



Tech Bulletin

World Leader in Race Fuel Technology™

Tech Bulletin prepared by Steve Burns, Director-Research & Development

Dirt Track Racing Fuels

The high RPM, high load demands of dirt track racing applications present unique challenges for a racing fuel. Because these high compression engines typically run at sustained high speeds and loads, the fuel's impact on engine operating temperature is as important as maximizing power and preventing detonation. VP Racing has developed a portfolio of fuels that are race proven to offer *more horsepower, more torque and cooler operating temperatures than competitive fuels*. Note that each of these fuels performs equally well on asphalt.

Late Model Plus™ – VP's premier fuel for dirt track applications, recommended for use on 3/8 mile or greater dirt and asphalt circle tracks in engines bigger than 400 ci and compression ratios greater than 14:1. Late Model Plus is **more effective than any fuel on the market at making more power while suppressing engine operating temperatures**. Its motor octane (MON) is 113, the highest of any comparable competitive fuel. As a result, it offers what Larry Clark, of Custom Race Engines, describes as "a wider tolerance range in tuning, a greater safety blanket for detonation and it's more forgiving in extreme conditions." With a relatively low RVP rating, LM+ also prevents problems associated with vapor lock. Preferred by other top engine builders including Pro Power Racing and many others, Late Model Plus is the fuel of choice for top drivers including Scott Bloomquist, Steve Francis, Chub Frank, Tim McCreadie and many others.

NEW! Q16™ – Q16 is highly oxygenated, requiring a 4-6% increase in fuel flow, which contributes to **making 3-5% more power than competitors' 116 octane fuels along with better detonation protection**. Its rapid vaporization rate yields superior burning speed and makes more pressure in the cylinders, both of which also make more power. Q16's oxygenation expands the range of air/fuel ratio acceptability, offering more consistent performance. Its more efficient combustion lowers exhaust gas temperatures and in turn, engine operating temps. Despite its oxygen content, Q16 still has relatively low vapor pressure. Recommended for engines with CRs up to 17:1.

C12™ – With better vaporization and greater energy value, C12 **makes 4-5 more horsepower than competitive fuels**. C12's performance in dirt track applications is best expressed by Craig Von Dohren, a top Northeast winner in big block Modified competition with more than 200 career feature wins. "C12 makes more power than other fuels, but its cooling effect is even more critical. Big block engines are expensive and can really be hurt by overheating. By running cooler, C12 protects my engine and helps ensure I'll make it to the finish." Recommended for use in naturally aspirated engines with CRs up to 15:1.

NEW! VP113™ – VP113 offers price competitive power gains in naturally aspirated engines with CRs up to 14:1. Oxygenated to street gas levels, VP113 **makes up to 2% more power than competitive 110-114 octane fuels**, with gains of 34% in engine applications with poor or marginal fuel vaporization qualities. Because of its superior vaporization qualities, VP113 will improve throttle response over any competitive 110 fuel. Due to its oxygenation, it will have to run richer, effectively adding 2-3 numbers to its standard ASTM octane rating, providing even more on-track protection against detonation.

VP110™ – Although the name of this fuel refers to its R+M/2 rating so customers understand its competitive set, the important thing to note about this nonoxygenated fuel is its MON. At 107, it's anything but "standard." In fact, it's higher than any other "110" racing fuel on the market. Like the other fuels in VP's dirt track stable, VP110 maximizes power while running cooler. Formulated for use in naturally aspirated engines with compression ratios up to 14:1, it's a good lower cost alternative.

The Relative Importance of MON

Of the two methods for testing octane -- motor octane (MON) and research octane (RON) -- the MON method is the only one that measures a fuel's performance under a high load. Because this more accurately simulates racing conditions, it's the most relevant measure of a fuel's ability to prevent detonation. The "pump" octane value is simply an average of the fuel's MON and RON values (R+M/2). Focusing on the MON of different fuels will help ensure you're comparing apples to apples. But bear in mind a fuel's ability to prevent detonation is a function of more than just octane. For example, most of VP's fuels—oxygenated or nonoxygenated—vaporize much better than comparable competitive fuels. This means it cools the intake charge and burns faster. As a result, the "effective" octane rating of VP's fuels is even higher than the octane test indicates, and they will prevent detonation better than competitive fuels with similar MONs.

