

# API Engine Oil Classifications For Service Fill Oils

## Footnotes

- (1) Not required for SAE XW-16 and 0W-20.
- (2) Not required for Non-ILSAC viscosity grades.
- (3) 45 max for Non-ILSAC viscosity grades.
- (4) No maximum for API SP or SN Non-ILSAC viscosity grades.
- (5) If API CI-4, CJ-4, CK-4 and/or FA-4 categories precede the "S" category and there is no API Certification Mark, the Sequence VH (ASTM D8256), or VG (ASTM D6593), Ball Rust (ASTM D6557), and Gelation Index (ASTM D5133) tests are not required.
- (6) Viscosity grades are limited to SAE 0W, 5W and 10W multigrade oils.
- (7) Not required for monograde and SAE 15W, 20W, and 25W multigrade oils.
- (8) Calculated conversions specified in ASTM D5800 are allowed.
- (9) For all viscosity grades: If API CH-4, CI-4 and/or CJ-4 categories precede the "S" category and there is no API Certification Mark, the "S" category limits for phosphorus, sulfur, and the TEOST MHT do not apply. However, the CJ-4 limits for phosphorus and sulfur do apply for CJ-4 oils, and the limit in the SP-RC column for phosphorus (0.08% mass max) applies when CK-4 with SP or FA-4 with SP is claimed. Note that these "C" category oils have been formulated primarily for diesel engines and may not provide all of the performance requirements consistent with vehicle manufacturers' recommendations for gasoline-fueled engines.
- (10) This is a non-critical specification as described in ASTM D3244.
- (11) After 1-minute settling period for all ILSAC viscosity grades and all API SP-RC or SN PLUS-RC/SN-RC oils.
- (12) After 10-minute settling period for non-ILSAC GF-6 or 5 viscosity grades which are not API SP-RC or SN PLUS-RC/SN-RC.
- (13) Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.
- (14) To be evaluated from -5°C to temperature at which 40,000 cP is attained or -40°C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.
- (15) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6A or GF-5. Not required for API SP or SN.
- (16) The aged oil is an end-of-test sample generated either in the Sequence II-IHA test (ASTM D8111), IIIGA test (ASTM D7320) or the ROBO test (ASTM D7528).
- (17) The ASTM D4684 (MRV TP-1) test is conducted at the original SAE J300 viscosity grade temperature if the measured CCS viscosity is less than or equal to the original viscosity grade maximum; and at 5°C higher temperature otherwise.
- (18) Except XW-20, which must remain >=5.6 cSt.
- (19) This is not an ILSAC GF-5 viscosity grade.
- (20) Stability after 10-minute settling period.
- (21) Option A allowed.
- (22) Stability after 1-minute settling period.
- (23) There is also a 0.08 min P requirement, unless a successful Sequence VG test has been run.
- (24) Meet the volatility requirement in either Test Method D5800, D5480, or D6417.
- (25) See ASTM D4485 for sludge parameters require in API SJ spec.
- (26) Phosphorous must be less than 0.08m% to obtain API S claims for ILSAC grades.
- (27) Requires all individual merit ratings to be equal to or greater than zero.
- (28) T-11 is an acceptable alternative at CI-4 Plus limits.
- (29) Sequence VE can be run in lieu of ASTM D6891 + ASTM D6593.
- (30) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6 A/B or GF-5.
- (31) Not required for SAE XW-16.

## Passenger Vehicle Engine Oil Requirements For API SP-RC/ILSAC GF-6A/6B Categories

Requirements for API SP are the same as RC version, except as per footnotes.

