

than to the refueling emissions canister(s) when required by this test procedure.

(c) For preconditioning that involves loading the vapor collection canister(s) with butane, provide valving or other means as necessary to allow loading of the canister(s).

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**§ 86.153-98 Vehicle and canister preconditioning; refueling test.**

(a) *Vehicle and canister preconditioning.* Vehicles and vapor storage canisters shall be preconditioned in accordance with the preconditioning procedures for the supplemental two-diurnal evaporative emissions test specified in § 86.132-96 (a) through (j). For vehicles equipped with non-integrated refueling emission control systems, the canister must be loaded using the method involving butane loading to breakthrough (see § 86.132-96(j)(1)).

(b) *Seal test.* The Administrator may choose to omit certain canister load and purge steps, and replace them with a bench purge of the refueling canister(s), in order to verify the adequacy of refueling emission control system seals. Failure of this seal test shall constitute a failure of the refueling emission control test. For integrated systems, this bench purge may be performed after the exhaust testing in order to obtain exhaust emission test results. Non-integrated system seal testing shall be performed using paragraph (b)(1) of this section.

(1) *Without the exhaust emission test.* The Administrator may conduct the canister preconditioning by purging the canister(s) with at least 1200 canister bed volumes of ambient air (with humidity controlled to 50±25 grains of water vapor per pound of dry air) maintained at a nominal flow rate of 0.8 cfm directly following the preconditioning drive described in § 86.132-96 (c) through (e). In this case, the canister loading procedures and the vehicle driving procedures described in § 86.132-96 (f) through (j) and in paragraphs (c) through (d) of this section shall be omitted, and the 10 minute and 60 minute time requirements of paragraph (e) of this section shall apply to time after completion of the bench purge. In

the case of multiple refueling canisters, each canister shall be purged separately.

(2) *With the exhaust emission test.* The Administrator may conduct the canister preconditioning by purging the canister(s) directly after the exhaust test (see paragraph (c)(1) of this section). The canister shall be purged with at least 1200 canister bed volumes of ambient air (with humidity controlled to 50±25 grains of water vapor per pound of dry air) maintained at a nominal flow rate of 0.8 cfm. In this case, the vehicle driving procedures described in paragraphs (c)(2) through (d) of this section shall be omitted, and the 10 minute and 60 minute time requirements of paragraph (e) of this section shall apply to time after completion of the bench purge. In the case of multiple refueling canisters, each canister shall be purged separately.

(c) *Canister purging; integrated systems.* (1) Vehicles to be tested for exhaust emissions only shall be processed according to §§ 86.135-94 through 86.137-96. Vehicles to be tested for refueling emissions shall be processed in accordance with the procedures in §§ 86.135-94 through 86.137-96, followed by the procedures outlined in paragraph (c)(2) of this section.

(2) To provide additional opportunity for canister purge, conduct additional driving on a dynamometer, within one hour of completion of the hot start exhaust test, by operating the test vehicle through one UDSS, a 2 minute idle, two NYCCs, another 2 minute idle, another UDSS, then another 2 minute idle (see § 86.115-78 and appendix I of this part). Fifteen seconds after the engine starts, place the transmission in gear. Twenty seconds after the engine starts, begin the initial vehicle acceleration of the driving schedule. The transmission shall be operated according to the specifications of § 86.128-79 during the driving cycles. The vehicle's air conditioner (if so equipped) shall be turned off. Ambient temperature shall be controlled as specified in § 86.151-98. It is not necessary to monitor and/or control in-tank fuel temperatures.

(i) The fixed-speed fan specified in § 86.135-94(b) may be used for engine cooling. If a fixed-speed fan is used, the vehicle's hood shall be opened.

(ii) Alternatively, the roadspeed-modulated fan specified in § 86.107-96(d)(1) may be used for engine cooling. If a road-speed modulated fan is used, the vehicle's hood shall be closed.

(d) *Canister purging; non-integrated systems.* Within one hour of completion of canister loading to breakthrough, the fuel tank(s) shall be further filled to 95 percent of nominal tank capacity determined to the nearest one-tenth of a U.S. gallon (0.38 liter) with the fuel specified in § 86.113-94. During this refueling operation, the refueling emissions canister(s) shall be disconnected. Following completion of refueling, the refueling emissions canister(s) shall be reconnected. Special care shall be taken during this step to avoid damage to the components and the integrity of the fuel system. Vehicle driving to purge the refueling canister(s) shall be performed using either the chassis dynamometer procedure or the test track procedure, as described in paragraphs (d)(1) and (d)(2) of this section. The Administrator may choose to shorten the vehicle driving for a partial refueling test as described in paragraph (d)(3) of this section. For vehicles equipped with dual fuel tanks, the required volume of fuel shall be driven out of one tank, the second tank shall be selected as the fuel source, and the required volume of fuel shall be driven out of the second tank.

(1) *Chassis dynamometer procedure.* (i) Vehicle driving on a chassis dynamometer shall consist of repeated drives with the UDDS until 85 percent of fuel tank capacity has been consumed. Driving in testing performed by manufacturers may be terminated before 85 percent of the fuel tank capacity has been consumed, provided that driving is not terminated partway through a UDDS cycle. Driving in testing performed by the Administrator may be terminated after the same number of UDDS cycles as driven in the manufacturer's certification testing.

