

**[The Regulations do not incorporate the amendments  
made December 1998 which have not yet been approved by OAL ]**

**Article 3. Specifications for Alternative Motor Vehicle Fuels**

**§ 2290. Definitions.**

(a) For the purpose of this article, the following definitions apply:

(1) "Alternative fuel" means any fuel which is commonly or commercially known or sold as one of the following: M-100 fuel methanol, M-85 fuel methanol, E-100 fuel ethanol, E-85 fuel ethanol, E-85 fuel ethanol, compressed natural gas, liquefied petroleum gas, or hydrogen.

(2) "ASTM" means the American Society for Testing Materials.

(3) "Motor vehicle" has the same meaning as defined in section 415 of the Vehicle Code.

(4) "Supply" means to provide or transfer a product to a physically separate facility, vehicle, or transportation system.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2291. Basic Prohibitions.**

(a) Starting January 1, 1993, no person shall sell, offer for sale or supply an alternative fuel intended for use in motor vehicles in California unless it conforms with the applicable specifications set forth in this article 3.

(b) An alternative fuel shall be deemed to be intended for use in motor vehicles in California if it is:

(1) stored at a facility which is equipped and used to dispense that type of alternative fuel to motor vehicles, or

(2) delivered or intended for delivery to a facility which is equipped and used to dispense that type of alternative fuel to motor vehicles, or

(3) sold, offered for sale or supplied to a person engaged in the distribution of motor vehicle fuels to motor vehicle fueling facilities, unless the person selling, offering or supplying the fuel demonstrates that he or she has taken reasonably prudent precautions to assure that the fuel will not be used as a motor vehicle fuel in California.

(c) For the purposes of this section, each retail sale of alternative fuel for use in a motor vehicle, and each supply of alternative fuel into a motor vehicle fuel tank, shall also be deemed a sale or supply by any person who previously sold or supplied such alternative fuel in violation of this section.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2292.1 Fuels Specifications for M-100 Fuel Methanol.**

The following standards apply to M-100 fuel methanol (The identified test methods are incorporated herein by reference.):

*Specifications for M-100 Fuel Methanol*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Methanol	96 vol. % (min.)	As determined by the distillation range below
Distillation	4.0°C (range)	ASTM D 1078-86. At 95% by volume distilled. Must include 64.6 + 0.1°C
Other alcohols and ethers	2 mass % (max.)	ASTM D 4815-89
Hydrocarbons, gasoline or diesel fuel derived	2 mass % (max.)	ASTM D 4815-89, and then subtract concentration of alcohols, ethers and water from 100 to obtain percent hydrocarbons
Specific gravity	0.792 + 0.002 @ 20°C	ASTM D 891-89
Acidity as acetic acid	0.01 mass % (max.)	ASTM D 1613-85
Total chlorine as chloride	0.0002 mass % (max.)	ASTM D 2988-86
Lead	2 mg/1 (max.) <sup>a</sup>	ASTM D 3229-88
Phosphorus	0.2 mg/1 (max.) <sup>b</sup>	ASTM D 3231-89
Sulfur	0.002 mass % (max.)	ASTM D 2622-87
Gum, heptane washed	5 mg/1 (max.)	ASTM D 381-86
Total particulates	5mg/1 (max.)	ASTM D 2276-89, modified to replace cellulose acetate filter with a 0.8 micron pore size membrane filter
Water	0.3 mass % (max.)	ASTM E 203-75
Appearance	Free of turbidity, suspended matter and sediment	Visually determined at 25°C by Proc. A of ASTM D 4176-86
Bitterant	<sup>c</sup>	
Odorant	<sup>d</sup>	

- a No added lead.
- b No added phosphorous.
- c The M-100 fuel methanol at ambient conditions must have a distinctive and noxious taste, for purposes of preventing purposeful or inadvertent human consumption. Applicable 1/1/95.
- d The M-100 fuel methanol upon vaporization at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability. Applicable 1/1/95.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2292.2 Specifications for M-85 Fuel Methanol.**

The following standards apply to M-85 fuel methanol (The identified test methods are incorporated herein by reference.):

*Specifications for M-85 Fuel Methanol*

<i>Specifications</i>	<i>Value</i>	<i>Test Method</i>
Methanol plus higher alcohols	84 vol. % (min.)	Annex A1 to the ASTM D-2 Proposal P-232. Draft 8-9-91
Higher alcohols (C2-C8)	2 vol. % (max.)	ASTM D 4815-89
Hydrocarbons + aliphatic ethers <sup>a</sup>	13-16 vol. %	ASTM D 4815-89, and then subtract concentration of alcohols, ethers and water from 100 to obtain percent hydrocarbons
Vapor pressure, dry <sup>b</sup>		Methods contained in Title 13, Section 2262 are preferred ASTM D 4953-90 is an alternative method, however, in case of dispute about the vapor pressure, the value determined by the methods contained in Title 13, Section 2262 shall prevail over the value calculated by ASTM D 4953-90, including its precision statement

