

Environmental Protection Agency

§ 86.159-00

§ 86.132-00, and an engine idle period of 1 to 2 minutes, after which the vehicle is accelerated into the US06 cycle. A proportional part of the diluted exhaust is collected continuously for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler. Optionally, as specified in § 86.159-08 and in part 600 of this chapter, a proportional part of the diluted exhaust may be collected continuously in two bag samples, one representing US06 City driving and the other representing US06 Highway driving. If two bag samples are collected, for petroleum-fueled diesel-cycle vehicles for which THC is sampled and analyzed continuously according to the provisions of § 86.110, the analytical system shall be configured to calculate THC for the US06 City phase and the US06 Highway phase as described in § 86.159-08.

(d) *SC03 Test Cycle.* The test procedure for determining exhaust emissions with the air conditioner operating (see § 86.160-00) is designed to determine gaseous exhaust emissions from light-duty vehicles and light-duty trucks while simulating an urban trip during ambient conditions of 95 °F, 100 grains of water/pound of dry air (approximately 40 percent relative humidity), and a solar heat load intensity of 850 W/m². The full test consists of vehicle preconditioning (see § 86.132-00 paragraphs (o)(1) and (2)), an engine key-off 10 minute soak, an engine start, and operation over the SC03 cycle. A proportional part of the diluted exhaust is collected continuously during the engine start and the SC03 driving cycle for subsequent analysis, using a constant volume (variable dilution) sampler or critical flow venturi sampler.

(e) The emission results from the aggressive driving test (§ 86.159-08), air conditioning test (§ 86.160-00), and FTP test (§ 86.130-00 (a) through (d) and (f)) (conducted on a large single roll or equivalent dynamometer) are analyzed according to the calculation methodology in § 86.164-08 and compared to the applicable SFTP emission standards in subpart S of this part.

(f) These test procedures may be run in any sequence that maintains the ap-

plicable preconditioning elements specified in § 86.132-00.

[71 FR 77920, Dec. 27, 2006]

§ 86.159-00 Exhaust emission test procedures for US06 emissions.

(a) *Overview.* The dynamometer operation consists of a single, 600 second test on the US06 driving schedule, as described in appendix I, paragraph (g), of this part. The vehicle is preconditioned in accordance with § 86.132-00, to bring it to a warmed-up stabilized condition. This preconditioning is followed by a 1 to 2 minute idle period that proceeds directly into the US06 driving schedule during which continuous proportional samples of gaseous emissions are collected for analysis. If engine stalling should occur during cycle operation, follow the provisions of § 86.136-90 (engine starting and restarting). For gasoline-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO₂, CH₄, and NO_x. For petroleum-fueled diesel-cycle vehicles, THC is sampled and analyzed continuously according to the provisions of § 86.110. Parallel bag samples of dilution air are analyzed for THC, CO, CO₂, CH₄, and NO_x.

(b) *Dynamometer activities.* (1) All official US06 tests shall be run on a large single roll electric dynamometer, or an approved equivalent dynamometer configuration, that satisfies the requirements of § 86.108-00.

(2) Position (vehicle can be driven) the test vehicle on the dynamometer and restrain.

(3) Required US06 schedule test dynamometer inertia weight class selections are determined by the test vehicles test weight basis and corresponding equivalent weight as listed in the tabular information of § 86.129-94(a) and discussed in § 86.129-00 (e) and (f).

(4) Set the dynamometer test inertia weight and roadload horsepower requirements for the test vehicle (see § 86.129-00 (e) and (f)). The dynamometer's horsepower adjustment settings shall be set to match the force imposed during dynamometer operation with actual road load force at all speeds.

(5) 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.

(6) The drive wheel tires may be inflated up to a gauge pressure of 45 psi (310 kPa), or the manufacturer's recommended pressure if higher than 45 psi, in order to prevent tire damage. The drive wheel tire pressure shall be reported with the test results.

(7) The driving distance, as measured by counting the number of dynamometer roll or shaft revolutions, shall be determined for the test.

(8) 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.

(9) During dynamometer operation, a fixed speed cooling fan with a maximum discharge velocity of 15,000 cfm will 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 positioned within 24 inches (61 centimeters) of the vehicle. In the case of vehicles with rear engine compartments (or if special designs make the above impractical), the cooling fan(s) shall be placed in a position to provide sufficient air to maintain vehicle cooling. The Administrator may approve modified cooling configurations or additional cooling if necessary to satisfactorily perform the test. In approving requests for additional or modified cooling, the Administrator will consider such items as actual road cooling data and whether such additional cooling is needed to provide a representative test.

