CLAIMS

What is claimed is:

1. An engine lubricating oil composition for lubricating a diesel internal combustion engine, the engine lubricating oil composition comprising:

one or more base oils of lubricating viscosity, wherein the one or more base oils have a combined base oil viscosity at 100° C. of less than or equal to about 5.4 cSt;

a detergent system providing a minimum total base number (TBN), measured pursuant to ASTM D4739, to the engine lubricating oil composition of at least about 4 to about 7 mg KOH/g, and wherein the detergent system includes only a magnesium-containing detergent additive;

wherein the engine lubricating oil composition has (i) a NOACK volatility of about 13% or less measured pursuant to CEC L-40-90 and/or ASTM D5800; (ii) a total base number (TBN) of the engine lubricating oil composition of about 7 to about 9 mg KOH/g measured pursuant to ASTM D2896; (iii) a calculated sulfated ash content (SASH) of about 0.8 weight percent or less measured pursuant to ASTM D874; and (iv) a CCS viscosity at -35° C. of about 6200 mPas or less measured pursuant to ASTM D5292.

2. The engine lubricating oil composition of claim 1, wherein the engine lubricating oil composition meets or exceeds lubricant performance set forth in the CEC L-117-20 (VW TDi3) piston cleanliness test with a piston cleanliness rating of at least about 53 merits.

3. The engine lubricating oil composition of claim 2, wherein the engine lubricating oil composition has a positive fuel economy increase as measured pursuant to JASO M 366 of at least about 0.5%.

4. The engine lubricating oil composition of claim 1, wherein the detergent system is substantially free of phenate detergent additives and wherein the detergent system consists essentially of sulfonate detergent additives.

5. The engine lubricating oil composition of claim 1, wherein the detergent system provides about 800 to about 1800 ppm of magnesium to the engine lubricating oil composition.

6. The engine lubricating oil composition of claim 1, wherein the detergent system includes one or more overbased detergent additives having a total base number (TBN) as measured pursuant to ASTM D2896 of at least about 250 mg KOH/g.

7. The engine lubricating oil composition of claim 1, wherein the engine lubricating oil composition has a TBN of about 8 or less measured pursuant to ASTM D2896.

8. The engine lubricating oil composition of claim 1, further comprising an oil-soluble molybdenum containing additive providing no more than about 800 ppm of molybdenum to the engine lubricating oil composition.

9. The engine lubricating oil composition of claim 1, further comprising about 2 to about 10 weight percent of one or more polymeric viscosity index improver additives.

10. The engine lubricating oil composition of claim 9, wherein the engine lubricating oil composition has a viscosity index of 130 to 300.

11. The engine lubricating oil composition of claim 10, wherein the one or more polymeric viscosity index improver additive is one of (i) an olefin copolymer, (ii) a dispersant or a non-dispersant poly(meth)acrylate copolymer viscosity modifier having a weight average molecular weight of about 500,000 or less, or (iii) combinations thereof.

12. The engine lubricating oil composition of claim 11, wherein the one or more polymeric viscosity index improver additive is the dispersant or the non-dispersant poly(meth)acrylate copolymer and has a weight average molecular weight of about 200,000 to about 500,000 with a polydispersity index of about 1.5 to about 2.5 and includes first (meth)acrylate monomer units with a hydrocarbyl group in a monomer ester moiety of up to about 700 and second (meth)acrylate monomer units with a hydrocarbyl group in a monomer ester moiety of up to about 10000.

13. The engine lubricating oil composition of claim 1, wherein the engine lubricating oil composition has a viscosity grade of 0W-X, wherein X is 8, 12, 16, 20, or 30.

14. The engine lubricating oil composition of claim 13, wherein the base oil viscosity is about 5.2 cSt or less.

15. The engine lubricating oil composition of claim 1, wherein the engine lubricating oil composition is substantially free of boron, substantially free of calcium, or combinations thereof.

16. The engine lubricating oil composition of claim 1, further including one or more metal dihydrocarbyl dithiophosphate compounds, and wherein the one or more metal dihydrocarbyl dithiophosphate compounds provide up to about 1000 ppm phosphorus to the lubricating oil composition.

17. The engine lubricating oil composition of claim 1, further comprising one or more sulfur-containing additives, and wherein the one or more sulfur-containing additives provide up to about 2500 ppm sulfur to the lubricating oil composition.

18. A method of improving the fuel economy and the piston cleanliness of a passenger car diesel engine using a lubricating oil composition, the method comprising:

lubricating an engine crankcase of a passenger car diesel engine with a lubricating oil composition;

wherein the lubricating oil composition is set forth in claim 1; and

wherein the lubricating oil composition meets or exceeds lubricant performance set forth in the CEC L-117-20 (VW TDi3) piston cleanliness test with a piston cleanliness rating of at least about 53 merits and the lubricating oil composition has a positive fuel economy increase as measured pursuant to JASO M 366 with a fuel economy improvement of at least about 0.5%.

19. A method of lubricating a crankcase of a passenger car diesel engine using a lubricating oil composition, the method comprising:

lubricating an engine crankcase of a passenger car diesel engine with a lubricating oil composition;

wherein the lubricating oil composition is set forth in claim 1; and

wherein the passenger car engine lubricated with the lubricating oil composition meets or exceeds lubricant performance set forth in the CEC L-117-20 (VW TDi3) piston cleanliness test with a piston cleanliness rating of at least about 53 merits and has a positive fuel economy increase as measured pursuant to JASO M 366 with a fuel economy improvement of at least about 0.5%.