Report of Environmental Monitoring carried out at: -

Burbidge & Son Ltd
Awson Street
Foleshill
Coventry CV6 6GJ

For the attention of Mr J Gwilliam

Examination, Assessment and Report by: -

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Authenticating Signature [redacted]...

Local Authority copy

Date: - December 2001

Contents

Introduction

This report relates to a visit to the premises of Burbidge & Son Ltd. at Awson Street in Coventry on 11th & 12th December 2000 and subsequent dates to complete measurements on the stain cab stack and other, low usage, spraying positions. The purpose of this visit was to carry out emissions monitoring as part of compliance with the Environmental Protection Act PG6/33(97) Secretary of State's Guidance- Wood Coating Processes. The process is authorised by City of Coventry authorisation number 045.

The emission points were monitored for volatile organic compounds (VOC) and for particulate matter.

The process conditions at the time of monitoring were typical operating conditions unless noted.

Reference documents

The reference documents used for the emissions monitoring were

- PG6/33 Secretary of State's Guidance- Wood Coating Processes
- MDHS 70- General methods for sampling airborne gasses and vapours
- BS 3405- Measurement of particulate emission including grit and dust (simplified method)

Sampling protocols

The following protocols were used in the emissions monitoring

- Stack sampling protocol- Measurement of airflow
- Stack sampling protocol- Measurement of particulate matter
- Stack sampling protocol- Measurement of Volatile Organic Compounds

These protocols were submitted to the Authority prior to monitoring and are included in this report in Appendix 1.

Equipment used

The following equipment was used in the emissions monitoring

- DP-CALC micromanometer and pitot tube
- SKC Highlite high volume sampling pump and rotameter
- SKC universal constant flow pump and dry-flo flowmeter
- In-stack particulate filter head using 4mm or 6 mm nozzle

Information on the equipment and appropriate calibration details are included in this report in Appendix 2.

Location and identification of sampling points

The location and identification of the sampling points are shown diagrammatically in Appendix 3 of this report.

Deviations from standards

1. BS3405 Section 8.3
   This requires that the particulate sample collected is a minimum percentage weight of the container mass. It was found with these measurements that even with considerably extended sampling times it was generally not possible to achieve this minimum. The results however are consistent between the normal and extended sampling times.
2. BS3405 Section 11
   Due to the variable work patterns at the spraying positions and the need to run extended sampling it was not always possible to sample the same coating material each time in each stack. This has therefore led to a larger variation between measurements than specified.
3. Air velocity at sampling point
   The air flow in the stacks was generally turbulent and did not follow the normal velocity gradient across the diameter of the stack. In order to minimise error in the measurement of particulate emissions additional air velocity measurements were taken at the 0.15D and 0.85D particulate sampling points and used to determine the sampling volume. The air velocity measurements did however satisfy the requirements of BS3405 section 6.3.2. Repeat air velocity measurements at the sampling points gave readings generally similar to the original although the turbulence made this difficult to quantify.
4. Occupancy of booths
   The occupancy of the manual spray booths was generally low with a small quantity of material being sprayed. It was therefore not always possible to take the requisite number of samples. In some instances specific spraying operations have been targeted to give an indication of potential worst case situations.
5. Sampling ports
   The sampling ports in the manual spray booths, in particular spray booths 3 and 4, have been sited closer to the extraction fans than the guidance position.

Results

A summary of results is given in the following table. The results in detail are given in Appendix 4.

It is difficult to estimate the accuracy of the results given the variability of the process and plant. Probable significant errors in the measurement of particulate matter are from air turbulence (10%) and low weight sample weighing (10%).

Stack Position	Particulate emissions	VOC emissions
	average mg/m^3	mg/m^3
Spraybooth 1- left	0.8	9.7
Spraybooth 1- right	0	6.8
Spraybooth 2- left	1.3	98.3
Spraybooth 2- right	1.5	13.3
Spraybooth 3	0.8	15.6
Spraybooth 4	3.0	85.4
Stain cab	13.7/ 34.0	1466.7
Stain flash-off	n/a	20.7
Lacquer cab	1.4	368.4
Lacquer flash-off	n/a	157.3
Oven 1	n/a	13.1
Oven 2	n/a	14.2
Stain kitchen	n/a	37.8
Lacquer kitchen	n/a	82.2

Conclusions

The particulate emissions are lower than normal for the manual spray booths due to the nature of the work undertaken and to the effective maintenance programme. Typical emissions for the furniture industry are 0-10 mg/m^3 for normal conditions and 10-15 mg/m^3 for high use or poor filter condition.

One of the particulate emissions for the stain cab is relatively high due mainly to the nature of the rapid dry patina stain being applied at the time of sampling. This probably represents the worst case. The lacquer cab is a newer specification and as such is specified to achieve the 3 mg/m^3 limit set in the German environmental legislation (TA- Luft).

The VOC emissions are typical for the industry and represent the different coatings and different occupancy of the spraying positions. The emission level recorded from the stain cab was again a worst case situation involving the patina stain. For a conventional solvent stain this would be expected to be approximately 150 mg/m^3.

11th & 12th Dec 2001

Appendix 1- Sampling Protocols and pre-monitoring information

Stack Sampling Protocol- Measurement of airflow

1. Instrumentation
   The preferred instrument for measuring airflow in stacks is the pitot tube. This is a differential pressure probe designed to cause minimal turbulence when inserted into the airflow. The total pressure within the stack comprises of Velocity pressure, caused by the movement of the air, and Static pressure, exerted in all directions by compression or expansion of the air caused by the process e.g. extraction fan. The BS 1042 pitot tube has an ellipsoidal tip that is aligned into the direction of flow. The pitot tube has two separate tappings. The tip is affected by total pressure in the stack whereas the tappings perpendicular to the tip are affected by the static pressure only. The velocity pressure is the difference between the two.

   The pressures exerted on the pitot tube are measured by an electronic micromanometer. This provides the static and velocity pressures and the air velocity in the stack.

   The micromanometer can be set to display true velocity readings by automatically correcting for actual test point gas density using independently measured test temperature and barometric pressure.

