

Environmental Protection Agency

§ 90.408

engine with cooling air and the original cooling fan may be removed.

(d) All emission control systems installed on or incorporated in the application must be functioning during all procedures in this subpart. In case of component malfunction or failure, no maintenance is allowed without prior approval from the Administrator, in accordance with § 90.119.

[60 FR 34598, July 3, 1995, as amended at 64 FR 15244, Mar. 30, 1999; 65 FR 24312, Apr. 25, 2000]

§ 90.405 Recorded information.

(a) Record the information described in this section for each test, where applicable.

(b) *Test data; general.* (1) Engine identification number.

(2) Engine emission control system.

(3) Test operator(s).

(4) Number of hours of operation accumulated on the engine prior to beginning the warm-up portion of the test (to the nearest tenth hour).

(5) Fuel identification.

(6) For 2-stroke engines, fuel/oil mixture ratio.

(7) Date of most recent analyzer bench calibration.

(8) All pertinent instrument information such as tuning, gain, serial numbers, detector number, and calibration curve(s). As long as this information is traceable, it may be summarized by system number or analyzer identification numbers.

(c) *Test data; pre-test.* (1) Date and time of day.

(2) Test number.

(3) Barometric pressure; as an option, barometric pressure can be measured as a modal measurement instead of or in addition to a pre- and post-test measurement.

(4) Recorder chart or equivalent. Identify for each test segment zero traces for each range used, and span traces for each range used.

(d) *Test data; modal.* (1) Recorder chart or equivalent. Identify for each test mode the emission concentration traces and the associated analyzer range(s).

(2) Observed engine torque.

(3) Observed engine rpm.

(4) Intake air flow if applicable.

(5) Test cell temperature and humidity for each mode.

(6) For raw gas testing; fuel flow for each mode. Fuel flow measurement is not required for dilute testing, but is allowed. If the fuel flow measurement is a volume measurement system, record the fuel temperature in the measurement system for fuel density corrections to the mass flow rate. If the fuel temperature is within 3 °C of the calibration temperature, no density correction is required.

(7) Engine intake temperature and humidity, if applicable.

(8) Exhaust mixing chamber surface temperature, if applicable.

(9) Exhaust sample line temperature, if applicable.

(10) Engine fuel inlet pressure.

(e) *Test data; post-test.* (1) Recorder chart or equivalent. Identify the hang-up check.

(2) Recorder chart or equivalent. Identify the zero traces for each range used and the span traces for each range used.

(3) Total number of hours of operation accumulated on the engine (to the nearest tenth hour).

(4) Barometric pressure, post-test segment.

§ 90.406 Engine parameters to be measured and recorded.

Measure or calculate, then record the engine parameters in Table 1 in Appendix A of this subpart.

§ 90.407 Engine inlet and exhaust systems.

(a) The engine manufacturer is liable for exhaust emission compliance over the full range of air inlet filter systems and exhaust muffler systems.

(b) The air inlet filter system and exhaust muffler system combination used on the test engine must be the systems expected to yield the highest emission levels.

§ 90.408 Pre-test procedures.

(a) *Engine service accumulation and stabilization procedure.* Use the service accumulation procedure determined by the manufacturer for exhaust emission stabilizing of an engine, consistent with good engineering practice (see § 90.118).

(1) The manufacturer determines, for each engine family, the number of hours at which the engine exhaust emission control system combination is stabilized for emission testing. However, this stabilization procedure may not exceed 12 hours. The manufacturer must maintain, and provide to the Administrator upon request, a record of the rationale used in making this determination. If the manufacturer can document that at some time prior to the full 12 hour service accumulation period the engine emissions are decreasing for the remainder of the 12 hours, the service accumulation may be completed at that time. The manufacturer may elect to accumulate 12 hours on each test engine within an engine family without making this determination.

(2) During service accumulation, the fuel and lubricants specified in §90.308 must be used.

(3) Engine maintenance during service accumulation is allowed only in accordance with §90.118.

(b) *Engine pre-test preparation.* (1) Drain and charge the fuel tank(s) with the specified test fuel (see §90.308(b)) to 50 percent of the tank's nominal capacity. If an external fuel tank is used, the engine fuel inlet system pressure must be typical of what the engine will see in use.

(2)(i) Operate the engine on the dynamometer measuring the fuel consumption (fuel consumption required only for raw gas sampling method) and torque before and after the emission sampling equipment is installed, including the sample probe, using the modes specified in the following table.

Engine class	Test cycle	Operating mode
(A) I, I-B, II	A	6
(B) I, I-B, II	B	1
(C) I-A, III, IV, V	C	1

(ii) These modes are from Table 2 in Appendix A of this subpart. The emission sampling equipment may not significantly affect the operational characteristics of the engine (typically the results should agree within five percent).

(c) *Analyzer pre-test procedures.* (1) If necessary, warm up and stabilize the

analyzer(s) before calibrations are performed.

(2) Replace or clean the filter elements and then leak check the system as required by §90.324(a). If necessary, allow the heated sample line, filters, and pumps to reach operating temperature.

(3) Perform the following system checks:

(i) If necessary, check the sample-line temperature. Heated FID sample line temperature must be maintained between 110 °C and 230 °C; a heated NO_x sample line temperature must be maintained between 60 °C and 230 °C.

(ii) Check that the system response time has been accounted for prior to sample collection data recording.

(iii) A HC hang-up check is permitted (see §90.413(e)).

(4) Check analyzer zero and span before and after each test at a minimum. Further, check analyzer zero and span any time a range change is made or at the maximum demonstrated time span for stability for each analyzer used.

(d) Check system flow rates and pressures and reset, if necessary.

[60 FR 34598, July 3, 1995, as amended at 65 FR 24312, Apr. 25, 2000]

§90.409 Engine dynamometer test run.

(a) *Engine and dynamometer start-up.*

(1) Only adjustments in accordance with §90.119 may be made to the test engine prior to starting a test.

(2) If necessary, warm up the dynamometer as recommended by the dynamometer manufacturer or use good engineering practice.

(3) For Phase 1 engines, at the manufacturer's option, the engine can be run with the throttle in a fixed position or by using the engine's governor (if the engine is manufactured with a governor). In either case, the engine speed and load must meet the requirements specified in paragraph (b)(12) of this section. For Phase 2 Class I, Phase 2 Class I-B, and Phase 2 Class II engines equipped with an engine speed governor, the governor must be used to control engine speed during all test cycle modes except for Mode 1 or Mode 6, and no external throttle control may