

(iv) The connection interface between the OBD system and test equipment and diagnostic tools shall meet the functional requirements of SAE J1962 "Diagnostic Connector—Equivalent to ISO/DIS 15031-3: December 14, 2001" (Revised, April 2002).

(v) All acronyms, definitions and abbreviations shall be formatted according to SAE J1930 "Electrical/Electronic Systems Diagnostic Terms, Definitions, Abbreviations, and Acronyms" Equivalent to ISO/TR 15031-2: April 30, 2002", (Revised, April 2002).

(vi) All equipment used to interface, extract and display OBD-related information shall meet SAE J1978 "OBD II Scan Tool" Equivalent to ISO 15031-4: December 14, 2001", (Revised, April 2002).

(vii) As an alternative to the above standards, heavy-duty vehicles may conform to the specifications of the SAE J1939 series of standards (SAE J1939-11, J1939-13, J1939-21, J1939-31, J1939-71, J1939-73, J1939-81).

(2) ISO materials. Copies of these materials may be obtained from the International Organization for Standardization, Case Postale 56, CH-1211 Geneva 20, Switzerland.

(i) ISO 9141-2 "Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information," (February 1, 1994) may be used as an alternative to SAE J1850 as the on-board to off-board communications protocol.

(ii) ISO 14230-4:2000(E) "Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems", (June 1, 2000) may also be used as an alternative to SAE J1850.

(iii) ISO 15765-4.3:2001 "Road Vehicles-Diagnostics on Controller Area Network (CAN)—Part 4: Requirements for emission-related systems", (December 14, 2001) may also be used as an alternative to SAE J1850.

(3) Beginning with the 2008 model year and beyond, ISO 15765-4.3:2001 "Road Vehicles-Diagnostics on Controller Area Network (CAN)—Part 4: Requirements for emission-related systems", (December 14, 2001) shall be the only acceptable protocol used for standardized on-board to off-board communications. At this time, all other standardized on-board to off-board communications protocols: SAE J1850 "Class B Data Communication Network Interface," (Revised, May 2001) in paragraph (h)(1)(i) of this section, ISO 9141-2 "Road vehicles—Diagnostic systems—Part 2: CARB requirements for interchange of digital information," (February 1, 1994) in paragraph (h)(2)(i) of this section, and ISO 14230-4 "Road vehicles—Diagnostic systems—KWP 2000 requirements for Emission-related systems", (June 1, 2000) in paragraph (h)(2)(ii) of this section will no longer be accepted.

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(j) California OBDII compliance option. For heavy-duty engines weighing 14,000 pounds GVWR or less, demonstration of compliance with California OBD II requirements (Title 13 California Code of Regulations § 1968.2 (13 CCR 1968.2)), as modified pursuant to CARB Mail-Out MSCD #02-11 (internet posting date October 7, 2002), shall satisfy the requirements of this section, except that compliance with 13 CCR 1968.2(e)(4.2.2)(C), pertaining to 0.02 inch evaporative leak detection, and 13 CCR 1968.2(d)(1.4), pertaining to tampering protection, are not required to satisfy the requirements of this section. Also, the deficiency provisions of 13 CCR 1968.2(i) do not apply. The deficiency provisions of paragraph (i) of this section and the evaporative leak detection requirement of paragraph (b)(4) of this section apply to manufacturers selecting this paragraph for demonstrating compliance. In addition, demonstration of compliance with 13 CCR 1968.2(e)(16.2.1)(C), to the extent it applies to the verification of proper alignment between the camshaft and crankshaft, applies only to vehicles equipped with variable valve timing.

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**§ 86.007-11 Emission standards and supplemental requirements for 2007 and later model year diesel heavy-duty engines and vehicles.**

This section applies to new 2007 and later model year diesel HDEs. Section 86.007-11 includes text that specifies requirements that differ from § 86.004-11. Where a paragraph in § 86.004-11 is identical and applicable to § 86.007-11, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see § 86.004-11."

