

(iv) On-board diagnostics requirements effective starting with the 2004 model year for Otto-cycle engines and complete vehicles, according to the provisions of §§ 86.005–17 and 86.1806–05.

(v) Refueling emissions requirements effective starting with the 2004 model year for Otto-cycle complete vehicles, according to the provisions of §§ 86.1810–01 and 86.1816–05.

(3) *Otto-cycle HDE Option 3.* The following requirements apply to Otto-cycle heavy-duty engines and vehicles certified by manufacturers that do not select one of the options for 2003 or 2004 model year compliance in paragraph (c)(1) or (c)(2) of this section:

(i) Emission standards for 2005 and later model year Otto-cycle heavy-duty engines, according to the provisions of § 86.005–10.

(ii) Emission standards for 2005 and later model year Otto-cycle complete heavy-duty vehicles, according to the provisions of § 86.1816–05.

(iii) On-board diagnostics requirements effective starting with the 2005 model year for Otto-cycle engines and complete vehicles, according to the provisions of §§ 86.005–17 and 86.1806–05.

(iv) Refueling emissions requirements effective starting with the 2005 model year for Otto-cycle complete vehicles, according to the provisions of §§ 86.1810–01 and 86.1816–05.

(v) Manufacturers selecting this option may exempt 2005 model year Otto-cycle heavy-duty engines and vehicles whose model year commences before July 31, 2004 from the requirements in paragraphs (c)(3)(i) through (iv) of this section.

(vi) For 2005 model year engines or vehicles exempted under paragraph (c)(3)(v) of this section, a manufacturer shall certify such Otto-cycle heavy-duty engines and vehicles to all requirements in this subpart applicable to 2004 model year Otto-cycle heavy-duty engines. The averaging, banking, and trading provisions contained in § 86.000–15 remain effective for these engines.

(d) [Reserved]

(e)–(f) [Reserved]. For guidance see § 86.001–1.

[65 FR 59949, Oct. 6, 2000]

§ 86.005–10 Emission standards for 2005 and later model year Otto-cycle heavy-duty engines and vehicles.

Section 86.005–10 includes text that specifies requirements that differ from § 86.098–10 or § 86.099–10. Where a paragraph in § 86.098–10 or § 86.099–10 is identical and applicable to § 86.005–10, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see § 86.098–10.” or “[Reserved]. For guidance see § 86.099–10.”.

(a)(1) Exhaust emissions from new 2005 and later model year Otto-cycle HDEs, except for Otto-cycle HDEs subject to the alternative standards in paragraph (f) of this section, shall not exceed:

(i)(A) *Oxides of Nitrogen plus Non-methane Hydrocarbons (NO_x + NMHC) for engines fueled with either gasoline, natural gas, or liquefied petroleum gas.* 1.0 grams per brake horsepower-hour (0.37 grams per megajoule).

(B) *Oxides of Nitrogen plus Non-methane Hydrocarbon Equivalent (NO_x + NMHCE) for engines fueled with methanol.* 1.0 grams per brake horsepower-hour (0.37 grams per megajoule).

(C) A manufacturer may elect to include any or all of its Otto-cycle HDE families in any or all of the emissions ABT programs for HDEs, within the restrictions described in § 86.098–15. If the manufacturer elects to include engine families in any of these programs, the NO_x plus NMHC (or NO_x plus NMHCE for methanol-fueled engines) FELs may not exceed 4.5 grams per brake horsepower-hour (1.7 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, banking, or trading programs.

(ii)(A) *Carbon monoxide for engines intended for use in all vehicles, except as provided in paragraph (a)(3) of this section.* 14.4 grams per brake horsepower-hour (5.36 grams per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide for engines intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 pounds.* 37.1 grams per brake horsepower-hour (13.8 grams per

megajoule), as measured under transient operating conditions.

(C) *Idle carbon monoxide.* For all Otto-cycle HDEs utilizing aftertreatment technology, and not certified to the on-board diagnostics requirements of § 86.005–17: 0.50 percent of exhaust gas flow at curb idle.

(2) The standards set forth in paragraphs (a)(1) and (f) of this section refer to the exhaust emitted over the operating schedule set forth in paragraph (f)(1) of appendix I to this part, and measured and calculated in accordance with the procedures set forth in subpart N or P of this part.

(3)(i) A manufacturer may certify one or more Otto-cycle HDE configurations intended for use in all vehicles to the emission standard set forth in paragraph (a)(1)(ii)(B) of this section: Provided, that the total model year sales of such configuration(s), segregated by fuel type, being certified to the emission standard in paragraph (a)(1)(ii)(B) of this section represent no more than five percent of total model year sales of each fuel type Otto-cycle HDE intended for use in vehicles with a Gross Vehicle Weight Rating of up to 14,000 pounds by the manufacturer.

(ii) The configurations certified to the emission standards of paragraph (a)(1)(ii)(B) of this section under the provisions of paragraph (a)(3)(i) of this section shall still be required to meet the evaporative emission standards set forth in § 86.099–10(b)(1)(i), (b)(2)(i) and (b)(3)(i).

(4) The manufacturer may exempt 2005 model year HDE engine families whose model year begins before July, 31, 2004 from the requirements in this paragraph (a). Exempted engine families shall be subject to the requirements in § 86.099–10.

(5) For certification purposes, where the applicable California evaporative emission standard is as stringent or more stringent than the applicable federal evaporative emission standard, the Administrator may accept California certification test data indicating compliance with the California standard to demonstrate compliance with the appropriate federal certification evaporative emission standard. The Administrator may require the manufacturer to provide comparative test data which

clearly demonstrates that a vehicle meeting the California evaporative standard (when tested under California test conditions/test procedures) will also meet the appropriate federal evaporative emission standard when tested under federal test conditions/test procedures described in this part 86.

