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Sequence IVA Information Letter No. 05-3
Sequence No. 14
December 13, 2005

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 IVA Mailing List

SUBJECT:
1. Tolerances Added to Sensor Locations
2. Revisions to the Number of Runs Allowed on a Head and Block
3. Oil Cooler, PCV Valve and Coolant System Cleaning Replacement Schedule
4. Limits on Lost Operational Data
5. Changes to Fuel Temperature Control Limits
6. Revision to Torque Control Strategy

1. At the November 9, 2005 Sequence IVA Surveillance Panel meeting, the panel agreed to remove "approximately" from a number of sensor locations and add tolerances on the location dimension. In addition, a number of sensor locations were described in multiple sections and the redundant sections have been deleted. Sections 6.3.4.4, 6.3.4.5, 6.3.6.1, 6.3.6.2, 6.3.6.3, 6.3.11.3, 6.3.11.4, 6.3.11.6 and 9.3.1 have been revised. Sections 6.3.11.8, 6.3.11.9, 6.3.11.10, 6.3.11.11, 6.3.12.6, and 6.3.12.8 have been deleted. Existing Section 6.3.12.7 has been revised and renumbered as 6.3.12.6.

2. Because the number of tests allowed on the head and block appeared in multiple sections of the test method, the panel agreed to list the number of runs allowed on the block and head in Annex A2 and delete the redundancies. Annex A2 has been revised to add footnotes delineating the number of runs on the block and head. Sections 6.2.7, 6.4, 6.4.1.1, 6.4.1.4, 6.4.4, 6.4.4.1, 9.3 and 9.3.1 have been revised to remove references to the number of runs.

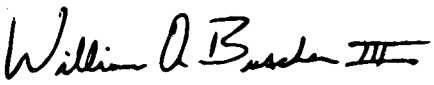
3. Section 10.4.2 has been revised to require replacement of the oil cooler when the engine is replaced. Section 11.3.5.2 has been revised to require replacement of the PCV valve each time the engine or cylinder head is replaced. Section 10.4.1 has been revised to have the engine coolant system cleaned internally each time a new engine is installed.

4. The panel agreed to include a requirement regarding loss of test operational data on controlled parameters. In order for a test to be considered operationally valid, there shall be no more that two hours of lost operational data on controlled parameters. Section 6.3.1 has been revised to include this requirement.

5. The panel approved changing the fuel temperature control requirement so that the fuel temperature is to be maintained below 50°C. Section 6.3.5.1 has been revised accordingly.

6. The panel agreed to change the transitional strategies for torque control. Section 11.2.6.4 has been revised accordingly.

The attached changes to Test Method D 6891 are effective November 9, 2005.



William A. Buscher III
Chairman
Sequence IVA Surveillance Panel

John Zalar
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Attachment

c: ftp://ftp.astmtmc.cmu.edu/documents/gas/sequenceiv/procedures_and_ils/ivail05-3-14.pdf

Distribution: Electronic Mail

6.2.7 *Oil Cooler*—Insert a water-to-oil heat exchanger (see Annex A3) between the engine oil filter adapter block and the oil filter, using a gasket as shown in Annex A3. See Annex A3 for installation details. Plumb the water outlet to the cooler fitting and orient to the same axis as the filter. Orient the cooler for both water fittings to face the rear of the engine. Use flexible hoses (16mm-diameter) of approximately 0.5 m length to connect process water to the oil cooler. Control the oil temperature by metering the flow of the process water outlet. A control system valve with Flow Coefficient (Cv) of 0.32 produces satisfactory control. Replace the oil cooler (see Annex A2) when the short block is replaced. Replace all hoses to the oil cooler when installing a new cooler.

6.3.1 *Computer Data Acquisition System*—The procedure shown in 6.3.1.1-6.3.1.3 details the test stand log operational data with a computer data acquisition system using sensor configurations, and is in compliance with Data Acquisition and Control Automation II.[9] Consider a test that has greater than 2 h without data acquisition on any controlled parameter to be operationally invalid.

6.3.4.4 *Intake Air Temperature*—For final control of the inlet air temperature, install an electric air heater strip within the supply air duct. The duct material and heater elements design shall not generate corrosion debris that could be ingested by the engine. To provide sufficient duct flow for adequate air temperature control, it is recommended that excess air be dumped just prior to the air cleaner snorkel. An air dump opening of a minimum of 6 cm^2 will provide sufficient flow without stagnation. If additional airflow is required to stabilize air temperature, it is permissible to install a nominal 1-cm bleed hole in the air filter housing. Install the inlet temperature sensor in the air cleaner, centered at the inlet to the air cleaner (see Annex A3). Attach a support brace to the air cleaner assembly mounting stud and wing nut, if vibration of the temperature sensor is a problem.

