

§ 86.1809-01 Prohibition of defeat devices.

(a) No new light-duty vehicle or light-duty truck shall be equipped with a defeat device.

(b) The Administrator may test or require testing on any vehicle at a designated location, using driving cycles and conditions which may reasonably be expected to be encountered in normal operation and use, for the purposes of investigating a potential defeat device.

(c) For cold temperature CO emission control, the Administrator will use a guideline to determine the appropriateness of the CO emission control at ambient temperatures between 25 deg. F (-4 deg. C) and 68 deg. F (20 deg. C). The guideline for CO emission congruity across the intermediate temperature range is the linear interpolation between the CO standard applicable at 25 deg. F (-4 deg. C) and the CO standard applicable at 68 deg. F (20 deg. C). For vehicles that exceed this CO emissions guideline upon intermediate temperature cold testing:

(1) If the CO emission level is greater than the 20 deg. F (-7 deg. C) emission standard, the vehicle will automatically be considered to be equipped with a defeat device without further investigation.

(2) If the CO emission level does not exceed the 20 deg. F emission standard, the Administrator may investigate the vehicle design for the presence of a defeat device under paragraph (d) of this section.

(d) For vehicle designs designated by the Administrator to be investigated for possible defeat devices:

(1) The manufacturer must show to the satisfaction of the Administrator that the vehicle design does not incorporate strategies that unnecessarily reduce emission control effectiveness exhibited during the Federal or Supplemental Federal emissions test procedures (FTP or SFTP) when the vehicle is operated under conditions which may reasonably be expected to be encountered in normal operation and use.

(2) Information requirements:

(i) Upon request by the Administrator, the manufacturer will provide an explanation containing detailed information regarding test programs, en-

gineering evaluations, design specifications, calibrations, on-board computer algorithms, and design strategies incorporated for operation both during and outside of the Federal emission test procedure.

(ii) For purposes of investigations of possible cold temperature CO defeat devices under this paragraph (d), the manufacturer shall provide an explanation which must show, to the satisfaction of the Administrator, that CO emissions are reasonably controlled in reference to the linear guideline, across the intermediate temperature range.

(e) For each test group of Tier 2 LDV/LLDTs and HLDT/MDPVs and interim non-Tier 2 LDV/LLDTs and HLDT/MDPVs the manufacturer must submit, with the Part II certification application, an engineering evaluation demonstrating to the satisfaction of the Administrator that a discontinuity in emissions of non-methane organic gases, carbon monoxide, oxides of nitrogen and formaldehyde measured on the Federal Test Procedure (subpart B of this part) does not occur in the temperature range of 20 to 86 degrees F. For diesel vehicles, the engineering evaluation must also include particulate emissions.

[64 FR 23925, May 4, 1999, as amended at 65 FR 6853, Feb. 10, 2000]

§ 86.1810-01 General standards; increase in emissions; unsafe conditions; waivers.

This section applies to model year 2001 and later light-duty vehicles and light-duty trucks fueled by gasoline, diesel, methanol, natural gas and liquefied petroleum gas fuels. Multi-fueled vehicles (including dual-fueled and flexible-fueled vehicles) shall comply with all requirements established for each consumed fuel (or blend of fuels in the case of flexible fueled vehicles). The standards of this subpart apply to both certification and in-use vehicles unless otherwise indicated. For Tier 2 and interim non-Tier 2 vehicles, this section also applies to hybrid electric vehicles and zero emission vehicles. Unless otherwise specified, requirements and provisions of this subpart applicable to methanol fueled vehicles

Environmental Protection Agency

§ 86.1810-01

are also applicable to Tier 2 and interim non-Tier 2 ethanol fueled vehicles.

(a) Any device, system or element of design installed on or incorporated in a new motor vehicle to enable such vehicle to conform to the standards imposed by this subpart:

(1) Shall not in its operation or function cause the emission into the ambient air of any noxious or toxic substance that would not be emitted in the operation of such vehicle without such system, except as specifically permitted by regulation; and

(2) Shall not in its operation, function or malfunction result in any unsafe condition endangering the vehicle, its occupants, or persons or property in close proximity to the vehicle.

(b) In establishing the physically adjustable range of each adjustable parameter on a new motor vehicle, the manufacturer shall ensure that, taking into consideration the production tolerances, safe vehicle drive ability characteristics are available within that range, as required by section 202(a)(4) of the Clean Air Act.

