A Program of ASTM International

Test Monitoring Center

@ Carnegie Mellon University
6555 Penn Avenue, Pittsburgh, PA 15206, USA

http://astmtmc.cmu.edu
412-365-1000

D4485 Information Letter 19-5
Sequence Number 5
August 15, 2019

ASTM consensus has not been obtained on this information letter. An appropriate ASTM ballot will be issued in order to achieve such consensus.

TO: D4485 Mailing List

SUBJECT: Add ILSAC GF-6A/GF-6B Standard for Passenger Car Engine Oils

On July 9, 2019 the D4485 Surveillance Panel approved the addition of the ILSAC GF-6A / GF-6B Standard for Passenger Car Engine Oils to D4485. The changes are detailed below.

1. Added new section X8. ILSAC GF-6A/GF-6B Standard for Passenger Car Engine Oils (Effective May 1, 2020)
2. Added new Table X8.1 ILSAC GF-6A Passenger Car Engine Oil Standard
3. Added new Table X8.2 ILSAC GF-6B Passenger Car Engine Oil Standard

The text of the revisions is shown in the attachment. This change is effective with the issuance of this information letter.

Joe Franklin
Chairman
ASTM Subcommittee B

Frank M. Farber
Director
ASTM Test Monitoring Center

Attachment
c: http://www.astmtmc.cmu.edu/ftp/docs/d4485/IL_19-5_D4485.pdf
Distribution: Email

X8. ILSAC GF-6A/GF-6B Standard for Passenger Car Engine Oils (Effective May 1, 2020)

See Table X8.1 GF-6A
See Table X8.2 GF-6B

X8.1 The Japan Automobile Manufacturers Association, Inc. and representatives from Fiat Chrysler Automobiles, Ford Motor Company, and General Motors LLC, through an organization called the International Lubricants Standardization Advisory Committee (ILSAC), jointly developed and approved the ILSAC GF-6A and GF-6B minimum performance standards for engine oils for spark-ignited internal combustion engines (see Tables X8.1 and X8.2).

X8.2 This standard specifies the minimum performance requirements (both engine sequence and bench tests) and chemical and physical properties for engine oils for spark-ignited internal combustion engines. It is expected that many engine manufacturers will recommend ILSAC GF-6A and/or GF-6B oils. However, performance parameters other than those covered by the tests included or more stringent limits on those tests included in these standards may be required by individual OEMs.

X8.3 In addition to meeting the requirements of the standards, it is the oil marketer's responsibility to be aware of and comply with all applicable legal and regulatory requirements on substance use restrictions, labeling, and health and safety information when marketing products meeting the ILSAC GF-6A and GF-6B standards. It is also the marketer's responsibility to conduct its business in a manner that represents minimum risk to consumers and the environment.

X8.4 The ultimate assessment of an engine oil's performance must include a variety of vehicle fleet tests that simulate the full range of customer driving conditions. The engine sequence tests listed in this document have been specified instead of fleet testing to minimize testing time and costs. This simplification of test requirements is only possible because the specified engine sequence tests have been judged to be predictive of a variety of vehicle tests.

X8.5 The relationships between engine sequence tests and vehicle fleet tests are judged valid based only on the range of base oils and additive technologies investigated — generally those that have proven to have satisfactory performance in service and that are in widespread use at this time. The introduction of base oils or additive technologies that constitute a significant departure from existing practice requires sufficient supporting vehicle fleet testing data to ensure there is no adverse effect to vehicle components or to emission control systems. This vehicle fleet testing should be conducted in addition to the other performance requirements listed in these standards.

X8.6 It is the responsibility of any individual or organization introducing a new technology to perform this vehicle fleet testing, and the responsibility of the oil marketer to ensure the testing of new technology was satisfactorily completed. No marketer can claim to be acting in a reasonable and prudent manner if they knowingly use a new technology based only on the results of engine sequence testing without verifying the suitability of the new technology in vehicle fleet testing that simulates the full range of customer operation.

X8.7 The ILSAC GF-6A and GF-6B Minimum Performance Standards include tests for which Viscosity Grade Read Across and Base Oil Interchange Guidelines have been developed by the appropriate groups. It should be pointed out, however, that when oil marketers use the guidelines, they do so based on their own judgment and at their own risk. The use of any guidelines does not absolve the marketer of the responsibility for meeting all specified requirements for any products the marketer sells in the marketplace that are licensed as ILSAC GF-6A or GF-6B with API.

