

State of California  
AIR RESOURCES BOARD

**Notice of Public Availability of Modified Text**

**PUBLIC HEARING TO CONSIDER AMENDMENTS TO THE ZERO-EMISSION VEHICLE  
REQUIREMENTS FOR PASSENGER CARS AND LIGHT-DUTY TRUCKS**

Public Hearing Date: March 28, 1996  
Public Availability Date: June 14, 1996  
Deadline for Public Comment: July 1, 1996

In September 1990, the Air Resources Board (the "Board") adopted the Low Emission Vehicle (LEV) program regulations. These regulations established four new categories of emission standards for passenger cars (PC) and light-duty trucks (LDT): transitional low-emission vehicles (TLEV), low-emission vehicles (LEV), ultra-low-emission vehicles (ULEV) and zero-emission vehicles (ZEV). Under the LEV regulations, each new vehicle category is subject to increasingly more stringent emission standards for non-methane organic gases (NMOG), oxides of nitrogen and carbon monoxide. Additionally the LEV regulations established a production-weighted fleet average NMOG requirement applicable beginning with the 1994 model year and increasing in stringency each model year through 2003. With the exception of the ZEV production requirement described below, manufacturers can produce any combination of vehicles that will meet the required fleet average NMOG level. In addition to meeting the fleet average NMOG requirement, the seven largest vehicle manufacturers were required to produce and offer for sale in California ZEVs in amounts equal to two percent of their total production of PCs and LDTs less than 0-3750 lbs. LVW beginning with the 1998 model year, rising to five percent in 2001 and ten percent in 2003.

At a public hearing held March 28 and 29, 1996, the Board considered amendments to the ZEV requirements found in sections 1900 and 1960.1, title 13, California Code of Regulations (CCR). The primary purpose of the proposed amendments was to eliminate the ZEV production requirements for model years 1998 through 2002. The reasons for this action are detailed in the "Staff Report: Initial Statement of Rulemaking, Proposed Amendments to the Zero-Emission Vehicle Requirements for Passenger Cars and Light-Duty Trucks," released February 9, 1996.

Modified Regulations

At the March 28 and 29 hearing the Board approved the adoption of amendments to sections 1900 and 1960.1, title 13, CCR, as proposed with the following modifications:

**(1) Amend the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” to conform to section 1960.1, title 13, CCR, as amended.**

The amendments as originally proposed included changes to the standards for passenger cars, light-duty trucks and medium-duty vehicles as set forth in various subdivisions of section 1960.1, title 13, CCR. Although these standards are also set out in the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” (hereinafter the “Standards and Test Procedures”), the original proposal did not include conforming amendments to the parallel provisions of the Standards and Test Procedures. At the hearing the Board approved modifications to the Standards and Test Procedures consistent with the proposed amendments to the standards in section 1960.1. Except as noted below, all modifications to the Standards and Test Procedures are simply conforming changes.

**(2) Move the test procedure language of the ZEV credit provisions from title 13 to the incorporated Standards and Test Procedures.**

Under the proposed amendments to section 1960.1(g)(2), note (9)a, title 13, CCR, the regulation would allow multiple credits for ZEVs that have better range or that are equipped with batteries having a higher specific energy. The proposed amendments include test procedures for determining vehicle range and battery specific energy for purposes of calculating ZEV credits.

Typically regulatory provisions that are test procedures have been set out in the incorporated Standards and Test Procedures document only, and are not included in the regulatory text published in title 13. To be consistent with this standard practice, the Board approved modifications to the original proposal that move the test procedures for determining vehicle range and battery specific energy from section 1960.1, title 13, CCR, to sections 9.f.(2) and 9.g. of the Standards and Test Procedures.

**(3) Amend the vehicle range test procedure language of the ZEV credit provisions to clarify the procedure and make conforming amendments to various provisions of the Standards and Test Procedures related to vehicle range.**

The proposed amendments provide that for purposes of determining eligibility for multiple ZEV credits, vehicle range shall be determined using the Urban Dynamometer Driving Schedule (UDDS), Part 86, Appendix I, Code of Federal Regulations. But simply specifying the UDDS does not provide manufacturers with sufficient criteria to make a determination of vehicle range. To include all the criteria necessary to make a proper determination of vehicle range, the Board approved modifications to the existing all-electric range test procedure that separate the urban and highway driving cycles. The modified procedure results in range estimates for two distinct driving conditions and will, therefore, provide more meaningful range data, consistent with current fuel economy labels on conventional vehicles.

The existing test procedures require a light to illuminate when the vehicle is unable to achieve an all-electric range that is at least 75 percent of the range determined using the existing all-electric range test. When the Board approved the modifications to separate the all-electric range test into urban and highway cycles, the Board also approved modifications that would base the light requirement on the urban driving schedule.

**(4) Amend section 1976, title 13, CCR, to include a statement regarding evaporative emissions from ZEVs.**

The original proposal clarified the ZEV regulations by including the ZEV emission standards for passenger cars, light-duty trucks and medium-duty vehicles with the exhaust emission standards for these vehicles in section 1960.1, title 13, CCR, and deleting those same provisions from section 1900, title 13, CCR, which includes definitions of various terms. Because the ZEV standards as included in the definition section and as moved to section 1960.1 in the original proposal related to evaporative as well as exhaust emissions, staff proposed and the Board approved modifying the proposed regulation to move the language regarding ZEV evaporative emission standards to section 1976, title 13, CCR, which contains evaporative emission standards. To clarify the regulations and to be consistent with the modifications approved by the Board at the hearing, staff further proposes by this notice to delete the language regarding ZEV evaporative emission standards from section 1960.1 and the incorporated Standards and Test Procedures, both of which concern exhaust emission standards.

