Test Monitoring Center
6555 Penn Avenue
Pittsburgh, PA 15206-4489
(412) 365-1000

APPROVED BY ASTM D02.B 12/6/00
(DATE)

SEQUENCE VIII INFORMATION LETTER NO. 00-1
Sequence No. 2

June 1, 2000

ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: Sequence VIII Mailing List

SUBJECT: New Piston Ring Set & Revised Reporting Requirements
New Oil Filter
Revised Test Parts Source
Piston Cleaning Procedure for Reusing Pistons

This information letter implements action items approved by the Sequence VIII Surveillance Panel. This information letter addresses specific parts and procedures pertaining to quality, consistency, performance, and accountability of test parts as part of the ongoing effort by the panel to ensure continual process improvement of the Sequence VIII test. This information letter references Draft 3.1 of the Sequence VIII test procedure.

New Piston Ring Set & Revised Reporting Requirements

At the February 10, 1999 meeting of the Sequence VIII Surveillance Panel, the panel approved a motion to implement the use of a new piston ring set into Sequence VIII testing. This ring set is manufactured by Dana/Perfect Circle and carries part number 41274. At the May 19, 1999 meeting of the Sequence VIII Surveillance Panel the panel approved a motion eliminating the reporting requirements for piston ring batch information. The panel tasked the TMC with making the appropriate revisions to the Data Dictionary and Report Forms to reflect the removal of this requirement. The new piston ring set is acceptable for use in all Sequence VIII testing after February 10, 1999.

New Oil Filter

At the May 19, 1999 meeting of the Sequence VIII Surveillance Panel, the panel approved a motion to allow the use of Raycor LFS-62 oil filters in Sequence VIII testing, instead of the current Raycor LFS-55 oil filter, which is no longer available. The motion stated that laboratories wishing to change to this new oil filter must bring in the change with a reference oil test and continue to use the new oil filter from that point forward. This change is effective on May 19, 1999.

Revised Test Parts Source

At the November 16, 1999 meeting of the L-38 Surveillance Panel, Test Engineering, Inc. (TEI) announced that it had acquired the rights to the CLR Oil Test Engine from Laboratory Equipment

Corporation (Labeco), including all parts supplies. As such, all references to Labeco in Draft 3.1 of the Sequence VIII test procedure have been changed to reflect TEI as the new source for these materials.

Piston Cleaning Procedure for Reusing Pistons

On January 10, 2000 a letter ballot was circulated by the Surveillance Panel Chairman and the Operations & Hardware Subpanel Chairman to allow the reuse of Sequence VIII pistons in calibrated testing. The ballot also detailed a cleaning procedure to be followed to prepare these pistons for reuse. The ballot closed on January 28, 2000 and was approved by the panel. This change to the procedure is effective on January 28, 2000.

Replacement sections of Draft 3.1, along with a revised Data Dictionary and Report Forms are attached. A summary of data dictionary changes, which is not a part of the test method, is also attached. The Data Dictionary and Standardized Report Forms are effective July 10, 2000.

Zack Bishop
Chairman
Sequence VIII Surveillance Panel

John L. Zalar
Administrator
ASTM Test Monitoring Center

Attachments

c: DCC Information Letter Mailing List

6.1 *Test Engineering, Inc.*—The document *Instructions for Assembly and Disassembly to CLR L-38 Test Engine*[16] provides detailed parts listings, modification instructions, assembly/disassembly instructions, maintenance procedures, and parts replacement requirements. The following is a descriptive listing of some of the test engine and associated parts.

[14] Test Engineering, Inc. 12718 Cimarron Path, San Antonio, Texas 78249.

[17] Refer to *Instructions for Assembly and Disassembly to CLR L-38 Test Engine*, available from Test Engineering, Inc. 12718 Cimarron Path, San Antonio, Texas 78249.

6.1.1 Obtain the Test Engine from Test Engineering, Inc[14]. The test engine is known by various designations such as the L-38 engine, the CLR engine, or the Sequence VIII engine (as used in this test method). It is comprised of two principal units, the power section and the accessory case (Figure 1). The power section is a single-cylinder, spark-ignition unit with 96.5-mm (3.80-in.) bore and 95.2-mm (3.75-in.) stroke, displacing 0.696 L (42.5in.^{3})

6.1.2 Test Bearing-An SAE H-24 alloy connecting rod bearing, TEI Part No. 100034-1, from a batch approved by the ASTM Sequence VIII Test Surveillance Panel.

6.1.3 Test Engine Crankshaft - Obtain a crankshaft for the CLR test engine, TEI Part No. 100039-1, from TEI. If desired, the crankshaft may be refinished in one of the following two manners:

6.1.4 Test Engine Piston – Obtain a piston for the CLR test engine, TEI Part No. 2405, from TEI. If desired, a piston may be reused if it meets the piston-to-liner clearance specifications. Pistons used in the CLR test engine for L-38 testing, or any other testing using leaded fuel, shall not be reused in Sequence VIII testing. Used pistons shall be cleaned according to the following procedure before installation in the test engine:

6.1.4.1 Clean the piston crown of any carbon deposits using aliphatic naphtha and 3M fine-grade Scotch pads. Wet the cleaning pad in the solvent and scrub the deposit. Repeat until all carbon is removed.

6.1.4.2 Spray piston with clean solvent and air dry.

6.1.5 *Piston Ring Assembly*—Use a Dana/Perfect Circle piston ring assembly, part number 41274, in the L-38 test engine.[18]

{Footnotes 18 through 46 become Footnotes 19 through 47 respectively}

[18] The Dana/Perfect Circle piston ring assembly, part number 41274, is available from Dana Corporation, Perfect Circle Division, 1883 E. Laketon Ave., Product Distribution Center, Muskegon, MI 49442-6123 (616) 724-1509 (800) 972-3262. This piston ring assembly is the only one known to be available to the committee at this time.

6.3 Oil Filter-Install, a Racor[27], Model LFS-62 is the specified oil filter as shown in Fig. 6. Use suitable hydraulic hose and fittings[28].

6.7 *Procurement of Parts* - Obtain information on the CLR Oil Test Engine (see 6.1.1) and parts for it from TEI[14]. Users of this test method must comply with CLR Oil Test Engine Shop Manual[16] and the latest supplements (Information Letters and Memoranda) available from the TMC.[2]

