Mercedes-Benz specifications for engine oils (service fill) V2012.1

service oil requirements

MB Sheet No. a.)			226.9	228.0/.1	228.2/.3	228.31	228.5	228.51	229.1	229.3	229.31	229.5	229.51
Viscosity Requirements													
Mono-/Multigrade			multi	mono/multi	mono/multi	multi	multi	multi	multi	multi	multi	multi	multi
Viscosity Grades	SAE	=	acc. ACEA	acc. ACEA	acc. ACEA	acc. ACEA	acc. ACEA	acc. ACEA	acc. ACEA	0W-, 5W-,10W-X	0W-, 5W-,10W-X	0W-, 5W-,10W-X	0W-, 5W-,10W-X
SAE XW-30 and 0W-40	possible		no	yes d.)	yes d.)	yes d.)	yes d.)	yes d.)	yes	yes	yes	yes	yes
Read Across Guidelines													
MB Read Across o.)	RA		no	yes	yes	yes	yes	yes	yes	yes	yes	yes	yes
Package Pass o.)	RA		yes	yes	yes	yes	no	no	no	no	no	no	no
ACEA Oil Sequences required	ACEA		When any ACEA Ax, Bx, Cx or Ex oil sequence is claimed, then all tests within this oil sequence are mandatory.										
API Oil Categories required min.	API		-	-	-	**API CJ-4**	-	-	-	-	-	-	-
DDC Oil specification level	PGOS		-	-	-	(93K218)	-	-	-	-	-	-	-
Laboratory Tests													
Sulfated Ash (DIN 51575 or ASTM D874)	% b.w.	≥	≤ 1,0	≤ 2,0	> 1,0 & ≤ 2,0	≤ 1,0	> 1,0 & ≤ 2,0	≤ 1,0	> 0,8 & ≤ 1,5	> 0,8 & ≤ 1,5	≤ 0,8	**> 1,0 & ≤ 1,6**	≤ 0,8
TBN (ISO 3771 or ASTM D2896 fresh oil)	mgKOH/g	≥	-	6,0	8,0	7,0	12,0	7,0	6,0	7,0	6,0	**10,0**	6,0
TBN (ASTM D4739 fresh oil)	mgKOH/g	≥	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Pour point (ISO 3016 or ASTM D97)	°C	≤	-27	R&R/-27	R&R/-27	-27	-27	-27	-27	-27	-27	-27	-27
Evaporative Loss CEC L-40-93, ASTM D5800, Noack	%	≤	13	13	13	13	13	12	13	13	12	10	10
Viscosity @ High Temp.& High Shear Rate (CEC L-36-90) HTHS	mPa s	≥	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5	3,5
Zinc (DIN 51391 -2/-3 or ASTM D5185 / 6443)	% b.w.	≥	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	0,04	0,04	0,04	0,04	0,04
Sulfur (DIN EN ISO 14596 or ASTM D5185 / 2622)	% b.w.	≤	Rate & Report	Rate & Report	Rate & Report	0,4	Rate & Report	0,3	Rate & Report	0,5	0,3	0,5	0,3
Phosphorus (DIN 51363 -2/-3 / ASTM D5185 / 4951)	% b.w.	≤	Rate & Report	Rate & Report	Rate & Report	0,12	Rate & Report	0,08	Rate & Report	0,05 - 0,11	0,05 - 0,09	0,05 - 0,11	0,05 - 0,09
Chlorine (DIN ISO 15597 or ASTM D6443)	% b.w.	≤	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	0,0150	Rate & Report	0,0150	0,0150	0,0150	0,0150
Daimler Oxidation Test - Fresh Oil (Daimler Oxidation Test Procedure) c.)					✓	✓	✓	✓	✓	✓	✓	✓	✓
Kin. Viscosity @ 100°C, EOT 168h, avg of 3 runs	mm²/s	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Oxidation DIN 51453 @ EOT 168h, avg of 3 runs	A/cm	≤	-	-	60	60	25	25	Rate & Report	60	60	25	25
Delta Kin. Viscosity KV100 avg of 3 runs - absolute	mm²/s	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Delta Kin. Viscosity KV100, avg of 3 runs - relative	%	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Daimler Oxidation Test - with Fuel Dilution 5% B100 (FAME from OM 646 Biodiesel Test) c.)					✓	✓	✓	✓	✓	✓	✓	✓	✓
