AN ASSESSMENT OF EMISSIONS TO ATMOSPHERE FROM 2 OVEN VENTS, SPRAY BOOTH AND THE MAIN STACK

TRELLEBORG PPL
TUFTHANE BUILDING
FALKLAND CLOSE
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Report No:	13821C	**Client Ref:**	OH11753 Emissions Monitoring
Survey Date:	18 September 2013	**Site Contact:**	Victoria Tennant
Report Date:	10 October 2013	**Server Reference:**	G:\REPORTS\Reports by Name\2013\Trelleborg

CONTENTS

EXECUTIVE SUMMARY

Emissions to atmosphere were assessed on the 18 September 2013 during the spray application of adhesive coatings, moulding polyurethane items, curing of polyurethane mouldings and preheating isocyanate materials. The monitoring was deemed requisite to comply with the requirements stated in permit PPC 194. The results and information obtained during the visit indicated that:

- Levels of Isocyanates as methylene diphenyl diisocyanate (MDI) were under the LOD (Limit of Detection) and also under all pollution prevention control limits.

- Levels of VOC were all well under the PPC 194 limits given as 100mg/nm^3

- The results were therefore under the authorised limits for Trelleborg PPL as stated within PPC 194

SURVEYED BY :
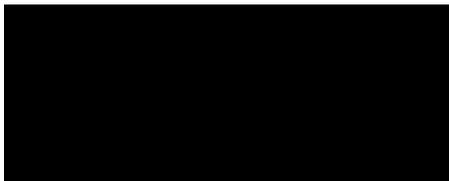
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Occupational Hygienist

VERIFIED BY:
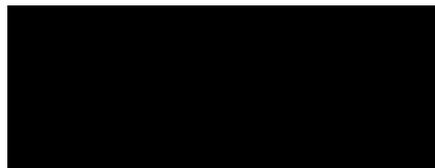
Simon Skentelbery MSc
General Manager

1.   INTRODUCTION

The survey described in this report was carried out on the 18 September 2013 by Geoff Waggett at the request of Victoria Tennant of Trelleborg PPL and in accordance with our work specifications outlined in quotation reference OH11753, in order to determine emissions to atmosphere to comply with the companies Pollution Prevention Control PPC194

Monitoring of emissions was carried out from four stacks; three stacks associated with curing ovens and the fourth stack a spray booth.

2.   DESCRIPTION OF PROCESS

Production schedules on the date of the survey were described as normal and the emissions quantified may be considered representative of working conditions.

The Oven Venting process is based on the force curing of polyurethane components moulded from MDI. All ovens exhaust to atmosphere via stacks directly through the factory roof or via a combined stack arrangement.

Oven 18 was used to cure representative polyurethane items using MDI as the base compound. Monitoring was carried out to determine emission of MDI.

Oven 13 was used to cure representative polyurethane items using MDI as the base compound. Monitoring was carried out to determine emission of MDI.

The spray booth was used to apply Cilbond 49SF bonding agent to a set of steel insert pieces. All monitoring was carried out for solvent emission.

The main stack fed from Ovens 22 & 23, the press, seismic mould and the release area, so this was tested for isocyanates and total volatile organic compounds. Operators were casting for 30 minute periods during the test phase.

3.   MONITORING

Isocyanate Monitoring

A sampling pump was connected to an impinger tube containing a solution of 1-(2 methoxyphenyl) piperizine in dry of toluene, the method based on MDHS 25. Sampling is performed by extracting air from the stack or vent, and bubbling through the impinger solution at 1 litre per minute for 30 minutes. The process was repeated over a one hour period.

The sampling solution was sealed in glass jars and sent for analysis using High Performance Liquid Chromatography.

Volatile Organic Compound (VOC) Monitoring

The sampling system comprises of a sampling head containing a SKC Sorbent sample tube (226-01), connected to a portable precision pump, capable of running continuously for 8 hours at the recommended flow rate. Following monitoring the 226-01 sorbent tube is capped and placed in a sealed inert container until analysis can be carried out. Analysis is by Gas Chromatography/Mass Spectrometry using specified procedures for the instrumentation.

Stack Velocity

Stack velocity was measured using a pitot tube, coupled to an electronic manometer; both are calibrated annually by a UKAS accredited supplier. Temperature measurements were taken using an electronic thermometer.

