



Technical Highlights

How to Maintain or Rebuild Engines Certified to EPA Standards

The U.S. Environmental Protection Agency (EPA) has adopted requirements that apply to the process of maintaining or rebuilding engines. This fact sheet describes these requirements for several types of highway and nonroad engines. Separate provisions apply to rebuilding urban bus engines (pre-1994 model year) and locomotive engines; these are not described here.

To which engines does this apply?

You will need to meet these requirements if you are rebuilding an engine that has been certified to meet certain emission standards for the following types of engines and vehicles:

- Heavy-duty highway diesel engines (40 CFR Part 86)
- Land-based nonroad diesel engines (40 CFR 89)
- Recreational and commercial marine diesel engines (40 CFR Part 94)
- Land-based nonroad spark-ignition engines (40 CFR part 1048)
- All-terrain vehicles, off-highway motorcycles, and snowmobiles

The provisions we describe in this fact sheet apply generally to any certified engine. For heavy-duty highway diesel engines and land-based nonroad diesel engines, the recordkeeping requirements we describe start with the model years listed in Table 1. The emission-control information label on each engine shows its model year and size or power rating.

What's the general principle behind EPA's rebuilding requirements?

As someone who maintains or rebuilds engines, you must generally restore the engine to its original configuration. This keeps the engine running the way the manufacturer originally designed it to operate, both for controlling emissions and for achieving the best overall performance. This adds an assurance that each engine will continue to control emissions, consistent with the manufacturer's original design, throughout its lifetime.

What does EPA consider "rebuilding"?

Rebuilding refers to a partial or complete rebuild of an engine or engine system. This includes a major overhaul in which you replace the engine's pistons or power assemblies or make other changes that significantly increase the service life of the engine. It also includes replacement or rebuilding of an engine's turbocharger/aftercooler system or its fuel injection/electronic control system if it increases the service life of the engine. For these provisions, rebuilding may or may not involve removing the engine from the truck, equipment, or vessel. Usually rebuilding does not include following the manufacturer's maintenance instructions or other routine maintenance; for these simpler service items you still need to avoid making changes that might increase emissions, but you don't need to keep any records.

How do I meet the rebuilding requirements?

You must have a reasonable technical basis for knowing that you are rebuilding the engine to its originally certified configuration for all the relevant tolerances, calibrations, and specifications that might affect emissions. You may use new, used, or rebuilt parts, but you should have a reasonable technical basis for knowing that the parts perform the same function as the original parts. You should follow the original engine manufacturer's instructions if you change any parameter or design element. Also, be sure to check, clean, adjust, repair, or replace all critical emission-related components as needed according to the original manufacturer's recommended practice. This includes the catalytic converter or other aftertreatment device, if there is one.

What is a “reasonable technical basis”?

You have a reasonable basis if you do two main things. First, you must install parts (new, used, or rebuilt) so a person familiar with the engine’s design and function would reasonably believe that the engine with those parts will control emissions to the same degree as with the original parts. For example, it would be reasonable to believe that parts performing the same function as the original parts (and to the same degree) would control emissions to the same degree as the original parts. Second, adjust parameters or change design elements only according to the original engine manufacturer’s instructions. Or, if you differ from these instructions, you must have data or some other technical basis to show you should not expect in-use emissions to increase.

What about diagnostic codes in the engine’s computers?

Don’t erase or reset emission-related codes or signals without diagnosing and responding appropriately to the diagnostic codes. Clear all codes from diagnostic systems when you return the rebuilt engine to service. Don’t disable a diagnostic signal without addressing the problem. This doesn’t apply to an engine if it has no onboard computer.

Can I make any changes to improve the engine?

Yes. You may make changes if you have data or some other technical basis to show that emissions will not increase. Also, you may use different than original parts or make other adjustments if they make the engine operate like one of the engine manufacturer’s newer certified models.

May the rebuilt engine go into any vehicle, equipment, or vessel?

No, some restrictions apply. Rebuilt engines should return to the same type of service (highway, nonroad, or marine). Also, the engine may not go into trucks, equipment, or vessels that were originally powered by engines certified to a more stringent level of emission control. Contact us if this is not clear from the engine’s emission-control information label.

What records do I need to keep?

Keep the following records for at least two years:

- the hours of operation (or mileage or other indication of age) at time of rebuild
- the work performed on the engine
- emission-related control components you worked on, including a listing of parts and components you used
- engine parameter adjustments
- emission-related codes or signals you responded to and reset

You may keep records based on engine families rather than individual engines if that's the way you do business. Keep the records in any format that allows us to review them if we ask. If you are a "backyard mechanic" working on your own engines, we don't require you to keep any records.

What records are not required?

You don't need to keep information that is not reasonably available through normal business practices. We don't expect you to have information that you can't reasonably access. Also, you don't need to keep any records of what other companies do.

Table 1
Implementation Schedule for Rebuild Recordkeeping Requirements

Application	Size Range	Model Year
Highway	all sizes	2004
Nonroad and Marine Diesel Engines under 37 kW (50 hp)	power < 19kW (power < 25 hp)	2000
	$19 \leq \text{power} < 37 \text{ kW}$ ($25 \leq \text{power} < 50 \text{ hp}$)	1999
Nonroad Diesel Engines at or above 37 kW (50 hp)	$37 \leq \text{power} < 75 \text{ kW}$ ($50 \leq \text{power} < 100 \text{ hp}$)	2004
	$75 \leq \text{power} < 225 \text{ kW}$ ($100 \leq \text{power} < 300 \text{ hp}$)	2003
	$225 \leq \text{power} < 450 \text{ kW}$ ($300 \leq \text{power} < 600 \text{ hp}$)	2001
	$450 \leq \text{power} < 560 \text{ kW}$ ($600 \leq \text{power} < 750 \text{ hp}$)	2002
	power > 560 kW (power > 750 hp)	2006

Application	Size Range	Model Year
Marine Diesel Engines at or above 37 kW (50 hp)	displacement < 0.9 L/cyl	2005*
	$0.9 \leq \text{displacement} < 2.5 \text{ L/cyl}$	2004*
	displacement > 2.5 L/cyl	2007*
Recreational vehicles	all sizes	2006**
Other Nonroad Spark-ignition Engines over 19 kW (25 hp)	all sizes	2004

*The dates shown apply to commercial marine diesel engines. Requirements related to recreational marine diesel engines (as identified on the emission-control information label) apply two years later.

**Up to half of a manufacturer's sales of off-highway motorcycles and all-terrain vehicles may be uncertified in the 2006 model year. These vehicles will not have an emission-control information label and the requirements described in this fact sheet don't apply to them.

For More Information

See the following regulations for a more detailed description:

- Heavy-duty highway engines: 40 CFR 86.004-40
- Nonroad diesel engines: 40 CFR 89.130
- Marine diesel engines: 40 CFR 94.11
- Nonroad spark-ignition engines and recreational vehicles: 40 CFR 1068.120

The provisions that apply uniquely to rebuilding locomotive engines are described in *Requirements for Railroads Regarding Locomotive Exhaust Emission Standards* (EPA420-F-99-036).

For additional information, visit the Office of Transportation and Air Quality Web site at:

www.epa.gov/otaq

You can also contact us at:

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