

Fuels For Sport Aircraft: The Looming Crisis

EAA AirVenture

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**An Overview Of The Ethanol Problem
With Links To Source Material**

by

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Legal Avgas In The U.S.

1. ASTM D910:

100 LL (Blue) 2 grams TEL / Gallon Max.

According to Air-Nav 100 LL is found at 3599 of 3700 FBO's in the US.
(97%)

2. ASTM D6227:

82 UL (Purple) Not produced.

3. ASTM D4814:

Commonly known as motor gasoline or "Mogas".
87 AKI (No dye) (EAA / Petersen STC, Rotax 912, 85 HP)
91+ AKI (No dye) (Petersen STC, Rotax 912, 100 HP)

According to Air-Nav mogas is found at 133 FBO's in the US. (<4%)

Summary of States With Mandatory Ethanol Laws

State	Type	Exceptions	Escape Clause	Pump Label	Public Use Airports With Mogas
1. Minnesota	E10	premium unleaded: airport, marina, mooring facility resort, motor sports racing, collector vehicle, off-road use (no guarantee of availability)	No Required	Not	9 of 154 (Air-Nav, <6%)
* Note: Minnesota may have the first mandatory E20 law in the US.					
2. Hawaii	E10	premium unleaded: aviation, marina, small gasoline-driven tools.	Yes 1% of higer	Required	0 of 14 (Air-Nav)
3. Missouri	E10	aviation premium gasoline marinas (no guarantee of availability)	Yes Required	Not	4 of 130 (Air-Nav, 3%)
4. Oregon	E10	Originally NONE SB-1079: aviation, marine antique cars, small engines, certain off road vehicles (No guarantee of availability)	No	Required	1 of 97 (Air-Nav, 1%)
5. Montana	E10	Public or private racecourse, premium unleaded, aviation fuel, (No guarantee of availability)	Yes	Required	0 of 122 (Air-Nav)

* **Note:** Law that has **not** triggered. (Probably never will)

State	Type	Exceptions	Escape Clause	Pump Label	Public Use Airports With Mogas
6. Washington	2% Volumetric	Aviation	No	Required	2 of 136 (Air-Nav <1.5%)
					* Note: This law has been completely overtaken by EISA 2007.
7. Florida	E10	Aircraft, marine collector vehicles off road vehicles motorcycles, small engines (No guarantee of availability)	Yes	Required	2 of 127 (Air-Nav, <2%)
					* Note: Effective date: December 31, 2010 (Not in effect yet) The question is, if the law isn't effective yet, do the exceptions apply? There is already a class action lawsuit in the marine industry in Florida for widespread boat damage.
8. Louisiana	2% Volumetric	Aviation	Sort of Resolution > 1%	Required	2 of 75 (Air-Nav, < 3%)
					* Note: Law has not triggered. * Note: This law has been completely overtaken by EISA 2007.

States Without Pump Label Laws (A Hazard to Public Safety)

California *

District of Columbia

Indiana

Kansas

Kentucky

Maryland

Michigan

Minnesota

Missouri

Nevada

New Hampshire?

New Jersey

North Carolina (Had a law that expired 1 July 2009)

Ohio

Source: http://www.fuel-testers.com/state_guide_ethanol_laws.html

* California is erroneously left out of the list in the above source.

This list is pertinent to the [article in the May/June FAAST](#) entitled "Why Does My Airplane Smell Like It Has Been Drinking". If you self-fuel your airplane from a local service station in one of the above listed states, make sure you test your fuel. Unfortunately the FAA article did not accurately explain why ethanol is spreading into every state in the country. The next section will explain why.