Data Dictionary

Sequence	Form	Test Area	Field Name	Field Length	Decimal Size	Data Type	Units/Format	Description
10	1	VIII	VERSION	8	0	C	YYYYMMDD	VIII VERSION 20000128
20	1	VIII	TSTSPON1	40	0	C		CONDUCTED FOR, FIRST LINE
30	1	VIII	TSTSPON2	40	0	C		CONDUCTED FOR, SECOND LINE
40	1	VIII	LABVALID	1	0	C	V, I OR N	TEST LAB VALIDATION (V, I OR N)
50	1	VIII	TSTOIL	2	0	C	NR or RO	OIL TEST TYPE (NR or RO)
60	1	VIII	STAND	5	0	C		STAND
70	1	VIII	ENGINE	6	0	C		POWER SECTION
80	1	VIII	ENRUNSR	3	0	C		NO. OF POWER SECTION RUNS SINCE REF.
90	1	VIII	TOTENRUN	5	0	C		RUNS ON POWER SECTION
100	1	VIII	DTCOMP	8	0	C	YYYYMMDD	DATE COMPLETED (YYYYMMDD)
110	1	VIII	EOTTIME	5	0	C	HH:MM	TIME COMPLETED (HH:MM)
120	1	VIII	OILCODE	38	0	C		TEST OIL CODE
130	1	VIII	FORM	38	0	C		FORMULATION/STAND CODE
140	1	VIII	ALTCODE1	10	0	C		ALTERNATE OIL CODE 1
150	1	VIII	ALTCODE2	10	0	C		ALTERNATE OIL CODE 2
160	1	VIII	ALTCODE3	10	0	C		ALTERNATE OIL CODE 3
170	1	VIII	OPVALID	8	0	C		OPERATIONAL VALIDITY -- HAS/HAS NOT
180	1	VIII	SUBLAB	40	0	C		TESTING LABORATORY NAME
190	1	VIII	SUBSIGIM	70	0	C		TESTING LABORATORY VALIDATORS SIGNATURE
200	1	VIII	SUBNAME	40	0	C		TESTING LABORATORY VALIDATORS NAME
210	1	VIII	SUBTITLE	40	0	C		TESTING LABORATORY VALIDATORS TITLE
220	4	VIII	LAB	2	0	C		LAB CODE
230	4	VIII	SAEVISC	7	0	C		SAE VISCOSITY GRADE
240	4	VIII	OILTEMP	8	1	N	°C	OIL TEMPERATURE (°C)
250	4	VIII	LABOCODE	12	0	C		LABORATORY INTERNAL OIL CODE
260	4	VIII	DTSTRT	8	0	C	YYYYMMDD	START DATE (YYYYMMDD)
270	4	VIII	FUELTYPE	16	0	C		FUEL TYPE
280	4	VIII	STRTTIME	5	0	C	HH:MM	TIME STARTED (HH:MM)
290	4	VIII	FUELBTID	7	0	C	YYnnnnn	FUEL BATCH IDENTIFIER (YYnnnnn)
300	4	VIII	BEARBAT	5	0	C	nn-nn	BEARING BATCH NO. (nn-nn)
310	4	VIII	BEARLEAD	3	0	N	ppm	BEARING STORAGE OIL LEAD (ppm)
320	4	VIII	BEARLOT	2	0	C	nn	BEARING LOT NO. (nn)
330	4	VIII	TESTLEN	3	0	Z	HHH	TEST LENGTH (HHH)
340	4	VIII	IND	6	0	C		TMC OIL CODE
350	4	VIII	TST_Hxxx	3	0	C	HHH	TEST HOURS (HHH)
360	4	VIII	BWLTHxxx	6	1	N	mg	BEARING WEIGHT LOSS TOP HALF (mg)
370	4	VIII	BWLBHxxx	6	1	N	mg	BEARING WEIGHT LOSS BOTTOM HALF (mg)
380	4	VIII	TBWLHxxx	6	1	N	mg	BEARING WEIGHT LOSS TOTAL (mg)
390	4	VIII	BWL_CF	6	1	N	mg	INDUSTRY CORRECTION FACTOR BEARING WEIGHT LOSS (mg)
400	4	VIII	BWL_SA	6	1	N	mg	BEARING WEIGHT LOSS SEVERITY ADJUSTMENT (mg)
410	4	VIII	BWLFNL	6	1	N	mg	FINAL BEARING WEIGHT LOSS (mg)
420	4	VIII	VIS_Hxxx	7	2	N	cSt	VISCOSITY AT 40 °C AT XXX HOURS (cSt)
430	4	VIII	VIS1Hxxx	7	2	N	cSt	VISCOSITY AT 100 °C AT XXX HOURS (cSt)
440	4	VIII	SVIS100	6	2	A	cSt	STRIPPED VISCOSITY, BCST @ 100 °C ,[N/A] (cSt)
450	4	VIII	RSTAND	5	0	C		LAST CALIBRATION TEST STAND
460	4	VIII	RENGINE	6	0	C		LAST CALIBRATION TEST POWER SECTION
470	4	VIII	RTOTRUN	5	0	C		LAST CALIBRATION TEST RUNS ON POWER SECTION
480	4	VIII	RBEARBAT	5	0	C	nn-nn	LAST CALIBRATION TEST BEARING BATCH NUMBER (nn-nn)
490	4	VIII	RBEARLOT	2	0	C	nn	LAST CALIBRATION TEST BEARING LOT NUMBER (nn)
500	4	VIII	RIND	6	0	C		LAST CALIBRATION TEST TMC OIL CODE
510	4	VIII	RSVIS100	6	2	A	cSt	LAST CALIBRATION TEST STRIPPED VISCOSITY, [N/A] (cSt)
520	4	VIII	RDTCOMP	8	0	C	YYYYMMDD	LAST CALIBRATION TEST COMPLETION DATE (YYYYMMDD)
530	4	VIII	REOTTIME	5	0	C	HH:MM	LAST CALIBRATION TEST COMPLETION TIME (HH:MM)