(a)(1) Exhaust emissions from new 2007 and later model year diesel HDEs shall not exceed the following:

(i) *Oxides of Nitrogen (NO<sub>x</sub>)*. (A) 0.20 grams per brake horsepower-hour (0.075 grams per megajoule).

(B) A manufacturer may elect to include any or all of its diesel HDE families in any or all of the NO<sub>x</sub> and NO<sub>x</sub> plus NMHC emissions ABT programs for HDEs, within the restrictions described in § 86.007-15 or § 86.004-15. If the manufacturer elects to include engine families in any of these programs, the NO<sub>x</sub> FELs may not exceed the following FEL caps: 2.00 grams per brake horsepower-hour (0.75 grams per megajoule) for model years before 2010; 0.50 grams per brake horsepower-hour

(0.19 grams per megajoule) for model years 2010 and later. This ceiling value applies whether credits for the family are derived from averaging, banking, or trading programs.

(ii)(A) *Non-Methane Hydrocarbons (NMHC) for engines fueled with either diesel fuel, natural gas, or liquefied petroleum gas.* 0.14 grams per brake horsepower-hour (0.052 grams per megajoule).

(B) *Non-Methane Hydrocarbon Equivalent (NMHCE) for engines fueled with methanol.* 0.14 grams per brake horsepower-hour (0.052 grams per megajoule).

(iii) *Carbon monoxide.* (A) 15.5 grams per brake horsepower-hour (5.77 grams per megajoule).

(B) 0.50 percent of exhaust gas flow at curb idle (methanol-, natural gas-, and liquefied petroleum gas-fueled diesel HDEs only). This does not apply for vehicles certified to the requirements of § 86.005-17

(iv) *Particulate.* (A) 0.01 grams per brake horsepower-hour (0.0037 grams per megajoule).

(B) A manufacturer may elect to include any or all of its diesel HDE families in any or all of the particulate ABT programs for HDEs, within the restrictions described in § 86.007-15 or other applicable sections. If the manufacturer elects to include engine families in any of these programs, the particulate FEL may not exceed 0.02 grams per brake horsepower-hour (0.0075 grams per megajoule).

(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)(2) 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, except as noted in § 86.007-23(c)(2).

(3) *SET* (i) The weighted average exhaust emissions, as determined under § 86.1360-2007(e)(5) pertaining to the supplemental emission test cycle, for each regulated pollutant shall not exceed 1.0 times the applicable emission standards or FELs specified in paragraph (a)(1) of this section.

(ii) For engines not having a NO<sub>x</sub> FEL less than 1.5 g/bhp-hr, gaseous exhaust emissions shall not exceed the

steady-state interpolated values determined by the Maximum Allowable Emission Limits (for the corresponding speed and load), as determined under § 86.1360-2007(f), when the engine is operated in the steady-state control area defined under § 86.1360-2007(d).

(4) *NTE* (i)(A) The brake-specific exhaust NMHC or NO<sub>x</sub> emissions in g/bhp-hr, as determined under § 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.5 times the applicable NMHC or NO<sub>x</sub> emission standards or FELs specified in paragraph (a)(1) of this section, during engine and vehicle operation specified in paragraph (a)(4)(ii) of this section except as noted in paragraph (a)(4)(iii) of this section.

(B) For engines not having a NO<sub>x</sub> FEL less than 1.50 g/bhp-hr, the brake-specific NO<sub>x</sub> and NMHC exhaust emissions in g/bhp-hr, as determined under § 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.25 times the applicable emission standards or FELs specified in paragraph (a)(1) of this section (or of § 86.004-11, as allowed by paragraph (g) of this section), during engine and vehicle operation specified in paragraph (a)(4)(ii) of this section except as noted in paragraph (a)(4)(iii) of this section.

(C) The brake-specific exhaust PM emissions in g/bhp-hr, as determined under § 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.5 times the applicable PM emission standards or FEL (for FELs above the standard only) specified in paragraph (a)(1) of this section, during engine and vehicle operation specified in paragraph (a)(4)(ii) of this section except as noted in paragraph (a)(4)(iii) of this section.