Federal RFS Mandate & The "Blending Wall"

H.R. 6
(2007)

a.k.a.
Energy Independence And Security Act of 2007

- [EISA 2007](#) .pdf is 310 pages long.
- Has many sections other than RFS.
- RFS is Section 201 - 251, pp. 28 - 58.
- No blending ratio is mentioned in the Act. EISA 2007 is NOT a mandatory E10 law. It is clear from the production quotas shown below that this law is designed to boost E85 production. In fact all of the tax incentives are for the production and distribution of E85 and for the production of Flex-Fuel vehicles. E85 can only be used in a Flex-Fuel vehicle. Federal law prohibits the use of more than 10% ethanol blended fuel (E10) in non flex-fuel vehicles.
- Section 202 defines the Renewable Fuel Standard by production quotas hard coded in the Act:

(2) APPLICABLE VOLUMES OF RENEWABLE FUEL.—Subparagraph

(B) is amended to read as follows:

“(B) APPLICABLE VOLUMES.—

“(i) CALENDAR YEARS AFTER 2005.—

“(l) RENEWABLE FUEL.—For the purpose of subparagraph (A), the applicable volume of renewable fuel for the calendar years 2006 through 2022 shall be determined in accordance with the following table:

“Calendar year:	Applicable volume of renewable fuel (in billions of gallons):	
...		
2009	11.1	
2010	12.95	
2011	13.95 --	
2012	15.2	 - Blend Wall
2013	16.55 --	years
2014	18.15	
2015	20.5	
2016	22.25	
2017	24.0	
2018	26.0	
2019	28.0	
2020	30.0	
2021	33.0	
2022	36.0	

The "Blending Wall"

- **US auto fuel production in 2009 is projected to be 136 billion gallons and isn't growing.**
- **Between 2011 and 2012 the ethanol production quota of EISA 2007 will take all gasoline production E10, - E85 which is not growing as rapidly as Congress had hoped.**
- **Because of the "Blending Wall" the ethanol lobby has asked the EPA to grant a waiver raising the blending limit for ethanol blended gasoline to 15% (E15) for non flex-fuel cars.**

BOB And The Disappearance Of Mogas As We Know It

- BOB means: "Blendstock for Oxygenate Blending"
- BOB is coming to all of the distribution terminals for making E10:

This is the 12 February 2009 Public testimony by Greg Hannon, representing Western States Petroleum Association (WSPA) on HB-1903, a bill to require the availability of ethanol free gasoline of at least 87 AKI at every rack in the state of Washington.

" ... any ethanol free product at the terminal is a before ethanol blend or BOB. Regular BOB is 85.5 octane and when mixed with ethanol is then sold as 87 octane regular. The sub premium BOB is 88 and when mixed with ethanol is 91. This means that for regular gasoline without ethanol there is not the conventional regular gasoline octane available at that point, typically at the terminals."

- BOB is **NOT** gasoline as we know it.

E15 waiver comment by the Director of the Division of Air Resources, New York State Department of Environmental Conservation:

"E10 is not simply ethanol added to finished gasoline. Since most gasoline at retail contains ethanol, the industry factors the addition of ethanol into the formulation of the petroleum-based portion of the final blend. The chemical properties of ethanol and its dilution impact allow refiners to produce a petroleum-based blendstock which when combined with a specified amount of ethanol (or other oxygenate) results in a final blend with the **desired legal and market properties**. The petroleum-based blendstock, in most cases, **would not qualify as gasoline or be legal to sell as gasoline**. For RFG this blendstock is RBOB. For conventional gasoline it is CBOB, and for California RFG it is CaRBOB."

From: [EPA-HQ-OAR-2009-0211-2063.2.pdf](#)

Details of State Mandatory Ethanol Laws

1. **Minnesota:** First **implemented** mandatory E10 Law in the US

239.791, Minnesota Statutes, 2007 (Latest version)

[https://www.revisor.leg.state.mn.us/bin/getpub.php?](https://www.revisor.leg.state.mn.us/bin/getpub.php?pubtype=STAT_CHAP_SEC&year=2007§ion=239.791&keyword_type=all&keyword=10%2Bethanol)

[pubtype=STAT_CHAP_SEC&year=2007§ion=239.791&keyword_type=all&keyword=10%2Bethanol](https://www.revisor.leg.state.mn.us/bin/getpub.php?pubtype=STAT_CHAP_SEC&year=2007§ion=239.791&keyword_type=all&keyword=10%2Bethanol)

Exceptions:

Subd. 10. **Exemption for airport, marina, mooring facility, and resort.** A person responsible for the product may offer for sale, sell, or dispense at an airport, marina, mooring facility, or resort, for use in airplanes or for purposes listed under subdivision 12, paragraph (a), gasoline that is not oxygenated in accordance with subdivision 1 if the gasoline is unleaded premium grade as defined in section [239.751, subdivision 4](#).

