

TEST PROTOCOL

Project:	LONNY HEDVIG (RE-ENG.)
Number:	21625
Type:	8L20
Date(s):	4.12.2001 30.11.2001
Class. Soc.	DNV

Installation Data

ENGINE DATA

Customer: PREBEN THOMSEN SCHMIDT
Type: 8L20
Manufacturing number: 21625
Nominal output [kW]: 1440
Nominal speed [rpm]: 1000
Rotation direction: Clockwise

INSTALLATION

Type: Main Engine
Name: LONNY HEDVIG (RE-ENG.)
Number 8486

LOADING: Alternator

Type: AMG 560 M 8
Manufacturer: ABB
Number: 106521
Current [A]: 2099,4
Voltage [V]: 550
Output [kVA]: 2000
Frequency [Hz]: 50

FUEL

Quality	Density at [kg / l]	Temp. [C°]	Viscosity at [mm2 / s]	Temp. [C°]	Lower Heating value
MDF	0,84	15	2,9	40	43,07

LUBRICATING OIL

Quality: Shell Argina T 40

Test Program for LONNY HEDVIG (RE-ENG.)

Test Bed 21

Order number: 8486
Engine number: 21625
Engine type: 8L20
Test run date(s): 04.12.2001
 30.11.2001

Time: Start Stop	Dur. [min]	Speed [rpm]	Shaft load [%]	Engine power [kW]	η	Load power [kW]	Fuel	Oper. data	Notices
30 20:35	5	1000	0				MDF		Verification of HT-water and OIL stops.
35 20:55	20	1000	0 25				MDF		
35 21:15	20	1000	25	360	93,1	335	MDF	X	
15 21:20	5	1000	0				MDF		
20 21:40	20	1000	0 50				MDF		
40 22:00	20	1000	50	720	95,1	685	MDF	X	
00 22:15	15	1000	51	734	95,2	699	MDF	X	
0 9:10	20	1000	0 75				MDF		
0 9:30	20	1000	75	1080	95,7	1034	MDF	X	
0 9:35	5	1000	0				MDF		
5 10:10	35	1000	0 100				MDF		
10 10:30	20	1000	100	1440	95,6	1377	MDF	X	
30 10:35	5	1032	110	1584	95,6	1514	MDF		
35 11:05	30	909	75	1080	96,0	1037	MDF	X	
05 11:35	30	794	50	720	95,9	690	MDF	X	
35 12:05	30	630	25	360	93,9	338	MDF	X	

Check of overspeed devices

Operation Data

	25	50	51	75	100	75	50	25
Power/ Torque	21:05	21:50	22:10	09:20	10:20	10:45	11:15	11:45
	MDF	MDF	MDF	MDF	MDF	MDF	MDF	MDF

Data								
metric pressure	hPa	1034	1034	1033	1030	1030	1030	1029
ure of intake air	°C	29,2	31,6	26,9	24,4	24,4	26,1	26,0
umidity of intake air	%	17,9	15,3	19,5	18,7	17,4	17,0	16,2

r Data								
efficiency		93,1	95,1	95,2	95,7	95,6	96,0	95,9
output, actual	kW	335	685	699	1034	1377	1037	690
voltage, actual	V	689	688	689	686	682	663	592
current, actual	A	258	548	558	840	1131	869	648
voltage, nominal	V	550	550	550	550	550	550	550
current, nominal	A	2099.4	2099.4	2099.4	2099.4	2099.4	2099.4	2099.4