Documents Incorporated by Reference

The proposed regulations as modified include amendments to or affecting two documents that are incorporated by reference in existing regulations:

(1) The “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” (i.e., the Standards and Test Procedures), as amended herein. This document is incorporated by reference in section 1960.1(k), title 13, CCR.

(2) The Urban Dynamometer Driving Schedule, Part 86, Appendix I, Code of Federal Regulations. This schedule is incorporated by reference in Appendix I of the Standards and Test Procedures.

Additionally the proposed amendments as modified incorporate by reference the following document:

(3) The “U.S. Advanced Battery Consortium’s Electric Vehicle Battery Procedure Manual (January 1996), Procedure No. 2, “Constant Current Discharge Test Series” and Appendix. The procedure is incorporated by reference in section 9.g. of the Standards and Test Procedures.

### Submission of Written Comments

In Resolution 96-12, the Board approved the amendments to sections 1900, 1960.1 and 1976, title 13, CCR, and the incorporated “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Year Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles” as set forth in Attachment A to the resolution. In the resolution the Board directed the Executive Officer to adopt the proposed amendments with the modifications described above after making the modified regulatory language available to the public for written comment for a period of 15 days, provided that “the Executive Officer shall consider such written comments regarding the modifications and additional supporting documents and information as may be submitted during this period, shall make such modifications as may be appropriate in light of the comments received, and shall present the regulations to the Board for further consideration if he determines that this is warranted.”

The modified regulations are being made available by this notice for public comment prior to final action by the Executive Officer as required by Government Code section 11346.8(c) and (d). The regulation order including the text of modifications to sections 1960.1 and 1976, title 13, CCR, and the incorporated Standards and Test Procedures, is contained in Attachment A to this notice. As described in the regulation order, the originally proposed amendments are shown in *italics to indicate additions to* and ~~strikeout to indicate deletions from~~ the existing regulation; modifications to the original proposal are shown in *underlined italics to indicate additions to the original proposal* and [~~bracketed strikeout to indicate deletions from the original proposal~~].

Written comments regarding the modified regulations must be submitted to the Board Secretary, Air Resources Board, P.O. Box 2815, Sacramento, California 95812, no later than July 1, 1996, for consideration by the Executive Officer prior to final action. Only comments relating to the modifications or additional supporting documents and information as described in this notice will be considered by the Executive Officer.

CALIFORNIA AIR RESOURCES BOARD

James D. Boyd  
Executive Officer

Attachments

**Attachment A**  
**REGULATION ORDER**

PROPOSED REGULATION ORDER<sup>1</sup>

Sections 1900, 1960.1 and 1976, Title 13, CCR

1. Amend title 13, California Code of Regulations, section 1900 to read as follows:

**§1900. Definitions.**

[Subsections (a)(1) through (14) -- No change]

(a)(15) ~~“Zero-emission vehicle” (or “ZEV”) means any vehicle which is certified by the Executive Officer to produce zero emissions of any criteria pollutants under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40 degrees Fahrenheit and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions. [Reserved]~~

[Subsection (a)(16) -- No change]

Note: Authority cited: Sections 39600, 39601, 43013, 43018, 43101 and 43104, Health and Safety Code. Reference: Sections 39002, 39003, 39010, 39500, 40000, 43000, 43013, 43100, 43101, 43101.5, 43102, 43103, 43104, 43106 and 43204, Health and Safety Code; and section 27156, Vehicle Code.

2. Amend title 13, California Code of Regulations, section 1960.1 to read as follows:

**§1960.1. Exhaust Emission Standards and Test Procedures - 1981 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles.**

[Subsections (a) through (f) -- No Change]

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<sup>1</sup> In this document Universal font is used to provide explanatory text for the regulation order and to identify the sections of the regulations or test procedures to be amended. The originally proposed amendments, which affected sections 1900 and 1960.1, title 13, California Code of Regulations, are shown in *italics* to indicate additions to and ~~strikeout~~ to indicate deletions from the regulations as published in the California Code of Regulations (CCR). The modifications proposed herein affect section 1960.1, title 13, CCR, and the standards and test procedures document incorporated by reference in section 1960.1(k), and section 1976, title 13, CCR. The modifications are shown in *underlined italics* to indicate additions to and ~~[bracketed strikeout]~~ to indicated deletions from the text as originally proposed. Amendments to section 1960.1 and the incorporated standards and test procedures that have been previously approved by the Board in a separate rulemaking proceeding (the LDV/MDV rulemaking action heard by the Board September 28, 1995) and that are expected to be submitted to the Office of Administrative Law for review and filing with the Secretary of State prior to adoption of the amendments proposed herein are incorporated in the underlying text of this document.

