2
Lub Oil Temp a Engine	[C]	64,1

Comments: 750RPM100%Load15%HD

Engine Test Data KR3

Filename:			Date: 08-09-2008		Time: 14:32
		Engine Performance			
Engine Speed	[rpm]	683	Fuel Cons	[g/s]	25,7
Torque	[Nm]	5246	Fuel Cons_s	[g/kWh]	246,8
Power	[kW]	375,2	Energy Cons_s	[MJ/kWh]	10,61
Power_ISO	[kW]	359,6	Energy Cons_s_ISO	[MJ/kWh]	10,16
BMEP	[bar]	14,9			
Effective_eff	[%]	33,9			
Vol_eff	[%]	130,8			
Adiabatic Eff Comp	[%]	71,4	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	30607			
		Air - Exhaust			
Temp b Compressor	[C]	29,8	DP Air Throttle	[mbar]	10,55
Temp a Compressor	[C]	120,1	Press Airreceiver	[bara]	1,97
Temp Airreceiver	[C]	43			
			Air Cons	[kg/s]	0,74
Exhaust Temp Cyl 1	[C]	429	Air Cons_s	[kg/kWh]	7,13
Exhaust Temp Cyl 2	[C]	422			
Exhaust Temp Cyl 3	[C]	420	Exhaust Flow_s	[kg/kWh]	7,38
			Exhaust Flow	[kg/s]	0,77
Exhaust Temp b Turbine	[C]	537			
Exhaust Temp a Turbine	[C]	387	Humidity	[%]	29,4
			Ambient Press	[mbar]	1000,4
			Ambient Temp	[C]	29,6
		Emission			
O2	[%]	11,88	O2_s	[g/kWh]	898,3
CO	[ppm]	480	CO_s	[g/kWh]	3,18
CO2	[%]	6,51	CO2_s	[g/kWh]	677,2
HC	[ppm]	15	HC_s	[g/kWh]	0,16
NOx	[ppm]	1006	NOx_s	[g/kWh]	10,9
			NOx_s_corr	[g/kWh]	11,2
CO 5% O2	[mg/nm3]	1055			
HC 5% O2	[mg/nm3]	49,6	NOxCorrection	[]	1,02
NOx 5% O2	[mg/nm3]	3627,4	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0	Lambda_tot	[]	2,23
			Lambda_MFlow	[]	1,97
	Cooling water/Lub Oil				
Water Temp b Engine	[C]	79,6			
Water Temp a Engine	[C]	82,7			
Sea Water Temp b Engine	[C]	31,4			
Sea Water Temp a Engine	[C]	39,4			
Lub Oil Temp b Engine	[C]	56,1			
Lub Oil Temp a Engine	[C]	63,2			

Comments: 750RPM75%Propload15%HD

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 14:44

Engine Performance

Engine Speed	[rpm]	595	Fuel Cons	[g/s]	17,6
Torque	[Nm]	4036	Fuel Cons_s	[g/kWh]	251,3
Power	[kW]	251,6	Energy Cons_s	[MJ/kWh]	10,8
Power_ISO	[kW]	241,9	Energy Cons_s_ISO	[MJ/kWh]	10,39
BMEP	[bar]	11,5			
Effective_eff	[%]	33,3			
Vol_eff	[%]	130,9			
Adiabatic Eff Comp	[%]	70,8	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	23795			

Air - Exhaust

Temp b Compressor	[C]	29,8	DP Air Throttle	[mbar]	4,93
Temp a Compressor	[C]	86,4	Press Airreceiver	[bara]	1,55
Temp Airreceiver	[C]	38,5			
			Air Cons	[kg/s]	0,51
Exhaust Temp Cyl 1	[C]	391	Air Cons_s	[kg/kWh]	7,29
Exhaust Temp Cyl 2	[C]	396			
Exhaust Temp Cyl 3	[C]	396	Exhaust Flow_s	[kg/kWh]	7,54
			Exhaust Flow	[kg/s]	0,53
Exhaust Temp b Turbine	[C]	498			
Exhaust Temp a Turbine	[C]	377	Humidity	[%]	26,9
			Ambient Press	[mbar]	1000,3
			Ambient Temp	[C]	29,5