Luminosity		Shall produce a luminous flame, which is visible under maximum daylight conditions, throughout the entire burn duration
Acidity as acetic acid	0.005 mass % (max.)	ASTM D 1613-85
Total chlorine as chloride	0.0002 mass % (max.)	ASTM D 3120-87 modified for the det. of organic chlorides, and ASTM D 2988-86
Lead	2 mg/1 (max.) <sup>c</sup>	ASTM D 3229-88
Phosphorous	0.2 mg/1 (max.) <sup>d</sup>	ASTM D 3231-89
Sulfur	0.004 mass % (max.)	ASTM D 2622-87
Gum, heptane washed	5 mg/100 ml (max.)	ASTM D 381-86
Total particulates	0.6 mg/1 (max.)	ASTM D 2276-89, modified to replace cellulose acetate filter with a 0.8 micron pore size membrane filter
Water	0.5 mass % (max.)	ASTM E 203-75
Appearance	Free of turbidity, suspended matter and sediment	Visually determined at 25°C by Proc. A of ASTM D 4176-86

<sup>a</sup> Hydrocarbon fraction shall have a final maximum boiling point of 225 degrees C by ASTM method D 86-90, oxidation stability of 240 minutes by ASTM test method D 525-88 and No. 1 maximum copper strip corrosion by ASTM method D 130-88. Ethers must be aliphatic. No manganese added. Adjustment of RVP must be performed using common blending components from the gasoline stream. Starting on 4/1/96, the hydrocarbon fraction must also meet specifications for benzene, olefin content, aromatic hydrocarbon content, maximum T90 and maximum T50 found in California Code of Regulations, Title 13 sections 2262.3, 2262.4, 2262.7 and 2262.6 (T90 & T50), respectively.

<sup>b</sup> RVP range of 7.0 to 9.0 psi for those geographical areas and times indicated for A, A/B, B/A and B volatility class fuels in Table 2 of ASTM D 4814-91b. RVP range of 9.0 to 13.1 psi for those geographical areas and times indicated for B/C, C/B, C, C/D and D/C volatility fuels. RVP range of 10.9 to 13.1 psi for those geographical areas and times indicated for D, D/E, E/D and E volatility fuels. Geographical areas referenced in this note shall be adjusted to reflect the air basin boundaries set forth in Title 17, California Code of Regulations, sections 60100 through 60113.

<sup>c</sup> No added lead.

<sup>d</sup> No added phosphorus.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018, and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2292.3. Specifications for E-100 Fuel Ethanol.**

The following standards apply to E-100 fuel ethanol (The identification test methods are incorporated herein by reference.):

*Specifications for E-100 Fuel Ethanol*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Ethanol	92 vol. % (min.)	ASTM D 3545-90 <sup>a</sup>
Other alcohols and ethers	2 mass % (max.)	ASTM D 4815-89
Hydrocarbons, gasoline or diesel fuel derived	5 mass % (max.)	ASTM D 4815-89, and then subtract concentration of alcohols, ethers and water from 100 to obtain percent hydrocarbons
Acidity as acetic acid	0.007 mass % (max.)	ASTM D 1613-85
Total chlorine as chloride	0.0004 mass % (max.)	ASTM D 3120-87 modified for the determination of organic chlorides, and ASTM D 2988-86
Copper	0.07 mg/1 (max.)	ASTM D 1688-90 as modified in ASTM D 4806-88
Lead	2 mg/1 (max.) <sup>b</sup>	ASTM D 3229-88
Phosphorus	0.2 mg/1 (max.) <sup>c</sup>	ASTM D 3231-89
Sulfur	0.002 mass % (max.)	ASTM D 2622-87
Gum, heptane washed	5 mg/1 (max.)	ASTM D 381-86
Total particulates	5 mg/1 (max.)	ASTM D 2276-89, modified to replace cellulose acetate filter with a 0.8 micron pore size membrane filter
Water	1.25 mass % (max.)	ASTM E 203-75
Appearance	Free of turbidity, suspended matter and sediment	Visually determined at 25°C by Proc. A of ASTM D 4176-86

<sup>a</sup> The denaturant must meet the ASTM D 4806-88 specification for denatured fuel ethanol, except the denaturant cannot be rubber hydrocarbon solvent. The final blend specifications for E-100 take precedence over the ASTM D 4806-88 specifications.

<sup>b</sup> No added lead.