(g)(1) The exhaust emissions from new 1992 and subsequent model-year light-duty transitional low-emission vehicles, low-emission vehicles[;] and ultra-low emission vehicles, *and new 2003 and subsequent model-year light-duty zero-emission vehicles* shall not exceed:

EXHAUST EMISSION STANDARDS FOR TRANSITIONAL  
LOW-EMISSION VEHICLES, LOW-EMISSION VEHICLES, ~~AND~~  
ULTRA-LOW-EMISSION VEHICLES *AND ZERO-EMISSION VEHICLES* IN  
PASSENGER CAR AND LIGHT-DUTY TRUCK VEHICLE CLASSES<sup>6,7,8,9,10</sup>  
[grams per mile (or "g/mi")]

<i>Vehicle Type<sup>1</sup></i>	<i>Loaded Vehicle Weight (lbs)</i>	<i>Durability Vehicle Basis (mi)</i>	<i>Vehicle Emission Category<sup>2</sup></i>	<i>Non-Methane Organic Gases<sup>3,4</sup></i>	<i>Carbon Monoxide</i>	<i>Oxides of Nitrogen<sup>5</sup></i>
PC and LDT	All 0-3750	50,000	TLEV	0.125 (0.188)	3.4 (3.4)	0.4 (0.4)
			LEV	0.075 (0.100)	3.4 (3.4)	0.2 (0.3)
			ULEV	0.040 (0.058)	1.7 (2.6)	0.2 (0.3)
			ZEV <sup>2,1</sup>	--	--	--
	100,000	TLEV	0.156	4.2	0.6	
		LEV	0.090	4.2	0.3	
		ULEV	0.055	2.1	0.3	
		ZEV <sup>2,1</sup>	--	--	--	
LDT	3751-5750	50,000	TLEV	0.160 (0.238)	4.4 (4.4)	0.7 (0.7)
			LEV	0.100 (0.128)	4.4 (4.4)	0.4 (0.5)
			ULEV	0.050 (0.075)	2.2 (3.3)	0.4 (0.5)
			ZEV <sup>2,1</sup>	--	--	--
	100,000	TLEV	0.200	5.5	0.9	
		LEV	0.130	5.5	0.5	
		ULEV	0.070	2.8	0.5	
		ZEV <sup>2,1</sup>	--	--	--	

- (1) "PC" means passenger cars.  
 "LDT" means light-duty trucks.  
 "LVW" means loaded vehicle weight.  
 "Non-Methane Organic Gases" or "NMOG" means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.
- (2) "TLEV" means transitional low-emission vehicle.  
 "LEV" means low-emission vehicle.  
 "ULEV" means ultra-low-emission vehicle.  
 "ZEV" means zero-emission vehicle.
- (2.1) a. *The Executive Officer shall certify as ZEVs vehicles that produce zero exhaust [or evaporative] emissions of any criteria pollutant (or precursor pollutant)*

*under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40°F and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions.*

*b. Prior to the 2003 model year a manufacturer that voluntarily produces vehicles that meet the ZEV emission standards applicable to 2003 and subsequent model year vehicles may certify those vehicles as ZEVs for the purposes of calculating fleet average NMOG exhaust emission values under section (g)(2), note (4) or (5); NMOG credits under section (g)(2), note (7); and ZEV credits under section (g)(2), note (9)a.*

[Notes (3) through (10) -- No change]

[Section (g)(2), table and notes (1) through (8) -- No change]

(9) **ZEV Requirements.** While meeting the fleet average requirements, each manufacturer shall certify, produce and deliver for sale in California at least ~~2% ZEVs each model year from 1998 through 2000, 5% ZEVs in 2001 and 2002, and~~ 10% ZEVs in 2003 and subsequent model years. These percentages shall be applied to the manufacturer's total production of PCs and LDTs 0-3750 lbs. LVW delivered for sale in California.

a. **Calculation of ZEV Credits.** Manufacturers ~~which~~ *that* produce for sale in California more ZEVs than required in a given model year shall earn ZEV credits, which shall be expressed in units of g/mi NMOG. The amount of ZEV credits earned shall be equal to the number of ZEVs required to be produced and delivered for sale in California for the model year subtracted from the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year and then multiplied by the fleet average NMOG requirement for PCs and LDTs 0-3750 lbs. LVW for the model year.

*In calculating the number of ZEV credits under this note (9)a, each ZEV produced and delivered for sale prior to the 2003 model year may be counted as follows:*

*1. ZEV Credits based on vehicle range:*

<i>Number of ZEVs</i>	<i>Vehicle Range (miles)</i>		
	<i>Model Years 1996 and 1997</i>	<i>Model Years 1998 and 1999</i>	<i>Model Years 2000, 2001 and 2002</i>
<i>2</i>	<i>any</i>	<i>≥ 100</i>	<i>≥ 140</i>
<i>3</i>	<i>≥ 70</i>	<i>≥ 130</i>	<i>≥ 175</i>

*Range shall be determined [using the Federal Urban Dynamometer Driving Schedule, Part 86, Appendix I, Code of Federal Regulations] in accordance with section 9.f.(2)(a) of the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated by reference in section 1960.1(k).*

2. ZEV Credits based on the specific energy of the battery:

Number of ZEVs	Specific Energy of Battery (w-hr/kg)		
	Model Years 1996, 1997 and 1998	Model Years 1999 and 2000	Model Years 2001 and 2002
2	any	≥ 50	≥ 60
3	≥40	≥ 60	≥ 90

*For model years 1999 through 2002, additional ZEV credits will be determined by linear interpolation between the values shown in the above schedule. [~~“Specific”~~ Battery specific energy]” of batteries will be the specific energy as determined in accordance with the US Advanced Battery Consortium’s Electric Vehicle Battery Procedure Manual (January 1996), Procedure No. 2, “Constant Current Discharge Test Series,” using the C/3 rate. The weight calculation must reflect a completely functional battery system as defined in Appendix F of the Manual, including pack(s), required support ancillaries (e.g., thermal management), and electronic controller] shall be determined in accordance with section 9.g. of the “California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks and Medium-Duty Vehicles,” incorporated by reference in section 1960.1(k).*

3. For purposes of calculating ZEV credits, a ZEV may be counted according to note (9)a.1. or (9)a.2. above, but not both.

