

your engines are installed. For example, an engine that is expected to operate 5 percent of the time in use with enrichment would clearly not qualify.

(4) Include in your installation instructions any steps necessary for someone installing your engines to prevent enrichment during normal operation (see §1048.130).

(e) *Fuel types.* The exhaust emission standards in this section apply for engines using each type of fuel specified in 40 CFR part 1065, subpart H, on which the engines in the engine family are designed to operate, except for engines certified under §1048.625. For engines certified under §1048.625, the standards of this section apply to emissions measured using the specified test fuel. You must meet the numerical emission standards for hydrocarbons in this section based on the following types of hydrocarbon emissions for engines powered by the following fuels:

- (1) Natural gas-fueled engines: NMHC emissions.
- (2) Alcohol-fueled engines: THCE emissions.
- (3) Other engines: THC emissions.

(f) *Small engines.* Certain engines with total displacement at or below 1000 cc may comply with the requirements of 40 CFR part 90 or 1054 instead of complying with the requirements of this part, as described in §1048.615.

(g) *Useful life.* Your engines must meet the exhaust emission standards in paragraphs (a) through (c) of this section over their full useful life. For severe-duty engines, the minimum useful life is 1,500 hours of operation or seven years, whichever comes first. For all other engines, the minimum useful life is 5,000 hours of operation or seven years, whichever comes first.

(1) Specify a longer useful life in hours for an engine family under either of two conditions:

(i) If you design, advertise, or market your engine to operate longer than the minimum useful life (your recommended hours until rebuild may indicate a longer design life).

(ii) If your basic mechanical warranty is longer than the minimum useful life.

(2) You may request in your application for certification that we approve a shorter useful life for an engine family.

We may approve a shorter useful life, in hours of engine operation but not in years, if we determine that these engines will rarely operate longer than the shorter useful life. If engines identical to those in the engine family have already been produced and are in use, your demonstration must include documentation from such in-use engines. In other cases, your demonstration must include an engineering analysis of information equivalent to such in-use data, such as data from research engines or similar engine models that are already in production. Your demonstration must also include any overhaul interval that you recommend, any mechanical warranty that you offer for the engine or its components, and any relevant customer design specifications. Your demonstration may include any other relevant information. The useful life value may not be shorter than any of the following:

- (i) 1,000 hours of operation.
- (ii) Your recommended overhaul interval.
- (iii) Your mechanical warranty for the engine.

(h) *Applicability for testing.* The duty-cycle emission standards in this subpart apply to all testing performed according to the procedures in §§1048.505 and 1048.510, including certification, production-line, and in-use testing. The field-testing standards apply for all testing performed according to the procedures of subpart F of this part.

[67 FR 68347, Nov. 8, 2002, as amended at 70 FR 40466, July 13, 2005; 73 FR 3613, Jan 18, 2008; 73 FR 59232, Oct. 8, 2008]

**§ 1048.105 What evaporative emission standards and requirements apply?**

Starting in the 2007 model year, new engines that run on a volatile liquid fuel (such as gasoline) must meet the emission standards of this section over a useful life of five years, except as specified in paragraph (f) of this section. Note that §1048.245 allows you to use design-based certification instead of generating new emission data.

(a) *Fuel line permeation.* For non-metallic fuel lines, you must specify and use products that meet the Category 1 specifications for permeation in SAE J2260 (incorporated by reference in §1048.810).

(b) [Reserved]

(c) *Diurnal emissions.* Evaporative hydrocarbon emissions may not exceed 0.2 grams per gallon of fuel tank capacity when measured using the test procedures specified in §1048.501. Diurnal emission controls must continue to function during engine operation.

(d) *Running loss.* Liquid fuel in the fuel tank may not reach boiling during continuous engine operation in the final installation at an ambient temperature of 30 °C. Note that gasoline with a Reid vapor pressure of 62 kPa (9 psi) begins to boil at about 53 °C at atmospheric pressure, and at about 60 °C for fuel tanks that hold pressure as described in §1048.245(e)(1)(i).

(e) *Installation.* If other companies install your engines in their equipment, you may introduce your engines into U.S. commerce without meeting all the requirements in this section. However, you must give equipment manufacturers any appropriate instructions so that fully assembled equipment will meet all the requirements in this section, as described in §1048.130. Your instructions may specify that equipment manufacturers may alternatively use other fuel-system components that have been certified under 40 CFR part 1060. Introducing equipment into U.S. commerce without meeting all the requirements of this section violates 40 CFR 1068.101(a)(1).

(f) *Motor vehicles and marine vessels.* Motor vehicles and marine vessels may contain engines subject to the exhaust emission standards in this part 1048. Evaporative emission standards apply to these products as follows:

(1) Marine vessels using spark-ignition engines are subject to the requirements of 40 CFR part 1045. The vessels are not required to comply with the evaporative emission standards and related requirements of this part 1048.

(2) Motor vehicles are subject to the requirements of 40 CFR part 86. They are not required to comply with the evaporative emission standards and related requirements of this part 1048.

[73 FR 59232, Oct. 8, 2008]

#### § 1048.110 How must my engines diagnose malfunctions?

The following engine-diagnostic requirements apply for engines equipped

with three-way catalysts and closed-loop control of air-fuel ratios:

(a) *Equip your engines with a diagnostic system.* Starting in the 2007 model year, equip each engine with a diagnostic system that will detect significant malfunctions in its emission-control system using one of the following protocols:

(1) If your emission-control strategy depends on maintaining air-fuel ratios at stoichiometry, an acceptable diagnostic design would identify malfunction whenever the air-fuel ratio does not cross stoichiometry for one minute of intended closed-loop operation. You may use other diagnostic strategies if we approve them in advance.

(2) If the protocol described in paragraph (a)(1) of this section does not apply to your engine, you must use an alternative approach that we approve in advance. Your alternative approach must generally detect when the emission-control system is not functioning properly.

(b) *Use a malfunction-indicator light (MIL).* The MIL must be readily visible to the operator; it may be any color except red. When the MIL goes on, it must display “Check Engine,” “Service Engine Soon,” or a similar message that we approve. You may use sound in addition to the light signal. The MIL must go on under each of the following circumstances:

(1) When a malfunction occurs, as described in paragraph (a) of this section.

(2) When the diagnostic system cannot send signals to meet the requirement of paragraph (b)(1) of this section.

(3) When the engine’s ignition is in the “key-on” position before starting or cranking. The MIL should go out after engine starting if the system detects no malfunction.

(c) *Control when the MIL can go out.* If the MIL goes on to show a malfunction or system error, it must remain on during all later engine operation until servicing corrects the malfunction. If the engine is not serviced, but the malfunction or system error does not recur for three consecutive engine starts during which the malfunctioning system is evaluated and found to be working properly, the MIL may stay off during later engine operation.