

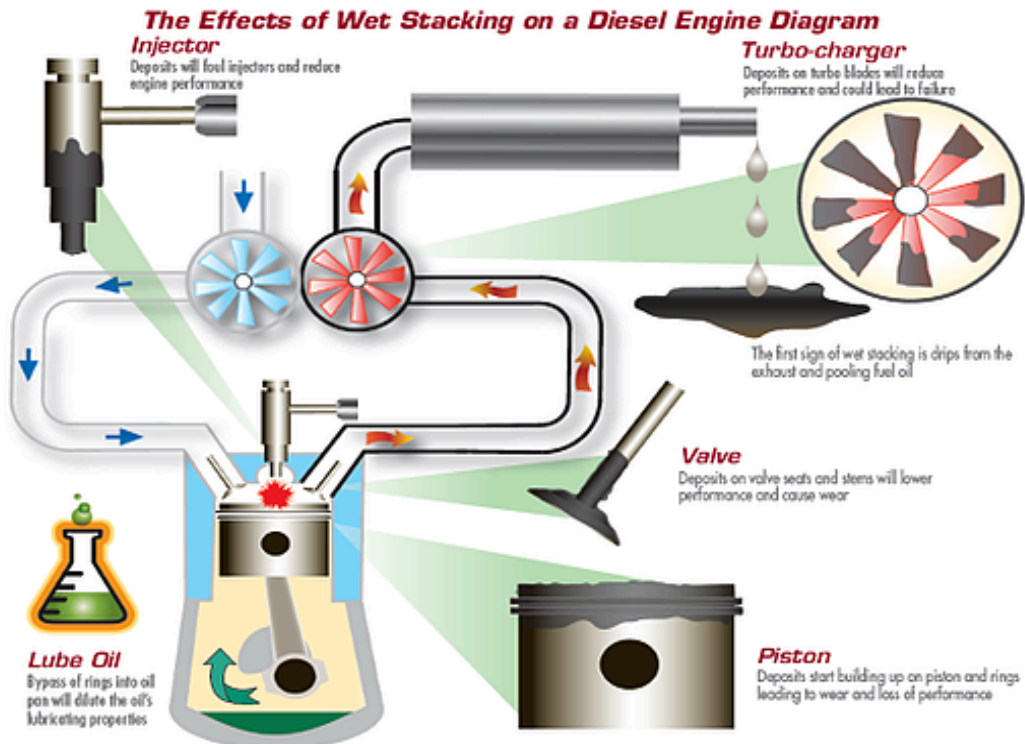


A large percentage of **standby power systems use the diesel engine**. Diesel is a convenient independent fuel source and the compression ignition systems of diesel engines have a much higher thermal efficiency than the spark ignition system used by gas engines. However, one factor to be considered when selecting a diesel power source is the potential for **“wet stacking.”**

Wet stacking is a condition that can affect all diesel engines, not just generators. Wet stacking means that not all the fuel is burned and the unburnt residue goes into the exhaust side of the turbo and into the exhaust system. The main cause for diesel generators is that the engine is running at a low proportion of its total capacity.

The symptoms of wet stacking are generally a black ooze around exhaust pipe connections and around the turbo as well as continuous black exhaust from the stack when under a constant load.

A diesel engine has to have exactly the right air to fuel ratio and be able to sustain the operational temperature it was designed to run at for a complete burn of the fuel. When a diesel generator only has light loads, it's not able to reach the correct operating temperature, which means not all the fuel is combusted. When the diesel engine runs below its designed operating temperature for extended periods, unburned fuel is exhausted and noticed as wetness in the exhaust system, hence the phrase wet stacking.





When unburned fuel is exhausted out of the combustion chamber, it starts to build up in the exhaust side of the engine, resulting in fouled injectors and a buildup of carbon on the exhaust valves, turbo charger and exhaust.

Excessive deposits can result in a loss of engine performance as gases bypass valve seatings, exhaust buildup produces back pressure, and deposits on the turbo blades reduces turbo efficiency.

Permanent damage will not be incurred over short periods, but over longer periods, deposits will scar and erode key engine surfaces. Over time permanent damage can occur as the deposits erode the engine surfaces. Additionally with the piston rings not getting to their designed temperature, unburned fuel and gases can escape into the oil pan diluting the lubricating properties of the oil, leading to premature engine wear.

The best way to avoid wet stacking is to ensure that the generator is run on load with at least 75% of its maximum load capacity so that it reaches its optimal running temperature. This can either be achieved by doing an on load test using the building load or using an external load bank. If wet stacking has already occurred but it is at its early stages, carrying out the same should burn off the unburnt fuel and solve the problem. If wet stacking has occurred for some time, it might be necessary to carry out an engine rehaul to resolve. The following load bank solutions should prevent a reoccurrence of wet stacking.

Automatic auxiliary loading:

When the generator set is the only source of power and the connected load for periods is very light a auxiliary load bank. The auxiliary automatically switches on when it detects the facility load is too low to adequately load the generator. When the facility load increases the load bank will switch off.

Facility manual load bank:

Operated as described for the automatic load bank, but a manually operated system for use with light loads and when the larger load is also manually initiated. The load bank can also be used for load testing a system primarily used for standby power.

Portable load bank:

The distributor for the diesel generator set is often the best qualified to undertake the maintenance of the system. Today it is very common for the owner of a standby generator system to outsource complete maintenance of the system and have a planned maintenance (PM) contract with a full service generator-set supplier.

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