

API CJ-4 Summary of Tests

TEST TYPE	PURPOSE	PARAMETER	REQUIREMENT																																			
Caterpillar 1N	Evaluates performance of crankcase lubricants	Piston deposits Ring sticking Piston scuffing Ring scuffing Liner scuffing Oil consumption	Weighted demerits, max 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) g/kwh, max 0.5 Piston/ring/liner scuffing None Piston ring stick None																																			
Caterpillar C13	Evaluates performance of crankcase lubricants for piston deposits, oil consumption	Liner (1Y-4107) Piston (1Y-4106) Top Ring (1Y-4108) 2 nd Ring (1Y-4109) Oil Ring (1Y-4110)	<table border="1"> <thead> <tr> <th></th> <th>Max</th> <th>Merit Wt</th> <th>Anchor</th> <th>Min</th> </tr> </thead> <tbody> <tr> <td>Delta O/C</td> <td>31</td> <td>300</td> <td>25</td> <td>10</td> </tr> <tr> <td>ATLC</td> <td>35</td> <td>300</td> <td>30</td> <td>15</td> </tr> <tr> <td>ATGC</td> <td>53</td> <td>300</td> <td>46</td> <td>30</td> </tr> <tr> <td>R2TCA</td> <td>33</td> <td>100</td> <td>22</td> <td>5</td> </tr> <tr> <td>Merits</td> <td colspan="4">1000</td> </tr> </tbody> </table>		Max	Merit Wt	Anchor	Min	Delta O/C	31	300	25	10	ATLC	35	300	30	15	ATGC	53	300	46	30	R2TCA	33	100	22	5	Merits	1000								
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Cummins ISB	Evaluates a crankcase lubricant's ability to reduce valve train and camshaft lobe wear	Camshaft Mushroom-style slider tappets Crosshead	<table border="1"> <thead> <tr> <th></th> <th colspan="4">MTAC</th> </tr> <tr> <th></th> <th>1</th> <th>2</th> <th>3</th> <th></th> </tr> </thead> <tbody> <tr> <td>ACSW 55</td> <td>55</td> <td>59</td> <td>61</td> <td></td> </tr> <tr> <td>ATWL 100</td> <td>100</td> <td>108</td> <td>11</td> <td></td> </tr> </tbody> </table>		MTAC					1	2	3		ACSW 55	55	59	61		ATWL 100	100	108	11																
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Engine Oil Aeration Test	Determines effectiveness of engine lubricating oils at minimizing air entrainment in large pickups and medium-duty trucks	Oil Evaluation	At 20 hours, the maximum allowable amount of air entrained in the oil is 8% for API CJ-4, CI-4, and CH-4; and 10% for API CF-4.																																			
Mack T11	Evaluates soot handling performance	Oil Filter Plugging	<table border="1"> <tbody> <tr> <td>Vis 12 cSts</td> <td>6.0 TGA Soot Mins</td> </tr> <tr> <td>Vis 15 cSts</td> <td>6.7</td> </tr> <tr> <td>Vis 4 cSts</td> <td>3.5</td> </tr> <tr> <td>New oil MRV@-20C</td> <td>20000 All grades</td> </tr> <tr> <td>180-Hr Used MRV</td> <td>25000, Yield stress <35 D 4684M</td> </tr> </tbody> </table>	Vis 12 cSts	6.0 TGA Soot Mins	Vis 15 cSts	6.7	Vis 4 cSts	3.5	New oil MRV@-20C	20000 All grades	180-Hr Used MRV	25000, Yield stress <35 D 4684M																									
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Mack T11A	Evaluates soot handling performance of lubricating oils operating in diesel engines equipped with EGR	Oil samples	<table border="1"> <tbody> <tr> <td>180-Hr sample soot</td> <td>4.82 / 5.16 / 5.49</td> </tr> <tr> <td>New oil MRV@-20C</td> <td>20000 All grades</td> </tr> <tr> <td>180-Hr Used MRV</td> <td>25000, Yield stress <35 D 4684M</td> </tr> </tbody> </table>	180-Hr sample soot	4.82 / 5.16 / 5.49	New oil MRV@-20C	20000 All grades	180-Hr Used MRV	25000, Yield stress <35 D 4684M																													
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Mack T12	Evaluates an oil's ability to minimize cylinder liner, piston ring and bearing wear in engines with EGR	Piston ring wear, cylinder liner wear, lead bearing corrosion, oil consumption, and oxidation	<table border="1"> <thead> <tr> <th>Parameter</th> <th>Anchor</th> <th>Merit Wt</th> <th>Max</th> <th>Min</th> </tr> </thead> <tbody> <tr> <td>RWL</td> <td>70</td> <td>200</td> <td>105</td> <td>35</td> </tr> <tr> <td>LWS</td> <td>20</td> <td>250</td> <td>24</td> <td>12</td> </tr> <tr> <td>Lead</td> <td>25</td> <td>200</td> <td>35</td> <td>10</td> </tr> <tr> <td>Lead delta</td> <td>10</td> <td>200</td> <td>15</td> <td>0</td> </tr> <tr> <td>O/C</td> <td>65</td> <td>150</td> <td>85</td> <td>50</td> </tr> <tr> <td>Merits</td> <td colspan="4">1000</td> </tr> </tbody> </table>	Parameter	Anchor	Merit Wt	Max	Min	RWL	70	200	105	35	LWS	20	250	24	12	Lead	25	200	35	10	Lead delta	10	200	15	0	O/C	65	150	85	50	Merits	1000			
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Sequence IIIG	Measures oil thickening and piston deposits under high-temp conditions	Pistons inspected for deposits, varnish; cam lobes and lifters measured for wear; oil screen plugging is evaluated	<table border="1"> <tbody> <tr> <td>PARAMETER</td> <td>PASS LIMIT</td> </tr> <tr> <td>Viscosity increase</td> <td>150%</td> </tr> </tbody> </table>	PARAMETER	PASS LIMIT	Viscosity increase	150%																															
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Chemical and Bench Tests

