




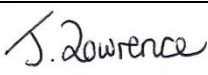
EAGLE SAFETY & ENVIRONMENT LTD

Specialists in Health Safety Environment and Noise

EMISSION TESTING REPORT

Completed For:

**Sealed Air Limited
1-3 Cromwell Road,
St Neots,
Cambridgeshire
PE19 1QN**

Report Number :	JL/0911246	
Date of Survey :	30 th September 2024	
Survey Completed By :	Jon Lowrence (Principal Consultant)	
	Author:	Authorised :
Name :	Jon Lowrence (Principal Consultant)	Jess Lowrence AFOH
Job Title :	Director	Consultant
Date :	18 th October 2024	16 th October 2024
Signature :		

Executive Summary

Eagle Safety & Environment Limited, were commissioned to undertake an emissions monitoring project for the welding fume extraction stack, Ink roller cleaning extraction flue ICT lines and dust filtration system for the 'bags on a roll' process in operation at Sealed Air Limited, St. Neots.

This report details the findings of the emissions testing of the ICT Lines, welding fume extraction, ink roller cleaning extraction & bags on a roll line and possible effects on local residents. Based on our findings there should not be any noticeable odours or particulate emissions beyond the boundary fence.

Typical Emission Limits.

Particulate Matter 10 mg/m³

Ozone – As low as practicable providing emissions do not cause a local odour nuisance.

Volatile Organic Compounds – 50 mg/m³

Welding fume - As low as practicable providing emissions do not cause a local odour nuisance.

Introduction:

Ozone Emissions

Eagle Safety & Environment Limited were requested to undertake emissions testing for three process flues ICT Lines 2, 4 and 6.

The ICT processes are known to produce ozone, and this substance is odorous and readily detected by the human nose.

The ICT lines generally have 3 lines operating at any one time, the emissions pass through respective flues, which then pass through the roof to the external atmosphere, the flues are understood to be 3 metres above roof ridge height.

However, each flue is near to each other at the final outlet, so the result for the ICT Line 2 outlet has been multiplied by a factor of 3 to provide a 'likely' emission level of ozone at roof height when 2 or 3 processes are operating (i.e. Representing a normal day's operations).

Emission testing and subsequent evaluation of the results was required to assist the business in determining the possible risk of odour complaints from local residents.

Particulate Emissions

The bags on a roll process emits via a dust filtration unit, to the rear of the plant (adjacent to the railway line).

As the dusts generated are filtered it is not expected that these would lead to a nuisance dust complaint being received by the business, unless the bag filter burst, and a large uncontrolled emission occurred.

Volatile Organic Compounds (VOC's)

VOC emissions were generated from the ink roller cleaning process, these vapours were extracted via a LEV system, via a high level flue above the roof ridge of the building and dispersed to atmosphere.

There are no process emission limits for emissions from Sealed Air St Neots process, the usual emission limit applied for authorised processes would be 50 mg/m³.

Welding Fume Emissions

Welding fume is produced when the business occasionally weld mild steel / stainless steel parts, the process does not operate for long durations (Usually minutes).

The welding fume has a distinctive odour and is easily detected beyond the boundary fence, if emissions are not adequately filtered or dispersed.

The emissions are not currently filtered and therefore there is a small risk a complaint may be received. The business could use a portable welding fume extraction unit which filters internally, rather than emitting the fume externally.

For example – Kemper Smartmaster extraction unit



Olfactory - Threshold of Odour

Ozone - threshold of Odour

Typically, 0.003 ppm to 0.010 ppm

The threshold of odour perception by the average person in clean air. Readily detectable by most normal persons. These concentrations can be measured with fair accuracy.

Welding fume – Threshold of odour, there is no data available, as welding fume is made up from several different toxic metals which are all easily detectable by the human nose.

Volatile Organic Compounds – Threshold of odour, there is no data available, as VOC's are made up from several different solvents, all with differing vapour pressures and most of these are all easily detectable by the human nose.

