

Environmental Protection Agency

§ 92.105

(c) The power produced by the engine is measured at each throttle setting.

(d) The fuel flow rate for each throttle setting is measured in accordance with § 92.107.

(e) Locomotives and locomotive engines are tested using the test sequence as detailed in §§ 92.124 and 92.126.

(f) Alternate sampling and/or analytical systems may be used if shown to yield equivalent results, and if approved in advance by the Administrator. Guidelines for determining equivalency are found in Appendix IV of this part.

(g) At the time of the creation of this part, essentially all locomotives and locomotive engines subject to the standards of this part were designed to use diesel fuel. Therefore, the testing provisions of this subpart focus primarily on that fuel. Some provisions for fuels other than diesel are also included. If a manufacturer or remanufacturer of locomotives or locomotive engines, or a user of locomotives, or other party wishes or intends to use a fuel other than diesel in locomotives or locomotive engines, it shall notify the Administrator, who shall specify those changes to the test procedures that are necessary for the testing to be consistent with good engineering practice. The changes made under this paragraph (g) shall be limited to:

(1) Exhaust gas sampling and analysis;

(2) Test fuels; and

(3) Calculations.

§ 92.104 Locomotive and engine testing; overview.

(a) The test procedures described here include specifications for both locomotive testing and engine testing. Unless specified otherwise in this subpart, all provisions apply to both locomotive and engine testing.

(b)(1) The test procedures for engine testing are intended to produce emission measurements that are essentially identical to emission measurements produced during locomotive testing using the same engine configuration. The following requirements apply for all engine tests:

(i) Engine speed setpoints for each mode shall be within 2 percent of the speed of the engine when it is operated

in the locomotive. Engine load setpoints for each mode shall be within 2 percent (or 3.0 horsepower, whichever is greater) of the load of the engine when it is operated in the locomotive.

(ii) The temperature of the air entering the engine after any charge air cooling shall be within 5 °F of the typical intake air temperature when the engine is operated in the locomotive under similar ambient conditions. Auxiliary fan(s) may be used to maintain engine cooling during operation on the dynamometer.

(iii) The engine air inlet system used during testing shall have an air inlet restriction within 1 inch of water of the upper limit of a typical engine as installed with clean air filters, as established by the manufacturer or remanufacturer for the engine being tested.

(2) Testers performing engine testing under this subpart shall not use test procedures otherwise allowed by the provisions of this subpart where such procedures are not consistent with good engineering practice and the regulatory goal specified in paragraph (b)(1) of this section.

(c) Provisions that specify different requirements for locomotive and/or engine testing are described in §§ 92.106, 92.108(a) and (b)(1), 92.111(b)(2) and (c), 92.114(a)(2)(ii), (b)(3)(ii), (c)(2)(iii)(A) and (d), 92.115(c), 92.116, 92.123(a)(2) and (b), 92.124(d), 92.125(a) and (b), 92.126(a)(7)(iii)(A).

[63 FR 18998, Apr. 16, 1998, as amended at 70 FR 40453, July 13, 2005]

§ 92.105 General equipment specifications.

(a) *Chart recorders.* (1) The recommended minimum chart speed for gaseous measurements is 1 cm per minute. (Higher chart speeds are required for smoke measurements during the acceleration phases of the test sequence.)

(2) All chart recorders (analyzers, torque, rpm, etc.) shall be provided with automatic markers which indicate ten second intervals. Preprinted chart paper (ten second intervals) may be used in lieu of the automatic markers provided the correct chart speed is used. (Markers which indicate 1 second

intervals are required for smoke measurements during the acceleration phases of the test sequence.)

(b) *Automatic data collection.* (1) In lieu of the use of chart recorders, automatic data collection equipment may be used to record all required data. The automatic data collection equipment must be capable of sampling at least two records per second.

(2) Other means may be used provided they produce a permanent visual data record of a quality equal to or better than those required by this subpart (e.g., tabulated data, traces, or plots).

(c) *Temperature measurements.* (1) The following temperature measurements shall be accurate to within 1.0 °F (0.6 °C):

(i) Temperature measurements used in calculating the engine intake humidity;

(ii) The temperature of the fuel, in volume measuring flow rate devices;

(iii) The temperature of the sample within the water trap(s);

(iv) Temperature measurements used to correct gas volumes (e.g., to standard conditions) or to calculate mass or moles of a sample.

(2) All other temperature measurements shall be accurate within 3.0 °F (1.7 °C).

(d) *Electrical measurements.* Instruments used to measure engine power output shall comply with the requirements of § 92.106.

(e) *Pressure measurements.* (1) Gauges and transducers used to measure any pressures used to correct gas volumes (e.g., to standard conditions) or to calculate mass or moles of a sample shall have an accuracy and precision of 0.1 percent of absolute pressure at point or better.

(2) Gauges and transducers used to measure any other pressures shall have an accuracy and precision of 1 percent of absolute pressure at point or better.

[63 FR 18998, Apr. 16, 1998, as amended at 70 FR 40453, July 13, 2005]

§ 92.106 Equipment for loading the engine.

For purposes of placing the required load on the engine during an emissions test, either the equipment specified in paragraph (a) of this section, or the

equipment specified in paragraph (b) of this section may be used.

(a) *Locomotive testing.* (1) The equipment required for loading the locomotive engine-alternator/generator assembly electrically, and for measurement of the electrical power output from the alternator/generator consists of the following, either in total or in part: electrical resistance load bank; fans or other means for cooling of the load bank; wattmeter, including phase angle compensation; meter(s) for measurement of the current through the load bank (a calibrated electrical shunt and voltmeter is allowed for current measurement); meter(s) to measure the voltage across the load bank; and electrical cable to connect the alternator/generator to the load bank. Many locomotives are equipped with an internal electrical resistance load bank and fans for cooling of the load bank; when so equipped, the locomotive load bank may be used for purposes of loading the engine during emissions tests.

(2) The combination of instruments (meters) used to measure engine or alternator/generator power output (wattmeter, ammeter, voltmeter) shall have accuracy and precision such that the accuracy of the measured alternator/generator power out is better than:

(i) 2 percent of point at all power settings except idle and dynamic brake; and

(ii) Less accuracy and precision is allowed at idle and dynamic brake, consistent with good engineering practice. Equipment with accuracy or precision worse than 20 percent of point is not allowed.

(3) The efficiency curve for the alternator/generator, shall specify the efficiency at each test point. The manufacturer or remanufacturer shall provide EPA with a detailed description of the procedures used to establish the alternator/generator efficiency.

(b) *Engine testing.* (1) For engine testing using a dynamometer, the engine dynamometer system must be capable of controlling engine torque and speed simultaneously under steady speed operation, during accelerations where the rate of change in torque and speed is representative of those changes which occur when the engine is operating in a