

Type	Kobe Diesel – Mitsubishi UE Diesel Engine Uniflow scavenging exhaust-turbocharged two-stroke single-acting crosshead type	
Model	6UEC50LSII	
Engine number	UE—2684	
Number of cylinder	6	
Cylinder bore	500	mm
Stroke	1950	mm
Maximum continuous rating	Output	8670 kW
	Engine speed	127 min ⁻¹
	Mean piston speed	8.26 m/sec
	Max. combustion pressure	14.02 MPa
	Brake mean effective pressure	1.783 MPa
	Indicated mean effective pressure	1.877 MPa
Cylinder center distance	880	mm
Overall length	6687	mm
Width of bed plate	3100	mm
Total height	8950	mm
Height from crank center to engine top	7302	mm
Piston drawing height from crank center	8900	mm
Direction of rotation	Clockwise (on ahead running, viewing from driving end)	
Supercharging system	Constant-pressure turbocharging	
Reversing system	Self reversing	
Firing system	Compression ignition	
Firing order	1 – 6 – 2 – 4 – 3 – 5	
Cooling system	Piston	Lub. Oil
	Cylinder jacket ...	Fresh water
	Exhaust valve	Fresh water
	Air cooler	Sea water
Starting system	Compressed air	
Turning gear	Electric motor driven	

2-1 Running-in and adjusting

Total running hour & total revolution of the shop trial are 21 hours and 35 minutes, and 132182 revolutions respectively.

2-2 Record run

The record run, was carried out according to the following schedule.

Date	Load	Output		Speed	brake weight		Duration
	%	kW	(PS)	min ⁻¹	N	(kgf)	min.
Oct. 25, 2006	50	4335	5894	100.8	573.4	58.5	30
	70	6069	8252	112.8	717.6	73.2	30
	85	7370	10020	120.3	816.8	83.3	60
	100	8670	11788	127.0	910.2	92.8	60

Remarks :

The power developed by the engine is absorbed and measured by dynamometer of froude type.

Type of dynamometer

FS - 24

$$\text{Dynamometer constant } K = \frac{\text{output (kW)}}{W1 \times Ne \times 0.075} = 1$$

$$K = \frac{\text{output (PS)}}{W2 \times Ne} = 1$$

W1 : Brake weight in N

W2 : Brake weight in kgf

Ne : Speed in min⁻¹

Ne : Speed in min⁻¹

kW = 0.7355 X PS

N = 9.80665 X kgf

2-3 Examiner

Owner : EXCEL MARINE CO., LTD.

: Mr.N.AOYAGI

: SETO SHIP MANAGEMENT CO., LTD.

: Mr.K.NAGAYASU

Shipyard : SHIN KURUSHIMA DOCKYARD CO., LTD.

: Mr.H.IMAOKA

Surveyor : NIPPON KAIJI KYOKAI KOBE BRANCH

: Mr.Y.DANJOH

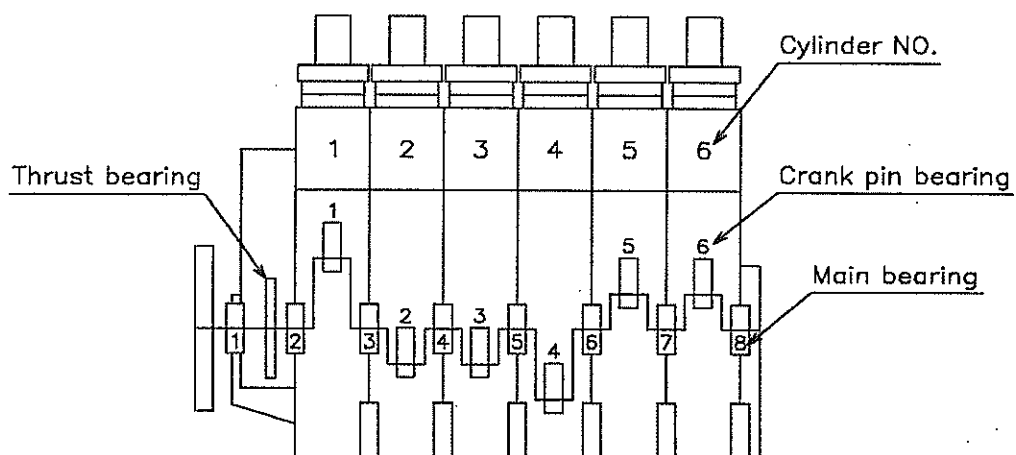
3. Fuel valve nozzle

Nozzle Type	50LSII-010A
Needle valve opening pressure	31.4 MPa

4. Fuel oil pump setting

Number of cylinder		1	2	3	4	5	6	7	8	9
Plunger dia. (mm)		46								
Cam lift (mm)		58								
Beginning before TDC in degrees	Ahead	3.5	3.0	3.5	3.5	3.5	4.0			
	Astern	4.4	3.9	4.4	4.1	4.3	4.0			

5. Number of cylinder and bearings.



6. Properties of fuel oil and lubricating oil used for official shop trial

Test properties of fuel oil		
Supplier	NIPPON OIL CORPORATION	
Name	" Diesel oil "	
Density at 15 °C g/cm ³	0.8702	
Flash point (JIS) °C	77.0	
Viscosity at 50 °C mm ² /S	2.829	
Sulfur (JIS) mass%	0.86	
Water by Distillation vol%	0.02	
Calorific value kJ/kg (Gross)	44,940	
Calorific value kJ/kg (Net)	42,230	

Typical properties of lubricating oil			
Supplier		NIPPON OIL CORPORATION	IDEMITSU KOSAN CO.,LTD.
Name		MARINE S30	N-KD 50
Application		System oil	Cylinder oil
Density at 15 °C g/cm ³		0.895	0.894
Flash point (JIS) °C		268	188
Viscosity mm ² /S	40 °C	109.0	244.0
	100 °C	11.8	19.4
Neutralization value mg KOH/g		Total Basic Number 7.00	Total Basic Number 30.9

*N-KD50 is for shop operation.

7. OFFICIAL SHOP TRIAL RESULTS

6

ENGINE TYPE & NO.		6UEC50LSII		NO. 18		UE—2684					
KIND OF FUEL		DIESEL OIL		Hu= 42230 kJ/kg							
TURBOCHARGER SPEC.		MET66SD		BS3D43DD6N							
FUEL INJECTION PUMP TYPE		A0		TYPE							
MAXIMUM CONTINUOUS RATING		8670		kW/		127 min ⁻¹					
		11788		PS/		127 min ⁻¹					
DATE		Oct. 25, 2006						Oct. 24 2006		Oct. 23 2006	
OBSERVED NO.		A1	A2	A3	A4	A5	A6		C6	C2	T1
OBSERVED TIME		9:05	9:35	10:05	10:35	11:05	11:35		OVER LOAD 110	ONE CYL. CUTOFF	TURBO CHARGE CUTOFF
KIND OF LOAD (%)		50	70	85	85	100	100				
*ENGINE SPEED (min ⁻¹)		100.8	112.8	120.4	120.3	127.0	127.0		131.2	101.6	67.5
*BRAKE WEIGHT	N	574	718	817	818	911	912		971	586	263
	kgf	58.5	73.2	83.3	83.4	92.9	93.0		99.0	59.8	26.8
OUTPUT	kW	4337	6073	7377	7379	8678	8687		9553	4469	1331
	PS	5897	8257	10029	10033	11798	11811		12989	6076	1809
*MAIN HANDLE NOTCH		6.1	7.1	7.8	7.8	8.4	8.4		8.7	6.2	3.1
GOVERNOR NOTCH OUTPUT	CONT. UNIT	55.2	67.3	73.9	74.0	82.3	83.0		88.1	67.0	32.3
	ACTUATOR	54.5	66.0	73.0	73.0	81.0	82.0		73.0	66.0	30.0
FUEL INJECTION PUMP NOTCH (PUMP RACK)	1	44.5	55.0	60.5	60.5	68.0	68.0		73.0	55~56	25.0
	2	44.5	55.0	60.5	60.5	68.0	68.0		73.0	55~56	25.0
	3	44.5	55.0	60.5	60.5	68.0	68.0		73.0	55~56	25.0
	4	44.5	55.0	60.5	60.5	68.0	68.0		73.0	55~56	25.0
	5	44.5	55.0	60.5	60.5	68.0	68.0		73.0	55~56	25.0
	6	44.0	54.5	60.0	60.0	67.5	68.0		72.5	—	24.5
	7										
	8										
	MEAN	44.4	54.9	60.4	60.4	67.9	68.0		72.9	—	24.9
*BAROMETRIC PRESS. (kPa)		102.2	102.2	102.2	102.2	102.2	102.2		101.6	101.6	101.4
*ROOM TEMPERATURE (°C)		19.8	20.3	20.8	21.3	21.4	21.8		20.5	18.9	20.2
*HUMIDITY (%)		64.5	63	59	56	56	52.5		59	66	82
FUEL OIL INLET TEMP. (°C)		22	25	25	26	27	27		25	23	20
*SPECIFIC FUEL CONSUMPTION	kg/h	755	1027	1236	1237	1479	1482		—	—	—
	g/kWh	174.1	169.1	167.5	167.6	170.4	170.6		—	—	—
42,700 kJ/kg	g/kWh	172.2	167.2	165.7	165.8	168.6	168.7		—	—	—
ISO CONDITION		g/kWh	172.8	167.6	165.9	165.8	168.6	168.5	—	—	—
	MEAN	g/kWh	/	/	165.85		/	/	—	—	—