4. For purposes of calculating manufacturer’s fleet average NMOG value under note (4) or (5), each ZEV shall be counted as one vehicle.

All ZEV credits earned prior to the ~~1998~~ 2003 model year shall be treated as if earned in the ~~1998~~ 2003 model year and shall be discounted in accordance with notes (7)c.

b. **Submittal of ZEV Credits.** A manufacturer may meet the ZEV requirements in any given model year by submitting to the Executive Officer a commensurate amount of ZEV credits. These credits may be earned previously by the manufacturer or acquired from another manufacturer. The amount of ZEV credits required to be submitted shall be calculated by subtracting the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year from the

number of ZEVs required to be produced by the manufacturer for the model year and then multiplying by the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for that model year.

c. **Requirement to Make Up a ZEV Deficit.** Manufacturers ~~which~~ *that* certify, produce, and deliver for sale in California fewer ZEVs than required in a given model year shall make up the deficit by the end of the next model year by submitting to the Executive Officer a commensurate amount of ZEV credits. The amount of ZEV credits required to be submitted shall be calculated by subtracting the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year from the number of ZEVs required to be produced by the manufacturer for the model year and then multiplying by the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for the model year in which the deficit is incurred.

d. **Penalty for Failure to Meet ZEV Requirements.** Any manufacturer ~~which~~ *that* fails to produce and deliver for sale in California the required number of ZEVs or submit an appropriate amount of ZEVs credits and does not make up ZEV deficits within the specified time period shall be subject to the Health and Safety Code section 43211 civil penalty applicable to a manufacturer ~~which~~ *that* 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 ZEV deficits are not balanced 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 standards shall be calculated according to the following equation: (No. of ZEVs required to be produced and delivered for sale in California for the model year) - (No. of ZEVs actually produced and delivered for sale in California for the model year) - [(Amount of ZEV credits submitted for the model year) / (the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for the model year)].

e. **ZEV Credits for MDVs and LDTs 3751 -5750 LVW.** ZEVs classified as MDVs or as LDTs 3751-5750 lbs. LVW may be counted toward the ZEV requirement for PCs and LDTs 0-3750 lbs LVW and included in the calculation of ZEV credits as specified in (9)a., if the manufacturer so designates.

f. Small volume manufacturers *as defined in note (6)* shall not be required to meet the percentage ZEV requirements. However, small volume manufacturers may earn and market credits for ZEVs they produce and deliver for sale in California.

~~g. Intermediate volume manufacturers as defined in section 1960.1(o) shall not be required to meet the percentage ZEV requirements before the 2003 model year.~~

[Subsection (h)(1) -- No Change]

(h)(2) The exhaust emissions from new 1992 and subsequent model-year medium-duty low-emission vehicles, ultra-low-emission vehicles and super ultra-low-emission vehicles, *and new 2003 and subsequent model-year medium-duty zero-emission vehicles* shall not exceed:

EXHAUST EMISSION STANDARDS FOR LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION  
VEHICLES, AND SUPER ULTRA-LOW-EMISSION VEHICLES AND ZERO-EMISSION VEHICLES  
IN THE MEDIUM-DUTY VEHICLE WEIGHT CLASSES<sup>8,9,10,11,12,13,14,15,16</sup>  
[grams per mile (or "g/mi")]

<i>Test Weight (lbs)<sup>1</sup></i>	<i>Durability Vehicle Basis (mi)</i>	<i>Vehicle Emission Category<sup>2</sup></i>	<i>Non-Methane Organic Gases<sup>3,4</sup></i>	<i>Carbon Monoxide</i>	<i>Oxides of Nitrogen<sup>5</sup></i>	<i>Particulates<sup>6,7</sup></i>
0-3750	50,000	LEV	0.125	3.4	0.4	n/a
		ULEV	0.075	1.7	0.2	n/a
		ZEV <sup>2,1</sup>	--	--	--	--
	120,000	LEV	0.180	5.0	0.6	0.08
		ULEV	0.107	2.5	0.3	0.04
		ZEV <sup>2,1</sup>	--	--	--	--
3751-5750	50,000	LEV	0.160	4.4	0.4	n/a
		ULEV	0.100	4.4	0.4	n/a
		SULEV	0.050	2.2	0.2	n/a
	120,000	ZEV <sup>2,1</sup>	--	--	--	--
		LEV	0.230	6.4	0.6	0.10
		ULEV	0.143	6.4	0.6	0.05
5751-8500	50,000	SULEV	0.072	3.2	0.3	0.05
		ZEV <sup>2,1</sup>	--	--	--	--
		LEV	0.195	5.0	0.6	n/a
	120,000	ULEV	0.117	5.0	0.6	n/a
		SULEV	0.059	2.5	0.3	n/a
		ZEV <sup>2,1</sup>	--	--	--	--
8501-10,000	50,000	LEV	0.280	7.3	0.9	0.12
		ULEV	0.167	7.3	0.9	0.06
		SULEV	0.084	3.7	0.45	0.06
	120,000	ZEV <sup>2,1</sup>	--	--	--	--
		LEV	0.230	5.5	0.7	n/a
		ULEV	0.138	5.5	0.7	n/a
10,001- 14,000	50,000	SULEV	0.070	2.8	0.35	n/a
		ZEV <sup>2,1</sup>	--	--	--	--
		LEV	0.330	8.1	1.0	0.12
	120,000	ULEV	0.197	8.1	1.0	0.06
		SULEV	0.100	4.1	0.5	0.06
		ZEV <sup>2,1</sup>	--	--	--	--
10,001- 14,000	50,000	LEV	0.300	7.0	1.0	n/a
		ULEV	0.180	7.0	1.0	n/a
		SULEV	0.09	3.5	0.5	n/a
	120,000	ZEV <sup>2,1</sup>	--	--	--	--
		LEV	0.430	10.3	1.5	0.12
		ULEV	0.257	10.3	1.5	0.06
120,000	SULEV	0.130	5.2	0.7	0.06	
	ZEV <sup>2,1</sup>	--	--	--	--	

- (1) "Test Weight" (or "TW") shall mean the average of the vehicle's curb weight and gross vehicle weight.  
 "Non-Methane Organic Gases" or "NMOG" means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.