Table X8.1 ILSAC GF-6A Passenger Car Engine Oil Standard

Requirement	Criterion
Fresh Oil Viscosity Requirements	
SAE J300	Oils shall meet all requirements of SAE J300. Viscosity grades are limited to SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30 multi-grade oils
Gelation index	ASTM D5133 12 (max) To be evaluated from –5˚C to temperature at which 40,000 cP is attained or –40˚C, or 2 Celsius degrees below appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first
Engine Test Requirements	
Wear and oil thickening	ASTM Sequence IIIH (ASTM D8111)
Kinematic viscosity increase @ 40°C, %	100 (max)
Average weighted piston deposits, merits	4.2 (min)
Hot stuck rings	None
Wear, sludge, and varnish	ASTM Sequence VH (ASTM D8256)
Average engine sludge, merits	7.6 (min)
Average rocker cover sludge, merits	7.7 (min)
Average engine varnish, merits	8.6 (min)
Average piston skirt varnish, merits	7.6 (min)
Oil screen sludge, % area	Rate and report
Oil screen debris, % area	Rate and report
Hot-stuck compression rings	None
Cold stuck rings	Rate and report
Oil ring clogging, % area	Rate and report
Valvetrain wear	ASTM Sequence IVB (ASTM DXXXX)
Average intake lifter volume loss (8 position avg), mm^3	2.7 (max)
End of test iron, ppm	400 (max)
Bearing corrosion	ASTM Sequence VIII (ASTM D6709)
Bearing weight loss, mg	26 (max)
Fuel efficiency	ASTM Sequence VIE (ASTM D8114)
SAE XW-20 viscosity grade	
FEI SUM	3.8% min
FEI 2	1.8% min after 125 hours aging
SAE XW-30 viscosity grade	
FEI SUM	3.1% min
FEI 2	1.5% min after 125 hours aging
SAE 10W-30 viscosity grade	
FEI SUM	2.8% min
FEI 2	1.3% min after 125 hours aging
Low-speed pre-ignition prevention	ASTM Sequence IX (ASTM DXXXX)
Average number of events for four iterations	5 (max)
Number of events per iteration	8 (max)
Chain wear	ASTM Sequence X (ASTM D8279)
Percent increase	0.085 (max)

Table X8.1 ILSAC GF-6A Passenger Car Engine Oil Standard (Continued)

Requirement	Criterion
Bench Test Requirements	
Catalyst compatibility	ASTM D4951 or D5185
Phosphorus content, % (mass)	0.08 (max)
Phosphorus volatility (Sequence IIIHB, phosphorus retention)	ASTM D7320 81% (min)
Sulfur content	ASTM D4951, D5185, or D2622
SAE 0W and 5W multigrades, % (mass)	0.5 (max)
SAE 10W-30, % (mass)	0.6 (max)
Wear	ASTM D4951 or D5185
Phosphorus content, % (mass)	0.06 (min)
Volatility	ASTM D5800 (B&D)
Evaporation loss, %	15.0 (max), 1 hour at 250°C
High temperature deposits	TEOST 33C (ASTM D6335)
Total deposit weight, mg	30 (max) Note: No TEOST 33C limit for SAE 0W-20.
Filterability	ASTM D6794
EOWTT, %	
with 0.6% H_2O	50 (max) flow reduction
with 1.0% H_2O	50 (max) flow reduction
with 2.0% H_2O	50 (max) flow reduction
with 3.0% H_2O	50 (max) flow reduction Note: Test formulation with highest additive (DI/VI) concentration. Read across results to all other base oil/viscosity grade formulations using same or lower concentration of identical additive (DI/VI) combination. Each different DI/VI combination must be tested.
EOFT, %	ASTM D6795 50 (max) flow reduction
Fresh oil foaming characteristics	ASTM D892 (Option A and excluding Section 11 Alternative Procedure)
Tendency, mL	
Sequence I	10 (max)
Sequence II	50 (max)
Sequence III	10 (max)
Stability, mL, after 1-minute settling	
Sequence I	0 (max)
Sequence II	0 (max)
Sequence III	0 (max)
Fresh oil high temperature foaming characteristics	ASTM D6082 (Option A)
Tendency, mL	100 (max)
Stability, mL, after 1-minute settling	0 (max)

Table X8.1 ILSAC GF-6A Passenger Car Engine Oil Standard (Continued)

