Tech Bulletin

Advancing the Science of Motorsports™

Tech Bulletin prepared by Steve Burns, Research & Development

C11 Racing Fuel

C11 was developed in 1997 for circle track racing and found immediate success. Since then it has been used in numerous applications ranging beyond that.

In engines that require lower octane than VP's C12 racing fuel, C11 can make more power (typically 1–1.5%). Typical applications for C11 are at CRs of 12:1 and under, with restrictor plates and standard flow heads. With unrestricted heads, manifolds and carburetors, C11 performs well to 11:1 CR. This fuel has fast burning speed along with excellent vaporization and BTU value. The better vaporization allows the fuel to absorb more heat in the combustion chamber, helping to lower the octane required.

Better vaporization also promotes faster burning speeds by having smaller fuel droplets (and more of them) giving more surface area. Remember the droplets can only oxidize (burn) on the surface, so more surface area gives better burning speed and more complete combustion. The higher BTU value is important in that this fuel gives off better heating value (energy) per the amount of air consumed.

These compression ratio recommendations are not set in stone, as there are many factors that determine the octane requirements of a racing engine. Cylinder swirl, mixture distribution, mixture ratio, RPM, coolant temperature and design of the combustion chamber all influence octane demand. After using C11 in short track (¼, ½ mile), going to a longer track means the engine will heat sink hotter and increase the octane demand. Moving to C12 might be necessary, especially if C11 was marginal in the short tracks. C11 has a rated MON of 104 (four numbers lower than C12) but its on-track resistance to detonation makes the octane value seem higher.

Property	Typical	Test Methods
Specific Gravity @ 60F°	.710	ASTM D 4052
API Gravity		ASTM D 1298-85
Motor Octane	104	ASTM D 2700-86
Reid Vapor Pressure	8.54	ASTM D 323
Distillation F°		ISO 33405
Initial Boiling Point		
10% Evap.	128.6	
50% Evap.	174.1	
90% Evap.	227.1	
E.P.	260.3	
Leaded	Yes	ASTM D 3237
Color	Orange or Purple	
Kenematic Viscosity in Centistokes @ 80F	-	ASTM D 445

C11 is recommended for use in circle track racing, NHRA stock and super stock, SCCA, karting, snowmobiles and motorcycles. C11 has proven to be popular during qualifying for many big races, such as Daytona Speed Weeks.

As it can be color dyed orange, blue or purple, C11 can be dressed up and taken to any occasion.

To store C11, keep it in a tightly sealed container. It will not separate as its components are solvents of one another. Do not expose the fuel to direct sunlight as the ultraviolet rays will oxidize the lead. (VP produces round or square utility jugs in a variety of colors, each of which is suitable for transportation of fuel. Contact your regional VP Racing sales manager for more information.)

To maintain the original properties and comply with Health and Safety regulations, this fuel should be handled and stored in a cool place and always maintained in tightly sealed drums.

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The four most important properties of racing fuel

You can't make a racing fuel that has the best of everything, but you can produce one that will give your engine the most power. This is why we produce different fuels for different applications. The key to getting the best racing gasoline is not necessarily buying the fuel with the highest octane, but getting one that is best suited for your engine.

1. **OCTANE -** The rating of fuels' ability to resist detonation and/or preignition. Octane is rated in Research Octane Numbers (RON), Motor Octane Numbers (MON), and Pump Octane Numbers (R+M/2). Pump Octane Numbers are what you see on the yellow decal at the gas stations and represents an average of RON and MON. VP uses MON because this test method is more prevalent in racing. Most other companies use RON because it is higher, easier to come by, and sounds better in marketing messages. Don't be fooled by high RON numbers or an average -- MON is the most important for a racing application. However, the ability of the fuel to resist preignition is more that just a function of octane.
2. **BURNING SPEED -** The speed at which fuel releases its energy. In a high-speed internal combustion engine, there is very little time (real time - not crank rotation) for the fuel to release its energy. Peak cylinder pressure should occur around 20° ATDC. If the fuel is still burning after this, it is not contributing to peak cylinder pressure, which is what the rear wheels see.
3. **ENERGY VALUE -** An expression of the potential in the fuel. The energy value is measured in BTUs per pound, not per gallon. The difference is important. The air fuel ratio is in weight, not volume. Remember, this is the potential energy value of the fuel. This difference will show up at any compression ratio or engine speed.
4. **COOLING EFFECT:** The cooling effect on fuel is related to the heat of vaporization. The higher the heat of vaporization, the better its effect on cooling the intake mixture. This is of some benefit in a four- stroke engine, but can be a big gain in two-stroke engines.

The VP Racing Story

At VP, we've been making the best fuels for motorsports since 1975. We've developed a well-earned reputation for producing high quality racing fuels respected for their power and consistency. In fact, we've fueled the NHRA Pro Stock Champions for 30 consecutive years – a record unmatched anywhere in the industry.

However, our track record isn't limited to the drag strip. We've fueled champions in off-road, off-shore, circle track, road race, motocross and even airplanes. A VP-powered racer has won every major championship in North America that allowed the competitor a choice of any fuel producer.

Total control over our products is just one of the reasons VP has achieved such consistent success. We blend all our own fuels. We lead them. We dye them. We drum them, test and store them.

Our chemists, engineers, dynos and test engines are dedicated to one single-minded purpose – creating the best fuels in the industry. But we don't spend all our time in-house. You'll find us working with racers on their dynos and at the races working with their vehicles. We do all this to stay ahead of our competition so that you can stay ahead of yours.

VP Racing products are conveniently distributed through warehouses across the United States, Canada, Australia, Mexico and Europe. VP also carries a complete line of racing synthetic oils, two-cycle lubricants, additives, chemicals, traction adhesives and related products – all of which are available for export worldwide. Distributor inquiries invited.

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