Foaming	Determines the foaming characteristics of lubricating oils	Foaming volumes	<table border="1"> <tr> <th colspan="2">Foaming / Settling</th> </tr> <tr> <td>Sequence I, max</td> <td>10 / 0 %</td> </tr> <tr> <td>Sequence II, max</td> <td>20 / 0 %</td> </tr> <tr> <td>Sequence III, max</td> <td>10 / 0 %</td> </tr> </table>		Foaming / Settling		Sequence I, max	10 / 0 %	Sequence II, max	20 / 0 %	Sequence III, max	10 / 0 %																																																				
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High-Temperature Corrosion	Evaluates diesel engine lubricants to determine tendency to corrode various metals	Four metal coupons	<table border="1"> <tr> <td>Copper</td> <td>Used oil increase</td> <td>Max 20 ppm</td> </tr> <tr> <td>Lead</td> <td>Used oil increase</td> <td>Max 120 ppm</td> </tr> <tr> <td>Copper</td> <td>Strip rating</td> <td>Max 3 ---</td> </tr> </table>	Copper	Used oil increase	Max 20 ppm	Lead	Used oil increase	Max 120 ppm	Copper	Strip rating	Max 3 ---																																																				
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High-Temperature High-Shear Viscosity	Covers the laboratory determination of the viscosity of engine oils	Viscosity	Viscosity @ 150 degrees C, minimum 3.5 cP																																																													
NOACK Volatility	Examines the evaporation loss of engine oils	The loss in mass of oil is determined	<table border="1"> <tr> <td>Evap Loss @ 250 Degrees C</td> <td>13%</td> </tr> <tr> <td>Vis Grades other than 10W-30, max</td> <td></td> </tr> <tr> <td>Evap Loss @ 250 Degrees C</td> <td>15%</td> </tr> <tr> <td>10W-30, max</td> <td></td> </tr> </table>		Evap Loss @ 250 Degrees C	13%	Vis Grades other than 10W-30, max		Evap Loss @ 250 Degrees C	15%	10W-30, max																																																					
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Seal Compatibility	Evaluates the compatibility of automotive engine oils with four reference elastomers	Effects of test oils on elastomers, measurement of changes in volume, hardness, tensile properties	<table border="1"> <tr> <td>Nitrile</td> <td>Volume change</td> <td>+5 / -3</td> </tr> <tr> <td></td> <td>Hardness</td> <td>+7 / -5</td> </tr> <tr> <td></td> <td>Tensile strength</td> <td>+10 / -TMC 1006</td> </tr> <tr> <td></td> <td>Elongation</td> <td>+10 / -TMC 1006</td> </tr> <tr> <td>Silicone</td> <td>Volume change</td> <td>+TMC 1006 / -3</td> </tr> <tr> <td></td> <td>Hardness</td> <td>+5 / -TMC 1006</td> </tr> <tr> <td></td> <td>Tensile strength</td> <td>+10 / -45</td> </tr> <tr> <td></td> <td>Elongation</td> <td>+20 / -30</td> </tr> <tr> <td>Polyacrylate</td> <td>Volume change</td> <td>+5 / -3</td> </tr> <tr> <td></td> <td>Hardness</td> <td>+8 / -5</td> </tr> <tr> <td></td> <td>Tensile strength</td> <td>+18 / -15</td> </tr> <tr> <td></td> <td>Elongation</td> <td>+10 / -35</td> </tr> <tr> <td>FKM</td> <td>Volume change</td> <td>+5 / -2</td> </tr> <tr> <td></td> <td>Hardness</td> <td>+7 / -5</td> </tr> <tr> <td></td> <td>Tensile strength</td> <td>+10 / -TMC 1006</td> </tr> <tr> <td></td> <td>Elongation</td> <td>+10 / -TMC 1006</td> </tr> <tr> <td>Vamac G</td> <td>Volume change</td> <td>+TMC 1006 / -3</td> </tr> <tr> <td></td> <td>Hardness</td> <td>+5 / -TMC 1006</td> </tr> <tr> <td></td> <td>Tensile strength</td> <td>+10 / -TMC 1006</td> </tr> <tr> <td></td> <td>Elongation</td> <td>+10 / -TMC 1006</td> </tr> </table>		Nitrile	Volume change	+5 / -3		Hardness	+7 / -5		Tensile strength	+10 / -TMC 1006		Elongation	+10 / -TMC 1006	Silicone	Volume change	+TMC 1006 / -3		Hardness	+5 / -TMC 1006		Tensile strength	+10 / -45		Elongation	+20 / -30	Polyacrylate	Volume change	+5 / -3		Hardness	+8 / -5		Tensile strength	+18 / -15		Elongation	+10 / -35	FKM	Volume change	+5 / -2		Hardness	+7 / -5		Tensile strength	+10 / -TMC 1006		Elongation	+10 / -TMC 1006	Vamac G	Volume change	+TMC 1006 / -3		Hardness	+5 / -TMC 1006		Tensile strength	+10 / -TMC 1006		Elongation	+10 / -TMC 1006
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For more information, contact:

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