



T-10A Alternative

HDEOCP

8 Dec 2009



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- *Previously, the HDEOCP has recommended the substitution of the T-11 for the T-8E as an alternative. This makes sense as the two tests have similar objectives as defined in D4485*
 - 4.1.8.4 Test Method D 5967 extended, the T-8E engine test, has been shown to generate soot-related oil thickening in a manner similar to 1998 emissions-controlled heavy duty diesel engines using electronic injection control systems.
 - 4.1.10.1 Test Method D 7156, the Mack T-11 diesel engine test has been shown to generate soot-related oil thickening in a manner similar to 2002 EGR emission-controlled heavy-duty engines with electronic injection control. This engine test uses 500 mg/kg (ppm) sulfur fuel.

- *Previously, the HDEOCP has recommended the substitution of the T-12 for the T-10 as an alternative. This makes sense as the two tests have similar objectives as defined in D4485*
 - 4.1.9.2 Test Method D 6987/D 6987M, the T-10 diesel engine test, is used to measure engine oil performance with respect to **piston ring and cylinder liner wear, bearing lead corrosion, and oil consumption** in an electronically governed, open chamber, in-line six-cylinder, four-stroke cycle, turbocharged, compression-ignition engine with exhaust gas recirculation.
 - 4.1.10.2 Test Method D 7422, the Mack T-12 diesel engine test is used to measure engine oil performance with respect to **piston ring and cylinder liner wear, bearing corrosion, and oil consumption**, using an in-line six cylinder, four-stroke, direct injection, turbo-charged engine with exhaust gas recirculation at levels expected for 2007 emission control engines. This engine test uses ultra low (15 mg/kg (ppm)) sulfur fuel.

- *CI-4 is an important HD category, both in the USA and around the world.*
- *CI-4 is often offered as an important credential alongside European ACEA categories.*

<u>ACEA Spec</u>	<u>T-10</u>	<u>T-12</u>	<u>T-11</u>	<u>T-8E</u>	<u>Typically Assoc API Spec</u>
E4-08			Either		CI-4
E6-08	Either		Either		
E7-08	Either		Either		CI-4
E9-08		Y	Y		CJ-4

There are a few idle T-10 stands in the industry but no referenced test stands. The test is effectively unavailable unless customers agree to pay for referencing.

- *While the T-11 can be run as a substitute for the T-8E few European fluids require this soot handling capability and the T-8E remains an important and viable test.*

