ALcontrol Laboratories
Saxon House
Saxon Way
Fordbridge
Birmingham
B37 5AY

REPORT FOR EMISSIONS TO AIR

FROM

MANUFACTURE OF MICROCELLULAR POLYURETHANE

For

PHIL SHEPHERD
HEALTH & SAFETY CONSULTANCY
OAK TREE COTTAGE
LENCHWICK
NR EVESHAM
WORCESTERSHIRE
WR11 4TG

at

TRELLEBORG AUTOMOTIVE UK LTD
MICROVON PROCESSES
HOLBROOK LANE
COVENTRY
CV6 4QX

PART 1: EXECUTIVE SUMMARY

REPORT NO:	4712a	**CLIENT REF:**	Mr Phil Shepherd
DATE OF VISIT:	23rd August & 17th October 2006	**CONTACT ON SITE:**	Mr Phil Shepherd
DATE OF REPORT:	03 November 2006		

Reported by:

Jonathan Litterick
MCERT No. MM 03236

Approved by:

for ALcontrol Laboratories

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1 MONITORING OBJECTIVES

The monitoring at this installation was carried out for the compliance check monitoring of emissions to air in accordance with process guidance note, PG6/29(2004) – Di-isocyanate Processes.

The processes are covered by Authorisation Reference 050, issued by Coventry City Council.

The substances monitored at each emission point are listed in the table below.

Substances to be monitored	**Emission Point Identification**		
	Microvon Lines		
	Desma M/C No.3	**Desma M/C No.1**	**COV Ralph No.5 M/C**
Total VOC	√	√	√
Total Isocyanates	√	√	√

1.1 Terms of Reference

Phil Shepherd of Health & Safety Consultancy, Oak Tree Cottage, Lenchwick, Nr Evesham, Worcestershire, WR11 4TG, has commissioned ALcontrol Laboratories to carry out the work described in this report. Monitoring was undertaken at Trelleborg Automotive UK Ltd, Holbrook Lane, Coventry, Warwickshire, CV6 4QX.

Monitoring was carried out on the 23rd August & 17th October 2006, by John Litterick at the request of Mr Phil Shepherd.

The work was carried out in accordance with the site specific sampling protocols outlined in proposal reference 12899a27e, dated 14th February 2006, and with the clients instructions.

2 MONITORING RESULTS

2.1 Emission Point Reference: Microvon – Desma M/C No.3

Date of Monitoring	23rd August 2006	**Reference Conditions**	NTP
Process Status		**Processes Running Normally**	

Substances To Be Monitored	**Emission Limit Value**	**Average Emission Concentration**	**Sampling Method Reference**	**Sampling Times**
Total VOC	100 $mgC.m^{-3}$	8.1 $mgC.m^{-3}$	BS EN 13526/ 13649	10:03 – 11:03
Total Isocyanates	0.1 $mg.m^{-3}$	<0.007 $mg.m^{-3}$	BS ISO 16702	09:33 – 11:33

2.2 Emission Point Reference: Microvon – Desma M/C No.1

Date of Monitoring	23rd August 2006	**Reference Conditions**	NTP
Process Status		**Processes Running Normally**	

Substances To Be Monitored	**Emission Limit Value**	**Average Emission Concentration**	**Sampling Method Reference**	**Sampling Times**
Total VOC	100 $mgC.m^{-3}$	16.8 $mgC.m^{-3}$	BS EN 13526/ 13649	11:28 – 12:28
Isocyanates	0.1 $mg.m^{-3}$	<0.007 $mg.m^{-3}$	BS ISO 16702	11:33 – 13:33

2.3 Emission Point Reference: Microvon – COV Ralph No.5 M/C

Date of Monitoring	17th October 2006	**Reference Conditions**	NTP
Process Status		**Processes Running Normally**	

Substances To Be Monitored	**Emission Limit Value**	**Average Emission Concentration**	**Sampling Method Reference**	**Sampling Times**
Total VOC	100 $mg.m^{-3}$	8.7 $mgC.m^{-3}$	BS EN 13526/ 13649	9:58 – 12:00
Isocyanates	0.1 $mg.m^{-3}$	<0.007 $mg.m^{-3}$	BS ISO 16702	9:58 – 12:00

3 PLANT AND OPERATING INFORMATION

Plant and operating conditions prevailing on the date of the survey were described as normal in all cases.

4 MONITORING DEVIATIONS

Emission Point Reference	Substance Deviations	Monitoring Deviations	Other Relevant Issues
All	None	None	None

5 DISCUSSIONS

The processes are covered by the process authorisation Reference Number 050, issued by Coventry City Council, which specifies the following release limits.

Parameter	Emissions Limit
Di-isocyanates	0.1 $mg.m^{-3}$ (averaged over any 2hr period while the process is in operation)
Volatile Organic Compounds (as total carbon excluding particulate matter)	100 $mg.m^{-3}$

5.1 Volatile Organic Compounds

All average VOC emissions were well below the limits.

