

least every 15 seconds with the temperature recording system specified in § 86.107-96(e).

(ix) When the ambient temperature is  $95\pm 5$  °F ( $35\pm 3$  °C) and the fuel tank temperature is  $95\pm 3$  °F the running loss test may begin.

(x) The ambient temperature shall be maintained at  $95\pm 5$  °F ( $95\pm 2$  °F on average) during the running loss test, measured at the inlet to the cooling fan in front of the vehicle; it shall be recorded at least every 60 seconds.

(xi) Fuel temperatures shall be controlled according to the specifications of paragraph (g)(1)(xv) of this section.

(xii) The tank pressure requirements described in paragraph (g)(1)(xvi) of this section apply also to running loss testing by the point source method.

(xiii) The running loss test ends with completion of the third 2-minute idle period.

(xiv) If emissions are collected in bags, the sample bags must be analyzed within 20 minutes of their respective sample collection phases, as described in § 86.137-94(b)(15). The results of the analysis are used in § 86.143 to calculate the mass of hydrocarbons emitted.

(xv) At the end of the running loss test, turn off all the fans specified in § 86.107-96(d).

(3) With prior approval of the Administrator, manufacturers may use an alternative running loss test procedure, provided the alternative test procedure is shown to yield equivalent or superior emission results (in terms of quality control, accuracy and repeatability) for the running loss, hot soak and diurnal portions of the three diurnal-plus-hot-soak test sequence. Additionally, the Administrator may conduct certification and in-use testing using the test procedures outlined in paragraph (g)(1) of this section, paragraph (g)(2) of this section or the alternative running loss test procedure as approved for a specific vehicle.

(h) Following the completion of the running loss drive, the vehicle may be tested for hot soak emissions as specified in § 86.138-96.

[58 FR 16040, Mar. 24, 1993, as amended at 59 FR 48510, Sept. 21, 1994; 60 FR 43896, Aug. 23, 1995; 70 FR 72927, Dec. 8, 2005]

#### § 86.135-00 Dynamometer procedure.

Section 86.135-00 includes text that specifies requirements that differ from §§ 86.135-90 and 86.135-94. Where a paragraph in § 86.135-90 or § 86.135-94 is identical and applicable to § 86.135-00, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see § 86.135-90.” or “[Reserved]. For guidance see § 86.135-94.”

(a) [Reserved]. For guidance see § 86.135-94.

(b)-(c) [Reserved]. For guidance see § 86.135-90.

(d) Practice runs over the prescribed driving schedule may be performed at test point, provided an emission sample is not taken, for the purpose of finding the appropriate throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustment. Both smoothing of speed variations and excessive accelerator pedal perturbations are to be avoided. When using two-roll dynamometers a truer speed-time trace may be obtained by minimizing the rocking of the vehicle in the rolls; the rocking of the vehicle changes the tire rolling radius on each roll. This rocking may be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch.

(e)-(i) [Reserved]. For guidance see § 86.135-90.

[61 FR 54894, Oct. 22, 1996]

#### § 86.135-12 Dynamometer procedure.

(a) *Overview.* The dynamometer run consists of two tests, a “cold” start test, after a minimum 12-hour and a maximum 36-hour soak according to the provisions of §§ 86.132 and 86.133, and a “hot” start test following the “cold” start by 10 minutes. Engine startup (with all accessories turned off), operation over the UDDS, and engine shutdown make a complete cold start test. Engine startup and operation over the first 505 seconds of the driving schedule complete the hot start test. The exhaust emissions are diluted with ambient air in the dilution tunnel as shown

in Figure B94-5 and Figure B94-6. A dilution tunnel is not required for testing vehicles waived from the requirement to measure particulates. Six particulate samples are collected on filters for weighing; the first sample plus backup is collected during the first 505 seconds of the cold start test; the second sample plus backup is collected during the remainder of the cold start test (including shutdown); the third sample plus backup is collected during the hot start test. Continuous proportional samples of gaseous emissions are collected for analysis during each test phase. For gasoline-fueled, natural gas-fueled and liquefied petroleum gas-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, and, for 2015 and later model year vehicles, N<sub>2</sub>O. For petroleum-fueled diesel-cycle vehicles (optional for natural gas-fueled, liquefied petroleum gas-fueled and methanol-fueled diesel-cycle vehicles), THC is sampled and analyzed continuously according to the provisions of § 86.110-94. Parallel samples of the dilution air are similarly analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, and, for 2015 and later model year vehicles, N<sub>2</sub>O. For natural gas-fueled, liquefied petroleum gas-fueled and methanol-fueled vehicles, bag samples are collected and analyzed for THC (if not sampled continuously), CO, CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, and, for 2015 and later model year vehicles, N<sub>2</sub>O. For methanol-fueled vehicles, methanol and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air formaldehyde sample, covering the total test period may be collected). For ethanol-fueled vehicles, methanol, ethanol, acetaldehyde, and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air formaldehyde sample, covering the total test period may be collected). Parallel bag samples of dilution air are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub>, NO<sub>x</sub>, and, for 2015 and later model year vehicles, N<sub>2</sub>O.

