

11 February 2005
Jack Kane, Chief, Weights & Measures Bureau
Dept of Labor and Industry
RE: Octane and energy contents of gasoline and ethanol blends

Dear Jack:

The following is a response to our conversation the morning of 11 February 2005 regarding various amendments to the ethanol blending bills.

Q. Many retail installations have two tanks, one each for regular and premium gasoline. The mid-grade gasoline at these locations is made by blending product from each tank in a specific ratio determined by the fuel provider (Exxon-Mobil, Conoco-Philips, Sinclair, etc.). The ratio appears to vary from 50:50 to 48:52 regular to premium. The question is what is the percent ethanol and octane in the mid-grade gasoline at these retail locations?

To make regular E10 blend, 10 percent fuel ethanol is blended with 90 percent regular gasoline. The fuel ethanol is a mix of 100-percent anhydrous ethanol denatured with up to 5 percent unleaded gasoline. (ASTM D4806 specification is 95.3% ethanol, 4.7% unleaded) (i.e. there is gasoline in fuel ethanol). Blending 10 percent fuel ethanol into 90 percent regular gasoline results in 9.5 gallons of ethanol in 90.5 gallons of gasoline and 9.5 gallons ethanol in an E10 blend. Energy and octane content are estimated below using API-1998 references, however exact octane will need to be tested as you already do. The mid-grade produced by blending E10 with non-oxygenated premium (91 octane) produces the same octane with any of the blending ratios.

Also, E85 is a generic term, like gasoline, with a summer and winter grade. Winter grade has more gasoline in it so the fuel can vaporize for easier starting.

Fuel	Octane	Volume % Ethanol	Energy Content, Btu/Gallon
Regular	85.5	0	114,138
Premium	91	0	--
Mid-grade	89	0	--
E10, Regular	88.1	9.5	111,313
E10, Premium	93.1	9.5	--
E10, mid-grade	90.6	9.5	--
Mid-grade without premium E10	89.6	4.56 to 4.75	--
E85, summer	101-105	80.75	90,125
E85, winter (50:50)		47.5	100,012
Fuel Ethanol	113*	95.3	85,887

*indicates denatured with 87 octane regular unleaded