Requirements	Test Method	Properties	Unit	Limits SP-RC/GF-6
<b>1. LABORATORY/BENCH TESTS</b>				
Viscosity Grades	SAE J300	All those that apply, typically SAE 0W-20, 0W-30, 5W-20, 5W-30 and 10W-30.	Manufacturer sets targets within SAE J300 specification	
Foam Tests	ASTM D892 <sup>(21)</sup>  ASTM D6082 <sup>(21)</sup>	Sequence I <sup>(11), (12)</sup> Sequence II <sup>(11), (12)</sup> Sequence III <sup>(11), (12)</sup> Sequence IV <sup>(11)</sup>	tendency/stability ml	10/0 max 50/0 max 10/0 max 100/0 max
EOFT	ASTM D6795	Flow Reduction	%	50 max
EOWTT	ASTM D6794	with 0.6% Water with 1.0% Water with 2.0% Water with 3.0% Water	% flow reduction % flow reduction % flow reduction % flow reduction	50 max 50 max 50 max 50 max
Aged Oil Low-Temp Pumpability <sup>(16)</sup>	ASTM D8111 or D7528 <sup>(7)</sup>	MRV TP-1 Apparent Viscosity and Yield Stress	cP and Pa	<60,000 cP with no yield stress <sup>(17)</sup>
TEOST 33C	ASTM D6335	High temperature deposits	total deposit weight, mg	30 max <sup>(1), (2), (15)</sup>
Emulsion Retention	ASTM D7563	Oil mixed with 10% Water and 10% E85	0°C and 25°C @ 24 hours	No water separation <sup>(2), (30)</sup>
Homogeneity & Miscibility	ASTM D6922	Oil Compatibility	None	Pass <sup>(13)</sup>
Gelation Index <sup>(5)</sup>	ASTM D5133	Scanning Brookfield Viscosity, Yield Stress	Calculated	12 max <sup>(2), (14)</sup>
Volatility	ASTM D5800	Evaporation Loss (Noack)	% off @ 250°C	15.0 max <sup>(8)</sup>
Ball Rust Test <sup>(5)</sup>	ASTM D6557	Rust rating	Average Gray Value	100 min
Elastomer Compatibility	ASTM D7216, Annex A2	Volume Change, %	Hardness, pts	Tensile strength change, %
	Polyacrylate Rubber (ACM)	-5, 9	-10, 10	-40, 40
	Hydrogenated Nitrile (HNBR)	-5, 10	-10, 5	-20, 15
	Silicone Rubber (VMQ)	-5, 40	-30, 10	-50, 5
	Fluorocarbon Rubber (FKM)	-2, 3	-6, 6	-65, 10
	Ethylene Acrylic Rubber (AEM)	-5, 30	-20, 10	-30, 30
Shear Stability	ASTM D6278 ASTM D6709 (Seq VIII)	Diesel Injector, SAE XW-16 only 10-hour stripped Kinematic Viscosity	KV @ 100°C after 30 passes cSt @ 100°C	5.8 min Stay in original visc grade <sup>(31)</sup>
Sequence IIIHB	ASTM D8111 (SP-RC) or ASTM D7320 (GF-6A)	Phosphorus retention	%	81 min <sup>(2), (30)</sup>
Phosphorus <sup>(9)</sup>	ASTM D4951 or D5185	Phosphorus content	%	0.06 - 0.08 <sup>(4), (10)</sup>
Sulfur <sup>(9)</sup>	ASTM D4951, D5185 or ASTM D2622	Sulfur content of SAE 0W and 5W multigrades SAE 10W-30 and all other grades	%	0.5 max <sup>(4)</sup> 0.6 max <sup>(4)</sup>
<b>2. ENGINE TESTS</b>				
Sequence IIIH	ASTM D8111	Kinematic viscosity increase Average weighted piston deposits Hot stuck rings	% @ 40°C after 100 hours Merits #	100 max 4.2 min None
Sequence IVB	ASTM 8350	Average intake lifter volume loss (8 position avg.) End of test iron	mm <sup>3</sup> ppm	2.7 max 400
Sequence VH <sup>(5)</sup>	ASTM D8256	Average engine sludge Average rocker cover sludge Average engine varnish Average piston skirt varnish Oil screen sludge Oil screen debris Hot stuck compression rings Cold stuck rings Oil ring clogging	Merits Merits Merits Merits % area % area # # % area	7.6 min 7.7 min 8.6 min 7.6 min Rate & report Rate & report None Rate & report Rate & report
Sequence VIE <sup>(2) (6) (15)</sup>	ASTM D8114	SAE XW-20	%FEI SUM/ %FEI2	3.8 min/ 1.8 min
		SAE XW-30	%FEI SUM/ %FEI2	3.1 min/ 1.5 min
		SAE 10W-30 and all other grades not listed above	%FEI SUM/ %FEI2	2.8 min/ 1.3 min
Sequence VIF	ASTM D8226	SAE XW-16 only	%FEI SUM/ %FEI2	4.1 min/ 1.9 min
Sequence VIII <sup>(31)</sup>	ASTM D6709	Bearing weight loss	mg	26 max
Sequence IX	ASTM D8291	Average number of events for 4 iterations Number of events per iteration	# #	5 max 8 max
Sequence X	ASTM D8279	EOT elongation	% increase	0.085 max

