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Test Monitoring Center

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D4485 Information Letter 20-4
Sequence Number 11
June 9, 2020

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: Update API Category CI-4 Requirements

On May 28, 2020, the D4485 Surveillance Panel approved updates to the API Category CI-4 requirements in ASTM Specification D4485, to bring it in line with the most recent edition of API 1509.

The text of the revisions is shown in the attachment. These changes are effective with the issuance of this information letter.

Joe Franklin
Chairman
ASTM Subcommittee B

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Director
ASTM Test Monitoring Center

Attachment
c: http://www.astmtmc.cmu.edu/ftp/docs/d4485/IL_20-4_D4485.pdf
Distribution: Email

[All changes are highlighted in yellow.]

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)[D] or Sequence IIIG (D7320)[E] or Sequence IIIH (D8111) or Sequence IIIH70 (D8111 using Appendix X5)	D6984	Kinematic viscosity (at 40 °C), percent increase, max		275	275 (MTAC)	275 (MTAC)
	D7320	Kinematic viscosity, percent increase at 40 °C max		150	150 (MTAC)	150 (MTAC)
	D8111	60 – 80 h[F] Kinematic viscosity, % increase at 40 °C max		370	370 (MTAC)	370 (MTAC)
	D8111 (Using IIIH70 Appendix X5 guideline)	70 h Kinematic viscosity, % increase at 40°C max		181	181(MTAC)	181 (MTAC)
1K (D6750)[G]	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
RFWT (D5966)	D5966	Average pin wear	mils, max	0.30	0.33	0.36
			µm, max	7.6	8.4	9.1
EOAT (D6894)[H]	D6894	Aeration, volume percent, max		8.0	8.0 (MTAC)[I]	8.0 (MTAC)[I]

TABLE 3 Diesel Engine Oil Category CI-4 (cont.)

CI-4 Bench Tests	Measured Parameter	Primary Performance Criteria	
D4683 (High temperature/High shear) or D4741 or D5481[J]	Viscosity after shear,[K] min	3.5 mPa-s	
MRV-TP-1 (D4684)	The following limits are applied to SAE viscosity grades 0W, 5W, 10W, and 15W: Viscosity of 75 h used oil sample from T-10 test (or T-10A[L] test), or 100 h used oil sample from T-12 test (or T-12A[M] test, tested at –20 °C, mPa-s, max	25 000	
	If yield stress is detected, use modified D4684[N] (external preheat), then mPa-s, max	25 000	
	and yield stress, Pa	<35	
Noack (D5800)	Evaporative loss at 250 °C, %, max	15	
HTCBT 135 °C (D6594)	Used Oil Elemental Concentration		
	Copper, mg/kg increase, max	20	
	Lead, mg/kg increase, max	120	
	Tin, mg/kg increase	report	
	Copper strip rating,[O] max	3	
D6278	Kinematic viscosity after shearing mm^2/s at 100 °C, min	SAE XW-30	SAE XW-40
		9.3	12.5
D892 (Option A not allowed)	Foaming/settling,[P] mL, max		
	Sequence I	10/0	
	Sequence II	20/0	
	Sequence III	10/0	

D7216 (Elastomer Compatibility)

Note—These are the *unadjusted specification limits* for elastomer compatibility. Candidate oils shall, however, conform to the *adjusted specification limits*, the calculation of which is described in Annex A4.

Elastomer	Volume Change, %	Hardness Change, Points	Tensile Strength Change, %	Elongation at Break Change, %
Nitrile (NBR)	(+5, -3)	(+7, -5)	(+10, -TMC 1006)	(+10, -TMC 1006)
Silicone (VMQ)	(+TMC 1006, -3)	(+5, -TMC 1006)	(+10, -45)	(+20, -30)
Polyacrylate (ACM)	(+5, -3)	(+8, -5)	(+18, -15)	(+10, -35)
Fluoroelastomer (FKM)	(+5, -2)	(+7, -5)	(+10, -TMC 1006)	(+10, -TMC 1006)

Note—TMC 1006 is the designation for the reference oil used in this test method. This designation represents the original blend or subsequent approved re-blends of TMC 1006.

[*Table 3 Footnotes*]

[A] See Annex A3 for additional information.

[B] A passing T-11 (TGA % soot at 12.0 mm^2/s increase, at 100 °C, min)—6.00 (first test), 5.89 (second test), and 5.85 (third test)—can be used in place of a T-8E in the applicable categories. This is not intended to indicate equivalence.

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

[D] Refer to RR:D02-1391.

[E] The Sequence IIIG limits shown are more restrictive than the corresponding limits in Sequence IIIF, and are not intended to indicate equivalence. Results meeting the Sequence IIIG criteria stated can be used in lieu of Sequence IIIF.

[F] 60 – 80 h value is interpolated according to the equation $PVIS@(60-80)\text{h} = \left(\frac{\sqrt{PVIS@60\text{h}} + \sqrt{PVIS@80\text{h}}}{2}\right)^2$, where PVIS@60 h is percent viscosity increase at 60 h and PVIS@80 h is percent viscosity increase at 80 h.

[G] Refer to RR:D02-1273. Alternatively, Test Method D6750 (1N) can be used; if this test method is used, the measured parameters and primary performance criteria are the same as those shown for Test Method D6750 (1N) in the CJ-4 category.

[H] Refer to RR:D02-1379.

[I] See Annex A1; use method without transformations.

[J] Tests as allowed in SAE J300.

[K] Noncritical specification as defined by Practice D3244; may be superseded only by applicable higher limits set by SAE J300.

[L] The T-10A test is the name given to a T-10 test run for 75 h to generate the sample for measurement by Test Method D4684.

[M] The T-12A test is the name given to a T-12 test run for 100 h to generate the sample for measurement by Test Method D4684.

[N] Refer to RR:D02-1517.

[O] The rating system in Test Method D130 is used to rate the copper coupon in Test Method D6594.

[P] Ten minutes for Sequence I, II, and III.