(b) During dynamometer operation, a fixed speed cooling fan shall be positioned so as to direct cooling air to the vehicle in an appropriate manner with the engine compartment cover open. In the case of vehicles with front engine

compartments, the fan shall be squarely positioned within 12 inches (30.5 centimeters) of the vehicle. In the case of vehicles with rear engine compartments (or if special designs make the above impractical), the cooling fan shall be placed in a position to provide sufficient air to maintain vehicle cooling. The fan capacity shall normally not exceed 5300 cfm (2.50 m<sup>3</sup>/sec). However, if the manufacturer can show that during field operation the vehicle receives additional cooling, and that such additional cooling is needed to provide a representative test, the fan capacity may be increased, additional fans used, variable speed fan(s) may be used, and/or the engine compartment cover may be closed, if approved in advance by the Administrator. For example, the hood may be closed to provide adequate air flow to an intercooler through a factory installed hood scoop. Additionally, the Administrator may conduct certification, fuel economy and in-use testing using the additional cooling set-up approved for a specific vehicle.

(c) The vehicle speed as measured from the dynamometer rolls shall be used. A speed vs. time recording, as evidence of dynamometer test validity, shall be supplied on request of the Administrator.

(d) Practice runs over the prescribed driving schedule may be performed at test point, provided an emission sample is not taken, for the purpose of finding the minimum throttle action to maintain the proper speed-time relationship, or to permit sampling system adjustment. NOTE: When using two-roll dynamometers a truer speed-time trace may be obtained by minimizing the rocking of the vehicle in the rolls; the rocking of the vehicle changes the tire rolling radius on each roll. This rocking may be minimized by restraining the vehicle horizontally (or nearly so) by using a cable and winch.

(e) The drive wheel tires may be inflated up to a gauge pressure of 45 psi (310 kPa) in order to prevent tire damage. The drive wheel tire pressure shall be reported with the test results.

(f) If the dynamometer has not been operated during the 2-hour period immediately preceding the test, it shall

be warmed up for 15 minutes by operating at 30 mph (48 kph) using a non-test vehicle or as recommended by the dynamometer manufacturer.

(g) If the dynamometer horsepower must be adjusted manually, it shall be set within 1 hour prior to the exhaust emissions test phase. The test vehicle shall not be used to make this adjustment. Dynamometers using automatic control of pre-selectable power settings may be set anytime prior to the beginning of the emissions test.

(h) The driving distance, as measured by counting the number of dynamometer roll or shaft revolutions, shall be determined for the transient cold start, stabilized cold start, and transient hot start phases of the test. The revolutions shall be measured on the same roll or shaft used for measuring the vehicle's speed.

(i) Four-wheel drive and all-wheel drive vehicles may be tested either in a four-wheel drive or a two-wheel drive mode of operation. In order to test in the two-wheel drive mode, four-wheel drive and all-wheel drive vehicles may have one set of drive wheels disengaged; four-wheel and all-wheel drive vehicles which can be shifted to a two-wheel mode by the driver may be tested in a two-wheel drive mode of operation.

[75 FR 25679, May 7, 2010]

**§ 86.135–90 Dynamometer procedure.**

(a) *Overview*—(1) *Gasoline-fueled and methanol-fueled Otto-cycle vehicles.* The dynamometer run consists of two tests, a “cold” start test after a minimum 12-hour and a maximum 36-hour soak according to the provisions of §§ 86.132 and 86.133, and a “hot” start test following the “cold” start test by 10 minutes. Engine startup (with all accessories turned off), operation over the UDDS and engine shutdown make a complete cold start test. Engine startup and operation over the first 505 seconds of the driving schedule complete the hot start test. The exhaust emissions are diluted with ambient air and a continuously proportional sample is collected for analysis during each phase. The composite samples collected in bags are analyzed for hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen. A parallel sample of

the dilution air is similarly analyzed for hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen. Methanol and formaldehyde samples (exhaust and dilution air) are collected and analyzed for methanol-fueled vehicles (a single dilution air formaldehyde sample covering the total time of the test may be collected in place of three individual samples). Methanol and formaldehyde samples may be omitted for 1990 through 1994 model years when a FID calibrated on methanol is used.

(2) *Petroleum-fueled and methanol-fueled diesel vehicles.* The dynamometer run consists of two tests, a “cold” start test after a minimum 12-hour and a maximum 36-hour soak according to the provisions of §§ 86.132 and 86.133, and a “hot” start test following the “cold” start by 10 minutes. Engine startup (with all accessories turned off), operation over the UDDS, and engine shutdown make a complete cold start test. Engine startup and operation over the first 505 seconds of the driving schedule complete the hot start test. The exhaust emissions are diluted with ambient air in the dilution tunnel as shown in Figure B90–5 and Figure B90–6. Six particulate samples are collected on filters for weighing; the first sample plus back-up is collected during the first 505 seconds of the cold start test; the second sample plus back-up is collected during the remainder of the cold start test (including shutdown); the third sample plus back-up is collected during the hot start test. Continuous proportional samples of gaseous emissions are collected for analysis during each test phase. For petroleum-fueled vehicles, the composite samples collected in bags are analyzed for carbon monoxide, carbon dioxide, and oxides of nitrogen. Hydrocarbons from petroleum-fueled vehicles are sampled and analyzed continuously according to the provisions of § 86.110. Parallel samples of the dilution air are similarly analyzed for hydrocarbon, carbon monoxide, carbon dioxide, and oxides of nitrogen. For methanol-fueled vehicles, bag samples are collected and analyzed for hydrocarbons, carbon monoxide, carbon dioxide, and oxides of nitrogen. Methanol and formaldehyde samples are taken for both exhaust emissions and dilution air (a single dilution air