Proposed Performance Tests

We will continue to keep you informed on the development of performance tests by the various ASTM Surveillance Panels, including details relating to the purpose, running conditions and status.

The following performance tests are currently being considered by ILSAC for inclusion in the GF-5 category.

Proposed Tests	Performance Characteristic	Comment
Sequence VID	Fuel Economy	VID test details released to ASTM. Test proceeds to precision matrices
ROBO	Used Oil Pumpability	Measurement is MRV pass in original CCS grade or +1 grade of used oil
TEOST 33C – ASTM D6335	Deposit gain, mg	Test was in GF-2
ASTM D6894	Used Engine Oil Aeration	Test was in PC-9
Sequence IIIGB (IIIG EOT)	Phosphorus Volatility	Test recommended to ILSAC/Oil but not yet adopted
Chrysler to provide	Emulsion Retention	Await clarification from Chrysler
ASTM D1748	Rust Protection	100 hr. sand blasted panel
ASTM D7216-05	Seal Compatibility	Seals as in PC-9

PERFORMANCE TESTS

Proposed Performance Tests

		ILSAC Standard		
Performance Parameter	**Test Method**	**GF-4**	**ILSAC 9-08**	**ILSAC 2-07**
Seq. IIIG Piston Deposits, merits, min.	Seq. IIIG	**3.5**	**4.5**	**5.0**
Seq. VG Engine Sludge, merits, min.	Seq. VG	**7.8**	**8.0**	**8.3**
Seq. VG Rocker Sludge, merits, min.	Seq. VG	**8.0**	**8.3**	**8.5**
Seq. VG Oil Screen Clogging % max.	Seq. VG	**20.0**	**15.0**	**5.0**
Phosphorous, mass%, min.	ASTM D4951	**0.06**	**0.06**	**0.06**
Phosphorous, mass%, max.	ASTM D4951	**0.08**	**0.08**	**0.07**
Sulfur Content, mass%, max.	ASTM D4951 or ASTM D2622	**0.5 (0W & 5W) 0.7 (10W)**	**0.5 (0W & 5W) 0.6 (10W)**	**0.5**
Fresh Oil Foaming/Hi Temp Foaming Charact.	D892/6082 OptA	**10 min settling**	**1 min settling pd**	**1 min settling pd**
TEOST MHT, deposit weight, mg	ASTM D7097	**35**	**30**	**30**
Seq. VID Fuel Economy, %, min.	Seq. VID	**---**	**At least 0.5% above VIB limits**	**At least 0.5% above VIB limits**
Used Engine Oil Aeration Volume, %, max.	ASTM D6894	**---**	**8**	**6**
IIIGB Phos. Retention	Seq. IIIGB	**---**	**85.0%**	
TEOST 33C, deposit weight, mg	ASTM D6335	**---**	**25**	**25**
ROBO - Used Oil Pumpability	ROBO	**---**	**MRV pass in orig. CCS grade or +1 grade of used oil**	**MRV pass in orig. CCS grade or +1 grade of used oil**
Emulsion Retention test	Chrysler method	**---**	**No separation 0°C, 24 hours 25°C, 24 hours**	**No separation 0°C, 24 hours 25°C, 24 hours**
Seal Compatability	SAE J2643	**---**	**4 materials**	**4 materials**
Rust Protection (100hrs sand blasted panel)	ASTM D1748	**---**	**Removed**	**No Rust**
Seq. IIIGA Aged Oil Low Temp Vis.	Seq. IIIGA	**MRV+1grade**	**Removed (ROBO only)**	**Or ROBO**

	Removed
	New
	Unchanged
	Tightened

PERFORMANCE TESTS

Sequence VID

SCOPE

The Sequence VIB test, used to determine the engine oil effect on fuel economy, will be replaced with the Sequence VID test for GF-5. A Consortium was formed to oversee development and provide funding for development of the new test and comprises:

- Five additive companies
  - Infineum, Afton Chemical, Lubrizol, Oronite, R.T. Vanderbilt
- Three oil companies
  - Chevron, ExxonMobil, Shell
- Two automotive companies
  - General Motors, Ford

STATUS

Test details were released by the Consortium to ASTM in a detailed report.

Microsoft PowerPoint Presentation

A research report on the test was recently issued to ASTM and can be found at the TMC Web site.

www.astmtmc.cmu.edu/docs/gas/sequencevi/VIDConsortium/

The baseline weighting details are as follows:

- 3 Baseline runs will be run for each test: BLB1, BLB2, BLA
- BLB2 must be within -0.20% to +0.40% of BLB1, otherwise BLB3 needs to be run
- Baseline weighting for FEI-1: 0% BLB1, 80% BLB2, 20% BLA
- Baseline weighting for FEI-2: 0% BLB1, 10% BLB2, 90% BLA

The Stage weighting details are as follows:

Stage	3	4	5	7	8	9
Weight, %	30	3.2	31	17.4	1.1	17.2

The updated timeline for the VID test development is shown here:

	2008					2009										
	Aug	Sep	Oct	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
ASTM Seq. VID Precision/BOI/VGRA Matrix																	
MOU & Funding																	
Matrix Oil Procurement, Blending & Distribution																	
SP to Resolve Test Issues - Oil Pressure, Fuel Diffs, MAP, etc.																	
BL and Flush Oil Procurement for Life of GF-5																	
Engine Procurement for the Life of GF-5																	
Run Step 1 of the Precision Matrix						32 tests											
Calibration Oils Decision and Homogination by TMC																	
Run Step 2 of the Precision Matrix							12 tests										
Statistical Analysis of Matrix								A lot for one month...									
ASTM Test Acceptance of the Sequence VID																	
ACC Registration Begins																	
Technology Demonstration for GF-5																	
ILSAC/Oil Approve GF-5 Specification																	

The precision matrices are now expected to start some time in December.

Details of the precision matrix oils are provided in the attached API presentation made at the October 23, 2008 ILSAC/Oil meeting.

Microsoft PowerPoint Presentation

PERFORMANCE TESTS

ROBO

SCOPE

This test is targeted to evaluate used oil low temperature performance as currently measured by the Sequence IIIGA in the GF-4 specification. Developed by Degussa Rhomax Additives, the ROBO was accepted by ILSAC/Oil for further evaluation as a potential substitute for the Sequence IIIGA.

TEST CONDITIONS

- 200 grams of test fluid
- 15 ppm iron ferrocene catalyst
- 2 ml high purity nitrogen dioxide (liquid phase) delivered for 12 hrs.
- 185 ml per minute of dry air
- 200 rpm agitation
- 18mm Hg for vacuum
- 35-45% loss of volatility
- Reaction temperature 170°C
- Reaction time 40 hours

KEY CURRENT ACTIVITIES

The ROBO test is intended for inclusion in GF-5 and projected to become an ASTM standard. Laboratory round robins are complete and the test is now proceeding to ballot within ASTM. Following is the most recent report on the ROBO test developments made to ILSAC/Oil.

Microsoft PowerPoint Presentation

TEOST 33C – ASTM D6335

This test was in GF-2 at a 60 mg max. limit deposit weight gain. It was excluded from GF-3 and GF-4 but has been included in the GF-5 draft specification at a proposed limit of 25 mg max. weight gain.

SCOPE

This test method covers the procedure to determine the amount of deposits formed by automotive engine oils utilizing the thermo-oxidation engine oil simulation test (TEOST). An inter-laboratory study determined it to be applicable over the range from 10 to 65 mg total deposits.

The test simulates the cyclic temperatures of 200° to 500+°C experienced in the turbocharger with a 12-cycle test run over a period of two hours requiring 100+ mL of test oil. The test obtains the weight of deposits forming on a resistively-heated hollow rod (TEOST® Depositor Rod) held within a casing as bulk oil flows by at a rate of 0.45 g/minute. The increase in rod weight caused by deposits is used as a measure of oil performance.

SIGNIFICANCE AND USE

The test method is designed to predict the high temperature deposit forming tendencies of an engine oil. This test method can be used to screen oil samples or as a quality assurance tool.

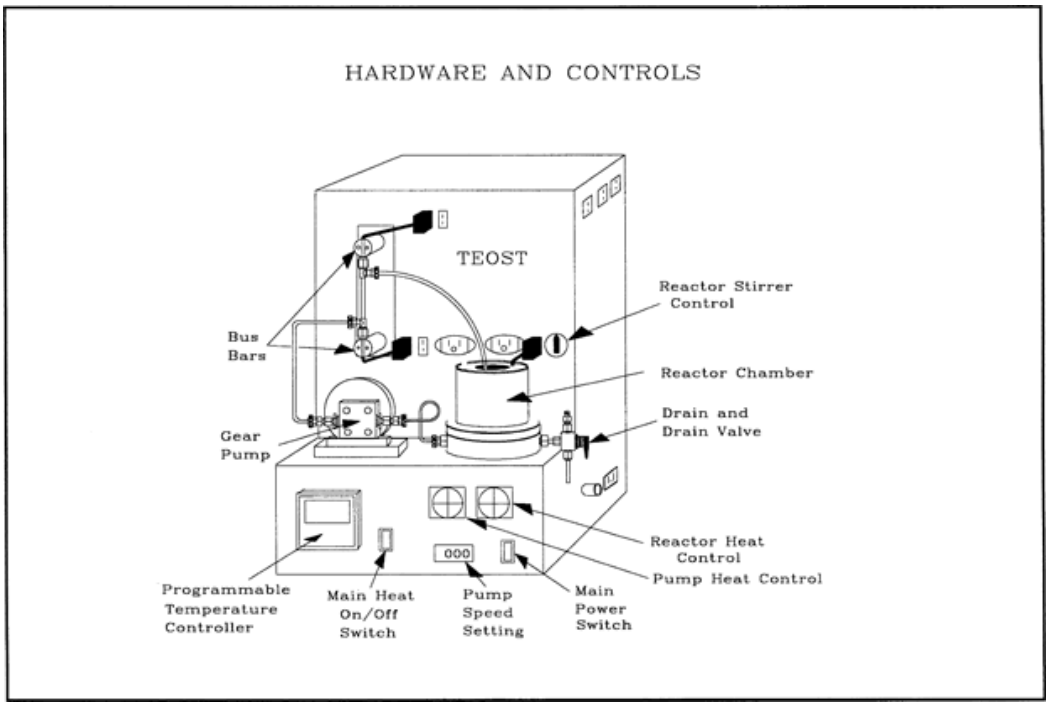

FIG. 1 Thermo-oxidation Engine Oil Simulation Test (TEOST)

KEY CURRENT ACTIVITIES

Chrysler is running a dyno test on a high Moly oil from JAMA. This test is projected to finish in Q1 2009. Once the data from this test are available, there will be further discussion and resolution in ILSAC/Oil.

A presentation on the background, development and application of TEOST 33C test was made by the test developer Savant at the October 23, 2008 ILSAC/Oil meeting.

Adobe Acrobat Document

PERFORMANCE TESTS

ASTM D6894

This is the standard test method for evaluation of aeration resistance of engine oils in direct-injected, turbocharged automotive diesel engines.

SCOPE

This 20-hour test, using an International truck, 7.3-liter engine running at 3000 rpm and wide-open throttle, evaluates engine oil's resistance to aeration. It is commonly referred to as the Engine Oil Aeration Test (EOAT). This test method was developed as a replacement for Test Method D 892 after it was determined that this bench test did not correlate with oil aeration in actual service. The EOAT was first included in API Service Category CG-4 in 1995.

KEY CURRENT ACTIVITIES

There will be further discussion and resolution in ILSAC/Oil.

Sequence IIIGB (IIIG EOT)

SCOPE

This test measures phosphorus volatility.

PERFORMANCE TESTS

CHRYSLER TO PROVIDE

SCOPE

PERFORMANCE TESTS

ASTM D1748

SCOPE

This is the standard test method used for evaluating the rust-preventive properties of metal preservatives under conditions of high humidity.

The test is run in a humidity cabinet that produces a moisture saturated atmosphere with continuous condensation at a constant 120°F (48.9°C) for 33 steel test specimens. Test panels are suspended on a 1/3rpm rotating stage. Air temperature is maintained at 120 ±2°F (48.9 ±1.1°C) by a digital LCD electronic controller.

KEY CURRENT ACTIVITIES

There will be further discussion and resolution in ILSAC/Oil.

PERFORMANCE TESTS

ASTM D7216-05
Elastomer Compatibility Test

This is the standard test method for determining automotive engine oil compatibility with typical seal elastomers.

SCOPE

This test method covers quantitative procedures for the evaluation of the compatibility of automotive engine oils with four reference elastomers that are typical of those used in the sealing materials in contact with these oils. Compatibility is evaluated by determining the changes in volume, Durometer A hardness and tensile properties when the elastomer specimens are immersed in the oil for a specified time and temperature.

Effective sealing action requires that the physical properties of elastomers used for any seal have a high level of resistance to the liquid or oil in which they are immersed. When such a high level of resistance exists, the elastomer is said to be compatible with the liquid or oil. The four reference elastomer formulations specified in this test method were chosen to be representative of those used in heavy-duty diesel engines. The procedures described in this test method, however, can also be used to evaluate the compatibility of automotive engine oils with different elastomer types/formulations or different test durations and temperatures to those employed in this test method.

TEST CONDITIONS

Test procedure	Variation of gear lube test
Test length	20 days (336 hours)
Test temperature	100°C for Nitrile seals 150°C for Silicone Polyacrylic and FKM seals
Seal measurements	Volume swell Hardness change Tensile strength change Elongation change

KEY CURRENT ACTIVITIES

There will be further discussion and resolution in ILSAC/Oil.