Emission

O2	[%]	12,09	O2_s	[g/kWh]	937,5
CO	[ppm]	747	CO_s	[g/kWh]	5,06
CO2	[%]	6,33	CO2_s	[g/kWh]	674,5
HC	[ppm]	15	HC_s	[g/kWh]	0,17
NOx	[ppm]	1078	NOx_s	[g/kWh]	12
			NOx_s_corr	[g/kWh]	12,1
CO 5% O2	[mg/nm3]	1679,2			
HC 5% O2	[mg/nm3]	51,1	NOxCorrection	[]	1,01
NOx 5% O2	[mg/nm3]	3979,5	Dry2WetCorr	[]	0,93
AVL FSN (M)	[]	0,53	Lambda_tot	[]	2,3
			Lambda_MFlow	[]	1,97

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,3
Water Temp a Engine	[C]	82
Sea Water Temp b Engine	[C]	30,6
Sea Water Temp a Engine	[C]	36,2
Lub Oil Temp b Engine	[C]	55,5
Lub Oil Temp a Engine	[C]	62,4

Comments: 750RPMPropload15%HD

Engine Test Data KR3

Filename: Date: 08-09-2008 Time: 14:59

Engine Performance

Engine Speed	[rpm]	474	Fuel Cons	[g/s]	9,1
Torque	[Nm]	2528	Fuel Cons_s	[g/kWh]	260,8
Power	[kW]	125,4	Energy Cons_s	[MJ/kWh]	11,21
Power_ISO	[kW]	121,7	Energy Cons_s_ISO	[MJ/kWh]	10,89
BMEP	[bar]	7,2			
Effective_eff	[%]	32,1			
Vol_eff	[%]	121,6			
Adiabatic Eff Comp	[%]	62	Hn_Diesel	[MJ/Kg]	43
Turbine Speed	[rpm]	14611			

Air - Exhaust

Temp b Compressor	[C]	28,4	DP Air Throttle	[mbar]	1,61
Temp a Compressor	[C]	53,7	Press Airreceiver	[bara]	1,19
Temp Airreceiver	[C]	34,2			
			Air Cons	[kg/s]	0,29
Exhaust Temp Cyl 1	[C]	312	Air Cons_s	[kg/kWh]	8,39
Exhaust Temp Cyl 2	[C]	309			
Exhaust Temp Cyl 3	[C]	299	Exhaust Flow_s	[kg/kWh]	8,65
			Exhaust Flow	[kg/s]	0,3
Exhaust Temp b Turbine	[C]	393			
Exhaust Temp a Turbine	[C]	307	Humidity	[%]	26,1
			Ambient Press	[mbar]	1000,3
			Ambient Temp	[C]	28,1

Emission

O2	[%]	13,71	O2_s	[g/kWh]	1233,6
CO	[ppm]	181	CO_s	[g/kWh]	1,42
CO2	[%]	5,23	CO2_s	[g/kWh]	647,5
HC	[ppm]	15	HC_s	[g/kWh]	0,19
NOx	[ppm]	1397	NOx_s	[g/kWh]	18,1
			NOx_s_corr	[g/kWh]	18,1
CO 5% O2	[mg/nm3]	497,3			
HC 5% O2	[mg/nm3]	61,9	NOxCorrection	[]	1
NOx 5% O2	[mg/nm3]	6307,4	Dry2WetCorr	[]	0,94
AVL FSN (M)	[]	0,32	Lambda_tot	[]	2,76
			Lambda_MFlow	[]	2,19

Cooling water/Lub Oil

Water Temp b Engine	[C]	79,3
Water Temp a Engine	[C]	81,6
Sea Water Temp b Engine	[C]	29,6
Sea Water Temp a Engine	[C]	32,6
Lub Oil Temp b Engine	[C]	54,9
Lub Oil Temp a Engine	[C]	61,2

Comments: 750RPM25%Propload15%HD