(ii) Except with the advance approval of the Administrator, the number of UDDSs required to consume 85 percent of tank fuel capacity (total capacity of both tanks when the vehicle is equipped with dual fuel tanks) shall be determined from the fuel economy on the UDDS applicable to the test vehicle

and from the number of gallons to the nearest 0.1 gallon (0.38 liter) that constitutes 85 percent of tank volume. If this "fuel consumed point" occurs partway through a UDDS cycle, the cycle shall be completed in its entirety.

(iii) For vehicles equipped with dual fuel tanks, fuel switching from the first tank to the second tank shall occur at the 10 percent volume of the first tank regardless of the point in the UDDS cycle at which this occurs.

(iv) If necessary to accommodate work schedules, the engine may be turned off and the vehicle parked on the dynamometer. The vehicle may be parked off of the dynamometer to facilitate maintenance or repairs if required.

(v) During the driving on the dynamometer, a cooling fan(s) shall be positioned as described in § 86.135-94(b).

(2) *Test track procedure.* (i) Vehicle driving on a test track shall consist of repeated drives with the UDDS until 85 percent of fuel tank capacity has been consumed. Driving performed by manufacturers may be terminated before 85 percent of the fuel tank capacity has been consumed, provided that driving is not terminated partway through a UDDS cycle. Driving performed by the Administrator may be terminated after the same number of UDDS cycles as driven in the manufacturer's certification testing.

(ii) If the distance from the emission laboratory to the test track is less than 5 miles (8.05 km) the vehicle may be driven to the test track at a speed not to exceed 25 mph. If the distance is greater than 5 miles (8.05 km) the vehicle shall be moved to the test track with the engine off.

(iii) Except with the advance approval of the Administrator, the number of UDDSs required to consume 85 percent of tank fuel capacity (total capacity of both tanks when the vehicle is equipped with dual fuel tanks) shall be determined from the fuel economy on the UDDS applicable to the test vehicle and from the number of gallons to the nearest 0.1 gallon (0.38 liter) that constitutes 85 percent of tank volume. If this "fuel consumed point" occurs partway through a UDDS cycle, the cycle shall be completed in its entirety.

(iv) The vehicle shall be driven at a speed not to exceed 25 mph from the test track to the laboratory provided the distance from the test track to the laboratory does not exceed 5 miles (8.05 km). If the distance from the test track to the emission laboratory is greater than 5 miles (8.05 km) the vehicle shall be moved from the test track with the engine off.

(v) For vehicles equipped with dual fuel tanks, fuel switching from the first tank to the second tank shall occur at the 10 percent volume of the first tank regardless of the point in the UDDS cycle at which this occurs.

(vi) If necessary to accommodate work schedules, the engine may be turned off and the vehicle parked on the test track. The vehicle may be parked off of the test track to facilitate maintenance or repairs if required. If the vehicle is moved from the test track, it shall be returned to the track with the engine off when mileage accumulation is to be resumed.

(3) *Drive schedule for partial refueling test.* The Administrator may conduct a partial refueling test involving a shortening of the drive procedures described in paragraphs (d) (1) and (2) of this section and a modified soak and refueling procedure as described in paragraph (e) of this section and § 86.154-98(e)(7)(i). The drive shall be performed as described in paragraph (d) (1) or (2) of this section except that the drive shall be terminated when at least 10 percent but no more than 85 percent of the fuel tank nominal capacity has been consumed and not partway through a UDDS cycle. The amount of fuel consumed in the drive shall be determined by multiplying the number of UDDSs driven by the mileage accumulated per UDDS and dividing by the fuel economy for the UDDS applicable to the test vehicle.

(e) *Vehicle cool down*—(1) *Partial refueling test.* If the Administrator is conducting the non-integrated system partial refueling test, after the driving procedure specified in paragraph (d)(3) of this section, the vehicle shall be parked (without starting the engine) and soaked at  $80\pm 3$  °F ( $27\pm 1.7$  °C) for a minimum of 1 hour and a maximum of 6 hours.

(2) *For all other refueling emission tests.* Within 10 minutes of completion of refueling emissions canister stabilization (see paragraph (c) or (d) of this section), the refueling emissions canister(s) shall be disconnected. Within 60 minutes of completion of refueling emissions canister stabilization (see paragraph (c) or (d) of this section), the vehicle fuel tank(s) shall be drained, the fuel tank(s) fueled to 10 percent of nominal tank capacity determined to the nearest one-tenth of a U.S. gallon (0.38 liter) with the specified fuel, and the vehicle parked (without starting the engine) and soaked at  $80\pm 3$  °F ( $27\pm 1.7$  °C) for a minimum of 6 hours and a maximum of 24 hours.

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**§ 86.154-98 Measurement procedure; refueling test.**

(a) The refueling test measurement procedure described in this section immediately follows the vehicle and canister preconditioning described in § 86.153-98.

(b) The refueling emission enclosure shall be purged for several minutes immediately prior to the test. Warning: If at any time the concentration of hydrocarbons, of methanol, or of methanol and hydrocarbons exceeds 15,000 ppm C, the enclosure should be immediately purged. This concentration provides a 4:1 safety factor against the lean flammability limit.

(c)(1) The FID (or HFID) hydrocarbon analyzer, and additional analyzer, if needed, shall be zeroed and spanned immediately prior to the test.

(2) For methanol-fueled vehicles only, impingers charged with known volumes of pure deionized water shall be placed in the methanol sampling system.

(d) If not already on, the enclosure mixing fan and the spilled fuel mixing blower shall be turned on at this time.

(e) The refueling emission measurement portion of the refueling test shall be performed as follows:

(1) The line from the fuel tank(s) to the refueling emissions canister(s) shall be connected.