* Marked data in page 6 to 9 are measured by factory facilities.

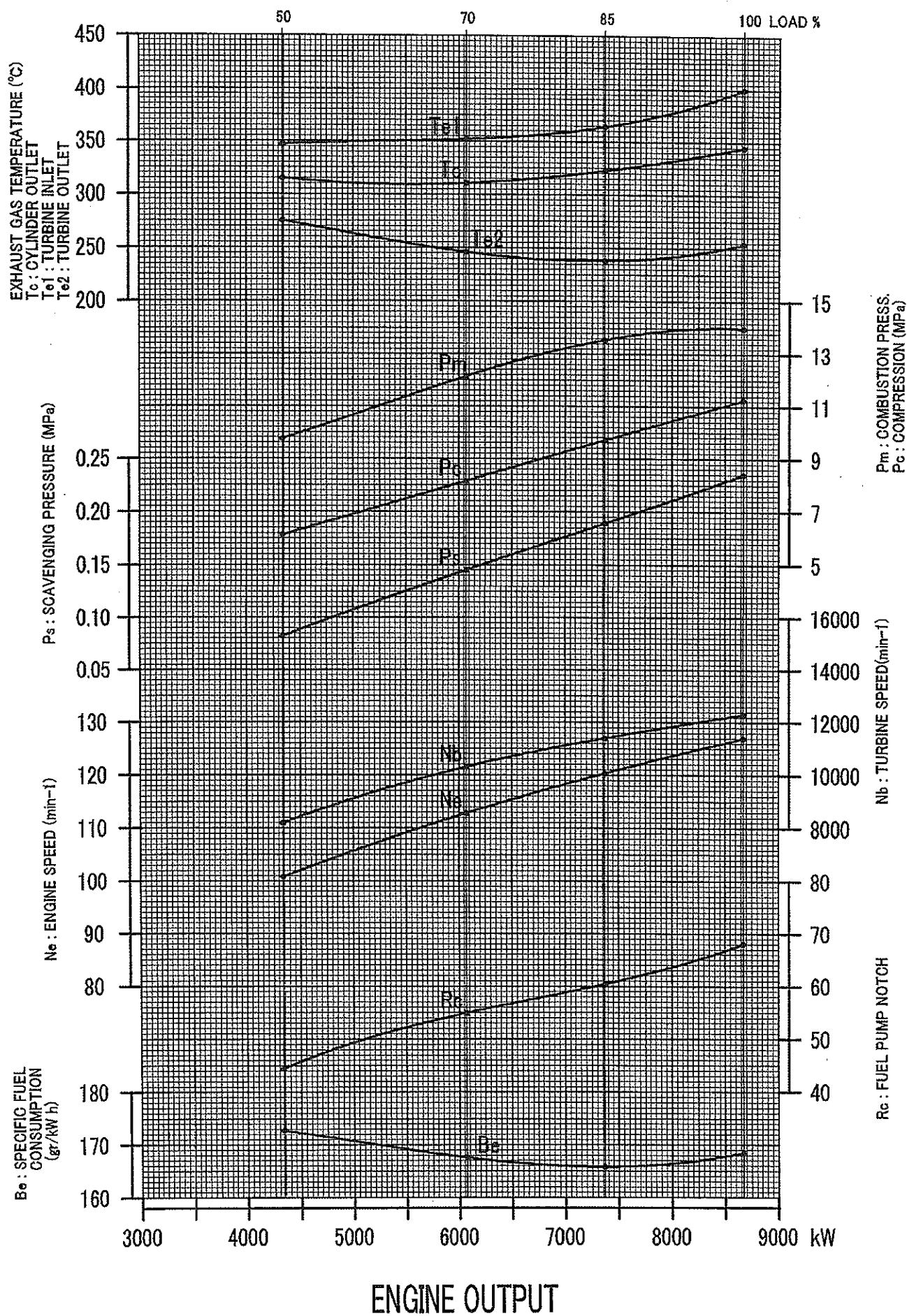
C50LSII-060103

KIND OF LOAD		%	50	70	85	85	100	100		110	CYL CUT	T/C CUT
GAUGE BOARD PRESS. (MPa)	LUB. OIL		0.220	0.220	0.220	0.220	0.220	0.220		0.220	0.170	0.210
	NORMAL USE 0.12~0.22											
	EXH.V.D. OIL		0.390	0.390	0.390	0.390	0.390	0.390		0.390	0.360	0.390
	NORMAL USE 0.29~0.39											
	EXH.V.S. AIR		0.620	0.625	0.625	0.625	0.625	0.625		0.625	0.630	0.650
	NORMAL USE 0.59~0.69											
	T/C L.O.		0.160	0.160	0.155	0.150	0.150	0.150		0.150	0.120	0.160
	NORMAL USE 0.09~0.16											
	CYL. L.O.		0.050	0.050	0.050	0.050	0.050	0.050		0.051	0.051	0.053
AUX. BLOWER MOTOR AMPERE (A)		NO.1	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF	24
		NO.2	OFF	OFF	OFF	OFF	OFF	OFF		OFF	OFF	22
TURBOCHARGER SPEED (min ⁻¹)	1		8200	10300	11400	11400	12300	12300		12900	8700	—
	2											
	MEAN		8200	10300	11400	11400	12300	12300		12900	8700	—
AIR PRESSURE LOSS OF TURBO. FILTER (kPa)	1		0.10	0.15	0.30	0.30	0.35	0.35		0.35	0.10	—
	2											
	MEAN		0.10	0.15	0.30	0.30	0.35	0.35		0.35	0.10	—