(D) The brake-specific exhaust CO emissions in g/bhp-hr, as determined under § 86.1370-2007 pertaining to the not-to-exceed test procedures, shall not exceed 1.25 times the applicable CO emission standards or FEL specified in paragraph (a)(1) of this section, during engine and vehicle operation specified in paragraph (a)(4)(ii) of this section except as noted in paragraph (a)(4)(iii) of this section.

(ii) For each engine family, the not-to-exceed emission limits must apply

during one of the following two ambient operating regions:

(A) The not-to-exceed limits apply for all altitudes less than or equal to 5,500 feet above sea-level, during all ambient conditions (temperature and humidity). Temperature and humidity ranges for which correction factors are allowed are specified in § 86.1370-2007(e); or

(B)(1) The not-to-exceed emission limits apply at all altitudes less than or equal to 5,500 feet above sea-level, for temperatures less than or equal to the temperature determined by the following equation at the specified altitude:

$$T = -0.00254 \times A + 100$$

Where:

T = ambient air temperature in degrees Fahrenheit.

A = altitude in feet above sea-level (A is negative for altitudes below sea-level).

(2) Temperature and humidity ranges for which correction factors are allowed are specified in § 86.1370-2007(e);

(iii) For engines equipped with exhaust gas recirculation, the not-to-exceed emission limits specified in paragraph (a)(4)(i) of this section do not apply to engine or vehicle operation during cold operating conditions as specified in § 86.1370-2007(f).

(iv) *Deficiencies for NTE emission standards.* (A) For model years 2007 through 2009, upon application by the manufacturer, the Administrator may accept a HDDE as compliant with the NTE standards even though specific requirements are not fully met. Such compliances without meeting specific requirements, or deficiencies, will be granted only if compliance would be infeasible or unreasonable considering such factors as, but not limited to: Technical feasibility of the given hardware and lead time and production cycles including phase-in or phase-out of engines or vehicle designs and programmed upgrades of computers. Deficiencies will be approved on an engine model and/or horsepower rating basis within an engine family, and each approval is applicable for a single model year. A manufacturer's application must include a description of the auxiliary emission control device(s) which will be used to maintain emissions to

the lowest practical level, considering the deficiency being requested, if applicable. An application for a deficiency must be made during the certification process; no deficiency will be granted to retroactively cover engines already certified.

(B) Unmet requirements should not be carried over from the previous model year except where unreasonable hardware or software modifications would be necessary to correct the deficiency, and the manufacturer has demonstrated an acceptable level of effort toward compliance as determined by the Administrator. The NTE deficiency should only be seen as an allowance for minor deviations from the NTE requirements. The NTE deficiency provisions allow a manufacturer to apply for relief from the NTE emission requirements under limited conditions. EPA expects that manufacturers should have the necessary functioning emission control hardware in place to comply with the NTE.

(C) For model years 2010 through 2013, the Administrator may allow up to three deficiencies per engine family. The provisions of paragraphs (a)(4)(iv)(A) and (B) of this section apply for deficiencies allowed by this paragraph (a)(4)(iv)(C). In determining whether to allow the additional deficiencies, the Administrator may consider any relevant factors, including the factors identified in paragraph (a)(4)(iv)(A) of this section. If additional deficiencies are approved, the Administrator may set any additional conditions that he/she determines to be appropriate.

(v) The emission limits specified in paragraphs (a)(3) and (a)(4) of this section shall be rounded to the same number of significant figures as the applicable standards in paragraph (a)(1) of this section using ASTM E29-93a (Incorporated by reference at § 86.1).

(b)(1) introductory text through (b)(1)(iii) [Reserved]. For guidance see § 86.004-11.

