

Bio fuels in the Marina and Itai

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Apart from concerns about the gradual changes in fuel since the introduction of unleaded, there has been some discussion as to whether the increasing levels of Ethanol are also responsible for an apparent increase in fuel pump failures.

Burlen Fuels, the owners of SU, already have parts for fuel pumps and carburettors that are Ethanol friendly.

This article includes extracts from Federation of British Historic Vehicle Clubs (FBHVC) website; their full article can be viewed at <http://fbhvc.co.uk/bio-fuels/>, the club is grateful for permission to use their information in producing this article.

The design of the Marina and Itai dates from a period when regular pump fuel, was a mixture of petrol, benzene, lead and a bunch of other additives, the car was designed to work with those additives, resulting in the use of specific plastics, rubbers and metals that resisted the corrosive effects of pump petrol. Over the years we have seen government and EU initiatives changing the cocktail of pump petrol, to reduce harmful emissions in an attempt to hit various 'green' targets. The latest EU directive has been to increase the uptake of renewable fuels throughout Europe as part of the campaign to slow climate change, renewable fuels include adding bio-ethanol to pump petrol, first up to 5% and the from 2013 up to 10% by volume.

Many petrol suppliers took advantage of the up to 5% bio-ethanol content quite quickly. At concentrations of less than 5% there was, and still is, no obligation for the petrol pumps to be labelled at point of sale. Ethanol is hygroscopic (absorbs water) so manufacturers should have been adding corrosion inhibitors to it before blending with petrol. Ethanol and water together degrade to form a corrosive acid. Ethanol also changes the volatility of the fuel, which possibly provides a slight benefit to cold starting, but may increase vapour lock and hot start problems. Corrosion could be a problem if inhibitors are not used. From 2008 onwards FBHVC began to receive letters about the effects of ethanol in petrol.

Permitted ethanol content in petrol to rise from 5% to 10% in 2013

There will be a requirement to continue to offer fuels with a limit of 5% bio-ethanol until 2013. (It is assumed that after this date under 5% bio-ethanol fuels will be harder to find and may disappear in the same way that leaded petrol has).

Classic car owners, including Marina and Itai owners have reported a number of difficulties, most notably in respect of leaking petrol tanks and blocked filters and carburettors. Some types of sealing compounds react adversely to the presence of ethanol in the petrol, resulting in sticky deposits being washed through into the fuel system causing blockages. There are sealing compounds on the market which are compatible with petrol containing ethanol, it should be possible to re-seal an affected tank with a compatible product, after thorough cleaning to remove all traces of the non-compatible material.

The current level of volatility (e.g. 95 RON) in petrol will not change, but will be adapted (downwards) to accommodate the increased volatility caused by adding ethanol to the mix. In theory, this should mean that drivers will not notice any difference in performance with fuels containing ethanol, but this may not be a safe conclusion.

How will this affect my car?

Marina and Itai owners have already reported vapour-lock problems, where the volatile elements of the fuel boil off, causing vapour blockages in fuel lines and carburettors (including me). Some who have not previously suffered from problems previously may find problems in the future as bio-ethanol levels increase. The design of the Marina and Itai engines doesn't help us, with the inlet and exhaust on the same side of the engine, routing the fuel supply close to the exhaust system - heating the fuel up in the process. Various club members have resorted to shielding the fuel lines and carburettors from heat, with insulation around the exhaust manifold or the carb and/or rerouting fuel lines away from heat sources (exhaust manifolds and exhaust systems).

As a comment on this, if you get the chance to checkout a Marina or Itai parts catalogue, you'll see that cars exported to warm weather countries had extra heat shields between carbs and exhaust manifolds to overcome the excess heat problem.

What are the government doing?

The Department for Trade (DfT) has said in their consultation document that, "*cars with carburettors can be expected to disappear quietly over the next few years, so that by 2013 there will no longer be a problem*". The FBHVC has been representing the interests of the classic car movement pointing out the problems that we are already experiencing and pointing out the ridiculousness of the DfT's assumptions.

An investigation was commissioned by the DfT, and undertaken by the Fuels and Lubricants Centre, QinetiQ, based in Farnborough, to investigate the effects of petrol containing up to 10% ethanol. Specifically this investigated vehicle fuel system material compatibility and carburettor icing as well as other aspects such as drivability issues.

Report Recommendations

The report found that:

- The majority of vehicles 10 years old or older will not be compatible with E10 due to fuel system material incompatibility issues.
- Carburettor vehicles and powered two wheelers will suffer problems due to material incompatibility, corrosion, and driveability issues.
- Field experience has demonstrated that vehicles and petrol fuelled equipment fitted with glass fibre fuel tanks may suffer catastrophic failure due to the incompatibility of the glass fibre resin with petrol ethanol blends.
- Based on vehicle age, approximately 8.6 million vehicles will be unable to run on E10... Based on average vehicle life of 13 years very approximately half these vehicles will still be in use when the proposed phase out of E5 takes place in 2013.

The report also has a recommendations section which makes interesting reading:

- Vehicles ten years old or older, carburettored vehicles (including powered two wheelers) and first generation direct spark ignition vehicles should not be fuelled on E10 unless the manufacturer can state the vehicles are compatible with E10.
- E5 should not be phased out in 2013, its widespread availability should continue for the foreseeable future.
- Consideration should be given to maintaining a specification for E0 (no ethanol) fuel for historic and vintage vehicles.