- (2) “LEV” means low-emission vehicle.  
“ULEV” means ultra-low-emission vehicle.  
“SULEV” means super-ultra-low-emission vehicle.  
“ZEV” means zero-emission vehicle.

(2.1) a. *The Executive Officer shall certify as ZEVs vehicles that produce zero exhaust [~~or evaporative~~] emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40°F and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions.*

b. *Prior to the 2003 model year a manufacturer that voluntarily produces vehicles that meet the ZEV emission standards applicable to 2003 and subsequent model year vehicles may certify those vehicles as ZEVs for the purposes of calculating ZEV credits under section (g)(2), note (9)a. and (9)e.*

[Notes (3) through (16) and subsections (i) through (p) -- No change]

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, Health and Safety Code.

3. Amend the *California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles*, as follows:<sup>2</sup>

(a) Revise the title page and the first page of the Table of Contents of the test procedures to read as follows:

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<sup>2</sup> The material that follows includes excerpts from the *California Exhaust Emission Standards and Test Procedures for 1988 and Subsequent Model Passenger Cars, Light-Duty Trucks, and Medium-Duty Vehicles*, incorporated by reference in section 1960.1(k), title 13, CCR, as they will appear upon adoption of the currently pending LSV/MSV rulemaking action, with the amendments proposed as part of this 15-day modification package. Only those sections of the test procedures affected by the modifications proposed here are shown in this document. All other sections of the test procedures are unchanged.

Upon adoption by the Board and approval by the Office of Administrative Law, the amendments will be incorporated in the full test procedure document. The full test procedure document with the amendments adopted as part of this rulemaking action will then be available from the ARB by writing to the Air Resources Board, 9528 Tolstar Avenue, El Monte, California 91731 in accordance with 13 CCR 1902, or from the ARB Information System (ARBIS) electronic bulletin board (via modem at 916-322-2826 [choose *Low Emission Vehicle Program*, from *Mobile Source Programs*, under the *System Features*, menu] or via the Internet at <http://www.arb.ca.gov/> [choose *LEV Program*, under *CARB Programs*, from the main menu]).

State of California  
AIR RESOURCES BOARD

**CALIFORNIA EXHAUST EMISSION STANDARDS  
AND TEST PROCEDURES FOR 1988  
AND SUBSEQUENT MODEL PASSENGER CARS,  
LIGHT-DUTY TRUCKS, AND MEDIUM-DUTY VEHICLES**

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Amended: August 12, 1992  
Amended: October 23, 1992  
Amended: May 28, 1993  
Amended: September 17, 1993  
Amended: September 22, 1993  
Amended: September 22, 1994  
Amended: [date LDV/MDV amendments adopted]  
Amended: *[insert date of adoption]*

NOTE: The regulatory amendments proposed in this rulemaking are shown in *underlined italics* to indicate additions and ~~[bracketed strikeout]~~ to indicate deletions from the version of the test procedures adopted on [date currently pending LDV/MDV amendments are adopted].

The numbering convention employed in this document, in order of priority, is: 1.a.1.i.A. Any references within specific sections in the Code of Federal Regulations are denoted in order of priority as: (a)(1)(i)(A) - the same numbering system employed in the Code of Federal Regulations.

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(b) In section 1 of the test procedures, amend subsection (a) to read as follows:

a. These test procedures are applicable to 1988 and subsequent model gasoline, gaseous, diesel, and, beginning in 1993, alcohol passenger cars, light-duty trucks, and medium-duty vehicles. Procedures specific to transitional low-emission, low-emission, ultra-low-emission, and super-ultra-low-emission vehicles are applicable to 1992 and subsequent model-year gasoline and diesel, and to 1993 and subsequent model-year alternate fuel and hybrid electric passenger cars, light-duty trucks, and medium-duty vehicles. Procedures specific to zero-emission vehicles are applicable to [1992] 2003 and subsequent model-year passenger cars, light-duty trucks and medium-duty vehicles. References to "light-duty trucks" in 40 CFR 86 shall apply both to "light-duty trucks" and "medium-duty vehicles" in these procedures.

(c) In section 2 of the test procedures, amend the definition of *All-Electric Range Test*, and *Zero-emission vehicle*, to read as follows:

**"All-Electric Range Test"** means a test sequence used to determine the range of an electric vehicle or of a hybrid electric vehicle without the use of its auxiliary power unit. The All-Electric Range Test cycle consists of [alternating] the Highway Fuel Economy Schedule and the Urban Dynamometer Driving Schedule (see 9.f. of these test procedures).

**"Zero-emission vehicle"** or **"ZEV"** means any vehicle [which is] certified [by the Executive Officer to produce zero emissions of any criteria pollutants under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40° F and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions] to zero-emission standards.