AIR PRESSURE LOSS ACROSS AIR COOLER (kPa)	1		0.65	0.82	0.92	0.92	0.95	0.95		1.00	0.68	0.03
	2											
	MEAN		0.65	0.82	0.92	0.92	0.95	0.95		1.00	0.68	0.03
*SCAVENGING AIR PRESS. (MPa)			0.08	0.15	0.19	0.19	0.23	0.24		0.26	0.10	—
*EXHAUST GAS TURBO. OUTLET PRESSURE (kPa)	1		0.88	1.67	2.01	2.06	2.75	2.84		3.53	0.93	—
	2											
	MEAN		0.88	1.67	2.01	2.06	2.75	2.84		3.53	0.93	—
CYLINDER INNER PRESSURE (MPa) COMPRESSION MAXIMUM MAX 14.02MPa	1	6.2 9.7	8.2 12.1	9.7 13.6	9.7 13.6	11.2 14.0	11.2 14.0			12.2 14.1	6.7 10.9	3.5 5.2
	2	6.2 9.7	8.2 12.0	9.7 13.5	9.7 13.5	11.2 13.9	11.3 13.9			12.2 14.2	6.6 10.8	3.5 5.2
	3	6.1 9.8	8.1 12.2	9.7 13.6	9.7 13.6	11.3 14.1	11.3 14.1			12.0 14.0	6.6 10.7	3.4 5.1
	4	6.1 9.8	8.1 12.2	9.7 13.6	9.7 13.6	11.3 14.1	11.2 14.0			12.2 14.2	6.5 10.7	3.4 5.0
	5	6.1 9.8	8.2 12.2	9.7 13.6	9.7 13.5	11.3 13.9	11.3 14.0			12.0 14.0	6.2 10.2	3.4 5.1
	6	6.1 9.7	8.1 12.1	9.7 13.6	9.7 13.5	11.2 14.0	11.2 14.0			12.1 14.2	6.2 —	3.4 5.0
	7											
	8											
	MEAN	6.13 9.75	8.15 12.13	9.70 13.58	9.70 13.55	11.25 14.00	11.25 14.00			12.12 14.12	6.47 10.66	3.43 5.10

