ASTM D6795 Engine Oil Filterability Test (EOFT) and ASTM D6794 Engine Oil Water Tolerance Test (EOWTT)

Surveillance Panel Meeting

June 28, 2023

Yong-Li McFarland, Chair

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Agenda

- New EOFT Gelation Test
  - Discuss Pilot study
  - Status on method development and oils
- Next meeting

Surveillance Panel Membership and Scope

17 members

Beth Schwab, Afton Chemical
Robert Stockwell, Chevron Oronite
Dennis Gaal, Exxonmobil
Ron Shah, Infineum
Joe Franklin, Intertek
Karina Gil, Intertek
Michael Johnscher, ISP
Litchi Xie, Lubrizol Additive (Zhuhai) Co., Ltd.
Victoria Fein, Lubrizol
Jason Bowden, OH Technologies Inc
Greg Miiller, Savant Group
Maggie Smerdon, Savant Labs
Sean Alston, SGS North America
Jared Cavaliere, SwRI
Becky Grinfield, SwRI
Yong-Li McFarland*, SwRI
John Loop, TMC

*Chair

Scope and Objective

- It is the responsibility of this panel to provide surveillance over Test Methods D6794 and D6795 bench tests used in the ILSAC and API passenger car oil categories. The surveillance panel will review data semi-annually supporting the precision for each bench test and when necessary, conduct workshops to bring the bench tests within accepted limits. The surveillance panel will function with the support of the ASTM Test Monitoring Center (TMC) in an effort to monitor the bench tests and maintain appropriate and adequate supplies of reference oils for the monitoring process. The panel will maintain a liaison with the "expert groups" in ASTM, which may help in the maintenance and improvement of the bench test methods used in support of the current ILSAC and API categories. The surveillance panel will make recommendations for appropriate action through Subcommittee D02.B, Section 7.

New EOFT Gelation Test WK86363

- Ford request for modified EOFT Gelation Test: request to add a new test filterability test to better screen oils for field issues
- Current status
  - Method: 2 drafts (large volume (600g) and small volume (200 g)) proposed collecting comments on ASTM Collaboration Area, ILS registered ILS# 1854
  - Oils: **19** total fluids offered, different viscosity grades and base oils being considered, samples have shipped and arrived at TMC, consider Pilot Study
  - ILS Labs: 5 labs currently participating
  - ASTM ILS group and SubB statistician (Travis Kostan) engaged and confirmed to help

Pilot Study and ILS Test Matrix

- ILS goals: 1) determine reference oil performance level, 2) precision (repeatability and reproducibility) of possible samples, and 3) select sample volume for final test
- As a TMC monitored test, this ILS needs to include high quality reference oil tests. Require running potential reference oils many repeats by labs. Target a low and high reference oil with some flexibility. Consider a border line reference as well. Will consider any existing reference oils if donated.
- Test precision: target 4-5 samples representative of current fluids to look at variance in results
- Pilot study: suggest 2-3 labs run offered potential reference oil samples to see initial expected performance on both SV and LV procedures. Data then determine which samples are included in full ILS with repeats.

- Oils Donation Volunteers: we are only looking for fluids that could be supplied as reference fluid for this test for the next 3-5 years, sample volume estimate around 330 gallons (for 5 year supply), please let Yongli and John know which and how many samples still being considered
- Determine sample volumes to be shipped to TMC: ?
- Determine sample volume per sample to ship to lab: ?

Potential Pilot Study and ILS Test Matrix cont.