ata								
	kW	360	720	734	1080	1440	1080	719
	rpm	1000	1000	1000	1000	1000	909	794
sator position		15,0	22,0	22,0	28,0	33,0	29,0	24,0
position, A-bank	mm	11,5	17,5	18,0	23,0	28,5	24,0	19,0
nger speed, A-bank	rpm	19380	27105	27360	32880	37260	32460	26040
emp, cylinder A1	°C	343	365	365	380	413	392	379
emp, cylinder A2	°C	344	349	348	359	386	364	358
emp, cylinder A3	°C	326	336	336	343	373	351	345
emp, cylinder A4	°C	331	357	357	377	408	384	369
emp, cylinder A5	°C	324	344	343	351	378	351	345
emp, cylinder A6	°C	317	339	339	353	381	349	338
emp, cylinder A7	°C	338	358	358	364	389	370	356
emp, cylinder A8	°C	309	327	326	341	368	356	350
ie	°C	329	347	347	359	387	365	355
emp. aft. TC, A-bank	°C	327	357	359	329	340	356	390
r temp. in air receiver	°C	39	44	44	47	54	50	46
temp. bef. engine	°C	86	85	84	84	83	83	83
temp. aft. engine	°C	88	88	88	86	90	87	88
temp. bef. CAC	°C	43	43	43	40	38	40	40
temp. aft. CAC	°C	43	44	44	44	45	44	43
temp. aft. LOC	°C	47	49	49	50	50	48	46
mp. bef. LOC	°C	75	76	76	77	80	78	76
mp. aft. LOC	°C	64	64	64	64	64	64	64
ssure, cylinder A1	bar				152	180	156	
ssure, cylinder A2	bar				149	177	156	
ssure, cylinder A3	bar				150	178	158	
ssure, cylinder A4	bar				149	175	155	
ssure, cylinder A5	bar				149	177	155	
ssure, cylinder A6	bar				149	178	155	
ssure, cylinder A7	bar				152	180	158	
ssure, cylinder A8	bar				148	178	156	
ue	bar				150	178	156	
ir pressure	bar	0,40	1,30	1,30	2,10	3,00	2,10	1,20
pressure	bar	2,20	2,20	2,20	2,20	2,20	2,00	1,70
pressure	bar	2,50	2,40	2,40	2,40	2,40	2,20	1,90
ig oil pressure	bar	4,00	4,40	4,40	4,30	4,30	4,10	4,00
ressure	bar	9,80	9,50	9,60	8,00	7,60	7,90	7,60

asurements

JUSTMENT OF STOP SWITCHES:

Arm for low prelubricating oil pressure [bar]:	0,5	Tripping speed of mechanical overspeed trip device [rpm]:	-
Arm for low lubricating oil pressure [bar]:	2,0	No load value for the governor:	8,0
Arm for high HT-water temperature [°C]:	110	No load value for the rack [mm]:	6,0
Tripping speed of pneumatic overspeed trip device [rpm]:	1133	Fuel limiter [mm]:	17,00
Tripping speed of pneum. overspeed trip device (2) [rpm]:	1182		

JUSTMENT OF FUEL PUMPS:

Injection rack position, when				Delivery	Distance *
Starting lever at:	Work	Stop	Work	commencem.	
Governor lever at:	Min	Max	Max	before TDC	
Safety device:	Not rel.	Not rel.	Released		
Cylinder:					
A1		4	1	11,8	+3
A2		4	1	11,6	+5
A3		4	1	11,7	+4
A4		4	1	11,3	+3
A5		4	1	11,3	+6
A6		4	1	11,4	+2
A7		4	1	11,7	+2
A8		4	1	11,2	+3

*) Distance between the upper plane of the engine block and the base circle of the injection pump cam (20=100, 32=155)

GOVERNOR TEST

Load Application:

Load Reduction:

%	-	%	n - min	n - nom	dn	sec	%	-	%	n-max	n - nom	dn	sec
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AIM OF THE TEST

The aim of the test run performed was to check the general quality of the production and to prove that the engine performance values fulfill the prescribed requirements.

PRESENT AT THE TEST RUN

Wärtsilä Finland Oy

Customer(s)

After, Test Run Manager, Vaasa Factory

Rene Schmidt

Merisaari, Quality Assurance Manager, Marine

WÄRTSILÄ

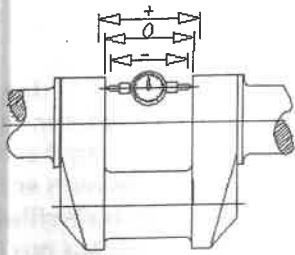
on behalf of
Classification Society

Marine 5.12.2001
Quality Assurance, Projects

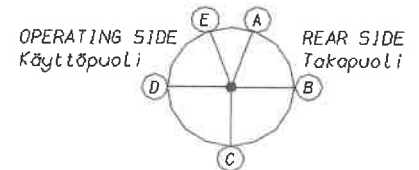
Koskinen, Det Norske Veritas

MSA No. R-1456

Crankshaft Measurements



DIAL INDICATOR POSITION
Mittakellon paikka
(lukema hetkellä)



AS SEEN FROM FLYWHEEL END
Katsottuna vauhtipyörän päästä

OT ENGINE

Room temperature when values were measured [°C]:

Initials:

Engine running continuously before indicating [h]:

Time between stop and indicating [min]:

Temperature of lubricating oil [°C]:

Temperature of cooling water before engine [°C]:

Measurement position	Cylinder									
	1	2	3	4	5	6	7	8		
Front side top Etäpuoli ylhäällä										
Front side Etäpuoli										
Bottom Alhaalla										
Operating side Käyttöpuoli										
Operating side top Käyttöpuoli ylhäällä										

Deviations 1/100 mm

Measurement of crankshaft alignment in main assembly

OLD ENGINE

Room temperature when values were measured [°C]: 21°C

Initials:

JH

Measurement position	Cylinder									
	1	2	3	4	5	6	7	8		
Front side top Etäpuoli ylhäällä	0	0	0	0	0	0	0	0		
Front side Etäpuoli	-1,5	0	+0,5	+0,5	+0,5	0	-0,5	-0,5		
Bottom Alhaalla	-2,5	-0,5	0	0	0	0	-0,5	-0,5		
Operating side Käyttöpuoli	-1	0	0	0	0	0	0	0		
Operating side top Käyttöpuoli ylhäällä	0	0	0	0	+0,5	0	0	0		

Deviations 1/100 mm

Inspection of the Wärtsilä Engine

Object: LONNY HEDVIG (RE-ENG.)
Engine number: 8486
Engine type: 8L20
Engine number: 21625
Classification society: DNV
Run date(s): 04.12.2001
30.11.2001
Inspection date: 04.12.2001

It has been agreed that the following openings and inspections are to be carried out at the delivery test attended by the buyer and / or the representative of the classification society.

Inspections:		Results:
Engine end bearing No.	All	Changed, 2,5,7,8
Main bearing No.	2	OK
Endoscope inspection	YES	OK
Opening of covers	YES	OK
Test of nozzles	YES	OK

Following corrections should be made before delivery:

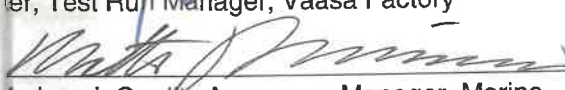
Wärtsilä Finland Oy

Customer(s)


Pekker Koskinen, Test Run Manager, Vaasa Factory


René Schmidt

Rene Schmi


Marko Merisaari, Quality Assurance Manager, Marine


WÄRTSILÄ

on behalf of
Classification Society

Marine 5.12.2001
Quality Assurance, Projects


Pekker Koskinen, Det Norske Veritas

MSA No. R-1456

Fuel Oil Consumption According to ISO 3046/1

Engine number: 21625
Project: LONNY HEDVIG (RE-ENG.)
Order number: 8486
Engine type: 8L20
Output/100% [kW]: 1440
Speed [rpm]: 1000

ratio of indicated power
power adjustment factor
barometric pressure during test [hPa]

standard reference barometric pressure [1000 hPa]
0,7 exponent
reference air temperature [298 K]
air temperature during test [K]
1,2 exponent
reference charge air coolant temperature [298 K]
charge air coolant temperature during test [K]

$$\left(\frac{P_x}{P_{ra}}\right)^m * \left(\frac{T_{ra}}{T_x}\right)^n * \left(\frac{T_{cr}}{T_{cx}}\right)^s$$

$$K - 0,7 * (1 - K) * \left(\frac{1}{Mek} - 1\right)$$

s = 1 exponent
Mek = mechanical efficiency
Q_{test} = lower heating value of the fuel oil during test [MJ / kg]
Q_{ISO} = lower heating value of the fuel oil (ISO) [MJ / kg]
Be = fuel oil consumption on test bed [g / kWh]
BISO = fuel oil consumption according to ISO [g / kWh]
M = measured fuel quantity [g]
MLS = flow of clean leak fuel [g / s]
P = output [kW]
S = time [s]
EDP = engine driven pumps [g / kWh] (calculated with or without EDP according to the contract)

$$Be = \frac{(M - S * MLS)}{P * S} * 3600 \Rightarrow [g / kWh]$$

$$BISO = \frac{\alpha}{K} * Be * \frac{Q_{test}}{Q_{ISO}} - EDP \Rightarrow [g / kWh]$$

ations:

[%]:	100	Lower heating value during test [MJ/kg]:	43,07
	MDF	Lower heating value (ISO) [MJ/kg]:	42,70
[kW]:	1440	Mechanical efficiency:	0,80
red fuel quantity [g]:	20 000,0	Engine driven pumps [g/kwh]:	4,00
leak fuel [g/s]:	0,60		
time [s]:	242,1		
ssure during test [hPa]:	1 030,1		
perature during test [°C]:	24	297 [K]	
e air coolant temp. during test [°C]:	38	311 [K]	

0,980668
0,977284

Be: 205,0
BISO: 202,0