

**Report of Meeting
ASTM PM-2 Task Force
Automotive Gear Lubricants and Fluids
PRI Headquarters
Warrendale, PA
August 13, 2008**

CALL TO ORDER

Mr. Akucewich, Chairman, called the meeting to order at 2:20 pm.

AGENDA

Task force (TF) reviewed the agenda. No changes were made. The agenda is shown as Attachment 1. The attendance list is shown as Attachment 2.

MEETING MINUTES

The task force approved the meeting minutes for the May 7, 2008 meeting without changes.

INDUSTRY LETTER UPDATE

The chairman updated the task force as to the status of the industry letter to be sent out. The overhead used in the discussion is shown in as Attachment 3. The industry letter has been approved over the last couple of months via e-mail as per the last meeting's instructions. Attachment 4 is the letter in its final form. The chairman is assembling a distribution list and will send the letter out once the list is put together. The list will be taken from membership lists of ASTM D2, SAE TC-3 and API.

REVIEW TESTING REQUIREMENT / PROPOSED TESTS

The majority of the meeting was used to discuss the individual tests and answer any questions member have about each of the tests selected at this point for each performance category. Attachment 5 contains the overheads for this discussion.

Below are the major items discussed by the panel:


- A concern was raised over the level of performance this new specification will have. PM-2 will be superseding GL-4 and the new spec would require an acceptable oil to demonstrate an increase in performance. PM-2 definitely would be an increase in performance requirements over GL-4 and this is what our charge is from SAE / ASTM. Attachment 6 is a copy of the industry letter directing this task force.
- The panel discussed the setting of pass-fail limits. The consensus of the discussion was that any limits currently outlined in our documents are not set in stone and are

subject to change. The actual setting of the limits would be based on the results of reference tests. The limits would be set at appropriate levels as per the function of the oil for this category.

- The chairman was charged to come up with the general test cost for each test for discussion at the next meeting. The task force members would like to get an idea how much it would be to run a candidate oil through the tests of this category.
- Discussed the need for both storage and compatibility tests in this specification. After a short discussion, it was decided that both were needed due to the way the oil in this specification would be used.
- The biggest obstacle to completing this specification the development of a pitting test. Currently no acceptable pitting tests are available. The group will initially focus on the development of the limits for the other tests. The group will monitor any developments in the pitting tests area.

ADJOURNMENT

The meeting was adjourned about 3:10 pm.

A handwritten signature in black ink, appearing to read "Ed Akucewich", with a long, sweeping horizontal stroke extending to the right.

Edward S. Akucewich,
PM-2 Task Force Chairman

ASTM PM-2 Task Force Meeting
Synchronized Manual Transmission Fluid Specification
for Commercial Vehicles

August 13, 2008

Agenda

- Call To Order
- Review Agenda
- Minutes – 7MAY08
- Industry Letter Update
- Review Requirements / Proposed Tests
- Adjourn

ATTACHMENT 1

PM-2 Task Force Meeting
13-Aug-08
Attendance Record

NAME	ADDRESS	TELEPHONE
CHINTAN VED	FORD Teams & Driveline Engg 35500 Plymouth Rd, Livonia, MI 48150	313-805-9495 cved@ford.com
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Galen Greene	"	ggre@Lubrizol.com
Don Bretlett	"	db@Lubrizol.com
Don Lind	6555 Penn Ave Pgh. PA 15204	412-365-1034 dml@astmtrc.cmu.edu
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STEVE ELIOT	18486 LANIER ISLAND SQ LEESBURG, VA. 20176	703-669-9916 stephen.w.eliote@exxonmobil.com
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Industry Letter Update

- Letter ready to go out
- Putting together mailing list
 - ASTM D2
 - SAE TC-3
- Will send out when have list together

ATTACHMENT 3

Date: ?? August 2008

To: Lubricant Users and Manufacturers

The purpose of this letter is to ask for your help in the development of a new category for commercial vehicle synchromesh manual transmissions and transaxles, designated PM-2, currently taking place within the ASTM D02 B3 Gear Oil Classification Panel (GOCP). ASTM D02 B3 established a task force (PM-2) to develop a new lubricant category to supersede the current API GL-4 category. The PM-2 task force has been working on developing the tests and limits for this new category for the last few years. We have made significant progress in this effort to date.

The PM-2 category consists of the following gear performance requirements (see attachment for proposed tests and limits):

1. High Torque Low Speed Axle
2. Corrosion Protection (wet/dry)
3. High Speed Shock Load
4. Anti-Foaming Performance
5. Storage and Compatibility
6. Synchromesh Durability
7. Oil Elastomer Compatibility
8. Shear Stability & Viscosity
9. Thermal/Oxidative Stability
10. Pitting Resistance

Addressing the above performance requirements, it is felt by the PM-2 task force and GOCP panel that items 1-9 can adequately be satisfied with existing tests.

