

(B) The manufacturer shall then list the vehicle configurations and acceleration times under high-altitude conditions of all those vehicles configurations which have higher acceleration times under high-altitude conditions than the highest acceleration time at low altitude identified in paragraph (g)(2)(iii)(A) of this section.

(iv) In lieu of performing the test procedure of paragraph (g)(2)(iii) of this section, its acceleration time can be estimated based on the manufacturer's engineering evaluation, in accordance with good engineering practice, to meet the exemption criteria of paragraph (g)(2)(iii) of this section.

(3) The sale of a vehicle for principal use at a designated high-altitude location that has been exempted as set forth in paragraph (g)(2) of this section will be considered a violation of section 203(a)(1) of the Clean Air Act.

[53 FR 43876, Oct. 31, 1988, as amended at 54 FR 14612, Apr. 11, 1989; 55 FR 46627, Nov. 5, 1990]

**§ 86.091-10 Emission standards for 1991 and later model year Otto-cycle heavy-duty engines and vehicles.**

(a)(1) Exhaust emissions from new 1991 and later model year Otto-cycle heavy-duty engines shall not exceed (compliance with these standards is optional through the 1996 model year natural gas- and liquefied petroleum gas-fueled heavy-duty engines):

(i) For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas, and intended for use in all vehicles except as provided in paragraph (a)(3) of this paragraph.

(A) *Hydrocarbons*. 1.1 grams per brake horsepower-hour (0.41 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide*. (1) 14.4 grams per brake horsepower-hour (5.36 grams per megajoule), as measured under transient operating conditions.

(2) *For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas and utilizing aftertreatment technology*. 0.50 percent of exhaust gas flow at curb idle.

(C) *Oxides of nitrogen*. (1) 5.0 grams per brake horsepower-hour (1.9 grams

per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its gasoline-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading, or banking programs.

(3) A manufacturer may elect to include any or all of its liquefied petroleum gas-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(ii) For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas, and intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs.

(A) *Hydrocarbons*. 1.9 grams per brake horsepower-hour (0.71 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon Monoxide*. (1) 37.1 grams per brake horsepower-hour (13.8 grams per megajoule), as measured under transient operating conditions.

(2) *For Otto-cycle heavy-duty engines fueled with either gasoline or liquefied petroleum gas and utilizing aftertreatment technology*. 0.50 percent of exhaust gas flow at curb idle.

(C) *Oxides of nitrogen*. (1) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its gasoline-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging,

trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(3) A manufacturer may elect to include any or all of its liquefied petroleum gas-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(iii) For *methanol-fueled Otto-cycle heavy-duty engines* intended for use in all vehicles, except as provided in paragraph (a)(3) of this section.

(A) *Total Hydrocarbon Equivalent*. 1.1 gram per brake horsepower-hour (0.41 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide*. (1) 14.4 grams per brake horsepower-hour (5.36 grams per megajoule), as measured under transient operating conditions.

(2) 0.50 percent of exhaust gas flow at curb idle.

(C) *Oxides of nitrogen*. (1) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its methanol-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(iv) For *methanol-fueled Otto-cycle heavy-duty engines* intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs.

(A) *Total Hydrocarbon Equivalent*. 1.9 grams per brake horsepower-hour (0.71 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide*. (1) 37.1 grams per brake horsepower-hour (13.8 grams per megajoule), as measured under transient operating conditions.

(2) 0.50 percent of exhaust gas flow at curb idle.

(C) *Oxides of nitrogen*. (1) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its methanol-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(v) For natural gas-fueled Otto-cycle heavy-duty engines intended for use in all vehicles except as provided in paragraph (a)(3) of this section.

(A) *Nonmethane hydrocarbons*. 0.9 gram per brake horsepower-hour (0.33 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide*. (1) 14.4 grams per brake horsepower-hour (5.36 grams per megajoule), as measured under transient operating conditions.

(2) *For natural gas-fueled Otto-cycle heavy-duty engines utilizing aftertreatment technology*. 0.50 percent of exhaust flow at curb idle.

(C) *Oxides of nitrogen*. (1) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its natural gas-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading or banking programs for

heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(vi) For natural gas-fueled Otto-cycle engines intended for use only in vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs.

(A) *Nonmethane hydrocarbons.* 1.7 grams per brake horsepower-hour (0.63 gram per megajoule), as measured under transient operating conditions.

(B) *Carbon monoxide.* (1) 37.1 grams per brake horsepower-hour (13.8 grams per megajoule), as measured under transient operating conditions.

(2) *For natural gas-fueled Otto-cycle heavy-duty engines utilizing aftertreatment technology.* 0.50 percent of exhaust gas flow at curb idle.

(C) *Oxides of nitrogen.* (1) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(2) A manufacturer may elect to include any or all of its natural gas-fueled Otto-cycle heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(2) The standards set forth in paragraph (a)(1) 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.

