MAIN ENGINE PERFORMANCE ANALYSIS REPORT

Japan Engine Corporation

Version 3.0.0 (20131028)

MV AURIGA LEADER （7UEC60LSII）

☑ **This item shown with mark is suggested this time.**
今回提案したアイテムです

Vessel Name	AURIGA LEADER	Engine Type	MITSUBISHI 7UEC60LS Ⅱ	Analysis Date	1-Apr-20
Owner	NYK SHIPMANAGEMENT PTE LTD	Englne No.	3959	Reporter	J-ENG
Total Running Hours	73,996.0	Peformance Data	30-Mar-20	Ref.No	-

1-1. ENGINE OPERATING POINTS (Refer to attached file Fig.1)

☑ Operating point is within Designed propeller characteristic curve,and there is normal condition.
運航点は問題ありません

☐ Operating point is a trend to ward torque-rich condition.Please pay attention to this condition.
運航点がトルクリッチ気味です。ご注意ください

1-2. PERFORMANCE CURVE (Refer to attached file Fig.2)

☑ The engine parameters are on the performance curves at the Shop test record which are in normal condition .
エンジンパラメーターは陸上運転と比べて問題ありません

☐ When comparing the shop test result, the difference is as follows
陸上運転データと違うデータは以下の通りです

- ☐ Load indicator(LI) is High.
  ロードインジケーター（LI）が高い
- ☐ Scav.air pressure（PS） is low.
  掃気圧力（PS)が低い
- ☐ Turbo charger revolution（Nt） is low.
  過給機回転数（Nt)が低い
- ☐ Pc is low.
  Pcが低い
- ☐ Pmax is High.
  Pmax. が高い
- ☐ Pmax is low.
  Pmax. が低い
- ☐ Exh.gas temp(Tv,Tn, and Tz) is high.
  排気ガス温度(Tv,Tn, Tz) が高い

1-3. OUR RECOMMENDATION

☑ Especial no recommendation
特に問題ありません

☐ We would like to advise you the following items for performance improvement
性能改善のために下記項目をアドバイスします

MV AURIGA LEADER （7UEC60LSII）

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今回提案したアイテムです

☐	Check of Fuel injection timing 燃料噴射タイミング不良（進・遅角）	・Inspection of sliding surfaces of fuel cam and roller, and confirmation of their lubricating condition ・Overhaul, cleaning, and inspection of FO pump (each valve) and FO valve driving device ・FO pump setting adjustment and timing inspection ・Inspection of oil leakage from fuel oil pipe joint part ・燃料カム,ローラの摺動面の点検,潤滑状況確認 ・燃料ポンプ（各弁），燃料弁駆動装置解放,清掃及び点検 ・燃料ポンプセッティング調整，及び，タイミング点検 ・燃料油管継手部からの漏れ点検

Judging from the data, we recommend to	**Keep**	fuel injection timing by :	**Present**	deg.