2. Measuring site location
   Wherever possible the sampling port should be located in a region of linear flow. BS 3405 states specific minimum distances, in terms of stack diameters, from points of turbulence e.g. fan (3), junction (2) or bend (1). It also states the location should be at least one diameter upstream of the next point of turbulence. In practice the greater the distances, the more reliable the airflow. In some cases these conditions cannot be met and measurements in these situations must be taken with some caution.

3. Measurements
   Measurements are taken at a series of points across the ducts. The positions of the points, along with alternative strategies, are given in BS 3405. In situations where the airflow is not linear, preference is given to measuring air velocity at the points where sampling will occur.

Stack Sampling Protocol- Measurement of particulate matter

1. Air velocity in stack
   Measure the airflow in the stack using pitot tube, micromanometer, barometer and thermometer.
   The micromanometer can be set to display true velocity readings by automatically correcting for actual test point gas density using independently measured test temperature and barometric pressure.

2. Isokinetic sampling for particulate matter
   In isokinetic sampling the velocity of flow into the sampling head is matched to the airflow velocity in the stack. This ensures an even flow of lighter particles into the head. If the sampling flow is set too low the light particles tend to be carried around the head by the airflow. If set too high, the light particles are pulled into the head from outside sampled volume of air. The required sampling rates can be determined by calculation or from standard tables.

3. Sampling
   Particulate sampling is taken over a 15-120 minute period at points specified in BS 3405. The samples are collected onto a pre-weighed glass fibre filters in an assembly inside the stack. The filters are reweighed to determine the quantity of particulate matter collected. Dummy filters are used for internal calibration.

4. Presentation of results
   Particulate sampling is assessed by weight (gravimetrically). The weight is normally expressed in milligrams.

   The volume of air sampled is derived from the sampling flow rate and the sampling time. The volume is expressed in cubic metres. Measurement are taken without correction for water vapour content.

   The concentration of particulate matter is expressed as milligrams per cubic metre or $mg.m^{-3}$.

Stack Sampling Protocol- Measurement of Volatile Organic Compounds

1. Measurements and Analysis
   The quantity of VOC's in a stack is measured by collecting a sample on a charcoal adsorption tube. This sample is subsequently analysed by a combination of Gas Chromatography and Mass Spectroscopy and the weight of VOC's calculated as total carbon.

2. Sampling
   A 6mm stainless steel probe is inserted into the stack and connected to the charcoal adsorption tube. The flue gasses are pumped through the adsorption tube for 20-50 minutes at a rate of 100-200 ml/min.

3. Presentation of results
   The volume of air sampled is derived from the sampling flow rate and the sampling time. The volume is expressed in cubic metres.

   The flue gasses are analysed to give the weight of VOC's in terms of total carbon.

   The concentration of volatile organic compounds is expressed as milligrams carbon per cubic metre or $mg.m^{-3}$.

Pre-monitoring information

Company	Burbidge & Son Ltd
Address	Awson Street Coventry
Contact	Mr J Gwilliam
Monitoring	Emissions from spray booths and automatic spray line to be tested for particulates and volatile organic compounds to comply with City of Coventry Environmental Protection Act 1990 Authorisation Number 045. Monitoring locations shown on enclosed drawing. All locations are internal and accessible from a short ladder run to minimise health & safety risk.
Contractor	Mike Thomas BSc MSc 1a Astwick Road Stotfold Hitchin Herts SG5 4AP affilliated to IEMA
Laboratory	RPS Laboratories Ltd Unit 12, Watersedge Business Park Modwen Road Salford M5 3EZ ukas accredation
Date/time	Provisionally set to start 11th December 2001
Enclosures	Measurement of airflow Measurement of particulate matter Measurement of volatile organic compounds Location drawing

Appendix 2- Equipment Used

Certificate of Calibration

This is to certify that the instrument detailed below has been calibrated using standards which are periodically verified and are traceable to National Standards where these exist.

Customer	:	**Mike Thomas**
Customer Identifier	:	**N/A**
Manufacturers Name	:	**TSI**
Type	:	**8705 Micromanometer**
Manufacturers Serial Number	:	**00110061**
BSRIA Identifier	:	**23224**
Previous BSRIA Identifier	:	**N/A**
Calibration Date	:	**14 November 2001**
Recommended Next Calibration Date	:	**13 November 2002**
Certificate Number	:	**23224**
Test Number	:	**N/A**

Laboratory Conditions	:	**Temperature**	23 ± 4°C
	:	**Humidity**	40 ± 15% RH

Approved Signature

BSRIA
Quality Approved
D J Stephens

HLA Calibration Sales
BSRIA
Instrument Solutions

BSRIA Instrument Solutions
Old Bracknell Lane West, Bracknell, Berkshire RG12 7AH UK

JS Holdings
Unit 6 Leyden Road
Stevenage
Hertfordshire
SG1 2BW
T: 01438 316994
F: 01438 316995

Certificate of Calibration

This Dry Flo Flowmeter, model 100A, serial number 0156 has been calibrated against an adjustable precision gas tight syringe, of nominal volume 100ml, which has been calibrated by filling with distilled water and determining the weight of water delivered in accordance with the general principles contained in British Standard Specification 6696:1986 and BS 6018:1991 or BS 7532:1991 as appropriate. At least ten determinations were made at each volume and the mean value was used to compute the measured volume. The weights used in the determination were a stainless steel reference set numbered ST1/831310, which have a certificate issued by the National Physical Laboratory, reference number 08C021/9506, and a stainless steel reference set numbered ST1/852298-860416, which have a certificate, issued by the National Physical Laboratory reference number 08C021/9402.

The measurement results are given in the table below, where each value given in the second column represents the average of three readings of the measured delivered volume of air at 20°C represented by the nominal value identified in the first column. The Uncertainty of Measurement is ± 0.2ml.

