

Suggested amendments to Title 13, California Code of Regulations, sections 1960.1(r) and (s) for the California Supplemental Federal Test Procedure exhaust emission levels for 2001 and subsequent model passenger cars, light-duty trucks, and medium-duty vehicles for low-emission vehicles, ultra-low-emission vehicles, and super-low-emission vehicles; last major amendments on June 4, 1997. These amendments would make minor updates to section 1960.1(r)1 and add 1960.1(s) as a new section.

Note: Proposed amendments to this document are shown in underline to indicate additions and ~~strikeouts~~ to indicate deletions compared to current CCR, Title 13, 1960.1(r). Existing intervening text that is not amended is indicated by a row of asterisks (****).

(r) The Supplemental Federal Test Procedure (SFTP) standards in this section represent the maximum SFTP exhaust emissions at 4,000 miles ± 250 miles or at the mileage determined by the manufacturer for emission-data vehicles in accordance with the “California Exhaust Emission Standards and Test Procedures for 1988 Through 2000 Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles,” as incorporated by reference in section 1960.1(k), and with the “California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles,” as incorporated by reference in section 1961(d). The SFTP exhaust emission levels from new 2001 through 2013 and subsequent model low-emission vehicles, ultra-low-emission vehicles and super-ultra-low emission vehicles in the passenger car and light-duty truck class, and new 2003 through 2013 and subsequent low-emission vehicles, ultra-low-emission vehicles, and super-ultra-low-emission vehicles in the medium-duty class, shall not exceed:

**SFTP EXHAUST EMISSION STANDARDS
FOR LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES, AND
SUPER-ULTRA-LOW-EMISSION VEHICLES IN THE PASSENGER CAR, LIGHTDUTY
TRUCK, AND MEDIUM-DUTY VEHICLE CLASSES**
(grams per mile)^{6,7,8,9,10,11}

<i>Vehicle Type¹</i>	<i>Gross Vehicle Weight Rating (lbs.)</i>	<i>Loaded Vehicle Weight Test Weight (lbs.)²</i>	<i>US06 Test¹</i> <i>NMHC⁴ + CO¹</i> <i>NOx¹</i>		<i>A/C Test^{1,5}</i> <i>NMHC⁴ + CO¹</i> <i>NOx¹</i>	
PC	All	All Vehicles in this category are tested at their loaded vehicle weight (curb weight plus 300 lbs.)	0.14	8.0	0.20	2.7
LDT LDT	< 6000 lbs	0-3750 lbs. (LVW) Vehicles in this category are tested at their loaded vehicle weight (curb weight plus 300 lbs.)	0.14	8.0	0.20	2.7
		3751-5750 lbs. (LVW) Vehicles in this category are tested at their loaded vehicle weight (curb weight plus 300 lbs.)	0.25	10.5	0.27	3.5
MDV MDV	6,000-8,500 lbs. ³	3751-5750 lbs. (ALVW) Vehicles in this category are tested at their adjusted loaded vehicle weight (average of curb weight and GVWR)	0.40	10.5	0.31	3.5
		5751-8500 lbs. (ALVW) ³ Vehicles in this category are tested at their adjusted loaded vehicle weight (average of curb weight and GVWR)	0.60	11.8	0.44	4.0

1 *Abbreviations and Definitions.*

2 For MDVs, "Loaded Vehicle Weight" shall mean "Test Weight," which is the average of the vehicle's curb weight and gross vehicle weight. PCs and LDTs will be tested at their "Loaded Vehicle Weight," which is the vehicle's curb weight plus 300 pounds. MDVs will be tested at their "Adjusted Loaded Vehicle Weight," which is the average of the vehicle's curb weight and gross vehicle weight rating.