(d) In section 3 of the test procedures, make the following changes:

(i) Amend note (11) of subsection f to read:

(11) Each manufacturer shall certify PCs or LDTs to the exhaust emission standards of Sections 3.f. and 3.g. of these test procedures [~~or as Zero-Emission Vehicles,~~] such that the manufacturer's fleet average NMOG values for California-certified PCs and LDTs from 0-3750 lbs. Loaded Vehicle Weight (or "LVW"), and LDTs from 3751-5750 lbs. LVW produced and delivered for sale in California are less than or equal to the requirement for the corresponding Model Year, Vehicle Type, and LVW Class in section 3.h. of these test procedures.

(ii) Amend the table and note (2) of and add a note (2.1) to subsection g to read:

g. The exhaust emissions from new 1992 and subsequent model-year transitional low-emission vehicles, low-emission vehicles and ultra-low-emission vehicles, and new 2003 and subsequent model-year zero-emission vehicles shall not exceed:

**EXHAUST MASS EMISSION STANDARDS  
FOR TRANSITIONAL LOW-EMISSION VEHICLES, LOW-EMISSION VEHICLES,  
[AND] ULTRA-LOW-EMISSION VEHICLES AND ZERO-EMISSION VEHICLES IN  
PASSENGER CAR AND LIGHT-DUTY TRUCK VEHICLE CLASSES<sup>6,7,8,9,10</sup>  
["grams per mile" (or "g/mi")]**

Vehicle Type <sup>1</sup>	Loaded Vehicle Weight (lbs)	Durability Vehicle Basis (mi)	Vehicle Emission Category <sup>2</sup>	Non-Methane Organic Gases <sup>3,4</sup>	Carbon Monoxide	Oxides of Nitrogen <sup>5</sup>			
PC and LDT	All 0-3750	50,000	TLEV	0.125	3.4	0.4			
			LEV	0.075	3.4	0.2			
			ULEV	0.040	1.7	0.2			
			<u>ZEV<sup>2,1</sup></u>	--	--	--			
			TLEV	0.156	4.2	0.6			
		100,000	LEV	0.090	4.2	0.3			
			ULEV	0.055	2.1	0.3			
			<u>ZEV<sup>2,1</sup></u>	--	--	--			
			LDT	3751-5750	50,000	TLEV	0.160	4.4	0.7
						LEV	0.100	4.4	0.4
ULEV	0.050	2.2				0.4			
<u>ZEV<sup>2,1</sup></u>	--	--				--			
	100,000	TLEV				0.200	5.5	0.9	
		LEV	0.130	5.5	0.5				
		ULEV	0.070	2.8	0.5				
		<u>ZEV<sup>2,1</sup></u>	--	--	--				

- (1) "PC" means passenger cars.  
 "LDT" means light-duty trucks.  
 "LVW" means loaded vehicle weight.  
 "Non-Methane Organic Gases" or "NMOG" means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.
- (2) "TLEV" means transitional low-emission vehicle.  
 "LEV" means low-emission vehicle.  
 "ULEV" means ultra-low-emission vehicle.  
"ZEV" means zero-emission vehicle.

(2.1) a. The Executive Officer shall certify as ZEVs vehicles that produce zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40°F and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions.

b. Prior to the 2003 model year a manufacturer that voluntarily produces vehicles that meet the ZEV emission standards applicable to 2003 and subsequent model year vehicles may certify those vehicles as ZEVs for the purposes of calculating fleet average NMOG exhaust emission values under note (4) or (5), section h.3. of these test procedures; NMOG credits under section h.3., note(7); and ZEV credits under section h.3., note (9)a.

(iii) Amend note (9) of subsection h to read:

(9) **ZEV Requirements.** While meeting the fleet average requirements, each manufacturer shall certify, produce, and deliver for sale in California at least [~~2% ZEVs each model year from 1998 through 2000, 5% ZEVs in 2001 and 2002, and~~] 10% ZEVs in 2003 and subsequent model years. These percentages shall be applied to the manufacturer's total production of PCs and LDTs 0-3750 lbs. LVW delivered for sale in California.

a. **Calculation of ZEV Credits.** Manufacturers that produce for sale in California more ZEVs than required in a given model year shall earn ZEV credits, which shall be expressed in units of g/mi NMOG. The amount of ZEV credits earned shall be equal to the number of ZEVs required to be produced and delivered for sale in California for the model year subtracted from the number of ZEVs produced and delivered for sale in the model year and then multiplied by the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for that model year.

In calculating the number of ZEV credits under this note (9)a, each ZEV produced and delivered for sale prior to the 2003 model year may be counted as follows:

1. ZEV Credits based on vehicle range:

<u>Number of ZEVs</u>	<u>Vehicle Range (miles)</u>		
	<u>Model Years 1996 and 1997</u>	<u>Model Years 1998 and 1999</u>	<u>Model Years 2000, 2001 and 2002</u>
<u>2</u>	<u>any</u>	<u>≥ 100</u>	<u>≥ 140</u>
<u>3</u>	<u>≥70</u>	<u>≥ 130</u>	<u>≥ 175</u>

Range shall be determined in accordance with section 9.f.(2)(a) of these procedures.