Nominal Value (ml)	Measured Volume (ml)	Accuracy %
20 (From 0 to 20)	19.00	98.00
40 (From 0 to 40)	38.50	96.25
60 (From 0 to 60)	58.50	97.50
80 (From 0 to 80)	78.60	98.25
100 (From 0 to 100)	98.00	98.00

Certificate number 0140

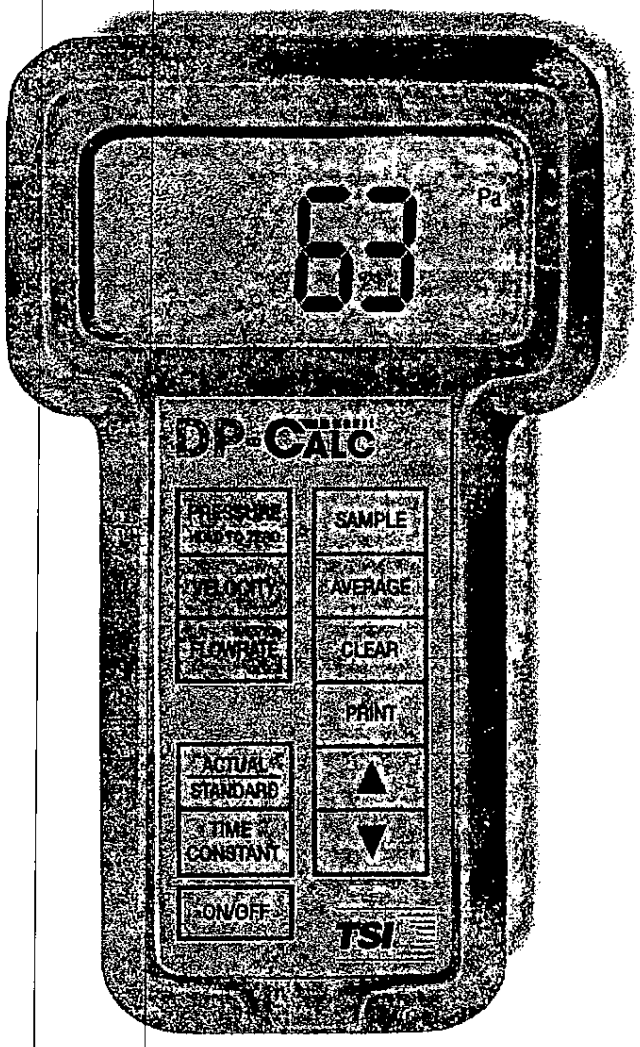
The uncertainties are for a confidence probability of not less than 95%

Model 8704

The advanced Model 8704 DP-CALC has all of the features of the Model 8702 and more. The Model 8704 allows storing of up to 500 data points, calculates volumetric flowrate along with velocity, converts between actual and standard velocity, and calculates statistics such as average, minimum, maximum and count. The saved data can then be recalled or downloaded to a computer for further analysis. Volumetric flowrate calculations also include a K factor. The included software allows downloading of the data into a spreadsheet. These features save you time in taking measurements and reporting results.

Features	8702	8704
Differential Pressure	●	●
Static Pressure	●	●
Velocity	●	●
Volumetric Flowrate		●
Calculates min/max		●
Variable Time Constant	●	●
Density Correction		●
Calculate Average	●	●
K Factor		●
Data Logging		●
Data Reporting Software*		●
Printer Output	●	●
NIST** Calibration Certificate	●	●

*Requires use of a spreadsheet software package
**U.S. National Institute of Standards and Technology



Model 8704

Backed by TSI Expertise

TSI Incorporated has more than 30 years experience in air flow measurement technology. It's this type of experience and innovation that provides you with accurate and reliable instruments. Along with TSI's expertise, each instrument is backed by a two year limited warranty and the industry's best service policy. Not only is service performed quickly, but calibrations are NIST traceable and a free certificate of calibration is included.

TSI®

Models 8702 and 8704 DP-CALC Micromanometers Specifications

Pressure:
Range: -1245 to 3735 Pa (-9.3 to 28.0 mm Hg, -5 to +15 in. H_2O)
Accuracy: ±1% of reading ±1 Pa (±0.01 mm Hg, ±0.005 in. H_2O)
Resolution: 1 Pa, 0.01 mmHg (0.001 in. H_2O)

Velocity:
Range[1]: 1.25 m/s to 78.5 m/s (250 ft/min - 15,500 ft/min)
Accuracy[2]: ±1.5% at 10 m/s (2,000 ft/min)

Instrument Temperature Range:
Operating range: 0 to 70°C (32 to 158°F)
Storage range: -40 to 85°C (-40 to 185°F)

Averaging Capability: (Model 8702 only)
Range: Up to 255 values each of pressure and velocity

Flow Rate: (Model 8704 only)
Displayed range[3]: to 9,999,000 ft³/min, m³/h, l/s
K Factor range: 0.01 to 2
Flow factor range: 0.01 to 999.9

Storage Capability: (Model 8704 only)
Range: Up to 500 values

Time Constant:
Values: 1, 5, 10, 15, or 20 seconds

Power Requirements:
Batteries: Four AA-size Alkaline or NiCd rechargeable
Approx. battery life: 24 hours (Alkaline), 7 hours (NiCd)
AC adapter (optional): 7 VDC nominal, 300 mA

Physical:
External dimensions: 100 mm x 168 mm x 38 mm (3.9 in. x 6.6 in. x 1.5 in.)
Weight (with batteries): 0.35 kg (0.76 lb.)
Display: 4-digit LCD, 15 mm (0.6 in.) digit height

Printer Interface:
Type: Serial
Baud rate: 1200

Recommended Maintenance Schedule:
Factory calibration: Annually

8702 DP-CALC includes the following accessories:
1 - carrying case
4 - size AA batteries
1 - NIST certificate of calibration
1 - operation and service manual

8704 DP-CALC includes the following accessories:
1 - carrying case
1 - static tube
4 - size AA batteries
2.44 m of tubing
1 - NIST certificate of calibration
1 - operation and service manual
1 - downloading software disk

1 Pressure velocity measurements are not recommended below 5.08 m/s and are best suited to velocities over 10.16 m/s.

2 Accuracy is a function of converting pressure to velocity. Conversion accuracy improves when actual pressure values increase.

3 Actual range is a function of maximum velocity, pressure, duct size, K factor and density correction.

Specifications are subject to change without notice.