Sealed Air St. Neots - Stack emission Monitoring

Location/ Process Involved	Substance Sampling for	Pump Flow Rate l / Min	Sampled Volume (Litres)	Sample ID	Sampling Pump Used & S/N	Sampling Period (Minutes)	Laboratory Results (µg)	RESULT (mg/m3)	FLOWRATES
Line 2 – ECLU exhaust	Ozone	2.0	120 litres 0.120 m3	BL2	Gilair	60	Ozone – 490	Ozone = 4.3	25.7 m/s
Line 4 – ECLU exhaust	Ozone	2.0	120 litres 0.120 m3	BL4	Gilair	60	Ozone - 1200	Ozone = 10.5	24.9 m/s
Line 6 – ECLU exhaust	Ozone	1.0	120 litres 0.120 m3	BL6	Gilair	60	Ozone - 900	Ozone = 7.9	24.3 m/s
Welding Bay exhaust	Welding fume	2.0	60 litres 0.060 m3	G943	Gilair	30	Total Particulate 0.29 mg Cobalt <0.1 Chromium <0.5 Copper <0.5 Manganese <0.2 Nickel <1.0	Total Particulate 5.1 Cobalt <0.02 Chromium <0.02 Copper <0.02 Manganese <0.02 Nickel <0.02	12.2 m/s

Location/ Process Involved	Substance Sampling for	Pump Flow Rate l / Min	Sampled Volume (Litres)	Sample ID	Sampling Pump Used & S/N	Sampling Period (Minutes)	Laboratory Results (µg)	RESULT (mg/m ³)	FLOWRATES
Ink Mixing / cleaning room exhaust	Volatile Organic compounds	110 mls/ min	3.74 litres 0.00374 m ³	IR1	Gilair	34	Total VOC's (as ethyl acetate) - 62	Total VOCs = 17.4	7.5 m/s

Results – Particulate Matter

Velocity/Temperature Measurement Traverse

Company :	Sealed Air Limited – St Neots
Plant ID :	Bags on a roll process
Engineer/s :	Jon Lowrence
Duct Diameter :	0.4 X 0.5m
Date :	30th September 2024
Time :	45 minutes

Axis (A)				
Position	Depth	Velocity (m/s)	T (°C)	Swirl Angle (°)
1	0.025	Centre of the Flue 8.9 m/s	21.0	~30°
2	0.075			
3	0.125			
4	0.175			
5	0.225			
6	0.275			
7	0.325			
8	0.375			
9	0.425			
10	0.475			

Ratio – Highest: Lowest velocity (m/s) = N/A

Axis (B)				
Position	Depth	Velocity (m/s)	T (°C)	Swirl Angle (°)
1	NO	ACCESS		
2				
3				
4				
5				
6				
7				
8				
9				
10				

Ratio – Highest: Lowest velocity (m/s) = N/A

Isokinetic Test Results

Company :	Sealed Air Limited – St Neots
Plant ID :	Bags on a roll process
Engineer/s :	Jon Lowrence
Duct Diameter :	0.4 X 0.5m
Date :	30th September 2024
Time :	45 minutes

Axis: A Only

Air Pressure: 101.0 KPa

Cross Sectional duct area: 0.2 m²

Extraction time of run: 45 minutes (centre of flue)

Filter ID: G946

Weight Gain of Filter: 0.64mg

Actual volume extracted dry: 0.405 m³ (405 litres)

Position	Depth (m)	Pressure (pa / mbar)	Velocity (m/s)	T (°C)	Flow (l/ml)
A1	0.075		8.9	21.0	9.0
A2	0.125				
A3	0.375				
A4	0.425				

Position	Depth (m)	Pressure (pa / mbar)	Velocity (m/s)	T (°C)	Flow (l/ml)
B1	NO ACCESS				
B2					
B4					
B5					

Note: 8mm nozzle

Summary

The results for emissions of Particulate Matter are as follows:

<u>Flue Identification</u>	<u>Particulate Matter Emission Level</u>	<u>Emission Limit (mg/m3)</u>
Bags on a roll flue	1.7 mg/m3	10 mg/m3