The PM-2 task force has identified two areas where we could use your guidance and input.

- 1) The first is a request for a standardized test which will fulfill the pitting requirement (item 10 above) of this proposed new category. Pitting resistance poses a problem which could result in a delay in the completion of this new specification. Pitting resistance is recognized by the industry as an important performance requirement. Any input as to a viable test which will meet the pitting test requirement would be greatly appreciated.

- 2) The second area of need is for oils to be used in developing the limits for the category. See attachment for testing requirements and current proposed limits. The task force is in need of both passing and failing oils for each test specified. Any input as to the identification of an oil or supplier of an oil is requested. Preferably the passing oil would be able to pass all the tests in the category and have appropriate field performance documentation.

Please consider the two above requests and forward any comments, questions and suggestions to me within 60 days. Thank you in advance for your attention to this request.

Edward Akucewich, Chairman
PM-2 Task Force
ASTM D02 B3

ASTM PM-2: Requirement / Proposed Tests

<u>Gear Performance Requirement</u>	<u>Proposed Test</u>	<u>Description</u>
Wear (High Torque Low Speed Axle)	CRC L-20 or ASTM D4998	Hypoid axle test – 30 hr at 93C or FZG wear test
Corrosion Protection (wet/dry)	ASTM D7038 (L-33-1) ASTM D130 (non-Fe)	Moisture corrosion test with axle components Standard Cu strip test at 3 hr/121C
Scuffing (High Speed Shock Load)	CEC L-084-02	FZG ½ tooth width step load test (A10/16.6R/120)
Anti-Foaming Performance	ASTM D892	Lab glassware test foaming tendency and stability 93C
Storage and Compatibility	FTM 3440.1 FMT 3430.2	Compatibility with other oils meeting same specification
Synchromesh Durability	CEC L-066-99	FZG SSP180 durability test with standard materials
Oil Elastomer Compatibility	ASTM D5662	Seal immersion test using FL, PA and NI type elastomers
Shear Stability & Viscosity	ASTM D445 ASTM D2983 CEC L-45-A-99	Kinematic viscosity Apparent (dynamic) viscosity 20hr bearing bench test
Thermal/Oxidative Stability	ASTM D5704 (L-60-1)	Bench test – 120ml/163C/Cu strip/air
Pitting Resistance	TBD	TBD

ASTM PM-2: Requirement / Proposed Tests

<u>Gear Performance Requirement</u>	<u>Proposed Test</u>	<u>Requirement</u>
Wear (High Torque Low Speed Axle)	CRC L-20 or ASTM D4998	TBD
Corrosion Protection (wet/dry)	ASTM D7038 (L-33-1) ASTM D130 (non-Fe)	SAE J2360 limits MT-1 limits
Scuffing (High Speed Shock Load)	CEC L-084-02	TBD
Anti-Foaming Performance	ASTM D892	MT-1 limits
Storage and Compatibility	FTM 3440.1 FTM 3430.2	Compatibility with other oils meeting the spec
Synchromesh Durability	CEC L-066-99	TBD
Oil Elastomer Compatibility	ASTM D5662	MT-1 limits
Shear Stability & Viscosity	SAE J306 Tests	SAE J306 limits
Thermal/Oxidative Stability	ASTM D5704 (L-60-1)	MT-1 limits
Pitting Resistance	TBD	TBD

Proposed Tests

Requirement: Wear (High Torque Low Speed Axle)

Test: CRC L-20

Hypoid axle test run in L-37 stand using L-37 hardware.
Run for 30 hrs cycling temperature (200F-250F) at a
slower speed and load than a standard L-37 test.

Limits: TBD – similar to SAE J2360 limits

PRI Headquarters, Warrendale, PA

August 13, 2008

Proposed Tests

Requirement: Wear (High Torque Low Speed Axle)

Test: ASTM D4998

Standard ASTM FZG wear test procedure. Evaluates
gear tooth wear resistance of fluids using A profile gears
operated at 100 rpm using load stage 10 load at 121C for
20 hours.

Gears are evaluated for weight loss and visual surface
condition.

Limits: TBD

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August 13, 2008

Proposed Tests

Requirement: Corrosion Protection

Test: ASTM D7938 (L-33-1)

Standard L-33-1 test procedure. 7 day moisture corrosion test with axle components.

Limits: SAE J2360 Limits

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Proposed Tests

Requirement: Corrosion Protection

Test: ASTM D130

Standard ASTM Cu strip test where copper strips are immersed into the oil for 3hr at 121C. After 3hr the copper is rated for discoloration.

Limits: MT-1 Limits – 2a

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Proposed Tests

Requirement: Scuffing (High Speed Shock Load)

Test: CEC L-084-02

More severe version of the ASTM D5182 Load Stage Wear Test.

FZG ½ tooth width, double speed, reverse rotation test, high temperature. A profile gears, 10 mm width, running at 16.6 m/s starting temperature 121C (A10/16.6R/120)

Limits: TBD

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August 13, 2008

Proposed Tests

Requirement: Storage and Compatibility

Test: FTM 3440.1

Bench test to determine the storage solubility characteristics of the oil.

Oil is heated to 120C for 20 minutes, stored in dark area at room temperature for 30 days. Then oil is centrifuged to see if any separation occurs.

Limits: compatibility with other oils meeting this spec

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Proposed Tests

Requirement: Storage and Compatibility

Test: FTM 3430.2

Bench test to determine the oils compatibility with other oils.

After mixing the oil with reference oils, the oil is heated to 121C for 20 minutes, stored at room temperature for 30 days. Then oil is centrifuged to determine the percentage of separated material.

Limits: compatibility with other oils meeting this spec

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August 13, 2008

Proposed Tests

Requirement: Syncromesh Durability

Test: CEC L-066-99

FZG SSP 180 Synchronizer durability test using production components. Two gears and a synchronizer element are electronically driven at a constant speed. The rig then shifts from one gear to another and back again for a 100k cycles.

Successful completion of the test will allow completion of all the cycles with little reduction in the coefficient of friction and wear of the components.

Limits: TBD

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Proposed Tests

Requirement: Oil Elastomer Compatibility

Test: ASTM D5662

Seal emersion bench test using FL, PA type elastomers measuring the change in elongation , hardness and volume.

Limits: MT-1 Limits

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August 13, 2008

Proposed Tests

Requirement: Thermal/Oxidative Stabily

Test: ASTM 5704 (L-60-1)

50 hr Bench test measuring viscosity increase, carbon/varnish levels and insoluble levels. Uses 120 ml of oil and runs at 350F using a Cu catalyst and air.

Limits: MT-1 Limits

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August 13, 2008

Proposed Tests

Requirement: Shear Stability and Viscosity

Test: ASTM D445

Standard kinematic viscosity test

Limits: SAE J306 Limits for grade

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Proposed Tests

Requirement: Shear Stability and Viscosity

Test: ASTM D2983

Standard test method of low-temperature viscosity as measured by Brookfield Viscometer

Limits: SAE J306 Limits for grade

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August 13, 2008

Proposed Tests

Requirement: Shear Stability and Viscosity

Test: CEC L-45-A-99

Measures shear stability via viscosity measurements using a 20 hr KRL - tapered roller bearing test rig.

Limits: SAE J306 Limits for grade

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August 13, 2008

Proposed Tests

Requirement: Pitting Resistance

Test: TBD

Our job is to find a test that measures the ability of an oil to prevent pitting.

Limits: TBD

PRI Headquarters, Warrendale, PA

August 13, 2008

Committee Correspondence

Name of Committee: Fuels and Lubricants
Division

Date: 12 June, 1998

Reply to:

J. A. Spearot
Fuels and Lubricants Dept.
GM Research & Development Center
30500 Mound Rd. - Box 9055
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Warren, MI 48090-9055
Phone: 810-986-1880
FAX: 810-986-2094

Mr. John Lauck
Chairman, API Lubricants Committee

Mr. Frank Duffey
Chairman, ASTM Subcommittee B

Gentlemen:

Subject: New Gear Category for Commercial Vehicle Synchronesh Manual Transmissions
and Transaxles

SAE has been evaluating the need to develop a new service category for Commercial Vehicle Synchronesh Manual Transmission and Transaxles. SAE Technical Committee Three and SAE Division have completed their evaluation and have voted affirmative that the need exists. One note on the approach that the Task Force took was to address the needs on a global basis. This is reflected in the input of its members and the proposed tests included in the final recommendation as it contains both ASTM and CEC performance tests.

The performance requirements and proposed tests are as follows:

<u>Requirement</u>	<u>Proposed Test</u>
High Torque Low speed Axle	--
Corrosion Protection (wet/dry)	--
High Speed Shock Load	--
Anti Foaming Performance	ASTM D892
Storage and Compatibility	FTM 3440
Synchronesh Durability	--
Shift Quality	
Coefficient of Friction	
Oil Elastomer Compatibility	--

Committee Correspondence

Shear Stability

Tapered Roller Bearing

CEC L-4-T-93

Thermal/Oxidative Stability

CRC L-60 and/or CEC Oxidation Test
(CEC L-48-A-95)

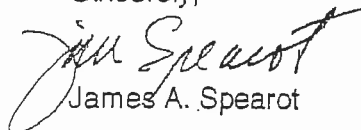
Pitting Resistance

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Accordingly, the SAE Fuels & Lubricants Division requests that the ASTM D02.B and the API Lubricants Committee take appropriate action to create this new category and to determine that appropriate tests and limits are established.

If there are any questions regarding the specifics of the recommendation, please let me know.

Sincerely,



James A. Spearot

cc:

J. Williams - API

R. Klein - Oronite

R. Cain - Lubrizol