Changing from Gasoline to E-85

Rockett Brand Racing Fuel has introduced an E85 Racing Fuel blend that contains 85% Ethanol and 15% Gasoline. The amount of Ethanol is always 85% and does not vary like the E85 available at service stations in some areas of the US.

This technical bulletin is for the person that wants to change from gasoline to an E-85 fuel blend. Changes to Air/Fuel Ratio(AFR) are extremely important. Without changes to AFR, the amount of fuel getting into the engine will be inadequate. If by chance the engine does run, it will have a very lean AFR which can lead to detonation and to engine damage.

The stoichiometric AFR for a non-oxygenated gasoline is approximately 14.7 to 1. This means that 14.7 pounds of air must be mixed with one pound of gasoline (fuel) to get the proper AFR for an efficient combustion to take place.

The stoichiometric AFR for E-85 is approximately 9.9 to 1. This means that 9.9 pounds of air must be mixed with one pound of E-85 to get the proper ratio for an efficient combustion process.

This tells us that an unchanged gasoline carburetor will provide an inadequate amount of E-85 leading to very lean conditions. More fuel is required when using E-85 than when using gasoline. That additional amount of fuel comes to about 33% to maintain a stoichiometric mixture.

To increase the fuel flow through a carburetor by an additional 33% requires significant changes to air bleeds, fuel passages, and jet sizes. This a job for a professional, so unless you are a carburetor expert, it would be best to buy a carburetor that has been set up by a more experienced person. There are several manufacturers of carburetors in the aftermarket that specialize in E-85 carbs. Check the websites for Quick Fuel, AED, or your favorite carb supplier for ready to use carbs.

The stoichiometric AFR's shown above for gasoline and E-85 are for part throttle operating conditions which can tolerate leaner mixtures than wide-open-throttle(WOT) operation. The ideal AFR at WOT for gasoline is in the range of 12.8-13.2 to 1, and for E85 the ideal AFR at WOT is approximately 8.6-8.9 to 1.

Your fuel pump, fuel lines, and fuel filter may need to be larger to handle the additional fuel flow with the E85 fuel blend.

Also, alcohol fuels sometimes attack the soft components in the fuel system, so be certain that your pump, lines, regulator, etc. are compatible with alcohol fuels

If your engine is fuel injected, all of the above pertains to your application with the exception of the carburetor information. Your engine will likely need larger injectors. Check with your fuel injection supplier for the correct injectors for your application when using E85. Some re-mapping of the AFR tables in your engine control computer may also be required. Check with your fuel pump, fuel lines, and pressure regulator suppliers to be certain that these parts are compatible when using an E85 fuel blend.

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