

EVALUATION OF A CANDIDATE OIL ADDITIVE

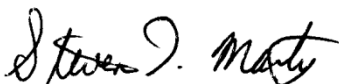
FINAL REPORT
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Gamma88
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1.0 Objective

The objective of this test was to evaluate an engine oil containing the Gamma88 additive per Department of Defense Policy Guidelines for the Use of Aftermarket Fuel and Lubricant Additives (dated February 2007). The evaluation included selected physical and chemical characteristics for a neat sample of oil (conforming to SAE J2362) and a sample of the same oil treated with Gamma88 additive.

2.0 Results

Two oil samples were evaluated in this study: a neat, 10W-30 motor oil meeting SAE J2362 (which supersedes A-A-52039B), and the same oil containing the candidate additive. The oil was acquired from a commercial source. The Oil/Additive blend was prepared as 1-oz Gamma88 to 1-qt oil.

The results of the analysis on each sample are provided in Table 1.

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
Viscosity Index	D2270	--	159	152
Kinematic Viscosity @ 100°C	D445	cSt	10.95	9.68
Kinematic Viscosity @ 40°C	D445	cSt	65.55	57.77
Sulfur Content	D2622	ppm	2104	2074
API Gravity @ 60°F	D287	--	31.2	31.1
Apparent Viscosity @ -20°C	D4684	mPa/s	3200	2400
Apparent Viscosity @ -25°C	D4684	mPa/s	5800	4500
Elemental Analysis	D4951			
Barium		ppm	<5	<5
Boron		ppm	68	66
Calcium		ppm	2088	2020
Copper		ppm	<1	<1
Magnesium		ppm	43	41
Phosphorus		ppm	770	744
Zinc		ppm	902	870
Molybdenum		ppm	212	208
Carbon Residue	D524_Neat	mass%	0.92	0.87
Simulated Distillation	D6352			
Initial BP		°C	330.0	271.5
1% off		°C	341.4	272.2
2% off		°C	351.9	323.8
3% off		°C	357.7	345.6
4% off		°C	362.0	354.0
5% off		°C	365.4	359.3
6% off		°C	368.2	363.2
7% off		°C	370.8	366.5
8% off		°C	373.1	369.1
9% off		°C	375.1	371.7
10% off		°C	377.1	373.9

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
11% off		°C	378.9	375.9
12% off		°C	380.6	377.9
13% off		°C	382.3	379.6
14% off		°C	384.0	381.3
15% off		°C	385.5	383.0
16% off		°C	387.1	384.6
17% off		°C	388.7	386.2
18% off		°C	390.2	387.8
19% off		°C	391.6	389.4
20% off		°C	393.0	390.9
21% off		°C	394.4	392.3
22% off		°C	395.8	393.7
23% off		°C	397.1	395.1
24% off		°C	398.5	396.5
25% off		°C	399.8	397.8
26% off		°C	401.1	399.2
27% off		°C	402.3	400.5
28% off		°C	403.5	401.8
29% off		°C	404.8	403.0
30% off		°C	406.1	404.3
31% off		°C	407.3	405.6
32% off		°C	408.5	406.8
33% off		°C	409.7	408.0
34% off		°C	410.9	409.3
35% off		°C	412.1	410.5
36% off		°C	413.3	411.7
37% off		°C	414.5	412.9
38% off		°C	415.7	414.1
39% off		°C	416.8	415.3
40% off		°C	418.0	416.5
41% off		°C	419.2	417.7
42% off		°C	420.4	418.9
43% off		°C	421.5	420.1
44% off		°C	422.7	421.3
45% off		°C	423.9	422.5
46% off		°C	425.2	423.7
47% off		°C	426.4	424.9
48% off		°C	427.5	426.2
49% off		°C	428.8	427.4
50% off		°C	430.0	428.6
51% off		°C	431.3	429.9
52% off		°C	432.6	431.2
53% off		°C	434.0	432.5
54% off		°C	435.4	433.9
55% off		°C	436.8	435.3
56% off		°C	438.1	436.7
57% off		°C	439.6	438.1
58% off		°C	441.0	439.6

Table 1. Summary of Results

Test	Method	Unit	10W-30 Oil	Oil + Additive
59% off		°C	442.4	441.1
60% off		°C	443.9	442.5
61% off		°C	445.4	444.0
62% off		°C	446.9	445.6
63% off		°C	448.4	447.1
64% off		°C	449.9	448.6
65% off		°C	451.3	450.2
66% off		°C	452.7	451.6
67% off		°C	454.1	453.0
68% off		°C	455.4	454.4
69% off		°C	456.8	455.8
70% off		°C	458.2	457.2
71% off		°C	459.7	458.7
72% off		°C	461.3	460.3
73% off		°C	463.0	462.0
74% off		°C	464.7	463.7
75% off		°C	466.5	465.5
76% off		°C	468.3	467.3
77% off		°C	470.1	469.1
78% off		°C	471.9	471.0
79% off		°C	473.9	473.0
80% off		°C	475.9	474.9
81% off		°C	477.9	476.9
82% off		°C	480.1	479.0
83% off		°C	482.4	481.1
84% off		°C	484.9	483.0
85% off		°C	487.6	485.5
86% off		°C	490.4	488.2
87% off		°C	493.4	491.1
88% off		°C	496.7	494.3
89% off		°C	500.0	497.6
90% off		°C	503.6	501.1
91% off		°C	507.9	504.9
92% off		°C	512.6	509.4
93% off		°C	518.6	514.2
94% off		°C	527.3	521.4
95% off		°C	541.8	531.7
96% off		°C	586.1	552.4
97% off		°C	640.0	611.3
98% off		°C	670.9	654.2
99% off		°C	705.9	685.5
Final BP		°C	735.2	707.1
Ash, Sulfated	D874	mass%	0.83	0.88
Flash Point	D92	°C	220	218
Pour Point	D97	°C	-36	-33
Stable Pour Point	FTM 203C	°C	-41	-41

3.0 Conclusion

This comparative evaluation included selected tests for bulk physical and chemical properties, safety and handling, and effects on performance characteristics per the DOD Policy Guidelines. The results of the testing showed no immediate signs of a negative impact on the oil properties tested. The only oil properties that appeared to show a significant change in response to the additive treatment was the Apparent Viscosity (D4684) and Kinematic Viscosity (D445). There was a clear 20-25% decrease in apparent viscosity at low temperature after treatment with the Gamma88 additive. Similarly, the decrease in viscosity at 40°/100°C was approximately 11-12%.