4. RESULTS

The detailed results are attached as Appendix 1 for the Volatile Organic Compounds, as no NCO was detected there are no appendixes for calculation sheets. The results for the monitoring period are summarised below:-

Main Stack

Substance	Concentration	PPC Limit	Time
	mg/nm³		
di-isocyanates total NCO **Run 1**	<0.007	0.1	09:18 to 09:48
di-isocyanates total NCO **Run 2**	<0.007	0.1	09:48 to 10:18
VOC As Carbon **Run 1**	7.98	100	09:18 to 09:48
VOC As Carbon **Run 2**	3.39	100	09:48 to 10:18

Spray Booth Vent 1

Substance	Concentration	PPC Limit	Time
	mg/nm³		
VOC As Carbon **Run 1**	8.85	100	10:49 to 11:19
VOC As Carbon **Run 2**	5.26	100	11:20 to 11:50

Oven Vent 13

Substance	Concentration	PPC Limit	Time
	mg/nm³		
di-isocyanates total NCO **Run 1**	<0.007	0.1	12:10 to 12:40
di-isocyanates total NCO **Run 2**	<0.007	0.1	12:40 to 13:10
VOC As Carbon **Run 1**	4.84	50.0	12:10 to 12:40
VOC As Carbon **Run 2**	3.51	50.0	12:40 to 13:10

Oven Vent 18

Substance	Concentration	PPC Limit	Time
	mg/nm³		
di-isocyanates total NCO **Run 1**	<0.007	0.1	14:10 to 14:40
di-isocyanates total NCO **Run 2**	<0.007	0.1	14:40 to 15:10
VOC As Carbon **Run 1**	1.47	100	14:10 to 14:40
VOC As Carbon **Run 2**	3.19	100	14:40 to 15:10

Pitot Traverse Velocity Profile from Each Stack

Location	Velocity Profile Pa	Average Pa
Oven Vent 13	23/24/28/32/33/35/37/38/39/42	33
Oven Vent 18	22/21/21/25/28/25/27/28/26/26	25
Spray Booth Vent 1	24/23/24/163/163/161/165/165/167/164	122
Main Stack	33/37/16/16/17/16/13/10/15/15	18

5. CONCLUSIONS AND RECOMMENDATIONS

All results were satisfactory and within the limits set out in PPC194.

APPENDIX I

VOC EMISSION CALCULATIONS

Location:	**Main stack run 1**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td) | 294 | K

Total pressure in duct = barometric + static (Pd) | 100.22 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as carbon | 0.033 | mg

Concentration VOC   = $\dfrac{Wc}{Q\ voc}$ | 7.33 | mg/m³

Correction to STP   = $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **7.98** | mg/m³

Sample GW1561

Location:	**Main stack run 2**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td) | 294 | K

Total pressure in duct = barometric + static (Pd) | 100.22 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as carbon (Wc) | 0.014 | mg

Concentration VOC   = $\dfrac{Wc}{Q\ voc}$ | 3.11 | mg/m³

Correction to STP   = $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **3.39** | mg/m³

Sample GW1562

Location:	**Spray booth 7 run 1**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td) | 291 | K

Total pressure in duct = barometric + static (Pd) | 100.32 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as carbon (Wc) | 0.037 | mg

Concentration VOC   = $\dfrac{Wc}{Q\ voc}$ | 8.22 | mg/m³

Correction to STP   = $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **8.85** | mg/m³

Sample GW1563

Location:	**Spray booth 7 run 2**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td) | 291 | K

Total pressure in duct = barometric + static (Pd) | 100.32 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as carbon (Wc) | 0.022 | mg

Concentration VOC   = $\dfrac{Wc}{Q\ voc}$ | 4.89 | mg/m³

Correction to STP   = $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **5.26** | mg/m³

Sample GW1564

Location:	**Vent 18 Run 1**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td)	298	K
Total pressure in duct = barometric + static (Pd)	100.23	kPa
Flow rate for VOC sampling (f)	150	ml/min
Total period of sampling (t) = T1-T0	30	mins
Total quantity of air samples = f x t (Q voc)	0.005	m³
Weight of VOC collected expressed as Carbon (Wc)	0.006	mg

Concentration VOC $= \dfrac{Wc}{Q\ voc}$

$\boxed{1.33}$ mg/m³

Correction to STP $= \dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$

$\boxed{\textbf{1.47}}$ mg/m³

Sample GW1571

Location:	**Vent 18 Run 2**
Date of Sample:	**18-Sep-13**

Absolute temperature in duct (Td)	298	K
Total pressure in duct = barometric + static (Pd)	100.23	kPa
Flow rate for VOC sampling (f)	150	ml/min
Total period of sampling (t) = T1-T0	30	mins
Total quantity of air samples = f x t (Q voc)	0.005	m³
Weight of VOC collected expressed as Carbon (Wc)	0.013	mg

Concentration VOC $= \dfrac{Wc}{Q\ voc}$

$\boxed{2.89}$ mg/m³

Correction to STP $= \dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$

$\boxed{\textbf{3.19}}$ mg/m³

Sample GW1572

Location:	Vent 13 Run 1	
Date of Sample:	18-Sep-13	

Absolute temperature in duct (Td) | 328 | K

Total pressure in duct = barometric + static (Pd) | 100.23 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as Carbon (Wc) | 0.018 | mg

Concentration VOC
= $\dfrac{Wc}{Q\ voc}$ | 4.00 | mg/m³

Correction to STP
= $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **4.86** | mg/m³

Sample GW1565

Location:	Vent 13 Run 2	
Date of Sample:	18-Sep-13	

Absolute temperature in duct (Td) | 328 | K

Total pressure in duct = barometric + static (Pd) | 100.23 | kPa

Flow rate for VOC sampling (f) | 150 | ml/min

Total period of sampling (t) = T1-T0 | 30 | mins

Total quantity of air samples = f x t (Q voc) | 0.005 | m³

Weight of VOC collected expressed as Carbon (Wc) | 0.013 | mg

Concentration VOC   = $\dfrac{Wc}{Q\ voc}$ | 2.89 | mg/m³

Correction to STP   = $\dfrac{Wc \times Td \times 101.3}{Q\ voc \times 273 \times Pd}$ | **3.51** | mg/m³

Sample GW1566

APPENDIX II

IMAGES OF SAMPLE POINTS

MAIN STACK

SPRAY BOOTH
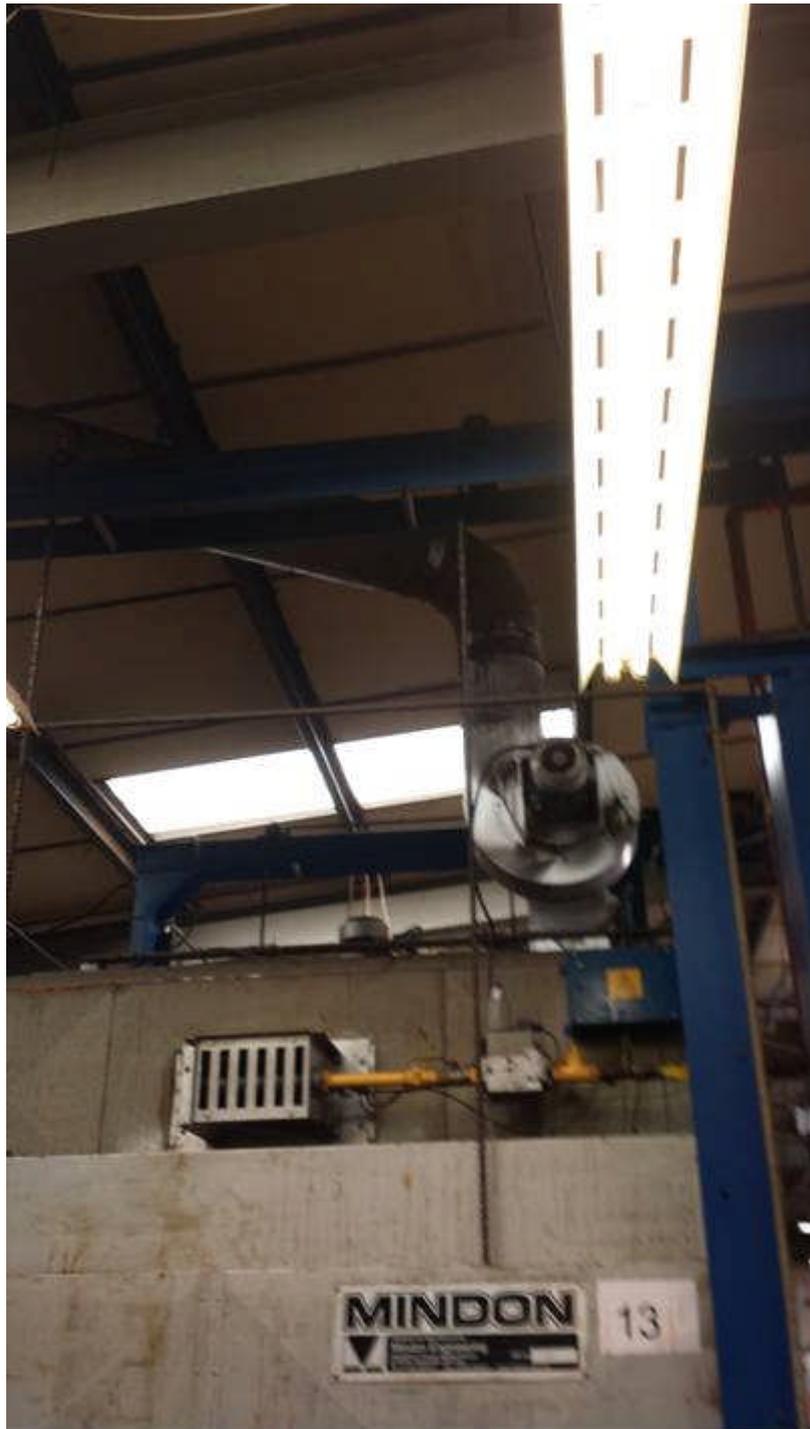
OVEN VENT 13

OVEN VENT 18 (BEHIND 19)