5.2 Di-isocyanates

Di-isocyanate emissions were less than the 0.007 $mg.m^{-3}$ analytical limit of detection, and therefore well below the 0.1 $mg.m^{-3}$ emissions limits.

5.3 Sampling Positions

The sampling locations used were all in straight sections of ductwork before the fans. In all cases the flow profiles at the sampling planes satisfied the requirements of BS EN 13284-1, and as such were acceptable.

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PART 2: SUPPORTING INFORMATION

REPORT NO:	4712a	**CLIENT REF:**	Mr Phil Shepherd
DATE OF VISIT:	23rd August & 17th October 2006	**CONTACT ON SITE:**	Mr Phil Shepherd
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6 APPENDIX I

6.1 Field Staff Used

Name	MCERTS Registration No:	MCERTS Qualifications	Function
John Litterick	MM 03236	Level 2, TE1 &TE4	Team Leader

6.2 Field Monitoring Methods Used

6.2.1 Stack Velocity & Temperature Measurements

Stack velocity was measured using a pitot tube, conforming to the design specifications of ISO 3966-1977, coupled to an electronic manometer. Both are calibrated annually by a UKAS accredited supplier. Temperature measurements were taken using a K-type thermocouple connected to an electronic thermometer. Both are calibrated annually by a UKAS accredited supplier. Measurements fulfil the requirements of ISO10780:1994.

6.2.2 Total Gaseous Organic Compounds by FID

Continuous extractive sampling for Total VOCs was conducted using a Bernath heated line Flame Ionisation Detection. Measurements were made designed to fulfil the requirements of BS EN 13526:2002. Results are expressed as propane equivalent values.

6.2.3 Total Gaseous Organic Compounds by Sorbent Tube

Continuous extractive sampling for Total VOCs was backed up by periodic extractive sampling for total VOCs using charcoal adsorbent tubes connected to calibrated metered sampling pumps. Measurements designed to fulfil the requirements of BS EN 13649:2002. The results for this tube sampling were used to provide a correction factor for fid results. (Results expressed as solvent response corrected).

6.2.4 Isocyanates

Periodic extractive sampling for Isocyanates was conducted using a calibrated pump connected to an impinger sampling train containing 1-(2-methoxyphenyl)piperazine solution. The sampling method is designed to fulfil requirements of ISO 16702:2001. Analysis is by HPLC, also to the requirements of ISO 16702:2001.

6.3 Laboratory Analysis Methods

6.3.1 Techniques & Detection Limits

Analyte	Analysis Technique	Detection Limit	UKAS Accredited	Laboratory Method Reference
MDI	HPLC	0.2 μg	Yes	I3
Total VOC (Tubes)	GC/ MS	5 μg	No	n/a

7 APPENDIX II

7.1 Flowrate Calculation Spreadsheets

This Appendix contains 3 pages.

8 APPENDIX III

8.1 VOC Profiling Data

This Appendix contains 3 pages.

9 APPENDIX IV

9.1 Calibration Records

This Appendix contains 8 pages.

FLOW AND TEMPERATURE TRAVERSE: BS EN 13284:2002 (& ISO 10780:1994)

Job Number	430 E01	Date of Testing	23 August 2006
Client	Trelleborg Automotive	Consultant	J Litterick
Plant Identification	DESMA M/C No.1		
Ambient temperature (°C)	22	Atmospheric Pressure (kPa)	101.3
Pitot Co-efficient	0.99	Duct Pressure (pa)	-1640
Duct Diameter (cm)	45	Duct Length (cm)	-
Duct Area (m^2)	0.159	Duct Width (cm)	-

Transect Point No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
% of Dimension	6.5	15.0	25.0	35.0	45.0	50.0	55.0	65.0	75.0	85.0	93.5

Point	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Pitot Reading (pa) **Line A**	210	214	198	190	189	141	156	121	100	90	90
Duct Temp (°C) **Line A**	24	24	24	24	24	24	24	24	24	24	24

Duct Velocity (msec-1)	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**
	18.6	18.8	18.1	17.7	17.7	15.3	16.0	14.1	12.8	12.2	12.2

Duct Velocity (m sec^{-1})	15.8
Absolute Flow Rate (m^3 hr^{-1})	9035
Flow @ STP (m^3 hr^{-1})	8171

STP is @ 273 °K and 101.3 kPa

Data Entered by:	**J Litterick**
Data Entry Verified by:	**A Barnes**

Compliance of sampling location with BS EN 13284

None of the Pitot readings should be less than 5 pa	**PASS**
Ratio of highest to lowest local gas velocities should be less than 3:1	**PASS**
There should be no local negative flow	**PASS**
Angle of gas flow should be less than 15° in regard to the duct axis	**PASS**
Does the test position conform to the flow criteria specified in BS EN13284	**YES**

Any other reasons for departures from the standard.

FLOW AND TEMPERATURE TRAVERSE: BS EN 13284:2002 (& ISO 10780:1994)

Job Number	430 E01	Date of Testing	23 August 2006
Client	Trelleborg Automotive	Consultant	J Litterick
Plant Identification	DESMA M/C No.3		
Ambient temperature (°C)	20	Atmospheric Pressure (kPa)	101.3
Pitot Co-efficient	0.99	Duct Pressure (pa)	-650
Duct Diameter (cm)	36	Duct Length (cm)	-
Duct Area (m^2)	0.102	Duct Width (cm)	-

Transect Point No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
% of Dimension	6.5	15.0	25.0	35.0	45.0	50.0	55.0	65.0	75.0	85.0	93.5

Point	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Pitot Reading (pa) **Line A**	240	243	251	256	259	241	240	235	240	240	230
Pitot Reading (pa) **Line B**	225.	238	256	262	255	250	235	220	215	200	195
Duct Temp (°C) **Line A**	20	20	20	20	20	20	20	20	20	20	20
Duct Temp (°C) **Line B**	20	20	20	20	20	20	20	20	20	20	20

Duct Velocity (msec-1)	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**
	19.8	19.9	20.2	20.4	20.5	19.8	19.8	19.6	19.8	19.8	19.4
Duct Velocity (msec-1)	**B1**	**B2**	**B3**	**B4**	**B5**	**B6**	**B7**	**B8**	**B9**	**B10**	**B11**
	19.1	19.7	20.4	20.7	20.4	20.2	19.6	18.9	18.7	18.0	17.8

Duct Velocity (m sec^{-1})	19.7
Absolute Flow Rate (m^3 hr^{-1})	7205
Flow @ STP (m^3 hr^{-1})	6670

STP is @ 273 °K and 101.3 kPa

Data Entered by:	**J Litterick**
Data Entry Verified by:	**A Barnes**

Compliance of sampling location with BS EN 13284

None of the Pitot readings should be less than 5 pa	**PASS**
Ratio of highest to lowest local gas velocities should be less than 3:1	**PASS**
There should be no local negative flow	**PASS**
Angle of gas flow should be less than 15° in regard to the duct axis	**PASS**
Does the test position conform to the flow criteria specified in BS EN13284	**YES**

Any other reasons for departures from the standard.

FLOW AND TEMPERATURE TRAVERSE: BS EN 13284:2002 (& ISO 10780:1994)

Job Number	430 E01	Date of Testing	17 October 2006
Client	Trelleborg Automotive	Consultant	J Litterick
Plant Identification	COV Ralph No.5 M/C		
Ambient temperature (°C)	21	Atmospheric Pressure (kPa)	101.3
Pitot Co-efficient	0.99	Duct Pressure (pa)	-150
Duct Diameter (cm)	50	Duct Length (cm)	-
Duct Area (m^2)	0.196	Duct Width (cm)	-

Transect Point No	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
% of Dimension	6.5	15.0	25.0	35.0	45.0	50.0	55.0	65.0	75.0	85.0	93.5

Point	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**
Pitot Reading (pa) **Line A**	**72**	**84**	**114**	**109**	**100**	**102**	**84**	**79**	**91**	**115**	**100**
Duct Temp (°C) **Line A**	22	22	22	22	22	22	22	22	22	22	22

Duct Velocity	**A1**	**A2**	**A3**	**A4**	**A5**	**A6**	**A7**	**A8**	**A9**	**A10**	**A11**
(msec-1)	10.9	11.7	13.7	13.4	12.8	12.9	11.7	11.4	12.2	13.7	12.8

Duct Velocity (m sec^{-1})	12.5
Absolute Flow Rate (m^3 hr^{-1})	8822
Flow @ STP (m^3 hr^{-1})	8208

STP is @ 273 °K and 101.3 kPa

Data Entered by:	**J Litterick**
Data Entry Verified by:	**A Barnes**

Compliance of sampling location with BS EN 13284

None of the Pitot readings should be less than 5 pa	**PASS**
Ratio of highest to lowest local gas velocities should be less than 3:1	**PASS**
There should be no local negative flow	**PASS**
Angle of gas flow should be less than 15° in regard to the duct axis	**PASS**
Does the test position conform to the flow criteria specified in BS EN13284	**YES**

Any other reasons for departures from the standard.

TOC Monitoring:- Flame Ionisation Detector
BS EN 12619: 1999 & BS EN 13526:2002

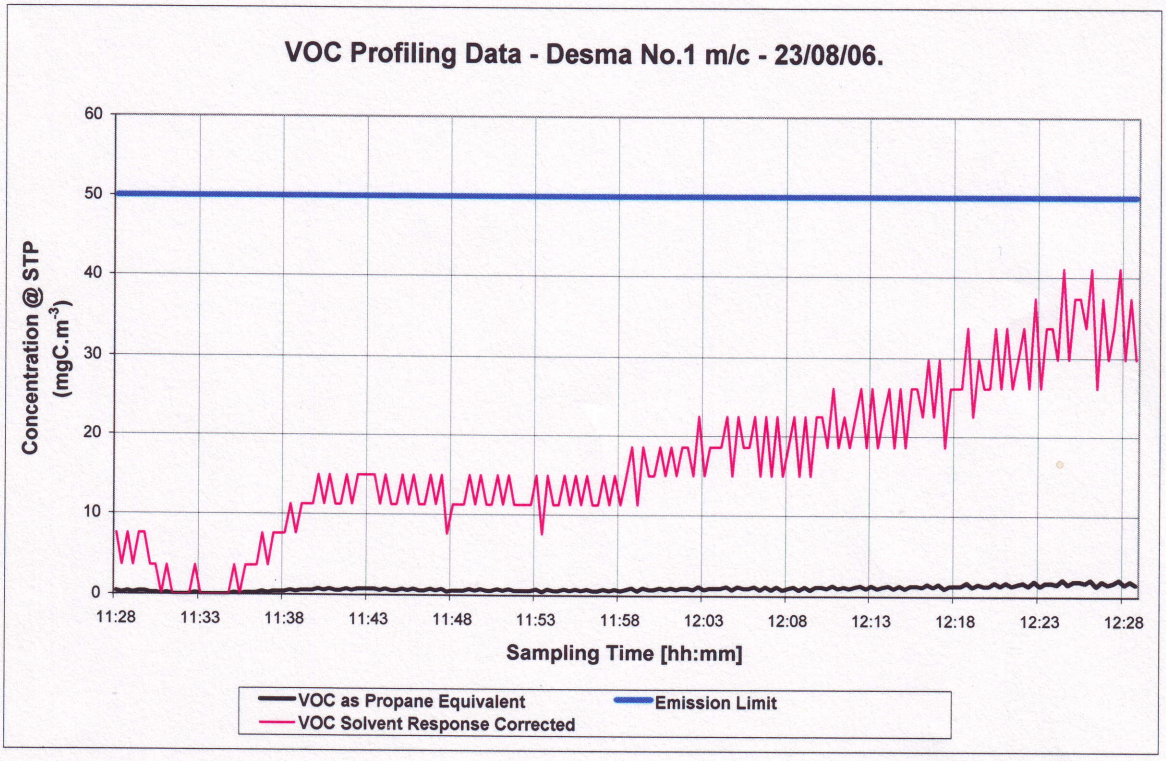
Job Number	430 E01	Date of Testing	23 August 2006
Client	Trelleborg	Consultant	J Litterick
Plant Identification	DESMA M/C No.1		
Ambient temperature (°C)	22	FID Identification	VC 08
Atmospheric Pressure (pa)	101.3	Detector Type	FID
Stack Pressure (pa)	-1640	Calibration Gas	Propane
Stack Temperature (°C)	24	Instrument Range	97.8
Logging Rate	00:00:20	Percent Carbon	82%
Emission Limit	50	Measurement Range (ppm)	300

Instrument Calibration

		Calibration Cylinder Identification	Actual (ppm)	Instrument (v)
Initial Calibration	Zero	Air	0	0.00
	Span	5982	327	3.29
Final Calibration	Zero	Air	0	0.02
	Span	5982	327	3.40

Span gas concentration should be +/- 80% of the measurement range **PASS**

Sampling Time	11:28 - 12:28	VOC Reading (ppm)	VOC as Propane ($mgC.m^{-3}$) at NTP	VOC as C (mgC.m-3) Solvent Response Corrected at NTP
Mean		0.5	0.9	16.8



TOC Monitoring:- Flame Ionisation Detector
BS EN 12619: 1999 & BS EN 13526:2002

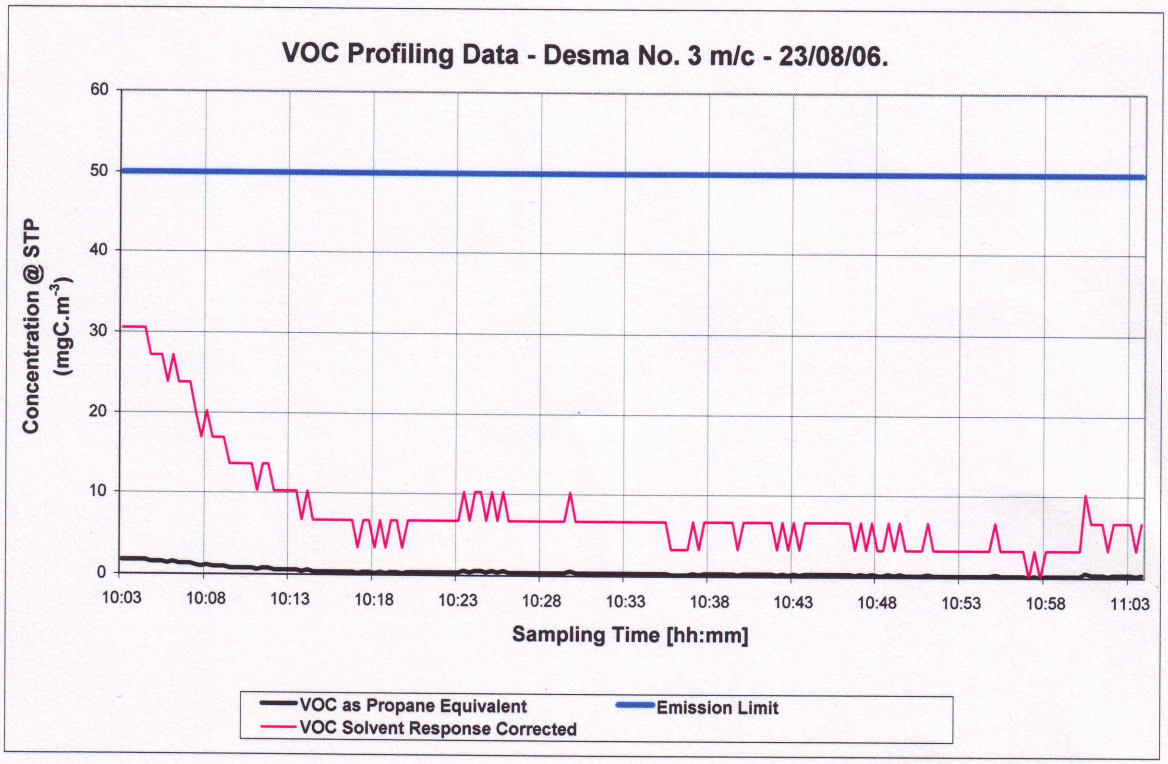
Job Number	430 E01	Date of Testing	23 August 2006
Client	Trelleborg	Consultant	J Litterick
Plant Identification	DESMA M/C No.3		
Ambient temperature (°C)	20	FID Identification	VC 08
Atmospheric Pressure (pa)	101.3	Detector Type	FID
Stack Pressure (pa)	-650	Calibration Gas	Propane
Stack Temperature (°C)	20	Instrument Range	97.8
Logging Rate	00:00:20	Percent Carbon	82%
Emission Limit	50	Measurement Range (ppm)	300

Instrument Calibration

		Calibration Cylinder Identification	Actual (ppm)	Instrument (v)
Initial Calibration	Zero	Air	0	0.00
	Span	5982	327	3.29
Final Calibration	Zero	Air	0	0.02
	Span	5982	327	3.40

Span gas concentration should be +/- 80% of the measurement range **PASS**

Sampling Time	10:03 - 11:03	VOC Reading (ppm)	VOC as Propane (mgC.m^{-3}) at NTP	VOC as C (mgC.m-3) Solvent Response Corrected at NTP
Mean		0.3	0.5	8.1



File Name: 430 E01 Trelleborg FID No 3
Date: 22/09/2006

TOC Monitoring:- Flame Ionisation Detector
BS EN 12619: 1999 & BS EN 13526:2002

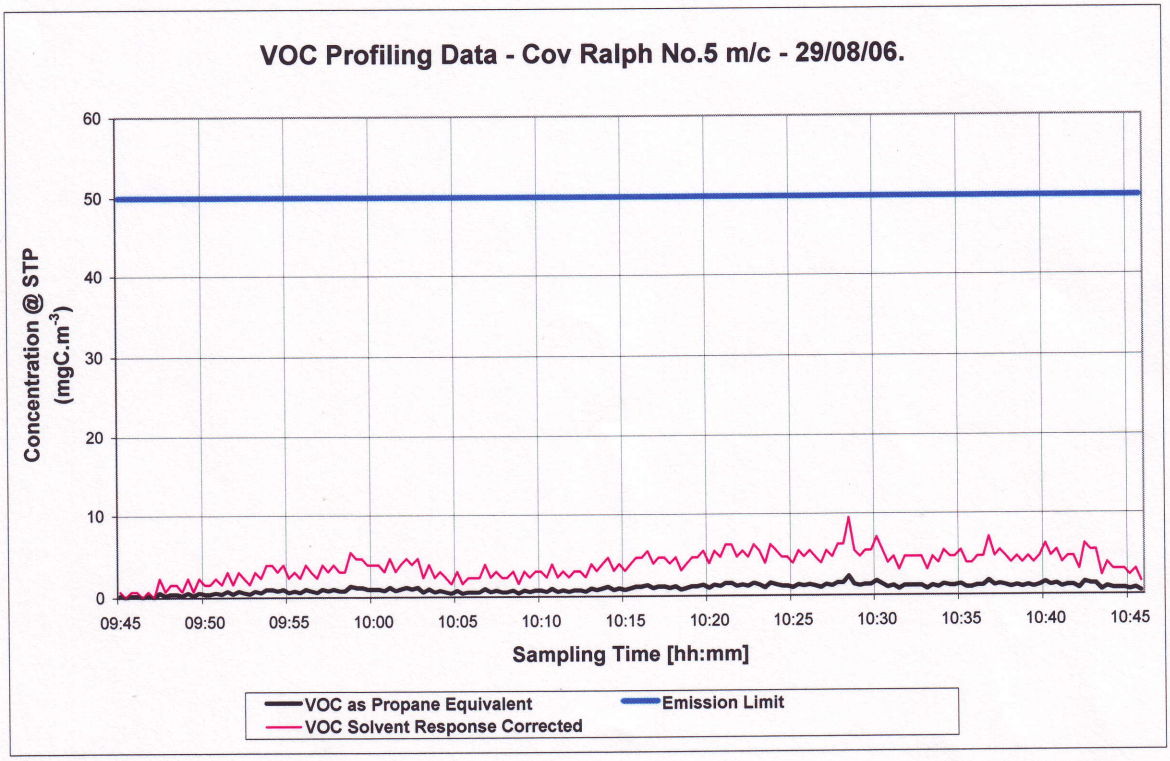
Job Number	430 E01	Date of Testing	29 September 2006
Client	Trelleborg	Consultant	J Litterick
Plant Identification	COV RALPH No.5 M/C		
Ambient temperature (°C)	20	FID Identification	VC 08
Atmospheric Pressure (pa)	101.3	Detector Type	FID
Stack Pressure (pa)	-1600	Calibration Gas	Propane
Stack Temperature (°C)	20	Instrument Range	97.8
Logging Rate	00:00:20	Percent Carbon	82%
Emission Limit	50	Measurement Range (ppm)	300

Instrument Calibration

		Calibration Cylinder Identification	Actual (ppm)	Instrument (v)
Initial Calibration	Zero	Air	0	0.00
	Span	5982	327	3.29
Final Calibration	Zero	Air	0	0.02
	Span	5982	327	3.40

Span gas concentration should be +/- 80% of the measurement range — **PASS**

Sampling Time	9:45 - 10:45	VOC Reading (ppm)	VOC as Propane ($mgC.m^{-3}$) at NTP	VOC as C (mgC.m-3) Solvent Response Corrected at NTP
Mean		**0.6**	**0.9**	**3.8**



Pullman Instruments Calibration Report

Issued By:

Pullman Instruments (UK) Ltd.
Chatsworth Terrace,
Chatsworth House,
Harrogate, HG1 5HT.
Tel : 01423 720360
Email : info@pullman.co.uk
www.pullman.co.uk

Customer :

3A AIR & ACOUSTICS
28D, 4th FLOOR, VERNON MILL
MERSEY STREET
STOCKPORT
CHESHIRE. SK1 2HX

The Instrument Listed Below Has Been Calibrated By A UKAS Accredited Laboratory.
For Results Refer To UKAS Certificate Issued.

Certificate No : 0072/N3018831P

Instrument information

I.D No.	31041226
Description	Digital Manometer
Manufacturer:	TESTO
Model	512
Serial No.	31041226
Job No.	NEW

Signatory : A.J.COX [redacted] Calibration Date : 09/12/2005

Approved Signatory

CERTIFICATE OF CALIBRATION

DATE OF ISSUE 09 December 2005 CERTIFICATE NUMBER N3018831P

UKAS CALIBRATION

0072

ASAP Calibration Services Ltd
Romsey Laboratory
UNIVERSAL HOUSE
ROMSEY INDUSTRIAL ESTATE
ROMSEY
HAMPSHIRE
SO51 0HR
Telephone 01794 523935
Facsimile 01794 523910
Email info@asap-cal.co.uk
Website www.asap-cal.co.uk

APPROVED SIGNATORY
[ ] M. Flux
[ ]
[ ]
[ ]

Customer : PULLMAN INSTRUMENTS
Address : CHATSWORTH HOUSE
CHATSWORTH TERRACE
HARROGATE
HG1 5HT

Order No : 202519

Apparatus Tested - DIGITAL MANOMETER

Type No : 512

Serial No : 31041226

Inventory No : -

Manufacturer : TESTO LTD

Range/Scale : 0 to 20 mbar
DIVISIONS: 0.01 mbar

est Conditions -

Date Instrument Received : 01 December 2005

Date Calibration Completed : 09 December 2005

Ambient Temperature : 20 ± 2 °C

Reference No : 3018831

Certified by [redacted]

CERTIFICATE OF CALIBRATION

UKAS Accredited Calibration Laboratory No. 0072

CERTIFICATE NUMBER
N3018831P

SERIAL NO: 31041226

CALIBRATION FLUID: AIR

THE PRESSURE WAS APPLIED TO THE + PORT
THE - PORT WAS LEFT OPEN TO ATMOSPHERE

NO ADJUSTMENTS WERE MADE TO THE INSTRUMENT UNDER TEST PRIOR TO THE CALIBRATION CHECK OTHER THAN SETTING IT TO ZERO.

THE INSTRUMENT WAS CALIBRATED IN THE HORIZONTAL POSITION AGAINST A PRECISION LIQUID MANOMETER. THE CALIBRATION OF WHICH IS TRACEABLE TO NATIONAL STANDARDS.

BEFORE THE COMMENCEMENT OF THE TEST, THE PRESSURE WAS INCREASED TO THE MAXIMUM PRESSURE AND DECREASED TO ZERO.

APPLIED PRESSURE UNITS: mbar gauge	INSTRUMENT READING UNITS: mbar gauge	
	RISING PRESSURE	FALLING PRESSURE
0.000	0.00	0.00
4.000	3.98	3.98
8.000	7.98	7.98
12.000	12.03	12.02
16.000	16.01	16.00
20.000	20.04	-

THE UNCERTAINTY OF MEASUREMENT IS ± [0.03% + 0.004 mbar OF THE APPLIED PRESSURE (+ INSTRUMENT RESOLUTION)]

THE UNCERTAINTIES ABOVE MUST BE TAKEN INTO ACCOUNT WHEN USING THE ABOVE INSTRUMENT SINCE THEY ARE SIGNIFICANT WHEN COMPARED WITH THE VALUES ACROSS THE RANGE OF THE INSTRUMENT

THE ABOVE UNCERTAINTY REFERS TO THE MEASUREMENT AND IS NOT INTENDED TO INDICATE THE SPECIFICATION OR STABILITY OF THE INSTRUMENT UNDER TEST.

Test Engineer .....

The reported expanded uncertainty is based on a standard uncertainty multiplied by a coverage factor k=2.00, providing a level of confidence of approximately 95%. The uncertainty evaluation has been carried out in accordance with UKAS requirements.

INTERNAL CALIBRATION CERTIFICATE - Rules and Tapes Measures

Equipment Name / Type: 5m TAPE MEASURE (JL)
Equipment Reference Number: AP3 51
Date of Calibration: 03/03/06
Person Conducting Calibration: JL

Reference Rule Reading mm	Working Rule Reading mm	Error (+/- mm)	Pass/Fail	Markings Clearly Visable?
1000	1000	0	P	Y
1500	1500	0	P	Y
1800	1800	0	P	Y

Tolerance = +/- 5mm

Reference Rule Used: S170

Date of Next Calibration: 03/03/07

Signed: [redacted]

Test Pump Reference:	**APJ 72**
Date of Calibration:	26 - 27/04/2006

Reference Dry Gas Meter Number:	E 949
Reference Dry Gas Meter Calibration Certificate:	N 207 4964F
Reference Dry Gas Meter Calibration Date:	08/08/2006

Section 1: Calibration Record

Flow Rate Setting (%)	Leak Check (Y/N)	SKC 222-3 Stroke Counter Reading			Time Period			Reference Dry Gas Meter Readings (litres)		
		Start	Finish	Δ	Start	Finish	Δ (hrs:min)	Start	Finish	Volume Measured
10	Y	640011	743056	103045	15:20	8:00	16:40	39239.6	39284.1	44.5
25	Y	800700	846000	45300	11:02	15:02	06:06:00	39309.8	39329.1	19.3
45	Y	743056	800700	57644	8:01	11:01	03:00	39284.1	39309.8	25.7

Section 2: Calculations

Flow Rate Setting (%)	10	25	45
Calibrated Volume, ml	44500	19300	25700
Test Period, (hh:mm)	16:40	06:06	03:00
No of Strokes	103045	45300	57644
Volume:Stroke Ratio	0.43	0.43	0.45

Mean Volume:Stroke (ml/stroke)	**0.43**
Maximum Volume:Stroke (ml/stroke)	**0.45**
Minimum Volume:Stroke (ml/stroke)	**0.43**
Is either max or min Volume:Stroke ratio more than 0.02 from the mean?	**N**

If yes then pump needs overhaul.

Calibrated By: [redacted]

Signature: [redacted]

Pitot Calibration Record

Working Pitot: APJ 39
Calibration Date: 27/04/2006
Reference Pitot Used: E 039
Person Conducting Calibration: AB/PC/JL

Ref Pitot Next Calibration Due : 03/07/2006

Pitot Type	Test	Pressure Reading Pascals	Pitot tube Coefficient	Cp(A) - Cp(B)
Reference Pitot				
	Pre Test Zero	0.0		
	Pitot Reading	8	0.994	
	Post Test Zero	0.0		
Working Pitot				
	Pre Test Zero	0.0		
	1st Pitot Reading Leg A	3		
	1st Pitot Reading Leg B	3		0
	Zero Check	0.0		
	Pitot Coefficient =		Side A	0.99
	Pitot Coefficient =		Side B	0.99
	Average (side A&B=			**0.99**
	Side A Deviation=			0.00
	Side B Deviation=			0.00
Reference Pitot				
	Pre Test Zero	0.0		
	Pitot Reading	98	0.994	
	Post Test Zero	0.0		
Working Pitot				
	Pre Test Zero	0.0		
	1st Pitot Reading Leg A	101		
	1st Pitot Reading Leg B	101		0
	Zero Check	0.0		
	Pitot Coefficient =		Side A	0.98
	Pitot Coefficient =		Side B	0.98
	Average (side A&B)=			**0.98**
	Side A Deviation=			0.00
	Side B Deviation=			0.00
Reference Pitot				
	Pre Test Zero	0.0		
	Pitot Reading	240	0.994	
	Post Test Zero	0.0		
Working Pitot				
	Pre Test Zero	0.0		
	1st Pitot Reading Leg A	243		
	1st Pitot Reading Leg B	243		0
	Zero Check	0.0		
	Pitot Coefficient =		Side A	0.99
	Pitot Coefficient =		Side B	0.99
	Average (side A&B)=			0.99
	Side A Deviation=			0.00
	Side B Deviation=			0.00

Mean Pitot Coefficient	0.99

Pitot coefficient must comply with requirements fo BS1042 (Elipsoidal only).

INTERNAL CALIBRATION CERTIFICATE - THERMOMETER & THERMOCOUPLES

Equipment Name / Type: Temperature Indicator
Equipment Reference Number: APJ 80
Date of Calibration: 27/04/2006
Date of Next Calibration: 26/04/2007
Person Conducting Calibration: AB/PC/JL

Temperature Reading °C Equivalent	Working Thermometer Reading °C	Injected Value mV (if applicable)	STDEV	Error % (of absolute reading)	PASS / FAIL
-50	-52.9		2.05061	-1.300	Pass
0	0		0	0.000	Pass
50	49.8		0.141421	-0.062	Pass
100	100.3		0.212132	0.080	Pass
150	148		1.414214	-0.473	Pass
200	200.1		0.070711	0.021	Pass
250	248.6		0.989949	-0.268	Pass
300	300.2		0.141421	0.035	Pass
350	349.3		0.494975	-0.112	Pass
400	400.2		0.141421	0.030	Pass
450	449.5		0.353553	-0.069	Pass
500	500.1		0.070711	0.013	Pass
550	549.0		0.707107	-0.122	Pass
600	600.0		0	0.000	Pass
650	648.0		1.414214	-0.217	Pass
700	700.0		0	0.000	Pass
750	748.7		0.919239	-0.127	Pass
800	799.9		0.070711	-0.009	Pass
850	849.1		0.636396	-0.080	Pass
900	899.8		0.141421	-0.017	Pass
950	949.6		0.282843	-0.033	Pass
1000	999.7		0.212132	-0.024	Pass
		Mean STDEV	0.47569		

Correction factor = Difference between Test Temp and Equivalent Temp (+/-) of the calibration certificate

Temperature Simulator Used: SIM 03 Date of Next Calibration:

Reference Thermometer Used: N/A Date of Next Calibration: n/a

Reference Thermocouple Used: N/A Date of Next Calibration: n/a

		Units
Uncertainty:	no more than 3	°C
Uncertainty:	no more than 3	°C
Uncertainty:	no more than 3	°C

Corrective Action Required: No

Date entered back into service: 27/04/2006

Signed: [redacted]

Uncertainty of Measurement(+/-): 0-500°C = +/- 1°C
500-1000°C = +/- 3°C

INTERNAL CALIBRATION CERTIFICATE - THERMOMETER & THERMOCOUPLES

Equipment Name / Type: 2 m stack Thermocouple
Equipment Reference Number: AQ 094
Date of Calibration: 27/04/2006
Date of Next Calibration: 26/04/2007
Person Conducting Calibration: PC/JL/AB

Temperature Reading °C Equivalent / Reference Thermometer Reading		Working Thermometer / Thermocouple Reading °C		Injected Value mV (if applicable)	STDEV	Error +/- °C	PASS / FAIL
Actual	Corrected	Actual	Corrected				
3.2	3.2	3.3	3.3		0.052681	0.1	
35.6	35.7	36.0	35.9		0.182002	0.4	
80.2	80.4	80.5	80.3		0.138036	0.3	
	0.0		0.0		0	0.0	
	0.0		0.0		0	0.0	
	0.0		0.0		0	0.0	
	0.0		0.0		0	0.0	
	0.0		0.0		0	0.0	
				Mean STDEV	0.04659		

Correction factor = Difference between Test Temp and Equivalent Temp (+/-) of the calibration certificate

1.002841
0.997167

Temperature Simulator Used: Date of Next Calibration: Uncertainty: no more than 3 °C

Reference Thermometer Used: TK14 Date of Next Calibration: 10/05/2006 Uncertainty: no more than 3 °C

Reference Thermocouple Used: TK07/A Date of Next Calibration: 12/05/2006 Uncertainty: no more than 3 °C

Units

Corrective Action Required: No

Date entered back into service: 27/04/2006

Signed: [redacted]

Uncertainty of Measurement(+/-): 0-500°C = +/- 1°C
500-1000°C = +/- 3°C