

| Item | | ASTM test method No. | Type 2-D |
|---|-------------------|----------------------|---------------|
| (i) Cetane Number | | D613 | 40-50 |
| (ii) Cetane Index | | D976 | 40-50 |
| (iii) Distillation range: | | | |
| (A) IBP | °F | D86 | 340-400 |
| | (°C) | | (171.1-204.4) |
| (B) 10 pct. point | °F | D86 | 400-460 |
| | (°C) | | (204.4-237.8) |
| (C) 50 pct. point | °F | D86 | 470-540 |
| | (°C) | | (243.3-282.2) |
| (D) 90 pct. point | °F | D86 | 560-630 |
| | (°C) | | (293.3-332.2) |
| (E) EP | °F | D86 | 610-690 |
| | (°C) | | (321.1-365.6) |
| (iv) Gravity | °API | D287 | 32-37 |
| (v) Total sulfur | ppm | D2622 | 7-15 |
| (vi) Hydrocarbon composition: | | | |
| (A) Aromatics, minimum (Remainder shall be paraffins, naphthenes, and olefins). | pct. | D5186 | 27 |
| (vii) Flashpoint, min. | °F | D93 | 130 |
| | (°C) | | (54.4) |
| (viii) Viscosity | centistokes | D445 | 2.0-3.2 |

(3) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in service accumulation. The grade of petroleum diesel fuel rec-

ommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel fuel, shall be used: (b)(4) through (g) [Reserved]. For guidance see § 86.113-94.

| Item | | ASTM test method No. | Type 2-D |
|----------------------------|-------------------|----------------------|----------|
| (i) Cetane Number | | D613 | 38-58 |
| (ii) Cetane Index | | D976 | min. 40 |
| (iii) Distillation range: | | | |
| 90 pct. point | °F | D86 | 540-630 |
| (iv) Gravity | °API | D287 | 30-39 |
| (v) Total sulfur | ppm | D2622 | 7-15 |
| (vi) Flashpoint, min. | °F | D93 | 130 |
| | (°C) | | (54.4) |
| (vii) Viscosity | centistokes | D445 | 1.5-4.5 |

(h)(1) For model year 2004 through 2006 Tier 2 diesel-fueled vehicles that incorporate sulfur-sensitive technologies, the manufacturer may test the vehicle using a test fuel meeting the specifications listed in paragraphs (b)(2) and (b)(3) of this section, provided the manufacturer clearly recommends to the ultimate purchaser in the owner's manual that the vehicle should use fuel with no higher than 15 ppm sulfur.

(2) For model year 2004 through 2006 Tier 2 diesel-fueled vehicles that incorporate sulfur-sensitive technologies and that are certified for 50-state sale (i.e., certified to California and EPA standards), the manufacturer may test the vehicle using a test fuel whose

qualities, on a specification by specification basis, meet the requirements of either the specifications listed in paragraph (b)(2) of this section or the California test fuel specifications, provided the manufacturer clearly recommends to the ultimate purchaser in the owner's manual that the vehicle should use fuel with no higher than 15 ppm sulfur.

(3) Where a manufacturer uses a test fuel under paragraph (h)(1) or (h)(2) of this section, EPA shall use the same fuel for its compliance testing.

[66 FR 5167, Jan. 18, 2001]

§ 86.113-91 Fuel specifications.

(a) *Otto-cycle test fuel.* (1) Gasoline having the following specifications will

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be used by the Administrator in exhaust and evaporative emission testing of petroleum-fueled Otto-cycle vehicles. Gasoline having the following specification or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer in exhaust and evaporative testing except that octane specifications do not apply.

| Item | | ASTM test method No. | Value |
|---------------------------|------------------------|----------------------|------------------------|
| Octane, re-search. | min | D2699 .. | 93 |
| Sensitivity | min ..... | ..... | 7.5 |
| Lead (organic) | g/U.S. gal. (g/liter). | D3237 .. | 1.0050 1 (0.013) |
| Distillation Range: | | | |
| IBP ² | °F | D86 | 75-95 |
| | (°C) ..... | ..... | (23.9-35) |
| 10 pct. point | °F | D86 | 120-135 |
| | (°C) ..... | ..... | (48.9-57.2) |
| 50 pct. point | °F | D86 | 200-230 |
| | (°C) ..... | ..... | (93.3-110) |
| 90 pct. point | °F | D86 | 300-325 |
| | (°C) ..... | ..... | (148.9-162.8) |
| EP, (max.) ... | °F | D86 | 415 |
| | (°C) ..... | ..... | (212.8) |
| Sulfur, weight pct. | max. | D1266 .. | 0.10 |
| Phosphorus, max. | g/U.S. gal. (g/liter). | D3231 .. | 0.005 (0.0013) |
| RVP ^{3, 4} | psi (kPa) | D323 | 8.7-9.2 (60.0-63.4) |
| Hydrocarbon composition: | | | |
| Olefins, | max. pct. | D1319 .. | 10 |
| Aromatics | max. pct. | D1319 .. | 35 |
| Saturates .... | ..... | D1319 .. | (⁵) |

¹ Maximum.
² For testing at altitudes above 1,219 m (4,000 ft) the specified range is 75°-105 °F (23.9°-40.6 °C).
³ For testing which is unrelated to evaporative emission control, the specified range is 8.0-9.2 psi (55.2-63.4 kPa).
⁴ For testing at altitudes above 1,219 m (4,000 ft) the specified range is 7.9-9.2 psi (54.5-63.4 kPa).
⁵ Remainder.

