1K/1N
FINAL REPORT COVER

Lookup Update

METHOD
VERSION

CONDUCTED FOR:

	V = VALID
	I = INVALID
	N = RESULTS CANNOT BE INTERPRETED AS REPRESENTATIVE OF OIL PERFORMANCE (NON-REFERENCE OIL) AND SHALL NOT BE USED IN DETERMINING AN AVERAGE TEST RESULT USING MULTIPLE TEST CRITERIA.

Test Number		
Test Stand:	Engine Run #:	
EOT Time:	EOT Date:	
Oil Code [A]:		
Formulation/Stand Code:		
Alternate Codes:		

In my opinion this test been conducted in a valid manner in accordance with the 1K/1N Test Procedure (Research Report RR:D02-1273/RR:D02-1321) and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

[A] CMIR or Non-Reference Oil Code

SUBMITTED BY: _____
Testing Laboratory

_____
Signature

_____
Typed Name

_____
Title

1K/1N
FORM 1
TEST REPORT SUMMARY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			
START DATE:	TOTAL TEST LENGTH:	TMC OIL TYPE:	
LABORATORY INTERNAL OIL CODE:			

	CORRECTION EFFECTIVE DATE	WDK/WDN	TGF %	TLHC%	TRANSFORMED TLHC%	BSOC g/KW-h	EOTOC g/kW-h
UNADJUSTED LAB RATING							
INDUSTRY CORRECTION (IF ANY)							
SUBTOTAL							
LAB SEVERITY ADJUSTMENT (IF ANY) [A]							
TOTAL							

	EFFECTIVE DATE	WDK/WDN	TGF %	TLHC %	TRANSFORMED TLHC%	BSOC g/KW-h	EOTOC g/kW-h
TEST TARGET MEAN [B]							
TEST TARGET STD [B]							
[A, C]							

	REFEREE LAB	WDK/WDN	TGF %	
REFEREE RATINGS				

	TOP	INT. 1	OIL	PISTON	LINER
RING LOSS OF SIDE CLEARANCE (mm)					
RING END GAP INCREASE (mm)					
IS THE RING STUCK?					
SCUFFED AREA %					
AVERAGE WEAR STEP (μm)					
% BORE POLISH					

Notes: [A] Reference oil tests or as requested by test sponsor
[B] Non-reference oil tests only
[C] See Appendix X4

1K/1N
FORM 2
OPERATIONAL SUMMARY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

OPERATING CONDITION		MINIMUM	MAXIMUM	AVERAGE	SPECIFICATION
ENGINE SPEED	r/min				2100 ± 10
ENGINE POWER	kW				REPORT
FUEL FLOW	g/min				185 ± 1
HUMIDITY	g/kg				17.8 ± 1.7
TEMPERATURE °C					
COOLANT OUT	°C				93 ± 2.5
COOLANT IN	°C				REPORT
COOLANT delta T	°C				5 ±1.0
OIL TO BRG	°C				107 ± 2.5
OIL COOLER IN	°C				REPORT
INLET AIR	°C				127 ± 2.5
EXHAUST	°C				550 ± 30
FUEL @ INJECTOR HOUSING	°C				57 + 3
PRESSURES					
OIL TO BRG	kPa				482 MAX
OIL TO JET	kPa				360 ± 13
INLET AIR	kPa				240 ± 1
EXHAUST (ABS)	kPa				216 ±1
FUEL @ FILTER HSG	kPa				210 ± 20
CRANKCASE VACUUM	kPa				0.7 ± 0.1
COOLANT JUG PRESSURE	kPa				REPORT
FLOWS					
BLOWBY	L/min				REPORT
COOLANT FLOW	L/min				65 ± 2

AIR/FUEL RATIO: 24 HR		AIR/FUEL RATIO: 252 HR	

ASSEMBLY MEASUREMENTS AND PARTS RECORD

PISTON/HEAD CLEARANCE mm		INTAKE VALVE OPEN °ATC	
		FUEL TIMING °BTC	

	PART NO. (1)	SERIAL NO. (2)	DATE CODE	INSPECTION CODE
LINER			F	G
RING SET (1)			I	H
PISTON			D	E

D Number blow "E" located on top of piston

E Number on top of "E" located on top of piston

F Four alphanumeric characters (NNAN) on liner O.D.

