

## **Ethanol testing**

This additional document must be regarded and used as a base line when ever a vehicle is diagnosed with these symptoms:

1. Hard starting
2. Rough running at most temperatures especially when cold
3. Cooler than normal engine temperatures
4. Misfire faults
5. Emissions related component damage
6. Lack of performance
7. Injector pulse width wider than normal

The technician may encounter the misfire faults without finding any defective components, or find other emissions component damage.

Be aware of Ethanol content greater than 10%. If the shop does encounter a greater value, proper diagnosis is not possible. This issue must be addressed if suspect and your Province or State offers Ethanol as an additive to blend into fuels. The provided document should be used as a guide and become a policy because of the quality of the fuels sold today. BMW offers this simple tool with instructions on its use.

The other way to obtain a similar device is through a pharmacy or similar business that offers these plastic syringes. Look for the 12 ml size. The syringe is reusable and the integrity of the rubber can be maintained if it is cleaned with NO SOLVENTS.



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Instructions are at the last page

# So what does this mean?

For the shop owner and technician, this simple test should simplify the answer to at least one question. What is the Ethanol content and is that the root cause of the driveability issue?

It is field experience that has been proven in recent years, to have exposed a significant increase in various driveability issues due to wide and seemingly unknown variations in fuel quality. Ethanol is offered though various different manufactures across Canada and U.S.

It is the percentage of alcohol with a high degree of ethanol and active detergents that have been the main contributors for the above noted issues.

Now there is a way to test the ethanol content but be aware, not every service station purchases the fuel from the same supplier every time. You and your customer will never know from each tank load.

## What is Ethanol and what are the effects?

Ethanol is a liquid alcohol made of oxygen, hydrogen and carbon and is obtained from the fermentation of sugar or converted starch contained in grains and other agricultural or agri-forest feedstocks. In Canada and the US, ethanol is presently made principally from corn and wheat.

Ethanol is combined with gasoline, and a primary function is to reduce engine knock. In combustion, ethanol provides less energy than gasoline, resulting in reduced fuel economy. When ethanol burns inside the engine, it tends to form a weaker mixture that may cause misfire, rough idle and cold start issues in your vehicle. In addition, engine components may deteriorate overtime when in contact with ethanol.

Pure ethanol is tasteless and odorless. Pure or highly concentrated ethanol may bring about permanent damage to living tissue on contact. It also cools unbroken skin because of its rapid evaporation. Ethanol is also a known depressant and is considered to be a drug. Death from ethyl alcohol poisoning is possible when the blood alcohol level reaches at least 0.4%. The use of ethanol is prohibited if the person is also barbiturates, benzodiazepines, narcotics, or phenothiazines. Ethanol is not a known carcinogen, but can aggravate existing cancer conditions.

## Use common sense when applying this test.

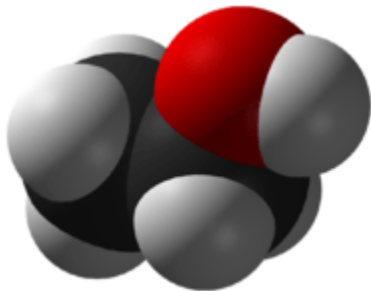
Use protective products, be well ventilated and do not test near any open flames. Make sure that a class B fire extinguisher is accessible.

1. Prepare a clean container
2. Draw 150 ml of fuel and add it to the clean container
3. Draw approximately 6 ml of water into the syringe
4. Invert the syringe and “push” the water out until there is 3 ml remaining
5. Draw fuel with the water to the 12 ml mark
6. Cap the syringe and shake it vigorously (relieve any pressure buildup)
7. Allow the syringe to “stand” upright for one minute

Notice the separation. If there is alcohol present, it will separate from the fuel and be dissolved into the water. Notice the boundary of the two liquids. Use the provided table to find the current percentage of ethanol in the fuel.

Boundary Line	% Alcohol	Boundary Line	% Alcohol
9.0 cc	0 %	5.0 cc	45 %
8.6 cc	5 %	4.5 cc	55 %
8.1 cc	10 %	4.2 cc	60 %
7.7 cc	15 %	3.6 cc	65 %
7.2 cc	20 %	3.2 cc	70 %
6.8 cc	25 %	2.7 cc	75 %
6.3 cc	30 %	2.3 cc	80 %
5.9 cc	35 %	1.8 cc	85 %
5.4 cc	40 %	1.4 cc	90 %

147.867648 ml = 5 US fluid ounces  
12 ml = 12cc



Ethanol is also known as **EtOH**, using the common organic chemistry notation of representing the ethyl group (C<sub>2</sub>H<sub>5</sub>) with **Et**.

A standard EFI gasoline engine can typically only tolerate up to 10% ethanol and 90% gasoline. Higher ethanol ratios require either larger-volume fuel injectors or an increase in fuel rail pressure to deliver the greater liquid volume needed to equal the energy content of pure gasoline.

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