Fuel	MON
VP Q16	116
VP Late Model Plus	113
Sunoco HCR+	110
Sunoco Supreme	110
VP113	109
Turbo Blue Advantage	108.5
VP C12	108
VP110	107
Sunoco Standard	105
Turbo Blue 110	105

Properties/ Typical Values	LM+	Q16	VP113	C12	VP110	Test Method
Specific Gravity @ F	.727	.716	.719	.717	.725	ASTM D 4052
Motor Octane	113	116	109	108	107	ASTM D 2700-86
Reid Vapor Pressure	5.52	6.76	7.96	7.30	6.70	ASTM D 323
Distillation) ?						ISO 33405
10% Evap.	171.6	141.0	135.7	131.0	147.0	
50% Evap.	213.3	174.0	188.8	194.0	211.0	
90% Evap.	221.3	214.5	225.7	228.0	223.0	
E.P.	241.4	260.2	262.9	233.3	253.0	
Lead	Yes	Yes	Yes	Yes	Yes	ASTM D 3237
Oxygenated	No	Yes	Yes	No	No	Elem Analysis
Color	Aqua	Yellow	Green	Green	Purple	

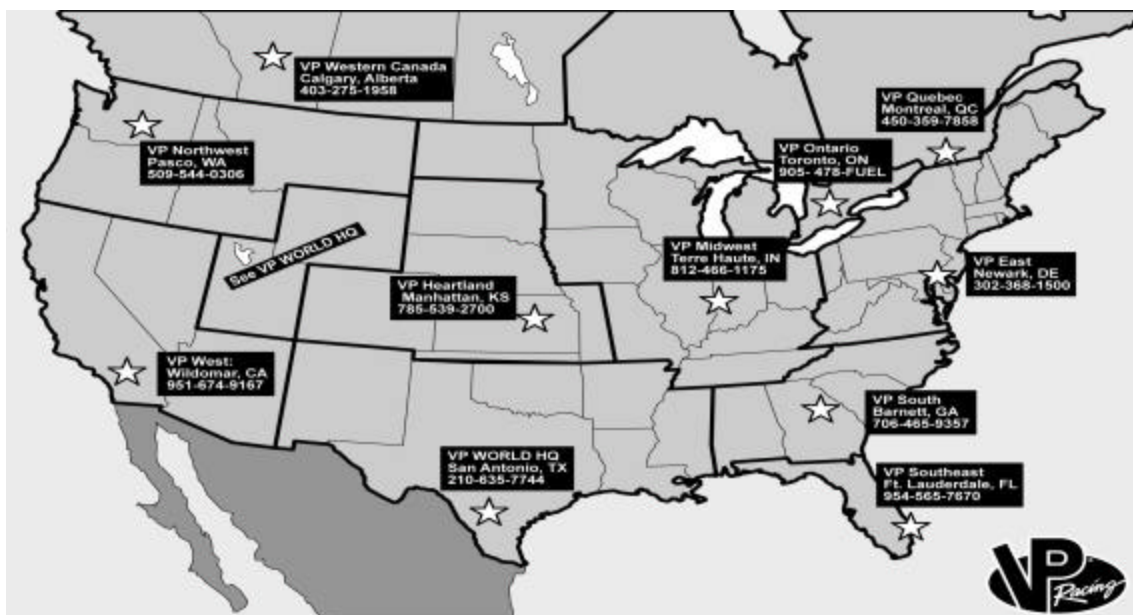
To maintain the original properties and comply with Health and Safety regulations, fuels should be handled and stored in a cool place and always maintained in a tightly sealed container

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 particular engine the most power. This is why we produce different fuels for the most 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.

- OCTANE** – This is simply the rating of a fuel's 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 relevant to 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 than just a function of octane.
- 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.
- 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.
- 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 twostroke engines.

VP Distribution



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