Minutes of the D4485 Surveillance Panel Hybrid Meeting
June 19, 2024
12:00 pm – 1:00 pm
Austin, Texas

Attendance: See sign in sheet. Attendees were asked to indicate if they wish to join the SP membership.

The meeting was called to order at 12:01 pm by the Chair, Laura Birnbaumer.

The Chair reviewed the Agenda.

The Chair asked if there were any changes to the minutes of the last meeting and hearing none, moved for acceptance. Sid Clark seconded. The motion passed unanimously.

The Chair gave a brief history of the Surveillance Panel and how before it's creation, changes to D4485, even type-os and other editorial corrections required presentations to and the recommendation from the Class Panels and ballots at Sub B. With the Surveillance Panel, we are able to use the Information Letter system to make editorial changes with major changes still coming from the Class Panels.

Old Business:

The Chair stated that there will be a 2024 version of D4485 as the Information Letter ballot with the new Heavy Duty elastomers' adjusted limits for the current reference oil had passed and was adjudicated the day prior.

New Business:

Item 1

Beth Schwab Afton. via the phone

ASTM D.02.09.1
ASTM D4485 Survalience Panel Meeting
June 19, 20024
Austin, TX

Name	Organization	Email	Wish to be included on SP mailings
Joe Franklin	Intertek	joe.franklin@intertek.com	Yes
Sid Clark	TMC	SCCLARK@Comcast.Net	
Robert Warden	SwRI	RWarden@swri.org	yes
Michael Lochte	SwRI	MLochte@SWRI.ORG	yes
Sean Moyer	TMC	SAM@ASTMTMC.ORG	Yes
Jeff Clark	TMC	jac@astmtmc.org	Yes
Quancheng Li	ExxonMobil	quancheng.li@exxonmobil.com	yes
Greer Gibbons	Lubrizol	greer.gibbons@lubrizol.com	yes
MIKE DEEGAN	FORD	mdeegan@ford.com	YES
Hind Abi-Akar	Caterpillar	hind.abiakar@cat.com	Yes

Luc Girard	Sanjura Consulting Inc.	lgirard@sanjuraconsulting.com
Jeremy Styer	Vanderbilt Chemicals	jstyer@vanderbiltchemicals.com

TABLE 6 Diesel Engine Oil Category FA-4

Required Test Method	Engine Test Method	Rated or Measured Parameter		Primary Performance Criteria One-test	Two-test[A]	Three-test[A]
T-12 (D7422)	D7422	Top Ring Mass Loss, mg, max		105	105	105
		Cylinder Liner Wear, µm, max		24.0	24.0	24.0
T-13 (D8048)	D8048	IR Peak at EOT, Abs., cm^{-1}		125	130	133
		Kinematic Viscosity Increase at 40 °C, % max		75	85	90
		Avg. Oil Consumption, 48 h to 192 h, g/h, max		Report	Report	Report
T-11 (D7156)	D7156	TGA % Soot at 4.0 mm^2/s increase, at 100 °C, min		3.5	3.4	3.3
		TGA % Soot at 12.0 mm^2/s increase, at 100 °C, min		6.0	5.9	5.9
		TGA % Soot at 15.0 mm^2/s increase, at 100 °C, min		6.7	6.6	6.5
C13 (D7549)	D7549	Merit rating,[A] min		1000	1000	1000
COAT (D8047)	D8047	Average Aeration,[A] 40 h to 50 h, %		11.8	11.8	11.8
ISB (D7484)	D7484	Slider tappet mass loss, mg, average, max		100	108	112
		Cam lobe wear, µm, average, max		55	59	61
		Crosshead mass loss, mg, average		Report	Report	Report
ISM (D7468)	D7468	Top Ring Mass Loss, mg, max		100	100	100
		Merit Rating,[A]		1000	1000	1000
1N (D6750)	D6750	Weighted demerits (WDN), max		286.2	311.7	323.0
		Top groove fill (TGF), %, max		20	23	25
		Top land heavy carbon (TLHC), %, max		3	4	5
		Oil consumption	g/kWh, (0 h to 252 h), max	0.54	0.54	0.54
			(g/MJ) (0 h to 252 h), max	(0.15)	(0.15)	(0.15)
		Piston, ring, and liner scuffing		none	none	none
		Piston ring sticking		none	none	none
RFWT (D5966)	D5966	Average pin wear,	mils, max	0.30	0.33	0.36
			(µm) max	(7.6)	(8.4)	(9.1)