G Four digit number on liner O.D.

H Three or four digit number on white label on ring set box

I NN-NN from part number label on ring set box

(1) AND (2) NUMBER ON PARTS BOX YELLOW LABEL

1K/1N
FORM 3
OPERATIONAL SUMMARY - OFFSET AND DEVIATION

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

CONTROLLED PARAMETER	ALLOWABLE % OUT	THIS TEST % OUT	ALLOWABLE % OFF	THIS TEST % OFF
SPEED	5		20	
FUEL FLOW	10		25	
HUMIDITY	10		25	
COOLANT FLOW	5		25	
TEMPERATURES				
COOLANT OUT	5		20	
OIL TO BEARING	5		20	
INTAKE AIR	5		20	
FUEL AT INJECTOR HOUSING	5		20	
PRESSURES				
OIL JET	5		25	
INTAKE AIR	10		25	
EXHAUST	10		25	
FUEL AT FILTER HOUSING	5		20	
CRANKCASE VACUUM	10		20	

1K/1N
FORM 4
PISTON RATING SUMMARY

TEST	LAB:	EOT DATE:	END TIME:	STAND:	RUN #:	METHOD:
FORMULATION/STAND CODE:					OILCODE:	
TEST FUEL:	FUEL BATCH:	DATE RATED:		RATING NUMBER:		RATER:

LAST STAND REFERENCE INFORMATION	DATE COMPLETED:	STAND #:	RUN #:	TMC OIL CODE:

	WDK/WDN	TGF	TLHC	TRANSFORMED TLHC	BSOC	EOTOC
LAST REF. THIS STAND						
INDUSTRY AVERAGE						
INDUSTRY STD						

TOTAL PISTON RATINGS SUMMARY

		GROOVES						LANDS						UPPER SKIRT		UNDER CROWN		PIN BORES			
	DEP. FACTOR	NO. 1		NO. 2		NO. 3		NO. 1		NO. 2		NO. 3						FRONT		REAR	
		A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.
CARBON																					
	HC-1.0																				
	MC-0.5																				
	LC-.25																				
	TOTAL																				
LACQUER	8 - 9																				
	7 - 7.9																				
	6 - 6.9																				
	5 - 5.9																				
	4 - 4.9																				
	3 - 3.9																				
	2 - 2.9																				
	1 - 1.9																				
	>0 - 0.9																				
	CLEAN		0		0		0		0		0		0		0		0		0		0
	TOTAL																				
RATING																					
LOCATION FACTOR		1.5		1.5		25		1		1		25		50		20		0		0	
IND RATING																					

TGF %	INT. GR. FILL %	WDK/WDN	UNWEIGHTED DEP.	T.L. HVY. CARBON %	T.L. FLAKED CARBON %

1K/1N
FORM 4A
PISTON RATING WORKSHEET

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Refer to Appendix C for an example of Piston Rating Worksheet.

1K/1N
FORM 5
SUPPLEMENTAL PISTON DEPOSITS (GROOVE SIDES AND RINGS)

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:		RUN NUMBER:	
FORMULATION/STAND CODE:			
OILCODE:			

DEPOSIT TYPE			CARBON			VARNISH									
			HC	MC	LC	8 - 9	7 - 7.9	6 - 6.9	5 - 5.9	4 - 4.9	3 - 3.9	2 - 2.9	1 - 1.9	>0 -	CLEAN
GROOVE TOP AND BOTTOM	1	T													
		B													
	2	T													
		B													
	3	T													
		B													
TOP BOTTOM AND BACK OF RINGS	1	T													
		B													
		BK													
	2	T													
		B													
		BK													
	3	T													
		B													
		BK													

ADDITIONAL DEPOSIT & CONDITION RATINGS	
PISTON CROWN	
RINGS	
LINER	

1K/1N
FORM 5A
REFEREE RATING

TEST IDENTIFICATION			
LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN #:		
FORMULATION/STAND CODE:			
OILCODE:			
REFEREE RATING INFORMATION			
COMPANY:	RATING NUMBER:	DATE RATED:	RATER:

TOTAL PISTON RATINGS SUMMARY

		GROOVES						LANDS						UPPER SKIRT		UNDER CROWN		PIN BORES			
	DEP. FACTOR	NO. 1		NO. 2		NO. 3		NO. 1		NO. 2		NO. 3						FRONT		REAR	
		A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.
CARBON																					
	HC-1.0																				
	MC-0.5																				
	LC-.25																				
	TOTAL																				
LACQUER	8 – 9																				
	7 - 7.9																				
	6 - 6.9																				
	5 - 5.9																				
	4 - 4.9																				
	3 - 3.9																				
	2 - 2.9																				
	1 - 1.9																				
	>0 - 0.9																				
	CLEAN		0		0		0		0		0		0		0		0		0		0
	TOTAL																				
RATING																					
LOCATION FACTOR		1.5		1.5		25		1		1		25		50		20		0		0	
IND RATING																					

TGF %	INT. GR. FILL %	WDK/WDN	UNWEIGHTED DEP.	TEST LAB TLHC%	TEST LAB TLHC %

1K/1N
FORM 6
OIL ANALYSIS AND RESULTS SUMMARY

TEST IDENTIFICATION			
LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE:			
TESTFUEL:		FUEL BATCH:	

OIL ANAL./ENG. HRS.		NEW / 0		24		204		252	
VISC @ 100°C									
TBN D4739									
WEAR METALS:	Fe/Al								
	Si/Cu								
	Cr/Pb								
FUEL DILUTION									
BLOWBY (L/min)									

24 HR. AVG. BSOC (g/kW-h) FOR HRS. END		0-252 HR. AVG. BSOC (g/kW-h):		EOT Oil Consumption(g/kW-h):					
24	48	72	108	132	156	180	204	228	252

INSPECTION AND MEAS. SUMMARY	RING GAP INCR (mm)	SIDE CL. LOSS (mm)	RING STUCK (1)	SCUFFED AREA % (2)	% BORE POLISH (WITH GRID)	AVERAGE WEAR STEP (mm)
TOP RING						
INT. RING						
OIL RING						
PISTON						
CYLINDER LINER						

PISTON DEPOSIT SUMMARY	TGF %	INT GR. F.%	WDK/WDN	UN WT DEP	T.L. HVY CARB %	T.L. FLAKED CARB %

UNWEIGHTED PISTON DEPOSITS									
GROOVES			LANDS			UPPER SKIRT	UNDER CROWN	PIN BORES	
1	2	3	1	2	3			FRONT	REAR

1K/1N
FORM 7
UNSCHEDULED DOWNTIME & MAINTENANCE SUMMARY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Number of Downtime Occurrences			
TEST HOURS	**DATE**	**DOWNTIME**	**REASONS**
			TOTAL DOWNTIME (125 HR. MAX)

Other Comments		
Number of Comment Lines		

(Rev. 5/94)

1K/1N
FORM 7A
UNSCHEDULED DOWNTIME & MAINTENANCE SUMMARY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Number of Downtime Occurrences			
TEST HOURS	**DATE**	**DOWNTIME**	**REASONS**
			TOTAL DOWNTIME (125 HR. MAX)

Other Comments		
Number of Comment Lines		

(Rev. 5/94)

1K/1N
FORM 7B
UNSCHEDULED DOWNTIME & MAINTENANCE SUMMARY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Number of Downtime Occurrences			
TEST HOURS	**DATE**	**DOWNTIME**	**REASONS**
			TOTAL DOWNTIME (125 HR. MAX)

Other Comments		
Number of Comment Lines		

(Rev. 5/94)

1K/1N
FORM 8
RING MEASUREMENTS

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

RING GAPS (mm)	TOP	INTERMEDIATE	OIL
SPECIFICATIONS	0.724 ± 0.076 mm	0.673 ± 0.076 mm	0.572 ± 0.190 mm
PRE-TEST			
POST-TEST			
INCREASE			

