concentration less than 1800 ppm HC is found at an elapsed time of 30 seconds (mt=30).

(d) Second-chance test. If the vehicle fails the first-chance test, the test timer resets to zero (tt=0) and a second-chance test is performed. The overall maximum test time for the second-chance test is 200 seconds (tt=200). The test consists of a preconditioning mode using a chassis dynamometer, followed immediately by an idle mode.

(1) Preconditioning mode. (i) The mode timer starts (mt=0) when the dynamometer speed is within the limits specified for the vehicle engine size in accordance with the following schedule. The mode continues for a minimum elapsed time of 30 seconds (mt=30). If the dynamometer speed falls outside the limits for more than five seconds in one excursion, or 15 seconds over all excursions, the mode timer resets to zero and resumes timing.

<table>
<thead>
<tr>
<th>Gasoline engine size, No. cylinders</th>
<th>Roll speed, mph</th>
<th>Normal loading, brake hp (kilo-watts)</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 or less</td>
<td>22–25 (35–40)</td>
<td>2.8–4.1 (2.1–3.1)</td>
</tr>
<tr>
<td>5–6</td>
<td>29–32 (47–52)</td>
<td>6.8–8.4 (5.1–6.3)</td>
</tr>
<tr>
<td>7 or more</td>
<td>32–35 (52–56)</td>
<td>8.4–10.8 (6.3–8.1)</td>
</tr>
</tbody>
</table>

(ii) The mode timer starts (mt=0) 5 seconds after the dynamometer speed has reached zero. The minimum idle mode length is determined as described in paragraph (d)(2)(ii) of this section. The maximum idle mode length is 90 seconds elapsed time (mt=90).

(iii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(2)(iii) (A) through (D) of this section.

(A) The vehicle passes the idle mode and the test is immediately terminated if, prior to an elapsed time of 30 seconds (mt=30), measured values are less than or equal to 100 ppm HC and 0.5 percent CO.

(B) The vehicle passes the idle mode and the test is terminated at the end of an elapsed time of 30 seconds (mt=30) if, prior to that time, the criteria of paragraph (d)(2)(ii)(A) of this section are not satisfied, and the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(C) The vehicle passes the idle mode and the test is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and 90 seconds (mt=90), measured values are less than or equal to the applicable short test standards described in paragraph (a)(2) of this section.

(D) The vehicle fails the idle mode and the test is terminated if none of the provisions of paragraphs (d)(2)(ii)(A), (B), and (C) of this section is satisfied by an elapsed time of 90 seconds (mt=90).

§ 85.2220 Preconditioned two speed idle test—EPA 91.

(a) General requirements—(1) Exhaust gas sampling algorithm. The analysis of exhaust gas concentrations begins ten seconds after the applicable test mode begins. Exhaust gas concentrations must be analyzed at a minimum rate of once every 0.75 second. The measured value for pass/fail determinations is a simple running average of the measurements taken over five seconds.

(ii) The probe may be removed from the tailpipe or the sample pump turned off if necessary to reduce analyzer fouling during the restart procedure.

(iii) The mode timer starts (mt=0) 5 seconds after the dynamometer speed has reached zero. The minimum idle mode length is determined as described in paragraph (d)(2)(ii) of this section. The maximum idle mode length is 90 seconds elapsed time.

(iv) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(2)(iii) (A) through (D) of this section.

(B) The vehicle passes the idle mode and the test is immediately terminated if, prior to an elapsed time of 30 seconds (mt=30), measured values are less than or equal to 100 ppm HC and 0.5 percent CO.

(C) The vehicle passes the idle mode and the test is terminated at the end of an elapsed time of 30 seconds (mt=30) if, prior to that time, the criteria of paragraph (d)(2)(ii)(A) of this section are not satisfied, and the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(D) The vehicle fails the idle mode and the test is terminated if none of the provisions of paragraphs (d)(2)(ii)(A), (B), and (C) of this section is satisfied by an elapsed time of 90 seconds (mt=90).
fails the test mode if the values for either HC or CO, or both, in all simultaneous pairs of values are above the applicable standards.

(3) Void test conditions. The test immediately terminates and any exhaust gas measurements are voided if the measured concentration of CO plus CO\textsubscript{2} falls below six percent or the vehicle’s engine stalls at any time during the test sequence.

