

HIGHWAY & HEAVY PARTS

highwayandheavyparts.com
(844)447-5487



Diesel Engine Break-in Guide



A Highway & Heavy Parts Compilation

Table of Contents



1

Introduction

2

Signs Your Engine May Need Rebuilding

6

Diesel Engine Break-in Procedure

9

**Oil Change Intervals After Diesel
Engine Break-in**

Introduction



Are you considering an engine rebuild and have questions? Or maybe you're still experiencing engine trouble after a recent rebuild? We can help answer some of these questions! An engine rebuild is no small task, and the work doesn't end once the parts are installed. It's vital to give your engine the proper care after install to ensure you're operating at full-capacity and preventing further damage to your engine.

This guide is designed to help you through the break-in process, from learning the signs that might lead to a rebuild, to the break-in itself, to properly caring for your engine after break-in. We want to help keep your engine running for miles to come.

Signs Your Engine May Need a Rebuild



In an earlier blog post, we took a look at some symptoms of common diesel engine problems. But did you know that sometimes those symptoms could indicate the need for a full engine rebuild? Pay attention to what your engine is telling you to help prevent unplanned downtime.

The Signs

There are many things that might force you to need to rebuild your engine. The following are some indicators that you may have a problem that requires investigating.

Power Loss

Loss of power could indicate an issue with your camshaft, but it could also point toward a larger issue in your engine. This can be caused by fuel problems, especially severe fuel contamination, excess buildup, injector issues, faulty turbo, or air getting into the system.

Poor Fuel Economy

Again you might notice poor mileage if you're experiencing issues with your camshaft, like lobe wear. There's a chance driving habits might cause a drop in fuel economy—too heavy of loads or hard acceleration, for example. It also might mean your engine needs rebuilding. Your fuel might be contaminated, you could have filter or injector issues, or you might have a leak in your system.

Excessive Oil Consumption

If you notice your engine using more oil than normal, you might want to investigate the issue before it causes a major system failure. You could be leaking or burning oil, which could be caused by dirty oil, too much oil in the crankcase, high engine vacuum, too little end clearance of piston rings, worn or broken piston rings, oil pressure too high, lugging engine, or restricted air intake. Carbon packing caused by malfunctioning EGR systems causes the piston rings to become compressed in the ring groove and no longer able to hold combustion gasses on the top side or control the oil on the bottom side. If oil is burning or leaking, it can cause additional problems if not addressed right away, resulting in a more expensive repair.

Knocking

Engine knocking can indicate a very serious problem in your engine and should not be ignored. Some causes of engine knocking can include compression issues, faulty fuel injectors, timing issues, failed bearings, or failed wrist pin bushing or wrist pin.

Compression Issues

A lack of compression is one of the biggest indicators of an issue within your engine that needs to be addressed. Compression issues can reveal leaking/broken valves, leaking/broken piston rings, blown head gasket, camshaft issues, broken timing belt, or a hole in the piston or cylinder.

Smoking

Excessive smoke coming from your exhaust can also clue you in to a larger issue in your engine, especially blue or black smoke. This can indicate quite a few problems, including faulty injectors, faulty injector pump, bad air filter, bad EGR, bad turbo, carbon build-up, poor or incomplete combustion, worn valve guides or seals, or wear in power assemblies.

Ways to Evaluate

Overdrive wrote an article, "Time For an Overhaul", where they recommend two different ways to better evaluate if your engine needs a rebuild.

First, they mention oil analyses. These will let you know if there are high metal concentrations that could cause issues for your engine, or if another contaminant has entered the oil. If caught early, you might save yourself some costly repairs. An oil analysis can also let you know if unfiltered air has entered your system, they point out, especially if they are conducted at regular intervals, giving you a baseline.

They also talk about crankcase blow-by as an indication of a larger engine problem. Excessive blow-by, where more gases are allowed to escape because of piston and piston ring wear, can cause a higher rate of oil consumption. Root causes can include turbocharger issues, worn valve guides, or cylinder head issues, among others. If you're noticing excessive blow-by, it might be time to have your engine looked at to find the cause.

