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LubeCorp`s Gasoline Octane Booster – Performance Testing

Introduction

LubeCorp`s Gasoline Octane Booster is an effective concentrated combustion enhancer that is highly effective in all grades of gasoline and formulated to improve driving performance and fuel economy in all types of gasoline engines.

LubeCorp`s Gasoline Octane Booster increases octane number by 7 to 9 points, enhances engine horsepower, provides customer reported fuel savings of up to 20%. In addition to its performance capabilities, it cleans injectors, lubricates, and protects the entire fuel system.

Performance Tests & Methodology

Octane Number

Octane rating is a standard measure of performance of gasoline fuel. The octane number represents how much compression the fuel can withstand before detonating (igniting), which results in a so-called "knocking" effect, which can damage engines. The ignition point of the fuel is measured and compared to a mixture of iso-octane and heptane, hence called an octane number. For instance, gasoline fuel 87 has the same knocking characteristics as an 87% iso-octane: 13% heptane mixture. The gasoline octane number is measured and reported in a variety of ways. There are four basic measures of octane number used throughout the world.

a) Research Octane Number (RON) – determined in a test engine in laboratory setting under controlled conditions of 600 rpm (ASTM D2699)

b) Motor Octane Number (MON) – to better simulate real conditions, it is measured in a test engine under laboratory conditions with a pre-heated fuel mixture and measured at 900 rpm (ASTM D2700). MON is typically 8 to 12 points higher than RON

c) Anti-Knock Index (AKI) – average of RON and MON[(R+M)/2] and typically 4 to 6 points higher than RON

d) Observed Road Octane Number (RdON) – this number is derived from testing gasoline in the real driving world or with chassis dynamometers; this method is still widely used and reliable today

Different countries report different octane numbers at the gas stations. Most countries, including Europe and Australia report RON. Canada and the United States report AKI; meaning that the same fuel with octane rating of 87 in Canada would be reported as 91 in European countries.

LubeCorp`s Octane Booster ability to increase octane number was measured during Observed Road Octane Number (RdON) tests using a dynamometer. This test also measures increases in horsepower, which is the true measure of engine performance. The goal of any performance gasoline fuel additive is to convert the gasoline into more power. Typically, there is 1-2% gain in power output with a premium gasoline (AKI of 90) when compared to regular gasoline (AKI 87). In general, some engines require higher octane rating fuels by design to prevent the "knocking" effect, which results in loss of power.

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LubeCorp claims octane number increase of 7 to 9 points. This measure is universal for every type of gasoline fuel; if the initial octane rating is 78, then after using LubeCorp`s Gasoline Octane Booster at ratio 500:1 or 0.2%, the fuel will result in engine power increase consistent with fuel having octane rating of 85 to 87.

Below is a description of methods used for measuring observed road octane number (RdON). The simplest and widely recognized method, so called Uniontown method, is observing the "knocking" while driving the car on a road and comparing the knocking behaviour of the tested fuel (or fuel with additives) to a standard reference mixture of iso-octane/heptane with specific octane rating. Described below are also its modifications and method using a chassis dynamometer.[1,2,3,4,5]

Method A – This method is used for determination of overall knock characteristics.

1. Car is run on a level road or on a slight gradient at full throttle in top gear between speeds of 10 to 15 m.p.h and 50 m.p.h.
2. The basic or static ignition setting is adjusted so that only trace "knock" is developed at any point throughout the speed range. The range of permissible basic ignition settings is determined by the limits between which the ignition can be varied without experiencing more than an agreed maximum drop in power relative to the optimum as determined by the time required to accelerate between speeds 20 -50 m.p.h. on full throttle in top gear on a standard knock fuel. It was found that generally a variation of +/- 5° crankshaft from the optimum power setting results in power loss as shown by acceleration time of less than 5%. This enables a range of octane numbers of at least 10 to be tested.
3. Compare the "trace" knock characteristics of the tested fuel with standard reference iso-octane/heptane mixture.

Method B – This method accounts for speed at which knocking occurs and provides more detailed information about the car behaviour.

1. Car is run on a hill of a substantially constant gradient to ensure that when approached at speeds up to 60 m.p.h. in top gear full throttle, the car speed will be considerably reduced. If sufficient reduction cannot be obtained, extra vehicle loading or braking is recommended. The ignition automatic advance mechanism is locked out and the vacuum ignition control is disconnected.

2. Testing of a fuel is conducted in successive stages of decreasing ignition advance. Fuel ratings are not conducted at ignition settings above 50°.
3. From the starting point A, the car is accelerated through the gears to pass point B at the commencement of the hill at the highest speed at which it is desired to rate the fuel.
4. At this point, the throttle is fully opened and as the car is decelerated by the hill gradient, the observer notes the speed at which onset of detonation occurs. The initial ignition setting aimed at is such that will cause detonation to come at about 5 m.p.h. below the speed at point B. The setting may have to be adjusted to achieve this.

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[1] Third World Petroleum Congress, Hague 1951, Section VII, p. 222-232
[2] CRC Designation E-I-1943: Procedure for Determination of Octane Number Requirements of Vehicles on the Road
[3] CRC Designation F-8A-943: Procedure for Determination of Antiknock Quality of Fuels on the Road, Borderline Test Procedure
[4] CRC Designation F-8B-943: Procedure for Determination of Antiknock Quality of Fuels on the Road, Modified Borderline Test Procedure
[5] CRC Designation F-8C-943 Procedure for Determination of Antiknock Quality of Fuels on the Road, Knock Intensity Test Procedure

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5. The procedure is repeated with the ignition retarded 5° the car being operated to pass point B at a speed equal to that at which detonation came in on the previous run.
6. Successive runs at progressively retarded ignition settings will result in series of points forming a curve relating to ignition advance for incipient detonation and speed over the desired speed range between 20-50 m.p.h.
7. Standard reference fuels are tested in the same manner. The curves are plotted over the entire speed range and octane number of the test fuel at any speed is obtained by interpolation.

Method C – This is a laboratory simulated test using chassis dynamometer. This test allows changes in a variety of parameters.

1. A graduated scale is fitted to the front of the engine concentric with the crankshaft. This device facilitates accurate determination of the ignition timing, which can be varied whilst the engine is running.
2. A flexible 4 inch pipe lagged with sound insulating material has one end contacting the cylinder block through a rubber seal and the pipe passes through to the operator. This has proved satisfactory and the sound of detonation stands out clearly from other noises.
3. The engine is warmed up using dump fuel at conditions chosen to represent normal 30 m.p.h. cruising on the road.
4. Having changed to the tested fuel and employing tentatively an ignition advance at maximum speed, the throttle is opened, holding the engine speed corresponding to the maximum road speed of the car.
5. The brake load is then increased slowly where the detonation should occur after speed is reduced slightly. If that is not the case, more advanced ignition setting must be used and procedure repeated.

In subsequent recordings, the engine must be returned to the steady running condition used for warming up and run at this condition for at least 3 minutes before carrying out the next stage of rating. These stages are carried out after 5 degree steps of ignition retardation.

Fuel Economy

LubeCorp claims that our Gasoline Octane Booster results in fuel economy increase of up to 20%. The fuel economy increase was directly measured and reported by numerous LubeCorp`s customers throughout the years; this product has been on the market since 1988.