(b)(1)(iv) Operation within the NTE zone (defined in § 86.1370-2007) must comply with a filter smoke number of 1.0 under steady-state operation, or the following alternate opacity limits:

**§ 86.007-11**

**40 CFR Ch. I (7-1-03 Edition)**

(A) A 30 second transient test average opacity limit of 4% for a 5 inch path; and

(B) A 10 second steady state test average opacity limit of 4% for a 5 inch path.

(2)(i) The standards set forth in § 86.004-11 (b)(1)(i) through (iii) 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.

(ii) The standards set forth in paragraph (b)(1)(iv) of this section refer to exhaust smoke emissions generated under the conditions set forth in § 86.1370-2007 and calculated in accordance with the procedures set forth in § 86.1372-2007.

(b)(3) and (b)(4) [Reserved]. For guidance see § 86.004-11.

(c) No crankcase emissions shall be discharged directly into the ambient atmosphere from any new 2007 or later model year diesel HDE, with the following exception: HDEs equipped with turbochargers, pumps, blowers, or superchargers for air induction may discharge crankcase emissions to the ambient atmosphere if the emissions are added to the exhaust emissions (either physically or mathematically) during all emission testing. Manufacturers taking advantage of this exception must manufacture the engines so that all crankcase emission can be routed into a dilution tunnel (or other sampling system approved in advance by the Administrator), and must account for deterioration in crankcase emissions when determining exhaust deterioration factors. For the purpose of this paragraph (c), crankcase emissions that are routed to the exhaust upstream of exhaust aftertreatment during all operation are not considered to be "discharged directly into the ambient atmosphere."

(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 I or N of this part to ascertain that such test engines

meet the requirements of paragraphs (a), (b), (c), and (d) of this section.

(e) [Reserved]. For guidance see § 86.004-11.

(f) (1) Model year 2007 and later diesel-fueled heavy-duty engines and vehicles for sale in Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands shall be subject to the same standards and requirements as apply to 2006 model year diesel heavy-duty engines and vehicles, but only if the vehicle or engine bears a permanently affixed label stating:

THIS ENGINE (or VEHICLE, as applicable) CONFORMS TO US EPA EMISSION STANDARDS APPLICABLE TO MODEL YEAR 2006. THIS ENGINE (or VEHICLE, as applicable) DOES NOT CONFORM TO US EPA EMISSION REQUIREMENTS IN EFFECT AT TIME OF PRODUCTION AND MAY NOT BE IMPORTED INTO THE UNITED STATES OR ANY TERRITORY OF THE UNITED STATES EXCEPT GUAM, AMERICAN SAMOA, OR THE COMMONWEALTH OF THE NORTHERN MARIANA ISLANDS.

(2) The importation or sale of such a vehicle or engine for use at any location U.S. other than Guam, American Samoa, or the Commonwealth of the Northern Mariana Islands shall be considered a violation of section 203(a)(1) of the Clean Air Act. In addition, vehicles or vehicle engines subject to this exemption may not subsequently be imported or sold into any state or territory of the United States other than Guam, American Samoa, or Commonwealth of the Northern Mariana Islands.

(g) Phase-in options. (1) For model years 2007, 2008, and 2009, manufacturers may certify some of their engine families to the combined NO<sub>x</sub> plus NMHC standard applicable to model year 2006 engines under § 86.004-11, in lieu of the separate NO<sub>x</sub> and NMHC standards specified in paragraph (a)(1) of this section. These engines must comply with all other requirements applicable to model year 2007 engines. The combined number of engines in the engine families certified to the 2006 combined NO<sub>x</sub> plus NMHC standard may not exceed 50 percent of the manufacturer's U.S.-directed production of heavy-duty diesel motor vehicle engines for model year 2007, 2008, or 2009, except as explicitly allowed by this paragraph (g).