Kin. Viscosity @ 100°C, EOT 168h, avg of 3 runs	mm²/s	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Oxidation DIN 51453 @ EOT 168h, avg of 3 runs	A/cm	≤	-	-	120	120	90	90	Rate & Report	120	120	80	80
Delta Kin. Viscosity KV100 avg of 3 runs - absolute	mm²/s	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Delta Kin. Viscosity KV100, avg of 3 runs - relative	%	≤	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
SRV (Schwing Reib Verschleiß) Test (MBN 10474) c.)									✓	✓	✓	✓	✓
Load carrying capacity avg 5 runs - fresh oil	N	≥	-	-	-	-	-	-	100	100	100	100	100
Coefficient of friction µr avg 5 runs - fresh oil		≤	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Load carrying capacity avg 5 runs - aged oil	N	≥	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Coefficient of friction µr avg 5 runs - aged oil		≤	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
CEC Low Temperature Pumping Test (CEC TDG-L105) c.)			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
MRV @ SAE J300 fresh oil temperature	mPa s	≤	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
MRV @ SAE J300 fresh oil temperature +5°C	mPa s	≤	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Yield Stress	Pa	≤	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Deposit test (MTU, DIN 51535)	mg		-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	-	-	-	-	-
Sooted Oil MRV T11/11A ASTM D6896			-	-	-	✓	-	-	-	-	-	-	-
180 hour sample T-11/T11 A drain MRV	mPa s	≤	-	-	-	18.000	-	-	-	-	-	-	-
MRV Yield Stress	Pa	≤	-	-	-	35	-	-	-	-	-	-	-
High Temperature Corrosion Bench Test HTCBT (modified ASTM D6594 @135°C) c.)					✓	✓	✓	✓	-	✓	✓	✓	✓
Cu increase - without / with 10% B100*	ppm	≤	-	-	R & R / R & R	20 / R & R	R & R / R & R	R & R / R & R	-	R & R / R & R	R & R / R & R	R & R / R & R	R & R / R & R
Pb increase - without / with 10% B100*	ppm	≤	-	-	100 / R & R	120 / R & R	R & R / R & R	R & R / R & R	-	R & R / R & R	R & R / R & R	R & R / R & R	R & R / R & R
Copper strip rating - without / with 10% B100*		≤	-	-	R & R / R & R	3 / R & R	R & R / R & R	R & R / R & R	-	R & R / R & R	R & R / R & R	R & R / R & R	R & R / R & R
* Reference Fuel B100 (80% RME + 20% SME) from OM 646 TDG-L104													
Shear Stability CEC L-14-93, ASTM D6278 / 7109			✓ @ 30 cycles	✓ @ 30 cycles	✓ @ 30 cycles	✓ @ 90 cycles	✓ @ 90 cycles	✓ @ 90 cycles	✓ @ 30 cycles	✓ @ 30 cycles	✓ @ 30 cycles	✓ @ 90 cycles	✓ @ 90 cycles
Kin.Viscosity @100°C after 30 / 90 cycles shearing	mm²/s		stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade	stay in grade
Foaming tendency			✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Sequence I (24° C) ASTM D892 w/o option A	ml	≤	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0
Sequence II (94°C) ASTM D892 w/o option A	ml	≤	50 / 0	50 / 0	20 / 0	20 / 0	20 / 0	20 / 0	50 / 0	20 / 0	20 / 0	20 / 0	20 / 0