Subd. 11. **Exemption for motor sports racing.** A person responsible for the product may offer for sale, sell, or dispense at a public or private racecourse, gasoline that is not oxygenated in accordance with subdivision 1 if the gasoline is intended to be used exclusively as a fuel for off-highway motor sports racing events.

Subd. 12. **Exemption for collector vehicle and off-road use.** (a) A person responsible for the product may offer for sale, sell, or dispense at a retail gasoline station for use in collector vehicles or vehicles eligible to be licensed as collector vehicles, off-road vehicles, motorcycles, boats, snowmobiles, or small engines, gasoline that is not oxygenated in accordance with subdivision 1 if the person meets the conditions in paragraphs (b) to (e). If the nonoxygenated gasoline is for use in a small engine, it must be dispensed into a can with a capacity of six or fewer gallons.

(b) The nonoxygenated gasoline must be unleaded premium grade as defined in section [239.751, subdivision 4](#).

(c) No more than one storage tank on the premises of the retail gasoline station may be used for storage of the nonoxygenated gasoline offered for sale, sold, or dispensed by the station.

(d) The pump stands must be posted with a permanent notice stating:

"NONOXYGENATED GASOLINE. FOR USE IN COLLECTOR VEHICLES OR VEHICLES ELIGIBLE TO BE LICENSED AS COLLECTOR VEHICLES, OFF-ROAD VEHICLES, MOTORCYCLES, BOATS, SNOWMOBILES, OR SMALL ENGINES ONLY."

This notice must be posted at least two feet above the ground. A retail gasoline station that sells nonoxygenated premium gasoline as defined in section [239.791, subdivision 15](#) must register every two years with the director, or an entity appointed by the director, on forms approved by the director, the total amount of nonoxygenated premium gasoline sold annually.

No guarantee of availability of ethanol free gasoline, everything is "... may offer for sale ...".

Escape Clause: None

Pump Labeling: **Not Required**

Minnesota may have the first mandatory E20 law in the US:

Subd. 1a. **Minimum ethanol content required.** (a) Except as provided in subdivisions 10

to 14, on August 30, 2013, and thereafter, a person responsible for the product shall ensure that all gasoline sold or offered for sale in Minnesota must contain at least 20 percent denatured ethanol by volume.

(b) For purposes of enforcing the minimum ethanol requirement of paragraph (a), a gasoline/ethanol blend will be construed to be in compliance if the ethanol content, exclusive of denaturants and permitted contaminants, comprises not less than 18.4 percent by volume and not more than 20 percent by volume of the blend as determined by an appropriate United States Environmental Protection Agency or American Society of Testing Materials standard method of analysis of alcohol content in motor fuels.

(c) No motor fuel shall be deemed to be a defective product by virtue of the fact that the motor fuel is formulated or blended pursuant to the requirements of paragraph (a) under any theory of liability except for simple or willful negligence or fraud. This paragraph does not preclude an action for negligent, fraudulent, or willful acts. This paragraph does not affect a person whose liability arises under chapter 115, water pollution control; 115A, waste management; 115B, environmental response and liability; 115C, leaking underground storage tanks; or 299J, pipeline safety; under public nuisance law for damage to the environment or the public health; under any other environmental or public health law; or under any environmental or public health ordinance or program of a municipality as defined in section [466.01](#).

(d) This subdivision expires on December 31, 2010, if by that date:

(1) the commissioner of agriculture certifies and publishes the certification in the State Register that at least 20 percent of the volume of gasoline sold in the state is denatured ethanol; or (2) federal approval has not been granted for the use of E20 as gasoline. The United States Environmental Protection Agency's failure to act on an application shall not be deemed approval of the use of E20, or a waiver under section 211(f)(4) of the Clean Air Act, United States Code, title 42, section 7545, subsection (f), paragraph (4).