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## Footnotes

- (1) Not required for SAE XW-16 and OW-20.
- (2) Not required for Non-ILSAC viscosity grades.
- (3) 45 max for Non-ILSAC viscosity grades.
- (4) No maximum for API SP or SN Non-ILSAC viscosity grades.
- (5) If API CI-4, CJ-4, CK-4 and/or FA-4 categories precede the "S" category and there is no API Certification Mark, the Sequence VH (ASTM D8256), or VG (ASTM D6593), Ball Rust (ASTM D6557), and Gelation Index (ASTM D5133) tests are not required.
- (6) Viscosity grades are limited to SAE OW, 5W and 10W multigrade oils.
- (7) Not required for monograde and SAE 15W, 20W, and 25W multigrade oils.
- (8) Calculated conversions specified in ASTM D5800 are allowed.
- (9) For all viscosity grades: If API CH-4, CI-4 and/or CJ-4 categories precede the "S" category and there is no API Certification Mark, the "S" category limits for phosphorus, sulfur, and the TEOST MHT do not apply. However, the CJ-4 limits for phosphorus and sulfur do apply for CJ-4 oils, and the limit in the SP-RC column for phosphorus (0.08% mass max) applies when CK-4 with SP or FA-4 with SP is claimed. Note that these "C" category oils have been formulated primarily for diesel engines and may not provide all of the performance requirements consistent with vehicle manufacturers' recommendations for gasoline-fueled engines.
- (10) This is a non-critical specification as described in ASTM D3244.
- (11) After 1-minute settling period for all ILSAC viscosity grades and all API SP-RC or SN PLUS-RC/SN-RC oils.
- (12) After 10-minute settling period for non-ILSAC GF-6 or 5 viscosity grades which are not API SP-RC or SN PLUS-RC/SN-RC.
- (13) Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.
- (14) To be evaluated from -5°C to temperature at which 40,000 cP is attained or -40°C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.
- (15) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6A or GF-5. Not required for API SP or SN.
- (16) The aged oil is an end-of-test sample generated either in the Sequence II-IHA test (ASTM D8111), IIIGA test (ASTM D7320) or the ROBO test (ASTM D7528).
- (17) The ASTM D4684 (MRV TP-1) test is conducted at the original SAE J300 viscosity grade temperature if the measured CCS viscosity is less than or equal to the original viscosity grade maximum; and at 5°C higher temperature otherwise.
- (18) Except XW-20, which must remain >=5.6 cSt.
- (19) This is not an ILSAC GF-5 viscosity grade.
- (20) Stability after 10-minute settling period.
- (21) Option A allowed.
- (22) Stability after 1-minute settling period.
- (23) There is also a 0.08 min P requirement, unless a successful Sequence VG test has been run.
- (24) Meet the volatility requirement in either Test Method D5800, D5480, or D6417.
- (25) See ASTM D4485 for sludge parameters require in API SJ spec.
- (26) Phosphorous must be less than 0.08m% to obtain API S claims for ILSAC grades.
- (27) Requires all individual merit ratings to be equal to or greater than zero.
- (28) T-11 is an acceptable alternative at CI-4 Plus limits.
- (29) Sequence VE can be run in lieu of ASTM D6891 + ASTM D6593.
- (30) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6 A/B or GF-5.
- (31) Not required for SAE XW-16.

