

WÄRTSILÄ DIESEL *GENBET #3* Test Report

Standard reference conditions according to ISO 3046/1

QI-1134 Encl. 2 Page 1(5)

Order Nr:
566-0900

Ordered by:

For:

Engine Data			
Engine type:	Engine No:	kW	r/min
16V25SG	3901	2960	1000
Turbocharger type:	Turbocharger I No:	Turbocharger II No:	
VTR254-11	406250	406249	

Generator Data				
Generator type:	Generator No:	kW		
HSG 710 LR6	4547522	3536 at Cos. $\phi = 0.8$		
kVA	Volt	Amp	Hz	Efficiency (η):
4420	10 000	255	50	96.83 at 100%

General Data			
Main Gas Control Valve:	Prechamber Gas Control Valve:	Prechamber:	
Gas Fuel:	Lower Heat Value:	Specific Gravity:	kg/nm ³
Natural Gas	37.816 MJ/nm ³		
Lubrication oil: Mobil Pegasus 480		Brake k=1/	

Test Data																	
Load % of Nominal:	%	25 %	50 %	75 %	100 %												
Date/Time for test:		941028/0955	941028/1100	941028/1415	941028/1540												
Engine room temperature:	°C	20/18	22/20	22/20	23/20												
Outside temperature:	°C	10	10	10	9												
Ambient air pressure:	kPa	100.3	100.3	100.3	100.3												
Relative Humidity:	%	55	55	55	55												
Gas pressure: Supply	bar	3.9	3.9	3.9	3.9												
Gas Temperature:	°C	9	10	10	10												
Gas pressure: Main injector	kPa	150	159	223	267												
Gas pressure: PCC	kPa	150	159	224	269												
Duration, PCC valve opening:	ms	21.6	26.5	27.0	31.0												
Gas consumption:	m ³																
Gas consumption, period:	min.																
Gas consumption:	m ³ /h																
Gas consumption:	nm ³ /kWh																
Main bearing temperature at 100% nominal load:	No	1	2	3	4	5	6	7	8	9							
	°C	92	95	93	93	94	93	93	94	87							
Max firing pressure at 100% nominal load:	Cyl.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
	bar																
Compression pressure:	bar																

Tested and approved by:

Bengt Lagergren

Date:

941111

Checked/Verified by:

Perk

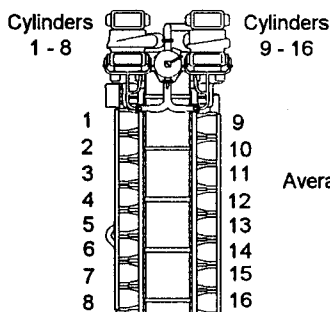
Type of Engine:
16V25SG

Engine No:
3901

QI-1134 Encl. 2 Page 2(5)

Load % of Nominal:	%	25 %	50 %	75 %	100 %
Date/Time for test:		941028	941028	941028	941028
Engine Speed:	RPM	1000	1000	1000	1000
Ignition timing:	°btdc	14	14	14	14
Brake load:	kNm				
Alternator Voltage/Current:	V/A	10.1/36.8	10.1/76.4	10.1/114.4	10.1/152
Alternator Load:	kW	667	1360	2050	2835

A = Exhaust Gas Temperature
B = Duration of main gas valve opening in milliseconds.



Cyl.	A °C	B ms	A °C	B ms	A °C	B ms	A °C	B ms
1	410		491		523		543	
2	414		491		523		544	
3	411		496		521		540	
4	410		492		522		544	
5	407		495		526		539	
6	414		493		524		544	
7	410		498		530		542	
8	409		492		526		541	
Average value:	411		494		525		541	23.9

Cyl.	A °C	B ms	A °C	B ms	A °C	B ms	A °C	B ms
9	408		498		528		540	
10	407		497		524		538	
11	407		490		529		542	
12	417		494		527		540	
13	411		495		523		536	
14	409		493		525		541	
15	414		496		529		541	
16	410		492		524		541	
Average value:	410		495		526		540	23.9