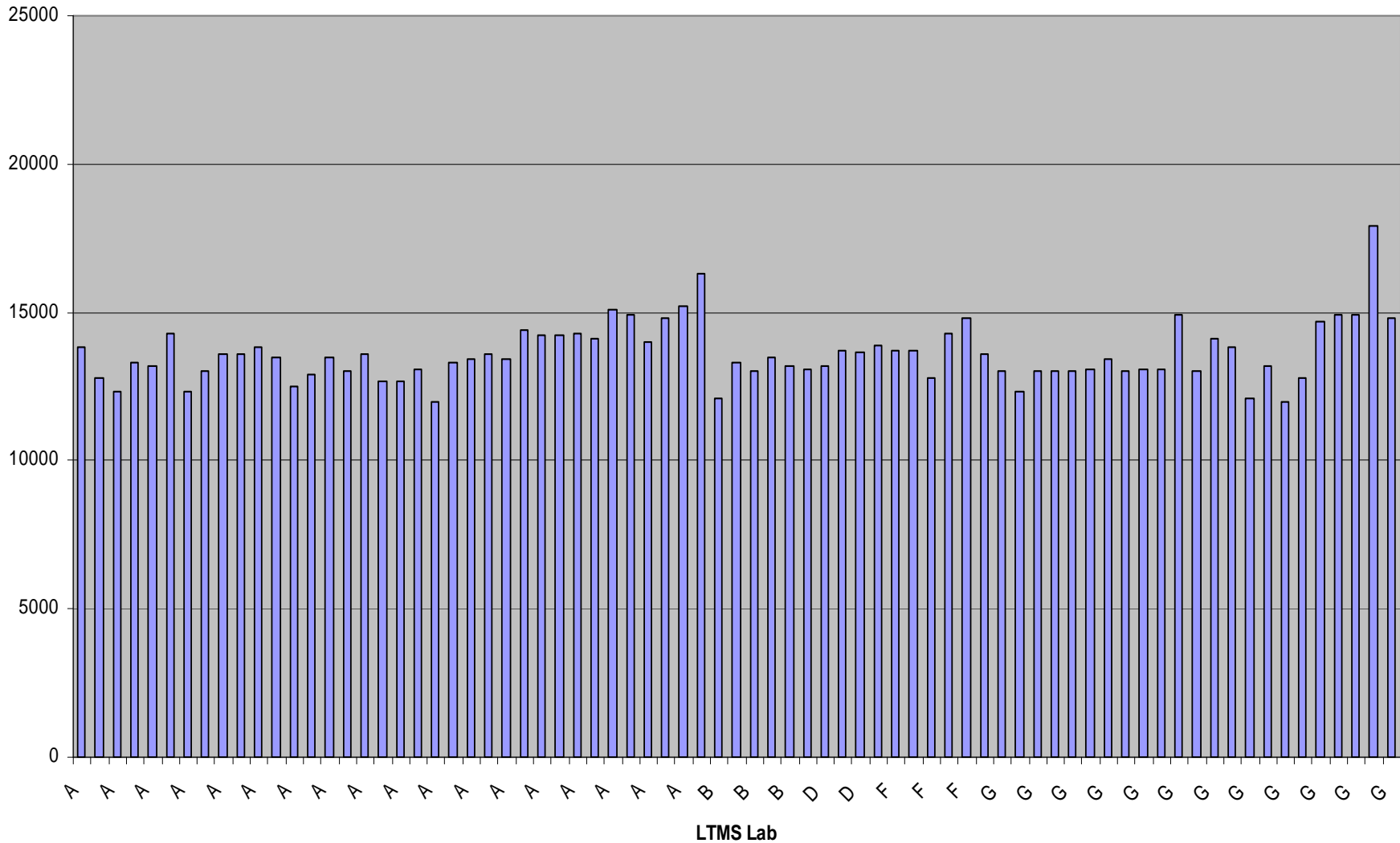
ACEA Spec	T-10	T-12	T-11	T-8E	Typically Assoc API Spec
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E6-08	Either		Either		
E7-08	Either		Either		CI-4
E9-08		Y	Y		CJ-4

API reports there are 990 CI-4 and 450 CI-4 PLUS registered formulations. There are more than twice as many CI-4 as CI-4 Plus oils. The oils claiming only CI-4 are not required to run a T-11 and most would not pass it. Future CI-4 approvals will be based on the T-12 and T-8E.

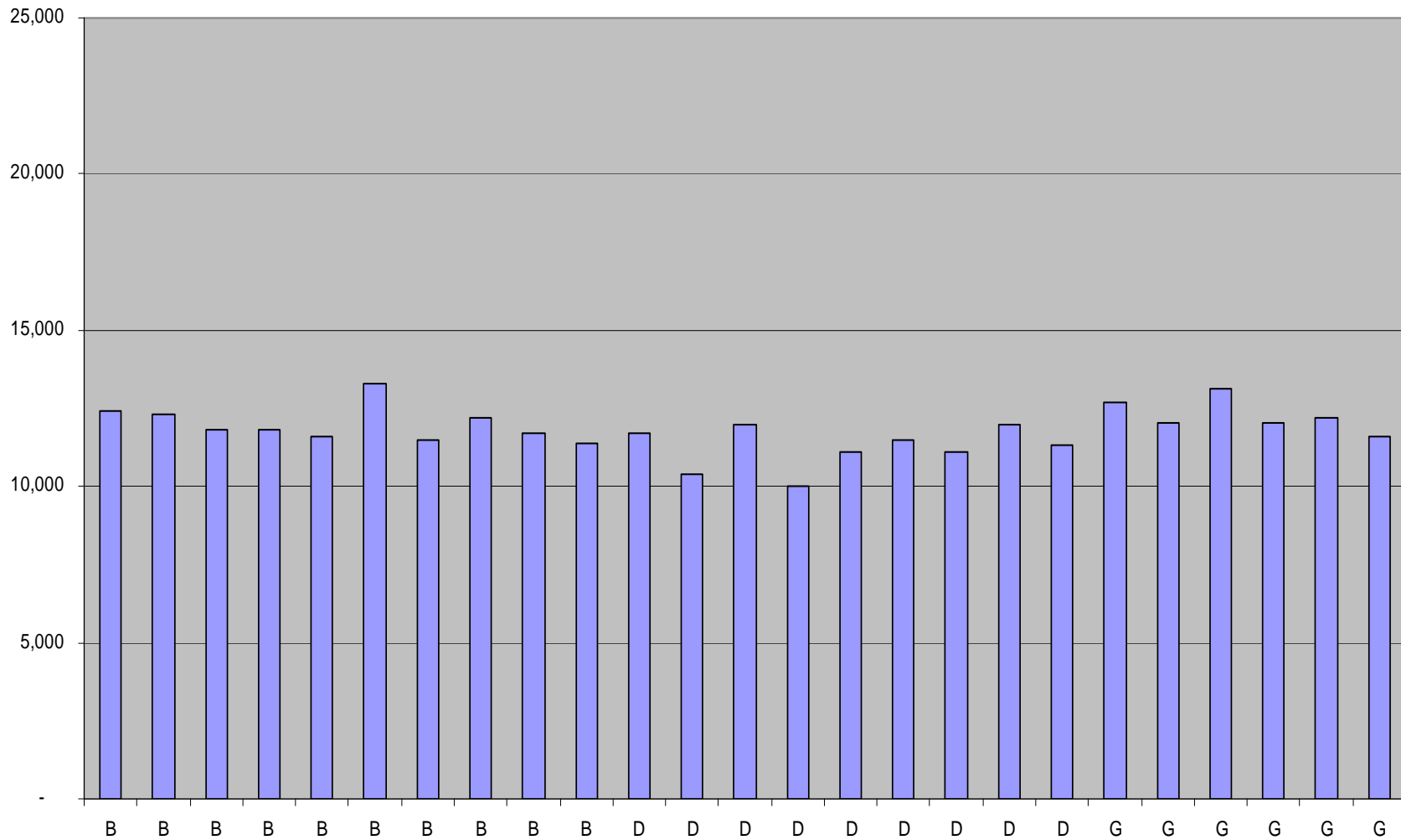
- ^{AD} The T-10A test is the name given to a T-10 test run for 75 h to generate the sample for measurement by Test Method D 4684. (MRV)
- *Today, the HDEOCP is considering recommending an alternative test for the T-10A.*
 - Suggested alternatives are to use the 180 hour drain from a T-11 Soot Handling test or the 100 hour drain from the test that is replacing the T-10, the T-12.
 - All future CI-4/CI-4 PLUS approvals will run the T-12
 - Two thirds of CI-4/CI-4 PLUS formulations do not presently run the T-11 and most would not pass it
 - Lubrizol is not opposed to adopting a T-11A alternative, but it is imperative that a T-12A alternative exist either alone or in parallel.

T-10A Historical Performance

T-10A MRV (Chartable; n=75)



T-12 100 Hr MRV (Self-Reported, n=25)



- Lubrizol strongly recommends a T-12A test be recommended as an alternative to the T-10A
- Recommending use of the T-12 for the CI-4 used oil MRV
 - Keeps the test type similar for the drain generating test
 - All current CI-4/CI-4 PLUS approvals will come from the T-12
 - Two thirds of CI-4/CI-4 PLUS formulations do not presently run the T-11 and most would not pass it
 - Lubrizol candidate data suggests test substitution will work
 - A good deal of Reference Data Has Been Collected on T-12 100 Hour MRV and it's very similar to the T-10A data

Mack T-12 100Hr v T-10 75Hr Drain oil MRV