☐	Excessive FO injection amount 燃料噴射量過多	・Overhaul and inspection of FO pump driving device ・FO pump setting adjustment and timing injection ・燃料ポンプ，駆動装置の解放，点検 ・燃料ポンプセッティング調整,及び,タイミング確認
☐	Torque rich operation トルクリッチ運転	・Confirmation of torque rich judging diagram & avoiding operation in alarm range ・Cleaning of hull ・トルクリッチ判定図の確認，警告範囲での運転回避 ・船体洗浄
☐	Check & Cleaning of Turbo charger (include turbine blade top clearance) 過給機性能不良	・Blower side overhaul and cleaning ・Turbine side cleaning (vegetable solid particles) ・Turbine side overhaul and cleaning ・Cleaning of air suction filter ・Inspection of air suction filter differential pressure ・Cleaning of exaust gas inlet grid ・Confirmation of exhaust gas economizer contamination ・ブロア側開放清掃 ・タービン側洗浄（植物性固体性状） ・タービン側開放清掃 ・空気吸込フィルタ清掃 ・空気吸込フィルタ差圧点検 ・排気ガス入口グリッド清掃 ・排気ガスエコノマイザー汚れ確認
☐	Check & Cleaning of air cooler エアクーラー冷却機能不良	・Air venting ・Inspection of air side differential pressure ・Air side washing (fin tube) ・Washing of cooling pipe inside ・Confirmation of cooling sea water inlet pressure ・Confirmation of water separator clogging ・空気抜き実施 ・空気側差圧点検 ・空気側洗浄（フィン管） ・冷却管内部洗浄 ・冷却海水入口圧力値確認 ・ウォーターセパレータ閉塞確認
☐	Check of air cooler （over cooling） エアクーラー不良（過冷）	・Confirmation of cooling sea water inlet pressure value ・Inspection of air side differential pressure ・冷却海水入口圧力値確認 ・空気側差圧点検
☐	Check & Maintenance of Fuel injection valve 燃料噴射状況不良	・Injection testing (Do maintence if atomization is not good.) ・Cleaning and correction of fuel injection nozzle ・Inspection of contact surfaces of fuel valve body and nozzle ・噴射テスト実施 （噴霧状況が悪けれ整備を実施） ・噴射ノズルの清掃及び修正 ・燃料弁本体とノズルの当り面の点検
☐	Check & Maintenance of pressure gauge 圧力計表示不良	・Inspection of pressure gauge line leakage ・Replacement of pressure gauge ・圧力計のラインのリーク点検 ・圧力計の交換
☐	Slackness of fuel oil regulation linkage 燃料調整リンケージのガタ	・Confirmation of each joint part wear and sticking of pin, bush, lever bearing, cam roller ・陸上運転記録と比較し、LI値とFOPumpラック値の関係に誤差が認められる。 ・各接続部ピン,ブッシュ,レバー軸受,カム・ローラ部の磨耗,固着確認

1-4.J-ENG Comments.／J-ENG コメント

Engine performancde curve shows in normal condition.
Cylinder oil feed rate is 0.70g/PSh at MCR condition // Cylinder lub oil feed rate is in recommended range.

The judgement of main engine performance

SHIP NAME	AURIGA LEADER	KW	14315
ENGINE TYPE	7UEC 60LS Ⅱ #3959	min-1	105

JUDGE	GOOD	NORMAL	CAUTION
MARK	◎	○	×

Judgement for main engine condition

Mark on graph	□	◇	△	×	＊	○	+	■	◆	●
Date	17-Aug-19	22-Sep-19	11-Oct-19	11-Nov-19	06-Dec-19	09-Jan-20	30-Mar-20	-	-	-
Load	71.6	71.1	70.8	71.3	68.8	64.9	71.2	-	-	-
Te1	○	○	◎	◎	◎	◎	◎	–	–	–
Te2	○	○	○	×	○	○	○	–	–	–
Tc	○	○	○	○	○	○	○	–	–	–
Ps(Mpa)	×	◎	◎	○	◎	○	○	–	–	–
Pm(Mpa)	○	○	◎	○	◎	◎	◎	–	–	–
Pc(Mpa)	○	○	◎	◎	◎	◎	◎	–	–	–
Rc or LI	◎	◎	◎	◎	◎	◎	◎	–	–	–
Nb	◎	◎	◎	◎	◎	◎	◎	–	–	–
Ne	◎	◎	◎	◎	◎	◎	◎	–	–	–
Te1-Te2	◎	◎	◎	×	◎	◎	◎	–	–	–
A.C.	◎	◎	◎	◎	◎	◎	◎	–	–	–

Result of calculation for main engine output **Standard Output of judgement: Output-Rc**

Output(PS)-Rc	13937.6	13835.5	13779.3	13877.6	13393.9	12639.4	13863.2	-	-	-
Output(KW)-Rc	10251.1	10176.0	10134.7	10207.0	9851.2	9296.3	10196.4	-	-	-
Output(PS)-Nb	11685.1	12568.1	11626.5	12092.2	11856.7	12552.4	12486.9	-	-	-
Output(KW)-Nb	8594.4	9243.9	8551.3	8893.8	8720.6	9232.3	9184.1	-	-	-
Output(PS)-Be	14006.4	13871.5	13060.6	13831.7	13807.0	15086.6	14114.9	-	-	-
Output(KW)-Be	10301.7	10202.5	9606.1	10173.2	10155.1	11096.2	10381.5	-	-	-