6 *SFTP*. SFTP means the additional test procedure designed to measure emissions during aggressive and microtransient driving, as described in section ~~86.159-00~~ 86.159-08, Title 40, Code of Federal Regulations, as adopted ~~October 22, 1996~~ March 30, 2006, over the US06 cycle, and also the test procedure designed to measure urban driving emissions while the vehicle's air conditioning system is operating, as described in section ~~86.160-00~~ 86.160-08, Title 40, Code of Federal Regulations, as adopted ~~October 22, 1996~~ March 30, 2006, over the SC03 cycle, except that the dynamometer inertial weight shall be as described in this document regardless of what may be specified in the Code of Federal Regulations. These sections of the Code of Federal Regulations are incorporated herein by reference.

(s) The following Supplemental Federal Test Procedure (SFTP II) standards in this section represent the maximum SFTP II exhaust emissions at full useful life in accordance with the "California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles," as incorporated by reference in section 1961(d). Manufacturers have the option to certify PCs and LDTs to either the "SFTP II" Exhaust Stand-Alone Standard or the "SFTP II" Exhaust Sales-Weighted Standard. MDVs must certify to the "SFTP II" Exhaust Stand-Alone Standard. The SFTP II exhaust emission levels from new 2014 and subsequent model low-emission vehicles, ultra-low-emission vehicles and super-ultra-low-emission vehicles in the passenger car, light-duty truck, and medium-duty classes, shall not exceed:

(s)(1) *SFTP II Exhaust Emission Standards for Passenger Cars and Light-Duty Trucks*

(A) "*SFTP II*" Exhaust Stand-Alone Standards. The following standards represent the maximum exhaust emissions for full useful life from new 2014 and subsequent model-year "SFTP II" LEVs, ULEVs, and SULEVs, including fuel-flexible, bi-fuel, and dual fuel vehicles when operating on any gaseous or liquid fuel they are designed to use:

SFTP II Exhaust Stand-Alone Mass Emission Standards for New 2014 and Subsequent Model LEVs, ULEVs, and SULEVs in the Passenger Car and Light-Duty Truck Classes^{3,4}

<i>Vehicle Type</i>	<i>Mileage for Compliance</i>	<i>Vehicle Emission Category</i> ²	<i>US06 Test</i> (g/mi)		<i>SC03 Test</i> ¹ (g/mi)	
			<i>NMHC ± NOx</i>	<i>Carbon Monoxide</i>	<i>NMHC ± NOx</i>	<i>Carbon Monoxide</i>
<u>All PCs, LDTs 8,500 lbs. GVWR or less Vehicles in this category are tested at their loaded vehicle weight (curb weight plus 300 pounds)</u>	<u>150,000</u>	<u>LEV</u>	<u>0.140</u>	<u>5.6</u>	<u>0.100</u>	<u>1.6</u>
		<u>ULEV</u>	<u>0.120</u>	<u>5.6</u>	<u>0.070</u>	<u>0.9</u>
		<u>SULEV</u>	<u>0.060</u>	<u>5.6</u>	<u>0.020</u>	<u>0.5</u>
		<u>Option A</u> ⁵				
		<u>SULEV</u>	<u>0.050</u>	<u>5.6</u>	<u>0.020</u>	<u>0.5</u>

¹ A/C-on Specific Calibrations. A/C-on specific calibrations (e.g. air-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). Such calibrations must not unnecessarily reduce the NMHC+NOx 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. If reductions in control system NMHC+NOx effectiveness do occur as a result of such calibrations, the manufacturer shall, 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.

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 Executive Officer 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 shall 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-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, shall 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, shall not be considered an "open-loop" or "commanded" air-fuel enrichment strategy.

² Vehicle Emission Categories. SFTP II requirements are linked with LEV III FTP requirements. LEV III includes subcategories for ULEV and SULEV termed ULEV50, ULEV70, SULEV20 and SULEV30. SFTP II does not include these breakouts, so all ULEVs will comply with the SFTP II ULEV standard whether they are categorized for LEV III as ULEV, ULEV50, or ULEV70, and all SULEVs will comply with the SFTP II SULEV standard whether they are categorized for LEV III as SULEV, SULEV20, or SULEV30.

