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idle torque recorded for the calculations in §86.345 shall be zero.

(h) If the operating conditions specified in paragraph (a) of this section for modes 2 through 8, and 10 through 16 cannot be maintained, the Administrator may authorize deviations from the specified load conditions. Such deviations shall not exceed 5 percent of the maximum torque at the test speed. The minimum deviations, above and below the specified load, necessary for stable operation shall be determined by the manufacturer and approved by the Administrator prior to the test run. Emission tests shall be performed by operating the engine at the higher ap-

proved load setting during cycle 1 and at the lower approved load setting during cycle 2. The weighting factors shall be as specified in paragraph (a) of this section.

(Secs. 206, 301(a), Clean Air Act as amended (42 U.S.C. 7525, 7601(a)))

[42 FR 45154, Sept. 8, 1977, as amended at 44 FR 16917, Mar. 20, 1979; 47 FR 49813, Nov. 2, 1982]

§ 86.336-79 Diesel engine test cycle.

(a) The following 13-mode cycle shall be followed in dynamometer operation tests of heavy-duty Diesel engines. Gasoline-fueled engines are covered in §86.335.

Test Segment	Mode No.	Engine Speed	Observed torque (percent of maximum observed)	Time in mode (minutes)		Maximum cumulative time (minutes)
				Minimum	Maximum	
1	1	Curb-idle	4.5	6.0	42
1	2	Intermediate	..... 2	4.5	6.0
1	3	.....do	..... 25	4.5	6.0
1	4	.....do	..... 50	4.5	6.0
1	5	.....do	..... 75	4.5	6.0
1	6	.....do	..... 100	4.5	6.0
1	7	Curb-idle	.....	4.5	6.0
2	8	Rated 100	4.5	6.0	36
2	9	.....do	..... 75	4.5	6.0
2	10	.....do	..... 50	4.5	6.0
2	11	.....do	..... 25	4.5	6.0
2	12	.....do	..... 2	4.5	6.0
2	13	Curb-idle	.....	4.5	6.0

(b) During each mode the specified speed shall be held to within 50 rpm. Torque for each mode must be held at the specified value ±2 percent of the maximum torque observed. For example, mode 4 torque shall be held between 48 and 52 percent of maximum torque (50 ±2%).

(c) If the operating conditions specified in paragraph (b) of this section for modes 3, 4, 5, 9, 10, and 11 cannot be maintained, the Administrator may authorize deviations from the specified load conditions. Such deviations shall not exceed 10 percent of the maximum torque at the test speed. The minimum deviations, above and below the specified load, necessary for stable operation shall be determined by the manufacturer and approved by the Administrator prior to the test run. Emission tests shall be performed at each of the approved load settings, one above and one below the operating conditions

specified in paragraph (a) of this section. The emission values obtained shall be calculated in accordance with §86.345 except that the weighting factor shall be 0.04.

(d) If the Administrator determines that an engine shall be tested as an automatic transmission code engine, then a load shall be applied by the dynamometer during the idle modes (1, 7, and 13) such that the engine speed is decreased from the recommended dynamometer-idle speed to the recommended curb-idle speed. The engine-idle torque recorded for the calculations in §86.345 shall be zero.

§ 86.337-79 Information.

The following information, as applicable, shall be recorded for each test:

(a) *Engine description and specification.* A copy of the information specified in this paragraph must accompany each engine sent to the Administrator

for compliance testing. The manufacturer need not record the information specified in this paragraph for each test if the information, with the exception of paragraphs (a) (3), (12), and (13), is included in the manufacturer's Part I.

- (1) Engine-system combination.
- (2) Engine identification numbers.
- (3) Number of hours of operation accumulated on engine.
- (4) Rated maximum horsepower and torque.
- (5) Maximum horsepower and torque speeds.
- (6) Engine displacement.
- (7) Governed speed.
- (8) Manufacturer's start-up and warm-up reference, (gasoline-fueled engines only).
- (9) Curb-idle rpm.
- (10) Dynamometer-idle rpm (automatic transmission code engines only).
- (11) Maximum horsepower at 2000 rpm (gasoline-fueled engines only).
- (12) Fuel consumption and maximum torque at 2000 rpm (gasoline-fueled engines only).
- (13) Fuel consumption at maximum power and torque (Diesel engines only).
- (14) Maximum air flow (Diesel engines only).
- (15) Air inlet restriction (Diesel engines only).
- (16) Exhaust pipe diameter(s) (Diesel engines only).
- (17) Maximum exhaust system back pressure (Diesel engines only).
- (18) Maximum exhaust system back pressure at 2000 rpm, if applicable (gasoline-fueled engines only).
- (b) *Test data; general.* This information may be recorded at any time between 4 hours prior to the test and 4 hours after the test.
 - (1) Engine-system combination.
 - (2) Engine identification number.
 - (3) Instrument operator.
 - (4) Engine operator.
 - (5) Number of hours of operation accumulated on the engine prior to beginning the warm-up portion of the test.
 - (6) Fuel identification.
 - (7) Date of most recent analytical assembly calibration.
 - (8) All pertinent instrument information such as tuning, gain, serial numbers, detector number, calibration

curve numbers, etc. As long as this information is traceable, it may be summarized by system number or analyzer identification numbers.