Rev. margin	5.28%	5.11%	4.83%	5.33%	6.69%	7.78%	4.68%	-	-	-
Feed rate(qP1)	0.70	0.72	0.70	0.70	0.71	0.78	0.70	-	-	-
Feed rate(qA)	0.87	0.91	0.89	0.88	0.91	1.04	0.87	-	-	-
Running hour	701135	706366	70989	71447	71954	74280	73996	-	-	-

Rev. margin	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	GOOD	-	-	-
Cyl. oil consump.	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	NORMAL	-	-	-

Te1,Te2 & Tc were converted into shop trial situation.
The final judgement is referred to the comment.

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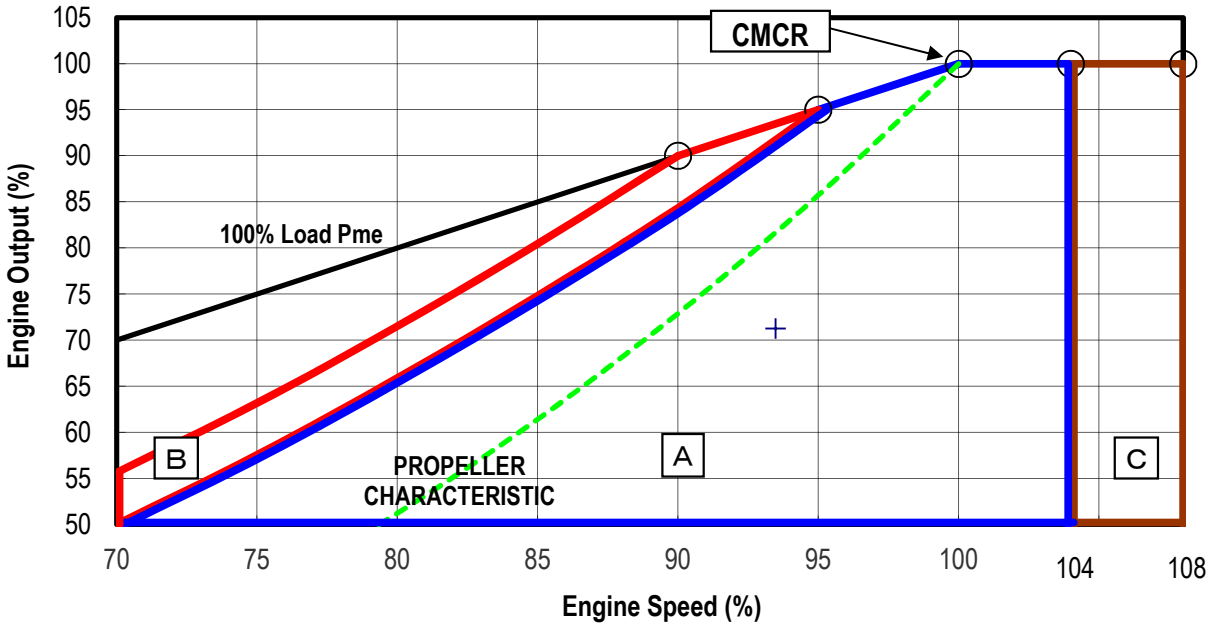
ENGINE TYPE	7UEC 60LSⅡ #3959	min-1	105

Engine Operating Range



A ： Service range for normal service

Recommendable operating point of the engine for service should be lie in Range A.