(2)(i) Manufacturers certifying engines to all of the applicable standards listed in paragraph (a) and (c) of this section (without using credits) prior to model year 2007 may reduce the number of engines that are required to meet the standards listed in paragraph (a) of this section in model year 2007, 2008 and/or 2009, taking into account the phase-in option provided in paragraph (g)(1) of this section. For every two engines that are certified early, the manufacturer may reduce the number of engines that are required by paragraph (g)(1) of this section to meet standards listed in paragraph (a)(1) of this section by three engines. For example, if a manufacturer produces 100 heavy-duty diesel engines in 2006 that meet all of the applicable standards listed in paragraph (a) of this section, and it produced 10,000 heavy-duty diesel engines in 2007, then only 4,850  $((10,000)(0.50) - (100)(1.5))$  of the engines would need to comply with the standards listed in paragraph (a) of this section.

(ii) Manufacturers certifying engines to the PM standards listed in paragraph (a), and to all of the applicable standards in paragraph (c) of this section (without using credits) prior to model year 2007 may reduce the number of engines that are required to meet the PM standard listed in paragraph (a) of this section in model year 2007, 2008 and/or 2009. For every two engines that are certified to the PM standard early, the manufacturer may reduce the number of engines that are otherwise required to meet the PM standard listed in paragraph (a)(1) of this section by three engines.

(3) Manufacturers may initially base compliance with the phase-in requirements of paragraph (g)(1) or (g)(2) of this section on projected U.S.-directed production estimates. This is allowed for model year 2007 and/or 2008. However, if a manufacturer's actual U.S. directed production volume of engines that comply with the model year 2007 NO<sub>x</sub> and NMHC standards is less than the required amount, the shortfall (in terms of number of engines) must be made up prior to 2010. For example, if a manufacturer plans in good faith to produce 50 percent of its projected 10,000 2007 engines (i.e., 5,000 engines) in

compliance with the 2007 NO<sub>x</sub> and NMHC standard, but is only able to produce 4,500 such engines of an actual 10,000 2007 engines, the manufacturer would need to produce an extra 500 engines in 2008 or 2009 in compliance with the 2007 NO<sub>x</sub> and NMHC standard. The deficit allowed by this paragraph (g)(3) may not exceed 25 percent of the U.S. directed production volume.

(4) Manufacturers certifying engines to a voluntary NO<sub>x</sub> standard of 0.10 g/bhp-hr (without using credits) in addition to all of the other applicable standards listed in paragraphs (a) and (c) of this section prior to model year 2007 may reduce the number of engines that are required to meet the standards listed in paragraph (a)(1) of this section in model year 2007, 2008 and/or 2009, taking into account the phase-in option provided in paragraph (g)(1) of this section. For every engine that is certified early under this provision, the manufacturer may reduce the number of engines that are required by paragraph (g)(1) of this section to meet the standards listed in paragraph (a)(1) of this section by two engines.

(5) For engines certified under paragraph (g)(1) of this section to the NO<sub>x</sub>+NMHC standard in § 86.004-11, the standards or FELs to which they are certified shall be used for the purposes of paragraphs (a)(3) and (a)(4) of this section.

(h)(1) For model years prior to 2012, for purposes of determining compliance after title or custody has transferred to the ultimate purchaser, for engines having a NO<sub>x</sub> FEL no higher than 1.30 g/bhp-hr, the applicable compliance limit shall be determined by adding the applicable adjustment from paragraph (h)(2) of this section to the otherwise applicable standard or FEL for NO<sub>x</sub>.

(2)(i) For engines with 110,000 or fewer miles, the adjustment is 0.10 g/bhp-hr.

(ii) For engines with 110,001 to 185,000 miles, the adjustment is 0.15 g/bhp-hr.

(iii) For engines with 185,001 or more miles, the adjustment is 0.20 g/bhp-hr.

(3) For model years prior to 2012, for purposes of determining compliance after title or custody has transferred to the ultimate purchaser, the applicable compliance limit shall be determined

## § 86.007-15

## 40 CFR Ch. I (7-1-03 Edition)

by adding 0.01 g/bhp-hr to the otherwise applicable standard or FEL for PM.