- (c) *Test data; pre-test.* (1) Date and time of day.
- (2) Test number.
- (3) Ambient temperature in dynamometer testing room (gasoline-fueled engines only).
- (4) Barometric pressure, pre-test for gasoline-fueled engines, pre-test segment for Diesel engines.
- (5) Engine intake humidity, pre-test for gasoline-fueled engines, pre-test segment for Diesel engines with non-conditioned air supply systems.
- (6) Maximum observed torque for intermediate and rated speeds (Diesel engines only).
- (7) Maximum observed torque at 2000 rpm (gasoline-fueled engines only).
- (8) *Recorder chart or equivalent.* Identify for each test (test segment for Diesel engines) zero traces for each range used, and span traces for each range used.
- (d) *Test data; modal.* (1) Recorder chart or equivalent. Identify for each test mode the emission concentration traces and the associated analyzer range(s). The start and finish of each test.
 - (2) Observed engine torque.
 - (3) Observed engine rpm.
 - (4) Record engine torque and engine rpm continuously with a chart recorder or equivalent recording device.
 - (5) Intake air flow and depression for each mode (Diesel engines only).
 - (6) Engine intake air temperature for each mode (Diesel engines only).
 - (7) *Fuel flow for each mode.* If the fuel flow measurement is a volume measurement system, record the fuel temperature in the measurement system for fuel density corrections to the mass flow rate. If the fuel temperature is within 3 °C (5.4 °F) of the calibration temperature, no density correction is required.
 - (8) Engine intake humidity (only for Diesel engines with humidity conditioned air supply).
- (e) *Test data; post-test.* (1) Recorder chart or equivalent. Identify the hang-up check.
 - (2) *Recorder chart or equivalent.* Identify the zero traces for each range used

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and the span traces for each range used.

(3) Ambient temperature in the dynamometer testing room (gasoline-fueled engines only).

(4) Total number of hours of operation accumulated on the engine.

[42 FR 45154, Sept. 8, 1977, as amended at 46 FR 50495, Oct. 13, 1981; 47 FR 49807, Nov. 2, 1982]

§ 86.338-79 Exhaust measurement accuracy.

(a) The analyzers must be operated between 15 percent and 100 percent of full-scale chart deflection during the measurement of the emissions for each mode. The exceptions to the lower limit of this operating rule are:

(1) The analyzer's response may be less than 15 percent of full-scale if the full-scale value is 155 ppm (or ppm C) or less.

(2) *Option.* For CO analysis the analyzer's response may be less than 15 percent of full scale if the full-scale value is 5500 ppm or less.

(3) The analyzer's response may be less than 15 percent of full scale if the emissions from the engine are erratic and the average chart-deflection value is greater than 15 percent of full scale.

(4) For gasoline-fueled engines, the analyzer's response may be less than 15 percent of full scale during the initial part of the CT mode provided that average chart-deflection value is greater than 15 percent of full scale.

(5) The analyzer's response may be less than 15 percent of full scale if the contribution of all modes read below the 15 percent level is less than 10 percent by mass of the final test results.

(6) The HC analyzer's response may be less than 15 percent of full-scale when transient emissions (spikes) can be reasonably expected to exceed 90 percent of full-scale. Higher analyzer ranges may be used provided that the precision and linearity of the analyzer at the level of the readings below 15 percent meets the specifications of the range that would be required if the transient emissions did not exist.

(b) [Reserved]

(Secs. 206, 301(a), Clean Air Act as amended (42 U.S.C. 7525, 7601(a)))

[42 FR 45154, Sept. 8, 1977, as amended at 44 FR 16917, Mar. 20, 1979; 46 FR 50495, Oct. 13, 1981, and 47 FR 49807, Nov. 2, 1982]

§ 86.339-79 Pre-test procedures.

(a) Allow a minimum of 30 minutes warm-up in the stand-by or operating mode prior to spanning the analyzers.

(b) Replace or clean the filter elements and then vacuum leak check the system, § 86.328(a). A pressure leak check is also permitted per § 86.328(b). Allow the heated sample line, filters, and pumps to reach operating temperature.

(c) Perform the following system checks:

(1) If a stainless steel NO₂ to NO converter is used, prior to gasoline-fueled engine tests, purge the converter with air (zero-grade air, room air, or O₂) for a minimum of 30 minutes. The converter must be at operational temperature while purging.

(2) Check the sample-line temperature (see § 86.310).

(3) Check the system response time (see § 86.329). System response time may be applied from the most recent check of response time if all of the following are met:

(i) The flow rate for each flow meter is equal to or greater than the flow rate recorded in § 86.329(b)(1)(ii).

(ii) For analyzers with capillaries, the response time from the sample/span valve is measured using in-use pressures and bypass flows (see § 86.329(b)(2)).

(iii) The response time measured in step (ii) is equal to or less than the response time determined in § 86.329(b)(2)(vii).

(4) A hang-up check is permitted.

(5) A converter-efficiency check is permitted. The check need not conform to § 86.332(b). The test procedure may be aborted at this point in the procedure in order to repair the NO₂ to NO converter. If the test is aborted, the converter must pass the efficiency check described in § 86.332(b) prior to starting the dynamometer test run.

(d) Introduce the zero-grade gases at the same flow rates and pressures used to calibrate the analyzers and zero the