Pilot Study Matrix	ILS Test Matrix	ILS Repeats
Oil 1 (known previous low performance “good”)	Oil 1 (known previous low performance “good”)	5-8
Oil 2 (known previous high performance “poor”)	Oil 2 (known previous high performance “poor”)	5-8
Oil 3 (unknown performance)	Oil 3 (unknown performance)	2-3
Oil 4 (unknown performance)	Oil 4 (unknown performance)	2-3
Oil 5 (unknown performance)	Oil 5 (unknown performance)	2-3
Oil 6 (unknown performance)	Oil 6 (unknown performance)	2-3
Oil 7 (unknown performance)	Oil 7 (unknown performance)	2-3
Oil 8 (unknown performance)		
Oil 9 (unknown performance)		
Oil 10 (unknown performance)		
Oil 11 (unknown performance)		
Oil 12 (unknown performance)		

	Total Tests per lab
Pilot Study	Up to 12 tests SV and up to 12 tests LV
ILS	20-31 tests SV?

Oil Matrix Table

New EOFT Test WK86363	Oil 1 Example only	Oil 2	Oil 3
Oil ID	**Tech 1 0W-16 / TMC 1011**		
SAE Viscosity Grade	0W-16		
Base Oil Group	IIID		
Single Base Oil Slate	Yes		
Additive Available for Reblending	Yes		
Finished Oil Properties			
Kv @100°C, cSt	7.34		
Kv @ 40°C, cSt	37.84		
VI, D2270	164		
CCS D5293 at temperature of grade	5380(-35°C)		
ICP, D5185 with S			
TBN, D2896			
SASH, D874			
Pumping at grade temp, cP (D4684)	19800		
Relative VM Content*	x		
Base Oil Properties			
Base Oil Blend KV @ 100°C	4.218		
Base Oil Blend KV @ 40°C	19.5		
Base Oil Blend VI	122.00		
Base Oil Blend Saturates D2007	98.3		
Base Oil Blend Saturates D7419	pending		
Base Oil Blend Sulfur content D2622	0		

***Anchor the VM level in one blend at X % wt. and report VM level in second blend relative to X. For example X and 0.9X or X and 1.2X.**

Participant	Fluids Offered
Toyota	2 fluids (2 technologies, 0W-20)
~~Ford~~	~~2 fluids~~
Afton	4 fluids (1 technology, 2 vis grades, 2 base oils)
Lubrizol	4 fluids (2 technologies 2 treat rates, 1 vis grade, 1 base oil)
Infineum	4 fluids (2 technologies, Oil 1 - 2 vis. grades, 2 base oils; Oil 2 – 2 VMs, 1 vis. grade, 1 base oil)
Oronite	4 fluids (4 technologies, 1 vis grade, 1 base oil)
Subaru	1 or 2 fluids
Total	**18-19 fluids**

Notes 6-28-23: Include line for Comments: Field Performance

Next Steps

- Review comments to 2 drafts in Collaboration Area
- Draft ILS report form and Beth S and John L to review
- Oils donation participants to send oils and Oil Matrix Excel to TMC
- TMC to ship out samples to Pilot Study labs
- Pilot Study labs run tests: SwRI, ISP, Intertek with Afton and Savant as backup
- Please email Jason Bowden (jhbowden@ohtech.com) to request filters aka coupons for pilot study or ILS study

Participants		
Method Development	Oil Donations	Testing Labs
Afton ExxonMobil Ford Infineum Intertek ISP Lubrizol Oronite Savant SwRI TMC	Afton Ford Infineum Lubrizol OH Technologies (donate filters only) Oronite Subaru TMC (collection, shipping only) Toyota	Afton Intertek ISP Savant SwRI TMC (monitoring system only)

Draft Timeline (realistic)

Task	Date						
	May-Jun 2023	Jul-Aug 2023	Sept-Oct 2023	Nov-Dec 2023	Jan-Feb 2024	Mar-Apr 2024	May-Jun 2024
Develop test procedure and report form (ILS)							
Collect and prepare donated oil samples (? samples)							
Samples shipped to Pilot labs							
Pilot Study labs run tests							
Ship out ILS samples to labs							
Labs run tests and submit results for ILS							
Data analysis to generate Research Report (RR) & Precision							
Ballot test procedure and RR							
Generate pass/fail limits [Outside this Surveillance Panel]							