[65 FR 59954, Oct. 6, 2000, as amended at 66 FR 5161, Jan. 18, 2001]

### § 86.007-15 NO<sub>x</sub> and particulate averaging, trading, and banking for heavy-duty engines.

Section 86.007-15 includes text that specifies requirements that differ from § 86.004-15. Where a paragraph in § 86.004-15 is identical and applicable to § 86.007-15, this may be indicated by specifying the corresponding paragraph and the statement “[Reserved]. For guidance see § 86.004-15.”

(a) through (l) [Reserved]. For guidance see § 86.004-15.

(m) The following provisions apply for model year 2007 and later engines (including engines certified during years 2007-2009 under the phase-in provisions of § 86.007-11(g)(1), § 86.005-10(a), or § 86.008-10(f)(1)). These provisions apply instead of the provisions of paragraphs § 86.004-15 (a) through (k) to the extent that they are in conflict.

(1) Manufacturers of Otto-cycle engines may participate in an NMHC averaging, banking and trading program to show compliance with the standards specified in § 86.008-10. The generation and use of NMHC credits are subject to the same provisions in paragraphs § 86.004-15 (a) through (k) that apply for NO<sub>x</sub> plus NMHC credits, except as otherwise specified in this section.

(2) Credits are calculated as NO<sub>x</sub> or NMHC credits for engines certified to separate NO<sub>x</sub> and NMHC standards. NO<sub>x</sub> plus NMHC credits (including banked credits and credits that are generated during years 2007-2009 under the phase-in provisions of § 86.007-11(g)(1), § 86.005-10(a), or § 86.008-10(f)(1)) may be used to show compliance with 2007 or later NO<sub>x</sub> standards (NO<sub>x</sub> or NMHC standards for Otto-cycle engines), subject to an 0.8 discount factor (e.g., 100 grams of NO<sub>x</sub> plus NMHC credits is equivalent to 80 grams of NO<sub>x</sub> credits).

(3) NO<sub>x</sub> or NMHC (or NO<sub>x</sub> plus NMHC) credits may be exchanged between heavy-duty Otto-cycle engine families certified to the engine standards of this subpart and heavy-duty Otto-cycle engine families certified to the chassis

standards of subpart S of this part, subject to an 0.8 discount factor (e.g., 100 grams of NO<sub>x</sub> (or NO<sub>x</sub> plus NMHC) credits generated from engines would be equivalent to 80 grams of NO<sub>x</sub> credits if they are used in the vehicle program of subpart S, and vice versa).

(4) Credits that were previously discounted when they were banked according to paragraph (c) of § 86.004-15, are subject to an additional discount factor of 0.888 instead of the 0.8 discount factor otherwise required by paragraph (m)(2) or (m)(3) of this section. This results in a total discount factor of 0.8 ( $0.9 \times 0.888 = 0.8$ ).

(5) For diesel engine families, the combined number of engines certified to FELs higher than 0.50 g/bhp-hr using banked NO<sub>x</sub> (and/or NO<sub>x</sub> plus NMHC) credits in any given model year may not exceed 10 percent of the manufacturer's U.S.-directed production of engines in all heavy-duty diesel engine families for that model year.

(6) The FEL must be expressed to the same number of decimal places as the standard (generally, one-hundredth of a gram per brake horsepower-hour). For engines certified to standards expressed only one-tenth of a gram per brake horsepower-hour, if the FEL is below 1.0, then add a zero to the standard in the second decimal place and express the FEL to nearest one-hundredth of a gram per brake horsepower-hour.

(7) Credits are to be rounded to the nearest one-hundredth of a Megagram using ASTM E29-93a (Incorporated by reference at § 86.1).

(8) Credits generated for 2007 and later model year diesel engine families, or generated for 2008 and later model year Otto-cycle engine families are not discounted (except as specified in paragraph (m)(2) or (m)(3) of this section), and do not expire.

(9) For the purpose of using or generating credits during a phase-in of new standards, a manufacturer may elect to split an engine family into two sub-families (e.g., one which uses credits and one which generates credits). The manufacturer must indicate in the application for certification that the engine family is to be split, and may assign the numbers and configurations of