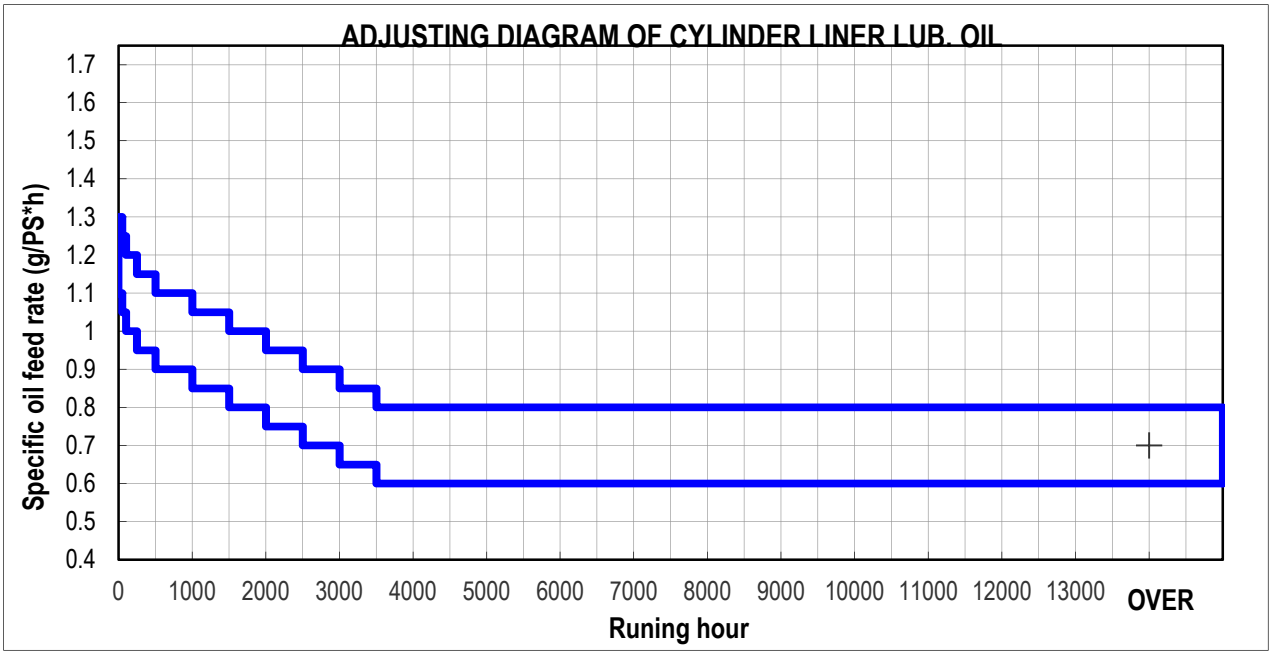
B ： Alarm range for service

The engine condition should be always monitored. If it is expected that the operating point enters into Range B, the suitable measures such as cleaning and repainting of ship's hull shall be performed as soon as possible. When the operating point enters this range unwillingly, the operation should be limitted toless than1 hour in every12 hours.

C ： Allowable range only at sea traial

Service range with overspeed of 104 to 108% CMCR speed, only permissible during sea trials to demonstrate the CMCR.

CMCR ： Contracted Maximum Continuous Rating,i.e. nominal power (100%PS) at nominal engine speed (100%rpm).



