

# FUEL DATA

	Density sp. gr. at 60°F	Weight lb/gal at 60°F	Heating Value Btu/lb - **	Air/Fuel Ratio for complete combustion	Latent heat of evaporation Btu/lb - **	Mixture temp. drop due to latent heat, °F - **
Gasoline	.690 aviation .751 most pump [ avg of (6) major brands ] .690 - .740 typical race	6.17 for .740 sp. gr.	20,000	14.7	148	35
Methanol	.792 with no water present (anhydrous)	6.60	8,600	6.5	500	250
Nitromethane (100%)	1.139	9.50	4,500	1.6	135	?

\*\* - These are approximate values, especially the latent heat and mixture temperature drop.

Note : water is 8.3 pounds per gallon.

**Example of use :** A popularly accepted rule of thumb is that of the total heating value of gasoline, only about 1/3 goes down the drive shaft as work, as about 1/3 goes out of the radiator as heat and about 1/3 goes out of the exhaust pipes as heat and blow-down pressure.

Lets look at a 331 cubic inch small block professional road race engine: 648 hp @ 7800 rpm with .46 BSFC (Brake Specific Fuel Consumption)  
470 ft-lb @ 6750 rpm with .42 BSFC

Looking at our conversion chart, we know that one horsepower = 42.44 Btu

**Torque** From the conversion chart,  $hp = \frac{\text{torque (ft-lb)} \times \text{rpm}}{5252} = \frac{470 \times 6750}{5252} = 604 \text{ hp}$

604 hp x 42.44 Btu/min per hp = 25,634 Btu/min work done by the engine

From the conversion chart,  $BSFC = \frac{\text{lb/hr fuel}}{\text{observed hp}}$  so lb/hr = BSFC x obs hp = .42 x 604 = 254 lb/hr

254 lb/hr = 4.233 lb/min gasoline 4.233 lb/min gas x 18,400 Btu/lb gas = 77,887 Btu/min heat value in the gasoline burned

Efficiency =  $\frac{25,634}{77,887} = 33\%$

**Horsepower** 648 hp x .46 BSFC = 298 lb/hr gas = 4.968 lb/min 4.968 lb/min x 18,400 Btu/lb = 91,411 Btu/min heat value  
648 hp x .4244 Btu/min per hp = 27,501 Btu/min work done by engine

Efficiency =  $\frac{27,501}{91,411} = 30\%$

**NOTE** It makes sense that the engine is less efficient at the horsepower peak than the torque peak, as the air pumping losses through the intake ports are higher at the horsepower peak.



**Earl Wooden's Land Speed "1947 Crosley", set several land speed records when equipped with a Kinsler small block Chevrolet, and now powered by a big block G.M./D.R.C.E.2 engine at the World Finals at Bonneville set the world record for a flying mile with a average of 292.288 M.P.H.**



**Jerry Helwig's Land Speed 1940 Ford Coupe powered by Kinsler injected flat head Ford, runs in XF/VGC on gasoline and XF/VFC with alcohol/nitromethance mixture**

© 2008

*Kinsler Fuel Injection, Inc.*

1834 THUNDERBIRD TROY, MICHIGAN 48084 U.S.A.  
www.Kinsler.com Phone (248) 362-1145 Fax (248) 362-1032