The results for emissions of Ozone are as follows:

<u>Flue Identification</u>	<u>Ozone Emission Level</u>	<u>Emission Limit (mg/m3)</u>
Line 2	4.3 mg/m3	None Prescribed
Line 4	10.5 mg/m3	
Line 6	7.9 mg/m3	

The results for emissions of Volatile Organic Compounds are as follows;

<u>Flue Identification</u>	<u>VOC Emission Level</u>	<u>Emission Limit (mg/m3)</u>
Ink Mixing / roller cleaning flue	17.4 mg/m3	50 mg/m3

The results for emissions of Particulate Matter & Toxic metals are as follows:

<u>Flue Identification</u>	<u>Particulate Matter Emission Level</u>	<u>Emission Limit (mg/m3)</u>
Welding Fume Flue	5.1 mg/m3	10 mg/m3
	Welding fumes (Chromium, Cobalt, Copper, Manganese, Nickel) < 0.02 mg/m3	None Prescribed

Comments;

- 1). All results corrected to standard temperature (273 K) & standard pressure (101.3KPa).
- 2). Only 1 sample port / plane was available for each flue.

Emissions to atmosphere Discussion

ICT Lines

Ozone emissions from three roof sources from on average 3 x ICT Lines operating would give a local level of ozone above the factory roof at an estimated level of 7.5 mg/m³ (previous year 2023 average = 8.8 mg/m³)

The threshold of odour is between 0.003 - 0.01ppm.

However ozone emissions emitted to external environment decay as the molecule is relatively active, the half-life of ozone in external air at 20°C is approximately 3 days (72 hours). This is the time taken to decay to half the concentration in the atmosphere, so after 3 days the emission is likely to be 2.5 mg/m³. However, as the process is continuous, this emission level is likely to be present at all times.

The dispersion rate into the atmosphere also depends on the exit velocity, typically an exit velocity of 15m/s with a flue height of 3 metres above roof ridge and in an area of clear airflow will be sufficient to prevent plume grounding.

The measured exit velocity was 24 - 25m/s for the ICT Line/s.

It is therefore reasonable to assume the ozone emissions will predominantly be punched through the boundary atmospheric layer, allowing dispersion to occur.

However, this is theoretical and can only be proven by the use of a dedicated dispersion model.

Bags on a roll process

The bags on a roll process, mean emissions over a 60 minute while the process was running was measured at 1.7 mg/m³, the dusts were assumed to be starch dusts.

The particulate emission was measured at far below the typical emission limit for other processes and this would be considered to be trivial currently, unless emission limits are reduced further in future.

It is understood that Sealed Air Limited, does not have a requirement to operate under a permit with respect to the Environment Act 2021.

Ink Mixing / Roller cleaning room

The extraction system from the ink area is currently is emitted above the roof ridge via a tall, galvanised steel flue, providing there is a sufficient exit velocity from the top of the flue, emissions would be dispersed into the atmosphere.

However the final efflux velocity would need to be measured to verify this assumption.

Welding Fume Extraction System

Welding is carried out periodically and welding fume has a distinctive smell, the fumes are emitted unabated to the front of the building, there is a real risk that local residents could complain about the odour during welding.

Abatement Systems

Currently the ICT Line flue emissions of Ozone do not have any abatement systems installed to reduce / remove emissions of ozone from entering external atmosphere.

Abatement options for the ICT flues, are as follows;

Ozone, is usually abated by the use of a charcoal filter, however due to the volume of air and ozone concentration the flues from the ICT lines may need to be combined and ducted through an activated charcoal bed, before emitting to external atmosphere.

Charcoal beds are expensive to replace regularly and can be high maintenance.

The 'Bags on a roll' process dust is filtered via the use of a Torit dust filtration system, which is subject to LEV, annual thorough examination & testing. It is understood the unit is serviced regularly.

The welding fume extraction system, could be replaced using an internal localised extraction & filtration system, e.g. For example – Kemper Smartmaster extraction unit