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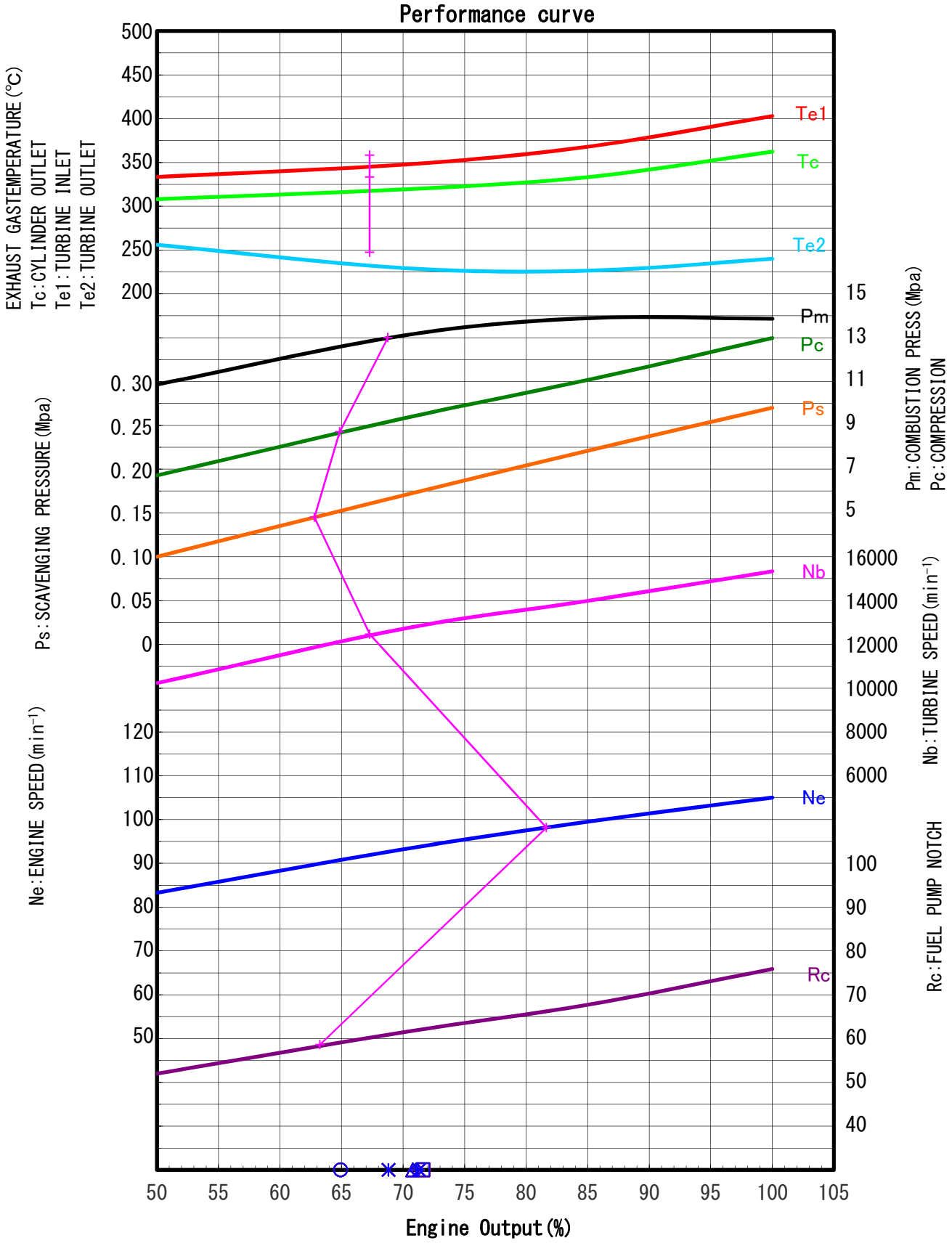

MAIN ENGINE LOG

7UEC60LS Ⅱ

KOBE DIESEL CO., LTD.

Ship name AURIGA LEADER	kW×min[-1] 14315 KW X 105 min(-1)	Date	30-Mar-20
Owner NYK LINE	Engine No.UE-3595	Reporter	C/E
Total Running Hours 73,996	Nationality PANAMA	Port	At sea

Remarks: FO 50 cst in use. WF-4 ;WD-NW; Sea-SLIGHT D=7.4/7.6 (F/A) , Voyage 83, Displacement = 23400 MT , Shaft Power - 11460 KW @ 98.16 Rp