(4) Multiple exhaust pipes. Exhaust gas concentrations from vehicle engines equipped with multiple exhaust pipes must be sampled simultaneously.

(5) The test is immediately terminated upon reaching the overall maximum test time.

(b) Test sequence. (1) The test sequence consists of a first-chance test and a second-chance test as described in paragraphs (b)(1) (i) and (ii) of this section.

(i) The first-chance test, as described under paragraph (c) of this section, consists of a first-chance high-speed mode followed immediately by a first-chance idle mode.

(ii) The second-chance test as described under paragraph (d) of this section is performed only if the vehicle fails the first-chance test.

(2) The test sequence begins only after the requirements described in paragraphs (b)(2) (i) through (iv) of this section are met.

(i) The vehicle is tested in as-received condition with the transmission in neutral or park and all accessories turned off. The engine must be at normal operating temperature (as indicated by a temperature gauge, temperature lamp, touch test on the radiator hose, or other visual observation indicating that overheating has not occurred).

(ii) For all pre-1996 model year vehicles, a tachometer shall be attached to the vehicle in accordance with the analyzer manufacturer’s instructions. For 1996 and newer model year vehicles the OBD data link connector will be used to monitor RPM. In the event that an OBD data link connector is not available or that an RPM signal is not available over the data link connector, a tachometer shall be used instead.

(iii) The sample probe is inserted into the vehicle’s tailpipe to a minimum depth of 10 inches. If the vehicle’s exhaust system prevents insertion to this depth, a tailpipe extension must be used.

(iv) The measured concentration of CO plus CO\textsubscript{2} must be greater than or equal to six percent.

(c) First-chance test. The test timer starts (tt=0) when the conditions specified in paragraph (b)(2) of this section are met. The overall maximum test time is 290 seconds (tt=290). The first-chance test consists of a high-speed mode followed immediately by an idle mode.

(1) First-chance high-speed mode. (i) The mode timer starts (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If the engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in the pass/fail determination, the measured value is invalidated and the mode continued. If any excursion lasts for more than ten seconds, the mode timer resets to zero (mt=0) and timing resumes. The high-speed mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (c)(1)(ii)(A) through (C) of this section.

(A) The vehicle passes the high-speed mode and the mode is terminated if any measured value is less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(B) The vehicle fails the high-speed mode and the mode is terminated if any measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(C) Optional. The vehicle may fail the first-chance test and any subsequent test may be omitted if no exhaust gas concentration lower than 1800 ppm HC is found at an elapsed time of 30 seconds (mt=30).

(2) First-chance idle mode. (i) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and
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1100 rpm. If the engine speed exceeds 1100 rpm or falls below 350 rpm, the mode timer resets to zero and resumes timing. The minimum first-chance idle mode length is determined as described in paragraph (c)(2)(ii) of this section. The maximum first-chance idle mode length is 90 seconds elapsed time (mt=90).

(ii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (c)(2)(ii) (A) through (D) of this section.

(A) The vehicle passes the idle mode and the test is immediately terminated if, prior to an elapsed time of 30 seconds (mt=30), measured values are less than or equal to 100 ppm HC and 0.5 percent CO.

(B) The vehicle passes the idle mode and the test is terminated at the end of an elapsed time of 30 seconds (mt=30) if, prior to that time, the criteria of paragraph (c)(2)(ii)(A) of this section are not satisfied, and the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(C) The vehicle passes the idle mode and the test is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and 90 seconds (mt=90), the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(D) The vehicle fails the idle mode and the test is terminated if none of the provisions of paragraphs (c)(2)(ii) (A), (B), and (C) of this section is satisfied by an elapsed time of 90 seconds (mt=90). Alternatively, the vehicle may be failed if the provisions of paragraphs (c)(2) (i) and (ii) of this section are not met within the elapsed time of 30 seconds.

(d) Second-chance test. (1) If the vehicle fails either mode of the first-chance test, the test timer resets to zero (tt=0) and a second-chance test begins. The second-chance test is performed based on the first-chance test failure mode or modes as described in paragraphs (d)(1) (i) through (iii) of this section.

(i) If the vehicle failed only the first-chance high-speed mode, the second-chance test consists of a second-chance high-speed mode as described in paragraph (d)(2) of this section. The overall maximum test time is 280 seconds (tt=280).