(c) Every manufacturer of new motor vehicles subject to any of the standards imposed by this subpart shall, prior to taking any of the actions specified in section 203(a)(1) of the Act, test or cause to be tested motor vehicles (or motor vehicle engines) in accordance with good engineering judgment to ascertain that such test vehicles will meet the requirements of this section for the useful life of the vehicle.

(d) *Crankcase emissions prohibited.* No crankcase emissions shall be discharged into the ambient atmosphere from any 2001 and later model year light-duty vehicle or light-duty truck.

(e) *On-board diagnostics.* All light-duty vehicles and light-duty trucks must have an on-board diagnostic system as described in § 86.1806-01.

(f) *Altitude requirements.* Except for supplemental exhaust emission standards (which apply only at low altitude conditions), all emission standards apply at low altitude conditions and at high altitude conditions. Interim non-Tier 2 LDV/Ts may be certified to applicable Tier 1 exhaust emission standards at high altitude as set forth in §§ 86.1811-01, 86.1812-01, 86.1813-01,

86.1814-02 and 86.1815-02. Requirements to meet emission standards at high altitude are optional for interim non-Tier 2 MDPVs.

(g) The standards set forth in this part refer to test procedures set forth in subparts B, C, O and P of this part.

(h) For methanol-fueled and natural gas-fueled vehicles, hydrocarbon standards refer to hydrocarbon equivalents and nonmethane hydrocarbon standards refer to nonmethane hydrocarbon equivalents.

(i) *Supplemental FTP general provisions.* (1) Implementation schedules. A minimum of the percentage of a manufacturer's model year sales of light-duty vehicles or light light-duty trucks (considered independently) shown in Table S01-1 and heavy light-duty trucks shown in Table S01-2 shall not exceed the applicable SFTP standards found in paragraph (b) of §§ 86.1811-01, 1812-01, 1813-01, 1814-02, and 1815-02 when tested under the applicable procedures in subpart B of this part. Tables S01-1 and S01-2 follow:

TABLE S01-1—SFTP IMPLEMENTATION SCHEDULE FOR LIGHT-DUTY VEHICLES AND LIGHT LIGHT-DUTY TRUCKS

Model year	Percentage
2000	40
2001	80
2002	100

TABLE S01-2—SFTP IMPLEMENTATION SCHEDULE FOR HEAVY LIGHT-DUTY TRUCKS

Model year	Percentage
2002	40
2003	80
2004	100

(2) Optionally, a minimum of the percentage shown in Table S01-1 of a manufacturer's combined sales of the applicable model year's light-duty vehicles and light light-duty trucks shall not exceed the applicable SFTP standards. Under this option, the light-duty vehicles shall not exceed the applicable SFTP standards in § 86.1811-01(b), and the light light-duty trucks shall not exceed the applicable SFTP standards in § 86.1812-01(b) or § 86.1813-01(b) as applicable.

(3) Sales percentages for the purposes of determining compliance with the applicable SFTP emission standards shall be based on total actual U.S. sales of light-duty vehicles of the applicable model year by a manufacturer to a dealer, distributor, fleet operator, broker, or any other entity which comprises the point of first sale. If the option of paragraph (i)(2) of this section is taken, such sales percentages shall be based on the total actual combined U.S. sales of light-duty vehicles and light light-duty trucks of the applicable model year by a manufacturer to a dealer, distributor, fleet operator, broker, or any other entity which comprises the point of first sale.

(4) The SFTP standards do not apply to vehicles or trucks certified on alternative fuels, but the standards do apply to the gasoline and diesel fuel operation of flexible fuel vehicles and trucks and dual fuel vehicles and trucks.

(5) The SFTP standards do not apply to vehicles or trucks tested at high altitude.

(6) The air to fuel ratio shall not be richer at any time than the leanest air to fuel mixture required to obtain maximum torque (lean best torque), plus a tolerance of six percent. The Administrator may approve a manufacturer's request for additional enrichment if it can be shown that additional enrichment is needed to protect the engine or emissions control hardware. For Tier 2 and interim non-Tier 2 vehicles, this provision does not apply to enrichment that occurs upon cold start, warm-up conditions and rapid-throttle motion conditions ("tip-in" or "tip-out" conditions).