## Passenger Vehicle Engine Oil Requirements For API SN PLUS-RC/SN-RC/ILSAC GF-5 Categories

Requirements For API SN PLUS/SN are the same as RC version, except as per footnotes.

Requirements	Test Method	Properties	Unit	Limits SN PLUS-RC/SN-RC GF-5	
<b>1. LABORATORY/BENCH TESTS</b>					
Viscosity Grades	SAE J300	All those that apply, typically SAE OW-20, OW-30, 5W-20, 5W-30 and 10W-30.	Manufacturer sets targets within SAE J300 specification		
Foam Tests	ASTM D892 <sup>(21)</sup>	Sequence I <sup>(11), (12)</sup> Sequence II <sup>(11), (12)</sup> Sequence III <sup>(11), (12)</sup> Sequence IV <sup>(11)</sup>	tend/stab ml	10/0 max 50/0 max 10/0 max 100/0 max	
	ASTM D6082 <sup>(21)</sup>				
EOFT	ASTM D6795	Flow Reduction	%	50 max	
EOWTT	ASTM D6794	with 0.6% Water with 1.0% Water with 2.0% Water with 3.0% Water	% flow reduction % flow reduction % flow reduction % flow reduction	50 max 50 max 50 max 50 max	
Aged Oil Low-Temp Pumpability <sup>(16)</sup>	ASTM D4684 <sup>(7)</sup>	MRV TP-1 Apparent Viscosity and Yield Stress	cP and Pa	<60,000 cP with no yield stress <sup>(17)</sup>	
TEOST 33C	ASTM D6335	High temperature deposits	total deposit weight, mg	30 max <sup>(1), (2), (15)</sup>	
TEOST MHT <sup>(9)</sup>	ASTM D7097	High temperature deposits	deposit weight, mg	35 max <sup>(3)</sup>	
Emulsion Retention	ASTM D7563	Oil mixed with 10% Water and 10% E85	0°C and 25°C @ 24 hours	No water separation <sup>(2), (15)</sup>	
Homogeneity & Miscibility	ASTM D6922	Oil Compatibility	None	Pass <sup>(13)</sup>	
Gelation Index <sup>(5)</sup>	ASTM D5133	Scanning Brookfield Viscosity, Yield Stress	Calculated	12 max <sup>(2), (14)</sup>	
Volatility	ASTM D5800 ASTM D6417	Evaporation Loss (Noack) Simulated distillation (GCD)	% off @ 250°C % off @ 371°C	15 max <sup>(8)</sup> 10 max	
Ball Rust Test <sup>(5)</sup>	ASTM D6557	Rust rating	Average Gray Value	100 min	
Elastomer Compatibility	ASTM D7216, Annex A2	Volume Change, %	Hardness, pts	Tensile strength change, %	
	Polyacrylate Rubber (ACM)	-5, 9	-10, 10	-40, 40	
	Hydrogenated Nitrile (HNBR)	-5, 10	-10, 5	-20, 15	
	Silicone Rubber (VMQ)	-5, 40	-30, 10	-50, 5	
	Fluorocarbon Rubber (FKM)	-2, 3	-6, 6	-65, 10	
	Ethylene Acrylic Rubber (AEM)	-5, 30	-20, 10	-30, 30	
Phosphorus <sup>(9)</sup>	ASTM D4951	Phosphorus content	%	0.06 - 0.08 <sup>(4), (10)</sup>	
Sulfur <sup>(9)</sup>	ASTM D4951 or ASTM D2622	Sulfur content of SAE OW and 5W multigrades	%	0.5 max <sup>(4), (10)</sup>	
		Sulfur content of SAE 10W multigrades	%	0.6 max <sup>(4), (10)</sup>	
<b>2. ENGINE TESTS</b>					
				Seq IIIG	Seq IIHH
Sequence IIIG or Sequence IIHH	ASTM D7320 or ASTM D8111	Kinematic Viscosity increase Average weighted piston deposits Average cam plus lifter wear Hot stuck rings	% @ 40°C after 100 hours merits microns #	150 max 4.0 min 60 max none	150 max 3.7 min n/a none
Sequence IIIGB or Sequence IIHHB	ASTM D7320	Phosphorus retention	%	79 min <sup>(2), (15)</sup>	81 min <sup>(2), (15)</sup>
Sequence IVA	ASTM D6891	Average Cam wear (7 position avg.)	microns	90 max	
				Seq VG	Seq VH
Sequence VG or Sequence VH <sup>(5)</sup>	ASTM D6593	Average engine sludge Average rocker cover sludge Average piston skirt varnish Average engine varnish Oil screen sludge Hot stuck compression rings Cold stuck rings Oil ring clogging Oil screen debris	merits merits merits merits % area # # % area % area	8.0 min 8.3 min 7.5 min 8.9 min 15 max none rate & report rate & report	7.6 min 7.7 min 7.6 min 8.6 min n/a none rate & report rate & report
Sequence VIII	ASTM D6709	Bearing weight loss 10-hour stripped Kinematic Viscosity	mg cSt @ 100°C	26 max Stay in original visc grade <sup>(18)</sup>	
				Seq VID	Seq VIE
Sequence VID or Sequence VIE <sup>(2), (6), (15)</sup>	ASTM D7589 or ASTM D8114	SAE xW-20	% FEI SUM/ % FEI2	2.6 min/ 1.2 min	3.2 min/ 1.5 min
		SAE xW-30	% FEI SUM/ % FEI2	1.9 min/ 0.9 min	2.5 min/ 1.2 min
		SAE 10W-30	% FEI SUM/ % FEI2	1.5 min/ 0.6 min	2.2 min/ 1.0 min
Sequence VIF	ASTM D8226	SAE OW-16 <sup>(19)</sup>	% FEI SUM/ % FEI2	3.8 min/ 1.8 min	
<b>3. ENGINE TESTS FOR API SN PLUS-RC/SN PLUS (same as API SN Engine Tests above in addition to following)</b>					
Sequence IX (API SN-RC PLUS/SN PLUS only)	ASTM D8291	Average LSPI events	#	5 max	