³ Air to Fuel Ratio Requirement. With the exception of cold-start conditions, warm-up conditions and rapid-throttle motion conditions ("tip-in" or "tip-out" conditions), the air-fuel ratio shall not be richer at any time than, for a given engine operating condition (e.g., engine speed, manifold pressure, coolant temperature, air charge temperature, and any other parameters), the leanest air-fuel mixture required to obtain maximum torque (lean best torque), with a tolerance of three percent of the fuel consumption. The emission control system shall remain in the

operating mode producing the best balance of HC, CO and NOx catalyst efficiency (e.g., closed loop/stoichiometric operation on 3-way catalyst system) under all conditions except when required for engine component temperature protection, driver power request, start enrichment requirements, fuel shut-off situations (decelerations, rev limiter, torque management, etc.) or certain component malfunctions preventing safe closed loop operation. The Executive Officer may approve a manufacturer's request for approval to use additional enrichment in subsequent testing if the manufacturer demonstrates that additional enrichment is needed to protect the vehicle, occupants, engine, or emission control hardware.

⁴ "Lean-On-Cruise" Calibration Strategies. In the Application for Certification, the manufacturer shall state 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 shall not be employed during vehicle operation in normal driving conditions, including A/C-usage, unless at least one of the following conditions is met:

1. Such strategies are substantially employed during the FTP or SFTP; or
2. Such strategies are demonstrated not to significantly reduce vehicle NMHC+NOx emission control effectiveness over the operating conditions in which they are employed; or
3. Such strategies are demonstrated to be necessary to protect the vehicle, occupants, engine, or emission control hardware.

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

The above provisions shall not apply to vehicles powered by "lean-burn" engines or Diesel-cycle engines. A "lean-burn" engine is defined as an Otto-cycle engine designed to run at an air-fuel ratio significantly greater than stoichiometry during the large majority of its operation.

⁵ Optional SFTP II SULEV Standard. A manufacturer may certify its light-duty truck fleet from 6001 to 8500 lbs. GVWR to the SULEV, option A, standard set forth in Test Procedures, Section E.1.2.3 for the 2014 through 2020 model years, only if the manufacturer extends the high cost parts emission warranty mileage to 200,000 miles. Passenger cars and light-duty trucks 0-6000 lbs. GVWR are not eligible for this option.

(B) "SFTP II" Exhaust Sales-Weighted Standard. The following standards represent the maximum exhaust emissions for full useful life model year sales-weighted NMHC+NOx standard. Vehicles must certify to SFTP II Composite Value Bins in increments of 0.010 g/mi to a maximum of 0.180 g/mi. Manufacturers will calculate an SFTP II Composite Value using the following equation:

$$\text{SFTP II Composite Value} = 0.28 \times \text{US06} + 0.37 \times \text{SC03} + 0.35 \times \text{FTP} \quad [\text{Eq. 1}]$$

Sales-Weighted SFTP II NMHC+NOx Exhaust Emission Standards (g/mi) ^{1,2,3,4,5,6}									
Model Year	2014	2015	2016	2017	2018	2019	2020	2021	2022
All PCs, LDTs 8,500 lbs. GVWR or less									
<u>Vehicles in this category are tested at their loaded vehicle weight (curb weight plus 300 pounds)</u>	<u>0.140</u>	<u>0.120</u>	<u>0.110</u>	<u>0.100</u>	<u>0.090</u>	<u>0.080</u>	<u>0.070</u>	<u>0.060</u>	<u>0.050</u>

¹ A/C-on Specific Calibrations. See footnote 1, "SFTP II Exhaust Stand-Alone" Table.

² Air to Fuel Ratio Requirement. See footnote 2, “SFTP II Exhaust Stand-Alone” Table.

³ “Lean-On-Cruise” Calibration Strategies. See footnote 4, “SFTP II Exhaust Stand-Alone” Table.

⁴ Vehicles must certify at full useful life values of 150,000 miles.