Sequence III (24°C) ASTM D892 w/o option A	ml	≤	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0	10 / 0
Sequence IV (150°C) ASTM D6082 after 1min settl. period	ml		Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Elastomer Compatibility - (CEC L-39-96) b.)	ACEA		ACEA E9	ACEA E7	ACEA E7	ACEA E9	ACEA E4	ACEA E6	ACEA A3/B4	ACEA A3/B4	ACEA C3	ACEA A3/B4	ACEA C3
Related Daimler Liefervorschrift (DBL)	DBL		6610	6610	6610	6610	6610	6610	6615	6615	6615	6615	6615
Engine Tests			i.)										
M 271 Sludge Test (M 271 Classic Sludge DL) - until M 271 EVO Sludge (CEC TDG-L107) is ready @ CEC c.)									✓	✓	✓	✓	✓
Engine sludge avg.	merit	≥	-	-	-	-	-	-	8,5	8,8	8,8	9,1	9,1
M 271 EVO Sludge Test (CEC TDG-L107) - when ready @ CEC - as alternative to M 271 Sludge Test c.									✓	✓	✓	✓	✓
Engine sludge avg.	merit	≥	-	-	-	-	-	-	8,5	8,8	8,8	9,1	9,1
M 271 Wear Test (MB DL, Wear, 250 h) c.)									✓	✓	✓	✓	✓
Cam wear inlet / outlet valve (avg. max. wear 8 cams)	µm	≤	-	-	-	-	-	-	5,0 / 5,0	5,0 / 5,0	5,0 / 5,0	5,0 / 5,0	5,0 / 5,0
Piston ring wear radial @ ring 1 / ring 2 (avg.) e.)	µm	≤	-	-	-	-	-	-	5,0 / 12,0	5,0 / 12,0	5,0 / 12,0	5,0 / 12,0	5,0 / 12,0
Piston ring wear axial @ ring 1 / groove 1 (avg.) e.)	µm	≤	-	-	-	-	-	-	5,0 / 15,0	5,0 / 15,0	5,0 / 15,0	5,0 / 15,0	5,0 / 15,0
Ring sticking	yes/no		-	-	-	-	-	-	no	no	no	no	no
Main Bearing wear (avg.) e.) / (max.)	µm	≤	-	-	-	-	-	-	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5
Conrod Bearing wear (avg.) e.) / (max.)	µm	≤	-	-	-	-	-	-	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5	1,5 / 3,5
Timing chain wear (elongation)	%	≤	-	-	-	-	-	-	0,25	0,25	0,25	0,25	0,25
Timing chain wear (single chain link)	%	≤	-	-	-	-	-	-	1,0	1,0	1,0	1,0	1,0
Bore polishing (xmm) - max. value of 6 cylinders	%	≤	-	-	-	-	-	-	t.b.d.	t.b.d.	t.b.d.	t.b.d.	t.b.d.
M 111 Fuel Economy (CEC L-54-96) c.)										✓	✓	✓	✓
Fuel economy improvement vs. RL 191 (15W-40)	%	≥	-	-	-	-	-	-	-	1,0	1,0	1,7	1,7
MB Fuel Economy Tests - FE benefit in NEDC (PC Chassis Dynamometer Test) for 0W-30/-40 and 5W-30/-40 vs MB RL001 Otto & MB RL002 Diesel c.)										✓	✓	✓	✓
FE in W204 C250 CDI / Engine: OM651 vs MB RL002	%	≥	-	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report
FE in W204 C350 CDI / Engine: OM642 vs MB RL002	%	≥	-	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report
FE in W204 C200 K / Engine: M271 ML18 vs MB RL001	%	≥	-	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report
FE in W204 C350CGI / Engine: M272 DE35 vs MB RL001	%	≥	-	-	-	-	-	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report
OM 646 DE22LA Biodiesel Test (CEC TDG-L-104) - when ready @ CEC c.)				✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Piston cleanliness (avg. 4 pistons)	merit	≥	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Engine sludge avg.	merit	≥	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Ring sticking	yes/no		-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