# API Engine Oil Classifications For Service Fill Oils

## Footnotes

- (1) Not required for SAE XW-16 and OW-20.
- (2) Not required for Non-ILSAC viscosity grades.
- (3) 45 max for Non-ILSAC viscosity grades.
- (4) No maximum for API SP or SN Non-ILSAC viscosity grades.
- (5) If API CI-4, CJ-4, CK-4 and/or FA-4 categories precede the "S" category and there is no API Certification Mark, the Sequence VH (ASTM D8256), or VG (ASTM D6593), Ball Rust (ASTM D6557), and Gelation Index (ASTM D5133) tests are not required.
- (6) Viscosity grades are limited to SAE OW, 5W and 10W multigrade oils.
- (7) Not required for monograde and SAE 15W, 20W, and 25W multigrade oils.
- (8) Calculated conversions specified in ASTM D5800 are allowed.
- (9) For all viscosity grades: If API CH-4, CI-4 and/or CJ-4 categories precede the "S" category and there is no API Certification Mark, the "S" category limits for phosphorus, sulfur, and the TEOST MHT do not apply. However, the CJ-4 limits for phosphorus and sulfur do apply for CJ-4 oils, and the limit in the SP-RC column for phosphorus (0.08% mass max) applies when CK-4 with SP or FA-4 with SP is claimed. Note that these "C" category oils have been formulated primarily for diesel engines and may not provide all of the performance requirements consistent with vehicle manufacturers' recommendations for gasoline-fueled engines.
- (10) This is a non-critical specification as described in ASTM D3244.
- (11) After 1-minute settling period for all ILSAC viscosity grades and all API SP-RC or SN PLUS-RC/SN-RC oils.
- (12) After 10-minute settling period for non-ILSAC GF-6 or 5 viscosity grades which are not API SP-RC or SN PLUS-RC/SN-RC.
- (13) Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.
- (14) To be evaluated from -5°C to temperature at which 40,000 cP is attained or -40°C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.
- (15) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6A or GF-5. Not required for API SP or SN.
- (16) The aged oil is an end-of-test sample generated either in the Sequence II-IHA test (ASTM D8111), IIIGA test (ASTM D7320) or the ROBO test (ASTM D7528).
- (17) The ASTM D4684 (MRV TP-1) test is conducted at the original SAE J300 viscosity grade temperature if the measured CCS viscosity is less than or equal to the original viscosity grade maximum; and at 5°C higher temperature otherwise.
- (18) Except XW-20, which must remain >=5.6 cSt.
- (19) This is not an ILSAC GF-5 viscosity grade.
- (20) Stability after 10-minute settling period.
- (21) Option A allowed.
- (22) Stability after 1-minute settling period.
- (23) There is also a 0.08 min P requirement, unless a successful Sequence VG test has been run.
- (24) Meet the volatility requirement in either Test Method D5800, D5480, or D6417.
- (25) See ASTM D4485 for sludge parameters require in API SJ spec.
- (26) Phosphorous must be less than 0.08m% to obtain API S claims for ILSAC grades.
- (27) Requires all individual merit ratings to be equal to or greater than zero.
- (28) T-11 is an acceptable alternative at CI-4 Plus limits.
- (29) Sequence VE can be run in lieu of ASTM D6891 + ASTM D6593.
- (30) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6 A/B or GF-5.
- (31) Not required for SAE XW-16.