Requirement	Criterion
Aged oil low temperature viscosity Measure aged oil low temperature viscosity on final formulation (pursuant to existing read across described in Annex F)—this includes base oil and additive combination being licensed—for each viscosity grade by either ROBO or IIIHA Measure CCS viscosity of EOT ROBO or IIIHA sample at CCS temperature corresponding to original viscosity grade	ROBO (ASTM D7528) a) If CCS viscosity measured is less than or equal to the maximum CCS viscosity specified for the original viscosity grade, run ASTM D4684 (MRV TP-1) at the MRV temperature specified in SAE J300 for the original viscosity grade. b) If CCS viscosity measured is higher than the maximum viscosity specified for the original viscosity grade in J300, run ASTM D4684 (MRV TP-1) at 5°C higher temperature (i.e., at MRV temperature specified in SAE J300 for the next higher viscosity grade). c) EOT ROBO sample must show no yield stress in the D4684 test and its D4684 viscosity must be below the maximum specified in SAE J300 for the original viscosity grade or the next higher viscosity grade, depending on the CCS viscosity grade, as outlined in a) or b) above. Or
Aged oil low temperature viscosity Measure aged oil low temperature viscosity on final formulation (pursuant to existing read across described in Annex F)—this includes base oil and additive combination being licensed—for each viscosity grade by either ROBO or IIIHA Measure CCS viscosity of EOT ROBO or IIIHA sample at CCS temperature corresponding to original viscosity grade	ASTM Sequence IIIHA (ASTM D8111) d) If CCS viscosity measured is less than or equal to the maximum CCS viscosity specified for the original viscosity grade, run ASTM D4684 (MRV TP-1) at the MRV temperature specified in SAE J300 for the original viscosity grade. e) If CCS viscosity measured is higher than the maximum viscosity specified for the original viscosity grade in J300, run ASTM D4684 (MRV TP-1) at 5°C higher temperature (i.e., at MRV temperature specified in SAE J300 for the next higher viscosity grade). f) EOT IIIHA sample must show no yield stress in the D4684 test and its D4684 viscosity must be below the maximum specified in SAE J300 for the original viscosity grade or the next higher viscosity grade, depending on the CCS viscosity grade, as outlined in a) or b) above.
Shear stability 10-hour stripped KV @ 100°C XW-20 XW-30	ASTM Sequence VIII (ASTM D6709) Stay in grade Stay in grade
Homogeneity and miscibility	ASTM D6922 Shall remain homogeneous and, when mixed with ASTM Test Monitoring Center (TMC) reference oils, shall remain miscible.
Engine rusting Average gray value	Ball Rust Test (ASTM D6557) 100 (min)
Emulsion retention 0°C, 24 hours 25°C, 24 hours	ASTM D7563 No water separation No water separation
Elastomer compatibility	ASTM D7216 Annex A2 Candidate oil testing for elastomer compatibility shall be performed using the five Standard Reference Elastomers (SREs) referenced herein and defined in SAE J2643. Candidate oil testing shall be performed according to ASTM D7216 Annex A2. The post-candidate-oil-immersion elastomers shall conform to the specification limits detailed below:

Elastomer Material (SAE J2643)	Test Procedure	Material Property	Units	Limits
Polyacrylate Rubber (ACM-1)	ASTM D471	Volume	% Δ	-5, 9
	ASTM D2240	Hardness	pts.	-10, 10
	ASTM D412	Tensile Strength	% Δ	-40, 40
Hydrogenated Nitrile Rubber (HNBR-1)	ASTM D471	Volume	% Δ	-5, 10
	ASTM D2240	Hardness	pts.	-10, 5
	ASTM D412	Tensile Strength	% Δ	-20, 15
Silicone Rubber (VMQ-1)	ASTM D471	Volume	% Δ	-5, 40
	ASTM D2240	Hardness	pts.	-30, 10
	ASTM D412	Tensile Strength	% Δ	-50, 5
Fluorocarbon Rubber (FKM-1)	ASTM D471	Volume	% Δ	-2, 3
	ASTM D2240	Hardness	pts.	-6, 6
	ASTM D412	Tensile Strength	% Δ	-65, 10
Ethylene Acrylic Rubber (AEM-1)	ASTM D471	Volume	% Δ	-5, 30
	ASTM D2240	Hardness	pts.	-20, 10
	ASTM D412	Tensile Strength	% Δ	-30, 30

Applicable Documents:

1. SAE Standard, Engine Oil Viscosity Classification—SAE J300, *SAE Handbook*.
2. SAE Standard, Standard Reference Elastomers (SRE) for Characterizing the Effects on Vulcanized Rubbers, Proposed Draft 2003-5—SAE J2643, *SAE Handbook*.
3. ASTM Annual Book of Standards, Volume 5, Petroleum Products and Lubricants, current edition.
5. M. Batko and D. F. Florkowski, “Low Temperature Rheological Properties of Aged Crankcase Oils,” SAE Paper 2000-01-2943.
6. M. Batko and D. F. Florkowski, “Lubricant Requirements of an Advanced Designed High Performance, Fuel Efficient Low Emissions V-6 Engine,” SAE Paper 01FL-265