KIND OF LOAD %		50	70	85	85	100	100		110	CYL CUT	T/C CUT
*TURBOCHARGER SUCTION AIR TEMPERATURE (°C)	1	25	26	26	26	27	28		27	25	22
	2										
	MEAN	25.0	26.0	26.0	26.0	27.0	28.0		27.0	25.0	22.0
TURBOCHARGER OUTLET AIR TEMPERATURE (°C)	1	74	103	122	123	140	142		151	80	20
	2										
	MEAN	74.0	103.0	122.0	123.0	140.0	142.0		151.0	80.0	20.0
AIR COOLER OUTLET AIR TEMPERATURE (°C)	1	26.5	36	46	47	54	55		58	28	20
	2										
	MEAN	26.5	36.0	46.0	47.0	54.0	55.0		58.0	28.0	20.0
SCAVENGING AIR TEMPERATURE (°C)	1	26	32	38	40	46	48		52	26	24
	2										
	MEAN	26.0	32.0	38.0	40.0	46.0	48.0		52.0	26.0	24.0
EXHAUST GAS CYLINDER OUTLET TEMPERATURE (°C) *PYROMETER MAX 450°C	1	319	311	322	321	343	342		373	344	289
	2	322	318	326	325	352	348		375	348	298
	3	306	306	322	319	343	339		371	378	297
	4	316	311	324	323	351	348		375	377	291
	5	312	305	318	320	347	344		375	372	298
	6	316	312	327	327	349	347		377	(62)	284
	7										
	8										
	MEAN	315.2	310.5	323.2	322.5	347.5	344.7		374.3	363.8	292.8
EXHAUST GAS TURBO. INLET TEMPERATURE (°C) *PYROMETER MAX 580°C	1	347	352	365	364	401	400		439	347	304
	2										
	MEAN	347.0	352.0	365.0	364.0	401.0	400.0		439.0	347.0	304.0
EXHAUST GAS TURBO. OUTLET TEMPERATURE (°C) *PYROMETER	1	275	246	238	238	253	254		278	270	272
	2										
	MEAN	275.0	246.0	238.0	238.0	253.0	254.0		278.0	270.0	272.0

KIND OF LOAD		%	50	70	85	85	100	100		110	CYL CUT	T/C CUT
PISTON COOLING OIL CYLINDER OUTLET TEMPERATURE (°C)	INLET COMM		44	44	44	44	44	44		44	44	32
	NORMAL USE INLET 40~50 OUTLET 45~65°C	1	50	51	52	52	53	53		54	50	35
		2	51	52	52	52	54	54		54	50	36
		3	51	52	52	53	54	54		54	50	36
		4	51	52	52	52	54	54		54	50	36
		5	51	52	52	53	54	54		54	50	36
		6	51	51	52	52	53	53		54	(46)	35
	7											
	8											
	MEAN		50.8	51.7	52.0	52.3	53.7	53.7		54.0	50.0	35.7
THRUST BEARING LUBRICATING OIL NORMAL USE 40~60°C		47	47	47	47	47	47		46	43	33.5	
T/C LUBRICATING OIL OUTLET TEMPERATURE (°C)	*INLET COMM		—	—	—	—	—	—		—	—	—
	NORMAL USE 60~80°C	1	54	58	62	62	64.5	64.5		50	53.5	31
		2										
MEAN		54.0	58.0	62.0	62.0	64.5	64.5		50.0	53.5	31.0	
EXHAUST VALVE DRIVE OIL INLET TEMPERATURE (°C)		44.5	44.5	44.5	44.5	44.5	44.5		45	42	32	
NORMAL USE 40~50°C												
CYLINDER COOLING WATER CYLINDER OUTLET TEMPERATURE (°C)	INLET COMM		76	74	74	74	72	72		76	76	44
	NORMAL USE 80~90°C	1	80	81	84	83	84	84		85	83	45
		2	80	83	84	84	84	84		85	83	46
		3	80	81	82	84	84	84		86	83	46
		4	81	81	82	82	83	83		86	83	46
		5	80	81	84	84	84	84		86	83	46
		6	80	81	83	84	84	84		86	(76)	46
		7										
		8										
	MEAN		80.2	81.3	83.2	83.5	83.8	83.8		85.7	83.0	45.8
AIR COOLER COOLING WATER TEMPERATURE (°C)	1	INLET	19.5	19.5	20	20	20	20		21	19	20
		OUTLET	26	33	40	40.5	46	46		50	26	20
	OUTLET MAX50°C	2	INLET									
			OUTLET									