RING SIDE CLEARANCE*		A	B	C	D	AVG.	MIN.	SPECIFICATION
TOP	PRE-TEST							0.193+0.032 mm
	POST-TEST							
	LSC							
INT.	PRE-TEST							0.090+0.020 mm
	POST-TEST							
	LSC							
OIL	PRE-TEST							0.073 +0.016 mm
	POST-TEST							
	LSC							

* NOTES:

1. WRITE "STUCK"IN PLACEOF DIMENSION WHEN APPLICABLE

2. WRITE "<0.038 mm"FOR CLEARANCE WHEN APPLICABLE.

3. WRITE ">"BEFORE CALCULATED DECREASE ORAVERAGE DECREASE VALUES THAT INCORPORATE A "<0.038 mm"IN CALCULATION.

4LSC: LOSS OF SIDE CLEARANCE

5. MIN: INTERMEDIATE AND OILRING MINIMUM SIDE CLEARANCE IS MEASURED 360° AROUNDPISTON.

1K/1N
FORM 9
LINER MEASUREMENTS

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

LINER SURFACE FINISH (MICROMETER)			
DISTANCE FROM TOP	TRANSVERSE	LONGITUDINAL	AVERAGE
130 mm			
50 mm			
25 mm			
		TOTAL AVERAGE	

%LINER BORE POLISH - GRID (ADD T/AT VALUES FROM GRID)	
THRUST	
ANTI-THRUST	
TOTAL	

LINER BORE MEASUREMENT (mm)				
BEFORE TEST - DIAMETER (DIAL BORE GAGE)				
BORE HEIGHT	**LONGITUDINAL**		**TRANSVERSE**	
230 mm				
130 mm				
50 mm				
25 mm				
15 mm				
AFTER TEST - (SURFACE PROFILE)				
	LONGITUDINAL		**TRANSVERSE**	
	FRONT	**REAR**	**T**	**AT**
WEAR STEP @ 15mm				

1K/1N
FORM 10
CHARACTERISTICS OF THE DATA ACQUISITION SYSTEM

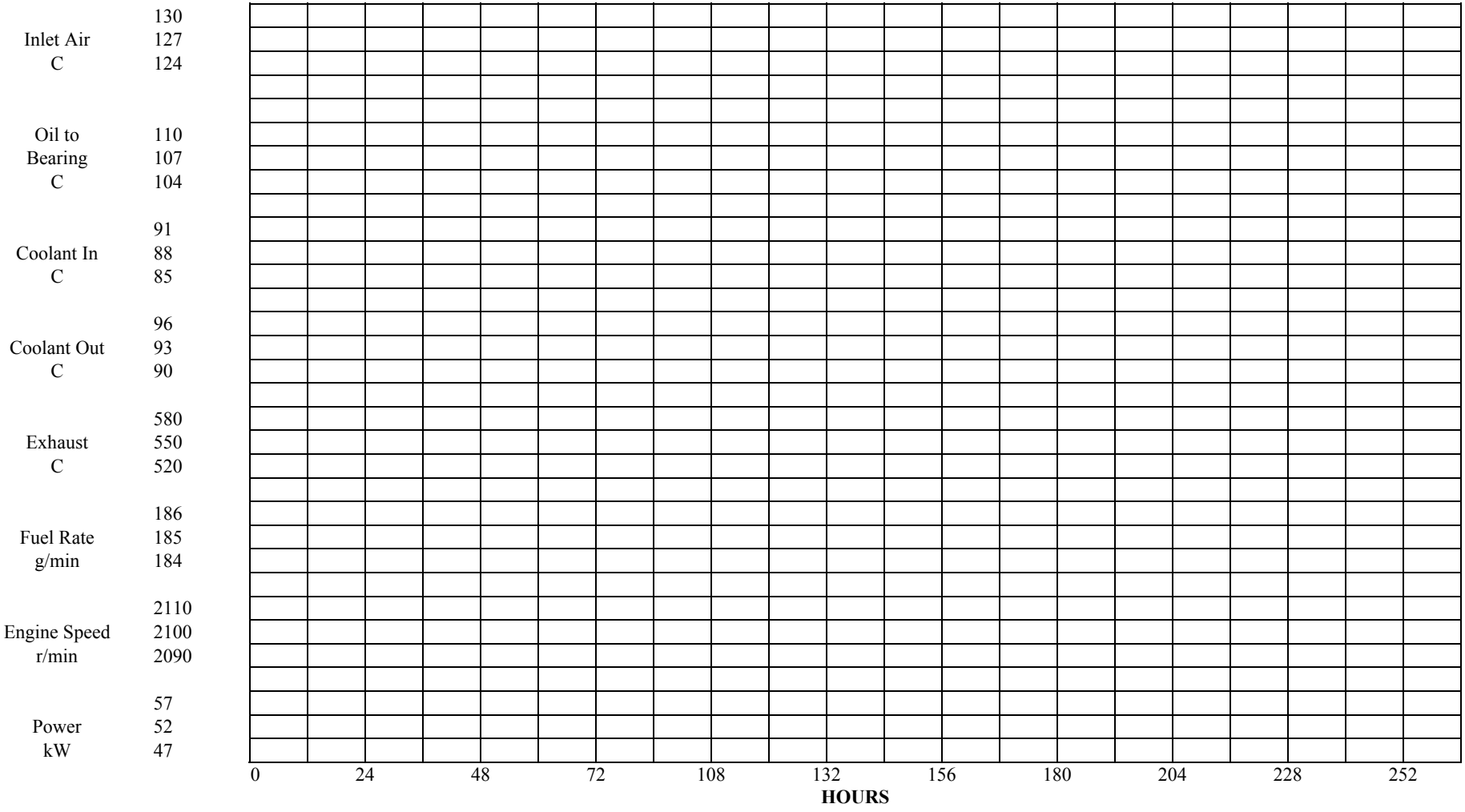
LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

PARAMETER (1)	SENSING DEVICE (2)	CALIBRATION FREQUENCY (3)	RECORD DEVICE (4)	OBSERVATION FREQUENCY (5)	RECORD FREQUENCY (6)	LOG FREQUENCY (7)	SYSTEM RESPONSE (8)
OPERATION CONDITIONS							
ENGINE SPEED (R\min)							
ENGINE POWER (kW)							
FUEL FLOW (g/min)							
HUMIDITY (g/kg)							
COOLANT OUT							
COOLANT IN							
OIL TO BRG.							
OIL COOLER IN							
INLET AIR							
EXHAUST							
FUEL							
PRESSURES (kPa)							
OIL TO BRG.							
OIL TO JET							
INLET AIR							
EXHAUST							
FUEL @ FILTER HSG							
CRANKCASE VAC							
FLOWS (L/min)							
BLOWBY							
COOLANT FLOW							

LEGEND:
(1) OPERATING PARAMETER
(2) THE TYPE OF DEVICE USED TO MEASURE TEMPERATURE, PRESSURE OR FLOW
(3) FREQUENCY AT WHICH THE MEASUREMENT SYSTEM IS CALIBRATED
(4) THE TYPE OF DEVICE WHERE DATA IS RECORDED
LG - HANDLOG SHEET
DL - AUTOMATIC DATA LOGGER
C/M - COMPUTER, USING MANUAL DATA ENTRY
SC - STRIP CHART RECORDER
C/D - COMPUTER, USING DIRECT I/O ENTRY
(5) DATA AREA OBSERVED BUT ONLY RECORDED IF OFF SPEC.
(6) DATA ARE RECORDED BUT ARE NOT RETAINED AT EOT
(7) DATA ARE LOGGED AS PERMANENT RECORD, NOTE SPECIFY IF:
SS - SNAPSHOT TAKEN AT SPECIFIED FREQUENCY
AG/X AVERAGE OF X DATA POINTS AT SPECIFIED FREQUENCY
(8) TIME FOR THE OUTPUT TO REACH 63.2% OF FINAL VALUE FOR STEP CHANGE AT INPUT