Sequence	Form	Test Area	Field Name	Field Length	Decimal Size	Data Type	Units/Format	Description
540	4	VIII	RTBWHxxx	6	1	N	mg	LAST CALIBRATION TEST TOTAL BEARING WEIGHT LOSS (mg)
550	4	VIII	RBWLFNL	6	1	N	mg	LAST CALIBRATION TEST FINAL BEARING WEIGHT LOSS (mg)
560	4	VIII	ROILCODE	38	0	C		LAST CALIBRATION TEST REFERENCE OIL CODE
570	5	VIII	IRPM	7	1	N	r/min	MIN ENGINE SPEED (r/min)
580	5	VIII	XRPM	7	1	N	r/min	MAX ENGINE SPEED (r/min)
590	5	VIII	ARPM	7	1	N	r/min	AVERAGE ENGINE SPEED (r/min)
600	5	VIII	IAFR	6	1	N		MIN AIR TO FUEL RATIO
610	5	VIII	XAFR	6	1	N		MAX AIR TO FUEL RATIO
620	5	VIII	AAFR	6	1	N		AVG AIR TO FUEL RATIO
630	5	VIII	IFFLO	5	2	N	kg/h	MIN FUEL FLOW (kg/h)
640	5	VIII	XFFLO	5	2	N	kg/h	MAX FUEL FLOW (kg/h)
650	5	VIII	AFFLO	5	2	N	kg/h	AVG FUEL FLOW (kg/h)
660	5	VIII	IPWR	7	1	N	W	MIN LOAD (W)
670	5	VIII	XPWR	7	1	N	W	MAX LOAD (W)
680	5	VIII	APWR	7	1	N	W	AVG LOAD (W)
690	5	VIII	IOHTRIN	7	1	N	W	MINIMUM OIL HEATER INPUT, (W)
700	5	VIII	XOHTRIN	7	1	N	W	MAXIMUM OIL HEATER INPUT, (W)
710	5	VIII	AOHTRIN	7	1	N	W	AVERAGE OIL HEATER INPUT, (W)
720	5	VIII	ICCOG	5	0	N	L/h	MINIMUM CRANKCASE OFF-GAS, (L/h)
730	5	VIII	XCCOG	5	0	N	L/h	MAXIMUM CRANKCASE OFF-GAS, (L/h)
740	5	VIII	ACCOG	5	0	N	L/h	AVERAGE CRANKCASE OFF-GAS, (L/h)
750	5	VIII	IGALT	6	1	N	°C	MINIMUM GALLERY OIL TEMPERATURE (°C)
760	5	VIII	XGALT	6	1	N	°C	MAXIMUM GALLERY OIL TEMPERATURE (°C)
770	5	VIII	AGALT	6	1	N	°C	AVERAGE GALLERY OIL TEMPERATURE (°C)
780	5	VIII	ICOLIN	6	1	N	°C	MIN ENGINE COOLANT IN TEMPERATURE (°C)
790	5	VIII	XCOLIN	6	1	N	°C	MAX ENGINE COOLANT IN TEMPERATURE (°C)
800	5	VIII	ACOLIN	6	1	N	°C	AVG ENGINE COOLANT IN TEMPERATURE (°C)
810	5	VIII	ICOLOUT	6	1	N	°C	MIN ENGINE COOLANT OUT TEMPERATURE (°C)
820	5	VIII	XCOLOUT	6	1	N	°C	MAX ENGINE COOLANT OUT TEMPERATURE (°C)
830	5	VIII	ACOLOUT	6	1	N	°C	AVG ENGINE COOLANT OUT TEMPERATURE (°C)
840	5	VIII	ICOLDT	5	1	N	°C	MIN COOLANT DELTA (°C)
850	5	VIII	XCOLDT	5	1	N	°C	MAX COOLANT DELTA (°C)
860	5	VIII	ACOLDT	5	1	N	°C	AVG COOLANT DELTA (°C)
870	5	VIII	IINAIRT	6	1	N	°C	MIN INTAKE AIR TEMPERATURE (°C)
880	5	VIII	XINAIRT	6	1	N	°C	MAX INTAKE AIR TEMPERATURE (°C)
890	5	VIII	AINAIRT	6	1	N	°C	AVG INTAKE AIR TEMPERATURE (°C)
900	5	VIII	IOILPRS	6	0	N	kPa	MIN OIL GALLERY PRESSURE (kPa)
910	5	VIII	XOILPRS	6	0	N	kPa	MAX OIL GALLERY PRESSURE (kPa)
920	5	VIII	AOILPRS	6	0	N	kPa	AVG OIL GALLERY PRESSURE (kPa)
930	5	VIII	IIMNVAC1	4	1	N	kPa	MIN INTAKE MANIFOLD VACUUM STAGE I (kPa)
940	5	VIII	XIMNVAC1	4	1	N	kPa	MAX INTAKE MANIFOLD VACUUM STAGE I (kPa)
950	5	VIII	AIMNVAC1	4	1	N	kPa	AVG INTAKE MANIFOLD VACUUM STAGE I (kPa)
960	5	VIII	IEXPR	4	1	N	kPa	MIN EXHAUST PRESSURE (kPa)
970	5	VIII	XEXPR	4	1	N	kPa	MAX EXHAUST PRESSURE (kPa)
980	5	VIII	AEXPR	4	1	N	kPa	AVG EXHAUST PRESSURE (kPa)
990	5	VIII	ICCV	6	2	N	kPa	MIN CRANKCASE VACUUM PRESSURE (kPa)
1000	5	VIII	XCCV	6	2	N	kPa	MAX CRANKCASE VACUUM PRESSURE (kPa)
1010	5	VIII	ACCV	6	2	N	kPa	AVG CRANKCASE VACUUM PRESSURE (kPa)
1020	5	VIII	ISPKTIM	3	0	N	°	MIN SPARK ADVANCE BTDC (°)
1030	5	VIII	XSPKTIM	3	0	N	°	MAX SPARK ADVANCE BTDC (°)
1040	5	VIII	ASPKTIM	3	0	N	°	AVG SPARK ADVANCE BTDC (°)
1050	5	VIII	IBLOBY	6	1	N	L/h	MIN BLOWBY (L/h)
1060	5	VIII	XBLOBY	6	1	N	L/h	MAX BLOWBY (L/h)
1070	5	VIII	ABLOBY	6	1	N	L/h	AVG BLOWBY (L/h)

Sequence	Form	Test Area	Field Name	Field Length	Decimal Size	Data Type	Units/Format	Description
1080	5	VIII	OILINIT	6	0	N	ml	OIL CONSUMPTION INITIAL OIL CHARGE (ml)
1090	5	VIII	OILADD	6	0	N	ml	OIL CONSUMPTION NEW OIL ADDED (ml)
1100	5	VIII	OILSMPL	6	0	N	ml	OIL CONSUMPTION OIL SAMPLES (ml)
1110	5	VIII	OILDRAIN	6	0	N	ml	OIL CONSUMPTION FINAL OIL DRAIN (ml)
1120	5	VIII	OILCON	6	0	N	ml	TOTAL OIL CONSUMPTION (ml)
1130	6	VIII	IVSCIN	7	4	N	mm	MINIMUM INLET VALVE STEM CLEARANCE IN GUIDE (mm)
1140	6	VIII	XVSCIN	7	4	N	mm	MAXIMUM INLET VALVE STEM CLEARANCE IN GUIDE (mm)
1150	6	VIII	AVSCIN	7	4	N	mm	AVERAGE INLET VALVE STEM CLEARANCE IN GUIDE (mm)
1160	6	VIII	IVSCEX	7	4	N	mm	MINIMUM EXHAUST VALVE STEM CLEARANCE IN GUIDE (mm)
1170	6	VIII	XVSCEX	7	4	N	mm	MAXIMUM EXHAUST VALVE STEM CLEARANCE IN GUIDE (mm)
1180	6	VIII	AVSCEX	7	4	N	mm	AVERAGE EXHAUST VALVE STEM CLEARANCE IN GUIDE (mm)
1190	6	VIII	ICRODCL	7	4	N	mm	MINIMUM CONNECTING ROD VALVE STEM CLEARANCE IN GUIDE (mm)
1200	6	VIII	XCRODCL	7	4	N	mm	MAXIMUM CONNECTING ROD VALVE STEM CLEARANCE IN GUIDE (mm)
1210	6	VIII	ACRODCL	7	4	N	mm	AVERAGE CONNECTING ROD VALVE STEM CLEARANCE IN GUIDE (mm)
1220	6	VIII	IMBCF	7	4	N	mm	MINIMUM FRONT MAIN BEARING CLEARANCE (mm)
1230	6	VIII	XMBCF	7	4	N	mm	MAXIMUM FRONT MAIN BEARING CLEARANCE (mm)
1240	6	VIII	AMBCF	7	4	N	mm	AVERAGE FRONT MAIN BEARING CLEARANCE (mm)
1250	6	VIII	IMBCR	7	4	N	mm	MINIMUM REAR MAIN BEARING CLEARANCE (mm)
1260	6	VIII	XMBCR	7	4	N	mm	MAXIMUM REAR MAIN BEARING CLEARANCE (mm)
1270	6	VIII	AMBCR	7	4	N	mm	AVERAGE REAR MAIN BEARING CLEARANCE (mm)
1280	6	VIII	XCRODOR	7	4	N	mm	MAX. CON. ROD JRNL. OUTOFROUND (mm)
1290	6	VIII	LINRUN	3	0	N		RUNS ON LINER
1300	6	VIII	PISLINCL	7	4	N	mm	PISTON TO LINER CLEARANCE (mm)
1310	6	VIII	CRANKID	10	0	C	c-yyyymmdd	CRANKSHAFT ID CODE (c-yyyymmdd)
1320	6	VIII	CAMSN	10	0	C	nnnnnnnnnn	CAMSHAFT ID CODE S/N (nnnnnnnnnn)
1330	6	VIII	MBEARID	10	0	C	nn-nn	MAIN BEARING ID CODE (nn-nn)
1340	6	VIII	CAMBRID	10	0	C		CAMSHAFT BEARING ID CODE
1350	6	VIII	CRODID	10	0	C	nnnn	CONNECTING ROD ID CODE (nnnn)
1360	6	VIII	PISTSN	10	0	C	nn-nn	PISTON SERIAL NUMBER (nn-nn)
1370	6	VIII	CLINID	10	0	C	nn-nn	CYLINDER LINER ID CODE (nn-nn)
1380	7	VIII	DWNOCR	2	0	Z		NUMBER OF DOWNTIME OCCURRENCES
1390	7	VIII	DOWNRxxx	6	0	C	HHH:MM	DOWNTIME TEST HOURS XXX (HHH:MM)
1400	7	VIII	DDATRxxx	8	0	C	YYYYMMDD	DOWNTIME DATE XXX (YYYYMMDD)
1410	7	VIII	DTIMRxxx	6	0	C	HHH:MM	DOWNTIME TIME XXX (HHH:MM)
1420	7	VIII	DREARxxx	60	0	C		DOWNTIME REMARKS/REASONS XXX
1430	7	VIII	TOTLDOWN	6	0	C	HHH:MM	DOWNTIME TIME TOTAL (HHH:MM)
1440	7	VIII	TOTCOM	2	0	Z		TOTAL LINES OF COMMENTS & OUTLIERS
1450	7	VIII	OCOMRxxx	70	0	C		OTHER DOWNTIME COMMENT XXX
1460	8	VIII	OUTOCR	3	0	N		NUMBER OF OPERATIONAL OUTLIERS OCCURRENCES
1470	8	VIII	OUT_Rxxx	5	0	C	HH:MM	OUTLIERS HOURS (HH:MM)
1480	8	VIII	OUTPRxxx	15	0	C		OUTLIERS PARAMETER
1490	8	VIII	OPARRxxx	15	0	C		OUTLIERS PARAMETER RANGE
1500	8	VIII	OREDRxxx	8	0	C		OUTLIERS READING
1510	8	VIII	OTIMRxxx	5	0	C	HH:MM	OUTLIERS TIME OUT (HH:MM)
1520	8	VIII	ODP_Rxxx	6	1	Z	%	OUTLIERS DEVIATION (%)
1530	9	VIII	GALTDP	6	1	Z	%	ENGINE OIL GALLERY TEMPERATURE TOTAL CAL DEV (%)
1540	9	VIII	COLOUTDP	6	1	Z	%	ENGINE COOLANT OUTLET TEMP CAL DEV (%)
1550	9	VIII	COLDTDP	6	1	Z	%	ENGINE COOLANT DELTA TEMPERATURE TOTAL CAL DEV (%)
1560	9	VIII	FFLODP	6	1	Z	%	ENGINE FUEL FLOW TOTAL CAL DEV (%)
1570	9	VIII	CCOGDP	6	1	Z	%	ENGINE CRANKCASE OFF GAS TOTAL CAL DEV (%)
1580	9	VIII	OILPDP	6	1	Z	%	OIL PRESSURE TOTAL CAL DEV (%)
1590	9	VIII	RPMDP	6	1	Z	%	ENGINE SPEED TOTAL CAL DEV (%)
1600	9	VIII	AFRDP	6	1	Z	%	AIR TO FUEL RATIO TOTAL CAL DEV (%)
1610	9	VIII	SPRKADP	6	1	Z	%	SPARK ADVANCE TOTAL CAL DEV (%)

