



Aquasolve Project Report 2018

Bus Emissions Analysis

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1.0 Acknowledgements

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2.0 Executive Summary

Due to stringent exhaust emissions legislation there is continuous pressure on owners of commercial and domestic diesel driven vehicles and machinery to reduce their emissions levels. Emissions standards are set by the UK Government which stipulate the maximum allowable exhaust emissions a vehicle can have in order to pass the inspection and maintenance checks known as the MOT, which legally allows users to drive vehicles on UK highways. The figures set by the UK Government can vary dependent upon the vehicles date of registration and the year of first use.

The report studies two buses from a major bus operating company, both vehicles were registered in 2004. Emissions readings were taken pre and post addition of the fuel additive, Aquasolve™ and the data gathered for analysis. The tests were conducted in a registered MOT Testing Station and the results demonstrate a significant reduction in emissions levels when the additive is used. The figures obtained were much lower than the current allowable limits set for the age of the vehicles and they also achieved lower figures than the values set in the category for newer vehicles of registration.

3.0 Introduction

The report considers two buses from a major bus operating company, both registered in 2004. The buses undergo MOT testing every twelve months to legally operate on the UK highways. As part of the MOT process the exhaust emissions are checked using the Free Acceleration Smoke Test which concludes in a pass or fail on emissions.

The objective of the report was to gather data before and after adding Aquasolve™ to the fuel. The measured values were analysed to provide data on the emission reductions obtained.

4.0 Statutory Requirements

The figures listed below were obtained from the Drivers and Vehicle Standards Agency (DVSA) Public Service Vehicle (PSV) Inspection Manual 2018 edition¹.

For vehicles used before to 1 July 2008:

- i. 2.5m^{-1} for non-turbocharged engines or the level specified on the manufacturer's plate, where it is lower.
- ii. 3.0m^{-1} for turbocharged engines or the level specified on the manufacturer's plate, where it is lower.

For vehicles first used from 1 July 2008:

- iii. The level specified on the manufacturer's plate or 1.5m^{-1} for all CI engines, where the plate value is not available.

For vehicles first used from 1 January 2014:

- iv. The level specified on the manufacturer's plate or 0.7m^{-1} for all CI engines, where the plate value is not available.

5.0 Aquasolve™

Aquasolve™ is a family of compounds which are ash less, non-metallic and totally organic, developed for use as fuel components for all liquid combustible fuels. The use of the unique formula reduces emissions, increases drive ability and improves efficiency. Aquasolve™ does this by delivering the fuel to the engine in a state which allows for a more complete combustion. Engine testing at the City of London University has shown it substantially reduces total unburned hydrocarbons (HC), Carbon Monoxide (CO), Nitrous Oxide compounds (NO_x), Carbon Dioxide (CO_2), Smoke and Particulates in diesel.

In addition, the unique molecular binding properties of Aquasolve™ prevents phase separation between fuel mixtures that are contaminated by water. Depending on the weather conditions 3-6% of water is present as condensation in all fuel systems. The use of Aquasolve™ can provide a solution to the water contamination in fuel, therefore increasing the effective power delivered to the engine².

6.0 Test Information & Data

The tests were conducted in a registered MOT vehicle testing station. Full test result print outs and vehicle reports can be provided upon request.

Test Equipment Used:

Sun DGA 2500 VTSN Number 6693 AL

Vehicle Details No1:

Chassis: Volvo

Chassis Model: B7TL

Boddy Manufacturer: Wrightbus

Body Model: Eclipse Gemini

Engine: Volvo D7C (7.3litre)

Vehicle Details No2:

Chassis: Volvo

Chassis Model: B7TL

Boddy Manufacturer: Wrightbus

Body Model: Eclipse Gemini

Engine: Volvo D7C (7.3litre)

Testing Method for Vehicle No1:

Pre-dosing readings were obtained to establish baseline figures. Four tests were then conducted with the addition of Aquasolve™ as follows:

- 1) Road test to operating temperature and record data
- 2) Test with engine cold and record data
- 3) Test with engine warm and record data
- 4) Test with engine cold and record data

Testing Method for Vehicle No2:

Pre-dosing readings were obtained to establish baseline figures. Six tests were then conducted with the addition of Aquasolve™ as follows:

- 1) Road test to operating temperature and record data
- 2) Test with engine cold and record data
- 3) Test with engine cold and record data
- 4) Test with engine cold to operating temperature and record data
- 5) Post trial readings (Vehicle No2 only)
- 6) Post trial readings (Vehicle No2 only)

Results

Vehicle No.1 (470)		Registration No. #####			
Opacity readings given in m-1 (c=cold engine w=warm engine)					
Test No.	Date	Mileage	Average Reading	% Reduction on Base Reading 2.08m-1	% Reduction on Set Limit 3.0m-1
Baseline Test w	04/04/2018		2.08		
1w	17/04/2018	43327	0.78	62.00%	74.00%
2c	20/04/2018	43696	1.41	32.00%	3.20%
3w	23/04/2018	44239	0.91	56%	70%
4c	26/04/2018	44576	1.35	35%	55%

Fig 1: Diesel - Free Acceleration Smoke Tests for Vehicle No1

Vehicle 2 (473)		Registration No. #####			
Opacity readings given in m-1 (Test No. c=cold engine w=warm engine)					
Test No.	Date	Mileometer	Average Reading	% Reduction on Base Reading 2.24m-1	% Reduction on Set Limit 3.0m-1
Baseline Test w	20/02/2018		2.24		
1w	17/04/2018	219728	1.67	25.50%	44.00%
2c	20/04/2018	220046	2.17	3.20%	3.20%
3c	23/04/2018	220412	2.85	0%	5%
4w	26/04/2018	220836	1.46	35%	51%
The readings below taken post trial without Aquasolve					
5w	04/06/2018		1.54	31%	49%
6w	02/07/2018		1.99	11%	34%

Fig 2: Diesel - Free Acceleration Smoke Tests for Vehicle No2

7.0 Conclusions

The results demonstrate significant reductions in emissions levels when the additive is used. The readings obtained were much lower than the current allowable values set for the age of the vehicles. The figures were also lower than the limits set in the category for much newer vehicles of registration.

It was encouraging to observe the readings reducing to Fast Pass limits on both vehicles. The readings taken post trial also demonstrated the emissions levels began to increase without the addition of Aquasolve™.

The report has provided evidence that the addition of Aquasolve™ improves fuel quality and reduces harmful particulates and emissions.

8.0 References

¹Drivers and Vehicle Standards Agency (DVSA) Public Service Vehicle (PSV) Inspection Manual 2018 edition

²Coval Technologies Ltd