Turbocharger speed I/II:	RPM	12600/12600	16900/16800	21300/21100	25200/24900
Exhaust temp after turbocharger:	°C	360/361	433/435	445/446	440/443
Exhaust press. after turbocharger:	kPa				

Throttle valve position:	°	87	88	88	88
Charge air pressure:	kPa	120	149	196	250
Charge air temperature after CAC:	°C	51	51	54	63
Pressure drop over CAC:	kPa				

FW pressure after pump:	bar	4.0	3.9	4.0	4.0
FW temp before engine:	°C	89	88	88	88
FW temp after engine:	°C	93	93	94	97
FW temp before CAC:	°C	51	50	51	55
FW temp after CAC:	°C	55	58	67	84
Lube oil pressure before filter:	kPa				
Lube oil pressure after filter:	bar	4.4	4.4	4.2	4.1
Lube oil temp. before engine:	°C	74	74	75	75
Lube oil temp. after engine:	°C	84	84	84	84
Raw water temp. in:	°C	28	15	22	30
Raw water temp. out:	°C	61	68	71	78

GUGUWVORKFILE/QI1134-2.PMS

Tested and approved by:

Date:

Checked/Verified by:

Berg + Huggend

941111

cek

Stuy

Engine type:
16V25SG

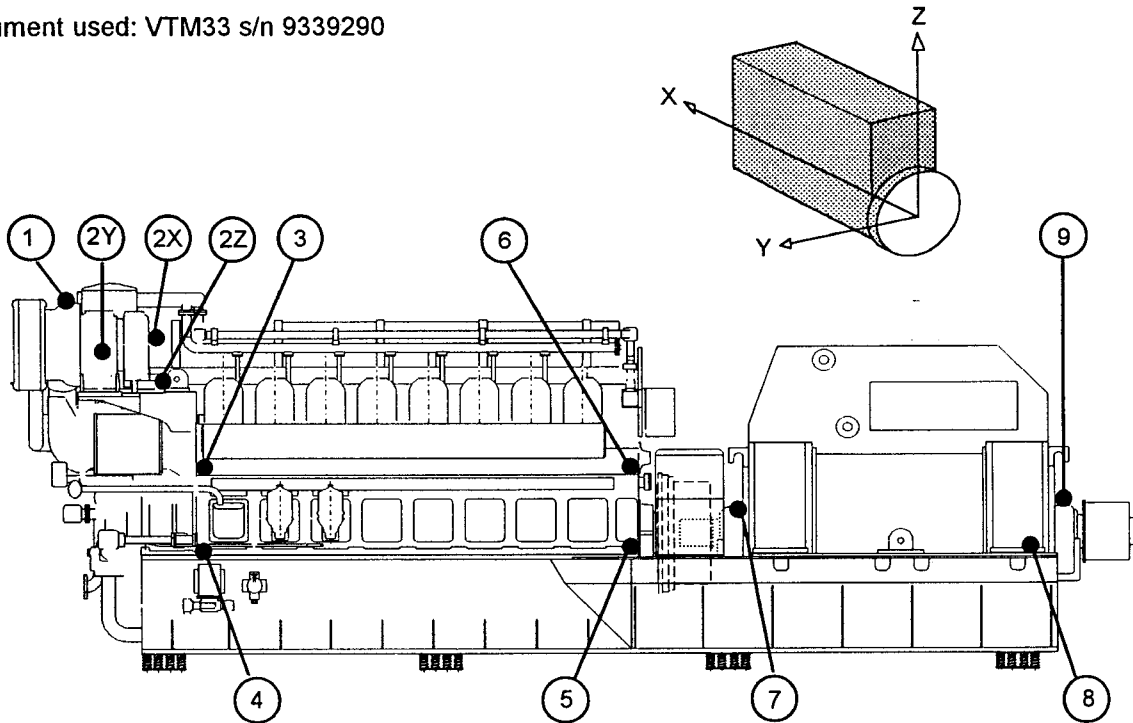
Engine No:
3901

Nominal rpm
1000

Nominal load
100 %

Measuring points indicated on illustration below

Instrument used: VTM33 s/n 9339290



Measurements taken

Test Point No.	Description	Vibration velocity mm/s RMS Direction			
		X	Y	Z	Rec. limit
1	Turbocharger, right side* (Same pos. as for 2)	36	21	18	20
2	Turbocharger, left side*	43	23	17	20
3	Top of block, upper forward corner.	6.5	6	7	15
4	Foot of block, forward end.	5	10	5	10
5	Foot of block, aft end.	3	6.5	7.5	10
6	Top of block, upper aft corner.	4	10	10.5	15
Points 7,8 & 9 only for Gensets					
7	Alternator, drive end bearing.	9	9	7.5	10
8	Base frame, aft corner of the flange.	5	12	11	10
9	Alternator, free-end bearing	10	12	15	10

* seen from flywheel end.

Tested and approved by:

Bengt Hagg

Date:

94 11 11