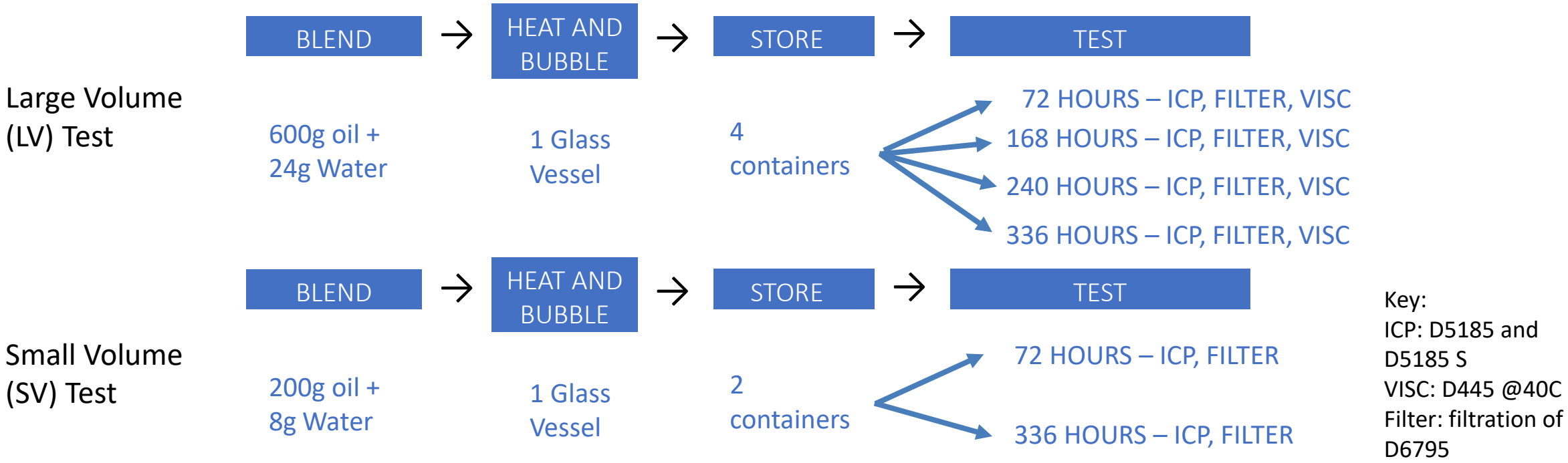
Action Items and Next Meeting

- Additional testing labs to participate in ILS? Let YM know by July 3.
- Jared C to add to method: run D5185 in duplicate per interval using 2 aliquots and other changes
- Yongli M to work on ILS Report form with Mike Deegan and John Loop, and Beth to review
- Oil Participants to send 20 gallons oil (if not already sent) to TMC by July 5 to be considered as a reference oil; if sample already sent, do not send additional sample; consider keeping to 1 (one) batch if possible
- Oil Participants to email Yongli and John L on how many samples eligible as reference oil.
- John L to confirm how many samples arrived at TMC and still eligible as reference oil
- Jared C to updated test name to EOGT (Engine oil gelation test) in 2 drafts
- Yongli M to create clear instructions for running pilot study (order, tests) and send out to pilot labs
- John L to update Oil Matrix table to include row for Comments (field performance, other)

- Next Meeting: July 10 at 8:30am CDT (update invite for whole group, not just oil donation group), meet every 2 weeks

Backup slides

New Filterability Test Flow



Key:
ICP: D5185 and D5185 S
VISC: D445 @40C
Filter: filtration of D6795

New Oil

Test ICP, VISC, Filter LV (@72 hours, 168 hours, 240 hours, 336 hours), Filter SV (@72 hours, 336 hours)

Zero Hour (SV & LV only)

Blend 30g oil + 1.2g Water (no heating or bubbling) → Test ICP, VISC (LV only)