(7) The requirement to use a single roll dynamometer (or a dynamometer which produces equivalent results), discussed in §§ 86.108-00, 86.118-00, and 86.129-00 of subpart B of this part, applies to all SFTP and FTP test elements as set forth in subpart B of this part for test groups which are designated as SFTP compliant under the implementation schedules in Tables S01-1 and S01-2 in paragraph (i)(1) of this section.

(8) Small volume provisions. (i) Light-duty vehicles and light light-duty trucks manufactured by small

volume manufacturers, as described in § 86.1801-01(d), are exempt from the requirements of this paragraph until model year 2002, when 100 percent compliance with the provisions of this paragraph (i) and the SFTP standards in § 86.1811-01(b) and § 86.1812-01(b) is required. This exemption does not apply to small volume test groups as defined in § 86.1838-01(b)(2).

(ii) Heavy light-duty trucks manufactured by small volume manufacturers, as defined in § 86.1801-01, are exempt from the requirements of this paragraph (i) until model year 2004 when 100 percent compliance with the provisions of this paragraph and the SFTP standards in §§ 86.1814-02(b) and 86.1815-02(b) is required. This exemption does not apply to small volume test groups as defined in § 86.1838-01(b)(2).

(9) [Reserved]

(10) The manufacturer must state at the time of Application for Certification, based on projected U.S. sales or projected production for U.S. sale, which test groups will be used to attain the required implementation schedule sales percentages for certification purposes.

(11) A manufacturer cannot use one set of test groups to meet its intermediate useful life standards and another to meet its full useful life standards. The same test groups which are used to meet the intermediate useful life standards will be required to meet the corresponding full useful life standards.

(12) Compliance with composite standards shall be demonstrated using the calculations set forth in § 86.164-00.

(13) *A/C-on specific calibrations.* (i) For Tier 2 and interim non-Tier 2 vehicles, A/C-on specific calibrations (e.g. air to fuel ratio, spark timing, and exhaust gas recirculation), may be used which differ from A/C-off calibrations for given engine operating conditions (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters).

(ii) Such calibrations must not unnecessarily reduce the NMHC+NO_x emission control effectiveness during A/C-on operation when the vehicle is operated under conditions which may reasonably be expected to be encountered during normal operation and use.

(iii) If reductions in control system NMHC+NO_x effectiveness do occur as a result of such calibrations, the manufacturer must, in the Application for Certification, specify the circumstances under which such reductions do occur, and the reason for the use of such calibrations resulting in such reductions in control system effectiveness.

(iv) A/C-on specific "open-loop" or "commanded enrichment" air-fuel enrichment strategies (as defined below), which differ from A/C-off "open-loop" or "commanded enrichment" air-fuel enrichment strategies, may not be used, with the following exceptions: Cold-start and warm-up conditions, or, subject to Administrator approval, conditions requiring the protection of the vehicle, occupants, engine, or emission control hardware. Other than these exceptions, such strategies which are invoked based on manifold pressure, engine speed, throttle position, or other engine parameters must use the same engine parameter criteria for the invoking of this air-fuel enrichment strategy and the same degree of enrichment regardless of whether the A/C is on or off. "Open-loop" or "commanded" air-fuel enrichment strategy is defined as enrichment of the air to fuel ratio beyond stoichiometry for the purposes of increasing engine power output and the protection of engine or emissions control hardware. However, "closed-loop biasing," defined as small changes in the air-fuel ratio for the purposes of optimizing vehicle emissions or driveability, must not be considered an "open-loop" or "commanded" air-fuel enrichment strategy. In addition, "transient" air-fuel enrichment strategy (or "tip-in" and "tip-out" enrichment), defined as the temporary use of an air-fuel ratio rich of stoichiometry at the beginning or duration of rapid throttle motion, must not be considered an "open-loop" or "commanded" air-fuel enrichment strategy.

(14) "*Lean-on-cruise" calibration strategies.* (i) For Tier 2 and interim non-Tier 2 vehicles, the manufacturer must state in the Application for Certification whether any "lean-on-cruise" strategies are incorporated into the vehicle design. A "lean-on-cruise" air-

fuel calibration strategy is defined as the use of an air-fuel ratio significantly greater than stoichiometry, during non-deceleration conditions at speeds above 40 mph. "Lean-on-cruise" air-fuel calibration strategies must not be employed during vehicle operation in normal driving conditions, including A/C usage, unless at least one of the following conditions is met:

(A) Such strategies are substantially employed during the FTP or SFTP;

(B) Such strategies are demonstrated not to significantly reduce vehicle NMHC+NO_x emission control effectiveness over the operating conditions in which they are employed; or

(C) Such strategies are demonstrated to be necessary to protect the vehicle occupants, engine, or emission control hardware.

