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Motor Gasoline Specifications

(Revised 01/11/2021)

Click on the items below to learn more about them.

Vapor Pressure

ASTM D5191: Standard Test Method for Vapor Pressure of Petroleum Products (Mini Method)

Click here for further information on this standard.

Vapor pressure is one of the measures of volatility, and is one of the most important properties of motor fuel. It is also the first test conducted on any gasoline sample. Fuels that vaporize too readily in pumps, fuel lines, carburetors, or fuel injectors will cause decreased fuel flow to the engine resulting in rough engine operation or vapor lock especially in mountain driving. Opposite of this, fuel that does not vaporize readily may cause hard starting and poor warm-up drivability and acceleration. Volatility characteristics are adjusted for seasonal variations in temperatures.

Vapor Pressure Analyzer

Vapor Pressure Specifications for Colorado

Month	Vapor Pressure (psi)
January	15.0
February	15.0/13.5
March	13.5/11.5
April	11.5/9.0
May	9.0
June	9.0
July	9.0
August	9.0
September 1 - 15	9.0
September 16 - 30	9.0/10.0
October	10.0/11.5
November	11.5/13.5
December	13.5/15.0

EPA regulations allow 1.0 psi higher vapor pressure for gasoline-ethanol blends containing 9.0 to 10.0 volume percent ethanol.

Fuel Oxygenates

ASTM D4815: Standard Test Method for Determination of MTBE, ETBE, TAME, DIPE, tertiary-Amyl Alcohol and C1 to C4 Alcohols in Gasoline by Gas Chromatography

Click here for further information on this standard.

The presence, type and amount of oxygenate are tested using a Gas Chromatograph (GC). This testing is done to verify the content of oxygenates and to ensure compliance with the labeling law, the RVP waivers, and the MTBE ban.

Gas Chromatograph

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Distillation Temperatures at any Volume % Ethanol

ASTM D86: Standard Test Method for Distillation of Petroleum Products at Atmospheric Pressure

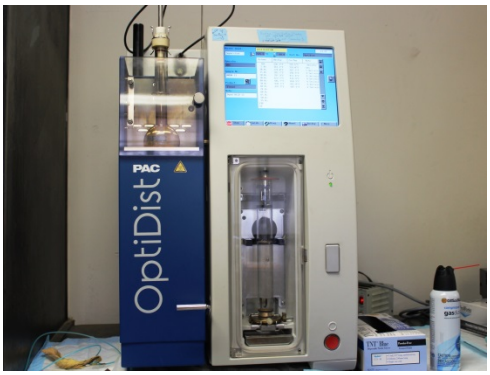
Click here for further information on this standard.

Distillation is another measure used to determine the volatility of fuels. The distillation characteristics affect the following vehicle performance characteristics: starting, drivability, vapor lock, dilution of the engine oil, fuel economy and carburetor icing. The distillation temperatures are used to characterize the volatility of gasoline and to determine whether the distillation properties meet the ASTM specifications.

Distillation Temperatures at Volume % Ethanol

Month	10% max ˚F	50% min ˚F	50% max ˚F	90% max ˚F	End point max ˚F	Residue max.
January	122	150	230	365	437	2
February	122/131	150	230/235	365	437	2
March	131/140	150	235/240	365	437	2
April	140/158	150	240/250	365/374	437	2
May	158	150	250	374	437	2
June	158	150	250	374	437	2
July	158	150	250	374	437	2
August	158	150	250	374	437	2
September	158	150	250	374	437	2
October	149/140	150	245/240	365	437	2
November	140/131	150	240/235	365	437	2
December	131/122	150	235/230	365	437	2

Where two temperatures are shown in a cell, the first value changes to the second value on the 16th of the month.



Automatic Distillation Instrument

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Vapor-Liquid Ratio

ASTM D4814: Standard Specification for Automotive Spark-Ignition Engine Fuel, Table 3, Vapor Lock Protection Class Requirements

Click here for further information on this standard.

Vapor-Liquid Ratio of 20 - Temperature T(V/L=20) is another measurement of a fuel's volatility. The T(V/L=20) is defined as the temperature at which the ratio of the volume of vapor formed at atmospheric pressure to the volume of liquid fuel is 20. The vapor lock tendency of a fuel as measured by the T(V/L=20) is confirmed by a loss of power during full-throttle accelerations. For high ambient temperatures, a fuel with a high value of T(V/L=20), indicating a fuel with a low tendency to vaporize is generally specified; conversely.

Vapor-Liquid Ratio of 20 - Temperature in ˚F

Month	Temperature in ˚F
January	105
February	105/116
March	116
April	116
May	116
June	122
July	122
August	122
September	122
October	122/116
November	116
December	116/105

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Octane Number or Antiknock Index

ASTM D2699: Standard Test Method for Research Octane Number of Spark-Ignition Engine Fuel

Click here for further information on the RON standard.

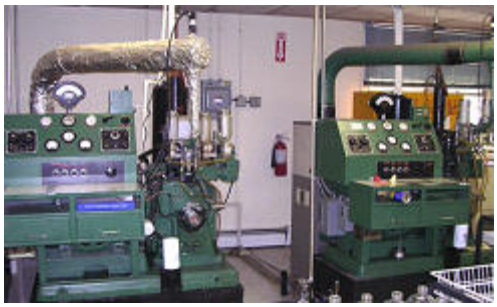
ASTM D2700: Standard Test Method for Motor Octane Number of Spark-Ignition Engine Fuel

Click here for further information on the MON standard.

The octane number is a measure of the antiknock performance of a gasoline or gasoline component, the higher the octane number, the greater the fuel's ability to resist engine knock. There are two types of octane number, the Research Octane Number (RON) and the Motor Octane Number (MON), which are based on different engine operating conditions. RON simulates low speed (idling), which affects low to medium speed knock, and MON simulates higher speed (acceleration), which affects high-speed knock or ping. Octane number is not a measurement of a fuel's power, but is a measurement of the temperature a which the fuel ignites when compressed with a spark.

Both RON and MON are based on the knocking tendencies of pure hydrocarbons; n-heptane has an assigned value of zero and isooctane a value of 100. The octane number of a fuel is the percentage of isooctane in a blend with n-heptane that gives the same knock intensity as the fuel under test when evaluated under standard conditions in a standard engine.

Antiknock Index (AKI) is the average of the Research Octane Number (RON) and the Motor Octane Number (MON) or (R+M)/2, and this number is posted on the pump.



Research and Motor Octane Engines