(2) Unleaded gasoline representative of commercial gasoline which will be generally available through retail outlets shall be used in service accumulation for petroleum-fueled Otto-cycle vehicles. Leaded gasoline will not be used in service accumulation.

(i) The octane rating of the gasoline used shall be no higher than 1.0 Research octane number above the minimum recommended by the manufacturer and have a minimum sensitivity of 7.5 octane numbers, where sensitivity is defined as the Research octane number minus the Motor octane number.

(ii) The Reid Vapor Pressure of the gasoline used shall be characteristic of the motor fuel used during the season in which the service accumulation takes place.

(3) Methanol fuel used for exhaust and evaporative emission testing and in service accumulation of methanol-fueled Otto-cycle vehicles shall be representative of commercially available methanol fuel and shall consist of at least 50 percent methanol by volume.

(i) Manufacturers shall recommend the methanol fuel to be used for testing and service accumulation in accordance with paragraph (a)(3) of this section.

(ii) The Administrator shall determine the methanol fuel to be used for testing and service accumulation.

(4) Other methanol fuels may be used for testing and service accumulation provided:

(i) They are commercially available, and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service, and

(iii) Use of a fuel listed under paragraph (a)(3) of this section would have a detrimental effect on emissions or durability, and

(iv) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(5) The specification range of the fuels to be used under paragraphs (a)(2), (a)(3), and (a)(4) of this section shall be reported in accordance with § 86.090-21(b)(3).

(b) *Diesel test fuel.* (1) The petroleum fuels employed for testing diesel vehicles shall be clean and bright, with pour and cloud points adequate for operability. The petroleum fuel may contain nonmetallic additives as follows: cetane improver, metal deactivator, antioxidant, dehazer, antirust, pour depressant, dye, dispersant and biocide. Except for the sulfur content of "Type 2-D" fuel, fuels specified for emissions testing are intended to be representative of commercially available in-use fuels.

(2) Petroleum fuel for diesel vehicles meeting the following specifications,

or substantially equivalent specifications approved by the Administrator, shall be used in exhaust emissions testing. The grade of petroleum fuel recommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel, shall be used.

| Item | | ASTM test method No. | Type 2-D |
|--------------------------|------------------------|----------------------|--------------------------|
| Cetane Number | ..... | D613 | 42-50 |
| Distillation range: | | | |
| IBP | °F (°C) | D86 | 340-400 (171.1-204.4) |
| 10 pct. point | °F (°C) | D86 | 400-460 (204.4-237.8) |
| 50 pct. point | °F (°C) | D86 | 470-540 (243.3-282.2) |
| 90 pct. point | °F (°C) | D86 | 560-630 (293.3-332.2) |
| EP | °F (°C) | D86 | 610-690 (321.1-365.6) |
| Gravity | ° API | D287 | 32-37 |
| Total sulfur | pct. | D2622 | 0.08-0.12 |
| Hydrocarbon composition: | | | |
| Aromatics, min | pct. | D1319 | 27 |
| Paraffins, | ..... | D1319 | (¹) |
| Naphthenes, Olefins. | | | |
| Flashpoint, min | °F (°C) | D93 | 130 (54.4) |
| Viscosity, centistokes. | ..... | D445 | 2.0-3.2 |

¹ Remainder.

(3) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in service accumulation. The grade of petroleum diesel fuel recommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel fuel, shall be used.

| Item | | ASTM test method No. | Type 2-D |
|---------------------|------------------------|----------------------|--------------------------|
| Cetane Number | ..... | D613 | 38-58 |
| Distillation range: | | | |
| 90 pct. point | °F (°C) | D86 | 540-650 (282.2-343.3) |
| Gravity | °API | D287 | 30-39 |
| Total sulfur | pct. | D2622 | 0.08-0.12 |
| Flashpoint, min | °F (°C) | D93 | 130 (54.4) |
| Viscosity | centistokes | D455 | 1.5-4.5 |

(4) Methanol fuel used for exhaust and evaporative emission testing and in service accumulation of methanol-fueled diesel vehicles shall be representative of commercially available

methanol fuel and shall consist of at least 50 percent methanol by volume.

(i) Manufacturers shall recommend the methanol fuel to be used for testing and service accumulation in accordance with paragraph (b)(4) of this section.

(ii) The Administrator shall determine the methanol fuel to be used for testing and service accumulation.

(5) Other fuels may be used for testing and service accumulation provided:

(i) They are commercially available, and

(ii) Information, acceptable to the Administrator, is provided to show that only the designated fuel would be used in customer service, and

(iii) Use of a fuel listed under paragraphs (b)(2) and (b)(3) or (b)(4) of this section would have a detrimental effect on emissions or durability, and

(iv) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(6) The specification range of the fuels to be used under paragraphs (b)(2), (b)(3), (b)(4), and (b)(5) of this section shall be reported in accordance with § 86.090-21(b)(3).