2. ZEV Credits based on the specific energy of the battery:

<u>Number of ZEVs</u>	<u>Specific Energy of Battery (w-hr/kg)</u>		
	<u>Model Years 1996, 1997 and 1998</u>	<u>Model Years 1999 and 2000</u>	<u>Model Years 2001 and 2002</u>
<u>2</u>	<u>any</u>	<u>≥ 50</u>	<u>≥ 60</u>
<u>3</u>	<u>≥40</u>	<u>≥ 60</u>	<u>≥ 90</u>

For model years 1999 through 2002, additional ZEV credits will be determined by linear interpolation between the values shown in the above schedule. Battery specific energy shall be determined in accordance with section 9.g. of these procedures.

3. For purposes of calculating ZEV credits, a ZEV may be counted according to note (9)a.1. or (9)a.2. above, but not both.

4. For purposes of calculating manufacturer's fleet average NMOG value under note (4) or (5), each ZEV shall be counted as one vehicle.

All ZEV credits earned prior to the [~~1998~~] 2003 model year shall be treated as if earned in the [~~1998~~] 2003 model year and shall be discounted in accordance with note (7)c.

b. **Submittal of ZEV Credits.** A manufacturer may meet the ZEV requirements in any given model year by submitting to the Executive Officer a commensurate amount of ZEV credits. These credits may be earned previously by the manufacturer or acquired from another manufacturer. The amount of ZEV credits required to be submitted shall be calculated by subtracting the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year from the number of ZEVs required to be produced by the manufacturer for the model year and then multiplying by the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for that model year.

c. **Requirement to Make Up a ZEV Deficit.** Manufacturers that certify, produce, and deliver for sale in California fewer ZEVs than required in a given model year shall make up the deficit by the end of the next model year by submitting to the Executive Officer a commensurate amount of ZEV credits. The amount of ZEV credits required to be submitted shall be calculated by subtracting the number of ZEVs produced and delivered for sale in California by the manufacturer for the model year from the number of ZEVs required to be produced by the manufacturer for the model year and then multiplying by the fleet average requirements for PCs and LDTs 0-3750 lbs. LVW for the model year in which the deficit is incurred.

d. **Penalty for Failure to Meet ZEV Requirements.** Any manufacturer that fails to produce and deliver for sale in California the required number of ZEVs or submit an appropriate amount of ZEV credits and does not make up ZEV deficits within the specified time period shall be subject to the Health and Safety Code § 43211 civil penalty applicable to a manufacturer that 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 ZEV deficits are not balanced by the end of the specified time period. For the purposes of Health and Safety Code § 43211, the number of vehicles not meeting the state board's standards shall be calculated according to the following equation: (No. of ZEVs required to be produced and delivered for sale in California for the model year) - (No of ZEVs actually produced and delivered for sale in California for the model year) - [(Amount of ZEV credits submitted for the model year) / (the fleet average requirement for PCs and LDTs 0-3750 lbs. LVW for the model year)].

e. **ZEV Credits for MDVs and LDTs 3751-5750 lbs. LVW.** ZEVs classified as MDVs or as LDTs 3751-5750 lbs. LVW may be counted toward the ZEV requirement for PCs and LDTs 0-3750 lbs. LVW and included in the calculation of ZEV credits as specified in note (9)a., if the manufacturer so designates.

f. Small volume manufacturers *as defined in note (6)* shall not be required to meet the percentage ZEV requirements. However, small volume manufacturers may earn and market credits for ZEVs they produce and deliver for sale in California.

~~[g:] [Intermediate volume manufacturers shall not be required to meet the percentage ZEV requirements before the 2003 model year.]~~

*(iv) Amend the table and note (2) of and add a note (2.1) to subsection j;*

j. The exhaust emission levels from new 1992 and subsequent model-year medium-duty low-emission vehicles, ultra-low-emission vehicles[;] and super-ultra-low-emission vehicles, *and new 2003 and subsequent model-year medium-duty zero-emission vehicles* shall not exceed:

**EXHAUST EMISSION STANDARDS FOR LOW-EMISSION VEHICLES, ULTRA-LOW-EMISSION VEHICLES, [AND] SUPER-ULTRA-LOW-EMISSION VEHICLES AND ZERO-EMISSION VEHICLES IN THE MEDIUM-DUTY VEHICLE WEIGHT CLASS**<sup>8,9,10, 11, 12, 14, 15, 16</sup>

[grams per mile (or "g/mi")]

<u>Test Weight</u> (lbs.) <sup>1</sup>	<u>Durability</u> <u>Vehicle</u> <u>Basis (mi)</u>	<u>Vehicle</u> <u>Emission</u> <u>Category</u> <sup>2</sup>	<u>Non-Methane</u> <u>Organic Gases</u> <sup>1,3,4</sup>	<u>Carbon</u> <u>Monoxide</u>	<u>Oxides of</u> <u>Nitrogen</u> <sup>5</sup>	<u>Particulates</u> <sup>6,7</sup>
0-3750	50,000	LEV	0.125	3.4	0.4	n/a
		ULEV	0.075	1.7	0.2	n/a
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
	120,000	LEV	0.180	5.0	0.6	0.08
		ULEV	0.107	2.5	0.3	0.04
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
3751-5750	50,000	LEV	0.160	4.4	0.4	n/a
		ULEV	0.100	4.4	0.4	n/a
		SULEV	0.050	2.2	0.2	n/a
	120,000	<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
		LEV	0.230	6.4	0.6	0.10
		ULEV	0.143	6.4	0.6	0.05
5751-8500	50,000	SULEV	0.072	3.2	0.3	0.05
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
		LEV	0.195	5.0	0.6	n/a
	120,000	ULEV	0.117	5.0	0.6	n/a
		SULEV	0.059	2.5	0.3	n/a
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
8501-10,000	50,000	LEV	0.280	7.3	0.9	0.12
		ULEV	0.167	7.3	0.9	0.06
		SULEV	0.084	3.7	0.45	0.06
	120,000	<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
		LEV	0.230	5.5	0.7	n/a
		ULEV	0.138	5.5	0.7	n/a
10,001-14,000	50,000	SULEV	0.070	2.8	0.35	n/a
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
		LEV	0.330	8.1	1.0	0.12
	120,000	ULEV	0.197	8.1	1.0	0.06
		SULEV	0.100	4.1	0.5	0.06
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
10,001-14,000	50,000	LEV	0.300	7.0	1.0	n/a
		ULEV	0.180	7.0	1.0	n/a
		SULEV	0.09	3.5	0.5	n/a
	120,000	<u>ZEV</u> <sup>2.1</sup>	--	--	--	--
		LEV	0.430	10.3	1.5	0.12
		ULEV	0.257	10.3	1.5	0.06
10,001-14,000	120,000	SULEV	0.130	5.2	0.7	0.06
		<u>ZEV</u> <sup>2.1</sup>	--	--	--	--