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P.O. Box No. 2
Portishead, Bristol BS20 9JB
England

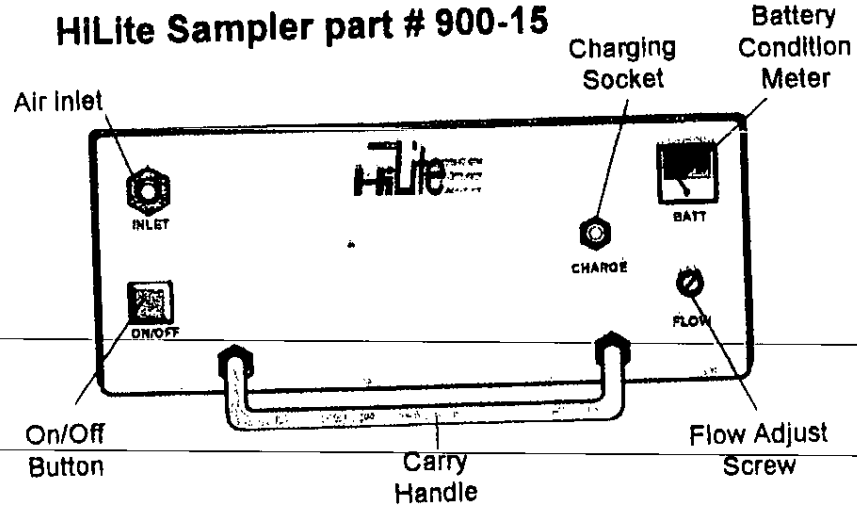
FEATURES

Where are the controls located? All the controls of the HiLite series are located on the front panel.

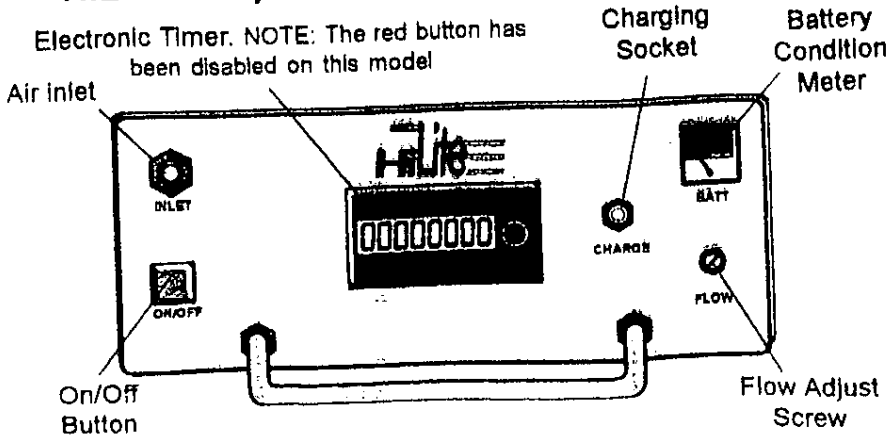
ON/OFF SWITCH. When pressed down to the ON position the pump will start to run, and the LCD (if fitted) activate showing eight ZEROS. If left running the timer will increase in one minute steps to a maximum of 99999999 minutes.

TIMER (if fitted). The red button on the timer is disabled on the HiLite pump and has no effect when pressed. Once the pump has been started the timer will record the run time in minutes. At the end of the sample the pump is stopped and the timer will freeze displaying the total run time. When the pump is next restarted the timer will zero and commence recording the run time once again.

HiLite Sampler part # 900-15



HiLite Sampler with Timer part # 900-15T



FLOW ADJUST. Below the level of the hole marked FLOW is a small screw. To adjust the flow use a small screwdriver, making sure the screwdriver end is located in the slot. To increase the flow turn clockwise. The span of this screw is around 5 turns. **DO NOT FORCE** the flow adjust screw, and Flow range by this adjuster is approximately 3-12 l/min.to free air.

BATTERY CHARGE METER. The meter gives an indication of the battery capacity available. If the meter is in the RED area the pump should be recharged before use.

INLET. Connect the sampling device to this pipe stub using flexible tubing of 6mm diameter.

FUSE. An internal fuse is fitted which can only be accessed by removal of the case top. Please refer to page 4 for instructions on how to remove case top. The fuse is rated at 2 Amp anti surge and **must** be replaced with an equivalent. Replacement of the fuse with a higher or lower value can cause damage to your pump.

CHARGING. The charger for the HiLite will automatically switch to a trickle charge after the battery has reached full charge. This prevents overheating of the battery and increases its life.