(ii) If the manufacturer proposes to use a "lean-on-cruise" calibration strategy, the manufacturer must specify the circumstances under which such a calibration would be used, and the reason or reasons for the proposed use of such a calibration.

(j) *Evaporative emissions general provisions.* (1) The evaporative standards in §§ 86.1811-01(d), 86.1812-01(d), 86.1813-01(d), 86.1814-01(d) and 86.1815-01(d) apply equally to certification and in-use vehicles and trucks. The spitback standard also applies to newly assembled vehicles.

(2) For certification testing only, manufacturers may conduct testing to quantify a level of non-fuel 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 non-fuel background emissions may be subtracted from evaporative emission test results from certification vehicles if approved in advance by the Administrator.

(3) All fuel vapor generated in a gasoline- or methanol-fueled light-duty vehicle or light-duty truck during in-use operation 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.

(k) *Refueling emissions general provisions—(1) Implementation schedules.* (i)

Tables S01-3, S01-4, and S01-5 in this paragraph (k)(1)(i) give the minimum percentage of a manufacturer's sales of the applicable model year's gasoline- and methanol-fueled Otto-cycle and petroleum-fueled and methanol-fueled diesel-cycle light-duty vehicles and light-duty trucks which shall be tested under the applicable procedures in subpart B of this part, and shall not exceed the standards described in §§ 86.1811-01(e), 86.1812-01(e), 86.1813-01(e), 86.1814-01(e). Vehicles waived from the emission standards under the provisions of paragraphs (m) and (n) of this section shall not be counted in the calculation of the percentage of compliance. Tables S01-3, S01-4, and S01-5 follow:

TABLE S01-3—LIGHT-DUTY VEHICLES

Model year	Percentage
1998 ^a	40
1999 ^a	80
2000 ^a	100

^aNote: This subpart prescribes standards for 2001 and later MY vehicles. However, the implementation phase-in periods prior to this date are included for ease of reference.

TABLE S01-4—LIGHT LIGHT-DUTY TRUCKS

Model year	Percentage
2001	40
2002	80
2003	100

TABLE S01-5—HEAVY LIGHT-DUTY TRUCKS

Model year	Percentage
2004	40
2005	80
2006	100

(ii) Either manufacturer sales or actual production intended for sale in the United States may be used to determine combined volume, at the manufacturer's option.

(2) Sales percentages for the purposes of determining compliance with the applicable refueling emission standards shall be based on total actual U.S. sales of light-duty vehicles or light-duty trucks of the applicable model year by a manufacturer to a dealer, distributor, fleet operator, broker, or any other entity which comprises the point of first sale.

(3) *Refueling receptacle requirements.* Refueling receptacles on natural gas-

fueled vehicles shall comply with the receptacle provisions of the ANSI/AGA NGV1-1994 standard (as incorporated by reference in § 86.1(b)(3)). This requirement is subject to the phase-in schedules in Tables S01-3 and S01-4 of paragraph (k)(1)(i) of this section.

(1) *Fuel dispensing spitback testing waiver.* (1) Vehicles certified to the refueling emission standards set forth in §§ 86.1811-01(e), 86.1812-01(e) and 86.1813-01(e) are not required to demonstrate compliance with the fuel dispensing spitback standard contained in that section provided that:

(i) The manufacturer certifies that the vehicle inherently meets the fuel dispensing spitback standard as part of compliance with the refueling emission standard; and

(ii) This certification is provided in writing and applies to the full useful life of the vehicle.

(2) EPA retains the authority to require testing to enforce compliance and to prevent noncompliance with the fuel dispensing spitback standard.

(m) *Inherently low refueling emission testing waiver.* (1) Vehicles using fuels/fuel systems inherently low in refueling emissions are not required to conduct testing to demonstrate compliance with the refueling emission standards set forth in §§ 86.1811-01(e), 86.1812-01(e) and 86.1813-01(e) provided that:

(i) This provision is only available for petroleum diesel fuel. It is only available if the Reid Vapor Pressure of in-use diesel fuel is equal to or less than 1 psi (7 kPa) and for diesel vehicles whose fuel tank temperatures do not exceed 130 deg.F (54 deg. C); and

(ii) To certify using this provision the manufacturer must attest to the following evaluation: "Due to the low vapor pressure of diesel fuel and the vehicle tank temperatures, hydrocarbon vapor concentrations are low and the vehicle meets the 0.20 grams/gallon refueling emission standard without a control system."

