

Environmental Protection Agency

§ 86.1336-84

paragraph (f) of this section must be met before the cold cycle exhaust emission test may begin.

[62 FR 47131, Sept. 5, 1997]

§ 86.1336-84 Engine starting, restarting, and shutdown.

(a) The engine shall be started according to the manufacturer's recommended starting procedure in the owner's manual, using either a production starter motor or the dynamometer. The speed at which the engine is cranked (motored) with the dynamometer shall be equal to the cranking speed (nominal speed ± 10 percent) in the vehicle with a fully charged battery. The time taken to accelerate the engine to cranking speed by the dynamometer shall be equal (nominal ± 0.5 seconds) to the time required with a starter motor. Motoring by the dynamometer shall be terminated not more than one second after the engine starts. The 24 ± 1 -second free idle period, and declutching if applicable, shall begin when the engine is determined to have started.

(1) Engines 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.

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

(3) The operator may use the choke, throttle, etc. where necessary to keep the engine running.

(4) 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 throttle half way and cranking the engine until it starts.

(b)(1) If the engine does not start after 15 seconds of cranking, cranking shall cease and the reason for failure to start shall be determined. The gas flow measuring device (or revolution counter) on the constant volume sampler (and the hydrocarbon integrator when testing diesel-fueled engines) shall be turned off during this diagnostic period. In addition, either the CVS should be turned off or the ex-

haust tube disconnected from the tailpipe during the diagnostic period. If failure to start is an operational error, the engine shall be rescheduled for testing from a cold start.

(2) If longer cranking times are necessary and recommended to the ultimate purchaser, such cranking times may be used in lieu of the 15-second limit, provided the owner's manual and the service repair manual indicate that the longer cranking times are normal.

(3) If a failure to start occurs during the cold portion of the test and is caused by an engine malfunction, corrective action of less than 30 minutes duration may be taken (according to § 86.084-25), and the test continued. The sampling system shall be reactivated at the same time cranking begins. When the engine starts, the timing sequence shall begin. If failure to start is caused by engine malfunction and the engine cannot be started, the test shall be voided and corrective action may be taken according to § 86.084-25.

(4) If a failure to start occurs during the hot start portion of the test and is caused by engine malfunction, the engine must be started within one minute of key on. The sampling system shall be reactivated at the same time cranking begins. When the engine starts, the transient engine cycle timing sequence shall begin. If the engine cannot be started within one minute of key on, the test shall be voided, corrective action taken (according to § 86.084-25), and the engine rescheduled for testing.

(c) *Engine stalling.* (1) If the engine stalls during the initial idle period of either the cold or hot start test, the engine shall be restarted immediately using the appropriate cold or hot starting procedure and the test continued.

(2) If the engine stalls anywhere in the cold cycle, except in the initial idle period, the test shall be voided.

(3) If the engine stalls on the hot cycle portion of the test at any time other than the initial idle, the engine may be shut off and resoaked for 20 minutes. The hot cycle may then be rerun. Only one hot start resoak and restart is permitted.

(d) *Engine shutdown.* Engine shutdown shall be performed in accordance with manufacturer's specifications.

(e) *Test equipment malfunction*—(1) *Gasoline- and methanol-fueled engines.* If a malfunction occurs in any of the required test equipment during the test run, the test shall be voided.

(2) *Diesel-fueled, natural gas-fueled and liquefied petroleum gas-fueled engines.* (i) If a malfunction occurs in any of the required test equipment during the cold cycle portion of the test, the test shall be voided.

(ii) If a malfunction occurs in any of the required test equipment (computer, gaseous emissions analyzer, etc.) during the hot cycle portion of the test, complete the full engine cycle before engine shut-down then resoak for 20 minutes.

(A) If the test equipment malfunction can be corrected before the resoak period has been completed, the hot cycle portion of the test may be rerun.

(B)(1) If the test equipment malfunction is corrected after the completion of the resoak period, then the preconditioning cycle must be run before the hot cycle. This consists of a full 20 minute transient cycle followed by a 20 minute soak and then the for-record hot cycle.

(2) In no case can the start of the cold cycle and the start of the hot cycle be separated by more than 4 hours.

(Secs. 202, 203, 206, 207, 208, 301a, Clean Air Act, as amended; 42 U.S.C. 7521, 7522, 7525, 7541, 7542, 7601a)

[48 FR 52210, Nov. 16, 1983, as amended at 49 FR 48145, Dec. 10, 1984; 50 FR 10694, Mar. 15, 1985; 52 FR 47874, Dec. 16, 1987; 58 FR 16065, Mar. 24, 1993; 59 FR 48533, Sept. 21, 1994]

§ 86.1337-90 Engine dynamometer test run.

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

(1) Prepare the engine, dynamometer, and sampling system for the cold-start test. Change filters, etc., and leak check as necessary.

NOTE: For a single dilution particulate system, a propane check will not reveal a pressure side leak (that portion of the system downstream of the pump) since the volume concentration in ppm will not change if a portion of the sample is lost. A separate leak check is needed.

A leak check of a filter assembly that has only one seal ring in contact with the filter media will not detect a leak when tested

under vacuum. A pressure leak test should be performed.

(2) Connect evacuated sample collection bags to the dilute exhaust and dilution air sample collection systems.

(3) For methanol-fueled vehicles, install fresh methanol and formaldehyde impingers (or cartridges) in the exhaust and dilution air sample systems for methanol and formaldehyde. A single dilution air sample covering the total test period may be utilized for methanol and formaldehyde background. (Background measurements of methanol and formaldehyde may be omitted and concentrations assumed to be zero for calculations in § 86.1344.)

(4) Attach the CVS to the engine exhaust system any time prior to starting the CVS.

(5) Start the CVS (if not already on), the sample pumps (except for the particulate sample pump(s), if applicable), the engine cooling fan(s), and the data collection system. The heat exchanger of the constant volume sampler (if used), and the heated components of any continuous sampling system(s) (if applicable) shall be preheated to their designated operating temperatures before the test begins. (See § 86.1340(e) for continuous sampling procedures.)

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

NOTE: CFV-CVS sample flow rate is fixed by the venturi design.

(7) For diesel engines tested for particulate emissions, carefully install a clean particulate sample filter into each of the filter holders and install the assembled filter holders in the sample flow line (filter holders may be preassembled).

(8) Follow the manufacturers choke and throttle instructions for cold starting. Simultaneously start the engine and begin exhaust and dilution air sampling. For petroleum-fueled diesel engines (and natural gas-fueled, liquified petroleum gas-fueled or methanol-fueled diesels, if used), turn on the hydrocarbon and NO_x (and CO and CO₂, if continuous) analyzer system integrators (if used), and turn on the particulate sample pumps and indicate the start of the test on the data collection medium.

(9) As soon as it is determined that the engine is started, start a "free