Table X8.2 ILSAC GF-6B Passenger Car Engine Oil Standard

Requirement	Criterion
Fresh Oil Viscosity Requirements	
SAE J300	Oils shall meet all requirements of SAE J300. Viscosity grades are limited to SAE 0W-16 multi-grade oils
Gelation index	ASTM D5133 12 (max) To be evaluated from –5˚C to temperature at which 40,000 cP is attained or –40˚C, or 2 Celsius degrees below appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first
Engine Test Requirements	
Wear and oil thickening	ASTM Sequence IIIH (ASTM D8111)
Kinematic viscosity increase @ 40°C, %	100 (max)
Average weighted piston deposits, merits	4.2 (min)
Hot stuck rings	None
Wear, sludge, and varnish	ASTM Sequence VH (ASTM D8256)
Average engine sludge, merits	7.6 (min)
Average rocker cover sludge, merits	7.7 (min)
Average engine varnish, merits	8.6 (min)
Average piston skirt varnish, merits	7.6 (min)
Oil screen sludge, % area	Rate and report
Oil screen debris, % area	Rate and report
Hot-stuck compression rings	None
Cold stuck rings	Rate and report
Oil ring clogging, % area	Rate and report
Valve train wear	ASTM Sequence IVB (ASTM DXXXX)
Average intake lifter volume loss (8 position avg.), mm^3	2.7 (max)
End of test iron, ppm	400 (max)
Fuel efficiency	ASTM Sequence VIF (ASTM D8226)
SAE 0W-16 viscosity grade	
FEI SUM	4.1% min
FEI 2	1.9% min after 125 hours aging
Low-speed pre-ignition prevention	ASTM Sequence IX (ASTM DXXXX)
Average number of events for four iterations	5 (max)
Number of events per iteration	8 (max)
Chain wear	ASTM Sequence X (ASTM D8279)
Percent increase	0.085 (max)

Table X8.2 ILSAC GF-6B Passenger Car Engine Oil Standard (Continued)

Requirement	Criterion
Bench Test Requirements	
Catalyst compatibility	ASTM D4951 or D5185
Phosphorus content, % (mass)	0.08 (max)
Phosphorus volatility (Sequence IIIHB, phosphorus retention)	ASTM D7320 81% (min)
Sulfur content	ASTM D4951, D5185, or D2622
SAE 0W and 5W multi-grades, % (mass)	0.5 (max)
Wear	ASTM D4951 or D5185
Phosphorus content, % (mass)	0.06 (min)
Volatility	ASTM D5800 (B&D)
Evaporation loss, %	15.0 (max), 1 hour at 250°C
Filterability	ASTM D6794
EOWTT, %	
with 0.6% H_2O	50 (max) flow reduction
with 1.0% H_2O	50 (max) flow reduction
with 2.0% H_2O	50 (max) flow reduction
with 3.0% H_2O	50 (max) flow reduction Note: Test formulation with highest additive (DI/VI) concentration. Read across results to all other base oil/viscosity grade formulations using same or lower concentration of identical additive (DI/VI) combination. Each different DI/VI combination must be tested.
EOFT, %	ASTM D6795 50 (max) flow reduction
Fresh oil foaming characteristics	ASTM D892 (Option A and excluding paragraph 11)
Tendency, mL	
Sequence I	10 (max)
Sequence II	50 (max)
Sequence III	10 (max)
Stability, mL, after 1-minute settling	
Sequence I	0 (max)
Sequence II	0 (max)
Sequence III	0 (max)
Fresh oil high temperature foaming characteristics	ASTM D6082 (Option A)
Tendency, mL	100 (max)
Stability, mL, after 1-minute settling	0 (max)

Table X8.2 ILSAC GF-6B Passenger Car Engine Oil Standard (Continued)