TBN (ASTM D 4739) @ end of test	mgKOH/g	≥		Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
TAN (ASTM D 664) @ end of test	mgKOH/g	≤		Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Oil consumption	g/test	≤	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Soot	%	≤	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Viscosity increase at 100°C	%	≤	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
OM 646 DE22LA Wear (CEC L-99-08) c.)			-	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Cam wear inlet (avg. max. wear 8 cams)	µm	≤	-	**120**	**100**	**100**	**90**	**90**	**120**	**100**	**100**	**90**	**90**
Cam wear outlet (avg. max. wear 8 cams)	µm	≤	-	**155**	**130**	**130**	**110**	**110**	**155**	**130**	**130**	**110**	**110**
Cylinder wear (avg. 4 cylinder)	µm	≤	-	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0	5,0
Bore polishing (13 mm) - max. value of 4 cyl.	%	≤	-	4,0	3,5	3,5	3,0	3,0	4,0	3,5	3,5	3,0	3,0
Piston cleanliness (avg. 4 pistons)	merit	≥	-	10,0	12,0	12,0	14,0	14,0	10,0	12,0	12,0	14,0	14,0
Engine sludge avg.	merit	≥	-	**8,6**	**8,8**	**8,8**	**9,1**	**9,1**	**8,6**	**8,8**	**8,8**	**9,1**	**9,1**
Ring sticking	yes/no		-	no	no	no	no	no	no	no	no	no	no
Tappet wear inlet (avg. max. wear 8 cams)	µm	≤	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Tappet wear outlet (avg. max. wear 8 cams)	µm	≤	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report
Bearing wear main / con rod bearing e.)	µm	≤	-	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1	2,1/2,1
Piston ring wear axial @ ring 1 e.)	µm	≤	-	10,4	10,4	10,4	8,7	8,7	10,4	10,4	10,4	8,7	8,7
Piston ring wear axial @ ring 2 e.)	µm	≤	-	6,0	6,0	6,0	4,0	4,0	6,0	6,0	6,0	4,0	4,0
Piston ring wear axial @ ring 3 e.)	µm	≤	-	5,0	5,0	5,0	3,0	3,0	5,0	5,0	5,0	3,0	3,0
Piston ring wear radial @ ring 1 e.)	µm	≤	-	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0	10,0
Piston ring wear radial @ ring 2 e.)	µm	≤	-	12,0	12,0	12,0	12,0	12,0	12,0	12,0	12,0	12,0	12,0
Piston ring wear radial @ ring 3 e.)	µm	≤	-	8,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0	8,0
Timing chain wear (elongation)	%	≤	-	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4	0,4
Oil consumption	g/test	≤	-	7000	7000	7000	7000	7000	7000	7000	7000	7000	7000
Soot	%	≤	-	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0	4,0 - 7,0
Viscosity increase at 100°C	%	≤	-	100	100	100	90	90	100	100	100	90	90
VW TDI (CEC L-078-99)			-	-	-	-	-	-	✓	✓	✓	✓	✓
Piston cleanliness (avg.)	merit	≥	-	-	-	-	-	-	RL 206 - 4	RL 206	RL 206	RL 206	RL 206
All other requirements as listed in ACEA 2010	Pass		-	-	-	-	-	-	A3/B3-10	A3/B4-10	C3-10	A3/B4-10	C3-10
VW T4 (VW PV 1449)			-	-	-	-	-	-	-	✓	-	✓	-
All test parameter from VW 502.00	Pass		-	-	-	-	-	-	-	yes	-	yes	-

