

§ 7.84

- (14) Cylinder head gasket; and
- (15) Precombustion chamber, if applicable.

(d) The application shall include a drawing showing the general arrangement of the engine.

(e) All drawings shall be titled, dated, numbered, and include the latest revision number.

(f) When all necessary testing has been completed, the following information shall be submitted:

- (1) The gaseous ventilation rate for the rated speed and horsepower.
- (2) The particulate index for the rated speed and horsepower.
- (3) A fuel deration chart for altitudes for each rated speed and horsepower.

§ 7.84 Technical requirements.

(a) *Fuel injection adjustment.* The fuel injection system of the engine shall be constructed so that the quantity of fuel injected can be controlled at a desired maximum value. This adjustment shall be changeable only after breaking a seal or by altering the design.

(b) *Maximum fuel-air ratio.* At the maximum fuel-air ratio determined by § 7.87 of this part, the concentrations (by volume, dry basis) of carbon monoxide (CO) and oxides of nitrogen (NO_x) in the undiluted exhaust gas shall not exceed the following:

- (1) There shall be no more than 0.30 percent CO and no more than 0.20 percent NO_x for category A engines.
- (2) There shall be no more than 0.25 percent CO and no more than 0.20 percent NO_x for category B engines.

(c) *Gaseous emissions ventilation rate.* Ventilation rates necessary to dilute gaseous exhaust emissions to the following values shall be determined under § 7.88 of this part:

| | |
|------------------------|------------|
| Carbon dioxide | - 5000 ppm |
| Carbon monoxide | - 50 ppm |
| Nitric oxide | - 25 ppm |
| Nitrogen dioxide | - 5 ppm |

A gaseous ventilation rate shall be determined for each requested speed and horsepower rating as described in § 7.88(b) of this part.

(d) *Fuel deration.* The fuel rates specified in the fuel deration chart shall be based on the tests conducted under paragraphs (b) and (c) of this section and shall ensure that the maximum fuel:air (f/a) ratio determined under

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paragraph (b) of this section is not exceeded at the altitudes specified in the fuel deration chart.

(e) *Particulate index.* For each rated speed and horsepower requested, the particulate index necessary to dilute the exhaust particulate emissions to 1 mg/m³ shall be determined under § 7.89 of this part.

§ 7.85 Critical characteristics.

The following critical characteristics shall be inspected or tested on each diesel engine to which an approval marking is affixed—

- (a) Fuel rate is set properly; and
- (b) Fuel injection pump adjustment is sealed, if applicable.

§ 7.86 Test equipment and specifications.

(a) Dynamometer test cell shall be used in determining the maximum f/a ratio, gaseous ventilation rates, and the particulate index.

(1) The following testing devices shall be provided:

- (i) An apparatus for measuring torque that provides an accuracy of ±2.0 percent based on the engine's maximum value;
- (ii) An apparatus for measuring revolutions per minute (rpm) that provides an accuracy of ±2.0 percent based on the engine's maximum value;
- (iii) An apparatus for measuring temperature that provides an accuracy of ±4 °F (2 °C) of the absolute value except for the exhaust gas temperature device that provides an accuracy of ±27 °F (15 °C);
- (iv) An apparatus for measuring intake and exhaust restriction pressures that provides an accuracy of ±5 percent of maximum;
- (v) An apparatus for measuring atmospheric pressure that provides an accuracy of ±0.5 percent of reading;
- (vi) An apparatus for measuring fuel flow that provides an accuracy of ±2 percent based on the engine's maximum value;
- (vii) An apparatus for measuring the inlet air flow rate of the diesel engine that provides an accuracy of ±2 percent based on the engine's maximum value; and
- (viii) For testing category A engines, an apparatus for metering in 1.0 ±0.1