Test Method	Measured Parameter		Primary Performance Criteria
D4683 or D4741 or D5481	SAE J300 Viscosity Grade		SAE xW-30
	High temperature/high shear viscosity at 150 °C, mPa·s	min	2.9
		max	3.2
HTCBT, 135 °F (D6594)	Copper, mg/kg increase, max		20
	Lead, mg/kg increase, max		120
	Copper strip rating,[B] max		3
Noack (D5800)	Evaporative loss at 250 °C, %, max		13
Foam (D892)	Foaming/settling,[C] Sequence I, mL, max		10/0
	Foaming/settling,[C] Sequence II, mL, max		20/0
	Foaming/settling,[C] Sequence III, mL, max		10/0
D7109 and HTHS Viscosity (see above methods) after 90 pass shearing	Kinematic viscosity after 90 pass shearing, mm^2/s at 100 °C, min		9.3
	HTHS Viscosity at 150 °C, mPa·s, min		2.8
Sooted Oil MRV TP-1 (D6896) (D7156 Engine test required)	Viscosity, 180 h used oil sample from a T-11/T-11A test, tested at –20 °C, mPa·s, max		25 000
	Yield stress of the 180 h used oil sample above, Pa max		≤35

Chemical Limits (non-critical)

Test Method	Measured Parameter	Primary Performance Criteria
D874	Mass fraction sulfated ash, %, max	1.0

HTCBT, 135 °F (D6594)	Copper, mg/kg increase, max	20
	Lead, mg/kg increase, max	120
	Copper strip rating,[B] max	3

Beth Schwab moved to correct the HTCBT temperature method in Table 6 from degrees F to degrees C. Joe Franklin seconded. The motion passed unanimously.

Item 2

X7. REQUIREMENTS FOR API SERVICE CATEGORY SN AND API SN WITH RESOURCE CONSERVING

X7.1 See Table X7.1.

X7.2 SN PLUS Classification in conjunction with API Service Category SN and API SN with Resource Conserving (see Table X7.2).

TABLE X7.1 Requirements for API Service Category SN and API SN with Resource Conserving, and API SN with SN Plus

NOTE 1—All oils must meet the requirements of the most recent edition of SAE J300.

NOTE 2—NR = Not required.

	API SN	API SN	API SN with Resource Conserving
	SAE 0W-16, SAE 5W-16, SAE 0W-20, SAE 5W-20, SAE 0W-30, SAE 5W-30, SAE 10W-30	Other Viscosity Grades	All Viscosity Grades
Engine Test Requirements[A]			
ASTM D7320, (Sequence IIIG)			

TABLE X7.1 *Continued*

	API SN	API SN	API SN with Resource Conserving
	SAE 0W-16, SAE 5W-16, SAE 0W-20, SAE 5W-20, SAE 0W-30, SAE 5W-30, SAE 10W-30	Other Viscosity Grades	All Viscosity Grades
with 0.6 % H_2O	50	50	50
with 1.0 % H_2O	50	50	50
with 2.0 % H_2O	50	50	50
with 3.0 % H_2O	50	50	50
ASTM D4951 or D5185, phosphorus % mass, max[G]	0.08[H]	NR	0.08[H]
ASTM D4951 or D5185, phosphorus % mass, min[G]	0.06[H]	0.06[H]	0.06[H]
ASTM D4951, D5185, or D2622, sulfur % mass, max[G]			
SAE 0W-16, 5W-16, 0W-20, 0W-30, 5W-20, and 5W-30	0.5[G]	NR	0.5[G]
SAE 10W-30	0.6[G]	NR	0.6[G]
All other viscosity grades	NR	NR	0.6[G]
ASTM D892 (Option A), foaming tendency			
Sequence I, mL, max, tendency/stability	10/0[I]	10/0[J]	10/0[I]
Sequence II, mL, max, tendency/stability	50/0[I]	50/0[J]	50/0[I]
Sequence III, mL, max, tendency/stability	10/0[I]	10/0[J]	10/0[I]
ASTM D6082 (Option A), high-temperature foaming mL, max, tendency/stability[I]	100/0	100/0	100/0
ASTM D6922, homogeneity and miscibility	K	K	K
ASTM D6709, (Sequence VIII) shear stability	L	L	L
ASTM D7097, TEOST MHT, high-temperature deposits, deposit wt, mg, max[F]	35	45	35
ASTM D5133, gelation index, max[B]	12[M]	NR	12[M]
ASTM D6335, TEOST 33C, high-temperature deposits, total deposit weight, mg, max			
SAE XW-16	NR	NR	NR
SAE 0W-20	NR	NR	NR
All other viscosity grades	NR	NR	30
ASTM D7563, emulsion retention	NR	NR	no water separation

[A] Tests are per ASTM requirements.

