



# Test Monitoring Center

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

Sequence VG Information Letter 02-2  
Sequence No. 11

February 7, 2002

***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 VG Mailing List

SUBJECT: Replacement of Exhaust Gas CO, CO<sub>2</sub> and O<sub>2</sub> Readings with Lambda Measurements

At the November 14, 2001 meeting of the Sequence V Surveillance Panel, the panel agreed to drop the requirement to monitor CO, CO<sub>2</sub> and O<sub>2</sub> and, instead, monitor Lambda as a measure of air-fuel ratio. Table 2, Sections 9.6.1.1, 9.6.1.2 12.3.3.1, 12.5.5.1, Figure A3.16 and Appendix X2.1.12 of Test Method D6593 have been revised. References to SAE J254 in Section 2.2, Footnote 10 and Figure A3.19 have been deleted. Sections 3.2 and 3.2.1 have been added.

The attached changes to Test Method D6593 shall be implemented with the next reference oil test on each stand starting on or after March 1, 2002.

Peter Misangyi  
Product Engineering  
Ford Motor Company

John Zalar  
Administrator  
ASTM Test Monitoring Center

Attachment

c: [ftp://www.tmc.astm.cmri.cmu.edu/documents/gas/sequencev/procedures\\_and\\_ils/vgil02-2-11.pdf](ftp://www.tmc.astm.cmri.cmu.edu/documents/gas/sequencev/procedures_and_ils/vgil02-2-11.pdf)

Distribution: US Mail

(Revises Test Method D6593-00, as amended by Information Letters 01-1, 01-2, 01-3 and 02-1)

2.2 Deleted, existing section 2.3 renumbered as 2.2. Footnote 10 deleted, existing footnotes 11 through 20 have been renumbered as 10 through 19.

3.2 *Definitions of Terms Specific to This Standard*

3.2.1 *Lambda, n*--the ratio of actual air mass induced, during engine operation, divided by the theoretical air mass requirement at the stoichiometric air-fuel ratio for the given fuel.

3.2.1.1 *Discussion*--A Lambda value of 1.0 denotes a stoichiometric air-fuel ratio.

Table 2. Sequence VG Operating Specification

<u>Condition</u>	<u>Stage I</u>	<u>Stage II</u>	<u>Stage III</u>
Duration, minutes	120	75	45
Engine Speed, r/min	1200 ± 5	2900 ± 5	700 ± 15
Engine Power, kW	Record	Record	1.10 to 1.50
Manifold Abs Press, kPa (abs)	69 ± 0.2	66 ± 0.2	Record
Engine Oil, In, °C	68 ± 0.5	100 ± 0.5	45 ± 1
Engine Coolant Out, °C	57 ± 0.5	85 ± 0.5	45 ± 1
Engine Coolant Flow, L/min	48 ± 2	Record	Record
Engine Coolant Pressure, kPa (gauge)	70 ± 10	70 ± 10	70 ± 10
RAC Coolant, In, °C	29 ± 0.5	85 ± 0.5	29 ± 1
Rocker Cover Flow, L/min	15 ± 1	15 ± 1	15 ± 1
Intake, Air, °C	30 ± 0.5	30 ± 0.5	30 ± 0.5
Intake Air Press, kPa (gauge)	0.05 ± 0.02	0.05 ± 0.02	0.05 ± 0.02
Lambda, typical values	1.0	1.0	0.75
Blowby Flow Rate, Avg, L/min	-----	60 - 70	-----
Intake Air Humidity, g/kg	11.4 ± 0.8	11.4 ± 0.8	11.4 ± 0.8
Exhaust Back Pressure, kPa abs	104 ± 2	107 ± 2	Record
Fuel Flow, kg/min	Record	Record	Record