Mercedes-Benz specifications for engine oils (service fill) V2012.1

service oil requirements

MB Sheet No. a.)			226.9	228.0/.1	228.2/.3	228.31	228.5	228.51	229.1	229.3	229.31	229.5	229.51
OM 501 LA Euro 5 (CEC L-101-09) c.) d.)			-	✓	✓	✓	✓	✓	-	-	-	-	-
Piston cleanliness avg.	merit	≥	-	**16,0**	**19,0**	**19,0**	**28,0**	**28,0**	-	-	-	-	-
Ring sticking 2. piston rings	ASF	≤	-	1,0	1,0	1,0	1,0	1,0	-	-	-	-	-
Engine sludge avg.	merit	≥	-	9,0	9,0	9,0	9,4	9,4	-	-	-	-	-
General engine deposits avg.	demerit	≤	-	3,0	2,0	2,0	2,0	2,0	-	-	-	-	-
Wear rating (visual) avg.	demerit	≤	-	3,0	3,0	3,0	2,0	2,0	-	-	-	-	-
Bore polishing avg.	%	≤	-	3,0	2,0	2,0	1,0	1,0	-	-	-	-	-
Cylinder wear avg.	mm	≤	-	0,008	0,008	0,008	0,008	0,008	-	-	-	-	-
Turbocharger deposits	demerit	≤	-	3,0	2,0	2,0	2,0	2,0	-	-	-	-	-
TBN (ASTM D 4739) @ end of test	mgKOH/g		-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	-	-	-	-	-
TAN (ASTM D 664) @ end of test	mgKOH/g		-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	Rate & Report	-	-	-	-	-
Specific oil consumption	g/h	≤	-	50,0	30,0	30,0	30,0	30,0	-	-	-	-	-
OM 501 LA Euro 5 Fuel Economy Test (Daimler Inhouse Test, WHTC, FE vs MB RL003, 10W-40) c.)					✓	✓	✓	✓	-	-	-	-	-
FE-Benefit vs. MB RL003 - only required for xW-30	%	≥	-	-	Rate & Report	Rate & Report	Rate & Report	Rate & Report	-	-	-	-	-
Mack T-12 EGR u.)			-	-	-	✓	-	-	-	-	-	-	-
Mack Merit Rating, min.	merit	≥	-	-	-	1000		-	-	-	-	-	-
Mack T-11 (ASTM D7156)			-	-	-	✓	-	-	-	-	-	-	-
Minimum TGA % Soot @ 4.0 cSt increase @ 100° C	%	≥	-	-	-	3,5 / 3,4 / 3,3		-	-	-	-	-	-
Minimum TGA % Soot @ 12.0 cSt increase @ 100° C	%	≥	-	-	-	6,0 / 5,9 / 5,9		-	-	-	-	-	-
Minimum TGA % Soot @ 15.0 cSt increase @ 100° C	%	≥	-	-	-	6,7 / 6,6 / 6,5		-	-	-	-	-	-
Cummins ISM EGR u.)			-	-	-	✓	-	-	-	-	-	-	-
Cummins Merit Rating, min.	merit	≥	-	-	-	1000	-	-	-	-	-	-	-
Top Ring Weight Loss, max.	mg	≤	-	-	-	100 / 100 / 100	-	-	-	-	-	-	-
Cummins ISB EGR			-	-	-	✓	-	-	-	-	-	-	-
Average Slider Tappet Weight Loss	mg	≤	-	-	-	100 / 108 / 112	-	-	-	-	-	-	-
Average Cam Lobe Wear, µm, max. 55	µm	≤	-	-	-	55 / 59 / 61	-	-	-	-	-	-	-
Average Crosshead Weight Loss, max. R&R	mg		-	-	-	Rate & Report	-	-	-	-	-	-	-
Caterpillar C13 u.)			-	-	-	✓	-	-	-	-	-	-	-
CAT Merit Rating, min.	merit	≥	-	-	-	1000	-	-	-	-	-	-	-
Hot-stuck piston ring			-	-	-	none	-	-	-	-	-	-	-
Caterpillar 1N (ASTM D6750)			-	-	-	✓	-	-	-	-	-	-	-
Weighted Demerits, max.	demerit	≤	-	-	-	286,2 / 311,7 / 323,0		-	-	-	-	-	-
Top Groove Fill, max.	%	≤	-	-	-	20 / 23 / 25	-	-	-	-	-	-	-
Top Land Heavy Carbon, max.	%	≤	-	-	-	3 / 4 / 5	-	-	-	-	-	-	-
Oil Consumption (0-252 hrs), max.	g/kw h	≤	-	-	-	0,5	-	-	-	-	-	-	-
Piston/ring/liner scuffing			-	-	-	none	-	-	-	-	-	-	-
Piston ring stick			-	-	-	none	-	-	-	-	-	-	-
Sequence IIIF (ASTM D6984)			-	-	-	✓	-	-	-	-	-	-	-
EOT Kinematic Viscosity / %Incr. @40° C, max.		≤	-	-	-	275%(MTAC)			-	-	-	-	-
Sequence IIIG (alternative to IIIF)			-	-	-	✓	-	-	-	-	-	-	-
EOT Kinematic Viscosity / %Incr. @40° C, max.		≤	-	-	-	150%(MTAC)			-	-	-	-	-
Roller Follower Wear Test (ASTM D5596)			-	-	-	✓	-	-	-	-	-	-	-
Average pin wear, mils, max.	mils	≤	-	-	-	0,30 /0,33 /0,36	-	-	-	-	-	-	-
or Average pin wear, µm, max	µm	≤	-	-	-	7,6 / 8,4 / 9,1	-	-	-	-	-	-	-
Engine Oil Aeration Test (ASTM D6894)			-	-	-	✓	-	-	-	-	-	-	-
Oil aeration volume %, max. (MTAC)	%	≤	-	-	-	8,0	-	-	-	-	-	-	-