Public airports with mogas: Albert Lea Municipal Airport (KAEL)
Anoka County-Blaine Airport (KANE)
South St Paul Municipal Airport (KSGS)
Stanton Airfield (KSYN)
Wipline Airport (35MN)
Moberg Air Base Airpot (MN13)
Moberg Air Base Seaplane Base (96M)
Wadena Municipal Airport (KADC)
Richard B Helgeson Airport (KTWM)
(154 Public use airports according to Air-Nav, <6%)

2. **Hawaii:** Mandatory E10 Law

I'm unable to find the original text of legislation dating back to the early 1990s, but it was a mandatory E10 Law with an exemption of 15% of the premium unleaded gasoline, which was supposed to be available for marine and aviation use. Didn't work out that way. All of the gasoline was taken E10 except for the gasoline delivered to Lanai, which was ethanol free and accounted for the entire 15% exemption. This caused havoc in their marine industry and public safety. Wasn't implemented until governor decree in 2006. H.B. No. 791 H.D. 1, 2007
http://www.capitol.hawaii.gov/session2007/bills/HB791_HD1_.htm

Effective Date: April 2006

Exceptions: Premium gasoline so it is available for marine industry, aviation
and small gasoline-driven tools.

Escape Clause: "The rule allows for an exemption if there are not sufficient quantities of ethanol or if it is not competitively priced with conventional gasoline."

Pump Labeling: Required if ethanol content 1% or higher.

Public airports with mogas: None
(14 Public use airports according to Air-Nav)

3. **Missouri:** Mandatory E10 Law
HOUSE BILL NOS. 1270 & 1027, 2006
<http://www.house.missouri.gov/content.aspx?info=/bills061/biltxt/truly/HB1270T.HTM>
<http://www.sos.mo.gov/adrules/csr/current/2csr/2c110-3.pdf>

Effective Date: 1 January 2008

Exceptions:

(G) The following shall be exempt from the provisions of section 414.255, RSMo and this rule.

1. Aviation fuel and automotive gasoline used in aircraft;
2. Premium gasoline;
3. E75-E85 fuel ethanol;
4. Any specific exemptions declared by the United States Environmental Protection Agency;
5. Bulk transfers between terminals; and
6. Marinas that sell fuel exclusively to watercraft.

There is no guarantee that ethanol free gasoline must be made available despite these exceptions.

Escape Clause:

(3) Requirements and Exemptions.

(A) On and after January 1, 2008, all gasoline sold or offered for sale in Missouri at retail shall be fuel ethanol-blended gasoline, unless a distributor is unable to obtain fuel ethanol or fuel ethanol-blended gasoline from a position holder or supplier at the terminal at the same or lower price as unblended gasoline.

Price comparisons are to be made between position holders or suppliers at a particular terminal, not by price comparisons between terminals.

Pump Labeling: **Not Required**

Public airports with mogas: Midwest National Air Center Airport (KGPH)
Lee's Summit Municipal Airport (KLXT)
Tan Tar A Resort Seaplane Base (19T)
Mexico Memorial Airport (KMYJ)
(130 Public use airports according to Air-Nav, 3%)

4. Oregon:

HB-2210, 2007 Mandatory E10 Law

<http://www.leg.state.or.us/07reg/measure/hb2200.dir/hb2210.en.html>

Triggered on October, 2007, became completely effective September, 2008

Exceptions: **None**

Escape Clause: None

Pump Labeling: Required

Trigger: 40 Mgy ethanol production in state.

SB-1079, 2008 Made exceptions for aviation, marine, antique cars, small engines, etc. (but not classic cars nor motorcycles), no guarantee of availability of ethanol free gas. Only ethanol exception law that applies to both regular unleaded and premium unleaded.

<http://www.leg.state.or.us/08ss1/measure/sb1000.dir/sb1079.b.html>

HB-3497, 2009 Exception for premium unleaded for anyone, but still no guarantee of availability of ethanol free gas.