PERFORMANCE CURVE

6UEC50LSII#18 8670kW / 127min⁻¹

C50LSII-060103

Load (%)		Engine speed (min^{-1})			Instantaneous speed change (%)	Stabilization time (sec)
Beginning	End	Beginning	Instantaneous maximum speed	Stabilized speed		
100	—	127	137.6	127	8.3	44.12

*Permissible instantaneous speed change. : under 15%

Particulars of governor	
Type	MG-800
Serial number	06668

10-1. Emergency stop test results

Item	Setting		Operating	
Bearing lubricating oil	0.08	MPa	0.08	MPa
Exhaust valve driving oil	0.20	MPa	0.205	MPa
Exhaust valve spring air	0.44	MPa	0.44	MPa
Over speed	*139.7	min^{-1}	138.1	min^{-1}

*Setting speed is temporary value to confirm the function of over speed emergency stop system.

10-2. Starting interlock tests results

(executed at preliminary stage of test run)

- 1) The turning gear is engaged good
- 2) The camshaft shifting safety gear disengaged good

10-3. The other test results

Item	Setting		Operating	
1) Minimum revolution test	32.0	min^{-1}	31.6	min^{-1}
2) Astern test	88.9	min^{-1}	89.1	min^{-1}

11. Measuring of bearing temperature

(Measured at preliminary trial, immediately after the 100% loading test) (unit $^{\circ}\text{C}$)

No. of bearings	1	2	3	4	5	6	7	8	9	10
Main bearing		47.0	48.0	49.0	49.0	48.0	48.0	48.0		
Crank pin bearing	48.0	49.0	50.0	49.0	49.0	50.0				
Crosshead pin bearing	50.0	50.0	50.0	49.0	50.0	50.0				

*Lubricating oil temperature 45 $^{\circ}\text{C}$

*Room temperature 23.1 $^{\circ}\text{C}$

Item	Temperature	Item	Temperature
Room	19.0°C	T/C lubricating oil inlet	36.0°C
Fresh water inlet	65.0°C	Lubricating oil inlet	36.0°C

No.	Air reservoir pressure		Note	No.	Air reservoir pressure		Note
	MPa				MPa		
	Before starting	After starting			Before starting	After starting	
1	2.45	2.28	AH	26			
2	2.28	2.12	AS	27			
3	2.12	1.98	AH	28			
4	1.98	1.85	AS	29			
5	1.85	1.73	AH	30			
6	1.73	1.64	AS	31			
7	1.64	1.54	AH	32			
8	1.54	1.47	AS	33			
9	1.47	1.38	AH	34			
10	1.38	1.30	AS	35			
11	1.30	1.22	AH	36			
12	1.22	1.15	AS	37			
13	1.15	1.09	AH	38			
14	1.09	1.02	AS	39			
15	1.02	0.98	AH	40			
16	0.98	0.92	AS	41			
17	0.92	0.88	AH	42			
18	0.88	0.82	AS	43			
19	0.82	0.78	AH	44			
20	0.78	0.71	AS	45			
21	0.71	0.67	AH	46			
22	0.67	—	Not Start	47			
23				48			
24				49			
25				50			

Capacity of air reservoir	m ³	3.0
Number of starting		21

Remarks : Capacity of equipment piping : about 0.4 m³