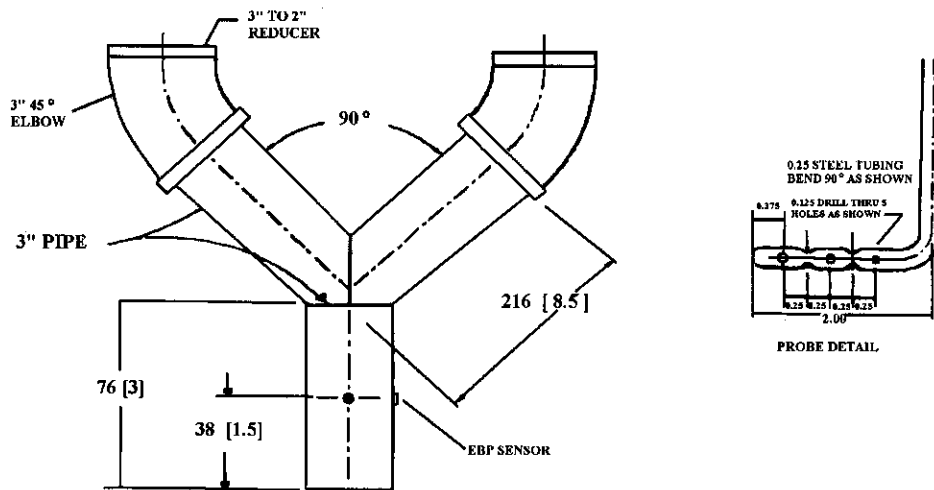
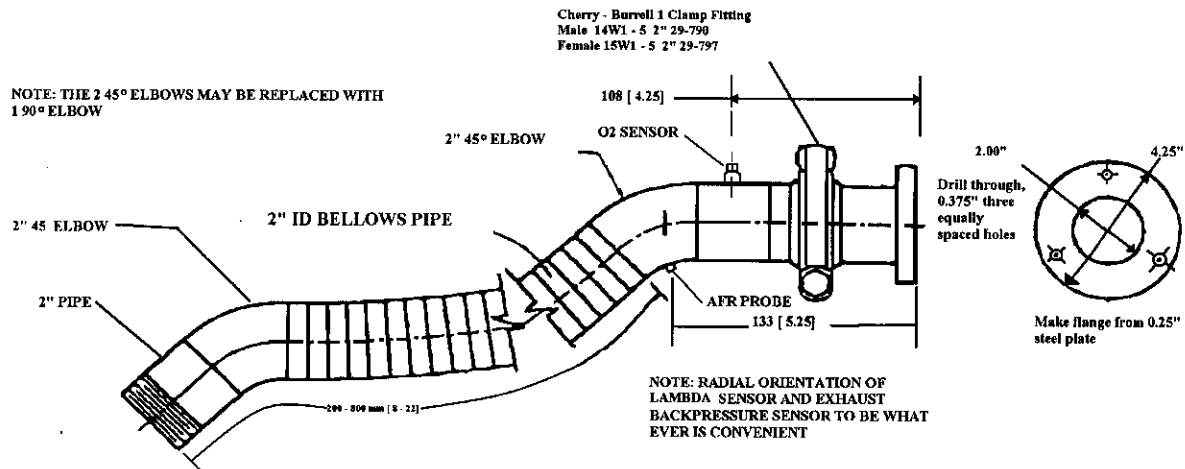
9.6.1.1. Determine the air-fuel ratio using a device to measure lambda. A suitable device is available from the supplier listed in X2.1.

9.6.1.2. Calibrate the lambda measurement device by introducing the sensor to air prior to each test.

12.3.3.1. The recorded readings for exhaust gas Lambda are taken during each stage and each cycle and shall be measured immediately after engine oil and coolant temperatures have reached steady-state conditions (approximately 20±5 min into each stage). The data are used to confirm that the EEC system is operating the engine at the correct air/fuel ratio.

12.5.5.1. Use the Lambda levels in the exhaust gas to determine the characteristics of combustion that occur during the test. Use this parameter to determine the normalcy of combustion and any significant changes in combustion that occur throughout a particular test. Lambda in all three stages is controlled by the program in the EPROM chip. No adjustments can be made to change the exhaust gas Lambda. If

Lambda differs from what appears in Table 2, check the EEC system. Correcting a fault in the EEC system is the only way to achieve the correct Lambda value.



DIMENSIONS ARE IN MILLIMETERS AND [INCHES]

Fig. A3.16 Typical Laboratory Exhaust System

Fig.A3.19 deleted

Fig. A3.20 through A3.28 renumbered as A3.19 through A3.27

X2.1.12. Exhaust Air-Fuel Measurement Device—Lambda (exhaust air-fuel) measurement device can be obtained from the following supplier:

Horiba.  
5900 Hines Dr.  
Ann-Arbor MI 48108  
Phone 800-346-7422, Facsimile 734-213-6525