Sequence	Form	Test Area	Field Name	Field Length	Decimal Size	Data Type	Units/Format	Description
1620	9	VIII	EXPRDP	6	1	Z	%	EXHAUST TOTAL CAL DEV (%)
1630	9	VIII	CCVACDP	6	1	Z	%	CRANKCASE VACUUM TOTAL CAL DEV (%)
1640	10	VIII	OILISENS	14	0	C		OIL INLET SENSING DEVICE
1650	10	VIII	OILICALF	14	0	C		OIL INLET CALIBRATION FREQUENCY
1660	10	VIII	OILIRECD	3	0	C		OIL INLET RECORD DEVICE
1670	10	VIII	OILIOBSF	12	0	C		OIL INLET OBSERVATION FREQUENCY
1680	10	VIII	OILIRECF	12	0	C		OIL INLET RECORD FREQUENCY
1690	10	VIII	OILILOGF	12	0	C		OIL INLET LOG FREQUENCY
1700	10	VIII	OILISYSR	8	0	C		OIL INLET SYSTEM RESPONSE
1710	10	VIII	COTSENS	14	0	C		COOLANT OUT TEMPERATURE SENSING DEVICE
1720	10	VIII	COTCALF	14	0	C		COOLANT OUT TEMPERATURE CALIBRATION FREQUENCY
1730	10	VIII	COTRECD	3	0	C		COOLANT OUT TEMPERTURE RECORD DEVICE
1740	10	VIII	COTOBSF	12	0	C		COOLANT OUT TEMPERATURE OBSERVATION FREQUENCY
1750	10	VIII	COTRECF	12	0	C		COOLANT OUT TEMPERATURE RECORD FREQUENCY
1760	10	VIII	COTLOGF	12	0	C		COOLANT OUT TEMPERATURE LOG FREQUENCY
1770	10	VIII	COTSYSR	8	0	C		COOLANT OUT TEMPERATURE SYSTEM RESPONSE
1780	10	VIII	COLDSENS	14	0	C		COOLANT DELTA TEMPERATURE SENSING DEVICE
1790	10	VIII	COLDCALF	14	0	C		COOLANT DELTA TEMPERATURE CALIBRATION FREQUENCY
1800	10	VIII	COLDRECD	3	0	C		COOLANT DELTA TEMPERTURE RECORD DEVICE
1810	10	VIII	COLDOBSF	12	0	C		COOLANT DELTA TEMPERATURE OBSERVATION FREQUENCY
1820	10	VIII	COLDRECF	12	0	C		COOLANT DELTA TEMPERATURE RECORD FREQUENCY
1830	10	VIII	COLDLOGF	12	0	C		COOLANT DELTA TEMPERATURE LOG FREQUENCY
1840	10	VIII	COLDSYSR	8	0	C		COOLANT DELTA TEMPERATURE SYSTEM RESPONSE
1850	10	VIII	FFLOSENS	14	0	C		FUEL FLOW SENSING DEVICE
1860	10	VIII	FFLOCALF	14	0	C		FUEL FLOW CALIBRATION FREQUENCY
1870	10	VIII	FFLORECD	3	0	C		FUEL FLOW RECORD DEVICE
1880	10	VIII	FFLOOBSF	12	0	C		FUEL FLOW OBSERVATION FREQUENCY
1890	10	VIII	FFLORECF	12	0	C		FUEL FLOW RECORD FREQUENCY
1900	10	VIII	FFLOLOGF	12	0	C		FUEL FLOW LOG FREQUENCY
1910	10	VIII	FFLOSYSR	8	0	C		FUEL FLOW SYSTEM RESPONSE
1920	10	VIII	RPMSENS	14	0	C		ENGINE SPEED SENSING DEVICE
1930	10	VIII	RPMCALF	14	0	C		ENGINE SPEED CALIBRATION FREQUENCY
1940	10	VIII	RPMRECD	3	0	C		ENGINE SPEED RECORD DEVICE
1950	10	VIII	RPMOBSF	12	0	C		ENGINE SPEED OBSERVATION FREQUENCY
1960	10	VIII	RPMRECF	12	0	C		ENGINE SPEED RECORD FREQUENCY
1970	10	VIII	RPMLOGF	12	0	C		ENGINE SPEED LOG FREQUENCY
1980	10	VIII	RPMSYSR	8	0	C		ENGINE SPEED SYSTEM RESPONSE
1990	10	VIII	AFRSENS	14	0	C		AFR MEASUREMENT SENSING DEVICE
2000	10	VIII	AFRCALF	14	0	C		AFR MEASUREMENT CALIBRATION FREQUENCY
2010	10	VIII	AFRRECD	3	0	C		AFR MEASUREMENT RECORD DEVICE
2020	10	VIII	AFROBSF	12	0	C		AFR MEASUREMENT OBSERVATION FREQUENCY
2030	10	VIII	AFRRECF	12	0	C		AFR MEASUREMENT RECORD FREQUENCY
2040	10	VIII	AFRLOGF	12	0	C		AFR MEASUREMENT LOG FREQUENCY
2050	10	VIII	AFRSYSR	8	0	C		AFR MEASUREMENT SYSTEM RESPONSE
2060	10	VIII	EXPRSENS	14	0	C		EXHAUST PRESSURE SENSING DEVICE
2070	10	VIII	EXPRCALF	14	0	C		EXHAUST PRESSURE CALIBRATION FREQUENCY
2080	10	VIII	EXPRRECD	3	0	C		EXHAUST PRESSURE RECORD DEVICE
2090	10	VIII	EXPROBSF	12	0	C		EXHAUST PRESSURE OBSERVATION FREQUENCY
2100	10	VIII	EXPRRECF	12	0	C		EXHAUST PRESSURE RECORD FREQUENCY
2110	10	VIII	EXPRLOGF	12	0	C		EXHAUST PRESSURE LOG FREQUENCY
2120	10	VIII	EXPRSYSR	8	0	C		EXHAUST PRESSURE SYSTEM RESPONSE
2130	10	VIII	CCOGSENS	14	0	C		CRANKCASE OFF GAS SENSING DEVICE
2140	10	VIII	CCOGCALF	14	0	C		CRANKCASE OFF GAS CALIBRATION FREQUENCY
2150	10	VIII	CCOGRECD	3	0	C		CRANKCASE OFF GAS RECORD DEVICE

