

This sequence defines the minimum quality level of a product for self-certification to EELQMS and for presentation to ACEA members. Performance parameters other than those covered by the tests shown or more stringent limits may be indicated by individual member companies.

1. LABORATORY TESTS

REQUIREMENT	TEST METHOD	PROPERTIES	UNIT	LIMITS				
				E4-08	E6-08	E7-08	E9-08	
1.1 Viscosity		SAE J300 Latest Active Issue		No restriction except as defined by shear stability and HT/HS requirements. Manufacturers may indicate specific viscosity requirements related to ambient temperature.				
1.2 Shear stability	CEC-L-014-93 or ASTM D6278	Viscosity after 30 cycles measured at 100°C	mm ² /s	Stay in grade	–	–	–	
	ASTM D6278	Viscosity after 90 cycles measured at 100°C	mm ² /s	–	Stay in grade			
1.3 Viscosity High Temperature High Shear Rate	CEC-L-036-90 (2nd Edition) (Ravenfield)	Viscosity at 150°C and 10 ⁶ s ⁻¹ shear rate	mPa.s	≥3.5				
1.4 Evaporative Loss	CEC-L-040-93 (Noack)	Max. weight loss after 1h at 250°C	%	≤13				
1.5 Sulphated Ash	ASTM D874		% m/m	≤2.0	≤1.0	≤2.0	≤1.0	
1.6 Phosphorus (1)	ASTM D5185		% m/m	–	≤0.08	–	≤0.12	
1.7 Sulphur (1)	ASTM D5185		% m/m	–	≤0.3	–	≤0.4	
1.8 Oil Elastomer Compatibility (2)	CEC-L-039-96	Max. variation of characteristics after immersion for 7 days in fresh oil without pre-aging Hardness DIDC Tensile strength Elongation rupture Volume variation	points % % %	Elastomer type				
				RE1	RE2-99	RE3-04	RE4	AEM
				-1/+5	-5/+8	-25/+1	-5/+5	(NAMAC)
				-50/+10	-15/+18	-45/+10	-20/+10	As per
				-60/+10	-35/+10	-20/+10	-50/+10	Daimler
1.9 Foaming Tendency	ASTM D892 without option A	Tendency - stability	ml ml ml	Sequence I (24°C) 10 - nil Sequence II (94°C) 50 - nil Sequence III (24°C) 10 - nil			Seq I 10/0 Seq II 20/0 Seq III 10/0	
1.10 High temperature foaming tendency	ASTM D6082	Tendency - stability	ml	Sequence IV (150°C) 200 - 50			–	
1.11 Oxidation	CEC-L-085-99 (PDSC)	Oxidation Induction time	min	Report	Report	≥65	≥65	
1.12 Corrosion	ASTM D6594	Copper increase	ppm	Report	Report	Report	≤20	
		Lead increase	ppm	Report	Report	≤100	≤100	
		Copper strip rating	max	Report	Report	Report	3	
1.13 Turbocharger performance (3)								
1.14 TBN	ASTM D2896		mg KOH/g	≥12	≥7	≥9 (4)	≥7	

2. ENGINE TESTS

REQUIREMENT	TEST METHOD	PROPERTIES	UNIT	LIMITS			
				E4-08	E6-08	E7-08	E9-08
2.1 Wear (5, 6)	CEC L-099-08 (OM646LA)	Outlet cam wear (Avg. max. wear 8 cams)	µm	≤140	≤140	≤155	≤155
2.2 Soot in oil (7)	ASTM D5967 (Mack T-8E)	Test duration 300 h Relative viscosity at 4.8% soot 1 test/2 test/3 test average		≤2.1/2.2/2.3	≤2.1/2.2/2.3	≤2.1/2.2/2.3	–
2.3 Soot in oil	Mack T11	Min TGA soot @ 4.0 cSt (100°C) Min TGA soot @ 12.0 cSt (100°C) Min TGA soot @ 15.0 cSt (100°C)	%	–	–	–	3.5/3.4/3.3 6.0/5.9/5.9 6.7/6.6/6.5
2.4 Bore polishing Piston cleanliness (8-10)	CEC L-101-08 (OM501LA)	Bore polishing, average	%	≤1.0	≤1.0	≤2.0	≤2.0
		Piston cleanliness, average	Merit	≥26	≥26	≥17	≥17
2.5 Soot induced wear	Cummins ISM	Oil consumption	kg/test	≤9	≤9	≤9	≤9
		Engine sludge, average	Merit	Report	Report	Report	Report
		Merit				(11)	≥1000
		Rocker pad average weight loss at 3.9% soot	mg			≤7.5/7.8/7.9	≤7.1
		1 test/ 2 test/ 3 test average Oil filter diff.press @ 150h	kPa	–	–	≤55/67/74	≤19
2.6 Wear (liner-ring- bearings)	Mack T12	1 test/ 2 test/ 3 test average Engine sludge	Merit			≥8.1/8.0/8.0	≥8.7
		1 test/2 test/ 3 test average Adj. screw weight loss	mg				≤49
		Merit			≥1000	≥1000	≥1000
		Avg. liner wear	µm		≤26	≤26	≤24
Average top ring weight loss	mg		≤117	≤117	≤105		
End of test lead	ppm	–	≤42	≤42	≤35		
Delta lead 250-300 hrs	ppm		≤18	≤18	≤15		
Oil consumption (Phase II)	g/hr		≤95	≤95	≤85		
				(12,13)	(12,13)		

(1) The internal standard method has to be used. (2) Use either the most recent complete Daimler requirements (VDA 675301, 7 days, 4 materials (NBR: NBR34 DIN 53538 T3 (100 °C); FPM:AK6 (150 °C); ACM: E7503 (150 °C); AEM: D 8948/200.1 (150 °C)) + RE3 according to requirement 1.8 above, or complete requirements according to 1.8 above + Daimler requirements for AEM. (3) Should a test become available before the next document update, ACEA reserves the right to set performance limits providing adequate data is available. (4) Values < 9.00 are not accepted. (5) OM602A data can be used instead of OM646LA data providing it meets the requirements as specified in the 2007 ACEA sequences. (6) Additional parameters may be included once approved by CEC. (7) Mack T11 results obtained as part of an API CI-4, CI-4 plus or API CJ-4 approval program, can be used in place of Mack T8E (8) Bore polish, oil consumption and engine sludge are non-approved CEC partners. (9) OM441LA data can be used instead of OM501LA data providing it meets the requirements as specified in the 2007 ACEA sequences. (10) Limits for the sludge parameter may be reconsidered when more data becomes available. (11) Results from M11HST (ASTM D6838), at API CH-4, or M11EGR (ASTM D6975), at API CI-4 or CI-4 Plus, can be used in place of Cummins ISM. (12) Merit number shall be calculated according to the API CI-4 specification (13) Mack T10 results obtained as part of an API CI-4 or CI-4 plus approval program, can be used in place of Mack T12.