

§79.55 Base fuel specifications.

(a) General Characteristics. (1) The base fuel(s) in each fuel family shall serve as the group representative(s) for the baseline group(s) in each fuel family pursuant to §79.56. Also, as specified in §79.51(h)(1), for fuel additives undergoing testing, the designated base fuel for the respective fuel family shall serve as the substrate in which the additive shall be mixed prior to the generation of emissions.

(2) Base fuels shall contain a limited complement of the additives which are essential for the fuel's production or distribution and/or for the successful operation of the test vehicle/engine throughout the mileage accumulation and emission generation periods. Such additives shall be used at the minimum effective concentration-in-use for the base fuel in question.

(3) Unless otherwise restricted, the presence of trace contaminants does not preclude the use of a fuel or fuel additive as a component of a base fuel formulation.

(4) When an additive is the test subject, any additive normally contained in the base fuel which serves the same function as the subject additive shall be removed from the base fuel formulation. For example, if a corrosion inhibitor were the subject of testing and if this additive were to be tested in a base fuel which normally contained a corrosion inhibitor, this test additive would replace the corrosion inhibitor normally included as a component of the base fuel.

(5) Additive components of the methanol, ethanol, methane, and propane base fuels in addition to any such additives included below shall be limited to those recommended by the manufacturers of the vehicles and/or engines used in testing such fuels. For this purpose, EPA will review requests from manufacturers (or their agents) to modify the additive specifications for the alternative fuels and, if necessary, EPA shall change these specifications based on consistency of those changes with the associated vehicle manufacturer's recommendations for the operation of the vehicle. EPA shall publish notice of any such changes to a base fuel and/or its base additive package specifications in the Federal Register.

(b) Gasoline Base Fuel. (1) The gasoline base fuel is patterned after the reformulated gasoline summer baseline fuel as specified in CAA section 211(k)(10)(B)(i). The specifications and blending tolerances for the gasoline base fuel are listed in table F94-1. The additive types which shall be required and/or permissible in the gasoline base fuel are listed in table 1 as well.

Table F94-1—Gasoline Base Fuel Properties

API Gravity	57.4±0.3
Sulfur, ppm	339±25
Benzene, vol%	1.53±0.3
RVP, psi	8.7±0.3
Octane, (R + M)/2	87.3±0.5
Distillation Parameters:	
10%, °F	128±5
50%, °F	218±5
90%, °F	330±5
Aromatics, vol%	32.0±2.7
Olefins, vol%	9.2±2.5
Saturates, vol%	58.8±2.0
Additive Types:	
Required	Deposit Control
	Corrosion Inhibitor
	Demulsifier
	Anti-oxidant
	Metal Deactivator
Permissible	Anti-static

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(2) The additive components of the gasoline base fuel shall contain compounds comprised of no elements other than carbon, hydrogen, oxygen, nitrogen, and sulfur. Additives shall be used at the minimum concentration needed to perform effectively in the gasoline base fuel. In no case shall their concentration in the base fuel exceed the maximum concentration recommended by the additive manufacturer. The increment of sulfur contributed to the formulation by any additive shall not exceed 15 parts per million sulfur by weight and shall not cause the gasoline base fuel to exceed the sulfur specifications in table F94-1 of this section.

(c) Diesel Base Fuel. (1) The diesel base fuel shall be a #2 diesel fuel having the properties and blending tolerances shown in table F94-2 of this section. The additive types which shall be permissible in diesel base fuel are presented in table F94-2 as well.

Table F94-2—Diesel Base Fuel Properties

API Gravity	33±1
Sulfur, wt%	0.05 ±0.0025
Cetane Number	45.2±2
Cetane Index	45.7±2
Distillation Parameters:	
10%, °F	433±5
50%, °F	516±5
90%, °F	606±5
Aromatics, vol%	38.4±2.7
Olefins, vol%	1.5±0.4
Saturates, vol%	60.1±2.0
Additive Types:	
Required	Corrosion Inhibitor
	Demulsifier
	Anti-oxidant
	Metal Deactivator
Permitted	Anti-static
	Flow Improver
Not Permitted	Deposit Control

(2) The additive components of the diesel base fuel shall contain compounds comprised of no elements other than carbon, hydrogen, oxygen, nitrogen, and sulfur. Additives shall be used at the minimum concentration needed to perform effectively in the diesel base fuel. In no case shall their concentration in the base fuel exceed the maximum concentration recommended by the additive manufacturer. The increment of sulfur contributed to the base fuel by additives shall not cause the diesel base fuel to exceed the sulfur specifications in table F94-2 of this section.

