



Fuel Filter Life and Diesel Fuel Contamination

Product: All diesel powered Toro products

July 15, 2007

Affected Units:

Models:

Serial Numbers:

ALL

ALL

Subject: Information pertaining to filter life and diesel fuel contamination.

Bulletin Type and Status: **Information Only: Final Release**

Situation: Important Information

Premature clogging of the filter is usually the first indication of problems with fuel quality or cleanliness. However, fuel quality and cleanliness is rarely considered when diagnosing a problem. Once a fuel filter problem occurs, customers assume there is a machine related failure.

The fuel filter has done its job if the filter clogs. The purpose of the filter is to stop contaminants from being introduced into sensitive precision fuel system components.

Fuel contamination is an everyday hazard. Many factors are involved, such as biological contamination, water / condensation and debris ingress. To ensure fuel system longevity, Toro fuel systems filter fuel to the highest standard recommended by the engine manufacturer. Clogged filters can lead to the perception of lesser performance when in reality the filter performs as designed.

Given all the factors discussed, our customers may be concerned and looking for a way to extend filter life.

Correction: The Filter Manufacturers Council has published Technical Service Bulletin 95-1R1 on the subject. This is a very good article. We recommend you read and refer to it whenever the topic of fuel filter life is discussed.

Refer to Toro Service Bulletin General 03-05. Although this bulletin refers to a biodiesel conversion, some of the kits described in the bulletin have the added advantage of larger filters and stronger fuel pumps. Installation of this kit can help extend fuel filter service intervals over the original filtration system.

Action Required: Monitor and Report

There is no action required. This information is forwarded for your benefit while addressing fuel-related customer concerns.

Safety Awareness: Follow reasonable and customary safety precautions

Attachments: Technical Service Bulletin 95-1R1, Filter Manufacturers Council

Parts: Requirements not specified.



Fuel Filter Life and Diesel Fuel Contamination

Warranty: Information only, not warrantable.

SRT Code: Not applicable.

Parts Retention: Not applicable.

Exempt Units: Not applicable.

Distribution: For Distributor and Customer Bulletin only.

Attached Customer Bulletin may be copied to customers with affected product or instruct customers to access Service Bulletins at www.toro.com.

References: Technical Service Bulletin 95-1R1, Filter Manufacturers Council
General 03-05, Toro Service Bulletin

Bulletin Routing									
	Svc Mgr	Technicians					Pts Mgr	Sls Mgr	WTY Mgr
Initials									



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Given all the factors discussed, maintenance technicians and supervisors are often looking for a way to extend filter life.

Information:

The following articles have been attached for additional information and reference:

Technical Service Bulletin 95-1R1, Filter Manufacturers Council

General 03-05, Toro Service Bulletin

Although Service Bulletin General 03-05 refers to a biodiesel conversion, the kits described in the bulletin have the added advantage of larger filters and stronger fuel pumps. Installation of this kit can help extend fuel filter service intervals over the original filtration system. Kits should only be installed on recommended machines. The addition of available kits is considered a maintenance accessory and is at the option and expense of the owner.

Diesel Fuel Contamination and Fuel Filter Plugging

Fuel contamination is a fact of life. Preventing problems and equipment damage associated with contaminated fuel is primarily the responsibility of the end user. These responsibilities include the proper and timely replacement and servicing of the filters; selection of the fuel source, grade, and blend; and use of heaters, separators, and additives as required.

Fuel filters capture unwanted contaminants from the fuel. Left unchecked, these contaminants may cause serious and expensive damage to many system components including pumps, lines, and injectors. Fuel contaminants have many sources. Most sources are external to the fuel system itself, that is, most contaminants come with the fuel that is delivered to the fuel tank. As it comes from the refinery, diesel fuel is clean. Contaminants in diesel fuel are generally introduced in fuel storage systems through mixing, transferring, and storage.

Fuel filters naturally build resistance to the flow of fuel as they go about their job of removing unwanted contaminants from the fuel system. Fuel systems, unlike lube systems, do not have the opportunity for bypass flow and consequently, as flow through the fuel filter decreases, decreased performance of the fuel system and the engine will result. Fuel filters will become restricted or plugged over their life -- this is an expected result. A thorough investigation of the filter and the fuel source should be conducted anytime a fuel filter is suspected of delivering less than its expected life.

Some common contaminants found in today's fuels might include:

Water -- is the greatest concern because it is the most common form of contaminant. Water may be introduced into the fuel supply during fueling when warm, moisture laden air condenses on the cold metal walls of fuel storage tanks or from poor housekeeping practices. The effects of water in diesel fuel can be serious. Water can cause a tip to blow off an injector, or reduce the lubricity of the fuel which can cause seizure of close tolerance assemblies such as plungers.

Once in the system, water can be removed by using in-line water separating filters or devices. Long term prevention of problems associated with water in fuel is best accomplished by obtaining fuel from reputable suppliers capable of providing high quality fuel. Further, fuel tanks should be kept well filled to prevent condensation, and fuel should be drawn from the top of a storage tank if possible, as water is heavier than diesel fuel and tends to settle to the bottom of storage tanks. Tanks can also be kept free of water with continuous off-line or "kidney-loop" filtration/separation.

Fungus and Bacteria -- These micro-organisms live in water and feed on the hydrocarbons found in fuel. Called Humbugs for short, these active and multiplying colonies will spread throughout a fuel system and quickly plug a fuel filter. The fuel filter will have a slime coating over the surface of the media, dramatically reducing the service life of the filter. Bacteria may be any color, but is usually black, green or brown. Draining the system will reduce microbial activity, but will not eliminate it. The only way to eliminate microbial growth once it has started is to clean and treat the system with a biocide.

Wax -- while desirable as a source of energy in fuel, control in cold weather operation is needed. Wax crystals form as a result of cold temperature precipitation of paraffin. Temperatures below a fuel's cloud point will result in wax precipitation and filter plugging. To prevent plugged filters due to wax formation, the cloud point of fuel must be at least +12° Celsius (+22°F) below the lowest outside temperature. Fuel suppliers blend diesel fuel based on local anticipated cold weather conditions. Particular attention should be given to diesel fuel purchased outside your local area. For example, fuel purchased in the West or South may not be suitable for operating conditions in the Midwest or North.

Asphaltenes -- are components of asphalt that are generally insoluble and are generally present to some extent in all diesel fuel. These black, tarry asphaltenes are hard and brittle, and are made up of long molecules. Fuel with a high percentage of asphaltenes will drastically shorten the life of a fuel filter.

Sediment and other solids -- often get into fuel tanks and cause problems. Most sediment can be removed by settling or filtration. Fuel filters designed for specific applications will remove these harmful contaminants before they cause further system wear and damage.

In no case should a more "open" filter be substituted to fix a perceived problem with premature plugging. Plugged filters will develop as the filter works to remove unwanted contaminants from the fuel system. Filter manufacturers design fuel filters to provide the level of filtration protection specified or required by the OEM manufacturer. Substitution of a more "open" filter may prolong a filter's life before plugging occurs, but it will also allow unwanted contaminants to pass downstream which will eventually impact the life of other, more expensive fuel system components.

Clean fuel is essential for efficient, full-power engine performance. Remember, newly refined fuel is clean. Between the time the fuel leaves the refinery and enters the engine's fuel tanks, it should be handled carefully to avoid possible contamination that can prematurely plug fuel filters and cause even further, more serious damage within the engine's fuel system.

For additional information, contact:

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