



INSTALLATION GUIDE

Congratulations on the purchase of your new engine! We recommend that the following items be replaced when installing a remanufactured engine assembly.

Please ensure that your engine has engine oil in it before the initial start up as they are typically drained and shipped dry! Ignition timing must be checked immediately upon start up as the distributor can get moved during shipping or installation.

ENGINE OIL

For CCE high performance crate engines, we recommend using **Driven HR 10w-30** or **Lucas Hot Rod 10w-30** conventional oil (synthetic oils should not be used in the first 2500KM). Engines with flat tappet cams must run specific high zinc oil! For stock replacement engines, please refer to your owner's manual for the oil weight for specific engines. Certain stock replacement engines may require specific break-in oils or additives for initial break in.

FILTERS

Oil, Air & Fuel

IGNITION

Spark Plugs and Plug Wires, Distributor Cap and Rotor (where applicable)

COOLING SYSTEM

A mixture of 50% anti-freeze/coolant and water (follow the original manufacturers recommendation regarding antifreeze type), thermostat, radiator cap, all hoses and belts

OTHER ITEMS

PCV Valve, grommets, and hoses

Oil Pump Pick-up tube and Drive Rod or Collar (if not included with engine)

We also suggest that the following items be cleaned, inspected and replaced if necessary:

- Carburetor or Fuel Injection System
- Distributor
- Radiator (all radiators should be rod out, re-cored or replaced)
- Water Pump
- Intake & Exhaust Manifolds
- EGR Valve
- Harmonic Balancer
- Flex-Plate or Flywheel
- Valve Covers and baffles, Timing Cover & Oil Pan (if not included with engine)
- All Engine and Transmission Mounts

ANY OF THESE ITEMS WHICH ARE FAULTY OR IMPROPERLY ADJUSTED CAN LEAD TO PREMATURE ENGINE FAILURE AND MAY NOT BE COVERED BY YOUR REMANUFACTURED ENGINE WARRANTY.

TOOL CHECKLIST

There are a few special tools you will need to install this engine properly. Make sure you have them available before you start.

- Timing Light
- Repair Manual (for the vehicle you're working on)
- Mechanical Oil Pressure
- Gauge
- Torque Wrench
- Engine Oiler (optional)

Preparation (Before You Start)

These recommendations are intended as guidelines that should be followed during any engine installation. For more specific instructions about the vehicle you're working on, you should refer to the repair manual. Take a moment to verify that this is the correct engine for the application.

On engines supplied with valve covers, timing cover and oil pan, please be aware that these parts may not fit all applications. Please clean and use your original parts. Turn the engine over by hand. This is easily done by installing the bolt that goes in front of the crankshaft and turning the engine with a wrench. The engine should turn smoothly. If it does not, **STOP** and call our Customer Service Department for assistance at 866-440-3850.

Installation

Some of the most common causes of premature engine failure are:

- Detonation and Pre-ignition
- Overheating
- Lack of proper lubrication
- Contaminations from reinstallation of dirty parts

PROTECT YOURSELF FROM THESE COMMON PROBLEMS BY PAYING EXTRA ATTENTION TO THE VEHICLE'S COOLING, IGNITION, FUEL, EXHAUST AND EMISSION SYSTEMS.

Clean & Inspect

Avoid bearing and piston damage by carefully cleaning the oil pan, timing cover and valve covers. A frequent trouble spot on V6 and V8 engines is the underside of the intake manifold. In many cases there is a sheet metal shield under the manifold. This should be removed, cleaned and reinstalled (In some instances this shield is riveted to the manifold. If you are not able to remove and reinstall the shield, take it to your local automotive machine shop to have it cleaned). Remove and clean under valve cover baffles. Sludge build up under the valve cover baffle will prevent vapor and oil separation resulting in oil consumption. Always use a new oil pump pickup tube. Remember that sludge or hard carbon deposits left on these parts can damage bearings and clog valve lifters. Never use sand-blasted or bead-blasted parts or surface conditioning discs. Debris from these will cause damage to bearings, piston rings and cylinder walls.

THE MANUFACTURER STRONGLY RECOMMENDS THAT YOU DO NOT USE SAND-BLASTED OR BEAD BLASTING OR SURFACE CONDITIONING DISCS! THE USE OF THESE CLEANING METHODS WILL RESULT IN DAMAGE TO THE ENGINE THAT IS NOT COVERED BY THE WARRANTY.

Cooling System

Prevent overheating damage by replacing all belts and hoses. Always use a new thermostat and radiator cap. Send the radiator out to be inspected, rod out, re-core or replace if necessary. Check your water pump carefully. The pump shaft should have no side to side play and should spin smoothly. It should show no signs of leakage. If it does, replace the water pump. On cars so equipped make sure the thermostatic fan clutch or electric fan and fan switch are working properly. Bleed the cooling system of air. Always use fresh coolant in a 50/50 mix with water or follow the original manufacturers recommended antifreeze type and mixture.