SKC

HiLite

OPERATING INSTRUCTIONS

FEATURING

HILITE HIGH VOLUME SAMPLING PUMP

SPECIALISTS IN AIR SAMPLING

SKC®

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Blandford Forum, Dorset, DT11 8ST
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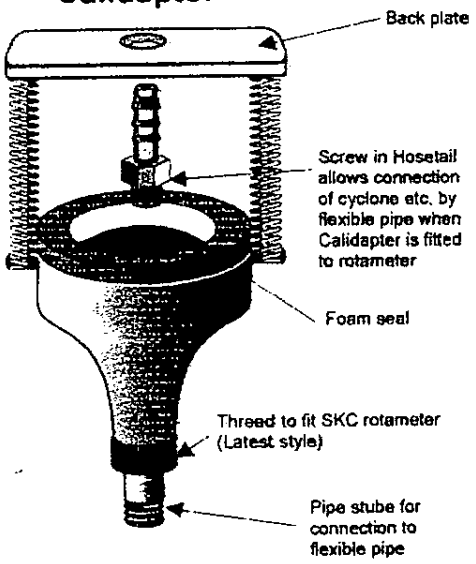
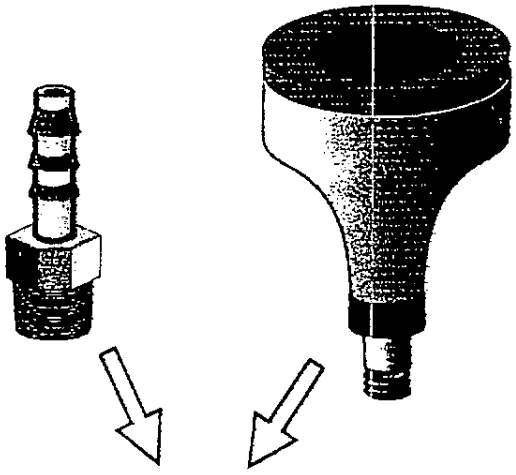
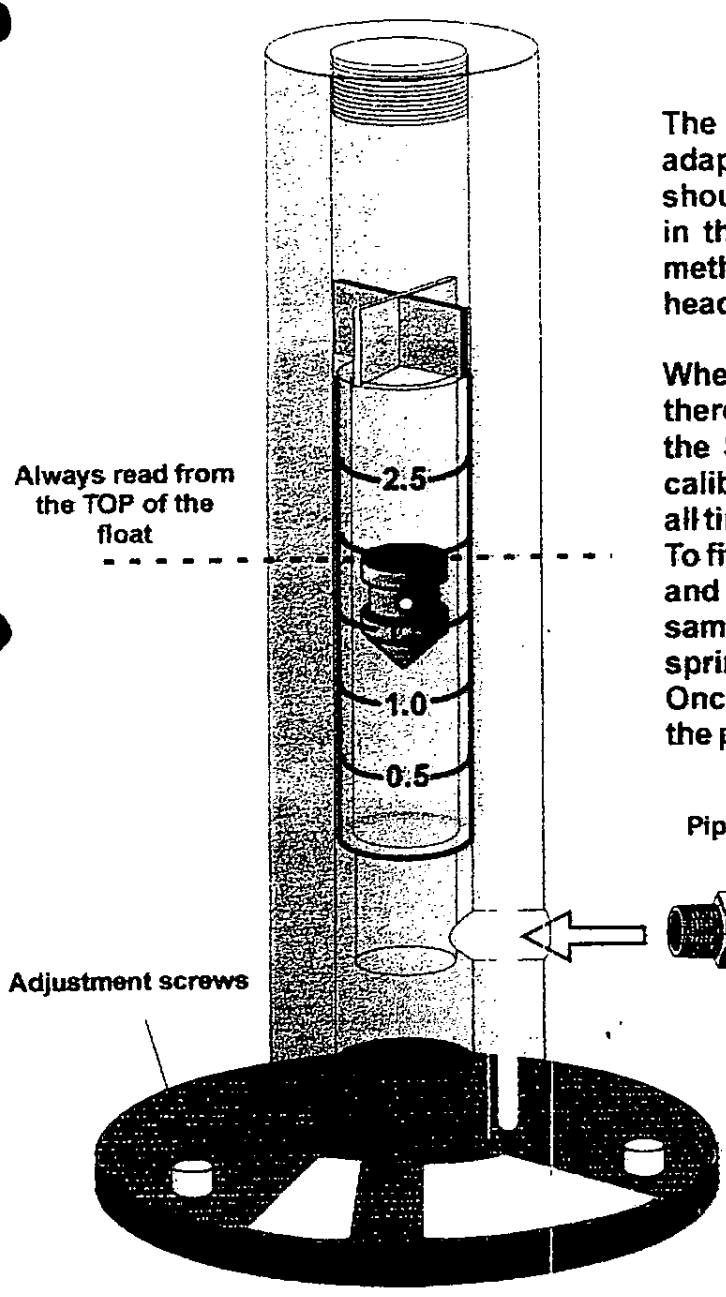
CE

Calidaptor



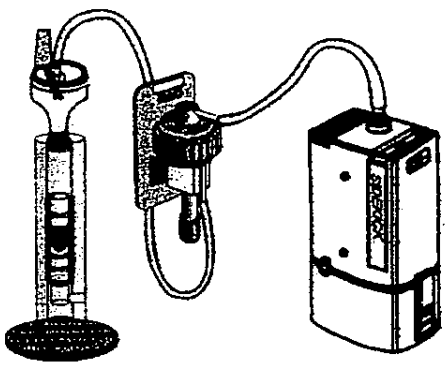




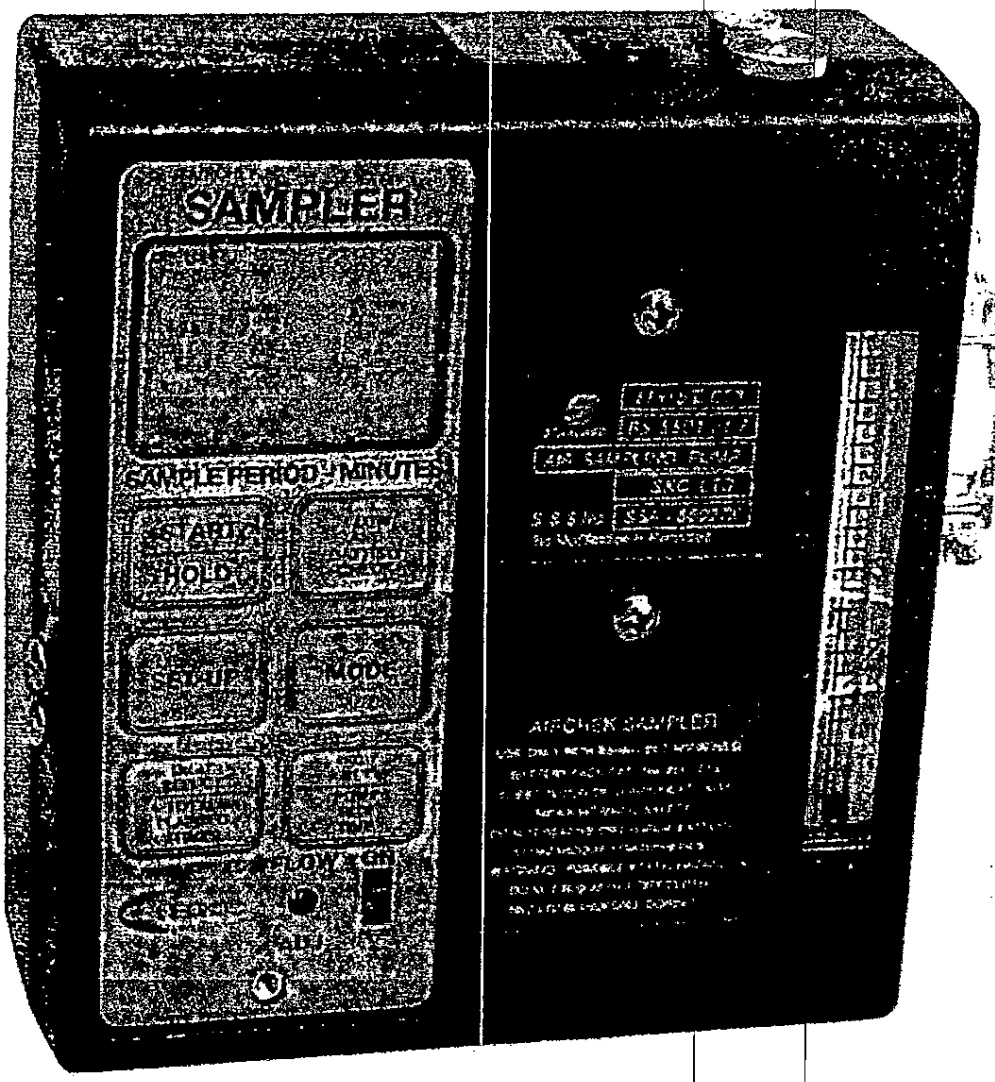
The SKC rotameter is supplied with an adapter and two pipe stub fittings which should be screwed into position as shown in the diagram opposite. This provides a method of connecting either a sampling head or flexible pipe to the rotameter.

When using an I.O.M. head or similar, where there is no facility to connect a flexible pipe the SKC CALIDAPTOR allows hands free calibration and ensures a good air seal at all times.
To fit simply remove the pipe stub (if fitted) and replace it with the CALIDAPTOR. The sample head is now clipped between the spring loaded back plate and the foam seal. Once in place both hands are left free to set the pump flow rate.

Pipe stub fitting



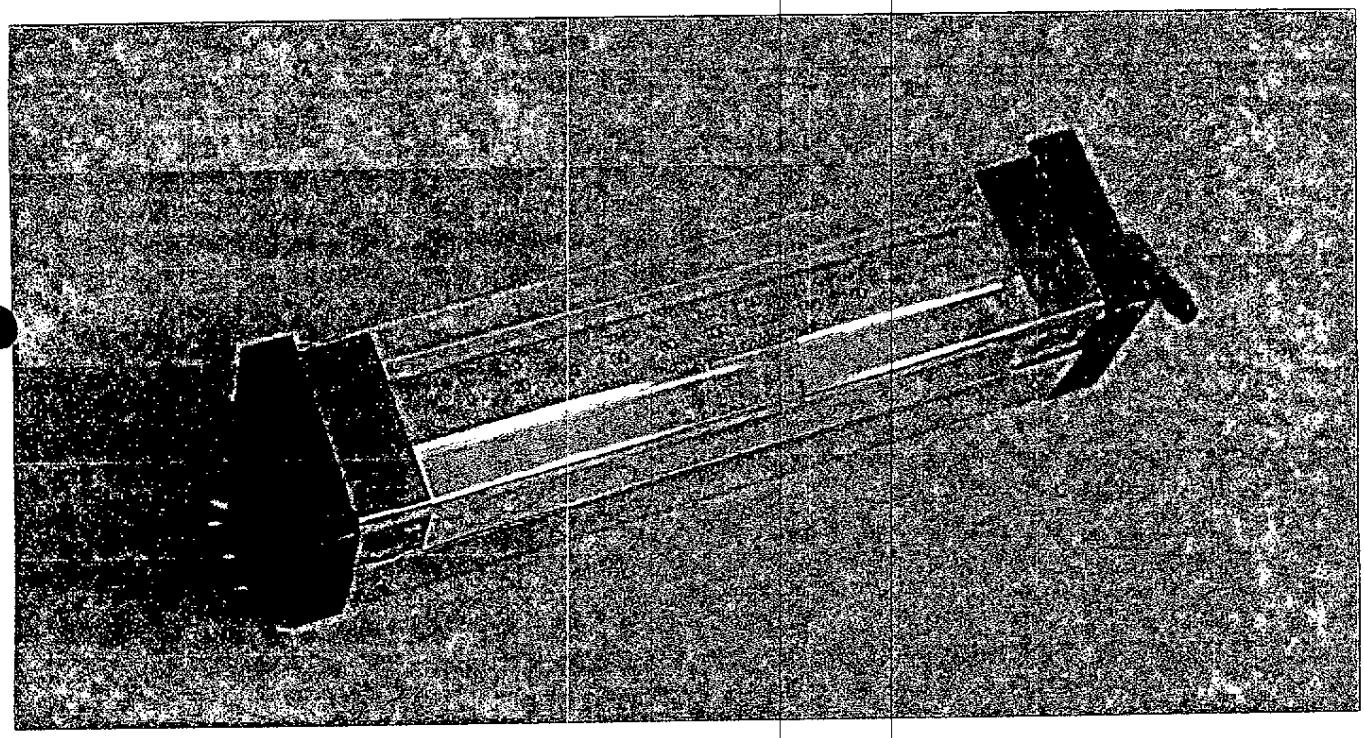
Set up showing cyclone being calibrated


SAMPLER
SAMPLE PERIOD MINUTES
START
HOLD
SET-UP
MODE
FLOW CM
AIRCHEK SAMPLER

J.S. HOLDINGS

DRY-FLO FLOWMETER MODEL 100A

OPERATING INSTRUCTIONS



Description of Operation

A hollow glass cylinder and near frictionless diaphragm form the measurement element. As gas is introduced or evacuated from one end of the cylinder, the diaphragm is displaced by an equal volume. The flow rate (using an external timer) or volume sampled is read off from a graduated scale.

Construction

The tube and diaphragm of the measuring element are constructed from borosilicate glass with plastic sealing caps. A steel channel with aluminium connector blocks secures the glass tube. The top of the instrument is protected by a transparent dust cover.

Applications

The DRY-FLO calibrator can be used for the calibration of either:

gas flow-rate (using an external timer)
sample volumes up to a maximum volume of 100 ml

Typical applications include calibration of:

low flow air sampling pumps
hand pumps for indicator tubes
(e.g. Draeger, Gastec)

WARNING:

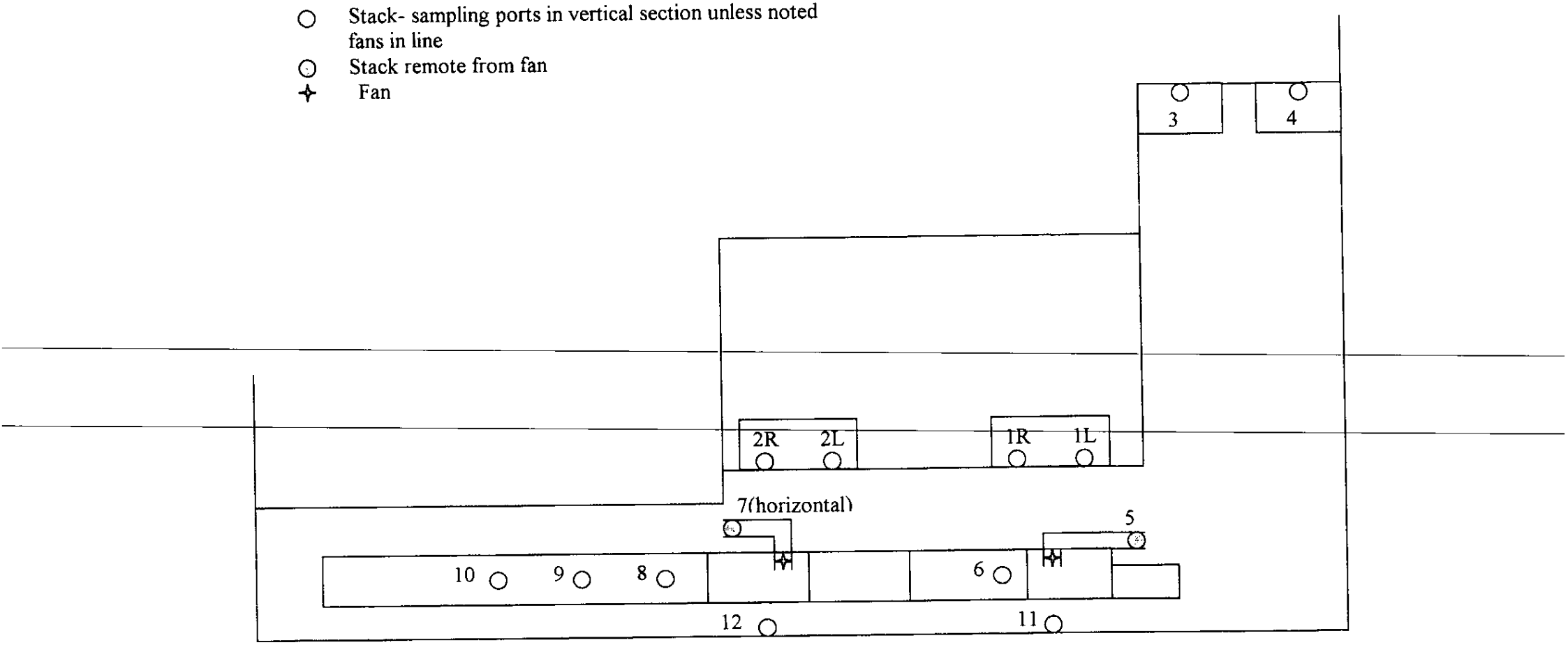
THE CALIBRATOR IS NOT COMPATIBLE WITH LIQUIDS

Appendix 3- Location and Identification of Sampling Points

○ Stack- sampling ports in vertical section unless noted fans in line

⊙ Stack remote from fan

✛ Fan



Schematic of location and identification of sampling points

Appendix 4- Results

Particulate Matter Stack Monitoring

Stack Identification/Position	**Left stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 1**	Process operation	**mixed materials**

Sample Point	Air Velocity	Isokinetic flow rate	Filter Number	Particulate Weight	Total Time	Total Volume	Particulate Concentration	Comments
	m/s	l/min		milligrams	minutes	litres	mg/m3	
perpendicular port, 0.15D	16.7	12.6	62	1.0	116	1461.6	0.7	
perpendicular port, 0.85D	8.0	6.1	435	0.6	113	689.3	0.9	

Particulate Matter Stack Monitoring

Stack Identification/Position	**Right stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 1**	Process operation	**drying**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
								used as drying area
								no particulate matter generated

Particulate Matter Stack Monitoring

Stack Identification/Position	**Left stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 2**	Process operation	**mixed materials**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
perpendicular port, 0.15D	9.0	6.8	173	0.8	94	638.3	1.3	
perpendicular port, 0.85D	7.2	12.3	382	1.7	110	1353.0	1.3	

Stack Identification/Position	**Right stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 2**	Process operation	**mixed materials**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
perpendicular port, 0.15D	2.2	3.8	387	0.4	90	342.0	1.2	
perpendicular port, 0.85D	6.0	10.8	481	1.7	90	972.0	1.7	

Particulate Matter Stack Monitoring

Stack Identification/Position	**Stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 3**	Process operation	**mixed materials**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
perpendicular port, 0.15D	2.0	3.4	340	0.0	120	408.0	0.0	low usage spray booth
perpendicular port, 0.85D	5.0	8.5	84	1.6	116	986.0	1.6	

Particulate Matter Stack Monitoring

Stack Identification/Position	**Stack**	Stack dimensions	**700mm**
Plant identification	**Spraybooth 4**	Process operation	**mixed materials**

Sample Point	Air Velocity	Isokinetic flow rate	Filter Number	Particulate Weight	Total Time	Total Volume	Particulate Concentration	Comments
	m/s	l/min		milligrams	minutes	litres	mg/m3	
parallel port, 0.85D	15.1	11.4	325	2.2	118	1345.2	1.6	low usage spray booth
perpendicular port, 0.85D	2.0	3.4	177	2.0	125	425.0	4.7	

Particulate Matter Stack Monitoring

Stack Identification/Position	**Stack**	Stack dimensions	**650mm**
Plant identification	**Spray cab 1**	Process operation	**patina**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
right port, 0.15D	9.0	6.8	187	2.8	30	204.0	13.7	
left port, 0.85D	8.6	14.5	208	14.8	30	435.0	34.0	water filtration system inoperative

Particulate Matter Stack Monitoring

Stack Identification/Position	**Stack**	Stack dimensions	**550mm**
Plant identification	**Spray cab 2**	Process operation	**lacquer**