※ Date		09-Jan-20	30-Mar-20
※ T.R.H		72480	73996
Speed		19	19.4
※ M/E Revolution (rpm)		98	98.16
Room Temp. (℃)		35	32
Sea Water Temp. (℃)		24	16
※ Handle Notch / Load Ind.		9.8/6.3	98/6.4
※ Governor Index		6.3	6.4
※ Pressure (MPa)	T/C LO	0.168	0.17
	LO	0.204	0.207
	FW	0.168	0.173
	Fuel Oil	0.61	0.51
	SW	180	0.149
	SCAV.AIR	0.146	0.145
	Exh. V.Oil / Air	0.37/061	0.38/0.59
F.O	Inlet Temp.° C	105	69
Viscosity (Actual)		13	13.3
F.O Pump Rack	1	55.0	59.0
	2	56.0	60.0
	3	56.0	58.0
	4	56.0	58.0
	5	56.0	58.0
	6	55.0	58.0
	7	55.0	59.0
	8		
	9		
※	Mean	55.6	58.6
Turbo Charger Rev.(min-1)	1	12450	12380
	2	12460	12550
	Mean	12455	12465
FW TEMP (℃)	In	68	71
	Out	82	84
P.C.LO TEMP (℃)	In	43	34
	Out	49	48
T/C LO TEMP (℃)	In	43	34
	Out	58	56
※ C.W. TEMP (℃) /Air cooler	In	33	33
	Out	42	42
F.O V. C.W. Temp (℃)			43
Thrust Temp (℃)		45	43
Exh.V.D.O Temp (℃)			
Cons.	F.O Mt / Day	49.6	46.4
	L.O l / Day	50	50
	Cyl. Oil l / Day	336	312
	Exh. V.Oil l / Day	NA	NA

※ P.Comp / P.Max (Mpa)				
1	8.7	12.3	8.5	12.7
2	8.7	12.5	8.7	12.8
3	8.5	12.4	8.7	12.8
4	8.7	12.6	8.8	13.1
5	8.7	12.7	8.7	13.0
6	8.7	12.8	8.6	13.1
7	8.8	12.9	8.7	13.2
8				
9				
Mean	8.7	12.6	8.7	13.0

※ Exhaust Gas Temp. / Cylinder Outlet Temp. / Piston Outlet Tempt.				
1	361	82	49	352
2	351	81	49	347
3	363	82	49	348
4	374	82	49	369
5	375	82	49	373
6	369	82	49	370
7	365	82	49	368
8				
9				
Mean	364.5	82.0	49.0	361.0

T/C Exh. Temp.(℃)	Inlet	1	397	385
		2	394	387
	Outlet	1	287	274
		2	284	276
Scavenging Air Temp. (℃)	A/Cooler Inlet	1	139	134
		2	145	141
	A/Cooler Outlet	1	39	40
		2	41	42
	Scav. Air Trunk	1	46	50
		2	45	50
T/C Blower Inlet Temp. (℃)		1	35	32
		2	35	32
Air Cooler Manometer (kpa)			120	120/120
T/C Blower Manometer (kpa)			40	1
IHP				
Fuel Oil	Gravity		0.9765	0.9382
	Sulfur		0.49	0.431
	Viscosity(50 C)		129	31
Stuff.G Leak Oil (l / Day)			19.44	
Anti Rust Chemical				
Last Bunker			ZEEBRUGGE	KAWASAKI
OIL BRAND	System Oil :		CDX 30	CDX 30
	Cyl.Oil :		CYLTECH 70	TOTAL TALUSIA LS 40
Cylinder Oil adjustment	Handle			
	Stroke		All Units 1, 2, 3, 4, 5,, 6 & 7 : 1.125	

POWER CALCULATION

LCV Trial	42250
Sg- Trial	0.8655
Fuel Rack	58.0
Krc(from graph)	108
S.Gr-15	0.9382
FM Temp	69
S.Gr at F	0.90337
LCV in us	41850
RPM	98.00
FO - M^3	51.36
MT	46.4
S.G.ENG. I	0.9034
Power (kW	10942.5
% POWER	76.4
FO Temp I	69
Sp Fo Cor	176.7

CYL OIL FEED RATE

CLO L/day	312
S.Gr-15	0.936
FM Temp	45
Sg @ FM	0.9165
CLO Kg/da	285.9
feed rate	1.09

eed Rate At P1 poir

At P1 poi	0.71