6.3.4.5 *Intake Air Supply Pressure*—Install a disc type valve in the controlled air system supply duct to control the engine inlet air gage pressure. Locate the sensing tube for inlet air pressure in the topside of the air cleaner assembly (5±1 cm left and 8±1 cm front of the right rear corner of the assembly). This location senses the pressure before the air enters the air cleaner element.

6.3.5.1 *Fuel Temperature*—Measure fuel temperature through one of the ports in a cross fitting located in the line between the fuel pump and the fuel rail. Maintain the fuel temperature to the fuel rail below 50°C.

6.3.6.1 *Air-to-Fuel-Ratio Sensor*—Install a Universal Exhaust Gas Oxygen (UEGO) sensor in the production exhaust pipe to monitor air-to-fuel ratio. Make a port 3±1 cm downstream of the collector. Orient the UEGO to the front side of the exhaust pipe using the appropriate weld fitting. It is not necessary to direct cooling air over the UEGO sensor.

6.3.6.2 *Exhaust Gas Temperature*—Measure the gas temperature using a 6-mm diameter thermocouple. Install the thermocouple in a welded fitting attached to the exhaust pipe at a location 5±1 cm downstream from the end of the collector. Insert the sensor tip to the center of the exhaust pipe (see Annex A3).

6.3.6.3 *Exhaust Absolute Pressure*—Attach the exhaust pressure sensor tube to a welded fitting installed on the exhaust pipe at a location 5±1 cm downstream from the end of the tube collector. Orient this fitting circumferentially 60 to 90° from the exhaust temperature sensor.

6.3.11.3 *Engine Coolant Inlet*—Install the engine coolant inlet temperature sensor at the inlet pipe, 200±20 mm from the end of the thermostat-housing nipple. Locate the sensor tip at the center of the pipe inner diameter.

6.3.11.4 *Engine Coolant Outlet*—Install the engine coolant outlet temperature sensor at the coolant water outlet passage at the front end of the intake manifold. Locate the existing port at the top of the manifold , 5±1 cm from the intake gasket surface. Locate the sensor tip in the center of flow. The recommended thermocouple diameter is 3.2 mm. This temperature is the coolant control point.

6.3.11.6 *Engine Oil Sump Temperature*—Sense the oil sump temperature by modifying the drain plug location in the oil pan for a thermocouple fitting, as shown in Fig. 6. Insert the sensor tip 50 ±5 mm inside the interior surface of the oil pan. Only monitor this temperature. It is not used for oil temperature control.

6.3.11.8 Deleted

6.3.11.9 Deleted. This section is duplicated in 6.3.4.4

6.3.11.10 Deleted. This section is duplicated in 6.3.6.2

6.3.11.11 Deleted. This section is duplicated in 6.3.5.1

Renumber 6.3.11.12 as 6.3.11.8

6.3.12.6 Deleted. This section is duplicated in 6.3.4.5

6.3.12.6 Crankcase Pressure—Attach the crankcase pressure sensing line to a fitting welded to the dipstick tube. Locate this fitting 8±1 cm from the top of the dipstick tube (see Fig. 8). The sensor shall be capable of measuring positive and negative pressure. If using a manometer, install a liquid trap to prevent manometer fluid from entering the crankcase.

6.3.12.8 Deleted. This section is duplicated in 6.3.6.3

6.4 *Test Engine Hardware*—This section specifies the hardware required to build the test engine. Conduct the engine break-in procedure prior to the first test on a long block and on the first test when a cylinder head is replaced. The new engine is a long-block, as received. Use the camshaft and rocker arms in the new engine for break-in purposes only. Remove and modify the new cylinder head for the cylinder head oil gallery temperatures and pressure measurement port and for valve spring force calibration. Clean and reassemble the head using the break-in camshaft and rocker arms. Use the break-in procedure shown in 11.1.3. After break-in, replace the break-in camshaft and rocker arms with the new camshaft and rocker arm parts.

6.4.1.1 *Test Engine Long Block*—Order the test engine long-block assembly (also called bare engine assembly) as shown in Annex A2. The test engine includes the block, pistons, rods, crankshaft, oil pan, front cover, cylinder head and rocker arm cover final assembly. Use the camshaft and rocker arms during engine break-in only; but they are not official test parts. Annex A2 contains information regarding the number of tests the short-block may be used. Use the original cylinder head for the number of tests listed in Annex A2.

6.4.1.4 *Cylinder Head Replacement Kit*—Every engine short-block is used for the number of tests listed in Annex A2. Use the original cylinder head for the number of tests listed in Annex A2. After that number of tests, install a replacement cylinder head for the number of runs listed in A2. To assemble and install the bare cylinder head, use 1 gasket and seal kit. Install new, calibrated valve springs, intake and exhaust valves with the replacement head (see Annex A2). When the replacement head is installed onto the engine, use the original supplied camshaft and rocker arms for conducting another break-in prior to the next test.