<sup>c</sup> No added phosphorus.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

#### § 2292.4. Specifications for E-85 Fuel Ethanol.

The following standards apply to E-85 fuel ethanol (The identified test methods are incorporated herein by reference.):

##### *Specifications for E-85 Fuel Ethanol*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Ethanol	79 vol. % (min.)	ASTM D 3545-90 <sup>a</sup>
Other alcohols	2 vol. % (max.)	ASTM D 4815-89
Hydrocarbons + aliphatic ethers <sup>b</sup>	15-21 vol. %	ASTM D 4815-89, and then subtract concentration of alcohols, ethers and water from 100 to obtain percent hydrocarbons. The denaturant is included in this percentage.
Vapor pressure, dry <sup>c</sup>		Methods contained in Title 13, Section 2262 must be used. ASTM D 4953-90 is an alternative method, however, in case of dispute about the vapor pressure, the value determined by the methods contained in Title 13, Section 2262 shall prevail over the value calculated by ASTM D 4953-90, including its precision statement
Acidity as acetic acid	0.007 mass % (max.)	ASTM D 1613-85
Total chlorine as chloride	0.0004 mass % (max.)	ASTM D 3120-87 modified for the det. of organic chlorides, and ASTM D 2988-86
Copper	0.07 mg/1 (max.)	ASTM D 1688-90 as modified in ASTM D 4806-88
Lead	2 mg/1 (max.)	ASTM D 3229-88
Phosphorus	0.2 mg/1 (max.) <sup>c</sup>	ASTM D 3231-89

Sulfur	0.004 mass % (max.)	ASTM D 2622-87
Gum, heptane washed	5 mg/100 ml (max.)	ASTM D 381-86
Total particulates	5 mg/l (max.)	ASTM D 2276-89, modified to replace cellulose acetate filter with a 0.8 micron pore size membrane filter
Water	1.25 mass % (max.)	ASTM E 203-75
Appearance	Free of turbidity, suspended matter and sediment	Visually determined at 25°C by Proc. A of ASTM D 4176-86

<sup>a</sup> The denaturant must meet the ASTM D 4806-88 specification for denatured fuel ethanol, except the denaturant cannot be rubber hydrocarbon solvent. The final blend specifications for E-85 take precedence over the ASTM D 4806-88 specifications.

<sup>b</sup> Hydrocarbon fraction shall have a final maximum boiling point of 225 degrees C by ASTM method D 86-90, oxidation stability of 240 minutes by ASTM test method D 525-88 and No. 1 maximum copper strip corrosion by ASTM method D 130-88. Ethers must be aliphatic. No manganese added. Adjustment of RVP must be performed using common blending components from the gasoline stream. Starting 4/1/96, the hydrocarbon fraction must also meet specification for benzene, olefin content, aromatic hydrocarbon content, maximum T90 and maximum T50 found in California Code of Regulations, Title 13 sections 2262.3, 2262.4, 2262.7 and 2262.6 (T90 & T50), respectively.

<sup>c</sup> RVP range of 6.5 to 8.7 for those geographical areas and times indicated for A, A/B, B/A and B volatility class fuels in Table 2 of ASTM D 4814-91b. RVP range of 7.3 to 9.4 for those geographical areas and times indicated for B/C, C/B, C, C/D and D/C volatility fuels. RVP range of 8.7 to 10.2 for those geographical areas and times indicated for D, D/E, E/D and E volatility fuels. Geographical areas referenced in this note shall be adjusted to reflect the air basin boundaries set forth in Title 17, California Code of Regulations, section 60100 through 60113.

<sup>d</sup> No added lead.

<sup>e</sup> No added phosphorus.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2292.5. Specifications for Compressed Natural Gas.**

The following standards apply to E-85 fuel ethanol (The identified test methods are incorporated herein by reference.):

*Specifications for Compressed Natural Gas*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Hydrocarbons (expressed as mole percent)		
Methane	88.0% (min.)	ASTM D 1945-81
Ethane	6.0% (max.)	ASTM D 1945-81
C <sub>3</sub> and higher HC	3.0% (max.)	ASTM D 1945-81
C <sub>6</sub> and higher HC	0.2% (max.)	ASTM D 1945-81
Other Species (expressed as mole percent unless otherwise indicated)		
Hydrogen	0.1% (max.)	ASTM D 2650-88
Carbon Monoxide	0.1% (max.)	ASTM D 2650-88
Oxygen	1.0% (max.)	ASTM D 1945-81
Inert gases		
Sum of CO <sub>2</sub> and N <sub>2</sub>	1.5-4.5% (range)	ASTM D 1945-81
Water	a	
Particulate matter	b	
Odorant	c	
Sulfur	16 ppm by vol. (max.)	Title 17 CCR Section 94112

<sup>a</sup> The dewpoint at vehicle fuel storage container pressure shall be at least 10°F below the 99.0% winter design temperature listed in Chapter 24, Table 1, Climatic Conditions for the United States, in the American Society of Heating, Refrigerating and Air Conditioning Engineer's (ASHRAE) Handbook, 1989 fundamentals volume. Testing for water vapor shall be in accordance with ASTM D 1142-90, utilizing the Bureau of Mine apparatus.

