

BIODIESEL

Overview Including Response to Questions posed in Discussion Paper 6 - “Department of the Environment and Heritage”

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Introduction.

This report is an overview of technical issues that will impact on the manufacture and maintenance of Gilbarco Australia Limited products that will be required to operate with Biodiesel. It also lists the company responses to the specific questions put forward in the “Discussion paper 6” on 31st March 2003 by the Department of the Environment and Heritage.

The comments and opinions expressed in the report were compiled after consultation with Gilbarco affiliates in Europe and the USA, who have had some experience with Biodiesel, and with manufacturers of components used by Gilbarco in the supply and maintenance of equipment for the petroleum industry in Australia.

The extent to which Biodiesel will have an effect on all passed and future equipment will depend on the proportional blend used which in turn will depend on the, yet to be decided, Australian Standard for Biodiesel. In general a “B5” blend (5% Biodiesel and 95% petroleum Diesel) is considered as unlikely to have any noticeable effect on current equipment however blends greater than 5% will have varying degrees of impact. Notwithstanding this Gilbarco can, if required, produce pumps and dispensers that would handle 100% biodiesel i.e. B100 type.

To date Gilbarco Inc. in the USA has not done a lot of research into the effects of biodiesel on Gilbarco pump components however the American government, in 2001, released a Handling and User guidelines document.

Gilbarco affiliates in Europe on the other hand have been using Biodiesel for a number of years and have gained some experience as a result. A review of the USA guidelines and reported experiences from Europe form the bases of the following summary of the likely impact on Gilbarco’s local products.

Effect on Pumping Equipment.

In the US most manufactures of diesel engines and components of diesel engines have formally stated that, providing that the biodiesel is manufactured to meet ASTM D 6751 quality standard the use of biodiesel up to B20 blend, will not void their warranties. However the World-Wide Fuel Charter (WWFC) states that based on technical information, it is strongly advised that biodiesel content be restricted to less than or at 5%. As a pure fuel or at higher ratio levels with diesel fuel, the vehicles need to be adapted to the fuel, and particular care is needed to avoid problems.

It is Gilbarco Australia's understanding that local Vehicle Manufactures, Vehicle Distributors, Parts Manufactures and industry bodies in general are supportive of B5 blends but not of higher blends and that blends up to B5 will not cause any significant effect on operability and will not void warranty.

The areas of locally supplied equipment that will require review and attention for different possible Biodiesel / Diesel blend ratios are:

Biodiesel blends up to B5:

- There are no areas of concern.

Biodiesel blends between B5 and B20:

- Hose;
 - Existing hoses may be affected, and possibly we will need to only use Elaflex Biodiesel hose. (More testing needed to confirm.)
- Paint for Panels;
 - Existing paintwork may be affected. Baked Enamel should be OK but other paints are affected by some biodiesel blends.
 - The recommendation is that we only using stainless steel or special paint based on acryl or epoxy for all parts that could come in contact with Bio-Diesel. (More testing needed to confirm.)
- Filters;
 - It is recommended that existing / in service pump & dispenser have filters fitted. This will be at an approximate cost of \$500 per pump.
 - Filter cartridges need to be change after circulation with biodiesel blend and before they are used to dispense biodiesel blend to the general public.

Biodiesel blends above B20:

- O-rings and diaphragms and seals;
 - Only use Viton. (Although the Blackmer fluorocarbon shaft seals seem to be OK in Europe and US.)
- Hose;
 - Only use Elaflex Biodiesel hose.

- Paint for Panels;
 - Baked Enamel should be OK but other paints are affected by some biodiesels.
 - The recommendation is that we only using stainless steel or special paint based on acryl or epoxy for all parts that could come in contact with Bio-Diesel.
- Filters;
 - It is recommended that existing / in service pump & dispenser have filters fitted if not already fitted.
 - Filter cartridges need to be change after circulation with biodiesel blend and before they are used to dispense biodiesel blend to the general public.

Reported Experiences with Pumping Equipment.

Following is information on the effects that biodiesel has had on Gilbarco equipment around the world, our supplier's equipment and on equipment Gilbarco Australia are agents for:

GILBARCO affiliates:

- Germany, (Alfons Harding)
 - We have been delivering pumps for use with Bio-Diesel for a couple of years. In principal we are using standard components in those pumps (like C+Meter, ZPA-pumping unit, Asco- or Bürkert valves...). However we have to take care that only Viton-seals are used - no NBR-seals.
 - We need to use special hoses for Bio-Diesel from Elaflex.
 - We also have one Sk700 for Bio-Diesel installed for the last 8 month with the following configuration in the field: C+Meter, Lisk Digital Valve, and Blackmer pumping unit (with Fluorocarbon shaft seal). No problem so far.
 - At the moment we do have several types of Bio-diesel. Some are causing problems powder painted or wet painted parts. Therefore we are only using stainless steel or special paint based on acryl or epoxy for all parts that could come in touch with Bio-Diesel.

- USA, (Seify Nanaji).
 - Based on input from Salzkotten, Bio-Diesel used in Germany leaves a coating on the internal components that could cause performance problems with meters such as the Axial Flow Screw meter.
 - Copper and copper containing alloys (brass, bronze) can be a problem due to corrosion with long term exposure, or with long term storage.
 - The water to diesel interface is very corrosive. Most fuel tanks invariably get water that separates out. This can also promote algae and microbes growth.
 - Potential problems with algae and fungi and microbes growth. There are additives to treat this. First off this stuff may clog filters and any small flow passages (solenoid valve, piston meter, check valves, relive valves, etc). Secondly this stuff may be corrosive and have other damaging effects.
 - Depending on whether vegetable oils or animal fats were used, and the blend ratio with regular diesel, the fluid properties do vary a lot. Right now the specs are loose and many evaluation tests have not even been decided upon by groups like ASTM or others.
 - Bio-Diesel is more dense, about .86-.90 specific gravity. Regular diesel fuel is around .84. A viscosity comparison would be helpful if that info was available.