6.4.4 *Reusable Engine Parts*—Replace the engine short bock and the cylinder head as specified in Annex A2. Install a new oil cooler with every new short block. If the engine demonstrates deterioration (excessive blowby or oil consumption or fuel dilution, poor compression, low oil pressure, clearances beyond service limits, or stripped fasteners) prior to this expected life (see Annex A2), replace the engine and follow the break-in procedure prior to resuming non-reference oil testing. Due not exceed the number of tests on the short-block or cylinder heads listed in Annex A2.

6.4.4.1 Replace the PCV valve, fuel filters, rocker cover gaskets, and air filter whenever the cylinder head, or engine, or both are replaced. Replace the ignition distributor when an engine is installed.

9.3 *Cylinder Head Preparations*—Modify, clean, assemble and calibrate new test engine cylinder heads before using the cylinder head for testing purposes. Record the measurements shown in 9.3.3 on the appropriate form.

9.3.1 *Cylinder Head Modifications*—Access the cylinder head oil gallery from the intake side of the head through the vertical passage, centered front-to-rear. Drill this access port in a bossed area of the head, and located 10±1 mm upward from the deck surface of the head. Drill and tap the access port to accept a 1/8 in. close nipple.

10.4.1 *Periodic Cleaning of the Coolant System Plumbing*—Internally clean the engine coolant system plumbing each time a new engine is installed by a chemical flushing method. Use any commercial radiator cleaner/flush that is safe for vehicle use. After using a cleaner, flush the test stand coolant plumbing with fresh water until clear. If using a flush cart, stronger chemicals may be used providing the engine coolant pumps are bypassed and the instrument transducers are not included in the flush (see 6.1.3).

10.4.2 *Oil Cooler Replacement* –Replace the oil cooler (see Annex A2) when replacing the short-block assembly.

11.2.6.4 *Torque Steadiness During Transitions*—If using a transfer program for speed and load control, the torque can be changed to help stabilize control during the transfer and ramp for Stage I to II and Stage II to I. During the 5-min. transitions for speed and temperature changes, control the torque within 23 to 27 N·m. By the end of the 5-min. ramp, stabilize the torque at 25 ± 1.5 N·m.

11.3.5.2 *PCV Valve Replacement*—Replace the PCV valve when replacing the engine or cylinder head. The PCV valve can be obtained from any authorized Nissan Dealership.

A2. PARTS LIST

A2.1 This annex illustrates the parts needed for the Sequence IVA test (Table A2.1).

Section	Description	Part Number	Contents	Supplier
6.1	Bare Engine Assembly	A0102-76P01	Engine Block/Head/Valvetrain Assembly[A]	Nissan North America, Inc.
6.4.1.3	Test Kit	13000-40F85	Camshaft Assembly 1) Rocker Shaft (2) Rocker Arms (12) Oil Filter Assembly (3) Spark Plug (4)	Nissan North America, Inc.
6.4.1.4	Head Assembly[B]	A1040-40F80	with Valves and Springs without Camshaft, Rocker Arms	Nissan North America, Inc.
6.2.7	Oil Cooler[C]	21305-03E00	Engine Oil Cooler	Nissan North America, Inc
6.4.1.4	Engine Valve Regrind Kit	A1042-10C2E	Head Gasket and Seals	Nissan North America, Inc
6.4.1.2	Test Stand Kit No. 1	A0001-76P25		Nissan North America, Inc
6.4.1.2	Test Stand Kit No. 2	A0001-40F25		Nissan North America, Inc
6.4.1.2	Test Stand Kit No. 3	B4010-40F26		Nissan North America, Inc
6.4.1.2	Test Stand Kit No. 4	14004-F4003		Nissan North America, Inc
6.3.9	Jacketed Rocker Cover	TEI-NIVAWCR-020	Aluminum Jacketed Rocker Cover	Test Engineering, Inc.
6.2.9	Modified Wiring Harness	OHTKA24-002-1	Modified Wiring Harness for ECM	OH Technologies, Inc.
6.3.4.2	Air Filter Assembly	16500-86G50KT	Air Filter Housing and Element	Nissan North America, Inc.
6.5.1	Cam Angle Encoder Cylinder Head Calibration Apparatus	NIVACWM010		Test Engineering, Inc. OH Technologies, Inc.
7.4.2	Silicone Gasket Maker	999MP-A7007	RTV Sealant	Nissan Dealer
7.2	Test Fuel	KA24E	KA24E (dyed green)	Dow Chemical
7.3.1	Break-in Oil	TMC 926-2	TMC 926-2	ASTM Test Monitoring Center

[A] Can be used for twenty tests, cylinder head included with assembly can be used for ten tests
[B] Can be used for ten tests
[C] Install new cooler when engine assembly is replaced.