

The Health
and Safety
Consultancy
Ltd

Health, Safety & Environment Consultant

Emission

Monitoring

Report for:-

EXEL

Building 94

RAF Alconbury Airfield

(Northgate) Alconbury

HUNTINGDON

Cambridgeshire

PE28 4WY

Work Completed By :- Mr J Lawrence

Date of Monitoring:- 10th October 2006

Date Reported:- 30th October 2006.

Report Number:- 3126

Introduction

The report covers emission monitoring for emissions to atmosphere for compliance to PG6/34, 'Vehicle Re-Spraying Processes'.

The report covers the emissions of Volatile Organic compounds (VOC's) from the one Dalby Spray booth (Top Coat Oven) flue at the Alconbury site.




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Methods

(1) Process Details

Cars are delivered to the site, predominantly from fleet hire companies / insurance companies for repair and paintwork touch-up at the Alconbury site of Exel Limited. Upon completion of any repairs, the car body parts requiring paint application, are then usually sprayed with an compliant coating undercoat and compliant coating top coat of paint, followed by a none compliant coating of a lacquer coat in any of two Dalby, spray booths.

The paint is applied using HVLP spray guns, by usually one paint sprayer per booth, the car body panels themselves, are by design, subject to an amount of overspray, which is extracted by the spray booth, through several particulate filtration plants, then to external atmosphere.

The spray booths have a guarantee from Harry Dalby Engineering Limited that emissions of particulate matter are below the process guidance limit of 10 mg/m³ (Copy of report is available for reference), so testing for total particulate matter was not deemed as being required, hence only VOC monitoring was requested, its understood that Exel, do predominantly use compliant coatings in the primer and colour coat's.

(2) Strategy

The spray booths operator, (one personnel), were requested to spray under normal conditions for a normal time period, required to spray body panels (e.g. car wing, bumper, etc), in all spray booths, for the usual paint application used, in each respective booth, of an area of at least 1m².

Initial velocity temperature measurements were made before spraying commenced, followed by the VOC sampling run and duplicate, when spraying commenced in the booth.

Independent checks were made, to ensure that spraying was continuing, during the period of the testing on site.

(3) Preparation

Initial measurements were taken from each stack, before emission sampling commenced.

The measurements taken, were used for standardisation requirements, temperature within the stack, pressure, mass flow rate of each stack.

Efflux Velocities were taken using a pitot tube and air neotronics electronic manometer.

Temperature readings were taken with ETP 'K type' air probe and digital readout unit, with traceable NPL calibration certificate.

Stack diameter's and mass air flow were also recorded.

(4) Volatile Organic Compounds (VOC's)

VOC's were sampled using a Minirae Flame Ionisation Detector, which samples for the Carbon present within the VOC's being emitted to atmosphere.

The FID measures all VOC's as ppm carbon, this is then corrected to a mg/m³ reading, corrected to standard temperature and pressure.

Sampling was completed during normal spraying operations, within each respective booth, for a 2 minute period during spraying and a 15 minute period during baking process, for each respective paint type and each stack.

Standard Calculation Formula:-

$$\text{Mg/m}^3 \text{ Carbon} = \frac{\text{Measured Temp}}{\text{Standard Temp}} \times \frac{\text{Measured Pressure}}{\text{Standard Pressure}}$$
$$\times \frac{\text{Instrument Reading (ppm)}}{\text{Response factor of solvent}} \times \frac{50}{\text{ppm reading for 50 mg/m}^3}$$

Standard temperature = 273 Kelvin

Standard pressure = 101.3 Kpa.

FID Calibration

The FID was calibrated with 804 ppm Methane standard.

Calibration Readings

Specified Value = 804 ppm CH₄

Actual Value = 803 ppm CH₄

RESULTS

Dalby Spray Booth Serial Number SB4133 (Top Coat Oven)

Mass Flowrates

Efflux Velocity; 12.9 m/s
Stack Diameter; 0.40 x 0.40 m
Cross Sectional Area; 0.16 m²
Mass Emission Rate; 7430 m³/hour
Normal Operation Conditions
Temperature within the stack; 22.8 °C
Pressure; 101.3 Kpa
Spray area; Jaguar Bonnet and roof
Paint application type; Stadox MS Xtra Klarlack Lacquer Coat
Main constituents of Solvents in product; Naptha, Butyl Acetate, Trimethyl Benzene
Minirac Reading at 50 mg/m³ Carbon = 48.2
Mean Response Factor = 2.1

Volatile Organic Compounds, (VOC's)

	<u>Paint Spraying</u>	<u>Baking Cycle (ppm Carbon)</u>
Time		
1 minute	74	17
2 minutes	80	15
3 "	23	10
4 "		7
5 "		4
6 "	See Baking cycle	2
7 "		2
8 "		1
9 "		0
10 "		1
11 "		0
12 "		0
13 "		0
14 "		0
15 "		0
Highest 2 minute mean;	<u>77 ppm Carbon</u>	<u>3.9 ppm Carbon</u>

Results;

Spraying Lacquer = 42.0 mg/m³

Baking Cycle = 2.2 mg/m³

Note:- During baking cycle, extraction does not go to atmosphere, but is recycled into booth, hence readings only show, VOC residues left in ducting. Filter Tube residual VOC'S Present during 1st run.

CONCLUSIONS

Conclusions

On the day of testing, it can be shown that Emissions to atmosphere of Volatile Organic Compounds (VOC's), were measured at being well below the PG6/34 guidance note limit, of 50 mg/m³, during the use of Stadox medium solids lacquer coating.

Volatile Organic Compounds (VOC) Emissions

<u>Dalby Spraybooths</u>	<u>RESULT</u>		<u>PG6/34 Limit</u>
	Spraying (2 Mins)	Baking (15 Mins)	
Dalby Top Coat Oven (S/N SB4133)	42.0 mg/m³	2.2 mg/m³	50 mg/m³

Note:-

All results are corrected to standard temperature and pressure (273 Kelvin, 101.3 KPA)