(3)(i) A manufacturer may certify one or more Otto-cycle heavy-duty engine configurations intended for use in all vehicles to the emission standards set forth in paragraphs (a)(1)(ii), (a)(1)(iv) or (a)(1)(vi) of this section: *Provided*, that the total model year sales of such

configuration(s), segregated by fuel type, being certified to the emission standards in paragraph (a)(1)(ii) of this section represent no more than five percent of total model year sales of each fuel type Otto-cycle heavy-duty engine 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 paragraphs (a)(1) (ii), (iv) and (vi) 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 paragraphs (b)(1)(i), (b)(2)(i) and (b)(3)(i) of this section.

(b) *Evaporative emissions* from 1991 and later model year heavy-duty vehicles shall not exceed:

(1) *Hydrocarbons (for vehicles equipped with gasoline-fueled engines).* (i) For vehicles with a Gross Vehicle Weight Rating of up to 14,000 lbs, 3.0 grams per test.

(ii) For vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs, 4.0 grams per test.

(2) *Total Hydrocarbon Equivalent (for vehicles equipped with methanol-fueled engines).*

(i) For vehicles with a Gross Vehicle Weight Rating of up to 14,000 lbs, 3.0 grams per test.

(ii) For vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs, 4.0 grams per test.

(3)(i) For vehicles with a Gross Vehicle Weight Rating of up to 26,000 lbs, the standards set forth in paragraphs (b)(1) and (b)(2) of this section refer to a composite sample of evaporative emissions collected under the conditions set forth in subpart M and measured in accordance with those procedures.

(ii) For vehicles with a Gross Vehicle Weight Rating of greater than 26,000 lbs., the standards set forth in paragraphs (b)(1)(ii) and (b)(2)(ii) of this section refer to the manufacturer's engineering design evaluation using good engineering practice (a statement of which is required in § 86.091-23(b)(4)(ii)).

(c) No crankcase emissions shall be discharged into the ambient atmosphere from any new 1991 or later model year Otto-cycle heavy-duty engine.

(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 paragraphs (a) and (c) of this section.

(Secs. 202, 203, 206, 207, 208, 301a, Clean Air Act, as amended; 42 U.S.C. 7521, 7522, 7525, 7541, 7542, 7601a)

[50 FR 10652, Mar. 15, 1985, as amended at 54 FR 14464, Apr. 11, 1989; 55 FR 30622, July 26, 1990; 59 FR 48492, Sept. 21, 1994]

**§ 86.091-11 Emission standards for 1991 and later model year diesel heavy-duty engines.**

(a)(1) Exhaust emissions from new 1991 and later model year diesel heavy-duty engines shall not exceed the following:

(i)(A) *Hydrocarbons (for petroleum-fueled diesel engines)*. 1.3 grams per brake horsepower-hour (0.48 gram per megajoule), as measured under transient operating conditions.

(B) *Total Hydrocarbon Equivalent (for methanol-fueled diesel engines)*. 1.3 grams per brake horsepower-hour (0.48 gram per megajoule), as measured under transient operating conditions.

(ii) *Carbon monoxide*. (A) 15.5 grams per brake horsepower-hour (5.77 grams per megajoule), as measured under transient operating conditions.

(B) 0.50 percent of exhaust gas flow at curb idle (methanol-fueled diesel only).

(iii) *Oxides of nitrogen*. (A) 5.0 grams per brake horsepower-hour (1.9 grams per megajoule), as measured under transient operating conditions.

(B) A manufacturer may elect to include any or all of its diesel heavy-duty engine families in any or all of the NO<sub>x</sub> averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed 6.0 grams per brake horsepower-hour (2.2 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(iv) *Particulate* (A) For all diesel engines, including those to be used in urban buses, 0.25 gram per brake horsepower-hour (0.093 gram per megajoule) as measured under transient operating conditions.

(B) [Reserved]

(C) A manufacturer may elect to include any or all of its diesel heavy-duty engine families in any or all of the particulate averaging, trading, or banking programs for heavy-duty engines, within the restrictions described in § 86.091-15. If the manufacturer elects to include engine families in any of these programs, the particulate FELs may not exceed 0.60 gram per brake horsepower-hour (0.22 gram per megajoule). This ceiling value applies whether credits for the family are derived from averaging, trading or banking programs.

(2) The standards set forth in paragraph (a)(1) of this section refer to the exhaust emitted over operating schedules as set forth in paragraph (f)(2) of appendix I of this part, and measured and calculated in accordance with the procedures set forth in subpart N of this part, except as noted in § 86.091-23(c)(2) (i) and (iii).

(b)(1) The opacity of smoke emission from new 1991 and later model year diesel heavy-duty engines shall not exceed:

(i) 20 percent during the engine acceleration mode.

(ii) 15 percent during the engine lugging mode.

(iii) 50 percent during the peaks in idler mode.

(2) The standards set forth in paragraph (b)(1) of this section refer to exhaust smoke emissions generated under the conditions set forth in subpart I of this part and measured and calculated in accordance with those procedures.

(3) *Evaporative emissions* (total of non-oxygenated hydrocarbons plus methanol) from 1991 and later model year heavy-duty vehicles equipped with methanol-fueled diesel engines shall not exceed:

(i) For vehicles with a Gross Vehicle Weight Rating of up to 14,000 lbs, 3.0 grams per test.