§ 86.008–10 Emission standards for 2008 and later model year Otto-cycle heavy-duty engines and vehicles.

Section 86.008–10 includes text that specifies requirements that differ from §86.009–10. Where a paragraph in §86.009–10 is identical and applicable to §86.008–10, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see §86.009–10."

(a)(1) Exhaust emissions from new 2008 and later model year Otto-cycle HDEs shall not exceed:

(i)(A) Oxides of Nitrogen (NO\textsubscript{X}). 0.20 grams per brake horsepower-hour (0.075 grams per megajoule).

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

(iii)(A) Carbon monoxide. 14.4 grams per brake horsepower-hour (5.36 grams per megajoule).

(ii)(A) Non-methane Hydrocarbons (NMHC) for engines fueled with either gasoline, natural gas, or liquefied petroleum gas. 0.14 grams per brake horsepowe-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).

(C) A manufacturer may elect to include any or all of its Otto-cycle HDE families in any or all of the NMHC emissions ABT programs for HDEs, within the restrictions described in §86.008–15 or §86.004–15. If the manufacturer elects to include engine families in any of these programs, the NMHC FEL may not exceed 0.30 grams per brake horsepower-hour (0.052 grams per megajoule). This ceiling value applies whether credits for the family are derived from averaging, banking, or trading programs. The NMHC FEL cap is 0.40 for model years before 2011 for manufacturers choosing to certify to the 1.5 g/bhp-hr NO\textsubscript{X}+NMHC standard in 2003 or 2004, in accordance with §86.005–10(f).

Deviations from these standards require a waiver from the Administrator. For information on those standards and the waiver process, see §86.005–10(g).

§ 86.007–38 Maintenance instructions.

This section includes text that specifies requirements that differ from §§86.096–38 or §86.004–38. Where a paragraph in §86.096–38 or §86.004–38 is identical and applicable to §86.007–38, this may be indicated by specifying the corresponding paragraph and the statement "[Reserved]. For guidance see §86.096–38., or [Reserved]. For guidance see §86.004–38.".
(B) Idle Carbon Monoxide. For all Otto-cycle HDEs utilizing aftertreatment technology, and not certified to the onboard diagnostics requirements of §86.005–17: 0.50 percent of exhaust gas flow at curb idle.

(iv) Particulate. 0.01 grams per brake horsepower-hour (0.0037 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)(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:

(i) Perform the test interval set forth in paragraph (f)(1) of Appendix I of this part with a cold-start according to 40 CFR part 1065, subpart F. This is the cold-start test interval.

(ii) Shut down the engine after completing the test interval and allow 20 minutes to elapse. This is the hot soak.

(iii) Repeat the test interval. This is the hot-start test interval.

(iv) Calculate the total emission mass of each constituent, m, and the total work, W, over each test interval according to 40 CFR 1065.650.

(v) Determine your engine’s brake-specific emissions using the following calculation, which weights the emissions from the cold-start and hot-start test intervals:

\[
\text{brake-specific emissions} = \frac{m_{\text{cold start}} + 6 \cdot m_{\text{hot start}}}{W_{\text{cold start}} + 6 \cdot W_{\text{hot start}}}
\]

(3)-(4) [Reserved]

(b) Evaporative emissions from heavy-duty vehicles shall not exceed the following standards. The standards apply equally to certification and in-use vehicles. The spitback standard also applies to newly assembled vehicles. For certification vehicles only, manufacturers may conduct testing to quantify a level of nonfuel background emissions for an individual test vehicle. Such a demonstration must include a description of the source(s) of emissions and an estimated decay rate. The demonstrated level of nonfuel background emissions may be subtracted from emission test results from certification vehicles if approved in advance by the Administrator.

(1) Hydrocarbons (for vehicles equipped with gasoline-fueled, natural gas-fueled or liquefied petroleum gas-fueled engines).

(i) For vehicles with a Gross Vehicle Weight Rating of up to 14,000 lbs:

(A) For the full three-diurnal test sequence described in §86.1230–96, diurnal plus hot soak measurements: 1.4 grams per test.

(B) Running loss test (gasoline-fueled vehicles only): 0.05 grams per mile.

(C) Fuel dispensing spitback test (gasoline-fueled vehicles only): 1.0 grams per test.

(ii) For vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs:

(A) For the full three-diurnal test sequence described in §86.1230–96, diurnal plus hot soak measurements: 1.9 grams per test.

(B) Running loss test (gasoline-fueled vehicles only): 0.05 grams per mile.

(D) 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:

(A) For the full three-diurnal test sequence described in §86.1230–96, diurnal plus hot soak measurements: 1.9 grams carbon per test.

(B) Running loss test: 0.05 grams carbon per mile.

(C) Fuel dispensing spitback test: 1.0 grams carbon per test.

(ii) For vehicles with a Gross Vehicle Weight Rating of greater than 14,000 lbs:

(A) For the full three-diurnal test sequence described in §86.1230–96, diurnal plus hot soak measurements: 1.9 grams carbon per test.
(2) For the supplemental two-diurnal test sequence described in §86.1230-96, diurnal plus hot soak measurements: 2.3 grams carbon per test.

(B) Running loss test: 0.05 grams carbon per mile.

(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 and measured in accordance with the procedures set forth in subpart M of this part.

(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 §86.098-23(b)(4)(ii)).