Requirement	Criterion
Aged oil low temperature viscosity Measure aged oil low temperature viscosity on final formulation (pursuant to existing read across described in Annex F)—this includes base oil and additive combination being licensed—for each viscosity grade by either ROBO or IIIHA Measure CCS viscosity of EOT ROBO or IIIHA sample at CCS temperature corresponding to original viscosity grade	ROBO (ASTM D7528) a) If CCS viscosity measured is less than or equal to the maximum CCS viscosity specified for the original viscosity grade, run ASTM D4684 (MRV TP-1) at the MRV temperature specified in SAE J300 for the original viscosity grade. b) If CCS viscosity measured is higher than the maximum viscosity specified for the original viscosity grade in J300, run ASTM D4684 (MRV TP-1) at 5°C higher temperature (i.e., at MRV temperature specified in SAE J300 for the next higher viscosity grade). c) EOT ROBO sample must show no yield stress in the D4684 test and its D4684 viscosity must be below the maximum specified in SAE J300 for the original viscosity grade or the next higher viscosity grade, depending on the CCS viscosity grade, as outlined in a) or b) above. or
Aged oil low temperature viscosity Measure aged oil low temperature viscosity on final formulation (pursuant to existing read across described in Annex F)—this includes base oil and additive combination being licensed—for each viscosity grade by either ROBO or IIIHA Measure CCS viscosity of EOT ROBO or IIIHA sample at CCS temperature corresponding to original viscosity grade	ASTM Sequence IIIHA (ASTM D8111) d) If CCS viscosity measured is less than or equal to the maximum CCS viscosity specified for the original viscosity grade, run ASTM D4684 (MRV TP-1) at the MRV temperature specified in SAE J300 for the original viscosity grade. e) If CCS viscosity measured is higher than the maximum viscosity specified for the original viscosity grade in J300, run ASTM D4684 (MRV TP-1) at 5°C higher temperature (i.e., at MRV temperature specified in SAE J300 for the next higher viscosity grade). f) EOT IIIHA sample must show no yield stress in the D4684 test and its D4684 viscosity must be below the maximum specified in SAE J300 for the original viscosity grade or the next higher viscosity grade, depending on the CCS viscosity grade, as outlined in a) or b) above.
Shear stability KV @ 100°C after 30 passes, cSt	Diesel Injector (ASTM D6278) 5.8 (min)
Homogeneity and miscibility	ASTM D6922 Shall remain homogeneous and, when mixed with ASTM Test Monitoring Center (TMC) reference oils, shall remain miscible.
Engine rusting Average gray value	Ball Rust Test (ASTM D6557) 100 (min)
Emulsion retention 0°C, 24 hours 25°C, 24 hours	ASTM D7563 No water separation No water separation
Elastomer compatibility	ASTM D7216 Annex A2 Candidate oil testing for elastomer compatibility shall be performed using the five Standard Reference Elastomers (SREs) referenced herein and defined in SAE J2643. Candidate oil testing shall be performed according to ASTM D7216 Annex A2. The post-candidate-oil-immersion elastomers shall conform to the specification limits detailed below:

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	ASTM D2240	Hardness	pts.	-10, 10
	ASTM D412	Tensile Strength	% Δ	-40, 40
Hydrogenated Nitrile Rubber (HNBR-1)	ASTM D471	Volume	% Δ	-5, 10
	ASTM D2240	Hardness	pts.	-10, 5
	ASTM D412	Tensile Strength	% Δ	-20, 15
Silicone Rubber (VMQ-1)	ASTM D471	Volume	% Δ	-5, 40
	ASTM D2240	Hardness	pts.	-30, 10
	ASTM D412	Tensile Strength	% Δ	-50, 5
Fluorocarbon Rubber (FKM-1)	ASTM D471	Volume	% Δ	-2, 3
	ASTM D2240	Hardness	pts.	-6, 6
	ASTM D412	Tensile Strength	% Δ	-65, 10
Ethylene Acrylic Rubber (AEM-1)	ASTM D471	Volume	% Δ	-5, 30
	ASTM D2240	Hardness	pts.	-20, 10
	ASTM D412	Tensile Strength	% Δ	-30, 30

Applicable Documents:

1. SAE Standard, Engine Oil Viscosity Classification—SAE J300, *SAE Handbook*.
2. SAE Standard, Standard Reference Elastomers (SRE) for Characterizing the Effects on Vulcanized Rubbers, Proposed Draft 2003-5—SAE J2643, *SAE Handbook*.
3. ASTM Annual Book of Standards, Volume 5, Petroleum Products and Lubricants, current edition.
5. M. Batko and D. F. Florkowski, "Low Temperature Rheological Properties of Aged Crankcase Oils," SAE Paper 2000-01-2943.
6. M. Batko and D. F. Florkowski, "Lubricant Requirements of an Advanced Designed High Performance, Fuel Efficient Low Emissions V-6 Engine," SAE Paper 01FL-265

Renumber existing sections;

X8 becomes X9

X9 becomes X10