Technical Report

DICHLOROMETHANE EMISSION TEST SURVEY

FOR

UNIVERSAL SURFACES UK LTD

PRA Project No : 74981-05

23 November 2010

Global Surface Coatings Covered

ENVIRONMENTAL SERVICES TEST REPORT

Project No.	74981-05
Test Dates	3rd November 2010
Report Date	23rd November 2010
Client	UNIVERSAL SURFACES UK LTD Beckingham Business Park Tolleshunt Major Maldon Essex CM9 8LZ FAO John Royce
Work requested	Dichloromethane Emission Test Survey
Work carried out by	T. Sullivan Environmental Services
Approved by	P. Collins, T.J. Glazier Authorised Signatory

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DICHLOROMETHANE EMISSION TEST SURVEY

1.0 Introduction

Universal Surfaces UK Ltd operates a powder coating process at their site. Part of this process involves surface cleaning of parts using a vapour degreaser. The vapour degreaser uses dichloromethane which has a risk phrase of R40 (limited evidence of carcinogenic effect) making it a designated risk phrase material. The aim of this test survey is to provide emission data to assess compliance against the emission limits given in Process Guidance Note PG6/45(04) "Surface Cleaning".

The emission testing was carried out on the 3 December 2010 by Tim Sullivan, MCERTS Accreditation No. MM03456. This report presents the test procedures, results and observations, as well as the conclusions and recommendations made.

2.0 Test Procedures

2.1 Sampling Locations

A description of the sampling locations is given in table 1.0. A diagram of the release point is shown in appendix 1.

Table 1.0 Sampling locations

Release Point	Dimensions (mm)	Sample Location
Vapour Degreaser Extract Stack	circular duct 300 dia.	Single sample port (10 mm diameter) 0.5 m above the fan.

2.2 Flow Measurement

The gas velocity and volume flow rate was measured using a calibrated ellipsoidal nose pitot tube and calibrated micromanometer.

The gas temperature was measured using a calibrated digital temperature indicator and K type probe. The temperature was measured at a single point in the duct/louvre. This was considered sufficient as the temperature is unlikely to vary for the LEV system operating at ambient temperature.

2.3 Dichloromethane Emission

The emission of dichloromethane was carried out using ANASORB CSC coconut charcoal adsorption tubes and personal sampling pumps in accordance with MDHS 96 "Volatile organic compounds in air (4)", 2000.

The adsorption tubes were sent to a UKAS accredited laboratory where the tubes were solvent desorbed and analysed using gas chromatography.

3.0 TEST RESULTS

All measurements were taken under typical operating conditions and are reported at reference conditions 273 K and 1013 m.bar.

The methods of calculating the gas velocity, volume flow and dichloromethane emission concentration are shown in appendix 2. The test data for gas velocity and dichloromethane emissions are shown in appendix 3.

3.1 Flow Measurement

The gas velocity and volume flow measured are shown in table 2.

Table 2 Flow

Test Number	**Date & Time**	**Gas Velocity (m/s)**	**Volume Flow (m^3/h)**	**Volume Flow at STP (m^3/h)**
1	3 November : 12.45	8.87	2256	2101

3.2 Dichloromethane Emission

The concentration levels dichloromethane from the vapour degreaser extract stack are shown in table 3.0.

Table 3.0 : Concentration

TEST / TIME	WT OF DICHLOROMETHANE (μg)	VOLUME SAMPLED (litres)	DICHLOROMETHANE CONC ($mg.m^{-3}$)
Vapour Degreaser Extract Stack – 3 November 2010			
Test 1 – 11.30	474	0.89	532.6
Test 2 – 11.50	524	1.41	371.6
Test 3 – 12.20	467	1.41	331.2

4.0 Discussion

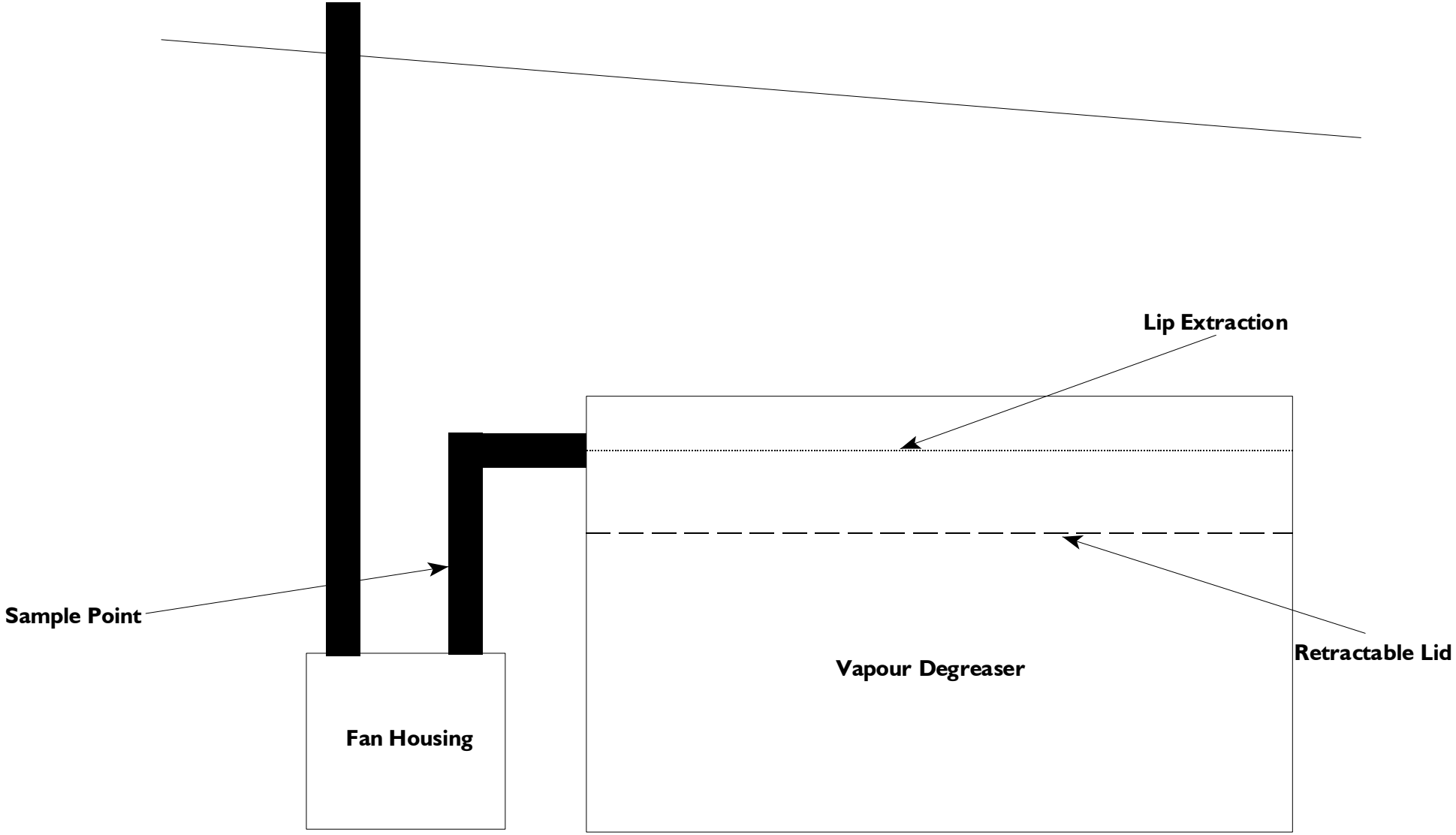
PG6/45 states that where the combined mass emission of all R40 solvents is greater than or equal to 100g/h, an emission limit of 20 $mg.m^{-3}$ for the combined mass of individual solvents must apply.

The average mass emission for dichloromethane over 3 complete cleaning cycles (i.e. cover closed; cover opened, lowering of basket, close cover, clean parts, open cover, remove basket, close cover) was 929 g/h. Therefore the mass emission is above the initial mass emission criteria of 100 g/h. The average dichloromethane concentration from the vapour degreaser extract stack was 411.8 $mg.m^{-3}$. Therefore the concentration from the vapour degreaser is above the emission limit of 20 $mg.m^{-3}$.

5.0 Conclusions

1. The dichloromethane emission is above the mass emission criteria of 100g/h and is also above the concentration limit of 20 $mg.m^{-3}$.

APPENDIX 1
Diagram of Vapour Degreaser Extract Stack



APPENDIX 2

Calculations

1.1 Volume Calculations

i) Actual Volume Sampled (V_A)

$V_A = F \times t$

where F = pump flow rate (l/min)
t = time sampled

ii) Volume sampled at S.T.P (20°C and 1013 m.bar)

$$V_{STP} = V_A \times \frac{293}{T} \times \frac{P}{1013}$$

where V_A = actual volume (litres)
T = ambient temperature of room (K)
P = atmospheric pressure (m.bar)

1.2 Dichloromethane Concentration

$$\text{Concentration } (mg.m^{-3}) = \frac{M}{V_{STP}}$$

where M = mass of dichloromethane (μg)
V_{STP} = volume sampled at STP (litres)

APPENDIX 3

Test Data

1.0 FLOW MEASUREMENTS

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1.1 Vapour Degeaser Extract Stack

Date:	03-Nov-10
Time:	12.45
Gas temperature (K)	292
Atmospheric pressure (m.bar)	1009
Static pressure (m.bar)	2.07
Duct diameter (m)	0.3
Area (m2)	0.0707

Distance Along Sample Line	Vel. Pressure Hv (Pa)	Sqrt Hv	Average Sqrt Hv (Pa)	Gas Velocity (m/s)
0.113D	54	7.35	6.92	8.87
0.500D	48	6.93		
0.887D	42	6.48		

Gas flowrate (m3/h)	2256
Gas flowrate at STP (m3/h)	2101

2.0 DICHLOROMETHANE MEASUREMENTS - VOLUMES SAMPLED

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Standard Temperature (K) = 273
Standard Pressure (m.bar) = 1013

2.1 Vapour Degreaser Exract Stack - Test 1

Stack	Date	Pump	Temp K	Pressure m.bar	Flow Rate litres/minute	Sampling Time minutes	Actual Volume litres	Volume at STP litres
1	03-Nov	Sidekick	292	1009	0.0799	12	0.96	0.89

2.2 Vapour Degreaser Extract Stack - Test 2

Stack	Date	Pump	Temp K	Pressure m.bar	Flow Rate litres/minute	Sampling Time minutes	Actual Volume litres	Volume at STP litres
1	03-Nov	Sidekick	292	1009	0.0799	19	1.52	1.41

2.3 Vapour Degreaser Extract Stack - Test 3

Stack	Date	Pump	Temp K	Pressure m.bar	Flow Rate litres/minute	Sampling Time minutes	Actual Volume litres	Volume at STP litres
1	03-Nov	Sidekick	292	1009	0.0799	19	1.52	1.41

3.0 DICHLOROMETHANE MEASUREMENTS - WEIGHT COLLECTED

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3.1 Vapour Degreaser Exract Stack - Test 1

Test	Date	Weight of Dichloromethane µg	Volume Sampled litres	Dichloromethane Concentration mg/m3
1	03-Nov	474.00	0.89	532.6

3.2 Vapour Degreaser Extract Stack - Test 2

Test	Date	Weight of Dichloromethane µg	Volume Sampled litres	Dichloromethane Concentration mg/m3
1	03-Nov	524.00	1.41	371.6

3.3 Vapour Degreaser Extract Stack - Test 3

Test	Date	Weight of Dichloromethane µg	Volume Sampled litres	Dichloromethane Concentration mg/m3
1	03-Nov	467.00	1.41	331.2

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