(4) All fuel vapor generated in a gasoline- or methanol-fueled heavy-duty vehicle during in-use operations shall be routed exclusively to the evaporative control system (e.g., either canister or engine purge). The only exception to this requirement shall be for emergencies.

(c) No crankcase emissions shall be discharged into the ambient atmosphere from any new 2008 or later model year Otto-cycle HDE.

(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) Phase-in options. (1)(i) For model year 2008, manufacturers may certify some of their engine families to the evaporative standards applicable to model year 2007 engines under §86.005-10, in lieu of the standards specified in this section. These engines must comply with all other requirements applicable to model year 2007 engines, except as allowed by paragraph (f)(1)(i) of this section. The combined number of engines in the engine families certified to the 2007 standards may not exceed 50 percent of the manufacturer's U.S.-directed production of heavy-duty Otto-cycle motor vehicle engines for model year 2008.

(2)(i) Manufacturers certifying engines to all of the applicable exhaust standards listed in paragraph (a) of this section prior to model year 2008 (without using credits) may reduce the number of engines that are required to meet the NOX and NMHC exhaust standards listed in paragraph (a) of this section in model year 2008 and/or 2009, taking into account the phase-in option provided in paragraph (f)(1) of this section. For every engine that is certified early, the manufacturer may reduce the number of engines that are required by paragraph (f)(1) of this section to meet the NOX and NMHC standards listed in paragraph (a) of this section by one engine. For example, if a manufacturer produces 180 heavy-duty Otto-cycle engines in 2007 that meet all of the applicable standards listed in paragraph (a) of this section, and it produced 10,000 heavy-duty Otto-cycle engines in 2009, then only 9,900 of the engines would need to comply with the NOX and NMHC standards listed in paragraph (a) of this section.

(ii) Manufacturers certifying engines to all of the applicable evaporative standards listed in paragraph (b) of this section prior to model year 2008 may reduce the number of engines that are required to meet the evaporative standards listed in paragraph (a) of this section in model year 2008 and/or 2009,
taking into account the phase-in option provided in paragraph (f)(1) of this section. For every engine that is certified early, the manufacturer may reduce the number of engines that are required by paragraph (f)(1) of this section to meet evaporative standards listed in paragraph (b) of this section by one engine.

(3) Manufacturers certifying engines to a voluntary NO\textsubscript{X} standard of 0.10 g/bhp-hr (without using credits) in addition to all of the applicable standards listed in paragraphs (a) and (b) of this section prior to model year 2008 may reduce the number of engines that are required to meet the NO\textsubscript{X} and NMHC standards listed in paragraph (a) of this section in model year 2008 and/or 2009, taking into account the phase-in option provided in paragraph (f)(1) of this section. For each such engine that is certified early, the manufacturer may reduce the number of engines that are required by paragraph (f)(1) of this section to meet the NO\textsubscript{X} and NMHC standards listed in paragraph (a) of this section by two engines.

(g) 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\textsubscript{X} FEL no higher than 0.50 g/bhp-hr, the applicable compliance limits for NO\textsubscript{X} and NMHC shall be determined by adding 0.10 g/bhp-hr to the otherwise applicable standards or FELs for NO\textsubscript{X} and NMHC.

§86.010–2 Definitions.

The definitions of §86.004–2 continue to apply to 2004 and later model year vehicles. The definitions listed in this section apply beginning with the 2010 model year.

DTC means diagnostic trouble code.

Engine or engine system as used in §§86.007–17, 86.007–30, 86.010–38, and 86.010–38 means the engine, fuel system, induction system, aftertreatment system, and everything that makes up the system for which an engine manufacturer has received a certificate of conformity.

Engine start as used in §86.010–18 means the point when the engine reaches a speed 150 rpm below the normal, warmed-up idle speed (as determined in the drive position for vehicles equipped with an automatic transmission). For hybrid vehicles or for engines employing alternative engine start hardware or strategies (e.g., integrated starter and generators.), the manufacturer may use an alternative definition for engine start (e.g., key-on) provided the alternative definition is based on equivalence to an engine start for a conventional vehicle.

Functional check, in the context of onboard diagnostics, means verifying that a component and/or system that receives information from a control computer responds properly to a command from the control computer.

Ignition cycle as used in §86.010–18 means a cycle that begins with engine start, meets the engine start definition for at least two seconds plus or minus one second, and ends with engine shut-off.

Limp-home operation as used in §86.010–18 means an operating mode that an engine is designed to enter upon determining that normal operation cannot be maintained. In general, limp-home operation implies that a component or system is not operating properly or is believed to be not operating properly.

Malfunction means the conditions have been met that require the activation of an OBD malfunction indicator light and storage of a DTC.

MIL-on DTC means the diagnostic trouble code stored when an OBD system has detected and confirmed that a malfunction exists (e.g., typically on the second drive cycle during which a given OBD monitor has evaluated a system or component). Industry standards may refer to this as a confirmed or an active DTC.

Onboard Diagnostics (OBD) group means a combination of engines, engine families, or engine ratings that use the same OBD strategies and similar calibrations.

Pending DTC means the diagnostic trouble code stored upon the detection of a potential malfunction.

Permanent DTC means a DTC that corresponds to a MIL-on DTC and is stored in non-volatile random access memory (NVRAM). A permanent DTC can only be erased by the OBD system.