

## Heavy-Duty Diesel Engine Test Category For API CJ-4

Requirements	Test Method	Properties	Unit	Limits		
				1 Test	2 Tests	3 Tests
<b>1. LABORATORY TESTS FOR API CJ-4</b>						
1.1 Viscosity Grades		SAE J300		Manufacturer specifies viscosity target within SAE J300 specification		
1.2 High Temperature Corrosion, 135°C	ASTM D6594	Copper, used oil increase, max Lead, used oil increase, max Copper Strip Rating, max	ppm ppm -	20 120 3	No MTAC <sup>(1),(2)</sup>	
1.3 Foaming	ASTM D892	Foaming/Settling, max Sequence I Sequence II Sequence III	% % %	10/0 20/0 10/0	No MTAC <sup>(1),(2)</sup>	
1.4 Shear Stability	ASTM D7109	KV @ 100°C after 90-passes for SAE XW-40, min KV @ 100°C after 90-passes for SAE XW-30, min	cSt cSt	12.5 9.3	No MTAC <sup>(1),(2),(3)</sup>	
1.5 Noack Volatility	ASTM D5800	Evap Loss @ 250°C, Vis Grades other than SAE 10W-30, max Evap Loss @ 250°C, SAE 10W-30, max	% %	13 15	No MTAC <sup>(1),(2)</sup>	
1.6 High Temperature/High Shear	ASTM D4683	Viscosity @ 150°C, min	cP	3.5	No MTAC <sup>(1),(2)</sup>	
1.7 Sooted Oil MRV	ASTM D6896	180 hour sample from Mack T-11 or T-11A Viscosity @ -20°C, max Yield stress	cP Pa	25,000 <35	No MTAC <sup>(1),(2)</sup>	
1.8 Chemical Limits (Non-Critical)	ASTM D874 ASTM D4951 ASTM D4951	Sulfated Ash, max Phosphorus, max Sulfur, max	% % %	1.0 0.12 0.4	No MTAC <sup>(1),(2)</sup>	
1.9 Seal Compatibility (ASTM D7216)	Nitrile Silicone Polyacrylate FKM Vamac G	Volume Change +5 / -3 +TMC1006 / -3 +5 / -3 +5 / -2 +TMC1006 / -3	Hardness +7 / -5 +5 / -TMC1006 +8 / -5 +7 / -5 +5 / -TMC1006	Tensile strength +10 / -TMC1006 +10 / -45 +18 / -15 +10 / -TMC1006 +10 / -TMC1006	Elongation +10 / -TMC1006 +20 / -30 +10 / -35 +10 / -TMC1006 +10 / -TMC1006	
<b>2. ENGINE TESTS FOR API CJ-4</b>			Unit	Limits		
				1 Test	2 Tests	3 Tests
2.1 Mack T-11	ASTM D7156	Soot @ 4cSt Inc, min Soot @ 12cSt Inc, min Soot @ 15cSt Inc, min	% % %	3.5 6.0 6.7	3.4 5.9 6.6	3.3 5.9 6.5
2.2 Mack T-12		Merits, min		1000 <sup>(3)</sup>	1000 <sup>(3)</sup>	1000 <sup>(3)</sup>
2.3 Cummins ISB		Tappet Wear, max Cam Wear, max Crosshead Weight Loss	mg microns mg	100 55 Rate/report	108 59 Rate/report	112 61 Rate/report
2.4 Cummins ISM		Merits, min Top Ring Wt Loss, max		1000 <sup>(3)</sup> 100	1000 <sup>(3)</sup> 100	1000 <sup>(3)</sup> 100
2.5 Caterpillar 1N	ASTM D6750	Top Land Heavy Carbon, max Top Groove Fill, max Weighted Demerits, max Average Oil Consumption (0-252 hr), max Ring / Liner Scuffing	% % demerits g/kW-hr None	3 20 286.2 0.5 None	4 23 311.7 0.5 None	5 25 323.0 0.5 None
2.6 Caterpillar C13		Merits, min Hot Stuck Rings		1000 <sup>(3)</sup> None	1000 <sup>(3)</sup> None	1000 <sup>(3)</sup> None
2.7 Engine Oil Aeration	ASTM D6894	Oil Aeration Volume, max	%	8.0 (MTAC)	8.0 (MTAC)	8.0 (MTAC)
2.8 Roller Follower Wear Test	ASTM D5966	Roller Follower Pin Wear, max	microns	7.6	8.4	9.1
2.9 Sequence IIIF <sup>(4)</sup>	ASTM D6984	Viscosity Inc at EOT, max	%	275 (MTAC)	275 (MTAC)	275 (MTAC)

<sup>(1)</sup> Not an ACC Test.

<sup>(2)</sup> MTAC is a statistical method for treating engine test results. Consult your sales representative for further information.

<sup>(3)</sup> Requires all individual merit ratings to be equal to or greater than zero. Consult your sales representative for further information.

<sup>(4)</sup> Passing Seq IIIG viscosity increase at API SM is an acceptable alternative.