

SOUTHWEST RESEARCH INSTITUTE®

Fuels and Lubricants Research Division

Sequence X Engine Test

(ASTM D8279)

Specifications

- ILSAC GF-6
- API SP

Objective

- Evaluate a lubricant's performance to protect against soot-induced timing chain wear experienced in modern gasoline direct-injection (GDI) style engines

Test Fixture

- 2012 Ford 2.0L EcoBoost, 4 cylinder
 - Direct-injected gasoline engine
 - Single-stage turbocharger with wastegate
 - Intake and exhaust valve timing phasers
 - No exhaust gas recirculation system
 - Metal link/pin type "silent" timing chain
- Piston ring gap increased to provide blow-by volume flow rate of ~70 L/m

Test Parameters

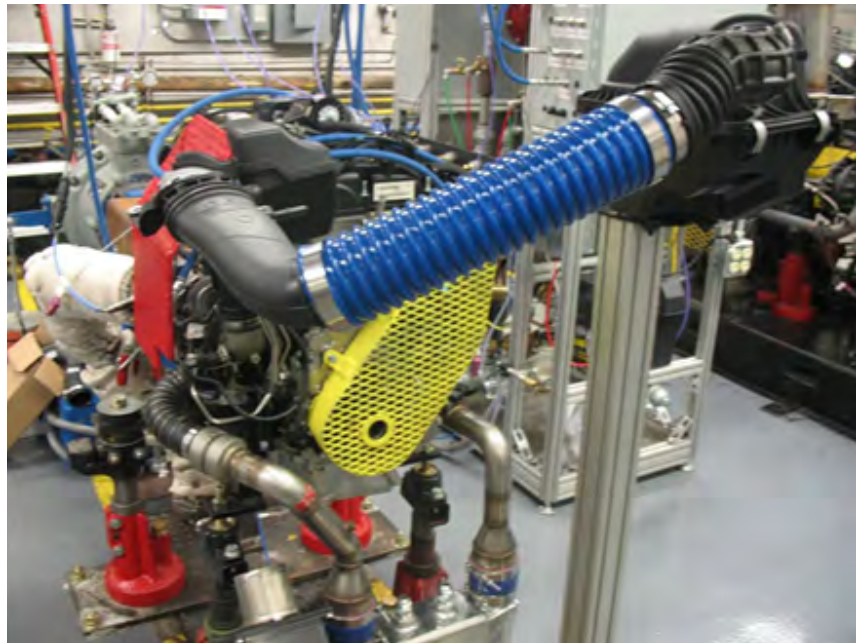
- Initial break-in is done using an 8 hour test cycle using the candidate test chain in order to obtain a well-established zero-hour length measurement.
- The test is 216 hours, consisting of six two-stage cycles every 24 hours,
 - Phase 1 runs with increased fuel delivery ($\lambda=0.78$) and low engine coolant and PCV gas temperatures.
 - Phase 2 runs with standard fuel delivery ($\lambda=0.98$) and moderate engine coolant temperature and PCV gas temperatures.
- Blow-by measurements are obtained during Phase 2 every 24 hours.

Test Parts Evaluated

- The timing chain length is measured after the engine break-in and at the end of test.

Pass/Fail Criteria

- The pass/fail criteria is $\leq 0.085\%$ timing chain elongation.



New and Used Lubricant Analysis	
ASTM D445 40°C viscosity	ASTM D664 total acid number
ASTM D445 100°C viscosity	ASTM D4739 total base number
ASTM D5185 ICP (metals)	ASTM D6304 water
ASTM D3525 fuel dilutions (% mass)	TGA soot

**We welcome your inquiries.
For additional information, please contact:**

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