(c) The flow capacity of the CVS shall be large enough to virtually eliminate water condensation in the system.

(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.

(e) Perform the test bench sampling sequence outlined in § 86.140-94 prior to or in conjunction with each series of exhaust emission measurements.

(f) *Test activities.* (1) The US06 consists of a single test which is directly preceded by a vehicle preconditioning in accordance with § 86.132-00. Following the vehicle preconditioning, the vehicle is idled for not less than one minute and not more than two minutes. The equivalent dynamometer mileage of the test is 8.0 miles (1.29 km).

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

(i) Immediately after completion of the preconditioning, idle the vehicle. The idle period is not to be less than one minute or not greater than two minutes.

(ii) With the sample selector valves in the "standby" position, connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(iii) Start the CVS (if not already on), the sample pumps, 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 should be preheated to their respective operating temperatures before the test begins.

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

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

(B) For THC samples, the minimum FID (or HFID in the case of diesel-cycle vehicles) flow rate is 0.066 cfm (0.031 liters/sec).

(C) CFV sample flow rate is fixed by the venturi design.

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

(vi) Start the gas flow measuring device, position the sample selector valves to direct the sample flow into the exhaust sample bag, the dilution air sample bag, 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).

(vii) Place vehicle in gear after starting the gas flow measuring device, but prior to the first acceleration. Begin the first acceleration 5 seconds after starting the measuring device.

(viii) Operate the vehicle according to the US06 driving schedule, as described in appendix I, paragraph (g), of this part. Manual transmission vehicles shall be shifted according to the manufacturer recommended shift schedule, subject to review and approval by the Administrator. For further guidance on transmissions see § 86.128-00.

(ix) Turn the engine off 2 seconds after the end of the last deceleration (i.e., engine off at 596 seconds).

(x) Five seconds after the engine stops running, simultaneously turn off gas flow measuring device No. 1 (and the petroleum-fueled diesel hydrocarbon integrator No. 1 and mark the petroleum-fueled diesel hydrocarbon recorder chart if applicable) and position the sample selector valves to the "standby" position. Record the measured roll or shaft revolutions and the No. 1 gas meter reading or flow measurement instrument.

(xi) As soon as possible, transfer the exhaust and dilution air bag samples to the analytical system and process the samples according to § 86.140-94 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.

(xii) Immediately after the end of the sample period, turn off the cooling fan, close the engine compartment cover, disconnect the exhaust tube from the vehicle tailpipe(s), and drive the vehicle from dynamometer.

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

§ 86.159-08 Exhaust emission test procedures for US06 emissions.

(a) *Overview.* The dynamometer operation consists of a single, 600 second test on the US06 driving schedule, as described in appendix I, paragraph (g), of this part. The vehicle is preconditioned in accordance with § 86.132-00, to bring it to a warmed-up stabilized condition. This preconditioning is followed by a 1 to 2 minute idle period that proceeds directly into the US06 driving schedule during which continuous proportional samples of gaseous emissions are collected for analysis. US06 emissions may optionally be collected in two bag samples representing US06 City and US06 Highway emissions, as provided for in this section and in part 600 of this chapter. Emissions from seconds 0-130 and seconds 495-596 are collected in one bag to represent US06 City emissions, and emissions from seconds 130-495 are collected in a second bag to represent US06 Highway emissions. If engine stalling should occur during cycle operation, follow the provisions of § 86.136-90 (engine starting and restarting). For gasoline-fueled Otto-cycle vehicles, the composite samples collected in bags are analyzed for THC, CO, CO₂, CH₄, and NO_x. For petroleum-fueled diesel-cycle vehicles, THC is sampled and analyzed continuously according to the provisions of § 86.110. Parallel bag samples of dilution air are analyzed for THC, CO, CO₂, CH₄, and NO_x.

(b) *Dynamometer activities.* (1) All official US06 tests shall be run on a large single roll electric dynamometer, or an approved equivalent dynamometer configuration, that satisfies the requirements of § 86.108-00.

(2) Position (vehicle can be driven) the test vehicle on the dynamometer and restrain.

(3) Required US06 schedule test dynamometer inertia weight class selections are determined by the test vehicles test weight basis and corresponding equivalent weight as listed in the tabular information of § 86.129-94(a) and discussed in § 86.129-00 (e) and (f).

(4) Set the dynamometer test inertia weight and roadload horsepower requirements for the test vehicle according to § 86.129-00 (e) and (f). The

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