Sequence	Form	Test Area	Field Name	Field Length	Decimal Size	Data Type	Units/Format	Description
2160	10	VIII	CCOGOBSF	12	0	C		CRANKCASE OFF GAS OBSERVATION FREQUENCY
2170	10	VIII	CCOGRECF	12	0	C		CRANKCASE OFF GAS RECORD FREQUENCY
2180	10	VIII	CCOGLOGF	12	0	C		CRANKCASE OFF GAS LOG FREQUENCY
2190	10	VIII	CCOGSYSR	8	0	C		CRANKCASE OFF GAS SYSTEM RESPONSE
2200	10	VIII	OPSISENS	14	0	C		OIL PSI SENSING DEVICE
2210	10	VIII	OPSICALF	14	0	C		OIL PSI CALIBRATION FREQUENCY
2220	10	VIII	OPSIRECD	3	0	C		OIL PSI RECORD DEVICE
2230	10	VIII	OPSIOBSF	12	0	C		OIL PSI OBSERVATION FREQUENCY
2240	10	VIII	OPSIRECF	12	0	C		OIL PSI RECORD FREQUENCY
2250	10	VIII	OPSILOGF	12	0	C		OIL PSI LOG FREQUENCY
2260	10	VIII	OPSISYSR	8	0	C		OIL PSI SYSTEM RESPONSE
2270	10	VIII	CCVSENS	14	0	C		CRANKCASE VAC. SENSING DEVICE
2280	10	VIII	CCVCALF	14	0	C		CRANKCASE VAC. CALIBRATION FREQUENCY
2290	10	VIII	CCVRECD	3	0	C		CRANKCASE VAC. RECORD DEVICE
2300	10	VIII	CCVOBSF	12	0	C		CRANKCASE VAC. OBSERVATION FREQUENCY
2310	10	VIII	CCVRECF	12	0	C		CRANKCASE VAC. RECORD FREQUENCY
2320	10	VIII	CCVLOGF	12	0	C		CRANKCASE VAC. LOG FREQUENCY
2330	10	VIII	CCVSYSR	8	0	C		CRANKCASE VAC. SYSTEM RESPONSE

```
################################################################################
#                                                                              #
#           D a t a  D i c t i o n a r y  R e p e a t i n g                    #
#              F i e l d  S p e c i f i c a t i o n s                           #
#                                                                              #
################################################################################
# The following contains specifications and field groupings for fields in the
# Data Dictionary that are REPEATING Fields.  These fields can be identified
# in the Data Dictionary by the Hxxx or Rxxx in the last four positions of the
# field name.
#
# Repeating fields are used to specify repeating measurements.
#
# The format for a repeating field name is 4 descriptive characters followed
# by the letter H or R followed by 3 characters for the actual interval
# the measurement was taken. The field will always be a total of 8 characters.
#
# Example ABCDHxxx.
#
# The following is the format of this specification:
#
# Column 1 - 8:   Repeating Field Name
# Column 10 - 17: The Parent Field Name of the Group
# Column 19 - 26: The Measurement Interval Group Name
# Column 30 - 80: Comments about the Repeating Field Group.
#
# The lines following the Repeating Field Name Record will contain the required
# measurements for the particular field.  Multiple 80 characters lines
# can be specified.  A blank line marks the end of each specification.
#
# The Field Name in Column 10-17 designates the the Group in which the field
# belongs.  The First field name in a group is the Parent of the grouping
# and can be used to determine how fields should be grouped.
# The changing of the Parent Field marks the end of a repeating group
# specification.
#
# Example:
#
# VIS_Hxxx, DVISHxxx and PVISHxxx expanded for transmission (8 and 16 hours):
#
#           VIS_H008
#           DVISH008
#           PVISH008
#           VIS_H016
#           DVISH016
#           PVISH016
#
# Note:  During electronic transmission, repeating field groups must be kept
#        together within the specified group but the order within the group
#        does not have to be maintained.
#
################################################################################
#                  Start of Field Grouping Specifications                      #
################################################################################
#
VIII VERSION 20000128
TST_Hxxx TST_Hxxx TST_Hxxx   TEST HOURS (HHH)
040

BWLTHxxx TST_Hxxx TST_Hxxx   BEARING WEIGHT LOSS TOP HALF (mg)
```

040

BWLBHxxx TST_Hxxx TST_Hxxx BEARING WEIGHT LOSS BOTTOM HALF (mg)
040

TBWLHxxx TST_Hxxx TST_Hxxx BEARING WEIGHT LOSS TOTAL (mg)
040

VIS_Hxxx VIS_Hxxx VIS_Hxxx VISCOSITY AT 40 DEG C AT XXX HOURS (cSt)
NEW 010

VIS1Hxxx VIS_Hxxx VIS_Hxxx VISCOSITY AT 100 DEG C AT XXX HOURS (cSt)
NEW 010

RTBWHxxx RTBWHxxx RTBWHxxx LAST CALIBRATION TEST TOTAL BEARING WEIGHT LOSS (mg
040

DOWNRxxx DOWNRxxx DOWNRxxx DOWNTIME TEST HOURS XXX (HHH:MM)

DDATRxxx DOWNRxxx DOWNRxxx DOWNTIME DATE XXX (YYYYMMDD)

DTIMRxxx DOWNRxxx DOWNRxxx DOWNTIME TIME XXX (HHH:MM)

DREARxxx DOWNRxxx DOWNRxxx DOWNTIME REMARKS/REASONS XXX

OCOMRxxx OCOMRxxx OCOMRxxx OTHER DOWNTIME COMMENT XXX

OUT_Rxxx OUT_Rxxx OUT_Rxxx OUTLIERS HOURS (HH:MM)

OUTPRxxx OUT_Rxxx OUT_Rxxx OUTLIERS PARAMETER

OPARRxxx OUT_Rxxx OUT_Rxxx OUTLIERS PARAMETER RANGE

OREDRxxx OUT_Rxxx OUT_Rxxx OUTLIERS READING

OTIMRxxx OUT_Rxxx OUT_Rxxx OUTLIERS TIME OUT (HH:MM)