It is also a good idea to pay particular attention to the age and mileage of your engine. If your engine is old, or has been running a lot of miles since it's last rebuild or repair, you might want to monitor your engine's health more closely to catch potential problems before they turn into major system failures.

Diesel Engine Break-in Explained

We often get calls about the break-in procedure of a newly-rebuilt engine. Proper break-in is critical and sometimes overlooked. Even though you may have used one of our outstanding overhaul kits and your mechanic did a great job installing the parts, if the engine is not broken-in correctly, the rings may not seat, leading to oil consumption and power loss.

Check out our video covering everything you need to know about diesel engine break-in. We'll talk about what diesel engine break-in is, how to break in your diesel engine, and who is responsible for proper engine break-in.

Everything You Need to Know About
Diesel Engine Break-In

www.HighwayandHeavyParts.com

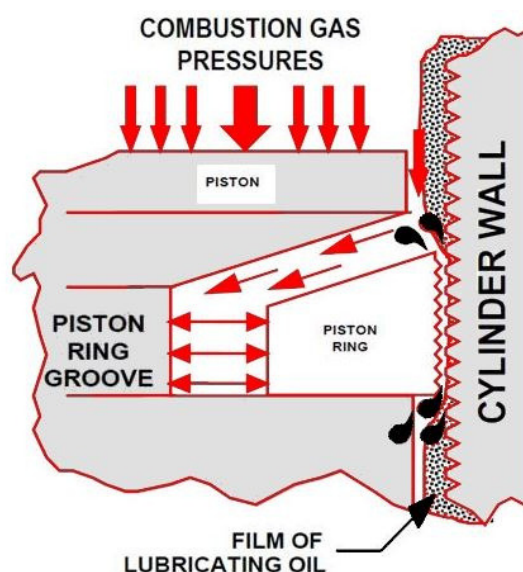


Why Break In A Diesel Engine?

Proper diesel engine break-in is crucial because it controls your oil consumption, fuel economy, and engine power. Many expect improvements in these three things after rebuilding engine, however if the proper break-in procedure isn't followed, oil consumption, fuel economy, and engine power could be worse than before engine rebuild.

What is Diesel Engine Break-In?

Diesel Engine Break-In is the process of seating the rings to the liner. Piston rings are designed to apply a small amount of outward force, but they rely heavily on the combustion pressure to force them down against the bottom of the ring land and outward into the cylinder wall. Without these forces, the rings will not seat or seal properly. Oil control rings will regulate the amount of oil film left on the cylinder wall to lubricate the compression and piston. In turn, these rings also remove some of the oil film, resulting in proper oil control.



As you can see combustion pressure pushes down on the ring as well as out against the cylinder wall for a good seal.

How to Break In a Diesel Engine

Every manufacturer's manual provides directions on the proper way to break-in your engine. Always refer to the manufacturer's manual prior to doing any work on your engine.

Running your truck on a dynamometer is the best way to ensure proper load and temperature is maintained; however, more often than not, a dynamometer is not an option. In that case, idle time should be limited to less than 10 minutes for checking for leaks and proper oil pressure. High RPM light load operation must be avoided during the run in procedure. Operate the truck pulling the heaviest available trailer allowed for the first 100-150 miles. Operate the truck in the highest available gear within the operating RPM range at 75%-80% of rated horsepower.

Procedures vary from rebuilder to rebuilder and you may already have a proven process for engine break in. The one thing that seems to be a common theme is to keep the initial startup, oil pressure and leak checks to the shortest amount of time possible. Then immediately loading the engine will be vital to its health and longevity. Delaying the loading process can result in oil consumption.

Who is Responsible for Proper Engine Break-In?

It is the responsibility of both the repair shop and the customer to break-in a diesel engine. To put it simply, without clear lines of communication and teamwork, proper engine break-in is extremely difficult to complete.

