

Diesel Fuel Storage Guide

Lifespan:

Proper storage conditions are essential for keeping diesel fuel in usable condition.

- Diesel fuel's lifespan is 6-12 months in environments higher than 30°C (86°F)
- Diesel's lifespan can last longer than 12 months if stored at an ambient of 20°C (68°F)

As diesel gets older and reacts with oxygen in the atmosphere, sediment and gum form in the fuel. Fine sediment and gum will block fuel filters, leading to fuel starvation, which then stops the engine. Engine stopping will require frequent filter changes to keep the filter going, which costs time and money. Additionally, gums and sediments do not burn well and can lead to carbon and soot deposits on injectors and other combustion surfaces in the engine.

Diesel fuel's expected lifespan is determined by the ASTM D2274 oxygen stability test. During the test, the fuel is stored in a 96°C (204.8°F) environment for 16 hours, which roughly corresponds to storage at 25°C (77°F) for one year. The test measures how much gum and sediment (also known as insolubles) are deposited during the 16-hour period. Acceptable test results must be less than 20mg/L of sediment and gum formed.

Accelerated Aging:

The following conditions accelerate diesel's aging process:

- Contact with zinc, copper, or metal alloys that contain zinc or copper. These metals react with diesel and form unstable compounds, which means there is higher potential for dangerous chemical reactions like explosions.
- The presence of water. Water permits growth of fungus and bacteria, whose natural byproducts can make the fuel unstable.
- Exposure to high temperatures.
- Exposure to dust and dirt which contain trace elements like copper and zinc, which will then destabilize the fuel.
- Fuel composition: some components naturally age faster than others.

Extending Storage Life:

The simplest way to prolong diesel's storage life is to avoid the above-mentioned conditions. Crucial measures to extend storage life include:

- Ensure that fuel does not contact surfaces like brass, which contain zinc, copper, or compounds containing zinc and copper. If such contact is inevitable, a metal deactivator additive will help.
- Establish a regular fuel maintenance program to remove water and dirt from storage containers. Water and dirt removal also eliminates the chance for fungus to grow.
- Drain water from storage tanks weekly. If the tanks don't show a tendency to collect water, the frequency can be reduced, but should be done at least monthly.
- Keep tanks full to reduce space for water to condense; maintaining tanks half-full increases water buildup and promotes corrosion in the top half of the tank. Water usually enters the tank when the tank breathes. The water collection rate depends on local climate (i.e., humid locations will experience a faster water collection rate).
- Tanks should have a clearly-defined low point at which water that has collected is drained.
- Create a system wherein the main storage vessel's contents are filtered through a recirculating filter system. This system can be automatic and will reduce potential engine issues by removing gum and sediment. System filters should be checked at regular intervals and changed when necessary.
- Tanks should be emptied and cleaned every 10 years, or more frequently if it has experienced a major contamination.
- Ensure that the fuel conforms to recognized specifications (which vary by country) and ensure that the fuel matches the local winter cloud point (temperature at which paraffin, which naturally occurs in diesel, forms wax crystals). This will help avoid filter blocking by the wax crystals when temperatures drop.
- Purchase fuel to replenish stocks in the winter, which will guarantee that the fuel will not cause wax problems in any season.
- Confirm with the supplier that all components are refined to promote stability.
- Take samples at regular intervals to monitor the fuel's condition. Samples can be examined on site for evidence of haziness, sediment, or darkening, or can be sent to a laboratory for thorough testing.
- Regularly turn the fuel over. Create a plan where fuel is used within 1 to 5 years and is replaced with fresh fuel.

Improve Storage Life with Additives:

The following additives can improve diesel fuel storage life:

- Metal deactivators. These additives stop copper, zinc, and other reactive metals from reacting with fuel and making it unstable.
- Fungicides/Biocides. These additives stop fungus and bacteria from growing in the fuel. It is important to note that these are only effective on fungus and bacteria and do not prevent other oxidation reactions. If fungus or bacteria is already present, a kill dose is necessary; if not, a lower maintenance dose is used to prevent fungus and bacteria growth. Biocides have disadvantages, such as:
 - they are poisonous, which makes mixing and handling dangerous
 - if a kill dose is required, the killed fungus can cause dead matter to build up in filters and cause the fuel to oxidize (tank should be drained immediately after killing fungus)
 - maintenance doses are no more effective than regular water draining and merely provide convenience over repeated draining disposal requires special handling for environmental reasons
- Anti-oxidants. These additives prevent oxidation from taking place. They stop the fuel from oxidizing and reduce gum and sediment formation.
- Fuel stability foam. Fuel Kleenik is a stability foam suspended in the storage tank and claims to keep fuel stable for 10 years. Stability foam has disadvantages, such as:
 - it does not work where water and fungus are present
 - its size (2100mm x 200mm x 200mm requires it to be dropped into the tank through a hatch
 - it must be disposed in a landfill after 15 years