ODP_Rxxx OUT_Rxxx OUT_Rxxx OUTLIERS DEVIATION (%)

```
#########################################################################
#                                                                       #
#          D a t a  D i c t i o n a r y  R e p e a t i n g              #
#             F i e l d  S p e c i f i c a t i o n s                     #
#                                                                       #
#########################################################################
# The following contains specifications and field groupings for fields in the
# Data Dictionary that are REPEATING Fields.  These fields can be identified
# in the Data Dictionary by the Hxxx or Rxxx in the last four positions of the
# field name.
#
# Repeating fields are used to specify repeating measurements.
#
# The format for a repeating field name is 4 descriptive characters followed
# by the letter H or R followed by 3 characters for the actual interval
# the measurement was taken. The field will always be a total of 8 characters.
#
# Example ABCDHxxx.
#
# The following is the format of this specification:
#
# Column 1 - 8:   Repeating Field Name
# Column 10 - 17: The Parent Field Name of the Group
# Column 19 - 26: The Measurement Interval Group Name
# Column 30 - 80: Comments about the Repeating Field Group.
#
# The lines following the Repeating Field Name Record will contain the required
# measurements for the particular field.  Multiple 80 characters lines
# can be specified.  A blank line marks the end of each specification.
#
# The Field Name in Column 10-17 designates the the Group in which the field
# belongs.  The First field name in a group is the Parent of the grouping
# and can be used to determine how fields should be grouped.
# The changing of the Parent Field marks the end of a repeating group
# specification.
#
# Example:
#
# VIS_Hxxx, DVISHxxx and PVISHxxx expanded for transmission (8 and 16 hours):
#
#           VIS_H008
#           DVISH008
#           PVISH008
#           VIS_H016
#           DVISH016
#           PVISH016
#
# Note:  During electronic transmission, repeating field groups must be kept
#        together within the specified group but the order within the group
#        does not have to be maintained.
#
#########################################################################
#                 Start of Field Grouping Specifications                #
#########################################################################
#
VIII VERSION 20000128
TST_Hxxx TST_Hxxx TST_Hxxx   TEST HOURS (HHH)
040

BWLTHxxx TST_Hxxx TST_Hxxx   BEARING WEIGHT LOSS TOP HALF (mg)
```

040

BWLBHxxx TST_Hxxx TST_Hxxx BEARING WEIGHT LOSS BOTTOM HALF (mg)
040

TBWLHxxx TST_Hxxx TST_Hxxx BEARING WEIGHT LOSS TOTAL (mg)
040

VIS_Hxxx VIS_Hxxx VIS_Hxxx VISCOSITY AT 40 DEG C AT XXX HOURS (cSt)
NEW 010

VIS1Hxxx VIS_Hxxx VIS_Hxxx VISCOSITY AT 100 DEG C AT XXX HOURS (cSt)
NEW 010

RTBWHxxx RTBWHxxx RTBWHxxx LAST CALIBRATION TEST TOTAL BEARING WEIGHT LOSS (mg
040

DOWNRxxx DOWNRxxx DOWNRxxx DOWNTIME TEST HOURS XXX (HHH:MM)

DDATRxxx DOWNRxxx DOWNRxxx DOWNTIME DATE XXX (YYYYMMDD)

DTIMRxxx DOWNRxxx DOWNRxxx DOWNTIME TIME XXX (HHH:MM)

DREARxxx DOWNRxxx DOWNRxxx DOWNTIME REMARKS/REASONS XXX

OCOMRxxx OCOMRxxx OCOMRxxx OTHER DOWNTIME COMMENT XXX

OUT_Rxxx OUT_Rxxx OUT_Rxxx OUTLIERS HOURS (HH:MM)

OUTPRxxx OUT_Rxxx OUT_Rxxx OUTLIERS PARAMETER

OPARRxxx OUT_Rxxx OUT_Rxxx OUTLIERS PARAMETER RANGE

OREDRxxx OUT_Rxxx OUT_Rxxx OUTLIERS READING

OTIMRxxx OUT_Rxxx OUT_Rxxx OUTLIERS TIME OUT (HH:MM)

ODP_Rxxx OUT_Rxxx OUT_Rxxx OUTLIERS DEVIATION (%)

Summary of VIII Data Dictionary changes from Version 19980820 to Version 20000128

	Sequence Number	Form Number	Field Name	Field Length	Decimal Size	Data Type	Units of Measure	Description
OLD	10	1	VERSION	8	0	C	YYYYMMDD	VIII VERSION 19980820
NEW	10	1	VERSION	8	0	C	YYYYMMDD	VIII VERSION 20000128
OLD	290	4	FUELBTID	8	0	C	YYMMnnn	FUEL BATCH IDENTIFIER (YYMMnnn)
NEW	290	4	FUELBTID	7	0	C	YYnnnnn	FUEL BATCH IDENTIFIER (YYnnnnn)
OLD	1350	6	RINGCODE	10	0	C	nn-nn	PISTON RING ID CODE (nn-nn)
NEW								
OLD	1400	7	DOWNHxxx	6	0	C	HHH:MM	DOWNTIME TEST HOURS XXX (HHH:MM)
NEW								
OLD	1410	7	DDATHxxx	8	0	C	YYYYMMDD	DOWNTIME DATE XXX (YYYYMMDD)
NEW								
OLD	1420	7	DTIMHxxx	6	0	C	HHH:MM	DOWNTIME TIME XXX (HHH:MM)
NEW								
OLD	1430	7	DREAHxxx	60	0	C		DOWNTIME REMARKS/REASONS XXX
NEW								
OLD	1460	7	OCOMHxxx	70	0	C		OTHER DOWNTIME COMMENT XXX
NEW								
OLD	1480	8	OUT_Hxxx	5	0	C	HH:MM	OUTLIERS HOURS (HH:MM)
NEW								
OLD	1490	8	OUTPHxxx	15	0	C		OUTLIERS PARAMETER
NEW								
OLD	1500	8	OPARHxxx	15	0	C		OUTLIERS PARAMETER RANGE
NEW								
OLD	1510	8	OREDHxxx	8	0	C		OUTLIERS READING
NEW								
OLD	1520	8	OTIMHxxx	5	0	C	HH:MM	OUTLIERS TIME OUT (HH:MM)
NEW								
OLD	1530	8	ODP_Hxxx	6	1	Z	%	OUTLIERS DEVIATION (%)
NEW								
OLD								
NEW	1390	7	DOWNRxxx	6	0	C	HHH:MM	DOWNTIME TEST HOURS XXX (HHH:MM)

Data Dictionary Operations Legend:

INSERT: An New entry without an Old entry
MODIFICATION: An Old entry with a New entry
DELETION: An Old entry without a New entry
Note: A field RENAME consists of a deletion of the Old field and the insertion of the New Field

Summary of VIII Data Dictionary changes from Version 19980820 to Version 20000128

	Sequence Number	Form Number	Field Name	Field Length	Decimal Size	Data Type	Units of Measure	Description
OLD								
NEW	1400	7	DDATRxxx	8	0	C	YYYYMMDD	DOWNTIME DATE XXX (YYYYMMDD)
OLD								
NEW	1410	7	DTIMRxxx	6	0	C	HHH:MM	DOWNTIME TIME XXX (HHH:MM)
OLD								
NEW	1420	7	DREARxxx	60	0	C		DOWNTIME REMARKS/REASONS XXX
OLD								
NEW	1450	7	OCOMRxxx	70	0	C		OTHER DOWNTIME COMMENT XXX
OLD								
NEW	1470	8	OUT_Rxxx	5	0	C	HH:MM	OUTLIERS HOURS (HH:MM)
OLD								
NEW	1480	8	OUTPRxxx	15	0	C		OUTLIERS PARAMETER
OLD								
NEW	1490	8	OPARRxxx	15	0	C		OUTLIERS PARAMETER RANGE
OLD								
NEW	1500	8	OREDRxxx	8	0	C		OUTLIERS READING
OLD								
NEW	1510	8	OTIMRxxx	5	0	C	HH:MM	OUTLIERS TIME OUT (HH:MM)
OLD								
NEW	1520	8	ODP_Rxxx	6	1	Z	%	OUTLIERS DEVIATION (%)

