



Tech Bulletin

World Leader in Race Fuel Technology™

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

Racing Fuels for Motorcycles, Powersports

MR Series -- VP Racing's MR series fuels are all designed to make the maximum power within fuel rule specifications for their respective sanctions and applications. The **MR fuels run substantially cleaner than any other fuel formulated specifically for motorcycles and other powersport applications.** Teardowns of factory team engines revealed that MR fuels ran significantly cleaner in intake and exhaust valves. Keeping the intake track and valves deposit-free is important to maintain proper airflow and full power for the entire race.

NEW! MR12™ - VP's best fuel yet for 4-stroke applications that can tolerate lower octane values, makes more power for powersport applications than any fuel on the market. Dyno tests proved up to **5% more power than VP's MR9 and up to 6% more power than VP's MRX01!** Although currently not legal in AMA Pro Racing, MR12 passes fuel rules for AMA Pro/Am, CCS, WERA, AFM, NMA, WORCS, SCORE and Best in the Desert as well as club level racing and more.

MRX01™ - Engineered to meet the demands of top professional motocross teams who demand maximum power with enough octane to run in both 4- and 2-stroke applications. MRX01 **makes up to 5% more power than pump gas** and won numerous AMA 125cc and 250cc Supercross and Outdoor National championships prior to implementation of AMA's unleaded fuel rule. Also produces excellent performance in higher compression road racing applications. Currently AMA legal except for Supercross and Outdoor Nationals.

MR-PRO4.1™ - An *unleaded* fuel designed to meet the lower octane demands of 4-stroke racing engines and formulated to make maximum power under the current AMA Pro Racing unleaded fuel rule. Used by AMA Motocross and Supercross champions to win 11 of a possible 12 titles in 2004 thru 2009. Legal in all AMA Pro Racing.

M8-1™ - Designed and specifically formulated to maximize power and performance in FIM MX and Road Race competition. Excellent for MX, Superbikes and more. Used by Team USA to win Motocross of Nations four consecutive years through 2009. High profile engine builders in Europe report horsepower gains of 2-3% over other top-selling brands, making M8-1 the fuel of choice from Indianapolis to Suzuka to Catalunya.

Other Motorcycle/Powersport Fuel Choices

NEW! U4.4™ - If you're not bound by fuel rules, this leaded fuel is the best choice for virtually any powersports application based on cost vs. performance. The latest generation of our U4-based fuels, U4.4 **makes up to 6% more power than pump gas** across a wider range of applications than its predecessors. It yields no sticky residue and is more resistant to heat. Designed as a direct, pour-in replacement for pump gas, it will require modest jetting changes, i.e., +2 main jets or +2 pilot jets at most. With its higher octane rating, U4.2 is designed for use in stock and modified 2-stroke and 4-stroke applications. Conforms with fuel rules in the same series as outlined under MR12.

NEW! Q16™ - Replaces VP's MR8 as the fuel of choice for 125/250 GP bikes or other higher compression 2-stroke applications where oxygenated fuels are allowed. With a motor octane of 116, Q16 offers more detonation protection than MR8. Because Q16 is oxygenated to a much higher level than MR8, jetting may need to be richened up substantially to compensate. All in all, Q16 generates power comparable to MR8 for a much lower cost!

C12™ - Introduced by VP 35 years ago, C12 is arguably the winningest fuel in history across all forms of racing that are not constrained by spec fuel rules. C12 is leaded and has the highest octane and resistance to detonation of any of the fuels listed here, making it an excellent choice for power and protection. More motorcycle National Championships (motocross or road racing) have been won with C12 than any other single fuel. In terms of performance vs. cost, it's still a cost-effective choice for amateur racing as well.

Motorsport 103™ - VP's most cost effective *unleaded* fuel, MS103 provides excellent performance and throttle response while meeting the AMA Pro Racing unleaded fuel rule. MS103 offers superior detonation protection for high compression 2-stroke race engines as well as meeting the high demands of today's 4-stroke motocross bikes. For additional performance benefits, check out our AMA Pro Racing-legal MR-PRO4.1 unleaded fuel, described above.

Motorsport 109™ and Motorsport 109E™ - Both of these *unleaded* fuels are a good option for 4-stroke or 2-strokes and **make more power than any unleaded racing fuel on the market** - up to 4% more than pump gas. Appropriate for all disciplines of motorcycle racing--dirt bike, road race or street bike (off road use only). Both pass fuel rules for AMA amateur racing as well as club level racing, CCS, WERA and AFM. MS109E is oxygenated with ethanol and legal for use in competition in all 50 states, including those that restrict the use of MTBE in fuels.

VP100™ - Well-suited for high-performance motorcycles, ATVs, personal watercraft and karts. *Unleaded* and oxygenated with ethanol, VP100 meets California Air Resource Board (CARB) requirements and is street legal throughout the U.S. At 100 octane (R+M/2), it generates substantial power increases over premium grade 92 octane pump gas. Offers excellent performance in 2- and 4-stroke MX applications as well as off-road racing, including hare scrambles, desert and enduro racing.

