

DE-BUG *Panamá S.A.*

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Test of DE-BUG Fuel Treatment Units with Cardoze y Lindo y DE-BUG Panamá S.A.

DE-BUG Panamá S.A. conducted two tests in August and September, 1998 with the engineers of Cardoze y Lindo S.A., **Caterpillar agent in the Republic of Panama**, to investigate the claim that DE-BUG Fuel Treatment units clean diesel and extend filter life.

The electric generation plant at Bahía Las Minas provides power for the national grid. Cardoze y Lindo S.A. had 22 containers each equipped with 2097HP Caterpillar engines - model 3516 - 1600KW. These were on a power generation contract between the government Power Company, IRHE and Cardoze y Lindo S.A.

REASON FOR TEST

The test was conducted to prove the claim that DE-BUG Fuel Treatment units clean diesel and extend filter life.

The generators at Las Miñas used cheap low-grade diesel provided from the Refinery as part of the contract. The protection of the 22 Caterpillar motors on contract required frequent filter changes. The life of a RACOR 2 Micron filter was 2 days and the life of a RACOR 10 Micron filter was 7 days.

METHOD

Install a DE-BUG L4000 unit on one of the motors and see if filter life was extended. Install 4 DE-BUG L1000 units on a second generator and compare the results.

Two machines - Caterpillar generators Model 3516, 1600 KW 2097 HP were equipped with DE-BUG Fuel Treatment Units.

The filter changes were noted by the maintenance team of Cardoze y Lindo S.A. The results were recorded in the daily maintenance register of Cardoze y Lindo at Bahía Las Miñas. The maintenance records of both generators were examined to verify the time filters lasted.

Oil changes were also recorded for Generator 5. This was not part of the formal test, however, the data was available and other international tests had commented on improvement of oil quality. Therefore this additional data was considered of interest although no formal conclusions were drawn for so short a period.

TEST

Generator No 4 was equipped with one (1) DE-BUG Model L4000 on August 13, 1998 while the generator was down for servicing. A new RACOR filter 2 MM was installed, before the generator was started up.

The generator ran for 7 days – 168 hours – without a filter change.

August 21, 1998, the 2 MM filter was changed and the engine ran another 7 days without a change being indicated.

August 28, 1998, the filter was changed to a RACOR 10 MM filter. No change was indicated for 19 days.

September 18, 1998, A RACOR 2 MM filter was installed and the generator ran for 8 days – 198 hours – before a change was indicated

September 26, 1998 A new RACOR 2 MM filter was installed and the generator ran for 10 days – 240 hours - before a change was indicated.

October 6, 1998, a RACOR 10 MM filter was installed.

The DE-BUG L4000 unit was removed on October 8, 1998. Three days later on October 11 a filter change was indicated.

A 10 MM filter was installed. It lasted 6 days.

The next RACOR 10 MM filter lasted 8 days until October 17, 1998.

Generator No 5 was equipped with four (4) DE-BUG Model L1000 in parallel connected to a manifold of hydraulic hoses on Sept. 6, 1998. A RACOR 2 MM filter was installed. The generator was out of service for two days and then ran for 7 days before a filter change was indicated.

The generator was once again out of service for some days, but when it was again on line, it ran another 7 days with a 2 MM RACOR filter.

These filter changes extended to 8 days, 9 days and 10 days.

It was also noted that oil changes extended. An oil change was noted before the unit went into service on Sept 6. This lasted 7 days to Sept 15.

The generator went back on line on September 20 at 1800 hours and the next oil change indication was Sept 30, 11 days.

This oil lasted until October 13 – 13 days

On Oct 26 when the results were recorded, no oil change had been indicated.

This was 14 days.

RESULTS

Generator No 4

The life of a RACOR 2 MM filter was extended from 2 days to 7 days immediately. A second RACOR 2 MM filter lasted the same period.

The life of a RACOR 10 MM filter was extended from 7 to 19 days before a change was indicated.

A third RACOR filter 2 MM lasted 8 days, and the next 10 days.

When the DE-BUG L4000 unit was removed the life of the RACOR 10 MM filter reduced to 5 days. Subsequent RACOR 10 MM filter changes were 6 days y 8 days. **See Table 1.**

After the test, sludge was found in the L4000 unit. This indicated that the generator had been receiving contaminated fuel.

Generator No 5

This generator used only RACOR 2 MM Filters in the test period from Sept. 6, 1998 until October 26, 1998. Filter life extended one day with each filter change in the time it was monitored.

Subsequently, these units were bought by Cardoze y Lindo S.A. and remained with the generator after the test.

CONCLUSION

Filter life was extended while the generators were equipped with DE-BUG Fuel Treatment Units. This occurred while the plant was receiving constantly contaminated fuel. This was attributed to the DE-BUG Fuel Treatment Units providing the generators with cleaner diesel.

The RACOR filter life was extended from 2 days to 7 days, 8 days, 9 days and 10 days in sequence on Generator 5. Generator 4 had similar results. The life of the filter was extended 4 times with a 2 MM filter. The life of a 10 MM filter was extended 2.5 times – from 7 to 19 days. This was an extension of 12 days.

The immediate change in filter life after the DE-BUG L4000 was removed indicated that the unit cleaned the fuel and was responsible for the extension of filter life.

The DE-BUG L4000 Fuel Treatment unit cleaned diesel and extended the life of the filters. Consequently, it protected the motor, because it cleaned the diesel. Further investigation was considered merited.

Signed by Engineer in charge of maintenance at
Bahia Las Miñas

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Date: September , 2000

Test of DE-BUG Fuel Treatment Units at Bahia Las Miñas

Table 1

Caterpillar Generator No 4 with equipped with DE-BUG L4000 Fuel Treatment Unit

Date: August 13, 1998 to October 8, 1998

Result:

August 13	Installed DE-BUG L4000 RACOR filter 2 MM	
August 17	Filter change and machine repair (Fuga de Agua)	
August 21	On line RACOR filter 2 MM	
August 28	Filter change - RACOR 10 MM	2 MM Filter life- 7 days
Sept 18	Filter change - RACOR 2 MM	10 MM filter life - 19 days
Sept 26	Filter change - RACOR 2 MM	2 MM filter life - 8 days
October 6	Filter change - RACOR 10 MM	2 MM filter life - 10 days
October 8	DE-BUG L-4000 removed	

Result without DE-BUG

October 11	Filter change - RACOR 10 MM	10 MM filter life - 5 days without DE-BUG - 3 days
October 17	Filter change RACOR 10 MM	Filter life - 6 days
October 20	Off line	
October 26	Filter change RACOR 10 MM	Filter life - 8 days

Engineer in Charege
Bahia Las Miñas

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Date September, 2000

Test of DE-BUG Fuel Treatment Units at Bahia Las Miñas

Table 2

Caterpillar Generator No 5 was equipped with 4 DE-BUG L1000 Fuel Treatment units

Date: September 6, 1998 until October 26, 1998.

Result:

September 6 1998	Instalación 4 unidades DE-BUG L1000 RACOR 2 MM filter
September 9	On line
September 15	Filter change -RACOR 2 MM Filter life - 2 days
September 17-20	Out of service – 4 days Oil change
September 20	On line 1800 hours
September 25	Filter change - Racor 2 MM Filter life - 7 days
September 30	Oil change Oil life - 11 days
October 3	Filter change - Racor 2 MM Filter life - 8 days
October 12	Filter change - Racor 2 MM Filter life - 9 days
October 13	Oil change Oil life - 13 days
October 21	Filter change - Racor 2MM Filter life - 10 days
October 26	On line -

Cardoze y Lindo S.A. bought the units when the test ended.

Signed by Engineer in Charge
Bahia Las Miñas, Republic of Panama

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Date: August, 2000