Data Dictionary Operations Legend:

INSERT: An New entry without an Old entry
MODIFICATION: An Old entry with a New entry
DELETION: An Old entry without a New entry
Note: A field RENAME consists of a deletion of the Old field and the insertion of the New Field

A18. Report Forms
Sequence VIII Engine Evaluation of Engine Oils

Form 1

VERSION *20000128*

CONDUCTED FOR

TSTSPON1

TSTSPON2

LABVALID	V = VALID
	I = INVALID

TSTOIL	NR = Non-reference Oil Test
	RO = Reference Oil Test

Test Number			
Test Stand	Power Section	# of Runs on Power Section Since Calibration Test	Total Runs on Power Section
STAND	*ENGINE*	*ENRUNSR*	*TOTENRUN*
Date Completed: *DTCOMP*		Completion Time: *EOTTIME*	
Oil Code: *OILCODE*			
Formulation/Stand Code: *FORM*			
Alternate Codes:	*ALTCODE1*	*ALTCODE2*	*ALTCODE3*

In my opinion this test *OPVALID* been conducted in a valid manner in accordance with the Sequence VIII Test Procedure (RR:) and the appropriate amendments through the information letter system. The remarks included in this report describe the anomalies associated with this test.

SUBMITTED BY:

SUBLAB
Testing Laboratory

SUBSIGIM
Signature

SUBNAME
Typed Name

SUBTITLE
Title

FIG. A18.1 Operational Validity Statement

Form 2

Sequence VIII Engine Evaluation of Engine Oils

Table of Contents

FIG. A18.2 Table of Contents

Sequence VIII Engine Evaluation of Engine Oils

Form 3

Summary of Test Method

The Sequence VIII test is designed to evaluate crankcase lubricating oils for their copper and lead corrosion control capabilities. It also evaluates shear stability under high temperature operating conditions.

The Sequence VIII involves steady state operation of the single cylinder CLR oil evaluation engine. After a 4 hour break-in and a 1/2 hour flush, the engine is operated under constant speed, air-fuel ratio and fuel flow conditions for an additional 40 hours. Prior to each run, the engine is thoroughly cleaned, and pertinent measurements of the engine parts are taken. A new piston, piston rings, copper/lead connecting rod bearing are installed. The cylinder head is also reconditioned.

The key operating conditions for this procedure are as follows:

Parameter	Set Point
Duration	40 h
Speed	3150 ± 25 r/min
Load	Adjusted to provide proper fuel flow at the specified Air:Fuel ratio
Fuel Flow	2.25 ± 0.11 kg/h
Air:Fuel Ratio	13.43 ± 0.5
Coolant Temperature	
Jacket Out	93.5 ± 1°C
Jacket Delta	5.6 ± 1°C
Gallery Oil Temperature	143.5 ± 1°C
Crankcase Off Gas	850 ± 28 SCL/h[A]

[A] Controlled by adding sufficient ambient air to rocker box to achieve an Off-Gas-Flow of 30 cfh.

This test utilizes an unleaded fuel named "KA24E" which has a green identifying dye. It is supplied by Specified Fuels & Chemicals Inc.

At the conclusion of the test, the engine is disassembled and the performance of the oil being tested is judged by the following:

1) by the weight loss of the copper/lead big end connecting rod bearing
2) by periodic oil sample analysis

FIG. A18.3 Summary of Test Method

Sequence VIII Engine Evaluation of Engine Oils
Form 4
Test Results

Laboratory	*LAB*	Oilcode	*OILCODE*
Date Completed	*DTCOMP*	Time Completed	*EOTTIME*
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

SAE Viscosity	*SAEVISC*	Test Oil Temperature (135.0° or 143.5°C)	*OILTEMP*
Laboratory Oil Code	*LABOCODE*	Date Started	*DTSTRT*
Test Fuel Type	*FUELTYPE*	Time Started	*STRTTIME*
Test Fuel Lot	*FUELBTID*	Bearing Batch No.	*BEARBAT*
Bearing Storage Oil Lead, ppm[A]	*BEARLEAD*	Bearing Lot	*BEARLOT*
Test Length	*TESTLEN*	Industry Reference Oil Code [A]	*IND*

Bearing Weight Loss Summary	
Test Length @ Measurement, hours	*TST_H040*
Top Bearing Half, mg	*BWLTH040*
Bottom Bearing Half, mg	*BWLBH040*
Total, mg	*TBWLH040*
Industry Correction Factor	*BWL_CF*
Severity Adjustment (non-reference tests only)	*BWL_SA*
Final Bearing Weight Loss, mg	*BWLFNL*

Hours	Viscosity cSt @ 40°C	Viscosity cSt @ 100°C	Stripped Viscosity @ 100°C
New Oil	*VIS_HNEW*	*VIS1HNEW*	
10	*VIS_H010*	*VIS1H010*	*SVIS100*

Test Stand/Power Section Reference History					
Stand No.	*RSTAND*	Power Section No.	*RENGINE*	Runs on Power Section	*RTOTRUN*
Bearing Batch No.			*RBEARBAT*	Bearing Lot No.	*RBEARLOT*
Industry Reference Oil Code			*RIND*	Stripped Viscosity, cSt	*RSVIS100*
Completion Date			*RDTCOMP*	Completion Time	*REOTTIME*
Total Bearing Weight Loss, mg			*RTBWH040*	Final Bearing Weight Loss, mg	*RBWLFNL*
Oil Code			*ROILCODE*		

[A] Reference Oil Tests Only

FIG. A18.4 Test Results

Sequence VIII Engine Evaluation of Engine Oils
Form 5
Operational Summary

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test No.	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

Test Parameter	Specification	Minimum	Maximum	Average
Speed, r/min	3150 ± 25	*IRPM*	*XRPM*	*ARPM*
Air/Fuel Ratio	13.43 ± 0.5:1	*IAFR*	*XAFR*	*AAFR*
Fuel Flow, kg/h	2.25 ± 0.11	*IFFLO*	*XFFLO*	*AFFLO*
Output, W	Record	*IPWR*	*XPWR*	*APWR*
Oil Heater Input, W (optional)	Record	*IOHTRIN*	*XOHTRIN*	*AOHTRIN*
Crankcase Off-Gas, L/h	850 ± 28	*ICCOG*	*XCCOG*	*ACCOG*
Temperatures	**Specification**	**Minimum**	**Maximum**	**Average**
Gallery Oil[A], °C	143.5 or 135.0 ± 1	*IGALT*	*XGALT*	*AGALT*
Coolant-In, °C	Record	*ICOLIN*	*XCOLIN*	*ACOLIN*
Coolant-Out, °C	93.5 ± 1	*ICOLOUT*	*XCOLOUT*	*ACOLOUT*
Delta T Coolant, °C	5.6 ± 1	*ICOLDT*	*XCOLDT*	*ACOLDT*
Intake Air, °C	Record	*IINAIRT*	*XINAIRT*	*AINAIRT*
Pressures	**Specification**	**Minimum**	**Maximum**	**Average**
Oil, kPa	276 ± 14	*IOILPRS*	*XOILPRS*	*AOILPRS*
Intake Man. Vac., kPa	Record	*IIMNVAC1*	*XIMNVAC1*	*AIMNVAC1*
Exhaust, in. kPa	0 to 3.4	*IEXPR*	*XEXPR*	*AEXPR*
Crankcase Vac., kPa	0.50 ± 0.12	*ICCV*	*XCCV*	*ACCV*
Spark Advance, °BTDC	35 ± 1	*ISPKTIM*	*XSPKTIM*	*ASPKTIM*
Blowby, L/h	Record	*IBLOBY*	*XBLOBY*	*ABLOBY*

Oil Consumption[B]	Initial Oil Charge (ml)	New Oil Added (ml)	Oil Samples (ml)	Final Oil Drain (ml)
	OILINIT	*OILADD*	*OILSMPL*	*OILDRAIN*
			Total Oil Consumption	*OILCON*

[A] (See Table 6 for Viscosity-Related Temperature.)