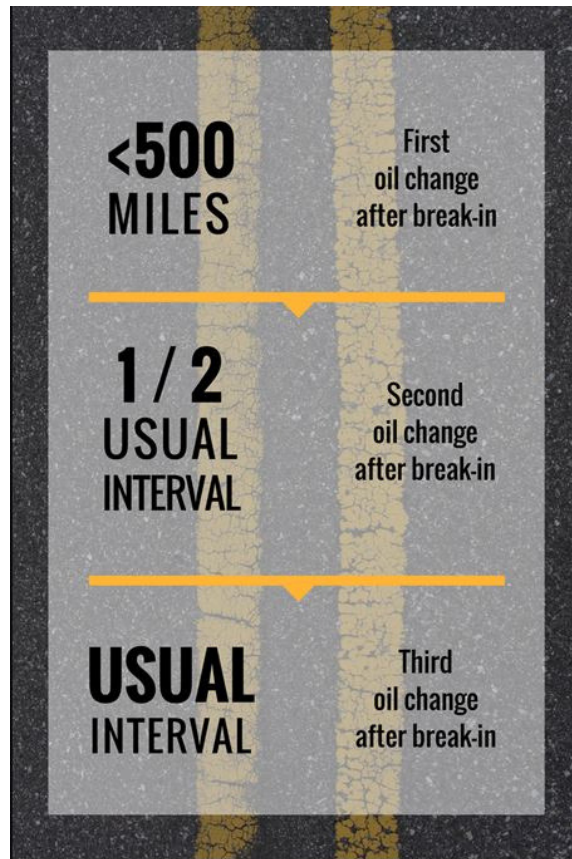
Before the repair is initiated, discuss how the engine will be broken-in. Whether you and your shop decide to use a dyno or you bring a load with the engine, discussing how the engine will be broken-in prior to repair is the fastest way to a successful diesel engine rebuild.

Oil Change Intervals After Diesel Engine Break-In

Proper break-in after an engine rebuild is one of the things that we find a lot of our customers don't know about. Another thing that most people don't realize is that break-in isn't complete after that first high-horsepower session. In reality, an engine is fully broken in when it does not lose any oil, which can take months for even the most active of engines.

Maintaining Your Newly Broken In Diesel Engine

The long time extended diesel break-in period means you still have to be careful about how you run your engine. For the first few months after initial break-in, try to keep it from idling as much as you possibly can. Whether you're getting fuel or need to run back into the house because you forgot to grab a snack for the road, turn your engine off rather than keep it running. It also means you're going to have to change the way you change your oil. We know how expensive an oil change can get for a heavy duty diesel engine, but an extra oil change or two is nothing compared to ruining break in and having to rebuild your engine all over again.



Diesel Engine Oil Change Intervals

The First Oil Change

The first oil change should be no more than 500 miles after you start your engine for the first time. Getting it changed soon is important for removing any contaminants that may have gotten into it during the rebuild, as well as any metal particles that get in it during break-in. When the piston rings and cylinder liners first make contact, they're not quite sealed. The first initial break-in is what pushes the rings up against the cylinder. The longer break-in process is what perfectly seals them. Cylinder liners are made with tiny grooves on the inside of the cylinder, which create peaks and valleys. As the engine runs for the first few months, the rings sliding up and down in the cylinder wear down the peaks. Essentially, the rings finish machining the cylinder liner. This creates better sealing, but means that minuscule particles of iron get into your oil and have the potential to ruin your engine.

The Second Oil Change

The second oil change should happen at approximately half the usual interval. For example, if your engine's typical oil change interval is 15,000 miles, the second oil change after rebuilding should happen at around 7,000 miles. At the 7,500th mile after rebuild, you should have changed your oil twice.

The Third Oil Change and Beyond

Starting with the third oil change, the engine is considered fully broken-in and is ready for standard interval oil changes.

Oil Change Tips

Use Conventional Oil

When changing your oil, make sure to use conventional motor oil for the first few changes. Synthetic oil is too slippery for proper break-in, and should not be used until months after the rebuild.

Use Break-in Oil or Additive

Another tip for the first oil change after rebuild is to use either break-in oil or additive. Break-in oil is especially clean of contaminants, which helps out when the peaks of the cylinder liner get machined down. Most break-in oils are also high pressure oils that keep the oil from scattering under the intense pressure that can occur during break-in.

We hope this will help you make sure your engine runs to the best of its ability.