(ii) If the vehicle failed only the first-chance idle mode, the second-chance test consists of a second-chance preconditioning mode followed immediately by a second-chance idle mode as described in paragraphs (d) (3) and (4) of this section. The overall maximum test time is 425 seconds (tt=425).

(iii) If both the first-chance high-speed mode and first-chance idle mode were failed, the second-chance test consists of the second-chance high-speed mode followed immediately by the second-chance idle mode as described in paragraphs (d) (2) and (4) of this section. However, if during this second-chance procedure, the vehicle fails the second-chance high-speed mode, then the second-chance idle mode may be eliminated. The overall maximum test time is 425 seconds (tt=425).

(2) Second-chance high-speed mode—(1) Ford Motor Company and Honda vehicles. The engines of 1981–1987 model year Ford Motor Company vehicles and 1984–1985 model year Honda Preludes must be shut off for not more than ten seconds and then restarted. The probe may be removed from the tailpipe or the sample pump turned off if necessary to reduce analyzer fouling during the restart procedure. This procedure may also be used for 1988–1989 model year Ford Motor Company vehicles but may not be used for other vehicles.

(ii) The mode timer resets (mt=0) when the vehicle engine speed is between 2200 and 2800 rpm. If the engine speed falls below 2200 rpm or exceeds 2800 rpm for more than two seconds in one excursion, or more than six seconds over all excursions within 30 seconds of the final measured value used in the pass/fail determination, the measured value is invalidated and the mode continued. The minimum second-chance high-speed mode length is determined as described in paragraphs (d)(2) (iii) and (iv) of this section. If any excursion lasts for more than ten
seconds, the mode timer resets to zero (mt=0) and timing resumes. The maximum second-chance high-speed mode length is 180 seconds elapsed time (mt=180).

(iii) In the case where the second-chance high-speed mode is not followed by the second-chance idle mode, the pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(2)(iii)(A) through (D) of this section.

(A) The vehicle passes the high-speed mode and the test is immediately terminated if, prior to an elapsed time of 30 seconds (mt=30), measured values are less than or equal to 100 ppm HC and 0.5 percent CO.

(B) The vehicle passes the high-speed mode and the test is terminated if at the end of an elapsed time of 30 seconds (mt=30) if, prior to that time, the criteria of paragraph (d)(2)(iii)(A) of this section are not satisfied, and the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(C) The vehicle passes the high-speed mode and the test is immediately terminated if, at any point between an elapsed time of 30 seconds (mt=30) and 180 seconds (mt=180), the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(D) The vehicle fails the high-speed mode and the test is terminated if none of the provisions of paragraphs (d)(2)(iii)(A), (B), and (C) of this section is satisfied by an elapsed time of 180 seconds (mt=180).

(iv) In the case where the second-chance high-speed mode is followed by the second-chance idle mode, the pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(2)(iv)(A) and (B) of this section.

(A) The vehicle passes the high-speed mode and the mode is terminated at the end of an elapsed time of 180 seconds (mt=180) if any measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(B) The vehicle fails the high-speed mode and the mode is terminated if paragraph (d)(2)(iv)(A) of this section is not satisfied by an elapsed time of 180 seconds (mt=180).

(3) Second-chance preconditioning mode. The mode timer starts (mt=0) when engine speed is between 2200 and 2800 rpm. The mode continues for an elapsed time of 180 seconds (mt=180). If the engine speed falls below 2200 rpm or exceeds 2800 rpm for more than five seconds in any one excursion, or 15 seconds over all excursions, the mode timer resets to zero and resumes timing.

(4) Second-chance idle mode—(i) Ford Motor Company and Honda vehicles. The engines of 1981–1987 model year Ford Motor Company vehicles and 1984–1985 model year Honda Preludes must be shut off for not more than ten seconds and then restarted. The probe may be removed from the tailpipe or the sample pump turned off if necessary to reduce analyzer fouling during the restart procedure. This procedure may also be used for 1988–1989 model year Ford Motor Company vehicles but may not be used for other vehicles.

(ii) The mode timer starts (mt=0) when the vehicle engine speed is between 350 and 1100 rpm. If the engine speed exceeds 1100 rpm or falls below 350 rpm the mode timer resets to zero and resumes timing. The minimum second-chance idle mode length is determined as described in paragraph (d)(4)(iii) of this section. The maximum second-chance idle mode length is 90 seconds elapsed time (mt=90).

