

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> and NO<sub>x</sub>. 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. Parallel samples of the dilution air are similarly analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>x</sub>. 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> and NO<sub>x</sub>. 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). Parallel bag samples of dilution air are analyzed for THC, CO, CO<sub>2</sub>, CH<sub>4</sub> and NO<sub>x</sub>. Methanol and formaldehyde samples may be omitted for 1990 through 1994 model years when a FID calibrated on methanol is used.

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

[56 FR 25775, June 5, 1991, as amended at 59 FR 48510, Sept. 21, 1994]

**§ 86.136-90 Engine starting and re-starting.**

(a) *Otto-cycle vehicles.* Paragraph (a) of this section applies to Otto-cycle vehicles.

(1) The engine shall be started according to the manufacturer's recommended starting procedures in the owner's manual. The initial 20-second idle period shall begin when the engine starts.

(2) *Choke operation:* (i) Vehicles equipped with automatic chokes shall be operated according to the manufacturer's operating instructions in the owner's manual, including choke setting and "kick-down" from cold fast idle.

(ii) Vehicles equipped with manual chokes shall be operated according to the manufacturer's operating instructions in the owner's manual.

(3) The transmission shall be placed in gear 15 seconds after the engine is started. If necessary, braking may be employed to keep the drive wheels from turning.

(4) The operator may use the choke, accelerator pedal, etc., where necessary to keep the engine running.

(5) If the manufacturer's operating instructions in the owner's manual do not specify a warm engine starting procedure, the engine (automatic and manual-choke engines) shall be started by depressing the accelerator pedal about half way and cranking the engine until it starts.

(b) *Diesel vehicles.* The engine shall be started according to the manufacturers recommended starting procedures in the owners manual. The initial 20-second idle period shall begin when the engine starts. The transmission shall be placed in gear 15 seconds after the engine is started. If necessary, braking may be employed to keep the drive wheels from turning.

(c) If the vehicle does not start after the manufacturer's recommended cranking time (or 10 continuous seconds in the absence of a manufacturer's recommendation), cranking shall cease for the period recommended by the manufacturer (or 10 seconds in the absence of a manufacturer's recommendation). This may be repeated for up to three start attempts. If the vehicle does not start after three attempts, the reason for failure to start shall be determined. The gas flow measuring device on the constant volume sampler (usually a revolution counter) or CFV (and the hydrocarbon integrator and particulate sampling system when testing petroleum-fueled diesel vehicles and the particulate sampling system when testing methanol-fueled diesel vehicles, see § 86.137) shall be turned off and the sampler selector valves, including the methanol sampler, placed in the "standby" position during this diagnostic period. In addition, either the CVS should be turned off, or the exhaust tube disconnected from the tailpipe during the diagnostic period. If failure to start is an

operational error, the vehicle shall be rescheduled for testing from a cold start.

(d) If the engine "false starts" the operator shall repeat the recommended starting procedure (such as resetting the choke, etc.).

(e) *Stalling.* (1) If the engine stalls during an idle period, the engine shall be restarted immediately and the test continued. If the engine cannot be started soon enough to allow the vehicle to follow the next acceleration as prescribed, the driving schedule indicator shall be stopped. When the vehicle restarts, the driving schedule indicator shall be reactivated.

(2) If the engine stalls during some operating mode other than idle, the driving schedule indicator shall be stopped, the vehicle shall then be restarted and accelerated to the speed required at that point in the driving schedule and the test continued. During acceleration to this point, shifting shall be performed in accordance with § 86.128.

(3) If the vehicle will not restart within one minute, the test shall be voided, the vehicle removed from the dynamometer, corrective action taken, and the vehicle rescheduled for test. The reason for the malfunction (if determined) and the corrective action taken shall be reported to the Administrator.

[54 FR 14530, Apr. 11, 1989, as amended at 58 FR 16042, Mar. 24, 1993; 59 FR 48510, Sept. 21, 1994]

**§ 86.137-90 Dynamometer test run, gaseous and particulate emissions.**

(a) *General*—(1) *Gasoline-fueled and methanol-fueled Otto-cycle vehicles.* The vehicle shall be allowed to stand with the engine turned off for a period of not less than 12 hours or more than 36 hours before the cold start exhaust emission test. The cold start exhaust test shall follow the diurnal breathing loss test by not more than one hour. 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.

(2) *Petroleum-fueled and methanol-fueled diesel vehicles.* The vehicle shall be allowed to stand with the engine turned off for a period of not less than 12 hours or more than 36 hours before the cold start exhaust emission test. 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 start of the "transient" phase, terminates at the same point in the 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.