⁵ Calculating the sales-weighted average. For each model year, the manufacturer shall calculate its sales-weighted average NMHC+NOx emissions value as follows:

$$\frac{[\sum_{i=1}^n (\text{number of vehicles in the engine family})_i \times (\text{Composite Value Bins})_i]}{\sum_{i=1}^n (\text{number of vehicles in the engine family})_i} \quad [\text{Eq 2}]$$

where "n" = a manufacturer's total number of certification engine families 8,500 lbs. GVWR or less for a given model year;

“number of vehicles in the engine family” = the number of vehicles produced and delivered for sale in California in the engine family;

“Composite Value Bin” = the numerical limit selected by the manufacturer for the engine family that serves as the emission standard for the engine family with respect to all testing, instead of the emission standard specified. Vehicles must certify to bins in increments of 0.010 g/mi. Vehicles cannot certify to values above the maximum of 0.180 g/mi.

⁶ Calculation of Fleet Average Total NMHC+NOx Credits or Debits. A manufacturer shall calculate the total NMHC+NOx credits or debits, as follows:

$$\frac{[(\text{NMHC+NOx Emission Standard}) - (\text{Manufacturer's NMHC+NOx Emission Value})] \times (\text{Total Number of Vehicles Produced and Delivered for Sale in California in the 8,500 lbs. GVWR or less class})}{\quad} \quad [\text{Eq 3}]$$

A negative number constitutes total NMHC+NOx debits, and a positive number constitutes total NMHC+NOx credits accrued by the manufacturer for the given model year. Total NMHC+NOx credits earned in a given model year shall retain full value through the fifth model year after they are earned. At the beginning of the sixth model year, the total NMHC+NOx credits will have no value.

A manufacturer shall equalize total NMHC+NOx debits by earning total NMHC+NOx credits in an amount equal to the total NMHC+NOx debits. A manufacturer shall equalize total NMHC+NOx debits within five model years after they have been incurred. If total NMHC+NOx debits are not equalized within the five model year period, the manufacturer shall be subject to the Health and Safety Code section 43211 civil penalty applicable to a manufacturer which sells a new motor vehicle that does not meet the applicable emission standards adopted by the state board. The cause of action shall be deemed to accrue when the total NMHC+NOx debits are not equalized by the end of the specified time period. For the purposes of Health and Safety Code section 43211, the number of vehicles not meeting the state board's emission standards shall be determined by dividing the NMHC+NOx debits for the model year by the fleet average NMHC+NOx emission standard for the model year in which the debits were first incurred.

(s)(2) SFTP II Exhaust Emission Standards for Medium-Duty Vehicles

SFTP II Exhaust Mass Emission Standards for New 2016 and Subsequent Model LEVs, ULEVs, and SULEVs in the Medium-Duty Vehicle Classes^{1,2,3,4,6}

<u>Vehicle Type</u>	<u>Mileage for Compliance</u>	<u>Vehicle Emission Category</u> ⁵	<u>SFTP II Composite Value</u> ⁷ (g/mi)	
			<u>NMHC + NOx</u>	<u>Carbon Monoxide</u>
<u>MDVs 8,501 - 10,000 lbs. GVWR</u> <u>Vehicles in this category are tested at their adjusted loaded vehicle weight (average of curb weight and GVWR)</u>	<u>150,000</u>	<u>ULEV</u>	<u>0.800</u>	<u>22.0</u>
		<u>SULEV</u>	<u>0.450</u>	<u>12.0</u>
<u>MDVs 10,001-14,000 lbs. GVWR</u> <u>Vehicles in this category are tested at their adjusted loaded vehicle weight (average of curb weight and GVWR)</u>	<u>150,000</u>	<u>ULEV</u>	<u>0.550</u>	<u>6.0</u>
		<u>SULEV</u>	<u>0.350</u>	<u>4.0</u>

¹ A/C-on Specific Calibrations. See footnote 1, “SFTP II Exhaust Stand-Alone” Table.

² Air to Fuel Ratio Requirement. See footnote 4, “SFTP II Exhaust Stand-Alone” Table.

