

**1K/1N
FINAL REPORT COVER**

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:	

<p>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.</p>

^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 ^C See Appendix X4
^B Non-reference oil tests only

**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

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

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

**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																					
	DEP. FACTOR	GROOVES						LANDS						UPPER SKIRT		UNDER CROWN		PIN BORES			
		NO. 1		NO. 2		NO. 3		NO. 1		NO. 2		NO. 3		A,%	DEM.	A,%	DEM.	FRONT		REAR	
		A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.					A,%	DEM.	A,%	DEM.
C A R B O N																					
	HC-1.0																				
	MC-0.5																				
	LC-.25																				
	TOTAL																				
L A C Q U E R	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/IN
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 -
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																					
	DEP. FACTOR	GROOVES						LANDS						UPPER SKIRT		UNDER CROWN		PIN BORES			
		NO. 1		NO. 2		NO. 3		NO. 1		NO. 2		NO. 3		A,%	DEM.	A,%	DEM.	FRONT		REAR	
		A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.	A,%	DEM.
C A R B O N	HC-1.0																				
	MC-0.5																				
	LC-.25																				
	TOTAL																				
L A C Q U E R	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		IND RATING																	
		1.5				1.5		25		1		1		25		50		20		0	
TGF %		INT. GR. FILL %				WDK/WDN				UNWEIGHTED DEP.				TEST LAB TLHC%				TEST LAB TLHC %			

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

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

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

Other Comments		
Number of Comment Lines		

**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/IN
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 PLACE OF DIMENSION WHEN APPLICABLE
2. WRITE "<0.038 mm" FOR CLEARANCE WHEN APPLICABLE.
3. WRITE ">" BEFORE CALCULATED DECREASE OR AVERAGE DECREASE VALUES THAT INCORPORATE A "<0.038 mm" IN CALCULATION.
4. LSC: LOSS OF SIDE CLEARANCE
5. MIN: INTERMEDIATE AND OIL RING MINIMUM SIDE CLEARANCE IS MEASURED 360° AROUND PISTON.

**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:			

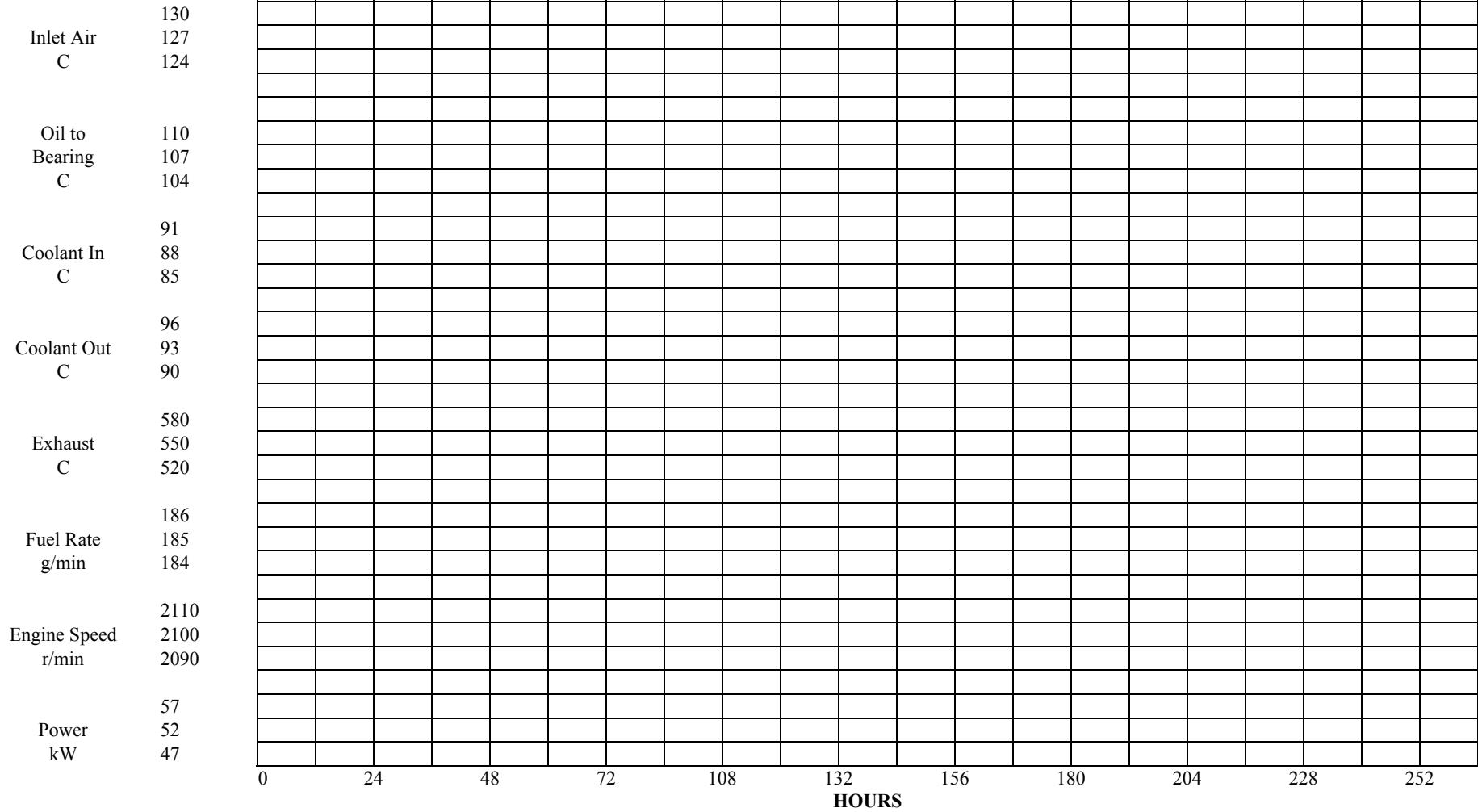
PARAMETER (1)	SENSING DEVICE (2)	CALIBRATION FREQUENCY (3)	RECORD DEVICE (4)	OBSERVATION FREQUENCY (5)	RECORD FREQUENCY (6)	LOG FREQUENCY (7)	SYSTEM RESPONSE (8)
OPERATION CONDITIONS							
ENGINE SPEED (R/min)							
ENGINE POWER (kW)							
FUEL FLOW (g/min)							
HUMIDITY (g/kg)							
COOLANT OUT							
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:

- | | |
|---|--|
| <p>(1) OPERATING PARAMETER</p> <p>(2) THE TYPE OF DEVICE USED TO MEASURE TEMPERATURE, PRESSURE OR FLOW</p> <p>(3) FREQUENCY AT WHICH THE MEASUREMENT SYSTEM IS CALIBRATED</p> <p>(4) THE TYPE OF DEVICE WHERE DATA IS RECORDED</p> <p style="margin-left: 20px;">LG - HANDLOG SHEET</p> <p style="margin-left: 20px;">DL - AUTOMATIC DATA LOGGER</p> <p style="margin-left: 20px;">C/M - COMPUTER, USING MANUAL DATA ENTRY</p> <p style="margin-left: 20px;">SC - STRIP CHART RECORDER</p> <p style="margin-left: 20px;">C/D - COMPUTER, USING DIRECT I/O ENTRY</p> | <p>(5) DATA AREA OBSERVED BUT ONLY RECORDED IF OFF SPEC.</p> <p>(6) DATA ARE RECORDED BUT ARE NOT RETAINED AT EOT</p> <p>(7) DATA ARE LOGGED AS PERMANENT RECORD, NOTE SPECIFY IF:</p> <p style="margin-left: 40px;">SS - SNAPSHOT TAKEN AT SPECIFIED FREQUENCY</p> <p style="margin-left: 40px;">AG/X AVERAGE OF X DATA POINTS AT SPECIFIED FREQUENCY</p> <p>(8) TIME FOR THE OUTPUT TO REACH 63.2% OF FINAL VALUE FOR STEP CHANGE AT INPUT</p> |
|---|--|

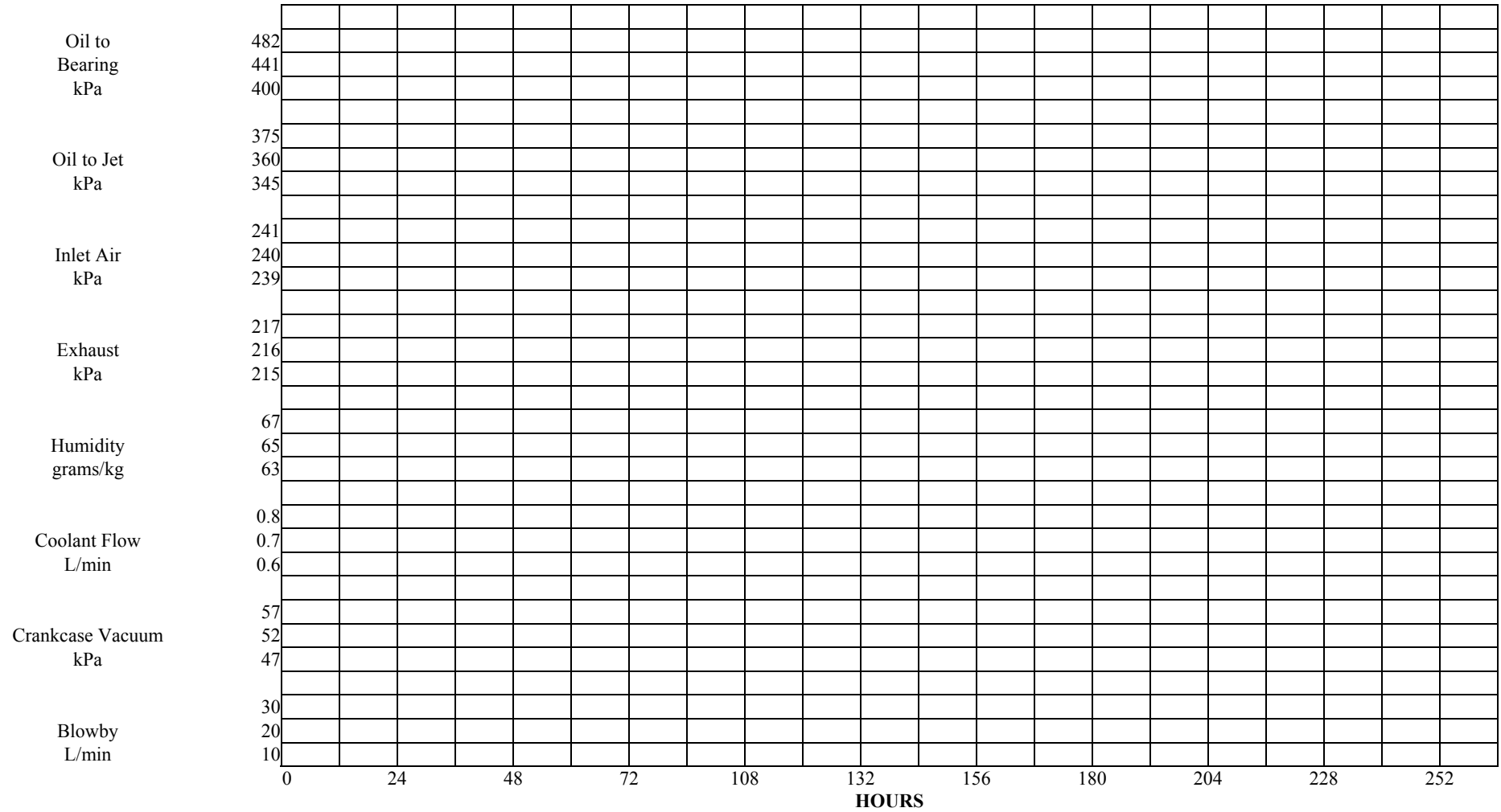
**1K/IN
FORM 11**

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



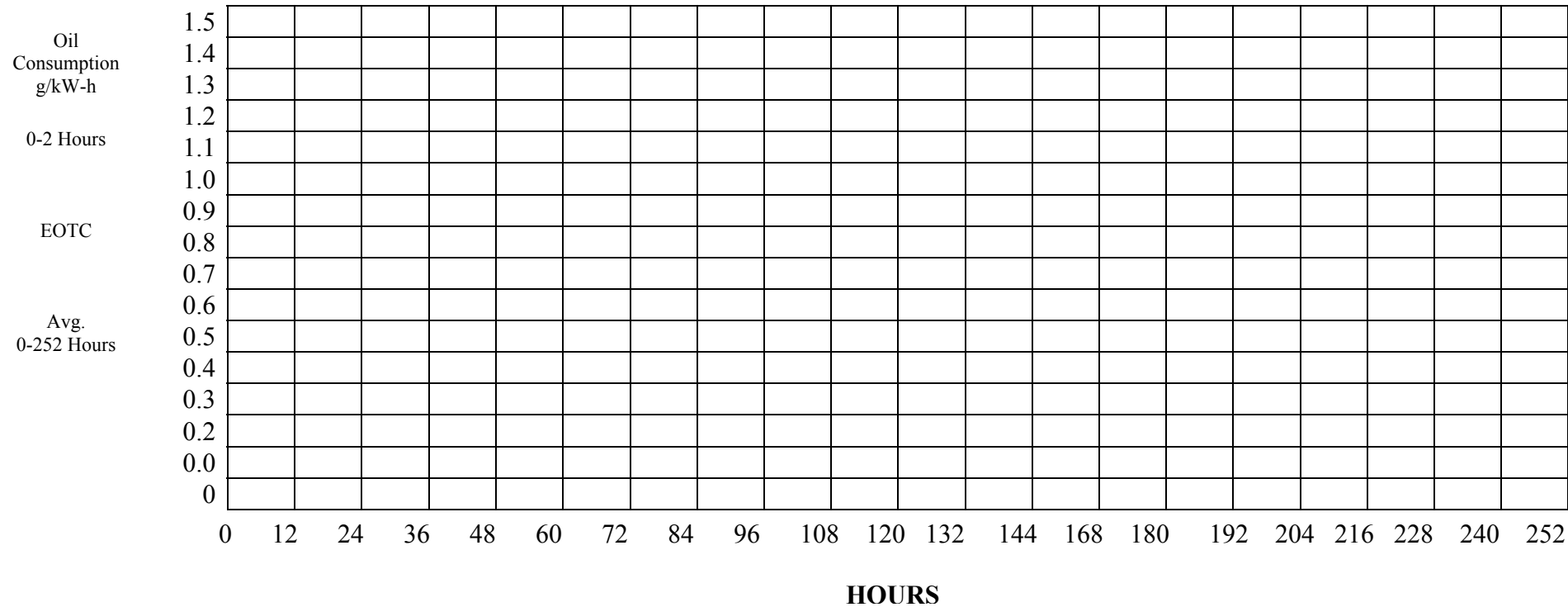
**1K/1N
FORM 12**

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/IN
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 16
TMC CONTROL CHART ANALYSIS

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

**1K/IN
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.