



UNIVERSITY OF ILLINOIS
EXTENSION

Ethanol

Illinois Labeling Requirements for Ethanol

If the fuel contains more than one percent of ethanol, Illinois requires that the gasoline pump be clearly marked with the maximum amount of ethanol included in the blend. Some states do not require that ethanol be labeled, so it would be difficult to know if the gasoline contains ethanol.

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contain
Ethanol



Ethanol Use in Motor Vehicles

Illinois consumers can find ethanol blends at many gasoline stations in the state. And, nationwide, nearly 70 percent of gasoline includes an ethanol blend.

Ethanol is an octane enhancer or anti-knock additive. With today's higher compression engines, ethanol helps the engine be more efficient. It also helps the gasoline burn cleaner, which makes it a friend to the environment with less carbon monoxide and oxides of nitrogen ("nox") emissions.

E10

The most common blend is E10, which includes up to 10 percent ethanol blended with unleaded gasoline. All auto manufacturers that sell vehicles in the United States cover under warranty the use of up to 10 percent ethanol (E10) in the vehicle.

E85

More consumers now have the ability to choose E85, which is a blend of up to 85 percent ethanol and 15 percent gasoline, at a local gasoline stations. In order to use E85, consumers must use a flex fuel vehicle or had a vehicle modified to use E85. A list of E85 vehicles can be viewed at: <http://www.illinois-greenfleets.org/vehicles/past-e85.html>.

As of December 2008, the Illinois Environmental Protection Agency's Illinois GREEN Fleets¹ program web site reported there were 194 stations selling E85 in Illinois. To see the loca-

tion of the stations and for mapping directions, visit: <http://www.illinoisgreenfleets.org/stations/e85-stations.html>

Illinois has several incentive programs for E85 as part of the Illinois Alternative Fuels Rebate Program. The Fuels Rebate is for E85 and biodiesel when used in a vehicle at least 50 percent during the year. Consumers may apply for a vehicle rebate when an E85 or biodiesel vehicle is purchased. Conversion rebates are also available when converting a conventional gasoline or diesel engine to an alternative fuel. However, conversion to natural gas, propane, or electricity are more common under that program. For more information about the rebates, visit: <http://www.illinoisgreenfleets.org/fuels/index.html>.

Other Ethanol Blends Between E10 and E85

Much research has been done and more is in progress to test other ethanol blends for use in motor vehicles.² Many of the studies indicate that higher blends of ethanol can be used in vehicles that have not been modified or are flex fuel vehicles.

One of the studies², which was released in December 2007, found that some vehicles had better fuel efficiency, even higher than gasoline, with a blend of 20 percent ethanol and 80 percent unleaded gasoline (E20). According to the study, "E20 offered a 15% mileage improvement over gasoline in one of

the four vehicles, and E30 offered a 1% mileage increase in two of the vehicles." No damage to the engines due to increased ethanol was reported during the trials.

Some state governments are considering increasing ethanol blends within their states and increased ethanol blends were part of discussions with automakers during federal economic bailout negotiations in late 2008. However, currently in Illinois all ethanol blends higher than 10 percent must be labeled, "For flexible fuel vehicle use only."

Some people may question why vehicles cannot run on 100 percent ethanol as people in Brazil are able to do with their cars. Pure alcohol may have difficulty starting an engine in cold temperatures, below 64 degrees Fahrenheit. Brazilian cars have a tank for gasoline to allow cold starts and then they switch to ethanol once the engine is warmed up. This is an approach used many years ago in some U.S.-made farm tractors that ran on "distillate", a heavy fuel oil. The tractor had a small starting tank supplying light kerosene, and a valve to switch to the less expensive, heavier oil once the engine was warm.

Blending Process

Ethanol is not blended for consumer use at the ethanol plant. Only a small amount of gasoline is added at the ethanol plant to "denature" the ethanol, or render it unusable for human consumption. Ethanol is shipped, usually via semi truck or tanker rail car, to fuel blenders or distributors. Using formulas requested by gasoline retailers, the distributor will load semi trucks or transfer trucks with the appropriate gasoline, ethanol, and other additives. These trucks then deliver the ethanol-blended gasoline to retailers.

It would be costly to install new storage tanks at retail locations in order to have different blends (other than E10 and E85) of ethanol, such as E15, E20, or E30. So, the ethanol industry is advocating for blending pumps at the retail locations. The new pumps would be programmed to deliver the percentage of ethanol that the consumer desires for vehicle performance and price fluctuations due to volatile petroleum markets, corn markets, and policy.

Energy Comparisons

Ethanol is a single molecule or pure chemical. Its formula is the same no matter where it is produced. Gasoline is a mix of hydrocarbons. Petroleum refineries produce different blends of hydrocarbons that don't target a particular molecule. The blends produced have many variables, including grade of crude oil, climate, season, and altitude.³

Ethanol's octane rating is 113 and when added to gasoline, usually increases the octane level by 2 or 3 points at a 10 percent ethanol blend.

Using E10 in small engines usually does not present a problem. However, engines that were built before ethanol blends became commonly available may have fuel system gaskets, seals, and fuel lines made of materials that are not compatible with ethanol. Check with the manufacturer for recommendations about fuels, parts compatibility, and regular maintenance. Use fresh fuel in the tank, as water contamination can cause phase separation of ethanol blends, in which the ethanol absorbs water and drops out of the gasoline, forming its own layer in the tank. The two layers have different combustion characteristics and, important for two-cycle engines, lubricating properties.



References

¹Illinois Environmental Protection Agency's Illinois Green Fleets Program: <http://www.illinoisgreenfleets.org>

²Argonne National Laboratory, Transportation Technology R&D Center: <http://www.transportation.anl.gov/fuels/ethanol.html>

³"OPTIMAL ETHANOL BLEND-LEVEL INVESTIGATION," University of North Dakota Energy & Environmental Research Center (EERC) and Minnesota Center for Automotive Research (MnCAR). Cosponsors: U.S. Department of Energy and American Coalition for Ethanol (ACE). Full report at: http://www.ethanol.org/pdf/contentmgmt/ACE_Optimal_Ethanol_Blend_Level_Study_final_12507.pdf

⁴<http://www.nmma.org/government/environmental/?catid=573>

Resources:

Alternative Fuels Institute: <http://www.afisd.com/>

American Coalition for Ethanol: <http://www.ethanol.org/>

Energy Information Administration (U.S. Department of Energy): <http://www.eia.doe.gov/fuelrenewable.html>

Flexible Fuel Vehicle Club of America: <http://www.flexiblefuelvehicleclub.org/>

Fuel Economy Guide (U.S. Department of Energy and U.S. Environmental Protection Agency): <http://www.fueleconomy.gov/>

Illinois Corn Growers Association & the Illinois Corn Marketing Board: <http://www.ilcorn.org/>

Illinois Environmental Protection Agency : <http://www.epa.state.il.us/>

• Bureau of Air: <http://www.epa.state.il.us/air/>

National Corn Growers Association: <http://www.ncga.com/>

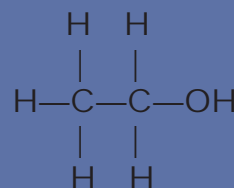
National Ethanol Vehicle Coalition: <http://www.e85fuel.com/>

Renewable Fuels Association: <http://www.ethanolrfa.org/>

U.S. Department of Energy:

• Alternate Fuels Data Center: <http://www.afdc.energy.gov/afdc/>

• AFDC Related Web Sites: <http://www.afdc.energy.gov/afdc/progs/related2.php>



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