<sup>b</sup> The compressed natural gas shall not contain dust, sand, dirt, gums, oils, or other substances in an amount sufficient to be injurious to the fueling station equipment or the vehicle being fueled.

<sup>c</sup> The natural gas at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).



**§ 2292.6. Specifications for Liquefied Petroleum Gas.**

The following standards apply to liquefied petroleum gas (The identified test methods are incorporated herein by reference.):

*Specifications for Liquefied Petroleum Gas*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Propane	85.0 vol. % (min.) <sup>a</sup>	ASTM D 2163-87
Vapor pressure at 100°F	208 psig (max.)	ASTM D 1267-89 ASTM D 2598-88 <sup>b</sup>
Volatility residue: Evaporated temp., 95% or butane and heavier	-37°F (max.)  2.5 vol. % (max.)	ASTM D 1837-86  ASTM D 2163-87
Propene	5.0 vol. % (max.) <sup>c</sup>	ASTM D 2163-87
Residual matter: residue on evap. of 100 ml oil stain observ.	0.05 ml (max.) pass <sup>d</sup>	ASTM D 2158-89 ASTM D 2158-89
Corrosion, copper strip	No. 1 (max.)	ASTM D 1838-89
Sulfur	120 ppmw (max.)	ASTM D 2784-89
Moisture content	Pass	ASTM D 2713-86
Odorant	<sup>e</sup>	

<sup>a</sup> Propane shall be required to be a minimum of 80.0 volume percent starting on January 1, 1993. Starting on January 1, 1999, the minimum propane content shall be 85.0 volume percent.

<sup>b</sup> In case of dispute about the vapor pressure of a product, the value actually determined by Test Method ASTM D 1267-89 shall prevail over the value calculated by Practice ASTM D 2598-88.

<sup>c</sup> The propene shall be limited to 10.0 volume percent starting January 1, 1993. Starting January 1, 1999, the propane limit shall be 5.0 volume percent.

<sup>d</sup> An acceptable product shall not yield a persistent oil ring when 0.3 ml of solvent residue mixture is added to a filter paper, in 0.1 increments and examined in daylight after 2 min. as described in Test Method ASTM 2158-89.

<sup>e</sup> The liquefied petroleum gas upon vaporization at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

**§ 2292.7. Specifications for Hydrogen.**

The following standards apply for hydrogen (The identified test methods are incorporated herein by reference.):

*Specifications for Hydrogen*

<i>Specification</i>	<i>Value</i>	<i>Test Method</i>
Hydrogen	98.0 mole % (min.)	ASTM D 1946-90
Combined hydrogen, water, oxygen and nitrogen	99.9 mole % (min.)	ASTM D 1946-90 for hydrogen, nitrogen oxygen; ASTM D 1142-90 for water using the Bureau of Mines apparatus
Total hydrocarbons	0.01 mole % (max.)	ASTM D 1946-90
Particulate mater	a	
Odorant	b	

<sup>a</sup> The hydrogen shall not contain dust, sand, dirt, gums, oils, or other substances in an amount sufficient to be injurious to the fueling station equipment or the vehicle being fueled.

<sup>b</sup> Starting 1/1/95, the hydrogen fuel at ambient conditions must have a distinctive odor potent enough for its presence to be detected down to a concentration in air of not over 1/5 (one-fifth) of the lower limit of flammability. This requirement applies only to hydrogen which is introduced into the vehicle fuel storage system in gaseous form.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39010, 39500, 40000, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).

### **§ 2293. Equivalent Test Methods.**

- (a) Whenever sections 2292.1 thru 2292.7 provide for the use of a specified test method, another test method may be used following a determination by the Executive Officer that the other test method produces results equivalent to the results obtained with the specified method.

### **§ 2293.5. Exemptions for Alternative Motor Vehicle Fuel Used in Test Programs.**

The executive officer shall consider and grant test program exemptions from the requirements of this Article in accordance with section 2259.

**Note: Authority cited:** Sections 39600, 39601, 43013, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975). **Reference:** Sections 39000, 39001, 39002, 39003, 39500, 39515, 39516, 39606, 41511, 43000, 43016, 43018 and 43101, Health and Safety Code; and *Western Oil and Gas Ass'n. v. Orange County Air Pollution Control District*, 14 Cal. 3d 411, 121 Cal. Rptr. 249 (1975).