<http://www.leg.state.or.us/09reg/measure/hb3400.dir/hb3497.en.html>

Public airports with mogas: Lebanon State (S30)
(97 Public use airports according to Air-Nav, 1%)

5. **Montana:** Mandatory E10 Law that **has not triggered**. (Probably never will)
MCA 82-15-121, 2007
<http://data.opi.state.mt.us/bills/mca/82/15/82-15-121.htm>

Trigger: 40 Mgy ethanol production in state for 3 months.

Exceptions:

82-15-122. (*Temporary*) Exemptions from use of ethanol-blended gasoline.

(1) Gasoline that is not ethanol-blended as required in [82-15-121](#) may be sold or dispensed at a public or private racecourse if the gasoline is intended to be used exclusively as a fuel for off-highway motor sports racing events.

(2) Gasoline retailers and wholesale bulk distributors shall hold, store, import, transfer, and offer for sale or use nonethanol-blended unleaded premium grade gasoline with an antiknock index number of 91 or greater.

(3) Aviation fuel is not subject to an ethanol blending requirement. (*Terminates on occurrence of contingency--sec. 21, Ch. 452, L. 2005.*)

Escape Clause: If in-state production falls below 20 Mgy / year.

Pump Labeling: Required if ethanol content 1.5% or higher.

Public airports with mogas: None

(122 Public use airports according to Air-Nav)

6. Washington:

SB-6508, 2006 2% Volumetric Law

<http://www.leg.wa.gov/pub/billinfo/2005-06/Pdf/Bills/Session%20Law%202006/6508-S.sl.pdf>

Effective date: 1 December 2008

Exceptions: Aviation only, no guarantee of availability of ethanol free gas.

Escape clause: None

Pump Labeling: Required

(This law has been completely overtaken by EISA 2007.)

Public airports with mogas: Pullman / Moscow Regional Airport (KPUW)
Oak Harbor (KOKH)
(136 Public use airports according to Air-Nav, <1.5%)

7. Florida:

HB 7135, 2008 Mandatory E10 law

<http://www.flsenate.gov/data/session/2008/House/bills/billtext/pdf/h713503er.pdf>

Effective date:

6158 (2) FUEL STANDARD.--Beginning December 31, 2010, all
6159 gasoline sold or offered for sale in Florida by a terminal
6160 supplier, importer, blender, or wholesaler shall be blended
6161 gasoline.

Exceptions:

6162 (3) EXEMPTIONS.--The requirements of this act do not apply
6163 to the following:
6164 (a) Fuel used in aircraft.
6165 (b) Fuel sold for use in boats and similar watercraft.
6166 (c) Fuel sold to a blender.
6167 (d) Fuel sold for use in collector vehicles or vehicles
6168 eligible to be licensed as collector vehicles, off-road
6169 vehicles, motorcycles, or small engines.

The question is, if the law isn't effective yet, do the exceptions apply? There is already a class action lawsuit in the marine industry in Florida for widespread boat damage.

No guarantee of availability of ethanol free gas for the exceptions.

Escape clause:

6194 526.204 Waivers and suspensions.--
6195 (1) If a terminal supplier, importer, blender, or
6196 wholesaler is unable to obtain fuel ethanol or blended
gasoline
6197 at the same or lower price as unblended gasoline, then the
sale
6198 or delivery of unblended gasoline by the terminal supplier,
6199 importer, blender, or wholesaler shall not be deemed a
violation
6200 of this act.

Pump Labeling: Required

Public airports with mogas: Winter Haven (KGIF)
Indiantown Airport (X58)
(127 Public use airports according to Air-Nav, <2%)

8. Louisiana:

House Bill No. 685, 2006 2% Volumetric Law

<http://www.legis.state.la.us/billdata/streamdocument.asp?did=399857>

Trigger: 50 Mgy of ethanol production in state. **(Has not triggered.)**

Exceptions: Aviation fuels.

Escape clause: HR No. 94, 2006 This is only a resolution urging the Department of Agriculture and Forestry not to implement the minimum ethanol requirements if the requirements will raise the price of gasoline by more than two cents per gallon.

Pump Labeling: Required if ethanol content 1% or higher.

Public airports with mogas: Pineville Municipal Airport (2L0)
Eunice Airport (4R7)
(75 Public use airports according to Air-Nav, <3%)