Checked/Verified by:

ewb

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Order Nr:

566-0900

Year:

1994

Engine Data

Engine type:	Engine No:	kW	r/min
16V25SG	3901	2960	1000

Exhaust Gas Composition:Oxygen (O₂) : 11.2 % volume, dry.Carbon dioxide (CO₂) : 5.6 % volume, dry.**Exhaust Gas Emission:**Nitrogen oxides (NO_x) : 164 ppm, dry.

Carbon monoxide (CO) : 580 ppm, dry.

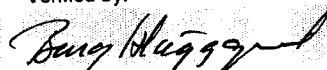
Total Hydrocarbons (C₁) : - ppm, wet.**Remarks**

The above data have been measured at 25 % nominal load using natural gas.
The composition of the gas is specified in the enclosed analysis report.

Date of engine test:

94 11 11

Verified by:



Order Nr:

566-0900

Ordered by:

For:

Genset General Data		
Engine type:	Engine No:	r/min:
16V25SG	3901	1000
Generator type:	Generator No:	kW:
HSG 710 LR6	4547522	3536 at Cos. $\phi = 0.8$

Site Conditions			
Altitude (MASL):	Ambient Temperature:	Ambient Air Pressure:	Relative Humidity:
49 meter	°C	kPa	%

Test Data					
Load % of Nominal:	%	25 %	50 %	75 %	100 %
Date/Time for test:		941028, 9 ⁵⁵	941028, 11 ⁰⁰	941028, 14 ¹⁵	941028, 15 ⁴⁰
Engine room temperature:	°C				
Heat run (hours):	h				
Frame Temperature:	°C				
Winding Temperature 1:	°C	42	47	50	57
Winding Temperature 2:	°C	42	47	50	57
Winding Temperature 3:	°C	42	48	51	58
Bearing Temperature NDE:	°C	61	63	60	63
Bearing Temperature DE:	°C	70	71	68	71

Air Cooled Generator					
Air flow:	m ³ /h				
Air Inlet Temperature:	°C				
Air Outlet Temperature:	°C				
Pressure drop over filter:	Pa				

Water Cooled Generator					
Cooling Water flow:	m ³ /h				
Water Inlet Temperature:	°C				
Water Outlet Temperature:	°C				
Pressure drop:	Pa				

Tested and approved by:

Bengt Klingenberg

Date:

941111

Checked/Verified by:

Carl

Engine type:
16V25SG

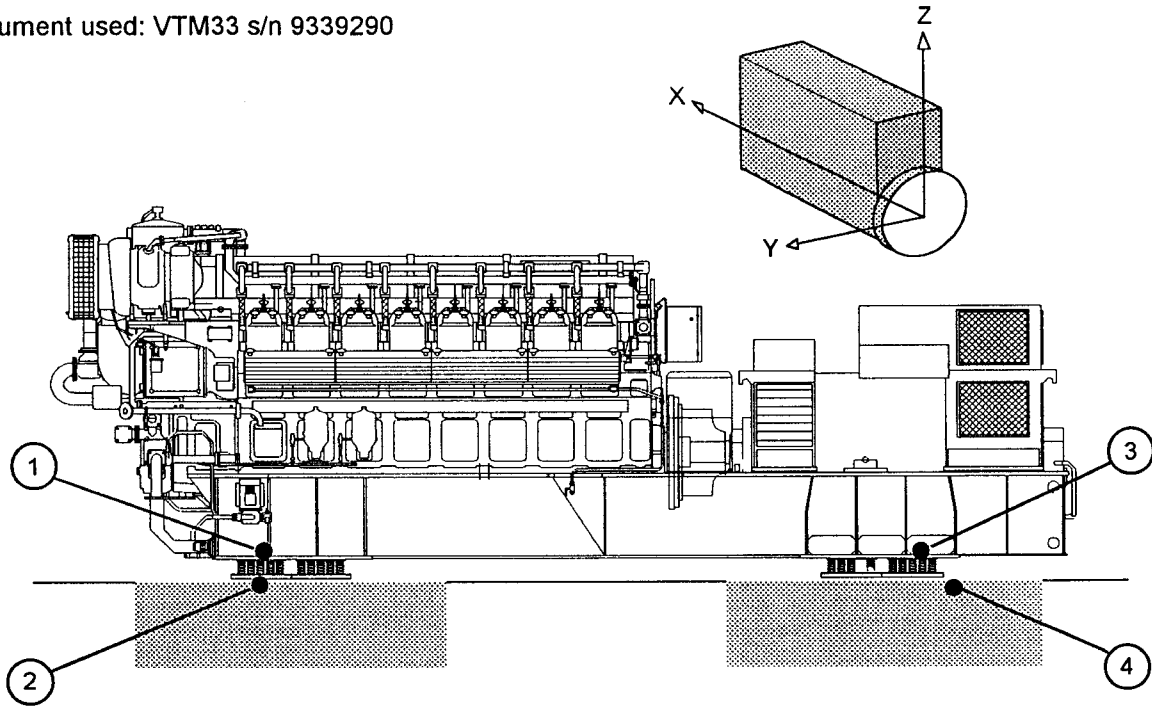
Engine No:
3901

Nominal rpm
1000

Nominal load
100 %

Measuring points indicated on illustration below

Instrument used: VTM33 s/n 9339290



Measurements taken

Test Point No.	Description	Vibration velocity mm/s RMS Direction		
		X	Y	Z
1	Right side*, above spring element engine	8	12	11
2	Right side, below spring element engine	0.85	1.9	1.0
3	Right side, above spring element generator	8	5	15
4	Right side, below spring element generator	0.75	1.3	0.5
1	Left side, above spring element engine	5.5	12	12.5
2	Left side, below spring element engine	1.9	1.0	0.85
3	Left side, above spring element generator	6	5.5	10
4	Left side, below spring element generator	0.6	1.3	0.65

* seen from flywheel end.

Tested and approved by:

Bengt Höggren

Date:

94/1/11

Checked/Verified by:

erf

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Engine type:
16V25SG

Engine No:
3901

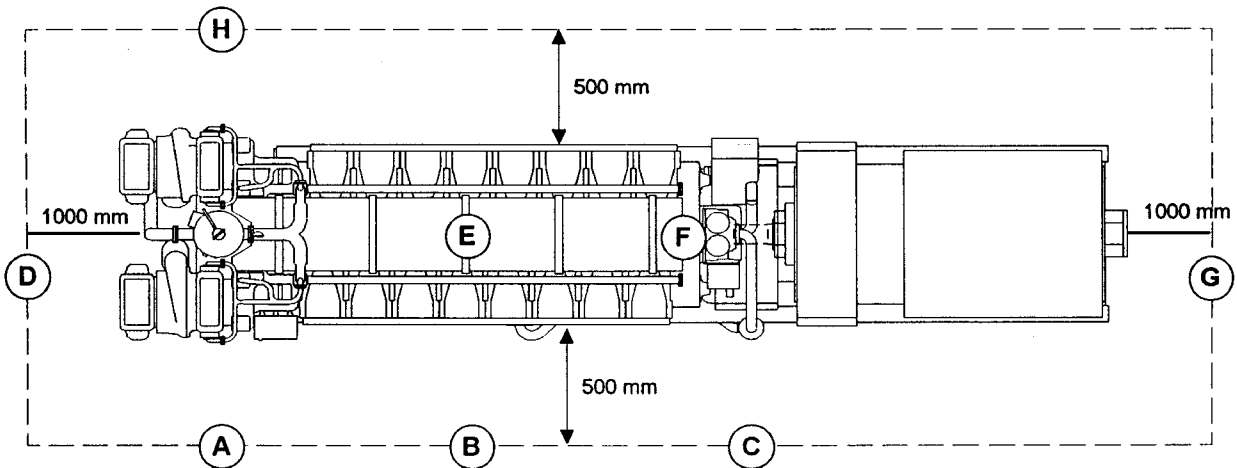
rpm:
1000

Nominal Load:
100 %

Measuring points indicated on illustration below

Height from the floor to measuring points A, B, C, D and H: 1000 mm

Height from the floor to measuring points G: 500 mm



Instrument used: Brüel 2209 s/n 537 250

Measurements taken

Test Point	Noise level (decibel dBA)	Limits	Remarks
A	110		
B	110.5		
C	111.5		
D	108		
E			
F			
G	109		
H	109		

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Tested and approved by:

Bengt Stuggart

Date:

94 11 11

Checked/Verified by:

ewf

Order No:

566-0900

Engine type:

16V25SG

Engine No:

3901

kW

2960

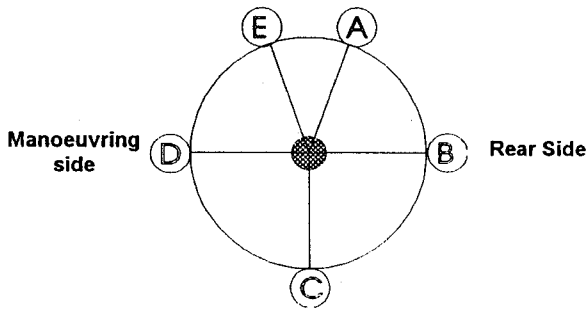
rpm

1000

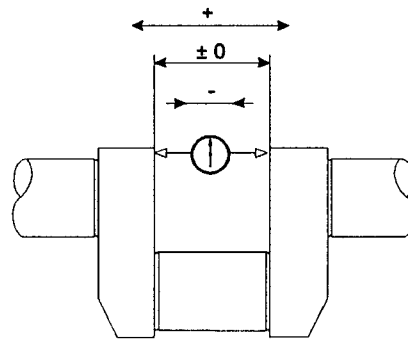
Crankshaft deflection before factory test (1/100 mm)

Indicator position:	Cylinder number:							
	1	2	3	4	5	6	7	8
A: Start position (TDC)	± 0	± 0	± 0	± 0	± 0	± 0	± 0	± 0
B: Rear Side	+ 0.5	- 0.5	± 0	+ 0.5	+ 1	+ 0.5	+ 1	+ 1
C: Low position (LDC)	+ 0.5	- 1.5	- 1	+ 0.5	+ 1	+ 1	+ 1.5	+ 2
D: Manoeuvring Side	+ 0.5	- 0.5	- 0.5	± 0	+ 0.5	+ 0.5	+ 1	+ 1.5
E: End position (TDC)	± 0	± 0	± 0	± 0	± 0	± 0	± 0	± 0

Indicator position
(As seen from flywheel)



Rotate crankshaft in the normal direction.



All Measurements in 1/100 mm

Remarks

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Department:

Date:

9/11/11

Signature:

Joung Hagg

Order No:
566-900

Engine type:
16V25SG

Engine No:
3901

Description	Work performed		
	Date	Signature	Remarks
1 Safety valves pressure tested and preserved.			
2 Centrifugal filter cleaned. Paper insert replaced.			
3 Main bearing No...1.....dismantled for inspection.	941029	<i>Häg</i>	#1
4 Big end bearing No...2.....dismantled for inspection.	941029	<i>Häg</i>	#4, #5
5 Thrust bearing dismantled for inspection.			
6			
7			
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26			

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Date:
941111

Department:

Signature:
Jouko Hägg

Delivery test completed: