Saybolt
A CORE LABORATORIES COMPANY
FAST TO THE POINT

LE - 002

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# ANALYSIS CERTIFICATE

| | |
|---|---|
| Report No. | 13201-00004574-08 |
| Lab number | SPL-2008-07-337 / 336 |
| Report Date | Jul-29-2008 |
| Object | N/A |
| Product | Diesel Oil & Diesel Oil Plus Ferox |
| Location | N/A |
| Sample Submitted as | Composite |
| Date Received | Jul-26-2008 |
| Marked | Diesel Oil & Diesel Oil Plus Ferox |
| Date of sampling | Jul-25-2008 |
| Testing Completed | Jul-28-2008 |
| Seal No. | N/A |

| Test | Units | Method | Result - DO | Result DO+Ferox | Specs |
|---|---|---|---|---|---|
| API Gravity | °API | ASTM D 1298 | 37.4 | 37.4 | 30 Min |
| Kinematic Viscosity | mm2/s (cSt) | ASTM D 445 | 2.496 | 2.349 | 1.9 - 4.1 |
| Cetane Index | | ASTM D 976 | 49.9 | 49.7 | 45 Min |
| Micro carbon residue, 10% Bottom | wt.% | ASTM D 4530 | 0.015 | 0.015 | 0.3 Max |
| Flash Point, PMCC | °F | ASTM D 93 | 152 | 152 | 140 Min |
| Water and sediment | vol. % | ASTM D 1796 | 0 | 0 | 0.05 Max |
| Ash Content, wt. % | wt.% | ASTM D 482 | < 0.001 | < 0.001 | 0.01 Max |
| Color | | ASTM D 1500 | L1.0 | L1.0 | 2.5 Max |
| Pour Point | °C | ASTM D 97 | -27 | -27 | Report |
| Corrosion Copper Strip, 3 h @ 122 Deg. F | | ASTM D 130 | 1a | 1a | 2 Max |
| Appearance | | Visual | B & C | B & C | B & C |
| Heat of Combustion - Gross | BTU/Lb | ASTM D-4868 | 19614 | 19600 | Report |
| Iron, ppm | mg/kg | ASTM D-3605 | 0.03 | 1.18 | Report |
| Distillation, Deg. F. | °F | ASTM D-86 | | | |
| - 10% Recovered | vol. % | | 416.1 | 416.7 | Report |
| - 50% Recovered | vol. % | | 500.8 | 500.9 | 550 Max |
| - 90% Recovered | vol. % | | 583.7 | 586.3 | 680 Max |
| - Final Boiling Point | vol. % | | 636.1 | 636.4 | Report |
| - Loss Percent | vol. % | | 1.5 | 1.7 | 2 Max |
| - Residue Percent | vol. % | | 1.3 | 1.3 | 2 Max |



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August 10, , 2008
Technical Report No. 13201-00004574-08

Ash contribution to treated fuel from Ferox 230

The ash contribution to treated fuels at the recommended treatment ratio of 1/5000 (Ferox 230/fuel) is usually insignificant (2.4 – 2.8 ppm) when compared to the actual ash content of the fuel itself.

Ash content of the fuel additive Ferox 230 itself

The calculated ash content of Ferox 230 is 1.2 – 1.4% ash. Commonly used standard ashing procedures (ASTM, AOAC, USP), however, usually fail to report this value and tend to give much lower ash values.

With regard to the Analysis Certificate provided by Cove Laboratories Panama, S.A., this is a nice report. The use of Ferox fuel additives at the recommended treatment ratio does not significantly change any meaningful fuel specification. The analytical data provided in this report strongly support this representation. This is what we always see. All of the values for the treated fuel are within specifications. This is the major reason that the use of Ferox treated fuels will not void an equipment warranty.

The heat of combustion BTU/lb value of 19614 vs. 19600 is not significant. We just as often see a higher value for Ferox treated fuel but the difference in values is always within experimental error. Theoretically, the values cannot be different because a catalyst cannot change heat of combustion. This report is exactly what we want to see. The use of some fuel additives will actually change fuel specifications. This is bad because it could void an equipment warranty. The corrosion copper strip test is particularly important in this regard.

The flash point of 152°F does not change on treatment with Ferox. The use of any fuel additive at a ratio of 1 to 5000 cannot possibly raise the flash point of the treated fuel. The flash point can be lower if the fuel additive has a substantially lower flash point. This is generally considered to be a disadvantage. Ferox has been engineered not to lower the flash point.

**Eficiencia Caldera 1 bunker sin Ferox:**

Promedio de carga: 76.75%

Consumo: 37.50gls

Potencia Promedio: (3488*0.7675) = 2677.04Kw

**Conversión**

| | | |
|---|---|---|
| 2677.04 * 56.92 = | 152377.116 | Btu por minuto |
| 152377.116 * 0.252 = | 38399.033 | Kcal por minuto |
| | 2303942.00 | |
| 38399.033 * 60 = | 6 | Kcal por segundo |

**Rendimiento**: $\frac{2303942.00}{(37.50*2)}$ = 30719.22 $\frac{\text{Kcal por segundo}}{\text{gls. HFO}}$

Resultado: En una (1) hora de trabajo con un (1) galón de combustible podemos generar 30719.22 Kcal por segundo.

**Eficiencia Caldera 1 bunker con Ferox:**

Promedio de carga: 76.75%

Consumo: 35.21gls

Potencia Promedio: (3488*0.7675) = 2677.04Kw

**Conversión**

| | | |
|---|---|---|
| 2677.04 * 56.92 = | 152377.116 | Btu por minuto |
| 152377.116 * 0.252 = | 38399.033 | Kcal por minuto |
| 38399.033 * 60 = | 2303942.006 | Kcal por segundo |

**Rendimiento**: $\frac{2303942.00}{(35.21*2)}$ = 32717.15 $\frac{\text{Kcal por segundo}}{\text{gls. HFO}}$

Resultado: En una (1) hora de trabajo con un (1) galón de combustible podemos generar 32717.15 Kcal por segundo.