[B] Total Oil Consumption = (Initial Oil Charge + New Oil Added) - (Oil Samples + Final Oil Drain)

FIG. A18.5 Operational Summary

Sequence VIII Engine Evaluation of Engine Oils
Form 6
Parts Measurement, Oil Analysis, and Critical Parts Listing

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

Power Section Measurements, mm				
Measurement	**Specification**	**Minimum**	**Maximum**	**Average**
Valve Stem Clearance in Guide, Inlet	0.0508 - 0.1016	*IVSCIN*	*XVSCIN*	*AVSCIN*
Valve Stem Clearance in Guide, Exhaust	0.0762 - 0.1270	*IVSCEX*	*XVSCEX*	*AVSCEX*
Connecting Rod Bearing Clearance	0.0610 - 0.0762	*ICRODCL*	*XCRODCL*	*ACRODCL*
Main Bearing Clearance, Front	0.0508 - 0.0762	*IMBCF*	*XMBCF*	*AMBCF*
Main Bearing Clearance, Rear	0.0508 - 0.0762	*IMBCR*	*XMBCR*	*AMBCR*
Connecting Rod Journal Out-of-Round	0.0254 Maximum		*XCRODOR*	

Runs on Liner	*LINRUN*	Liner may be used as long as the piston to liner clearance is in the specified range.
Piston to Liner Clearance	*PISLINCL*	0.0305 to 0.0635 mm

Critical Parts Listing	
Parts	**I.D. Code**
Crankshaft	*CRANKID*
Camshaft	*CAMSN*
Main Bearings	*MBEARID*
Camshaft Bearings	*CAMBRID*
Connecting Rod	*CRODID*
Piston	*PISTSN*
Cylinder Liner	*CLINID*

FIG. A18.6 Parts Measurement, Oil Analysis, and Critical Parts Listing

Sequence VIII Engine Evaluation of Engine Oils
Form 7
Downtime Occurrences and Other Comments

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

Number of Downtime Occurrences		*DWNOCR*	
Test Hours	Date	Downtime	Reasons
DOWNR001	*DDATR001*	*DTIMR001*	*DREAR001*
		TOTLDOWN	Total Downtime

Other Comments	
Number of Comment Lines	*TOTCOM*
OCOMR001	

FIG. A18.7 Downtime Occurrences and Other Comments

Sequence VIII Engine Evaluation of Engine Oils
Form 8
Operational Outliers Occurrences

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

Number of Operational Outliers Occurrences *OUTOCR*					
Test Hours	Parameter	Parameter Range	Reading	Time Out	Deviation Percentage
OUT_R001	*OUTPR001*	*OPARR001*	*OREDR001*	*OTIMR001*	*ODP_R001*

FIG. A18.8 Operational Outliers Occurrences

Sequence VIII Engine Evaluation of Engine Oils
Form 9
Deviations of Operational Parameters

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

Primary Parameter	Maximum Permitted Deviation Percentage	Calculated Total Deviation Percentage
Engine Oil Gallery Temperature	2.5%	*GALTDP*
Engine Coolant Outlet Temperature	2.5%	*COLOUTDP*
Engine Coolant Delta Temperature	2.5%	*COLDTDP*
Fuel Flow	2.5%	*FFLODP*
Crankcase Off Gas	2.5%	*CCOGDP*
Oil Pressure	2.5%	*OILPDP*
Secondary Parameters		
Engine Speed	5%	*RPMDP*
AFR	5%	*AFRDP*
Spark Advance	5%	*SPRKADP*
Exhaust	5%	*EXPRDP*
Crankcase Vacuum	5%	*CCVACDP*

FIG. A18.9 Deviations of Operational Parameters

Sequence VIII Engine Evaluation of Engine Oils
Form 10
Data Acquisition System Details

Laboratory	*LAB*	Oil Code	*OILCODE*
Date Completed	*DTCOMP*		
Test Number	*STAND* / *ENGINE* / *ENRUNSR* / *TOTENRUN*		
Formulation/Stand	*FORM*		

PARAMETER (1)	SENSING DEVICE (2)	CALIBRATION FREQUENCY (3)	RECORD DEVICE (4)	OBSERVATION FREQUENCY (5)	RECORD FREQUENCY (6)	LOG FREQUENCY (7)	SYSTEM RESPONSE (8)
TEMPERATURES							
OIL IN	*OILISENS*	*OILICALF*	*OILIRECD*	*OILIOBSF*	*OILIRECF*	*OILILOGF*	*OILISYSR*
COOLANT OUT	*COTSENS*	*COTCALF*	*COTRECD*	*COTOBSF*	*COTRECF*	*COTLOGF*	*COTSYSR*
COOLANT DELTA	*COLDSENS*	*COLDCALF*	*COLDRECD*	*COLDOBSF*	*COLDRECF*	*COLDLOGF*	*COLDSYSR*
OTHER							
FUEL FLOW	*FFLOSENS*	*FFLOCALF*	*FFLORECD*	*FFLOOBSF*	*FFLORECF*	*FFLOLOGF*	*FFLOSYSR*
ENGINE SPEED	*RPMSENS*	*RPMCALF*	*RPMRECD*	*RPMOBSF*	*RPMRECF*	*RPMLOGF*	*RPMSYSR*
AFR	*AFRSENS*	*AFRCALF*	*AFRRECD*	*AFROBSF*	*AFRRECF*	*AFRLOGF*	*AFRSYSR*
EXHAUST PRESSURE	*EXPRSENS*	*EXPRCALF*	*EXPRRECD*	*EXPROBSF*	*EXPRRECF*	*EXPRLOGF*	*EXPRSYSR*
CRANKCASE OFF GAS	*CCOGSENS*	*CCOGCALF*	*CCOGRECD*	*CCOGOBSF*	*CCOGRECF*	*CCOGLOGF*	*CCOGSYSR*
OIL	*OPSISENS*	*OPSICALF*	*OPSIRECD*	*OPSIOBSF*	*OPSIRECF*	*OPSILOGF*	*OPSISYSR*
CRANKCASE VAC.	*CCVSENS*	*CCVCALF*	*CCVRECD*	*CCVOBSF*	*CCVRECF*	*CCVLOGF*	*CCVSYSR*

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
SC - STRIP CHART RECORDER
C/M - COMPUTER, USING MANUAL DATA ENTRY
C/D - COMPUTER, USING DIRECT I/O ENTRY
(5) DATA ARE 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
(9) SEE ANNEX A14 FOR PROCEDURE TO DETERMINE SYSTEM RESPONSE OF THE CHARACTERISTICS OF THE ACQUISITION SYSTEM.

FIG. A18.10 Data Acquisition System Details