## Passenger Vehicle Engine Oil Requirements For API SM and ILSAC GF-4 Categories

Requirements	Test Method	Properties	Unit	Limits SM / GF-4	
<b>1. LABORATORY/BENCH TESTS</b>					
1.1 Viscosity Grades	SAE J300	All those that apply, typically SAE OW-20, OW-30, 5W-20, 5W-30 and 10W-30.		Manufacturer sets targets within SAE J300 specification	
1.2 Foam Test	ASTM D892 <sup>(21)</sup>  ASTM D6082 <sup>(21)</sup>	Sequence I <sup>(20)</sup> Sequence II <sup>(20)</sup> Sequence III <sup>(20)</sup> Sequence IV <sup>(11)</sup>	tend/stab ml	10/0 max 50/0 max 10/0 max 100/0 max	
1.3 Phosphorus	ASTM D4951	Phosphorus content	%	0.06 - 0.08 <sup>(4), (10)</sup>	
1.4 EOFT	ASTM D6795	% reduction in flow	%	50 max	
1.5 EOWTT	ASTM D6794	with 0.6% Water with 1.0% Water with 2.0% Water with 3.0% Water	% reduction % reduction % reduction % reduction	50 max 50 max 50 max 50 max	
1.6 TEOST (MHT4)	ASTM D7097	Total Deposits	mg	35 max <sup>(3), (9)</sup>	
1.7 Homogeneity & Miscibility	ASTM D6922	Oil Compatibility		pass <sup>(13)</sup>	
1.8 Gelation Index <sup>(5)</sup>	ASTM D5133	Scanning Brookfield Viscosity, Yield Stress	Calculated	12 max <sup>(14)</sup>	
1.9 Volatility	ASTM D5800 <sup>(6)</sup> ASTM D6417	Evaporation Loss (Noack) Simulated distillation (GCD)	% off @ 250°C % off @ 371°C	15 max 10 max	
1.10 Ball Rust Test <sup>(5)</sup>	ASTM D6557	Rust rating	Avg Gray Value	100 min	
1.11 Sulfur	ASTM D4951 or ASTM D2622	Sulfur content of SAE OW and 5W multigrades Sulfur content of SAE 10W multigrades	% %	0.5 max <sup>(4), (10)</sup> 0.7 max <sup>(4), (10)</sup>	
1.12 Aged Oil Low-Temperature Pumpability <sup>(2), (16)</sup>	ASTM D4684	MRV TP-1 Apparent Viscosity and Yield Stress	cP and Pa	<60,000 cP with no yield stress <sup>(16), (17)</sup>	
<b>2. ENGINE TESTS</b>					
				Seq IIIG	Seq IIIH
2.1 Sequence IIIG or Sequence IIIH	ASTM D7320 or ASTM D8111	Viscosity increase at 100 hours Average weighted piston deposits Hot stuck rings Average cam plus lifter wear	% merits # microns	150 max 3.5 min none 60 max	150 max 3.2 min none n/a
2.2 Sequence IVA	ASTM D6891	Cam wear average	microns	90 max	
				Seq VG	Seq VH
2.3 Sequence VG or Sequence VH <sup>(5)</sup>	ASTM D6593	Average engine sludge Rocker arm cover sludge Average piston skirt varnish Average engine varnish Oil screen clogging Hot stuck rings Cold stuck rings Oil ring clogging Follower pin wear, cyl #8, avg Ring gap increase, cyl #1 & #8, avg Oil screen debris	merits merits merits % # # % microns microns % area	7.8 min 8.0 min 7.5 min 8.9 min 20 max none rate & report rate & report rate & report rate & report	7.6 min 7.7 min 7.6 min 8.6 min n/a none rate & report rate & report rate & report rate & report
2.4 Sequence VIII	ASTM D6709	Bearing weight loss 10 hr. stripped viscosity	mg cSt	26 max Stay in grade	
2.5 Sequence VIB <sup>(2)</sup>	ASTM D6837	SAE xW-20 viscosity grades SAE xW-30 viscosity grades SAE 10W-30	% FEI1/% FEI2 % FEI1/% FEI2 % FEI1/% FEI2	2.3 min/2.0 min 1.8 min/1.5 min 1.1 min/0.8 min	

