



IPD TECHNICAL BULLETIN

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Breaking-In Rebuilt Engines

Even with quality replacement parts and engine assembly, you can still have problems with oil consumption if the engine is not broken in correctly to get the piston rings to seat.

Rings are designed to apply a controlled certain amount of tangential force outward. Compression rings rely on greater combustion pressure to force them down against the bottom of the piston's ring lands and outward to the cylinder wall. Without this combustion force, these rings may not seat or seal properly. Oil control rings regulate the amount of oil film left on the cylinder wall to lubricate the compression rings, and each compression ring removes some amount of this oil film resulting in proper oil control.

While it is ideal to break-in an engine in a controlled environment (such as a dynamometer test where factors such as horsepower, temperatures, etc. can be controlled and monitored), it is simply not always an available option after an engine is repaired or rebuilt. That is not to say you cannot get piston rings to seat without such equipment. It is important that an adequate load be put on the engine to create enough combustion pressure and temperatures to seat the rings. This is most critical within the first few hours of the engine's new service life. Idling, increasing the RPM, and hauling light loads will not create enough combustion pressure to seat new rings. Only under load can you obtain the pressure and temperatures needed. An engine placed into service at low load or allowed to idle will likely have oil consumption issues. If allowed to continue this problem can become irreversible.

Cummins® service tools recommend for On-Highway applications be operated pulling the heaviest available trailer, in the highest possible gear, near full throttle at 75-85 percent maximum horsepower RPM for the first 100 miles. Off-Highway applications should be operated under the highest possible load at full throttle within normal PM range for the first 3 hours. Neither application should be allowed to idle for more than 5 minutes at any one time.

Many of the other OE manufacturers do not publish bulletins that formally detail the process for breaking in an engine outside of a controlled environment. Our research has found that keeping idle time to a minimum and operating a freshly rebuilt engine at a minimum 75% of full load for at least the first 3 to 4 hours, produces satisfactory results in getting piston rings to seat.

The percentage of load and duration may change from rebuilder to rebuilder (many already have a proven process for engine break-in). All agree that once the initial start-up and checks are complete, getting a load on the engine is vital to seating the rings. Delaying this loading process can result in increased oil consumption.

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The brand, type, classification, and oil grade used during an engine break-in period can affect the piston rings performance. Use of OEM recommended oil is preferred. There are also several additives and break-in oils available. Those should only be used according to the manufacturer's recommendations.