Fuel Systems

Make sure your fuel system (carburetor or fuel injection) is delivering the proper amount of fuel to the engine. Pay special attention to the automatic choke or cold start valve (on fuel injected vehicles). Keep in mind that rich fuel mixtures can cause premature wear or damage to the pistons, piston rings and cylinder walls, lean fuel mixture is one of the primary causes of detonation and pre-ignition. If the vehicle has sat longer than 30 days, drain and flush the fuel system.

Ignition Systems

Check the ignition distributor shaft and gear for any excessive wear. Make sure the advance mechanisms (mechanical and vacuum) are working properly. Replace the distributor cap, rotor, plug wires and spark plugs (Use the correct heat range). Check and set ignition timing (initial) to the manufacturer's specifications and then CHECK FOR TOTAL IGNITION ADVANCE (refer to the shop manual for that exact procedure). Remember that ignition timing too far advanced or retarded can cause detonation and pre-ignition.

Emission & Exhaust Systems

Make sure that all emission equipment is installed and working properly, especially the EGR valve. In many cases the failure (or in-operation) of the EGR valve alone can cause severe engine damage as a result of detonation and pre-ignition. If you are not familiar with all the emission equipment on the vehicle, refer to the repair manual. Poor engine performance and high operating temperatures can indicate other obstructions in your exhaust system. To check for a clogged catalytic converter or other portion of the exhaust system, refer to the repair manual.

Lubrication System

The engine should be properly "pre-lubed" before it is started. This means supplying pressurized oil to all the bearings and wear surfaces in the engine before it is started. On engines where the ignition distributor drives the oil pump, this can be done by removing the distributor and turning the oil pump with a drill motor until oil appears at the rocker arms. A much better method, especially on engines without distributor driven oil pumps, is to use an optional oiler. This device enables you to supply pressurized oil to the entire engine without removing the distributor. It also enables you to properly pre-lube engines with non-distributor driven oil pumps. A mechanical oil pressure gauge should be installed so you can monitor oil pressure during start-up.

At Start-Up

Verify you have oil pressure (at least 10 psi) and immediately raise the engine speed to 2,000 rpm and hold it there for 15-20 minutes. If the engine fails to start quickly check your fuel and ignition systems again. Do not crank the engine excessively as this can wipe away pre-lubrication and cause damage to the bearings. During this 20 minute period adjust the ignition and fuel systems to the manufacturer's specifications.

After Initial Start-Up

Let the engine cool down (at least three hours). As part of the installation process we recommend engines that utilize an adjustable valve train require readjustment of the valve lash. Shim type adjustable valve trains we recommend verifying lash is within manufacturer's specification. We also recommend re-torque of the intake and exhaust manifolds to the manufacturer's specifications at this time.

We also recommend re-torque of the intake and exhaust manifolds to the manufacturer's specifications at this time. Check the tension of the belts that drive the accessories, they will stretch after the initial start-up and can become loose. A properly tensioned belt will deflect ½" when checked midway between the accessory and crankshaft pulley. A loose water pump belt can cause the engine to overheat, over tightened belts can cause premature failure of accessories like alternators and power steering pumps.

WARNING: DURING START-UP OF A REMANUFACTURED ENGINE, OIL PRESSURE AND ENGINE TEMPERATURE ARE CRITICAL. CAREFULLY MONITOR BOTH OF THESE FUNCTIONS AT ALL TIMES. DO NOT START THE ENGINE AND WAIT FOR OIL PRESSURE TO RISE! NEVER ALLOW THE ENGINE TO OVERHEAT! FAILURE TO FOLLOW THESE INSTRUCTIONS WILL VOID ANY WARRANTY.

COMMON PROBLEMS & SOLUTIONS FOR NON-WARRANTABLE FAILURES

1. Why is engine the being replaced?

Always diagnose what caused the original failure and fix the problem.

2. Overheating

This type of failure is the result of the cooling system not properly dissipating the heat away from the engine.

Normal causes of this failure are as follows:

- Restricted or damaged exhaust system.
- Incorrect water pump.
- Radiator, water pump, thermostat or thermal valve not functioning properly.
- Worn or defective fan clutch, or proper fan or fan shroud, air dam or scoop not installed correctly.
- Trapped air pockets, characterized by rapid overheat.
- Worn or defective ignition system or emission control device especially the EGR Valve.
- New antifreeze has silicates. When solution reaches higher than 60%, antifreeze gels, clogging radiator.



A heat tab has been installed on each block within a freeze plug. A melted tab indicates the engine has reached a temperature hot enough to do internal damage, and the warranty becomes void. If tab is melted, it is almost always non-warrantable failure.

Always:

- Flush or replace radiator, heater core.
- Check water pump bearing and impeller.
- Check all hoses, belts and replace if worn.
- Replace thermostat.
- Follow repair manual for refilling cooling system.
- Check Emission Control System, especially the EGR Valve.
- Verify electric fan is operating properly.
- Check timing.
- Check Exhaust system (Catalytic Converter).
- Check radiator air foil making sure it is not cracked or missing.
- Aftermarket front end bras can block or restrict air flow.