- At cold temps, expect Bio-Diesel to gel and potentially clog up more rapidly than typical diesel. This is already a problem with diesel in general. Diesel fuel is thinned in cold regions in the winter for proper flow for engine operation. However, with our dispensers above ground and exposed, we could have issues with metering or dispensing.
- Germany (Hans-Joachim Kruss)
 - I can confirm the information, which was given from Seify Nanaji.
 - In addition it is recommended by the Quality circle of Biodiesel in Germany to clean the tanks on site every 2-3 year.
 - Further, Biodiesel can clog the filters of the dispensers and the cars if the filters are previously used with normal diesel, due to residuals of the normal diesel. So it is also recommended to change the filters before the change to Bio diesel.

Component Manufacturers and Equipment Suppliers:

- ELAFLEX (Klaus Frost)
 - In Germany we have bio diesel since 1995. The information we can give you about our products is as follows:
 - Nozzle, Break couplings and Swivel are not affected by using biodiesel.
 - We have developed a special hose for bio diesel because the outer rubber of the normal hose is not resisted against the bio diesel. This bio diesel hose is available in 16 and 21 mm. As far as we can find out in this short time, this bio diesel hose will also fulfil the Australian Standard. We will check that out with Continental Rubber.
- PETROTECHNIK AUSTRALIA (Jim Craig)
 - UPP is compatible with the Biodiesel product. Therefore Biodiesel is covered under the terms & conditions of our standard warranty document.
- FE PETRO (Bill Otterson)
 - The typical blend of B20 has been used in the state of California since the late 1990s and Franklin Fueling have not heard of any issues with failures of their equipment.
- RED JACKET
 - No response.
- VEEDER-ROOT (Don Hala)
 - Not aware of any issues with Biodiesel.

Biodiesel – Specific questions.

The following are Gilbarco Australia Limited's responses to the questions raised on the different pages of the discussion paper as listed below.

Further to the specific questions Gilbarco makes the general comment that:

- ◆ Prior to a wide spread introduction of the use of biodiesel a controlled trial involving storage, handling and dispensing equipment should be conducted. Such a trial would need to be funded by either the Biodiesel industry or the government.
- ◆ It is also noted that existing equipment certification does not specifically include meteorologically approval for use with biodiesel. The metering and air separation characteristics of delivery and dispensing systems may need to be accessed. i.e higher viscosity.

Discussion Paper 6. – Specific questions.

Page 11.

- ◆ Comment 1. It is essential that a national fuel quality standard for biodiesel is developed and mandated. This must also be policed with appropriate penalties for non-compliance.
- ◆ Comment 2. The Australian standard should be as close as possible to the EU prEN 14214 & prEN 14213.

Page 13.

- ◆ The standard should only address characteristics and composition of biodiesel. Also storage, handling and testing parameters should be mandated.

Page 21.

- ◆ Item 4.8 – Storage for longer than 6 months will elevate Acid numbers which will increase fuel deposits and have the potential to damage pump seals and elastomers. The presence of water is also very undesirable so good housekeeping must be maintained. Therefore fuel should be turned around within the 6-month period and line filters should be changed at least every 2 years.

Page 23.

- ◆ B5 max preferred for existing equipment. Any increase in this blend ratio level will require user notification and possible upgrading of fuel storage and delivery systems.

Page 31.

- ◆ Phosphorous content should be kept below 1 ppm.

Page 32.

- ◆ Comment (a) As per the EU prEN 14214 & prEN 14213.

Page 33.

- ◆ Comment (a) As per the EU prEN 14214 & prEN 14213.

Page 34, 35, 36, 37 & 38.

- ◆ Comment (a) As per the EU prEN 14214 & prEN 14213.

Comments from page 39 to end of section six.

- ◆ All comments are as per the EU prEN 14214 & prEN 14213.

Page 63.

- ◆ Differences between Methanol and alcohol are not seen as a major issue for Gilbarco supplied equipment.
- ◆ From the point of minimising likely issues related to storage of the fuel it would seem that Methanol feedstock should be preferred over ethynyl products. This is based on the effects of glycerol concentration and water as stated on page 62 section 7.5.

Page 76.

- ◆ Comment (a). Current Gilbarco equipment is not designed for or covered by warranty for biodiesel. B5 blended biodiesel may be able to be used with minimal changes however testing will be required before standard warranty conditions could be considered to cover this fuel.
- ◆ Comment (b). To date Gilbarco Australia has no experience regarding negotiating specific warranty contracts with reference to biodiesel. Existing contracts exclude biodiesel.

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- ◆ Comment (a). The current storage and distribution equipment will handle a B5 blend but higher blends of biodiesel will require the storage and distribution equipment to be adapted to the fuel in the area of seals, diaphragms, hoses and filters; and changes to housekeeping will be required in the area of water entry.

There is also the potential issue of product leaking into the environment.

Even though biodiesel is much more biodegradable than petroleum diesel, if the biodiesel detrimentally affects an existing seal, gasket, hose, tank liner, etc. there could be a catastrophic leak resulting in environmental damage and a very expensive cleanup.

- ◆ Comment (b). With blends higher than B5 the end user should be made aware that their vehicles warranty may be voided.

The owner of the storage and distribution equipment should be made aware that the storage and distribution equipment warranty may also be made void as well as the potential environmental damage and cleanup costs should a leak occur.