(b) [Reserved]. For guidance see § 86.099–10.

(c) [Reserved]. For guidance see § 86.098–10.

(d) Every manufacturer of new motor vehicle engines subject to the standards prescribed in this section shall, prior to taking any of the actions specified in section 203(a)(1) of the Act, test or cause to be tested motor vehicle engines in accordance with applicable procedures in subpart N or P of this part to ascertain that such test engines meet the requirements of this section.

(e) [Reserved]. For guidance see § 86.099–10.

(f) *Alternative exhaust emission standards.* In lieu of the exhaust emission standards in paragraph (a)(1)(i)(A) or (B) of this section, the manufacturer may select the standards and provisions in either paragraph (f)(1) or (f)(2) of this section.

(1) *Otto-cycle HDE Option 1.* The alternative exhaust emission standards in this paragraph (f)(1) shall apply to new 2003 through 2007 model year Otto-cycle HDEs and, at the manufacturers option, to new 2003 through 2006 model year Otto-cycle complete heavy-duty vehicles less than or equal to 14,000 pounds GVWR

(i) *Oxides of Nitrogen plus Non-methane Hydrocarbons (NO_x + NMHC) for engines fueled with either gasoline, natural gas, or liquefied petroleum gas.* 1.5 grams per brake horsepower-hour (0.55 grams per megajoule).

(ii) *Oxides of Nitrogen plus Non-methane Hydrocarbon Equivalent (NO_x + NMHCE) for engines fueled with methanol.* 1.5 grams per brake horsepower-hour (0.55 grams per megajoule).

(2) *Otto-cycle HDE Option 2.* The alternative exhaust emission standards in this paragraph (f)(2) shall apply to new 2004 through 2007 model year Otto-cycle HDEs.

(i) *Oxides of Nitrogen plus Non-methane Hydrocarbons (NO_x + NMHC) for engines fueled with either gasoline, natural gas,*

or liquefied petroleum gas. 1.5 grams per brake horsepower-hour (0.55 grams per megajoule).

(ii) *Oxides of Nitrogen plus Non-methane Hydrocarbon Equivalent (NO_x + NMHC)* for engines fueled with methanol. 1.5 grams per brake horsepower-hour (0.55 grams per megajoule).

[65 FR 59950, Oct. 6, 2000, as amended at 66 FR 5160, Jan. 18, 2001; 70 FR 72927, Dec. 8, 2005]

§ 86.005-17 On-board diagnostics.

(a) *General.* (1) All heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must be equipped with an on-board diagnostic (OBD) system capable of monitoring all emission-related engine systems or components during the applicable useful life. Heavy-duty engines intended for use in a heavy-duty vehicle weighing 14,000 pounds GVWR or less must meet the OBD requirements of this section according to the phase-in schedule in paragraph (k) of this section. All monitored systems and components must be evaluated periodically, but no less frequently than once per applicable certification test cycle as defined in appendix I, paragraph (f), of this part, or similar trip as approved by the Administrator.

(2) An OBD system demonstrated to fully meet the requirements in § 86.1806-05 may be used to meet the requirements of this section, provided that the Administrator finds that a manufacturer's decision to use the flexibility in this paragraph (a)(2) is based on good engineering judgement.

(b) *Malfunction descriptions.* The OBD system must detect and identify malfunctions in all monitored emission-related engine systems or components according to the following malfunction definitions as measured and calculated in accordance with test procedures set forth in subpart N of this part (engine-based test procedures) excluding the test procedure referred to as the "Supplemental emission test; test cycle and procedures" contained in § 86.1360, and excluding the test procedure referred to as the "Not-To-Exceed Test Procedure" contained in § 86.1370, and excluding the test procedure referred to as the "Load Response Test" contained in § 86.1380.

(1) *Catalysts and particulate traps.* (i) *Otto-cycle.* Catalyst deterioration or malfunction before it results in an increase in NMHC (or NO_x+NMHC, as applicable) emissions 1.5 times the NMHC (or NO_x+NMHC, as applicable) standard or FEL, as compared to the NMHC (or NO_x+NMHC, as applicable) emission level measured using a representative 4000 mile catalyst system.

(ii) *Diesel.* (A) If equipped, catalyst deterioration or malfunction before it results in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NO_x (or NO_x+NMHC, as applicable) or PM. This requirement applies only to reduction catalysts; monitoring of oxidation catalysts is not required. This monitoring need not be done if the manufacturer can demonstrate that deterioration or malfunction of the system will not result in exceedance of the threshold.

(B) If equipped with a particulate trap, catastrophic failure of the device must be detected. Any particulate trap whose complete failure results in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC (or NO_x+NMHC, as applicable) or PM must be monitored for such catastrophic failure. This monitoring need not be done if the manufacturer can demonstrate that a catastrophic failure of the system will not result in exceedance of the threshold.

(2) *Engine misfire.* (i) *Otto-cycle.* Engine misfire resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO_x (or NO_x+NMHC, as applicable) or CO; and any misfire capable of damaging the catalytic converter.

(ii) *Diesel.* Lack of cylinder combustion must be detected.

(3) *Oxygen sensors.* If equipped, oxygen sensor deterioration or malfunction resulting in exhaust emissions exceeding 1.5 times the applicable standard or FEL for NMHC, NO_x (or NO_x+NMHC, as applicable) or CO.

(4) *Evaporative leaks.* If equipped, any vapor leak in the evaporative and/or refueling system (excluding the tubing and connections between the purge valve and the intake manifold) greater than or equal in magnitude to a leak caused by a 0.040 inch diameter orifice; an absence of evaporative purge air