(c) Fuels not meeting the specifications set forth in this section may be used only with the advance approval of the Administrator.

(d) *Mixtures of petroleum and methanol fuels for flexible fuel vehicles.* (1) Mixtures of petroleum and methanol fuels used for exhaust and evaporative emission testing and service accumulation for flexible fuel vehicles shall be within the range of fuel mixtures for which the vehicle was designed.

(2) Manufacturer testing and service accumulation may be performed using only those mixtures (mixtures may be different for exhaust testing, evaporative testing, and service accumulation expected to result in the highest emissions, provided:

(i) The fuels which constitute the mixture will be used in customer service, and

(ii) Information, acceptable to the Administrator, is provided by the manufacturer to show that the designated fuel mixtures would result in the highest emissions, and

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(iii) Written approval from the Administrator of the fuel specifications must be provided prior to the start of testing.

(3) The specification range of the fuels to be used under paragraph (d)(1) of this section shall be reported in accordance with § 86.090-21(b)(3).

[55 FR 34144, Aug. 21, 1990, as amended at 57 FR 19538, May 7, 1992]

§ 86.113-94 Fuel specifications.

(a) *Gasoline fuel.* (1) Gasoline having the following specifications will be used by the Administrator in exhaust and evaporative emission testing of petroleum-fueled Otto-cycle vehicles. Gasoline having the following specification or substantially equivalent specifications approved by the Administrator, shall be used by the manufacturer in exhaust and evaporative testing except that octane specifications do not apply;

| Item | ASTM test method No. | Value |
|---|----------------------|--|
| Octane, Research, Min | D2699 | 93 |
| Sensitivity, Min | | 7.5 |
| Lead (organic): | | |
| g/U.S. gal. (g/liter) | D3237 | ¹ 0.050 ¹ (0.013) |
| Distillation Range: | | |
| IBP: ² °F (°C) | D86 | 75-95 (23.9-35) |
| 10 pct. point: °F (°C) | D86 | 120-135 (48.9-57.2) |
| 50 pct. point: °F (°C) | D86 | 200-230 (93.3-110) |
| 90 pct. point: °F (°C) | D86 | 300-325 |
| (148.9-162.8): | | |
| EP, max: °F (°C) | D86 | 415 (212.8) |
| Sulfur, weight pct. max | D1266 | 0.10 |
| Phosphorus, max. g/U.S. gal. (g/liter). | D3231 | 0.005 (0.0013) |
| RVP ^{3,4} , psi (kPa) | D3231 | 8.7-9.2 (60.0-63.4) |
| Hydrocarbon composition: | | |
| Olefins, max. pct | D1319 | 10 |
| Aromatics, max. pct | D1319 | 35 |
| Saturates | D1319 | (⁵) |

¹ Maximum.
² For testing at altitudes above 1,219 m (4,000 ft), the specified range is 75²-105 °F (23.9²-40.6 °C).

³For testing which is unrelated to evaporative emission control, the specified range is 8.0-9.2 psi (55.2-63.4 kPa).
⁴For testing at altitudes above 1,219 m (4,000 ft), the specified range is 7.6-8.0 psi (52-55 kPa).
⁵Remainder.

(2)(i) Unleaded gasoline representative of commercial gasoline which will be generally available through retail outlets shall be used in service accumulation. Leaded gasoline will not be used in service accumulation.

(ii) The octane rating of the gasoline used shall be no higher than 1.0 Research octane number above the minimum recommended by the manufacturer and have a minimum sensitivity of 7.5 octane numbers, where sensitivity is defined as the Research octane number minus the Motor octane number.

(iii) The Reid Vapor Pressure of the gasoline used shall be characteristic of the motor fuel used during the season in which the service accumulation takes place.

(3) The specification range of the gasoline to be used under this paragraph (a) shall be reported in accordance with § 86.094-21(b)(3) or § 86.1844-01 as applicable.

(b) *Petroleum diesel test fuel.* (1) The petroleum fuels employed for testing diesel vehicles shall be clean and bright, with pour and cloud points adequate for operability. The petroleum diesel fuel may contain nonmetallic additives as follows: Cetane improver, metal deactivator, antioxidant, dehazer, antirust, pour depressant, dye, dispersant and biocide. Fuels specified for emissions testing are intended to be representative of commercially available in-use fuels.

(2) Petroleum fuel for diesel vehicles meeting the following specifications, or substantially equivalent specifications approved by the Administrator, shall be used in exhaust emission testing. The grade of petroleum diesel fuel recommended by the engine manufacturer, commercially designated as "Type 2-D" grade diesel, shall be used:

| Item | | ASTM test method No. | Type 2-D |
|---------------------|------|----------------------|---------------|
| Cetane number | | D 613 | 40-50 |
| Cetane index | | D 976 | 40-50 |
| Distillation range: | | | |
| IBP | °F | D 86 | 340-400 |
| | (°C) | | (171.1-204.4) |
| 10 pct. point | °F | D 86 | 400-460 |