(d) Methanol Base Fuels. (1) The methanol base fuels shall contain no elements other than carbon, hydrogen, oxygen, nitrogen, sulfur, and chlorine.

(2) The M100 base fuel shall consist of 100 percent by volume chemical grade methanol.

(3) The M85 base fuel is to contain 85 percent by volume chemical grade methanol, blended with 15 percent by volume gasoline base fuel meeting the gasoline base fuel specifications outlined in paragraph (b)(1) of this section. Manufacturers shall ensure the methanol compatibility of lubricating oils as well as fuel additives used in the gasoline portion of the M85 base fuel.

(4) The methanol base fuels shall meet the specifications listed in table F94-3.

Table F94-3—Methanol Base Fuel Properties

M100:	
Chemical Grade MeOH, vol%	100
Chlorine (as chlorides), wt%, max	0.0001
Water, wt%, max	0.5

Sulfur, wt%, max	0.002
M85	
Chemical Grade MeOH, vol%,	85
Gasoline Base Fuel, vol%	15
Chlorine (as chlorides), wt%, max	0.0001
Water, wt%, max	0.5
Sulfur, wt%, max	0.004

(e) Ethanol Base Fuel. (1) The ethanol base fuel, E85, shall contain no elements other than carbon, hydrogen, oxygen, nitrogen, sulfur, chlorine, and copper.

(2) The ethanol base fuel shall contain 85 percent by volume chemical grade ethanol, blended with 15 percent by volume gasoline base fuel that meets the specifications listed in paragraph (b)(1) of this section. Additives used in the gasoline component of E85 shall be ethanol-compatible.

(3) The ethanol base fuel shall meet the specifications listed in table F94-4.

Table F94-4—Ethanol Base Fuel Properties

E85:	
Chemical Grade EtOH, vol%, min	85
Gasoline Base Fuel, vol%	15
Chlorine (as chloride), wt%, max	0.0004
Copper, mg/L, max	0.07
Water, wt%, max	0.5
Sulfur, wt%, max	0.004

(f) Methane Base Fuel. (1) The methane base fuel is a gaseous motor vehicle fuel marketed commercially as compressed natural gas (CNG), whose primary constituent is methane.

(2) The methane base fuel shall contain no elements other than carbon, hydrogen, oxygen, nitrogen, and sulfur. The fuel shall contain an odorant additive for leak detection purposes. The added odorant shall be used at a level such that, at ambient conditions, the fuel 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. After addition of the odorant, the methane base fuel shall contain no more than 16 ppm sulfur by volume.

(3) The methane base fuel shall meet the specifications listed in table F94-5.

Table F94-5—Methane Base Fuel Specifications

Methane, mole%, min	89.0
Ethane, mole%, max	4.5
Propane and higher HC, mole%, max	2.3
C6 and higher HC, mole%, max	0.2
Oxygen, mole%, max	0.6
Sulfur (including odorant additive) ppmv, max	16
Inert gases:	
Sum of CO2 and N2, mole%, max	4.0

(g) Propane Base Fuel. (1) The propane base fuel is a gaseous motor vehicle fuel, marketed commercially as liquified petroleum gas (LPG), whose primary constituent is propane.

(2) The propane base fuel may contain no elements other than carbon, hydrogen, oxygen, nitrogen, and sulfur. The fuel shall contain an odorant additive for leak detection purposes. The added odorant shall be used at a level such that at ambient conditions the fuel 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. After addition of the odorant, the propane base fuel shall contain no more than 120 ppm sulfur by weight.

(3) The propane base fuel shall meet the specifications listed in table F94-6.

Table F94-6—Propane Base Fuel Specifications

https://ecfr.io/Title-40/se40.18.79_111

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Vapor pressure at 100-F, psig, max	208
Evaporative temperature, 95%, °F, max	-37
Propane, vol%, min	92.5
Propylene, vol%, max	5.0
Butane and heavier, vol%, max	2.5
Residue-evaporation of 100mL, max, mL	0.05
Sulfur (including odorant additive) ppmw, max	123