(iii) The pass/fail analysis begins after an elapsed time of ten seconds (mt=10). A pass or fail determination is made for the vehicle and the mode is terminated in accordance with paragraphs (d)(4)(iii) of this section. The maximum second-chance idle mode length is 90 seconds elapsed time (mt=90).

(A) The vehicle passes the second-chance idle mode and the test is immediately terminated if, prior to an elapsed time of 30 seconds (mt=30), measured values are less than or equal to 100 ppm HC and 0.5 percent CO.
(B) The vehicle passes the second-chance idle mode and the test is terminated at the end of an elapsed time of 30 seconds \((mt=30)\) if, prior to that time, the criteria of paragraph (d)(4)(iii)(A) of this section are not satisfied, and the measured values are less than or equal to the applicable short test standards as determined by the procedure described in paragraph (a)(2) of this section.

(C) The vehicle passes the second-chance idle mode and the test is immediately terminated if, at any point between an elapsed time of 30 seconds \((mt=30)\) and 90 seconds \((mt=90)\), measured values are less than or equal to the applicable short test standards described in paragraph (a)(2) of this section.

(D) The vehicle fails the second-chance idle mode and the test is terminated if none of the provisions of paragraphs (d)(4)(iii)(A), (B), and (C) of this section is satisfied by an elapsed time of 90 seconds \((mt=90)\).

[58 FR 58411, Nov. 1, 1993, as amended at 61 FR 40947, Aug. 6, 1996]

\$ 85.2221 [Reserved]

\$ 85.2222 On-board diagnostic test procedures.

The test sequence for the inspection of on-board diagnostic systems on 1996 and newer light-duty vehicles and light-duty trucks shall consist of the following steps:

(a) The on-board diagnostic inspection shall be conducted with the key-on/engine running (KOER), with the exception of inspecting for MIL illumination as required in paragraph (d)(4) of this section, during which the inspection shall be conducted with the key-on/engine off (KOEO).

(b) The inspector shall locate the vehicle connector and plug the test system into the connector.

(c) The test system shall send a Mode \$01, PID \$01 request in accordance with SAE J1979 to determine the evaluation status of the vehicle’s on-board diagnostic system. The test system shall determine what monitors are supported by the on-board diagnostic system, and the readiness evaluation for applicable monitors in accordance with SAE J1979. The procedure shall be done in accordance with SAE J1979 "E/E Diagnostic Test Modes." (DEC91). This incorporation by reference was approved by the Director of the Federal Register in accordance with 5 U.S.C. 552(a) and 1 CFR part 51. Copies of SAE J1979 may be obtained from the Society of Automotive Engineers, Inc., 400 Commonwealth Drive, Warrendale, PA 15096-0001. Copies may be inspected at the EPA Docket No. A–94–21 at EPA’s Air Docket (LE–131), Room 1500 M, 1st Floor, Waterside Mall, 401 M Street SW., Washington, DC, or at the National Archives and Records Administration (NARA). For information on the availability of this material at NARA, call 202–741–6030, or go to: http://www.archives.gov/federal_register/code_of_federal_regulations/ibr_locations.html.

(1) Coincident with the beginning of mandatory testing, repair, and retesting based upon the OBD-I/M check, if the readiness evaluation indicates that any on-board tests are not complete the customer shall be instructed to return after the vehicle has been run under conditions that allow completion of all applicable on-board tests. If the readiness evaluation again indicates that any on-board test is not complete the vehicle shall be failed.

(2) An exception to paragraph (c)(1) of this section is allowed for MY 1996 to MY 2000 vehicles, inclusive, with two or fewer unset readiness monitors, and for MY 2001 and newer vehicles with no more than one unset readiness monitor. Vehicles from those model years which would otherwise pass the OBD inspection, but for the unset readiness code(s) in question may be issued a passing certificate without being required to operate the vehicle in such a way as to activate those particular monitors. Vehicles from those model years with unset readiness codes which also have diagnostic trouble codes (DTCs) stored resulting in a lit malfunction indicator light (MIL) must be failed, though setting the unset readiness flags in question shall not be a prerequisite for passing the retest.

(d) The test system shall evaluate the malfunction indicator light status bit and record status information in the vehicle test record.