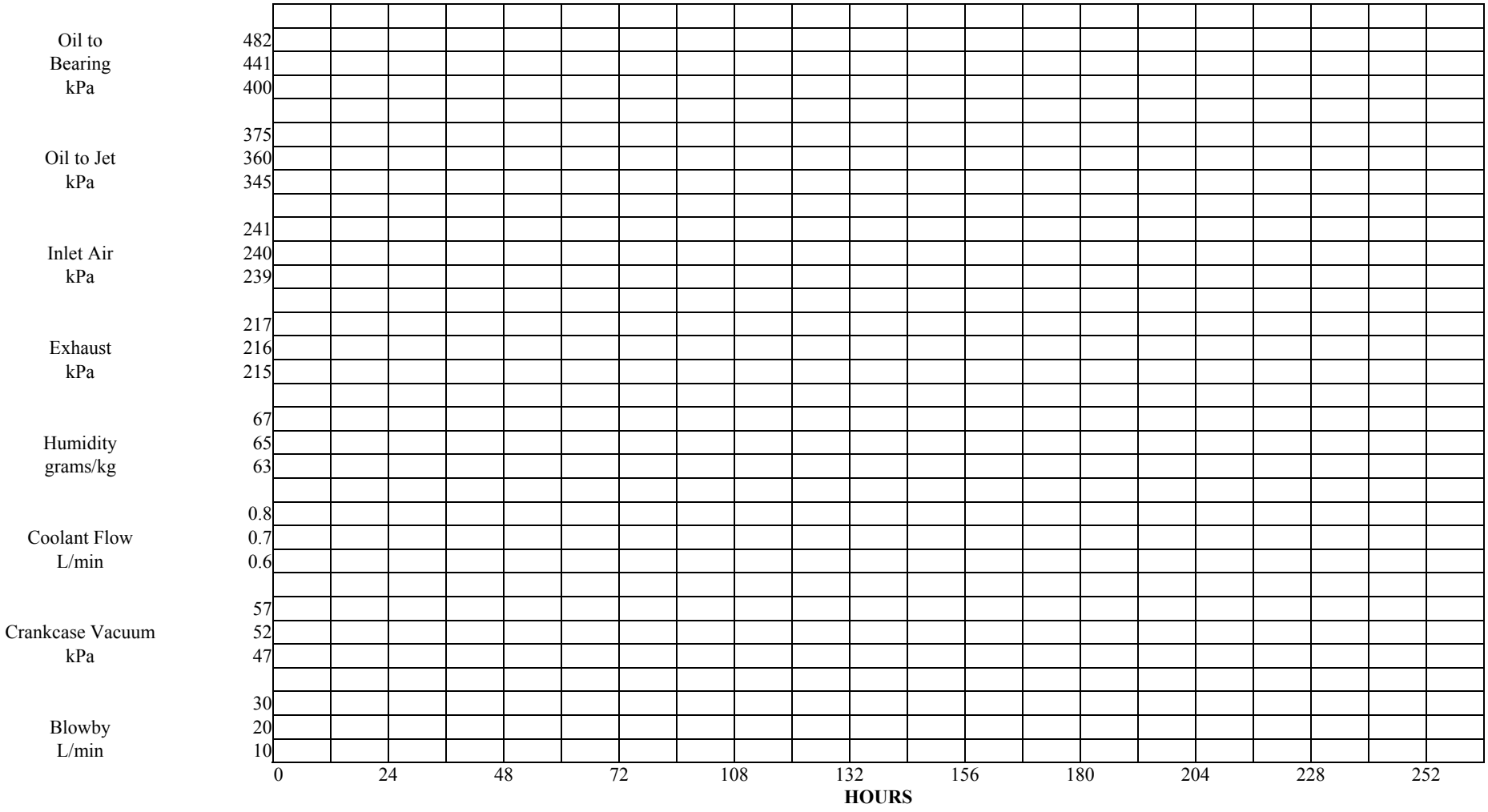
1K/1N
FORM 11

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			



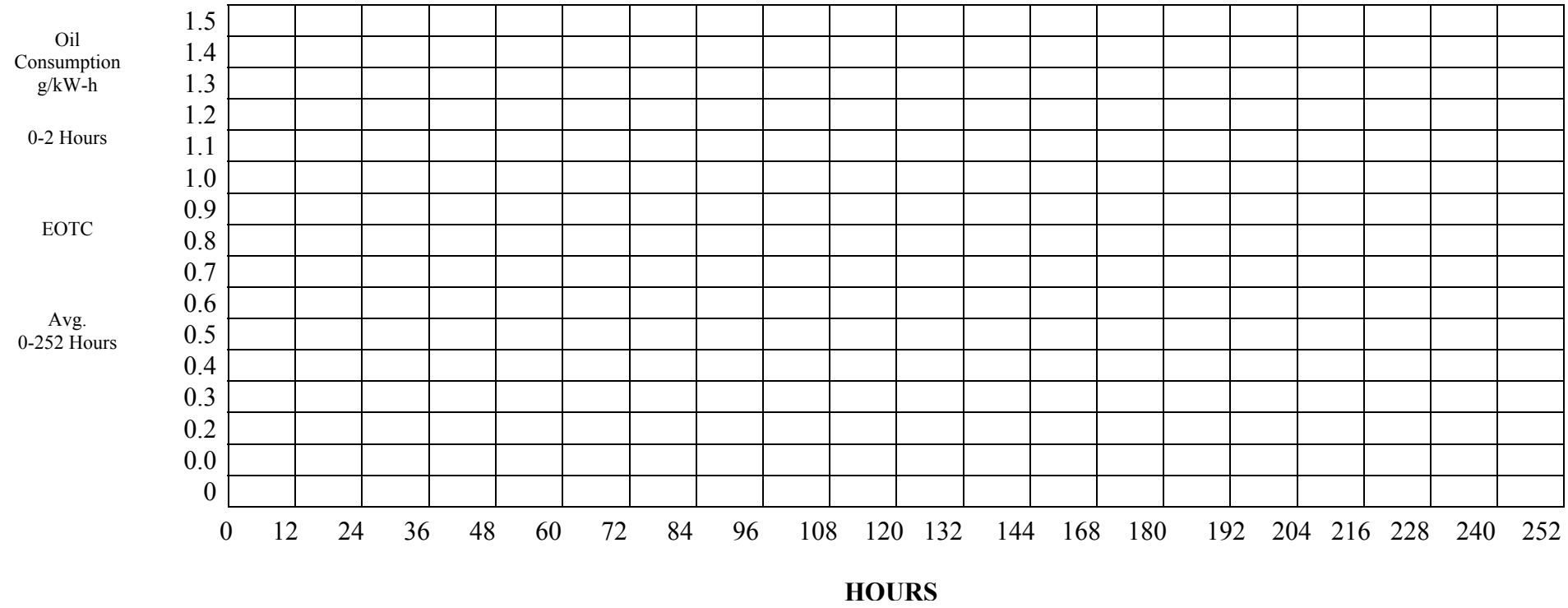
1K/1N
FORM 12

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			



1K/1N
FORM 13
OIL CONSUMPTION PLOT

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			



1K/1N
Form 14
PISTON, RING AND LINER PHOTOGRAPHS

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Refer to Appendix C for example of Photo Layout.

1K/1N
FORM 15
SEVERITY ADJUSTMENT HISTORY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

USAGE DATES		WDK/WDN		TGF %		TRANSFORMED TLHC %	
START	TIME	Zi	S.A.	Zi	S.A.	Zi	S.A.

1K/1N
FORM 15A
SEVERITY ADJUSTMENT HISTORY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

USAGE DATES		WDK/WDN		TGF %		TRANSFORMED TLHC %	
START	TIME	Zi	S.A.	Zi	S.A.	Zi	S.A.

1K/1N
FORM 15B
SEVERITY ADJUSTMENT HISTORY

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

USAGE DATES		WDK/WDN		TGF %		TRANSFORMED TLHC %	
START	TIME	Zi	S.A.	Zi	S.A.	Zi	S.A.

1K/1N
FORM 16
TMC CONTROL CHART ANALYSIS

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Refer to Appendix C for example of Control Chart Analysis page.

1K/1N
FORM 17
FUEL BATCH ANALYSIS

LAB:	EOT DATE:	END TIME:	METHOD:
STAND:	RUN NUMBER:		
FORMULATION/STAND CODE:			
OILCODE/CMIR:			

Refer to Appendix C for examples of appropriate Fuel Batch Analysis pages.