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## Footnotes

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- (2) Not required for Non-ILSAC viscosity grades.
- (3) 45 max for Non-ILSAC viscosity grades.
- (4) No maximum for API SP or SN Non-ILSAC viscosity grades.
- (5) If API CI-4, CJ-4, CK-4 and/or FA-4 categories precede the "S" category and there is no API Certification Mark, the Sequence VH (ASTM D8256), or VG (ASTM D6593), Ball Rust (ASTM D6557), and Gelation Index (ASTM D5133) tests are not required.
- (6) Viscosity grades are limited to SAE 0W, 5W and 10W multigrade oils.
- (7) Not required for monograde and SAE 15W, 20W, and 25W multigrade oils.
- (8) Calculated conversions specified in ASTM D5800 are allowed.
- (9) For all viscosity grades: If API CH-4, CI-4 and/or CJ-4 categories precede the "S" category and there is no API Certification Mark, the "S" category limits for phosphorus, sulfur, and the TEOST MHT do not apply. However, the CJ-4 limits for phosphorus and sulfur do apply for CJ-4 oils, and the limit in the SP-RC column for phosphorus (0.08% mass max) applies when CK-4 with SP or FA-4 with SP is claimed. Note that these "C" category oils have been formulated primarily for diesel engines and may not provide all of the performance requirements consistent with vehicle manufacturers' recommendations for gasoline-fueled engines.
- (10) This is a non-critical specification as described in ASTM D3244.
- (11) After 1-minute settling period for all ILSAC viscosity grades and all API SP-RC or SN PLUS-RC/SN-RC oils.
- (12) After 10-minute settling period for non-ILSAC GF-6 or 5 viscosity grades which are not API SP-RC or SN PLUS-RC/SN-RC.
- (13) Shall remain homogeneous and, when mixed with ASTM reference oils, shall remain miscible.
- (14) To be evaluated from -5°C to temperature at which 40,000 cP is attained or -40°C, or 2 Celsius degrees below the appropriate MRV TP-1 temperature (defined by SAE J300), whichever occurs first.
- (15) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6A or GF-5. Not required for API SP or SN.
- (16) The aged oil is an end-of-test sample generated either in the Sequence II-IHA test (ASTM D8111), IIIGA test (ASTM D7320) or the ROBO test (ASTM D7528).
- (17) The ASTM D4684 (MRV TP-1) test is conducted at the original SAE J300 viscosity grade temperature if the measured CCS viscosity is less than or equal to the original viscosity grade maximum; and at 5°C higher temperature otherwise.
- (18) Except XW-20, which must remain >=5.6 cSt.
- (19) This is not an ILSAC GF-5 viscosity grade.
- (20) Stability after 10-minute settling period.
- (21) Option A allowed.
- (22) Stability after 1-minute settling period.
- (23) There is also a 0.08 min P requirement, unless a successful Sequence VG test has been run.
- (24) Meet the volatility requirement in either Test Method D5800, D5480, or D6417.
- (25) See ASTM D4485 for sludge parameters require in API SJ spec.
- (26) Phosphorous must be less than 0.08m% to obtain API S claims for ILSAC grades.
- (27) Requires all individual merit ratings to be equal to or greater than zero.
- (28) T-11 is an acceptable alternative at CI-4 Plus limits.
- (29) Sequence VE can be run in lieu of ASTM D6891 + ASTM D6593.
- (30) Required for API SP-RC, SN PLUS-RC/SN-RC, ILSAC GF-6 A/B or GF-5.
- (31) Not required for SAE XW-16.