3. Contamination

This failure is the result of foreign material, normally dirt, in the lubrication system or air intake system.

If present In the oil system:

- Normally caused by re-using the old pick-up tube/screen. (Always replace the pick-up tube/screen with a new one. Never reuse the old/dirty/contaminated pick-up tube).
- Never reuse old oil pump.
- Replace oil cooler if so equipped.
- Completely clean the oil pan, front cover, valve covers and intake manifold. Always inspect these assemblies completely. Check under baffles and heat shields.
- Do not clean engine components using glass bead or other abrasives
- Do not clean parts with abrasive pads.

If present in the air intake system:

- Make sure intake manifold (especially the inside of the intake runners) is clean before re-installation. Never glass bead.
- Running engine without air filter will cause contamination damage to piston rings, and cylinder walls resulting in oil consumption and premature failure.
- Always replace the old PCV valve with a new one.
- Check for vacuum leaks.
- Make sure when using silicone sealer that you do not block oil or water passages by using too much. Make sure the silicone sealant is O2 sensor friendly.

4. Detonation/pre-Ignition

This failure is uncontrolled combustion in the engine It is caused by:

- Vacuum leaks in the hoses, intake cracks, vacuum doors, etc.
- Dirty carburetor or fuel injectors.
- Low fuel pressure injectors or fuel injectors with air leaking around the o-ring.
- Improper grade/quality of fuel.
- Overloading vehicle.
- Out-of-tune engine
- Defective ignition system (Distributor weights or bushings vacuum advance, etc.)
- Defective emission control system,
- Engines will self-destruct if EGR valve is not operating properly
- Clean all passageways. Verify that emission sensors are functioning. Replace if there is any question.
- Engine out of time.
- Carbon deposits caused by low speed stop-and-go driving.

5. Dry Start

This type of failure is normally the result of not priming the oil system correctly, or not installing the oil pump or pickup tube and screen correctly, or re-using the old one. This condition will damage bearings, pistons, rings, crankshaft, camshaft, and valve train components.

6. Flywheel Bolts Over Torqued

Warning! Over torquing flywheel bolts will cause rear seal surface to bulge and rear seal leaks will result. To prevent leaking, use sealer on flywheel bolts before torquing properly. Never use an impact wrench.

7. Gas Washing

This occurs when too much fuel gets into the cylinder. This removes the oil from the cylinder wall causing premature wear. Gas can be found in the oil pan under severe circumstances. This is caused by:

- Defective carburetor or injectors.
- Too rich fuel mixture.
- Restricted air intake system.
- Out-of-tune engine.
- Defective ignition system.
- Defective emission control system.
- Improper downshifting (lugging) manual transmissions.
- Improper adjustment of detent cable on automatic transmissions.

8. Slow/Long Burn

If the fuel takes too long to burn and is still burning when the exhaust valve opens, these super heated gases are drawn across the valve face. This can weld the valve to the seat. On the next stroke metal is torn loose. The result is exhaust valve failure. This is caused by:

- Too high octane fuel.
- Ignition timing retarded.
- Air/fuel mixture too rich.
- EGR system not functioning.
- MAP and O2 sensors not functioning.
- Check for excessive fuel pressure.

9. Transmission/Torque Converter Installation

1)Installing the Torque Converter.

Place the torque converter on the main shaft of the transmission and rotate until it engages, then keep rotating the torque converter until it engages a second time into the front of the transmission pump. (On some models a third rotation will be required, normally on lock-up type torque converters)

2) Installing the Transmission to the Engine.

With the two outer mounting bolts line up the transmission to the block of the engine. The transmission should then slide up against the back of the engine with little resistance. Once the transmission is in place tighten the rest of the mounting bolts. (DO NOT FORCE THE TRANSMISSION TO THE ENGINE) If the transmission will not go up against the engine PLEASE STOP AND CHECK STEP #1 .

3) Checking Your Transmission and Torque Converter installation.

*Before bolting the flywheel to the torque converter check the clearance between the torque converter and the flywheel. With the torque converter placed all the way back in the transmission you should be able to bring the torque converter forward towards the flywheel 1/8" to 3/8". If you do not have this clearance then the torque converter is not fully engaged in the front transmission pump. **THIS ERROR COULD RESULT SERIOUS ENGINE DAMAGE OR TRANSMISSION FAILURE.***

10. Standard Transmissions/Clutch

Always make sure clutch is properly adjusted. Failure to do so can cause severe thrust bearing damage. Assure proper alignment of transmission to pilot bushings.

Please give us a call with any questions regarding your new CCE crate engine. Thank you for your business!

TOLL FREE (880) 440-3850 - WWW.CANADIANCRATEENGINES.COM