All of VP's fuels are conveniently available from your local VP dealer in 5-, 15-, 30- and 54-gallon drums

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 tightly sealed drums. Do not expose the fuel to direct sunlight as the ultraviolet rays will oxidize the lead.

Property	MR12	MR10	MRX01	MR	M8-1	U4.4	C12	Q16	MS	MS	MS	VP100
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				PRO4.1					103	109	109E	
Spec Gravity @ 60°F	.733	.741	.717	.758	.739	.763	.717	.716	.743	.722	.805	.746
Motor Octane	87	86	98	89	90	103	108	116	99	101	99	96
Reid Vapor Press.	11.6	11.47	9.73	9.95	*	6.76	7.30	6.76	2.9	6.17	8.43	6.8
Distillation F° - IBP	94.3		103.4	94.7			103.0					
10% Evap.	106		121.5	110.1	**	139.5	131.0	141.0	190.0	147.0	137.7	148.0
50% Evap.	122.5	128.7	151.8	141.4	**	174.0	194.0	174.0	210.4	167.8	161.8	210.0
90% Evap.	258.8	316.5	214.5	319.6	**	225.5	228.0	214.5	217.1	213.3	309.6	216.0
E.P.	324.5	323.4	230.0	346.7	**	225.5	233.3	260.2	225.7	263.8	364.3	238.0
Lead	Yes	Yes	Yes	No	No	Yes	Yes	Yes	No	No	No	No
Oxygenated	Yes	Yes	Yes	Yes	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes
Color	Purple	Pale Green	Pink	Pale Blue	Yellow	Light Green	Green	Yellow	Clear	Clear	Yellow	Orange

* 58.10 kPa @ 37.8°C

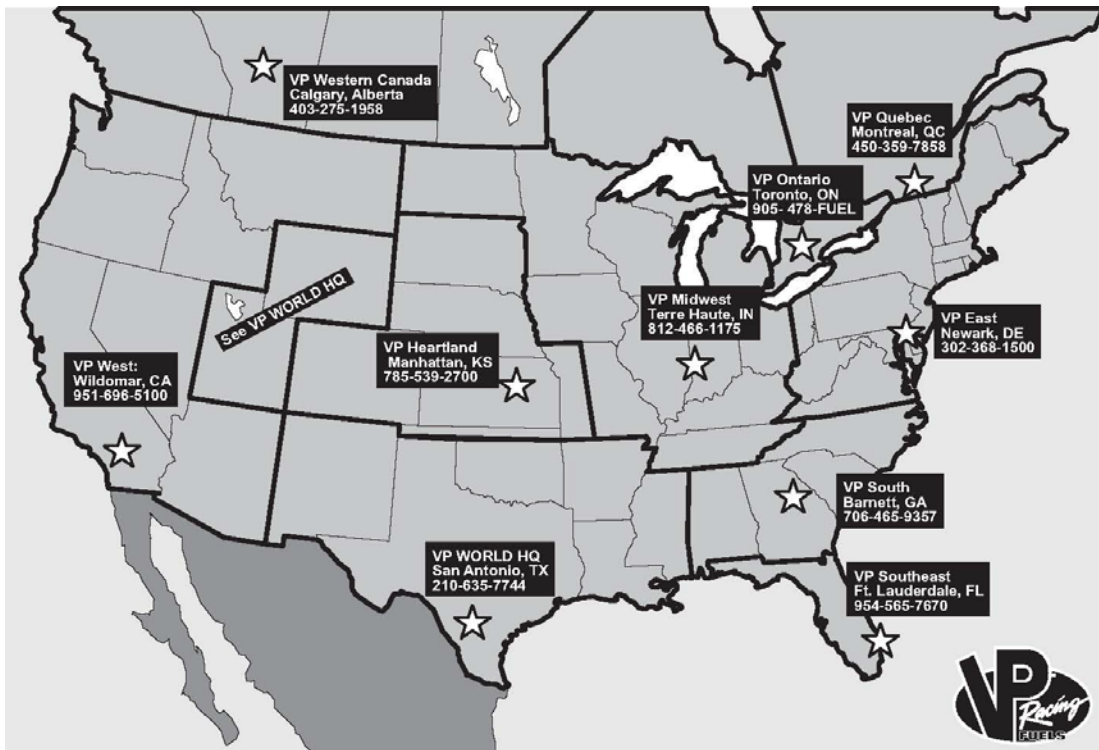
** 40.0% evap @ 70°C; 64.5% evap @ 100°C; >99.0% evap @ 150°C; FBP 144.0°C

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 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** – 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 reports MON ratings because this method tests a fuel's performance under a heavier load than the RON method, thus better simulates racing conditions. Most other companies use RON because it sounds better in marketing messages. Don't be fooled by high RON numbers or an average—MON is the most relevant for a racing application. However, a fuel's ability to resist preignition is more than 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.

VP Distribution



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