Sample Point	Air Velocity m/s	Isokinetic flow rate l/min	Filter Number	Particulate Weight milligrams	Total Time minutes	Total Volume litres	Particulate Concentration mg/m3	Comments
left port, 0.15D	19.7	14.8	434	2.2	109	1613.2	1.4	
left port, 0.85D	16.4	12.4	421	2.3	135	1674.0	1.4	

Measurement of VOC concentrations

sample	stack identification	total C microgram	pump rate ml/min	pump time min	air volume litre	emission mg/m3	Comments
1L	1L	62	200	32	6.40	9.7	
1R	1R	41	200	30	6.00	6.8	
2L	2L	590	200	30	6.00	98.3	
2R	2R	80	200	30	6.00	13.3	
3	3	110	150	47	7.05	15.6	
4	4	410	150	32	4.80	85.4	
cab 1	5	6600	150	30	4.50	1466.7	patina
C1 OV	6	62	150	20	3.00	20.7	
cab 2	7	2100	150	38	5.70	368.4	

Measurement of VOC concentrations

sample	stack identification	total C microgram	pump rate ml/min	pump time min	air volume litre	emission mg/m3	Comments
C2 f/o	8	590	150	25	3.75	157.3	
OV 1	9	49	150	25	3.75	13.1	
OV 2	10	68	150	32	4.80	14.2	
C1 KIT	11	170	150	30	4.50	37.8	
C2 KIT	12	370	150	30	4.50	82.2	

Spraybooths and drying rooms- air flow in exhaust stacks

duct identification	diameter mm	air velocity m/s										average velocity m/s	measured air volume m3/hr	static pressure pascals
		1	2	3	4	5	6	7	8	9	10			
spraybooth 1 left stack, perpendicular port	700	16.9	16.4	13	10.8	9.5	9.9	8.5	8.5	10.8	12.8	11.71	16,223	70
spraybooth 1 left stack, parallel port	700	13.8	14.7	14	12.8	9.5	13.8	12.2	12.8	10.2	7.2	12.1	16,763	
spraybooth 1 right stack, perpendicular port	700	9.8	10	10.3	8.7	8.6	11	10.9	12.2	10.9	10.6	10.3	14,270	100
spraybooth 1 right stack, parallel port	700	14.3	16.3	17	17.1	12.9	12.3	13	13.8	13.4	9.5	13.96	19,340	
spraybooth 2 left stack, perpendicular port	700	9.6	8.2	6.9	8.9	8.2	12	12.2	11.8	9.9	6.9	9.46	13,106	140
spraybooth 2 left stack, parallel port	700	9.6	10.7	12.6	13.3	12.7	8.7	11.1	10.4	8.1	6.4	10.36	14,353	
spraybooth 2 right stack, perpendicular port	700	0	4.7	5.1	6.1	7.3	8.4	9.1	9.3	8.6	4.8	6.34	8,783	55
spraybooth 2 right stack, parallel port	700	12.2	13.8	13.7	13.7	11.2	9.8	11.5	10.8	8.5	4.5	10.97	15,198	
spraybooth 3 perpendicular port	700	0	5.2	6.6	7.8	10.7	11	9.8	10.1	6.8	3.3	7.13	9,878	120
spraybooth 3 parallel port	700	14.9	16	17.9	18.3	15.6	13.5	16.8	17.4	16.6	14.3	16.13	22,347	

Spraybooths and drying rooms- air flow in exhaust stacks

duct identification	diameter mm	air velocity m/s										average velocity m/s	measured air volume m3/hr	static pressure pascals
		1	2	3	4	5	6	7	8	9	10			
spraybooth 4 perpendicular port	700	3.9	6.1	7.1	9.7	11.4	8.3	7.8	5.7	2.3	1.8	6.41	8,880	90
spraybooth 4 parallel port	700	17.1	18.1	17.9	15.8	12.4	12.9	15.8	16.4	15.9	14.7	15.7	21,751	
spray cab 1 right port	650	8.6	9.8	9.9	10.2	11.1	12	12.2	11.9	11.7	11.1	10.85	12,961	65
spray cab 1 left port	650	6.5	8.8	9.2	9.6	10.3	10.9	11.3	11.6	10.8	8.5	9.75	11,647	
cab 1 oven	250	14	16.6	19	19	18.9	19.4	19.3	18.9	18.9	18.9	18.29	3,232	250
spray cab 2 right port	550	20	21.4	20.4	19.5	19.3	17.9	16.9	16.3	15.3	14.9	18.19	15,557	275
spray cab 2 left port	550	19.8	19.6	19.5	19.3	19.7	19.5	19.3	18.9	18.3	16.5	19.04	16,284	
spray cab 2 flash-off right port	350	9.4	10	10.4	10.5	10.5	10.3	11.3	10.7	9.9	8.7	10.17	3,522	60
spray cab 2 flash-off left port	350	8.4	8.6	9.3	9.7	9.8	11	10.8	10.2	9.1	8.2	9.51	3,294	
spray cab 2 oven 1 right port	250	9.7	10.6	10.4	10.6	13.1	13.2	12.2	11.3	11	10.5	11.26	1,990	80

Spraybooths and drying rooms- air flow in exhaust stacks

duct identification	diameter mm	air velocity m/s										average velocity m/s	measured air volume m3/hr	static pressure pascals
		1	2	3	4	5	6	7	8	9	10			
spray cab 2 oven 1 left port	250	11.7	10.7	11.2	10.7	10.4	10.5	11.2	13.6	12.3	12.0	11.4	2,020	
spray cab 2 oven 2 right port	250	13.2	13.6	13.7	13.7	14.5	14.9	15.2	16.1	15.1	12.5	14.3	2,518	110.0
spray cab 2 oven 2 left port	250	15.1	16.0	16.5	16.2	15.3	14.8	14.6	14.4	13.6	10.9	14.7	2,605	
cab 1 kitchen	250	6.3	8.5	8.9	8.4	8.7	8.0	7.2	6.9	5.5	4.8	7.3	1,294	125.0
cab 2 kitchen	250	5.7	7.2	7.7	7.6	7.8	7.3	7.0	6.9	5.7	5.0	6.8	1,200	110.0