(1) "Test Weight" (or "TW") shall mean the average of the vehicle's curb weight and gross vehicle weight.

"Non-Methane Organic Gases" (or "NMOG") means the total mass of oxygenated and non-oxygenated hydrocarbon emissions.

(2) "LEV" means low-emission vehicle.

"ULEV" means ultra-low-emission vehicle.

"SULEV" means super ultra-low-emission vehicle.

"ZEV" means zero-emission vehicle.

(2.1) a. The Executive Officer shall certify as ZEVs vehicles that produce zero exhaust emissions of any criteria pollutant (or precursor pollutant) under any and all possible operational modes and conditions. Incorporation of a fuel fired heater shall not preclude a vehicle from being certified as a ZEV provided the fuel fired heater cannot be operated at ambient temperatures above 40°F and the heater is demonstrated to have zero evaporative emissions under any and all possible operational modes and conditions.

b. Prior to the 2003 model year a manufacturer that voluntarily produces vehicles that meet the ZEV emission standards applicable to 2003 and subsequent model year vehicles may certify those vehicles as ZEVs for the purposes of calculating ZEV credits under h.3., note(9)(a) and (e).

(e) In section 5 of the test procedures, amend subsection a.1.2.(i)(A)(10)(b) to read as follows:

(b) The manufacturer shall equip the vehicle with a useful life indicator for the battery system consisting of a light that shall illuminate the first time the battery system is unable to achieve an all-electric operating range (starting from a full state-of-charge) that is at least 75% of the range determined for the vehicle in the All-Electric Range-Urban (see section 9.f. (2)(a) of these test procedures) and submitted in the certification application.

(f) In section 9 of the test procedures, make the following changes:

(i) Amend subsection f.(2) to read:

(2) Driving schedule.

(a) **Determination of All-Electric Range-Urban.** At the end of the cold soak period, the vehicle shall be placed, either driven or pushed, onto a dynamometer and operated through an Urban Dynamometer Driving Schedule, 40 CFR., Part 86, Appendix I, until the vehicle is no longer able to maintain within 5 miles per hour of the speed requirements or within 2

seconds of the time requirements of the driving schedule. For hybrid electric vehicles this determination shall be performed without the use of the auxiliary power unit.

**(b) Determination of All-Electric Range-Highway.** At the end of the cold soak period, the vehicle shall be placed, either driven or pushed, onto a dynamometer and operated through a Highway Fuel Economy Driving Schedule, found in 40 CFR, Part 600, Appendix I [~~of the CFR, followed immediately by an Urban Dynamometer Driving Schedule, found in Part 86, Appendix I of the CFR, followed by another Highway Fuel Economy Driving Schedule and an Urban Dynamometer Driving Schedule. This sequence of driving schedules shall be repeated~~] until the vehicle is no longer able to maintain within 5 miles per hour of the speed requirements or within 2 seconds of the time requirements of the driving schedule[s ~~in the case of a ZEV, or unable to maintain within 5 miles per hour of the speed requirements or within 2 seconds of the time requirement of the driving schedules without the use of the auxiliary power unit in the case of a hybrid electric vehicle~~]. For hybrid electric vehicles this determination shall be performed without the use of the auxiliary power unit.

(ii) Redesignate existing subsection g as h and add a new subsection g to read:

**g. Determination of Battery Specific Energy for ZEVs.**

Determine the specific energy of batteries used to power a ZEV in accordance with the U.S. Advanced Battery Consortium's Electric Vehicle Battery Procedure Manual (January 1996), Procedure No. 2, "Constant Current Discharge Test Series," using the C/3 rate. The weight calculation must reflect a completely functional battery system as defined in Appendix of the Manual, including pack(s), required support ancillaries (e.g., thermal management), and electronic controller.

**h. Calculations; exhaust emissions**

4. Amend title 13, California Code of Regulations, section 1976 to read as follows:

**§1976. Standards and Test Procedures for Motor Vehicle Fuel Evaporative Emissions.**

[Subsections (a), (b)(1)(A) through (C) -- No change]

(b)(1)(D) Zero-emission vehicles shall produce zero evaporative emissions under any and all possible operational modes and conditions.

[Subsections (c) through (f) -- No change]

Note: Authority cited: Sections 39600, 39601, 39667, 43013, 43018, 43101, 43104 and 43107, Health and Safety Code. Reference: Sections 39003, 39500, 39667, 43000, 43013, 43018, 43101, 43102, 43104 and 43107, Health and Safety Code.