(2) The certification required in paragraph (m)(1)(ii) of this section must be provided in writing and must apply for the full useful life of the vehicle.

(3) EPA reserves the authority to require testing to enforce compliance and to prevent noncompliance with the refueling emission standard.

(n) *Fixed liquid level gauge waiver.* Liquefied petroleum gas-fueled vehicles which contain fixed liquid level gauges or other gauges or valves which can be opened to release fuel or fuel vapor during refueling, and which are being tested for refueling emissions, are not required to be tested with such gauges or valves open, as outlined in § 86.157-98(d)(2), provided the manufacturer can demonstrate, to the satisfaction of the Administrator, that such gauges or valves would not be opened during refueling in-use due to inaccessibility or other design features that would prevent or make it very unlikely that such gauges or valves could be opened.

(o) Unless otherwise approved by the Administrator, manufacturers must measure NMOG emissions in accordance with the California Non-Methane Organic Gas Test Procedures. These procedures are incorporated by reference (see § 86.1).

(p) For gasoline and diesel-fueled Tier 2 and interim non-Tier 2 vehicles, manufacturers may measure non-methane hydrocarbons (NMHC) in lieu of NMOG. Manufacturers must multiply NMHC measurements from gasoline vehicles by an adjustment factor of 1.04 before comparing with the NMOG standard to determine compliance with that standard. Manufacturers may use other factors to adjust NMHC results to more properly represent NMOG results. Such factors must be based upon comparative testing of NMOG and NMHC emissions and be approved in advance by the Administrator.

[64 FR 23925, May 4, 1999, as amended at 65 FR 6853, Feb. 10, 2000]

§ 86.1811-01 Emission standards for light-duty vehicles.

This section applies to 2001 and later model year light-duty vehicles fueled by gasoline, diesel, methanol, natural gas and liquefied petroleum gas fuels except as noted. Multi-fueled vehicles shall comply with all requirements established for each consumed fuel. For methanol fueled vehicles, references in this section to total hydrocarbons shall mean total hydrocarbon equivalents and references to non-methane hydrocarbons shall mean non-methane hydrocarbon equivalents. This section does not apply to 2004 and later model

year vehicles, except as specifically referenced by § 86.1811-04.

(a) *Exhaust emission standards.* (1) Exhaust emissions shall not exceed the following standards at intermediate useful life:

(i) Total hydrocarbons: 0.41 grams per mile, except natural gas, which has no standard.

(ii) Non-methane hydrocarbons: 0.25 grams per mile.

(iii) Carbon monoxide: 3.4 grams per mile.

(iv) Oxides of nitrogen: 0.4 grams per mile except diesel fuel which has a 1.0 gram per mile standard.

(v) Particulate matter: 0.08 grams per mile.

(2) Exhaust emissions shall not exceed the following standards at full useful life:

(i) [Reserved]

(ii) Non-methane hydrocarbons: 0.31 grams per mile.

(iii) Carbon monoxide: 4.2 grams per mile.

(iv) Oxides of nitrogen: 0.6 grams per mile except diesel fuel which has a 1.25 gram per mile standard.

(v) Particulate matter: 0.10 grams per mile.

(b) *Supplemental exhaust emission standards.* (1) Supplemental exhaust emissions from gasoline-fueled and diesel-fueled light-duty vehicles shall not exceed the following standards at intermediate useful life:

(i) Nonmethane hydrocarbon and oxides of nitrogen composite: 0.65 grams per mile except diesel fuel which has a 1.48 gram per mile standard.

(ii) Carbon monoxide. Regulated vehicles shall meet at least one of the following two sets of standards:

(A) *Individual US06 and SC03 Air Conditioning compliance.* Comply with both the following standards:

(1) 3.0 grams per mile on the A/C test, not applicable to diesel fueled vehicles; and

(2) 9.0 grams per mile on the US06 test; or

(B) *Composite Carbon Monoxide Standard:* 3.4 grams per mile.

(2) Supplemental exhaust emissions from gasoline-fueled and diesel-fueled light-duty vehicles shall not exceed the following standards at full useful life: