

Environmental Protection Agency

§ 86.237-08

monoxide, carbon dioxide, and, optionally, other pollutants. A parallel sample of the dilution air is similarly analyzed for carbon monoxide and, optionally, hydrocarbons, carbon dioxide, and oxides of nitrogen.

(b) As long as an emission sample is not taken, practice runs over the prescribed driving schedule may be performed at test point for the purpose of finding the minimum throttle action to maintain the proper speed-time relationship or to permit sampling system adjustment.

(c) Humidity should be set low enough to prevent condensation on the dynamometer rolls.

(d) The dynamometer shall be warmed as recommended by the dynamometer manufacturer and using procedures or control methods that assure stability of the residual frictional horsepower.

(e) The time between dynamometer warming and the start of the emission test shall be no longer than 10 minutes if the dynamometer bearings are not independently heated. If the dynamometer bearings are independently heated, the emission test shall begin no longer than 20 minutes after dynamometer warming.

(f) If the dynamometer horsepower must be adjusted manually, it shall be set within one hour prior to the exhaust emission test phase. The test vehicle shall not be used to make the adjustment. Dynamometers using automatic control of preselectable power settings may be set anytime prior to the beginning of the emission test.

(g) 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.

(h) Four-wheel drive vehicles will be tested in a two-wheel drive mode of operation. Full-time four-wheel drive vehicles will have one set of drive wheels temporarily disengaged by the vehicle manufacturer. Four-wheel drive vehicles which can be manually shifted to a two-wheel drive mode will be tested in the normal on-highway two-wheel drive mode of operation.

§ 86.236-94 Engine starting and re-starting.

The provisions of § 86.136 apply to this subpart.

§ 86.237-08 Dynamometer test run, gaseous emissions.

(a) The complete dynamometer test consists of a cold start drive of approximately 7.5 miles (12.1 kilometers) and a hot start drive of approximately 3.6 miles (5.8 kilometers).

(b) If the preconditioned vehicle is not already on the dynamometer, it shall be pushed into position.

(c) The vehicle is allowed to stand on the dynamometer during the ten minute time period between the cold and hot start test. The cold start test is divided into two periods. The first period, representing the cold start "transient" phase, terminates at the end of the deceleration which is scheduled to occur at 505 seconds of the driving schedule. The second period, representing the "stabilized" phase, consists of the remainder of the driving schedule, including engine shutdown. The hot start test is identical to the first part or transient phase of the cold start test. Therefore, the hot start test terminates after the first period (505 seconds) is run.

(d) 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 a hot start test following the cold start test by 10 minutes. The vehicle shall be stored prior to the emission test in such a manner that precipitation (e.g., rain or dew) does not occur on the vehicle. The complete dynamometer test consists of a cold start drive of 7.5 miles (12.1 km) and simulates a hot start drive of 7.5 miles (12.1 km). The vehicle is allowed to stand on the dynamometer during the 10 minute time period between the cold and hot start tests. The cold start test is divided into two periods. The first period, representing the cold start "transient" phase, terminates at the end of the deceleration which is scheduled to occur at 505 seconds of the driving schedule. The second period, representing the "stabilized" phase, consists of the remainder of the driving schedule including engine shutdown.

The hot start test, similarly, consists of two periods. The first period, representing the hot start "transient" phase, terminates at the same point in driving schedule as the first period of the cold start test. The second period of the hot start test, "stabilized" phase, is assumed to be identical to the second period of the cold start test. Therefore, the hot start test terminates after the first period (505 seconds) is run. Measurement of NO_x and particulate matter is not required.

(e) The following steps shall be taken for each test:

(1) Place drive wheels of vehicle on dynamometer without starting engine.

(2) Open the vehicle engine compartment cover and position the cooling fan.

(3) For all vehicles, with the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(4) For methanol-fueled vehicles, with the sample selector valves in the "standby" position, insert fresh sample collection impingers into the methanol sample collection system, fresh impingers or a fresh cartridge into the formaldehyde sample collection system and fresh impingers (or a single cartridge for formaldehyde) into the dilution air sample collection systems for methanol and formaldehyde (background measurements of methanol and formaldehyde may be omitted and concentrations assumed to be zero for calculations in § 86.144).

(5) Start the CVS (if not already on), the sample pumps (except the particulate sample pump, if applicable), the temperature recorder, the vehicle cooling fan, and the heated THC analysis recorder (diesel-cycle only). (The heat exchanger of the constant volume sampler, if used, petroleum-fueled diesel-cycle THC analyzer continuous sample line and filter, methanol-fueled vehicle THC, methanol and formaldehyde sample lines, if applicable, should be preheated to their respective operating temperatures before the test begins).

(6) Adjust the sample flow rates to the desired flow rate and set the gas flow measuring devices to zero.

(i) For gaseous bag samples (except THC samples), the minimum flow rate is 0.17 cfm (0.08 l/sec).

(ii) For THC samples, the minimum FID (or HFID in the case of diesel-cycle and methanol-fueled Otto-cycle vehicles) flow rate is 0.066 cfm (0.031 l/sec).

(iii) For methanol samples, the flow rates shall be set such that the system meets the design criteria of § 86.109 and § 86.110. For samples in which the concentration in the primary impinger exceeds 0.5 mg/l, it is recommended that the mass of methanol collected in the secondary impinger not exceed ten percent of the total mass collected. For samples in which the concentration in the primary impinger does not exceed 0.5 mg/l, analysis of the secondary impingers is not necessary.

(iv) For formaldehyde samples, the flow rates shall be set such that the system meets the design criteria of § 86.109 and § 86.110. For impinger samples in which the concentration of formaldehyde in the primary impinger exceeds 0.1 mg/l, it is recommended that the mass of formaldehyde collected in the secondary impinger not exceed ten percent of the total mass collected. For samples in which the concentration in the primary impinger does not exceed 0.1 mg/l, analysis of the secondary impingers is not necessary.

(7) Attach the exhaust tube to the vehicle tailpipe(s).

(8) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the "transient" exhaust sample bag, the "transient" methanol exhaust sample, the "transient" formaldehyde exhaust sample, the "transient" dilution air sample bag, the "transient" methanol dilution air sample and the "transient" formaldehyde dilution air sample (turn on the petroleum-fueled diesel-cycle THC analyzer system integrator, mark the recorder chart and record both gas meter or flow measurement instrument readings, if applicable), turn the key on, and start cranking the engine.

(9) Fifteen seconds after the engine starts, place the transmission in gear.

(10) Twenty seconds after the engine starts, begin the initial vehicle acceleration of the driving schedule.

(11) Operate the vehicle according to the Urban Dynamometer Driving Schedule (§86.115).

NOTE: During particulate testing, if applicable, adjust the flow rate through the particulate sample probe to maintain a constant value within ± 5 percent of the set flow rate. Record the average temperature and pressure at the gas meter or flow instrument inlet. If the set flow rate cannot be maintained because of high particulate loading on the filter, the test shall be terminated. The test shall be rerun using a lower flow rate, or larger diameter filter, or both.

(12) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously switch the sample flows from the "transient" bags and samples to the "stabilized" bags and samples, switch off gas flow measuring device No. 1, switch off the No. 1 petroleum-fueled diesel hydrocarbon integrator, mark the petroleum-fueled diesel hydrocarbon recorder chart, start gas flow measuring device No. 2, and start the petroleum-fueled diesel hydrocarbon integrator No. 2. Before the acceleration which is scheduled to occur at 510 seconds, record the measured roll or shaft revolutions and reset the counter or switch to a second counter. As soon as possible transfer the "transient" exhaust and dilution air samples to the analytical system and process the samples according to §86.140 obtaining a stabilized reading of the bag exhaust sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample collection phase of the test.

(13) Turn the engine off 2 seconds after the end of the last deceleration (at 1,369 seconds).

(14) Five seconds after the engine stops running, simultaneously turn off gas flow measuring device No. 2 and if applicable, turn off the hydrocarbon integrator No. 2, mark the hydrocarbon recorder chart and position the sample selector valves to the "standby" position (and open the valves isolating particulate filter No. 1, if applicable). Record the measured roll or shaft revolutions (both gas meter or flow measurement instrumentation readings), and reset the counter. As soon as possible, transfer the "stabilized" exhaust

and dilution air samples to the analytical system and process the samples according to §86.140, obtaining a stabilized reading of the exhaust bag sample on all analyzers within 20 minutes of the end of the sample collection phase of the test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period. (If it is not possible to perform analysis on the methanol and formaldehyde samples within 24 hours, the samples should be stored in a dark cold (4-10 °C) environment until analysis. The samples should be analyzed within fourteen days.)

(15) Immediately after the end of the sample period, turn off the cooling fan and close the engine compartment cover.

(16) Turn off the CVS or disconnect the exhaust tube from the tailpipe(s) of the vehicle.

(17) Repeat the steps in paragraphs (b)(2) through (b)(2) of this section for the hot start test, except only two evacuated sample bags, two methanol sample impingers, and two formaldehyde sample impingers are required. The step in paragraph (b)(9) of this section shall begin between 9 and 11 minutes after the end of the sample period for the cold start test.

(18) At the end of the deceleration which is scheduled to occur at 505 seconds, simultaneously turn off gas flow measuring device No. 1 (and the petroleum-fueled diesel hydrocarbon integrator No. 1, mark the petroleum-fueled diesel hydrocarbon recorder chart) and position the sample selector valve to the "standby" position. (Engine shutdown is not part of the hot start test sample period.) Record the measured roll or shaft revolutions (and the No. 1 gas meter reading or flow measurement instrument). (Carefully remove the third pair of particulate sample filters from its holder and place in a clean petri dish and cover, if applicable.)

(19) As soon as possible, transfer the hot start "transient" exhaust and dilution air samples to the analytical system and process the samples according to §86.140, obtaining a stabilized reading of the exhaust bag sample on all analyzers within 20 minutes of the end of the sample collection phase of the

§ 86.237-94

test. Obtain methanol and formaldehyde sample analyses, if applicable, within 24 hours of the end of the sample period. (If it is not possible to perform analysis on the methanol and formaldehyde samples, within 24 hours the samples should be stored in a dark cold (4-10 °C) environment until analysis. The samples should be analyzed within fourteen days.)

(20) Disconnect the exhaust tube from the vehicle tailpipe(s) and drive the vehicle from dynamometer.

(21) The CVS or CFV may be turned off, if desired.

(22) Vehicles to be tested for evaporative emissions will proceed according to § 86.138. For all others this completes the test sequence.

[71 FR 77925, Dec. 27, 2006]

§ 86.237-94 Dynamometer test run, gaseous emissions.

(a) The complete dynamometer test consists of a cold start drive of approximately 7.5 miles (12.1 kilometers) and a hot start drive of approximately 3.6 miles (5.8 kilometers).

(b) If the preconditioned vehicle is not already on the dynamometer, it shall be pushed into position.

(c) The vehicle is allowed to stand on the dynamometer during the ten minute time period between the cold and hot start test. The cold start test is divided into two periods. The first period, representing the cold start "transient" phase, terminates at the end of the deceleration which is scheduled to occur at 505 seconds of the driving schedule. The second period, representing the "stabilized" phase, consists of the remainder of the driving schedule, including engine shutdown. The hot start test is identical to the first part or transient phase of the cold start test. Therefore, the hot start test terminates after the first period (505 seconds) is run.

(d) The provisions of § 86.137(b) apply to this subpart.

§§ 86.238-94-86.239-94 [Reserved]

§ 86.240-94 Exhaust sample analysis.

The provisions of § 86.140 apply to this subpart.

40 CFR Ch. I (7-1-07 Edition)

§ 86.241-94 [Reserved]

§ 86.242-94 Records required.

The provisions of § 86.142-90 apply to this subpart.

§ 86.243-94 [Reserved]

§ 86.244-94 Calculations; exhaust emissions.

The provisions of § 86.144-94 apply to this subpart, except that NO_x measurements are optional. Should NO_x measurements be calculated, note that the humidity correction factor is not valid at colder temperatures. Light-duty vehicles and light-duty trucks must calculate and report the weighted mass of each relevant pollutant, i.e., THC, CO, THCE, NMHC, NMHCE, CH₄, NO_x, and CO₂ in grams per vehicle mile.

[71 FR 77926, Dec. 27, 2006; 72 FR 7921, Feb. 21, 2007]

§ 86.245-94 [Reserved]

§ 86.246-94 Intermediate temperature testing.

(a) This section is applicable to tests which are conducted at an intermediate temperature as defined in § 86.094-2.

(b) For testing during ambient temperatures of less than 50 °F (10 °C), the test procedure is identical to the test procedure that is used for testing at 20 °F (-7 °C) contained in 40 CFR part 86, subpart C.

(c) For testing at temperatures of 50 °F (10 °C) or higher, the FTP shall be used.

Subpart D—Emission Regulations for New Gasoline-Fueled and Diesel-Fueled Heavy-Duty Engines; Gaseous Exhaust Test Procedures

AUTHORITY: Secs. 202, 206, 207, 208, 301(a), Clean Air Act, as amended (42 U.S.C. 1857f-1, 1857f-5, 1857f-5a, 1857f-6, 1857g(a)).

SOURCE: 42 FR 45154, Sept. 8, 1977, unless otherwise noted.

§ 86.301-79 Scope; applicability.

This subpart contains gaseous emission test procedures for gasoline-fueled