§ 86.340–79 Gasoline-fueled engine dynamometer test run.

(a) This section applies to gasoline-fueled engines only. Diesel engines are covered in §86.341.

(b)(1) Mount test engine on the engine dynamometer.

(2) Install instrumentation and sample probe.

(3) Read and record the general test data as specified in §86.337(b).

(c) Precondition the engine by the following continuous steps:

(1) The engine shall be started and operated at:
   (i) Zero load in accordance with the manufacturer’s start-up and warm-up procedures for 1 minute ±30 sec;
   (ii) A torque equivalent to 10±3 percent of the most recent determination of maximum torque for 4 minutes ±30 second at 2,000 rpm. This torque level may be exceeded if the choke and fast idle cam mechanism would normally result in a stabilized idle speed in excess of 2,000 rpm.
   (iii) A torque equivalent to 55±5 percent of the most recent determination of maximum torque for 35 minutes ±1 minute at 2000 rpm;

(iv) Option. If the engine has been operating on service accumulation for a minimum of 40 minutes, the service accumulation may be substituted for steps (i) through (iii).

(2) If tested under the provisions of §86.079–29, check specifications as required. This check must be performed within 20 minutes after completion of engine preconditioning;

(3) Determine the maximum torque of the engine at 2000 rpm ±100 rpm;

   (i) Calculate the torque corresponding to 10, 25, 55, and 90 percent of the observed maximum torque value.

(4) Determine the analyzer ranges required for each mode specified in §86.335 to meet the range specifications of §86.338. Prior to determining the range selection, the automatic dynamometer controller, if used, may be calibrated for the prevailing ambient conditions. The engine must not be operated for more than 30 minutes. Cycle 1, or cycles 1 and 2, specified in §86.335, may be used for this purpose.

(5) The engine shall be turned off and allowed to stand for at least 1 hour, but not more than 2 hours, at an average ambient temperature of 25 °C ±5 °C (77 °F ±9 °F).

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

(1) Maintain dynamometer test cell average ambient temperature at 25 °C ±5 °C (77 °F ±9 °F);

(2) Observe pre-test procedures; §86.339;

(3) Start cooling system;

(4) Start engine and operate in accordance with manufacturer’s start-up and warm-up procedures. The duration of the warm-up procedures shall be 5 minutes ±30 seconds. Sample flow may begin during the warm-up;

(5) Read and record all pre-test data specified in §86.337(c) during the 5 minute warm-up;

(6) Release the choke idle-stop (if necessary) and return the engine throttle control to the curb-idle position, start sample flow and recorders if not
already started, and begin test sequence of §86.335;
(7) Should it be determined that the test must be rerun, then only the soak specified in paragraph (c)(5) of this section need be performed prior to paragraph (d) of this section;
(8) Perform the test cycle, §86.335, and continuously record exhaust gas concentrations;
(9) Read and record all modal data specified in §86.337(d) during the test cycle;
(10) The engine speed and load must be maintained within the requirements of §86.343;
(11) If at any time during a test, the test equipment malfunctions or the specifications in paragraph (d)(10) of this section are not met, the test is void, and may be aborted. The test sequence may be restarted under the provisions of paragraph (c)(5) of this section.

(e) Exhaust gas measurements. (1) Measure HC, CO, CO₂, and NOₓ volume concentration in the exhaust sample. Should the analyzer response exceed 100 percent of full scale or respond less than 15 percent of the full scale, the next higher or lower analyzer range shall be used per §86.338. For exceptions to the lower limit see §86.338. Should the fuel flow instrument read below 20 percent of the full-scale value, a flow measurement unit with a lower scale must be used unless the option in §86.314 is desired.

(2) For each analyzer, each range that may be used during a test must have the zero and span responses recorded prior to the execution of that test. Only the range(s) used to measure the emissions during a test are required to have their zero and span recorded after the completion of the test.

(3) If during an emission test the value of gauges downstream of the NDIR analyzer(s) (G3 or G4) differs by more than ±2 inches of water from the pretest value, the test is void.

(5) Precondition the engine in the following manner:
   (i) Operate the engine at idle for 2 to 3 minutes;
   (ii) Operate the engine at approximately 50 percent power at the peak torque speed for 5 to 7 minutes;
   (iii) Operate the engine at rated speed and maximum horsepower for 25 to 30 minutes;
   (iv) Option. It is permitted to precondition the engine at rated speed and maximum horsepower until the oil and water temperatures are stabilized. The temperatures are defined as stabilized if they are maintained within 2 percent of point for 2 minutes. The engine must be operated a minimum of 10 minutes for this option. This optional procedure may be substituted for step (iii);
   (v) Option. If the engine has been operating on service accumulation for a minimum of 40 minutes, the service accumulation may be substituted for steps (i) through (iii);