The report prompted the DfT to issue a statement that E5 is likely to be around until at least 2015, but this only puts off the inevitable introduction of E10 (and phasing out of E5). They also responded positively to the suggestion of provision of low ethanol (whatever that is) fuel for historic vehicles, however there were no firm plans here so don't bank on it.

What have the FBHVC been doing to help?

Expecting the inevitable introduction of E10 fuel, the FBHVC has commissioned research on;

- What materials are and are not affected by bio-ethanol fuel
- The effect of various additives that could help protect our cars.

Effects on tank sealing etc

Some metal alloys are not good with ethanol, which means that metals brazed together like some petrol tanks and/or their filler pipes and vents, may over time start to leak. Also the various seals used can also be corroded over time.

The obvious solution is to use a tank sealant. Any tank sealant manufactured in USA should not be affected by ethanol (e.g. the Frost brand) as ethanol has been in USA petrol for some time. To be sure of avoiding problems members should check that any such product does indicate it can be used with fuel containing ethanol. Many seals have a 'memory' and may leak when introduced to ethanol when they are old. The same type of seal may not leak when new.

Particles resulting from the breakdown of tank sealants and moving through the fuel system may also cause problems, although this would be for a finite time (until it has all been washed through). A solvent is available to remove existing tank sealant from steel tanks (but not aluminium or GRP), Epoxy Remover made by Tank Cure and supplied by LB Services.

However the active ingredient in this product is methylene chloride, aka paint stripper, which it is feared may be the subject of a proposed ban itself.

Additives for use with bio-fuels (Info updated 20/04/2012)

The problem is one of fuel filter blockage, injector fouling etc., there are products which have been designed to be added to the tank when re-fuelling to prevent degradation in storage in the fuel tank (corrosion inhibitors, stability improvers and biocidal products). One bottle should provide a season's protection – although this is obviously dependent on the vehicle and amount of usage.

The FBHVC instigated a test programme, with those products passing the test being allowed to carry the FBHVC logo on the packaging. The biofuel test was purely a laboratory test for corrosion. The test materials used included coated steels such as those extensively used to make petrol tanks, plus copper, zinc, and brass, together with a number of plastics (seals and gaskets) and fibre-glass composite materials. The metallic materials used were judged to be incompatible with ethanol because of potential corrosion by degraded ethanol in fuel. The additives tested are designed to prevent corrosion by protecting the metals from the degraded ethanol.

As yet there are no known additives to combat incompatibility between ethanol in petrol and plastic or composite materials. Where problems occur with gasket and seal materials, the only realistic course of action is to replace incompatible materials with suitable alternatives. At least one carburettor supplier can now supply components which incorporate materials compatible with ethanol in petrol. So if you are rebuilding your carb, check with the supplier for ethanol compatibility.

The tests carried out an accelerated aging process in which one week of the aging process is equivalent to one month in normal storage, so the 13 week accelerated aging process used in the test method is equivalent to one year in normal storage. Corrosion tests were carried out every two weeks to assess the effects of the aging process on the corrosiveness of the fuel. The results of the tests showed additive treated fuels continued to provide a very high standard of protection right to the end of the test.

Some of the products tested combined corrosion inhibitor additive with protection against valve seat recession, so that only one additive bottle will be necessary when it comes to fill up.

The stability additives that passed the test are:

- VSPe Power Plus (Millers Oils)
- VSPe (Millers Oils)
- EPS (Millers Oils)
- Ethomix (Frost A R T Ltd)
- Ethanolmate (Flexolite)

These all received an 'A' rating in the research which enables all these products carry an endorsement from the FBHVC, so look out for the FBHVC logo and the words: 'endorsed by the FBHVC as a fuel additive for protection against corrosion in metals'.

Recommendations for Materials Considered for Use in Ethanol and Ethanol/Gasoline Blend Applications

This list is not comprehensive and the quality of the material must be appropriate for the intended application.

Material	Recommended	Not Recommended
Metals	<ul style="list-style-type: none"> • Carbon steel (with post-weld heat treatment of carbon steel piping and internal lining of carbon steel tanks) • Stainless steel • Bronze • Aluminium 	<ul style="list-style-type: none"> • Zinc and galvanised materials • Brass • Copper • Lead/tin coated steel • Aluminium (may be an issue for E100 – pure ethanol)
Elastomers	<ul style="list-style-type: none"> • Buna-N (hoses & gaskets) • Fluorel • Fluorosilicone • Neoprene (hoses & gaskets) • Polysulfide rubber • Viton 	<ul style="list-style-type: none"> • Buna-N (seals only) • Neoprene (seals only) • Urethane rubber • Acrylonitrile-butadiene hoses • Polybutene terephthalate
Polymers	<ul style="list-style-type: none"> • Acetal • Polypropylene • Polyethylene • Teflon • Fibreglass-reinforced plastic 	<ul style="list-style-type: none"> • Polyurethane • Polymers containing alcohol groups (such as alcohol based pipe dope) • Nylon 66 • Fibreglass-reinforced polyester and epoxy resins • Shellac
Others	<ul style="list-style-type: none"> • Paper • Leather 	<ul style="list-style-type: none"> • Cork

With E10 on the way this is an area that owners will have to keep a close eye on in the future.

Happy Marina-ing

Chris Weedon