## Passenger Vehicle Engine Oil Requirements For API SJ and SL Categories

Requirements	Test	Properties	Unit	Limits	
				SJ	SL
<b>1. LABORATORY TESTS</b>					
1.1 Viscosity Grades		All those that apply, typically SAE 0W-20, 5W-20, 5W-30 and 10W-30.		Manufacturer sets targets within SAE J300 specification	
1.2 Foam Test	ASTM D892 <sup>(21)</sup> ASTM D6082 <sup>(21)</sup>	Sequence I <sup>(20)</sup> Sequence II <sup>(20)</sup> Sequence III <sup>(20)</sup> Sequence IV <sup>(22)</sup>	tendency/stability mL	10/0 max 50/0 max 10/0 max 200/50 max	10/0 max 50/0 max 10/0 max 100/0 max
1.3 Phosphorus	ASTM D4951 or D5185	Phosphorus Content	%	0.10 max <sup>(2), (10)</sup>	0.10 max <sup>(2), (10), (23)</sup>
1.4 EOFT	ASTM D6795	% reduction in flow	%	50 max	50 max
1.5 EOWTT	ASTM D6794	0.6% Water 1.0% Water 2.0% Water 3.0% Water	% % % %	report report report report	50 max 50 max 50 max 50 max
1.6 TEOST	ASTM D6335	Total Deposits	mg	60 max	NR
1.7 TEOST (MHT4)	ASTM D7097	Total Deposits	mg	NR	45 max
1.8 Homogeneity and Miscibility	ASTM D6922	Oil Compatibility		pass	pass
1.9 Scanning Brookfield	ASTM D5133	Gelation Index		12 max <sup>(2)</sup>	12 max <sup>(2), (10)</sup>
1.10 Volatility	ASTM D5800 ASTM D6417	Evaporation Loss (Noack) Simulated distillation (GCD)	% %	22 max <sup>(24)</sup> 17 max	15 max 10 max
1.11 BRT	ASTM D6557	Rust rating	Gray value	100 min	100 min
<b>2. ENGINE TESTS FOR API SJ AND SL</b>					
2.1 Sequence IIIF	ASTM D6984	% Viscosity increase Average piston skirt varnish rating Weighted piston deposit rating Cam plus lifter wear avg Hot stuck rings Low temperature viscosity performance	% merits merits microns # cP	325 max @ 60 hr 8.5 min @ 80 hr 3.2 min 20 max none NR	275 max @ 80 hr 9.0 min @ 80 hr 4.0 min 20 max none rate and report
2.2 Sequence IVA	ASTM D6891	Cam wear average	microns	120 max	120 max
2.3 Sequence VG <sup>(29)</sup>	ASTM D6593	Average engine sludge Rocker arm cover sludge Average piston skirt varnish Average engine varnish Oil screen clogging Hot stuck compression rings Cold stuck rings Oil screen debris Oil ring clogging	merits merits merits merits % # # % % %	7.8 min 8.0 min 7.5 min 8.9 min 20 max none n/a n/a n/a	7.8 min 8.0 min 7.5 min 8.9 min 20 max none rate and report rate and report rate and report
2.4 Sequence VIII	ASTM D6709	Bearing weight loss 10 hr. stripped viscosity	mg cSt	26.4 max Stay in grade	26.4 max Stay in grade