Notes:

a.) All required data have to be measured, calculated values are not accepted.

b.) Elastomer compatibility tests & limits according to DBL 6674 / 6610 / 6615 - will be replaced by new requirements as listed in ACEA Oil Test Sequences 2012

c.) Complete Test Report is required. Additional for MB Engine Tests: Rerating at EP/MDE for all related engine parts

d.) Only for xW-30 or 0W-40: Evaluation of bearing wear in a OM 501 LA engine with new crankshaft and premeasured bearings. Rerating by Daimler at TP/PHC

e.) The worst result (outlier result) will be replaced by the second worst to calculate the average to control outliers

i.) Approval conditions for engine oils for natural gas (CNG) engines: positive field test with MB CNG busses or a pass result in a 500h CNG engine test by MB do Brasil or a read across from MAN M 3271 approval.

o.) Read Across only according to MB Read Across Guidelines for engine tests (based on latest ATC and ATIEL Code of Practice). MB Package Pass only for Mineral Oils (SN, ATIEL Grp. I & II) and for SAE 15W-40, 20W-40, 15W-50, 20W-50.

u.) Detailed rating for Mack T-12, Cummins ISM and Cat C-13 according to API CJ-4 Merit Systems

Conditions for approvals and the use of performance claims (MB sheets) against MB oil specifications

MB requires that any claims for oil performance to meet the mentioned MB specifications must be based on credible data and controlled tests in accredited test laboratories.

All engine performance testing used to support a claim of compliance with these MB oil specifications must be generated according to the MB Read Across Guidelines and the European Engine Lubricants Quality Management System (EELQMS).

MB Approval for each new oil formulation is valid 5 years.

The runtime of rebrands and reblends is limited by the runtime of the original and are therefore limited to max. 5 years.

From the introduction date of a new version of the MB Specification the previous version is still valid one year. For this time-period both specification versions are valid for approvals.

Package Pass approvals: For every treat rate a trading approval is required. The trading approvals are handled like approvals for new oil formulations.

As a consequence the following timeline is valid from now on:

MB Specification - Issue (version with year.spec no)	First allowable use	New approvals by at the latest
MB Specification V2004.2	26.10.2004	18.03.2006
MB Specification V2005.1	18.03.2005	22.09.2007
MB Specification V2006.1	22.09.2006	01.12.2008
MB Specification V2007.1	01.12.2007	16.03.2010
MB Specification V2009.1	16.03.2009	21.03.2013
MB Specification V2012.1	21.03.2012	

First allowable use means that approvals and claims cannot be made against the specification before the date indicated.

New approvals by means that from this date all approvals for new oil formulations must be according to the latest MB specification release.