[B] If CI-4, CJ-4, CK-4 and/or FA-4 categories precede the "S" category and there is no API Certification Mark, the Sequence VG (ASTM D6593) or Sequence VH (ASTM

Beth Schwab noticed that in the 2022 version of the Standard, the Elastomer Requirement for API SN and API SN With Resource Conserving (Table X7.1) had disappeared and moved to add it back. Joe Franklin seconded the motion. The motion passed unanimously.

Item 3

TABLE 2 Diesel Engine Oil Category CH-4

Required Test Method	Test Method	Rated or Measured Parameter		Primary Performance Criteria		
				One-test	Two-test[A]	Three-test[A]
1P (D6681[B])	D6681	Weighted demerits (WDP), max		350	378	390
		Top groove carbon (TGC), demerits, max		36	39	41
		Top land carbon (TLC), demerits, max		40	46	49
		Average Oil Consumption, g/h (0 h – 360 h), max		12.4	12.4	12.4
		Final Oil Consumption, g/h (312 h – 360 h), max		14.6	14.6	14.6
		Piston, ring, and liner scuffing		none	none	none[C]
1K (D6750[D])	D6750	Weighted demerits (WDK), %, max		332	347	353
		Top groove fill (TGF), %, max		24	27	29
		Top land heavy carbon (TLHC), %, max		4	5	5
		Average Oil Consumption	g/kWh (0 h – 252 h), max	0.54	0.54	0.54
			g/MJ (0 h – 252 h), max	0.15	0.15	0.15
		Piston, ring, and liner scuffing		none	none	none[C]
T-9 (D6483) or T-10 (D6987/D6987M) or T-12 (D7422)	D6483	Average Liner Wear, normalized to 1.75 % soot, µm max		25.4	26.6	27.1
		Average Top Ring Mass Loss, mg max[E]		120	136	144
		EOT Used Oil Lead Content less New Oil Lead Content, mg/kg, max		25	32	36
	D6987/D6987M	Liner wear, µm, max		32	34	35
		Ring wear, mg, max		150	159	163
		Lead content at EOT, mg/kg, max		50	56	59
	D7422	Liner wear, µm, max		30.0	30.8	31.1
		Top Ring Mass Loss, mg, max		120	132	137
		Lead content at EOT, mg/kg, max		65	75	79
RFWT (D5966)	D5966	Average Pin Wear	mils, max	0.30	0.33	0.36
			(µm) max	(7.6)	(8.4)	(9.1)
M11 (D6838[F]) or ISM (D7468)	D6838	Rocker Pad Average Mass Loss, normalized to 4.5 % soot, mg max		6.5	7.5	8.0
		Oil Filter Differential Pressure at EOT, kPa max		79	93	100
		Average Engine Sludge, CRC Merits at EOT, min		8.7	8.6	8.5
	D7468	Crosshead wear, mg, max		7.5	7.8	7.9
		Oil filter delta pressure, at 150 h, kPa, max		79	95	103
		Sludge rating, CRC merits, min		8.1	8.0	8.0
Ext. T-8E (D5967[G])	D5967	Relative Viscosity at 4.8 % Soot by TGA, max		2.1	2.2	2.3
		Viscosity increase at 3.8 % Soot by TGA, mm²/s, max		11.5	12.5	13.0
Sequence IIIF (D6984) or	D6984	60 h Viscosity at 40 °C, increase from 10 min sample, % max			295	

Ext. T-8E (D5967[G])	D5967	Relative Viscosity at 4.8 % Soot by TGA, max	2
		Viscosity increase at 3.8 % Soot by TGA, mm²/s, max	11

Footnote refers to T-11 as an alternative

acea

2022 ACEA Oil Sequences for Heavy-Duty E

REQUIREMENT	TEST METHOD	PROPERTIES	UNIT	E4-22
2. ENGINE TESTS				
2.1 Wear	CEC L-99-08 (OM646LA)	Cam wear outlet (avg max wear 8 cams)	µm	≤140
2.2 * Soot in oil	ASTM D5967 (Mack T-8E)	Test duration 300h relative viscosity at 4.8% soot and 50% shear loss		≤2.1

Digging back through meeting notes from the Mack SP, I did find a note from '01 that clearly states which was being used where.