³ “Lean-On-Cruise” Calibration Strategies. See footnote 5, “SFTP II Exhaust Stand-Alone” Table.

⁴ SFTP II Start Date. All SFTP requirements begin with the 2014 model year. However, in linking SFTP II to LEV III requirements, the phase-in for MDVs will effectively begin with the 2016 model year.

⁵ Vehicle Emission Categories. SFTP II requirements are linked with LEV III FTP requirements. LEV III includes subcategories for ULEV and SULEV classes. SFTP II does not include these breakouts, so for 8,501-10,000 lbs. GVWR MDVs, ULEV250 and ULEV200 will comply with the SFTP II ULEV standard included herein and SULEV170 and SULEV150 will comply with the SFTP II SULEV standard included herein. For 10,001-14,000 lbs. GVWR MDVs ULEV400 and ULEV270 will comply with the SFTP II ULEV standard included herein, and SULEV230 and SULEV200 will comply with the SFTP II SULEV standard included herein.

⁶ MDV Model Year Phase-in. Phase-in for MDV test groups will align with the FTP phase-in requirements such that all 8,501-10,000 lbs GVWR MDVs certified to ULEV250 or lower and all 10,001-14,000 GVWR MDVs certified to ULEV40 or lower must comply with the standards included herein. All 2022 and subsequent model year MDVs are subject to the SFTP II MDV standards.

⁷ SFTP II Composite Value for MDVs 8,501-10,000 lbs GVWR = 0.28 x US06 + 0.37 x SC03 + 0.35 x FTP, in g/mi.
SFTP II Composite Value for MDVs 10,001-14,000 lbs GVWR = 0.28 x LA92 + 0.37 x SC03 + 0.35 x FTP, in g/mi.

(s)(3) Test Procedures. The certification requirements and test procedures for determining compliance with the emission standards in this section are set forth in the California Exhaust Emission Standards and Test Procedures for 2001 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles,” as amended September 27, 2010, and “California Non-Methane Organic Gas Test Procedures,” as amended July 30, 2002, which are incorporated herein by reference. In the case of hybrid electric vehicles and on-board fuel-fired heaters, the certification requirements and test

procedures for determining compliance with emission standards in this section are set forth in the “California Exhaust Emission Standards and Test Procedures for 2005 through 2008 Model Zero-Emission Vehicles, and 2001 through 2008 Model Hybrid Electric Vehicles, in the Passenger Car, Light-Duty Truck Medium-Duty Vehicle Classes,” incorporated by reference in section 1962.

(s)(4) Abbreviations. The following abbreviations are used in this section 1960.1(s):

“ALVW” means adjusted loaded vehicle weight;

“CO” means carbon monoxide emissions;

“g/mi” means grams per mile;

“GVWR” means gross vehicle weight rating;

“LDT” means light-duty truck;

“LEV” means low emission vehicle;

“LVW” means loaded vehicle weight;

“MDV” means medium-duty vehicle;

“NMHC+NO_x” means non-methane hydrocarbon plus oxides of nitrogen emissions;

“PC” means passenger car;

“SC03” means the test cycle designed to evaluate urban driving emissions while the vehicle’s air conditioner system is operating;

“SULEV” means super-ultra-low-emission vehicle;

“UC” means the Unified Test Cycle or LA92 test cycle;

“ULEV” means ultra-low-emission vehicle;

“US06” means the test cycle designed to evaluate emissions during aggressive and microtransient driving.

(s)(5) Severability. Each provision of this section is severable, and in the event that any provision of this section is held to be invalid, the remainder of this article remains in full force and effect.

Note: Authority cited: Sections 39600, 39601, 43013, 43018, 43101, 43104 and 43105, Health and Safety Code. Reference: Sections 39002, 39003, 39667, 43000, 43009.5, 43013, 43018, 43100, 43101, 43101.5, 43102, 43103, 43104, 43105, 43106, 43107, 43204-43205.5, and 43211, Health and Safety Code.