- Issues regarding T-8E relative viscosity: The CI-4 category uses 100% DIN shear as the initial viscosity, while CH-4 uses 50%, and the results differ. 100% DIN shear is not currently monitored for calibration or severity adjusted. **Proposal** – Add 100% DIN shear calculation to T-8E as 3rd parameter for severity adjustment only…not critical for stand calibration.
  Jeff noted he can back calculate targets from the existing data base.
  Greg Shank noted that he would prefer to calibrate stands using the 100% DIN shear targets and use 50% for SA's. **Action** – Jeff Clark will draft a proposal and lab charts for the above data and we will discuss during a teleconference in January.
  Bob Campbell questioned if we need to monitor DIN shear, and Joe Franklin suggested we look at the status of the data and discuss during the above teleconference.

TABLE 3 Diesel Engine Oil Category CI-4

Required Test Method	Engine Test Method	Rated or Measured Parameter	Primary Performance Criteria		
			One-test	Two-test[A]	Three-test[A]
1R (D6923) or 1P (D6681)	D6923	Weighted demerits (WDR), max	382	396	402
		Top groove carbon (TGC), demerits, max	52	57	59
		Top land carbon (TLC), demerits, max	31	35	36
		Initial oil consumption (IOC), (0 h – 252 h), g/h, average	13.1	13.1	13.1
		Final oil consumption,(432 h – 504 h), g/h, average, max	IOC + 1.8	IOC + 1.8	IOC + 1.8
		Piston, ring, and liner distress	none	none	none
		Ring sticking	none	none	none
	D6681	Weighted demerits (WDP), max	350	378	390
		Top groove carbon (TGC), demerits, max	36	39	41
		Top land carbon (TLC), demerits, max	40	46	49
		Average oil consumption, g/h (0 h – 360 h), max	12.4	12.4	12.4
		Final oil consumption, g/h (312 h – 360 h), max	14.6	14.6	14.6
		Piston, ring, and liner scuffing	none	none	none
T-10 (D6987/D6987M) or T-12 (D7422)	D6987/D6987M	Merit rating,[A] min	1000	1000	1000
	D7422	Merit rating,[A] min	1000	1000	1000
M11 EGR (D6975) or ISM (D7468)	D6975	Average crosshead mass. loss, mg, max	20.0	21.8	22.6
		Average top ring mass loss, mg	report	report	report
		Oil filter differential pressure at 250 h, kPa, max	275	320	341
		Average engine sludge, CRC merits at EOT, min	7.8	7.6	7.5
	D7468	Crosshead wear, mg, max	7.5	7.8	7.9
		Oil filter Δ pressure at 150 h, kPa, max	55	67	74
		Sludge rating, CRC Merits, min	8.1	8.0	8.0
Ext. T-8E (D5967)[B]	D5967	Relative viscosity at 4.8 % soot[C]	1.8	1.9	2.0
Sequence IIIF	D6984	Kinematic viscosity (at 40 °C), percent increase, max	275	275 (MTAC)	275 (MTAC)

[C] Relative Viscosity (RV) = viscosity at 4.8 % soot/viscosity of new oil sheared in Test Method D6278.

Robert Warden noticed the % shear loss descriptor was missing from the T-8E Relative Viscosity at 4.8% Soot for CH-4 (Table 2) and CI-4 (Table 3), provided the comparable requirement from ACEA and past Mack Survailence Panel minutes on this topic and moved to clarify and add back the % loss for the T-8E Relative Viscosity at 4.8% Soot – 50% shear loss for CH-4 and 100% shear loss for CI-4. Greer Gibbons seconded. The motion passed unanimously.

Item 4

Tables 5 (API CK-4) and 6 (API FA-4) both list the parameters for the Cummins ISM as such

ISM (D7468)	D7468	Top Ring Mass Loss, mg, max	100
		Merit Rating,[A]	1000

While Table 4 (API CJ-4) lists the same parameters in the opposite direction

ISM (D7468)	D7468	Merit rating,[A] min	1000
		Top ring mass loss, mg, max	100

Robert Warden moved to change the order of the listing of the ISM parameters in Tables 5 and 6 so that they match the order of the ISM parameters in Table 4 with the Merit rating appearing first. Luc Girard seconded. The motion passed unanimously.

Item 5

Tables 2 (API CH-4) and 3 (API CI-4) have a Shear Stability requirement.

D6278	D6278	Kinematic Viscosity after shearing, mm²/s at 100 °C, min	SAE XW-30	SAE XW-40
			9.3	12.5

[A] See Annex A3 for additional information.

ASTM declared D7109 at 30 cycles equivalent to D6278 in Research Report D02-2041. Both D6278 and D7109 use the Bosh injector to shear the oil and the number of cycles is the same – 30.

Designation: D7109 – 22$^{\varepsilon 1}$

Standard Test Method for Shear Stability of Polymer-Containing Fluids Using a European Diesel Injector Apparatus at 30 Cycles and 90 Cycles[1]

NOTE 2—Test Method D6278 uses essentially the same procedure with 30 cycles but without the 90 cycles portion of the test. The correlation between results from this test method at 30 cycles and results from Test Method D6278 has been established and shown in Research Report RR:D02-2041 to be equivalent.

Laura Birnbaumer moved to add "or D7109 30 cycles" as an alternative shear stability method to both Tables 2 and 3. Joe Franklin seconded. The motion passed unanimously.

Item 6

Table 4 (API CJ-4), 5 (API CK-4) and 6 (API FA-4) list the Mass Fraction Phosphorus and Mass Fraction Sulfur as part of the Category's chemical box by D4951.

	Measure the yield stress, Pa	<35
	Chemical Limits (non-critical)	
Bench Test Methods	Measured Parameter	Primary Performance Criteria
D874	Mass fraction sulfated ash, %, max	1.0
D4951	Mass fraction phosphorus, %, max	0.12
	Mass fraction sulfur, %, max	0.4

Table 1 (API SJ and SL) already allows either method to measure the Mass Fraction of Phosphorus.

D4485 – 22ε1

TABLE 1 S Engine Oil Categories

	API SJ Category		
e Test Method	Rated or Measured Parameter		
	with 3.0 % H_20	report	report
Test Method D4951 or D5185, mass fraction phosphorus, %, max	0.10[T]		NR[U]
Test Method D4951 or D5185, mass fraction phosphorus, %, min (unless valid passing Test Method D5302 results are obtained)	0.06		0.06

Designation: D5185 – 18

Standard Test Method for Multielement Determination of Used and Unused Lubricating Oils and Base Oils by Inductively Coupled Plasma Atomic Emission Spectrometry (ICP-AES)[1]

Costs associated with maintenance due to engine and machine wear can be significant. Therefore, diagnostic methods for determining the condition of engines and other machinery can be important. This test method is intended to quantify, for the purpose of equipment monitoring, the concentration of metals in used lubricating oils. Although the precision statement was determined by analyzing a variety of used oils this test method can, in principle, be used for the analysis of unused oils to provide more complete elemental composition data than Test Methods D4628, D4927, or D4951.

Laura Birnbaumer shared she had done a comparison of D4951 and D5185 so that API and ACEA now accepted either method for the elemental requirements of their Categories. Joe Franklin requested that all of this support be recorded in the minutes as additional justification for the change in case anyone asks. Laura moved to add D5185 as an alternative method to measuring the Mass Fraction Phosphorus and Mass Fraction Sulfur. Joe seconded the motion. The motion passed unanimously.

Item 7

Mike Deegan said that ILSAC is defined twice in D4485; once in the Introduction and once in X.5.1 and both are incorrect. The correct name is International Lubricant Specification Advisory Committee. Mike asked to have D4485 corrected.

Tabled Business:

Beth Schwab noticed that CH-4 (Table 2) and CI-4 (Table 3) clearly stated that Option A was not allowed for D892 foam while CJ-4 made no mention of optional blending. She questioned if this was intentional or unintentionally left out. Laura Birnbaumer asked the question of the Heavy Duty Engine Oil Class Panel the day prior in case anyone could recall the discussion from that time. Attendees mentioned looking for Class Panel minutes on the TMC website. The item was tabled so that a search could be performed. During the SP meeting Bob Warden located the HDEOCP minutes from 2006 where this change in foam was an intentional change. This item will come off the table at the December meeting.

The next meeting will be at the call of the Chair or December 11 during Committee Week in Anaheim.

The meeting adjourned at 12:32.