



**APPLICATION FOR VARIATION OF
ENVIRONMENTAL PERMIT TO OPERATE
ADHESIVE COATING AND ASSOCIATED DI-
ISOCYANATE ACTIVITIES PROCESS UNDER
THE ENVIRONMENTAL PERMITTING
(ENGLAND AND WALES) REGULATIONS
2016 (AS AMENDED)**

**ADDITIONAL PERMIT APPLICATION
DOCUMENT**



Adler Pelzer Group

**CAB AUTOMOTIVE LIMITED,
(ADLER PELZER GROUP),
VAUGHAN TRADING ESTATE,
SEDGLRY ROAD, TIPTON,
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ACRONYMS / TERMS USED IN THIS REPORT

ADPZ	Adler Pelzer Group
APAD	Additional Permit Application Document
CAB	CAB Automotive Limited
DAA	Directly Associated Activity
ECL	Environmental Compliance Limited
EP Regulations	Environmental Permitting (England and Wales) Regulations 2016
g/h	Grammes per Hour
Ha	Hectares
IED	Industrial Emissions Directive
IPPC	Integrated Pollution Prevention & Control
ISO	Isocyanate substances
LAPC	Local Authority Pollution Control
LEV	Local Exhaust Ventilation
mg/Nm ³	Milligrams per Normalised Cubic Metre
OS	Ordnance Survey
PU	Polyurethane
SB	Spray Booth
SDS	Safety Data Sheet
The Installation	CAB Automotive Site
TVOC	Total Volatile Organic Compounds
VOC	Volatile Organic Compounds

1. INTRODUCTION

1.1. Overview

- 1.1.1. This Additional Permit Application Document (“APAD”) document has been prepared on behalf of CAB Automotive Limited (“CAB”), part of the Adler Pelzer Group (“ADPZ”), by Environmental Compliance Limited (“ECL”). The document has been prepared following a site visit undertaken by the regulator as part of the permit application determination process. The Permit Variation Application relates to the adhesive coating and di-isocyanate activities that will be performed at the CAB Automotive site located at Vaughan Trading Estate, Sedgley Road East, Tipton, West Midlands, hereafter referred to as “the Installation”.
- 1.1.2. The Supplementary Information Document submitted with the Permit Variation Application identified the changes to adhesive coating and di-isocyanate activities that have taken place over the last few years and consolidated the current activities, emissions from them, locations on site and substances being used.
- 1.1.3. However, due to the variety and range of activities undertaken, the regulator has requested more detailed description for each activity. This would help to identify what actual activities are being undertaken and assist anyone else that needed to be aware of how the activities are undertaken.
- 1.1.4. This document, therefore, deals with each specific activity currently undertaken and witnessed by the regulator, and that falls within the scope of the permit requirements.

1.2. Installation Location

- 1.2.1. The Installation is located on Vaughan Trading Estate Road, Sedgley Road East, Tipton, West Midlands, DY4 7UJ. The Installation occupies an area of approximately 1.30 Hectares ("Ha") (13,000m²), and is centred on Ordnance Survey ("OS") National Grid Reference SO9662 9149. The wider CAB Automotive site occupies an area of approximately 3.00Ha (30,000m²).
- 1.2.2. The exact location of the Installation is indicated on the Installation Location Map provided in Appendix I of this document. The Installation boundary is indicated on the Installation Boundary Map, which is provided in Appendix II of this document.
- 1.2.3. The closest residential properties are approximately within 100m to the northeast and northwest of the Installation along Dudley Port A461 road and also Peacock Close which is to the northeast. To the southeast and south there are further industrial units, with the wider area being a mixture of commercial and residential, and transport networks.

2. LISTED ACTIVITIES

2.1. Installation Activities

- 2.1.1. As noted in Section 1.1.4., the activities undertaken at the Installation are covered by the Environmental Permitting Regulations (“EP Regulations”), namely;
- Schedule 1, Part 2, Section 6.4, Part B, (a) (iv); and also
 - Schedule 14, Solvent emission activities which cross references to the Industrial Emissions Directive (“IED”) and specific articles within it.
- 2.1.2. Part 2 of Annex VII in the IED lists Adhesive Coating in row 16 of the table with the same solvent consumption threshold as Section 6.4 of the EP Regulations, which is greater than 5 tonnes in any 12-month period.

2.2. Existing Authorisations

- 2.2.1. Section A 1.3 of the Application Form requests details of any existing Local Authority Pollution Control (“LAPC”) or Integrated Pollution Prevention & Control (“IPPC”) authorisations for the installation, or any waste management licenses or water discharge consents. CAB currently have two existing Part B permits which are PPC94089 and PPC92935-V1.

3. ACTIVITY DESCRIPTIONS

3.1. Adhesive Coating and Di-Isocyanate Processes

- 3.1.1. Each activity is dealt with separately and provides a description of the activity, raw materials used, substances used, and any emissions released and where they are released.
- 3.1.2. A process location and associated substance use diagram is provided in Appendix III.

3.2. Polyurethane (PU) Line Carpet (Bentley Carpets)

- 3.2.1. Pre-manufactured carpets are bought in, supplied on rolls, and used within the activity. The carpets are 'backed' with a heavy lay material that is also pre-manufactured and bought in. Both the carpet and heavy lay are cut to dimension, sufficient to fit into the 'blank' sizes used to form the carpet "mould". The 'blank' are manufactured under contract from other suppliers and constructed to the specific design shape and dimensions required for the vehicle in which the carpet moulds will be used, once finished.
- 3.2.2. The 'blank' is fitted to the Gantry Press ready for the cut carpet and heavy lay material to be inserted. Operators insert the carpet/lay materials into the 'blank' and then operate the Gantry Press which compresses the materials together to form the basic 'mould'. There are no substances used in the Gantry Press process, or substances released from it. There is heat released as the Press is opened to remove the mould.
- 3.2.3. The moulded carpet is removed from the Gantry Press and placed to a loading trolley ready to be transferred across to the PU Foaming Tool. There is a total of 6 PU Foaming Tools, but not all are operated at the same time. Tools 1 and 2 are used most frequently, with Tools 4,5, and 6 much less so. Tool 3 is not used.
- 3.2.4. The Foaming Tool is prepared for use by a spray application of a water-based mould release agent (Acmos 37-9830) detailed in Appendix IV. This release agent has small concentrations (< 0.3%) of substances assigned risk statements H341 (R68) and H360F (R61), therefore, the operators wear respiratory masks when applying the release agent. The Foaming Tool equipment is not currently served by local exhaust ventilation ("LEV"), however, capital expenditure request has been submitted, and agreed, for extraction to be installed. The specific substance is listed as 'stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))'.
- 3.2.5. Following release agent application, the carpet mould is placed into the PU foaming tool where foam is automatically dispensed onto the rear of the moulded carpet. This is achieved by two substances, Specflex NE 138 Isocyanate and Specflex NS 832 Polyol, being fed into the PU 'closed pour' dispensing head in separate sealed pipework until they reach the foam mixing nozzle. At this point the substances are mixed and react to create the foam backing which adheres to the rear surface of the carpet mould. The reaction and curing are extremely fast with very little emission release from the activity. There may be some limited di-isocyanate release from the limited air space between the cured foam and mixing nozzle when the Foaming Tool is opened to remove the completed mould. This is released internally with no LEV in place at present but with ongoing discussions to implement enclosure and LEV extraction. This process is one of the directly associated activities ("DAA") detailed within the permit.

- 3.2.6. The cured foam back carpets are transferred to the waterjet cutting machines where they are cut to the required specification. Particulate matter created from the high pressure, high precision waterjet cutting machines is captured within the water jets and filtered out. The waterjet cutting booths are served by LEV with extracted air released to atmosphere via wall vents through the side of the building.
- 3.2.7. The use of the Acmos 37-9830 and its associated hazard statement substances is directly relevant to Condition 4.3 of the permit (PPC94089) that deals with the use of such substances and associated risk phrases / hazard statements. The condition provides two thresholds for the sum of mass flows of relevant substances which are 100 g/h and 10 g/h, with associated emission limits of 20mg/m³ and 2mg/m³, respectively.
- 3.2.8. As identified above, this process is not currently served by LEV or subject to emission monitoring. However, the quantity of Acmos 37-9830 for 2023 and 2024 has been identified in the Solvent Emission Calculation Workbook, (2023 – 24) provided separately to this document, which has been used in combination with details from the Safety Data Sheet ("SDS") in Appendix IV.
- 3.2.9. There were 9,254kg of Acmos 37-9830 used in 2023 and 6,292kg used in 2024. Section 3.2.4 above details the concentration of the specific substance of concern is listed at <0.3%. This provides annual use of 27.762kg (27,762 grammes) and 18.876kg (18,876 grammes).
- 3.2.10. Using a conservative assumption that only two foaming tools are ever used at a time and used for only 6 hours a day for 5 days a week, for 48 weeks of the year (5 foaming tools are available for use and working shifts are at least 8 hours long), then the Acmos 37-9830 substance will have been used over 2880 hours in a year.
- 3.2.11. Dividing the annual grammages in section 3.2.9. above by the 2880 hours provides basic sum of mass flows for the substance of concern of 9.64g/h for 2023 and 6.55g/h for 2024. Both are below the tighter limit of 10g/h, albeit the 2023 figure is only just below. However, this is based on a conservative assumption.

3.3. Polyurethane (PU) Foam (JLR Defender Seats)

- 3.3.1. This process is not routinely used but remains for aftersales contracts in respect of JLR Defender seat production. The JLR Defender seats begin production in the Aftersales foaming area where the designated moulding tool is applied with several coats of a wax type of substance (Acmos P180-52) to prevent the foam from sticking to the mould.
- 3.3.2. The mould is then connected to the foaming production tanks where it is injected with a mixture of isocyanate (BASF – ISO 145 35) and polyol (BASF Elastoflex W 5516-131) which forms the interior cushioning of the Defender seats. The substances are delivered by an 'open pour' mould process where mixing is achieved within the mould, and at which point the reactions begin and the foam created. Once the foam has set, the seat cushioning is ready to be covered.
- 3.3.3. There is currently no LEV serving this area; however, production runs are short and irregular, resulting in 9 – 12 months between each order.
- 3.3.4. Pre-manufactured fabrics are bought in for the work and supplied to the necessary specifications. The required fabric is chosen, cut to size, and taken over to spray both ("SB") 7

where spray adhesive (Alpha Adhesive S1922) is applied to the fabric and the fabric then attached to the seat. SB7 is served by LEV and spray booth filters that remove overspray particulate matter. Section 4.0 below provides details on emission monitoring and results obtained.

3.4. Rhodes Press (After Sales)

- 3.4.1. The Rhodes Press is used to produce the Landrover Defender headliner. This involves the use of pre-cut non-phenolic felt that has been manufactured by another supplier and brought in as standard sized 'blanks'. Fabric, that has also been manufactured by others, is supplied on rolls. The fabric rolls are transferred to the Gerber cutting machine which cuts the fabric to the required shapes and dimensions.
- 3.4.2. The Rhodes Press is prepared by having a moulding fixture locked into the press. The press is then heated to the desired temperature and the fixture is sprayed with release agent (Acmos 37-9830) which has small concentrations (< 0.3%) of substances assigned risk statements H341 (R68) and H360F (R61).
- 3.4.3. The 'blanks' are placed into position over the mould. Full 'blanks' are used to form the base of the part and additional felt is cut from another 'blank' to build the shape of the headliner. Fabric is placed over the top forming the interior side of the part. Once all materials are in place the press is closed, allowing the parts to be moulded for approximately three minutes.
- 3.4.4. Once the three-minute cycle is complete the headliner is removed and left to cool on another cast. When the headliner has cooled down, operatives manually trim the edges, wrap in a protective fabric and pack into a cardboard pallet box.
- 3.4.5. The Rhodes Press is served by LEV that emit through two stacks. Improved extraction is being assessed through the extension of the press curtains. Heat and residues of the release agent will be emitted through stacks PH8FS and PH8RS.

3.5. Bentley Fabbing

- 3.5.1. Within this area various processes are undertaken to manufacture interior linings and components for Bentley vehicles. Pre moulded plastic parts bought in within stillages and transferred to the workstations as and when required. The plastics used in the manufacture of these parts are PC ABS and include:
 - Door casings;
 - Infill panels;
 - Trumpet panels;
 - Arm rests; and
 - Rear quarter panels.
- 3.5.2. A further part, known as "linkage door substrate", which is also plastic, is bought in as a premanufactured component with additional brass components already attached.

3.5.3. Premanufactured bought in foam materials and Abstang are precut on the Gerber machine and then transferred to the Fabbing area where they are attached to the plastic parts. The substances used in this activity are:

- Thermonex 063-05A (WB Solvent) [SB2];
- Thermonex 006B Blue hardener (WB Solvent) [SB2];
- Dyne Testing Fluid; and
- White Spirit.

3.5.4. The pre-moulded parts are brought to a preparation station and wiped down with white spirit so that surfaces are clean, thus enabling the adhesive to stick. The parts are transferred to Spray Booth 2 where they are placed on a frame and sprayed with the Thermonex adhesive mixture. The parts are then laid on a wire trolley which is wheeled into an oven, set to 50-60°C. They are left to cure for around 10 minutes with an alarm notifying the operatives that they are ready to be taken out.

3.5.5. The trolley is then transferred to the “fabbing” stations where operatives reactivate the adhesive using a small oven or heat gun (depending on size of the part). Dyne testing fluid is used to check the tackiness of the adhesive. The foam or Abstang is applied to the plastic part using a roller and then manually trimmed using a scalpel. Completed parts are moved over to the quality control racks where they are inspected before being stored in the correct picking location.

3.5.6. These are existing activities served by LEV for SB2 that emit through a stack that have not been subject to any changes. The emissions will relate to VOC and particulates. The stack emissions are subject to extractive monitoring.

3.6. McLaren Fabbing

3.6.1. This area is located directly adjacent to the Bentley Fabbing process area and performs similar activities – manufacturing interior components for McLaren vehicles.

3.6.2. Pre-moulded plastic parts are bought in within stillages and transferred to the workstations as and when required. The plastics used in the manufacture of these parts are PC ABS. Materials such as Leather, Alcatar and Vinyl are supplied by others but are pre-cut at the Gerber machine before being transferred to the fabbing area. The substance used in this area is:

- Alpha Adhesive S1922.

3.6.3. Pre moulded parts are brought to the fabbing area in boxes. The parts are transferred to Spray Booth 7 where they are placed on a frame and sprayed with the Alpha Adhesive S1922. The parts are then laid on a wire trolley which is wheeled into an oven, set to 50-60°C. They are left to cure for around 10 minutes with an alarm notifying the operatives that they are ready to be taken out.

3.6.4. The trolley is then transferred to the “fabbing” stations where operatives reactivate the adhesive using a small oven or heat gun (depending on size of the part). The foam or Abstang is applied to the plastic part using a roller and then manually trimmed using a scalpel. Completed parts are moved over to the quality control racks where they are inspected before being stored in the correct picking location.

- 3.6.5. These are existing activities with SB7 served by LEV and spray booth filters to capture overspray particulate matter. The LEV is vented through the roof to atmosphere. The emissions will relate to VOC and particulates. The stack emissions are subject to extractive monitoring.

3.7. Aston Martin Wheel Arch Construction

- 3.7.1. Fabric is bought in for the purpose of constructing wheel arches for Aston Martin vehicles. The fabric front wheel arch liners that have been processed through the Waterjet cutting booths are passed to the wheel arch construction area. The fabric liner is stapled together to form the desired shape and then rivets are used to attach pre-made grill components to one side of the wheel arch.
- 3.7.2. Pre-manufactured insulation foam, that has been bought in, is then attached to the other side of the wheel arch by using hotmelt glue (Jowat 628-90). The arch is then checked and packed into stillages.
- 3.7.3. The Waterjet cutting booths used for this activity are served by LEV that emits through wall vents exiting the High Bay area.

3.8. Aston Martin Wheel Arch & Engine Covers (Moulding)

- 3.8.1. These activities are undertaken within the High Bay, Press 1 and SB1 locations. Pre-manufactured substrates are bought in to make the wheel arches and engine covers. They are heated in an oven in order to make the material flexible. The heated substrates are loaded into Press 1 and foil coating, which is also pre-manufactured and bought in, is added to the relevant parts of the substrate which will act as heat protection once the parts are assembled. When the press has completed its cycle, the parts are removed and stacked ready for inspection.
- 3.8.2. Following inspection, any components identified with quality issues, such as tears in the foil, are set aside for repair. Repairable components are taken to SB1 where an aluminium paint (Brillux Aluminium Bronze) is used to repair the tear by application with a brush.
- 3.8.3. Press 1 is served by LEV that emits through wall vents referenced OV1S and OV2S and releases heat. SB1 is served by LEV that emits to atmosphere via a stack through the roof, however, the brush application of the aluminium paint will not release particulate matter, but there may be minimal odour release.

3.9. Bentley Interior Panels (Boot Kit)

- 3.9.1. This area produces a range of components for Bentley vehicles, as listed below, which are produced using pre-moulded plastic parts bought in within stillages and transferred to workstations as and when required. The parts are subject to different processes, as detailed in sections 3.9.3. to 3.9.5., below.

- Battery covers;
- Closing panels;

- Access panels; and
- Boot liners.

3.9.2. The substances used within the processes are:

- Jowat 628-90 Hot melt glue;
- Sikamelt 885-1A Hot melt glue, and
- Xtrabond 35.

3.9.3. Spray adhesive application is undertaken by plastic components being placed on a jig which is then wheeled into Spray Booth 7 (located in the Bentley Fabbing area) to be sprayed with Xtrabond 35 adhesive. Once the part has been coated with adhesive it is wheeled out of the spray booth and moved to a work area to the side. A piece of precut carpet is placed in the other side of the jig and clamped together with the plastic forming the base of the finished part. This part is then transferred to the Bentley Bootkit area for either Manual or Robot assembly.

3.9.4. Manual assembly of plastic components or base parts from the spray adhesive application are delivered to a workstation in the Bentley Bootkit area, where an operator uses hotmelt glue to manually attach fabric or plastic components known as “dog housing”. Depending on the part, the glue used is either Sika Melt 885-1A or Jowat 628.

3.9.5. For robotic cell assembly, the plastic components or base parts from the spray adhesive application are transferred to a Robot cell located within the Bentley Bootkit area. They are secured inside a fixture within the robot. Other plastic components known as “dog housing” are placed into a tray attached to the Robot. The Robot is activated and performs a cycle automatically picking up the dog housing, applying glue and placing in the correct position on the base part according to the fixture used. The glue used here is Sika Melt 885-1A.

3.9.6. All completed parts are placed into storage racking in preparation for order picking.

3.10. Carpet Cutting and Preparation (CB3 & CB4)

3.10.1. Pre-manufactured carpet materials are bought in and used to make carpet moulds in moulding machines. The moulded carpets are then placed into a tool and fed into a waterjet cutting booth (CB3 or CB4) where high-pressure water jets are used to trim the carpet mould to precise dimensions. Once the cycle is complete, the operatives check the carpet and use hotmelt glue (Sikamelt 885-1A) to attach pre-manufactured bought in foam parts and plastic components to the carpet.

The waterjet cutting booths are served by LEV with filter sock filtration and the filtered air is returned back into the workplace.

4. EMISSIONS

4.1. Overview

- 4.1.1. The key emissions that can be released from the activities to the environment are:
- particulate (from adhesive coating, as part of volatile organic compounds (“VOC”) released from the process, and as part of the press/cutting processes);
 - VOC (from adhesive coating, cleaning activities, mixing, drying and curing, surface cleaning, storage, handling, waste and spillage);
 - Isocyanate from the DAA of PU foam production; and
 - odour.
- 4.1.2. There may be some fugitive emissions and / or VOC emissions from on-site activities such as spray gun cleaning or component cleaning. The fugitive emission release will have reduced from previously due to process changes and better and more efficient LEV capture and release to atmosphere.
- 4.1.3. Emissions monitoring has been undertaken and is described in more detail in section 4.2. below.

4.2. Emission Limit Values & Emission Monitoring

- 4.2.1. The permit contains specific emission limits for particulates and total volatile organic compounds (“TVOC”) (as carbon), which are:
- Particulates 50mg/m³ (annually)
 - TVOC 20mg/m³ (annually)
 - TVOC 2mg/m³ (annually)
- 4.2.2. It is noted that the permit emission limit of 20mg/m³ for TVOC as carbon applies where the sum of the mass flows of all discharges of the compounds causing the risk phrase labelling is greater or equal to 100g/h.
- 4.2.3. The condition relates to the use of substances assigned the historical risk phrase R40, meaning ‘limited evidence of a carcinogenic effect’. Risk phrases were replaced with hazard statements and IED incorporated more specific references. Article 58 of IED deals with substitution of hazardous substances, and states:
- “Substances or mixtures which, because of their content of volatile organic compounds classified as carcinogens, mutagens, or toxic to reproduction under Regulation (EC) No 1272/2008, are assigned or need to carry the hazard statements H340, H350, H350i, H360D or H360F, shall be replaced, as far as possible by less harmful substances or mixtures within the shortest possible time.”
- 4.2.4. Article 59 of IED, relating to the control of emissions, states at paragraph 59.5:
- “The emissions of either volatile organic compounds which are assigned or need to carry the hazard statements H340, H350, H350i, H360D or H360F or halogenated volatile organic compounds which are assigned or need to carry the hazard statements H341 or H351, shall be controlled under contained conditions as far as technically and economically feasible to

safeguard public health and the environment and shall not exceed the relevant emission limit values set out in Part 4 of Annex VII.”

4.2.5. Part 4.1 of Annex VII of the IED, refers back to Article 58 stating:

“For emissions of the volatile organic compounds referred to in Article 58 where the mass flow of the sum of the compounds causing the labelling referred to in that Article is greater than, or equal to, 10 g/h, an emission limit value of 2 mg/Nm³ shall be complied with. The emission limit value refers to the mass sum of the individual compounds.”

4.2.6. Further reference to emission limits is made at Part 4.2 of Annex VII, stating:

“For emissions of halogenated volatile organic substances which are assigned or need to carry the hazard statements H341 or H351, where the mass flow of the sum of the individual compounds causing the hazard statements H341 or H351 is greater than, or equal to, 100 g/h, an emission limit value of 20 mg/Nm³ shall be complied with. The emission limit value refers to the mass sum of the individual compounds.”

4.2.7. In compliance with the permit condition to monitor annually, emissions monitoring was undertaken for particulates on the 9th November 2023, 18th December 2023, and 22nd January 2024, and TVOC as carbon was undertaken on 18th December 2023. A summary of the monitoring results is provided in Tables 1, 2 and 3 below. The full Emissions Monitoring Report is provided in Appendix V.

4.2.8. It should be noted that the emissions monitoring was undertaken before many of the process changes that took place during 2024. Those changes have resulted in a reduced number of emission points and monitoring requirements, as detailed below, with all other operational stacks releasing heat:

- SB1S (Aluminium Bronze Paint) (Brush Application)
- SB2S (Spray Adhesive)
- SB7S (Spray Adhesive)
- PH8FS (Release Agent)
- PH8RS (Release Agent)

Table 1: Particulate Monitoring Results

Units	Limit	EX 1 Booth No2 (Mini)	EX2 Booth No1 (Mini)	EX4 Booth No8 (McLaren)	EX5 Booth No9 (McLaren)	SB5 Bentley	SB7 Bentley	X152 Jaguar	EX3 Booth No3
mg/m ³	50	1.63	1.94	1.64	1.89	1.53	0.82	1.23	1.12
g/h	-	16.16	19.08	17.97	11.90	1.58	10.20	5.80	7.44

Table 2: TVOC as carbon Monitoring Results (EX3 Booth No. 3)

Emission Limit (mg/m ³)	TVOC Result (mg/m ³)	Test Number	Mass Flow Limit (≥ g/h)	Mass Flow (≥ g/h)
20 / 2	1.59	1	100 / 10	10.61
20 / 2	1.08	2	100 / 10	7.21
20 / 2	0.82	3	100 / 10	5.47
Average	1.16	-	Average	7.76
Maximum	1.59	-	Maximum	10.61

Table 3: Dichloromethane Monitoring Results

Units	Limit	Test Number	EX3 Booth No3
mg/m ³	-	1	0.90
g/h	-	1	6.00
mg/m ³	-	2	0.90
g/h	-	2	6.00
mg/m ³	-	3	0.90
g/h	-	3	6.00
mg/m ³	-	Average	0.90
g/h	-	Average	6.00

- 4.2.9. As can be seen from Tables 1, 2 and 3, all results were well within the permit limits. It should be noted that dichloromethane is no longer used on site.
- 4.2.10. Table 2 specifically illustrates that for the sum of mass flow of detailed hazard statement substances referred to in sections 4.2.5. and 4.2.6. above, the tighter limit of 2mg/m³ where a flow of ≥ 10g/h is measured was complied with as the maximum emission result was 1.59mg/m³. It should be noted that the EX3 Booth No 3 has been decommissioned and is no longer in use.
- 4.2.11. Further particulate monitoring was undertaken on 13th November 2024 for compliance purposes, with spray booths 2 and 7 being assessed. Press 1 was not operational on the day of monitoring. The result of the monitoring is shown below in Table 4, with the full monitoring report provided in Appendix VI.

Table 4: Particulate Monitoring Results (November 2024)

Units	Limit	SB2 (Bentley)	SB7 (McLaren)
mg/m ³	50	0.59	0.43
g/h	-	6.25	5.07

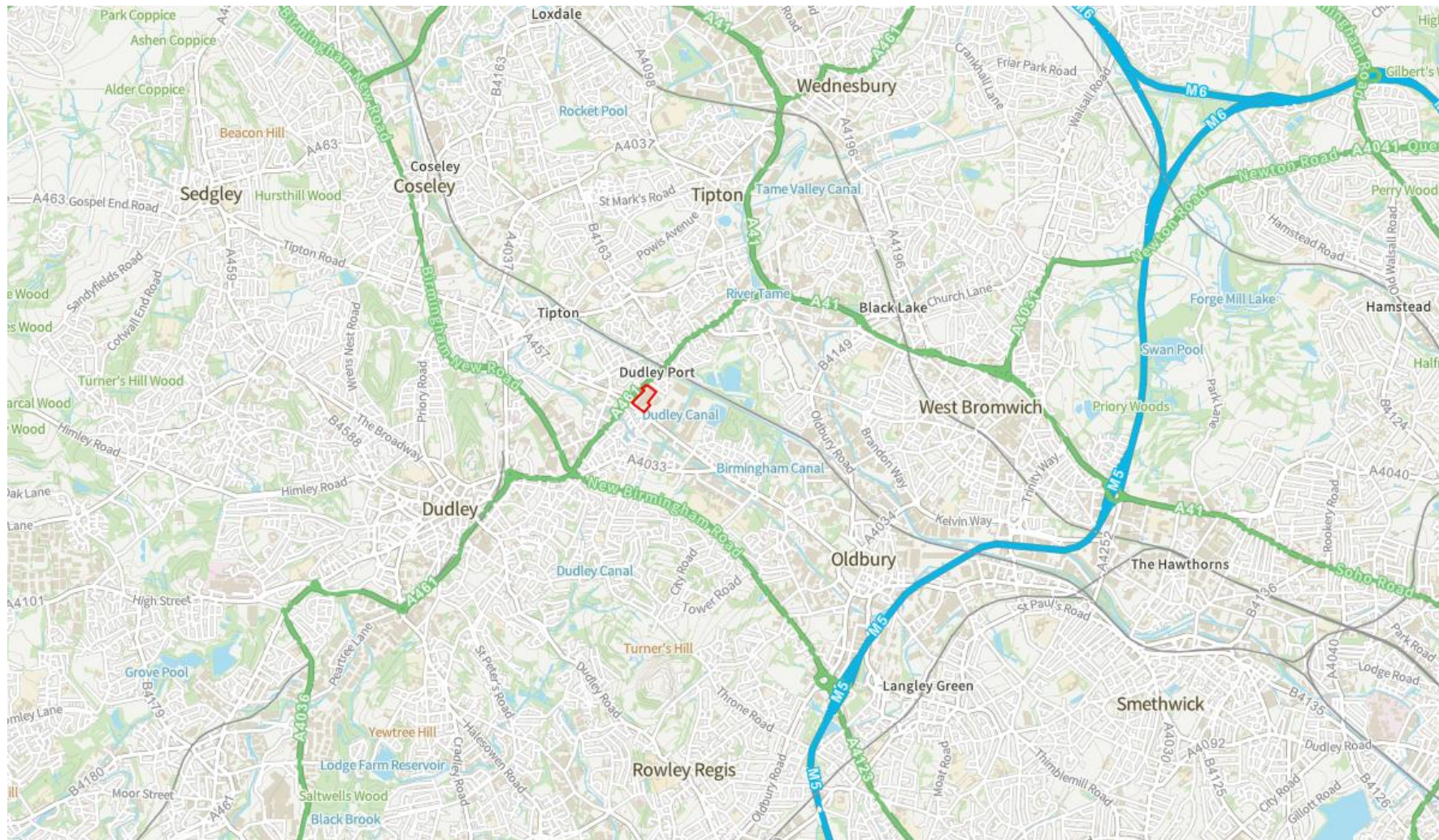
- 4.2.12. As can be seen, the results are again well below the permit emission limit value.

4.3. Di-isocyanate Emissions

- 4.3.1. One of the substances used on site (Specflex NE 138 DA) within the PU Carpet Line process is classed as an isocyanate, which contains Methylene diphenyl diisocyanate (MDI) and as such comes under Section 4.1 of Part 2 of Chapter 1 of the Environmental Permitting (England and Wales) Regulations 2016 (as amended). This section deals with the use of organic chemicals.
- 4.3.2. Part B (a) of this section specifically relates to the use of di-isocyanates or partly polymerised di-isocyanates where the activity will involve the use of greater than 5 tonnes of such substances in any 12-month period. This is the case for the PU Carpet Line with the consumption of Specflex NE 138 DA being 36.4 tonnes containing 20.4 tonnes of di-isocyanate in 2024.
- 4.3.3. As detailed in section 3.2 above, this process is not currently served by LEV but capital expenditure has been agreed for the installation of LEV for this process activity. Once LEV is installed, the captured emissions from the activity will be ventilated to atmosphere via stacks through the roof, and emission monitoring undertaken.

APPENDIX I

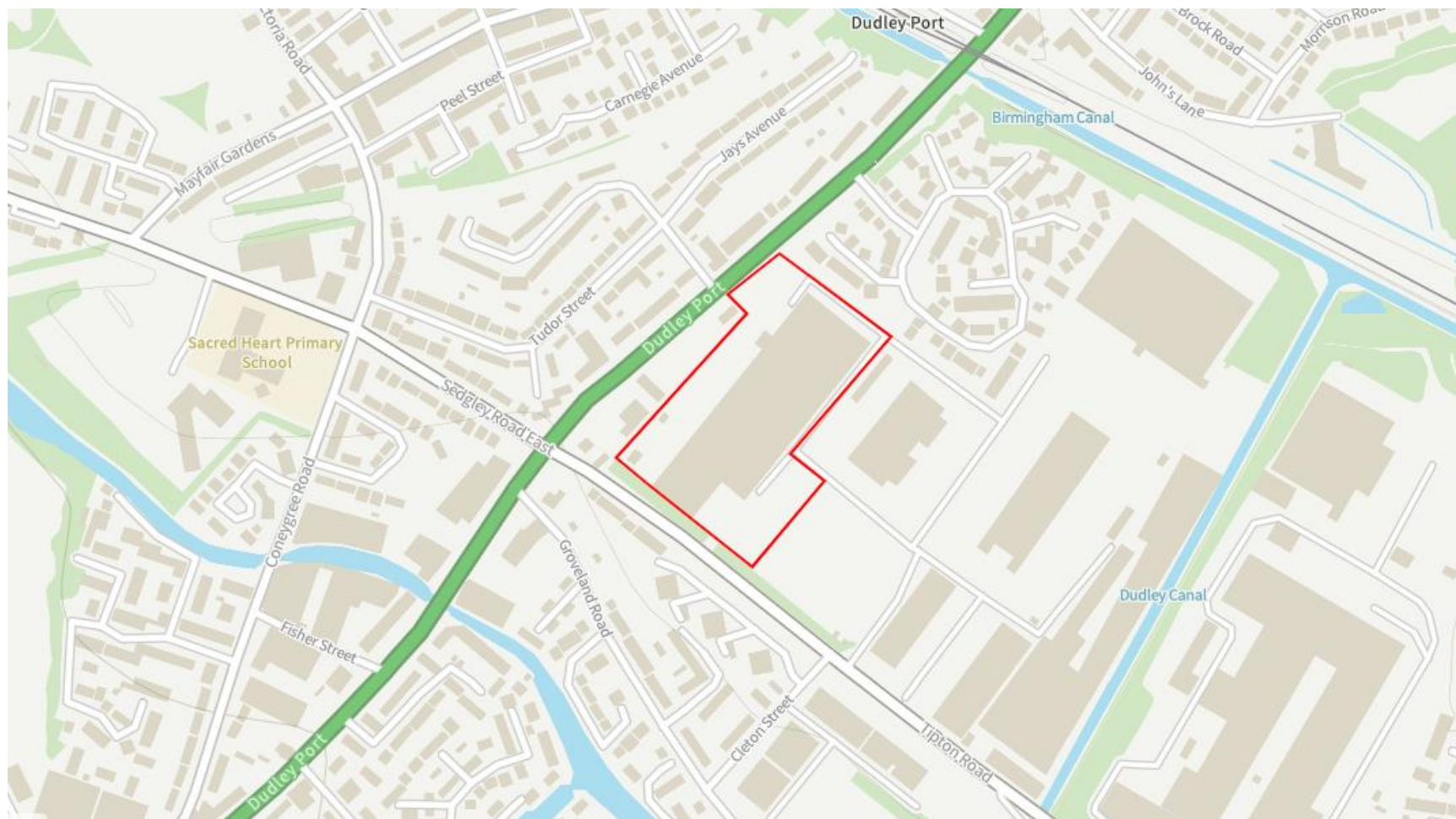
CAB AUTOMOTIVE INSTALLATION LOCATION MAP



MAGIC Mapping Image November 2024

APPENDIX II

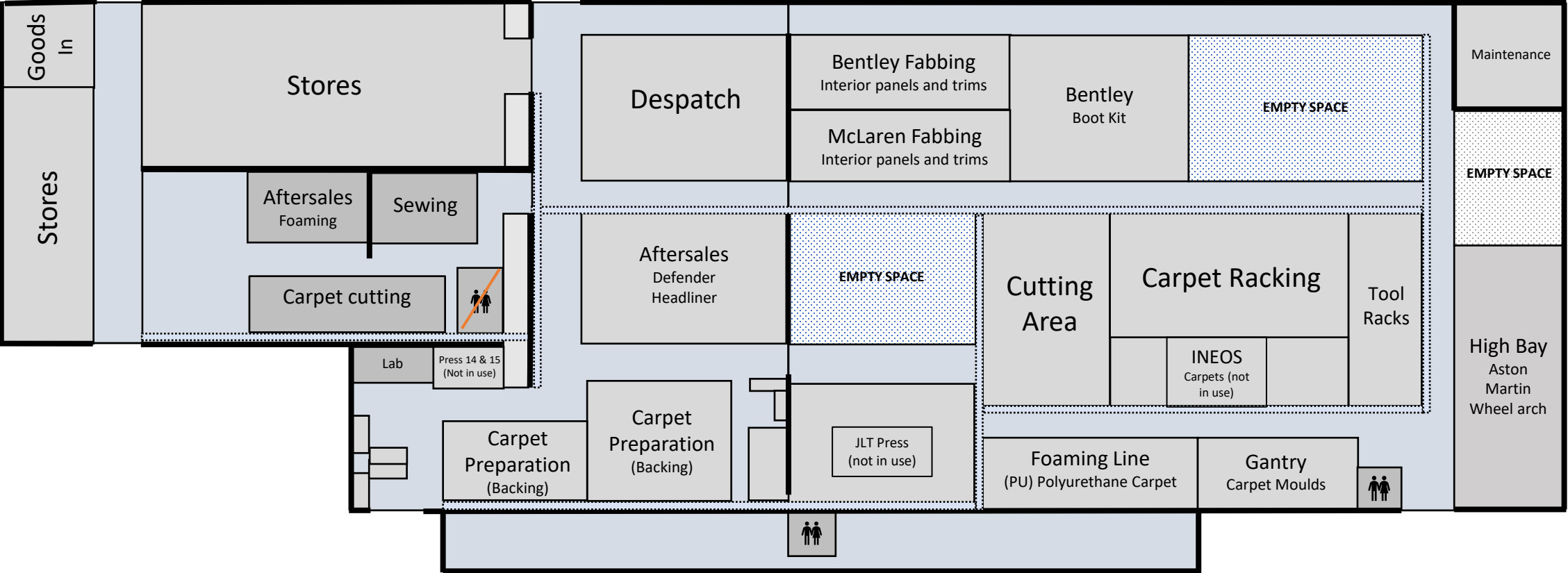
CAB AUTOMOTIVE INSTALLATION BOUNDARY MAP



MAGIC Mapping Tool November 2024

APPENDIX III

PROCESS LOCATION AND SUBSTANCE USE DIAGRAM



APPENDIX IV
ACMOS 37-9830 (RELEASE AGENT) SDS

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SECTION 1: Identification of the substance/mixture and of the company/undertaking**1.1. Product identifier**

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1.2. Relevant identified uses of the substance or mixture and uses advised against**Relevant identified uses**

Release agent for PUR

Uses advised against

Consumer uses: Private households (= general public = consumers)

Sector of uses [SU]: 21

Do not use for private purposes (household).

Relevant identified uses - Further information:

Industrial uses: Uses of substances as such or in preparations at industrial sites

Sector of uses [SU]: 3

The product is intended for professional use.

In compliance with the conditions described in the annex to this safety data sheet.

Summary of registered and identified uses and their respective exposure scenarios: see annex to this safety data sheet.

See section 16 for a comprehensive list of uses, for which an exposure scenario is provided as an annex.

1.3. Details of the supplier of the safety data sheet**Manufacturer**

Company name: ACMOS CHEMIE KG

Street: Industriestrasse 49

Place: D-28199 Bremen

Post-office box: 10 10 69

D-28010 Bremen

Telephone: +49 (0)421-5189-0

Telefax: +49 (0)421-511415

e-mail: acmos@acmos.com

Contact person: Mr. Stephan Dryhaus

e-mail: sds@acmos.com

Internet: www.acmos.com

Responsible Department: Laboratory (Division: Occupational- / Product security) - see under section 16

1.4. Emergency telephone number:

+49 (0)551 19240 (Emergency information service / official advisory body:

Giftinformationszentrum Nord, Universität Göttingen, 24 h from mo. - su.)

Language(s) of Telephone Service: DE, EN

Supplier

Company name: ACMOS U.K. Ltd., Willow Bank House

Street: Old Lane, Heswall

Place: GB-CH60 1 XX Wirral, Merseyside

Telephone: +44-(0)151-348 4849

Telefax: +44-(0)151-348 4850

e-mail: info@acmos.co.uk

Contact person: Mr. Stephen Spriggs

Telephone: +44-783 158 0003
(mobile)**1.4. Emergency telephone number:**

+44 111 (Emergency information service / official advisory body: National Poisons

Information Service - NPIS Birmingham) (<https://www.npis.org>)

Language(s) of Telephone Service: EN

SECTION 2: Hazards identification**2.1. Classification of the substance or mixture****GB CLP Regulation**

Eye Irrit. 2; H319

Aquatic Chronic 2; H411

Full text of hazard statements: see SECTION 16.

2.2. Label elements**GB CLP Regulation**

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Signal word:

Warning

Pictograms:



Hazard statements

- H319 Causes serious eye irritation.
H411 Toxic to aquatic life with long lasting effects.

Precautionary statements

- P273 Avoid release to the environment.
P280 Wear protective gloves/protective clothing/eye protection/face protection/hearing protection.
P305+P351+P338 IF IN EYES: Rinse cautiously with water for several minutes. Remove contact lenses, if present and easy to do. Continue rinsing.
P337+P313 If eye irritation persists: Get medical advice/attention.
P391 Collect spillage.

Special labelling of certain mixtures

- EUH208 Contains stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide)); reaction mass of 5 -chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1). May produce an allergic reaction.
Labeling according to Regulation (EU) No 528/2012 on biocides, Article 58 (3) and Regulation (EC) No 1272/2008, Article 25 (due to the specific conditions of the active substance approval): a) Contains biocidal products: Product-type 6: Preservatives for products during storage. b) Property attributed to the treated article: None c) Name of all active ingredients: See product label. d) Names of contained nanomaterials: None e) Relevant use instructions: Use personal protective equipment as required.

Additional advice on labelling

Labelling according to Regulation (EC) No. 1272/2008 [CLP]

2.3. Other hazards

Adverse physicochemical effects:
See section 9 for physical and chemical properties.

Adverse human health effects and symptoms:
See section 11 for toxicological information.
May cause sensitisation especially in sensitive humans.

Adverse environmental effects:
See section 12 for environmental information.

Other adverse effects:
Special danger of slipping by leaking/spilling product.

Results of PBT-/vPvB-assessment:
See under section 12.5 - Results of PBT and vPvB assessment.

SECTION 3: Composition/information on ingredients

3.2. Mixtures

Chemical characterization

Emulsion of active ingredients in water

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Hazardous components

CAS No	Chemical name			Quantity
	EC No	Index No	REACH No	
	Classification (GB CLP Regulation)			
124-30-1	octadecylamine			1 - < 3 %
	204-695-3	612-282-00-8	01-2119473804-32	
	Skin Irrit. 2, Eye Dam. 1, STOT RE 2, Asp. Tox. 1, Aquatic Acute 1, Aquatic Chronic 1; H315 H318 H373 H304 H400 H410			
90622-57-4	hydrocarbons, C11-C12, isoalkanes, <2% aromatics			1 - < 5 %
	918-167-1		01-2119472146-39	
	Asp. Tox. 1, Aquatic Chronic 4; H304 H413 EUH066			
1185-81-5	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))			< 0,3 %
	214-688-7		01-2119841260-50	
	Muta. 2, Repr. 1B, Acute Tox. 4, Skin Irrit. 2, Skin Sens. 1, STOT RE 1, Aquatic Acute 1, Aquatic Chronic 1; H341 H360FD H312 H315 H317 H372 H400 H410			
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate			< 0.1 %
	264-513-3		01-2119978231-37	
	Acute Tox. 4, STOT RE 1, Aquatic Chronic 1; H302 H372 H410			
90640-32-7	amines, C16-18-alkyl			< 0.1 %
	292-550-5		01-2119473799-15	
	Skin Irrit. 2, Eye Dam. 1, STOT RE 2, Asp. Tox. 1, Aquatic Acute 1, Aquatic Chronic 1; H315 H318 H373 H304 H400 H410			
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)			< 0,0015 %
	911-418-6	613-167-00-5	01-2120764691-48	
	Acute Tox. 2, Acute Tox. 2, Acute Tox. 3, Skin Corr. 1C, Eye Dam. 1, Skin Sens. 1A, Aquatic Acute 1, Aquatic Chronic 1; H330 H310 H301 H314 H318 H317 H400 H410 EUH071			

Full text of H and EUH statements: see section 16.

Specific Conc. Limits, M-factors and ATE

CAS No	EC No	Chemical name	Quantity
		Specific Conc. Limits, M-factors and ATE	
124-30-1	204-695-3	octadecylamine	1 - < 3 %
		inhalation: LC50 = > 0,099 mg/l (dusts or mists); dermal: LD50 = > 2000 mg/kg; oral: LD50 = > 2000 mg/kg M acute; H400: M=10 M chron.; H410: M=10	
90622-57-4	918-167-1	hydrocarbons, C11-C12, isoalkanes, <2% aromatics	1 - < 5 %
		inhalation: LC50 = > 5,6 mg/l (dusts or mists); dermal: LD50 = > 5000 mg/kg; oral: LD50 = > 5000 mg/kg	
1185-81-5	214-688-7	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))	< 0,3 %
		dermal: LD50 = 1000 - 2000 mg/kg; oral: LD50 = > 2000 mg/kg M acute; H400: M=1 M chron.; H410: M=1	
63843-89-0	264-513-3	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate	< 0.1 %
		inhalation: LC50 = > 0,46 mg/l (dusts or mists); dermal: LD50 = > 3170 mg/kg; oral: LD50 = 1490 mg/kg M chron.; H410: M=10	
90640-32-7	292-550-5	amines, C16-18-alkyl	< 0.1 %
		dermal: LD50 = > 2000 mg/kg; oral: LD50 = > 5000 mg/kg M acute; H400: M=10 M chron.; H410: M=10	
55965-84-9	911-418-6	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)	< 0,0015 %
		inhalation: ATE = 0,5 mg/l (vapours); inhalation: LC50 = > 0,33 mg/l (dusts or mists); dermal: LD50 = > 87 mg/kg; oral: LD50 = 64 - 66 mg/kg Skin Corr. 1C; H314: >= 0,6 - 100 Skin Irrit. 2; H315: >= 0,06 - < 0,6 Eye Dam. 1; H318: >= 0,6 - 100 Eye Irrit. 2; H319: >= 0,06 - < 0,6 Skin Sens. 1A; H317: >= 0,0015 - 100 M acute; H400: M=100 M chron.; H410: M=100	

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Further Information

The above mentioned EC-No. (Provisional List Number 9xx-xxx-x) is a specific subset of the specified CAS-No. and was associated with the registration process automatically (without CAS-No. or numeric identifier). An official announcement by the EC inventory will follow after evaluation of substance identity by the ECHA. The new nomenclature of hydrocarbon solvents is only related with group names of the HSPA (Hydrocarbon Solvents Producers Association). The previously used CAS-No. continues serving as a reference for different global inventories. The classification of hydrocarbon mixtures made in consideration of the applicable notes in annex VI of regulation (EC) No. 1272/2008.

SECTION 4: First aid measures**4.1. Description of first aid measures****General information**

Remove affected person from the danger area and lay down.
Take off immediately all contaminated clothing and wash it before reuse.
Put victim at rest, cover with a blanket and keep warm.
Do not leave affected person unattended.
If a person vomits when lying on his back, place him in the recovery position.
If breathing is irregular or stopped, administer artificial respiration.
If unconscious but breathing normally, place in recovery position and seek medical advice.
Never give anything by mouth to an unconscious person or a person with cramps.
In the event of cardiac arrest immediately perform cardiopulmonary resuscitation.
In case of accident or unwellness, seek medical advice immediately (show directions for use or safety data sheet if possible).

Self-protection of the first aider:
Wear personal protection equipment (refer to section 8).
First Aid.

Notes for the doctor:
No special measures are necessary.

After inhalation

Remove victim out of the danger area.
Provide fresh air.
Consult a doctor immediately in the case of inhaling spray mist and show him packing or label.

After contact with skin

Wash immediately with:
Water and soap
Rub greasy ointment into the skin.
Do not wash with:
Solvents/Thinner
In case of skin irritation, consult a physician.

After contact with eyes

In case of contact with eyes flush immediately with plenty of flowing water for 10 to 15 minutes holding eyelids apart and consult an ophthalmologist.
Remove contact lenses, if present and easy to do. Continue rinsing.
Protect uninjured eye.

After ingestion

Do NOT induce vomiting.
Give nothing to eat or drink.
Never give anything by mouth to an unconscious person or a person with cramps.
Call a physician immediately.

4.2. Most important symptoms and effects, both acute and delayed

The following symptoms may occur:
Cough
Allergic reactions
Acidosis
Nausea

4.3. Indication of any immediate medical attention and special treatment needed

Treat symptomatically.

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SECTION 5: Firefighting measures**5.1. Extinguishing media****Suitable extinguishing media**

Full water jet
Water spray jet
Water mist
Extinguishing powder (ABC-powder)
Foam
Carbon dioxide (CO₂)

Fire class: not relevant

Unsuitable extinguishing media

None known

5.2. Special hazards arising from the substance or mixture

Hazardous combustion products:
None known
The product itself does not burn.

5.3. Advice for firefighters

Usual measures of preventive and averting fire protection.
Co-ordinate fire-fighting measures to the fire surroundings.
Collect contaminated fire extinguishing water separately. Do not allow entering drains or surface water.
Fire residues and contaminated fire extinguishing water must be disposed of in accordance with local regulations.

Special protective equipment for firefighters
not relevant

SECTION 6: Accidental release measures**6.1. Personal precautions, protective equipment and emergency procedures****General advice**

Avoid contact with skin, eyes and clothes.
Do not breathe vapour/aerosol.
Prevent further leakage or spillage if safe to do so.
Provide adequate ventilation.
Special danger of slipping by leaking/spilling product.

For non-emergency personnel:
Use personal protection equipment.
Walk out of the danger zone and notify trained personnel.
Emergency procedures:
Keep the factory emergency plan and the information chain.

For emergency responders:
Use personal protection equipment.
The personal protective equipment must be adapted to the situation.
Suitable material:
See under section 8.2 - Personal protection equipment.

6.2. Environmental precautions

Do not allow to enter into surface water or drains.
Do not allow to enter into soil/subsoil.
Ensure waste is collected and contained.
In case of gas escape or of entry into waterways, soil or drains, inform the responsible authorities.

6.3. Methods and material for containment and cleaning up**Other information**

For containment:
Repair leaks if without risk.
Move containers from spill area.
Make sure spills can be contained, e.g. in sump pallets or kerbed areas.

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Prevent spread over a wide area (e.g. by containment or oil barriers).
Remove from the water surface (e.g. skimming, sucking).
Cover drains.

For cleaning up:

Clean-up methods - large spillage:

Absorb with liquid-binding material (sand, diatomaceous earth, acid- or universal binding agents).

Shovel into suitable container for disposal.

Local authorities should be advised if significant spillages cannot be contained.

Clean-up methods - small spillage:

Clear spills immediately.

Wipe up with absorbent material (eg. cloth, fleece).

Collect in closed and suitable containers for disposal.

Clear contaminated areas thoroughly.

Recommended cleansing agent:

Clean with detergents. Avoid solvent cleaners.

Retain contaminated washing water and dispose it.

Ensure all waste water is collected and treated via a waste water treatment plant.

Ventilate affected area.

Suitable material for taking up:

Sand

Kieselguhr

Universal binder

Absorbing material, organic

Unsuitable material for taking up:

None known

6.4. Reference to other sections

Personal protection equipment: see section 8

Disposal: see section 13

SECTION 7: Handling and storage**7.1. Precautions for safe handling****Advice on safe handling**

Measures to prevent aerosol and dust generation:

All work processes must always be designed so that the following is as low as possible:

Inhalation of vapours or spray/mists

Eye contact

Skin contact

Technical ventilation of workplace

Use only in a exhaust booth with integrated air filter.

Use in ventilated spray booths only.

Recirculation of exhaust air is not recommended.

Always close containers tightly after the removal of product.

Advice on protection against fire and explosion

Measures to prevent fire:

The product is not: Combustible

Usual measures for fire prevention.

Fire-fighting equipment on the basis of class B.

Further information on handling

Environmental precautions:

Transfer wash-downs in sealed containers.

Provide for retaining containers, e.g. floor pan without outflow.

For restriction of emission on volatile organic compounds (VOC) the solvent vapours should be supplied to an exhaust air purification facility (filter, gas washer, incineration).

Advices on general occupational hygiene:

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Wear personal protection equipment (refer to section 8).
Minimum standard for preventive measures while handling with working materials are specified in the TRGS 500.
General industrial hygiene practice.
Handle in accordance with good industrial hygiene and safety practice.
Working places should be designed to allow cleaning at any time.
Floors, walls and other surfaces in the hazard area must be cleaned regularly.
Clean spray booth and exhaust hood completely with every product change.
When using do not eat, drink, smoke, sniff.
Thorough skin-cleansing after handling the product.
Used working clothes should not be worn outside the work area.

7.2. Conditions for safe storage, including any incompatibilities**Requirements for storage rooms and vessels**

Suitable floor material:
Floors should be impervious, resistant to liquids and easy to clean.

Protect against:

Heat

Cold

Recommended storage temperature: +10 ... +30 °C

Keep away from:

Food and feedingstuffs

Packaging materials:

Suitable container/equipment material:

Keep/Store only in original container.

Unsuitable container/equipment material:

See under section 8.2 - Hand protection.

Hints on joint storage

Do not store together with:

Storage class:

1 (Explosive hazardous substances)

6.2 (Infectious substances)

7 (Radioactive substances)

Further information on storage conditions

Technical measures and storage conditions:

The valid water and zoning ordinances must be observed.

Keep container tightly closed.

Protect containers against damage.

Ensure adequate ventilation of the storage area.

Do not store outside.

See also instructions on the label.

7.3. Specific end use(s)

Recommendation:

Possibilities for substitution and references to less hazardous products:

This product was designed for a special application purpose and optimized appropriately.

In case of questions regarding product and application, please contact our field service in line with customer service or our technical sales department.

Observe technical data sheet.

Industrial sector specific solutions:

Hazardous substance information systems of professional associations:

SECTION 8: Exposure controls/personal protection**8.1. Control parameters**



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Exposure limits (EH40)

CAS No	Substance	ppm	mg/m³	fibres/ml	Category	Origin
-	Cycloalkanes >= C7	-	800		TWA (8 h)	WEL
-	Normal and branched chain alkanes >= C7 (it excludes n-heptane)	-	1200		TWA (8 h)	WEL
-	Tin compounds, organic, except Cyhexatin (ISO), (as Sn)	-	0.1		TWA (8 h)	WEL
		-	0.2		STEL (15 min)	WEL

DNEL/DMEL values

CAS No	Substance			
DNEL type		Exposure route	Effect	Value
124-30-1	octadecylamine			
Worker DNEL, long-term		dermal	systemic	0,09 mg/kg bw/day
Worker DNEL, long-term		inhalation	systemic	0,38 mg/m³
Consumer DNEL, long-term		oral	systemic	0,04 mg/kg bw/day
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate			
Worker DNEL, long-term		dermal	systemic	0,07 mg/kg bw/day
Worker DNEL, long-term		inhalation	systemic	0,05 mg/m³
Consumer DNEL, long-term		dermal	systemic	0,033 mg/kg bw/day
Consumer DNEL, long-term		inhalation	systemic	0,01 mg/m³
Consumer DNEL, long-term		oral	systemic	0,003 mg/kg bw/day
90640-32-7	amines, C16-18-alkyl			
Worker DNEL, long-term		inhalation	local	1 mg/m³
Consumer DNEL, long-term		inhalation	systemic	0,035 mg/m³
Worker DNEL, long-term		inhalation	systemic	0,38 mg/m³
Consumer DNEL, long-term		oral	systemic	0,04 mg/kg bw/day
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)			
Worker DNEL, long-term		inhalation	local	0,02 mg/m³
Worker DNEL, acute		inhalation	local	0,04 mg/m³
Consumer DNEL, long-term		inhalation	local	0,02 mg/m³
Consumer DNEL, acute		inhalation	local	0,04 mg/m³
Consumer DNEL, long-term		oral	systemic	0,09 mg/kg bw/day
Consumer DNEL, acute		oral	systemic	0,11 mg/kg bw/day

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PNEC values

CAS No	Substance	
Environmental compartment		Value
124-30-1	octadecylamine	
Freshwater		0,00026 mg/l
Marine water		0,000026 mg/l
Freshwater sediment		0,179 mg/kg
Marine sediment		0,0179 mg/kg
Micro-organisms in sewage treatment plants (STP)		0,55 mg/l
Soil		10 mg/kg
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate	
Freshwater		0,00004 mg/l
Marine water		0,00000 mg/l
Freshwater sediment		504,4 mg/kg
Marine sediment		50,44 mg/kg
Micro-organisms in sewage treatment plants (STP)		1 mg/l
Soil		1 mg/kg
90640-32-7	amines, C16-18-alkyl	
Freshwater		0,00026 mg/l
Freshwater sediment		0,0039 mg/kg
Micro-organisms in sewage treatment plants (STP)		0,550 mg/l
Soil		10 mg/kg
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)	
Freshwater		0,00339 mg/l
Marine water		0,00339 mg/l
Freshwater sediment		0,027 mg/kg
Marine sediment		0,027 mg/kg
Soil		0,01 mg/kg

Additional advice on limit values

GESTIS - International Limit Values - Institut für Arbeitsschutz der Deutschen Gesetzlichen Unfallversicherung (IFA):

<http://limitvalue.ifa.dguv.de>

Country information (EU)

<http://www.dguv.de/ifa/fachinfos/occupational-exposure-limit-values/foreign-and-eu-limit-values/index.jsp>Country information (GB) (<http://www.hse.gov.uk/pubns/books/eh40.htm>)

Occupational Exposure Limits of EU-memberstates - European Agency for Safety and Health at Work (OSHA)

<http://osha.europa.eu/en/topics/ds/oel/index.stm/members.stm>Source of law: EH40 (GB) (<http://www.hse.gov.uk>)**Recommended monitoring procedures:**

Workplace atmospheres - Guide for the application and use of procedures for the assessment of exposure to chemical and biological agents (BS EN 14042):

Personal air monitoring

Room air monitoring

Test tube

Gas warning system

Preliminary concentration measurements:Suitable detector tubes for measuring the current concentration in the air at the workplace: DRÄGER test tubes - short-term tubes (<http://www.gasmesstechnik.de>)DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 10 / a (n-octane, measuring range: 10 - 300 ppm, response time: 60 sec) (<http://www.gasmesstechnik.de>)DRÄGER test tubes - Short-term tubes - Petroleum hydrocarbons 100 / a (n-octane, measuring range: 100 - 2500 ppm, response time: 30 sec) (<http://www.gasmesstechnik.de>)

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Exposure limits at intended use:

DNEL-/PNEC-values:

Further information: see exposure scenarios attached to this safety data sheet.

Risk management measures according to used control banding approach:

Control banding for chemicals according to the ILO CHEMICAL CONTROL TOOLKIT (ICCT): ICCT-Guidelines and Control Guidance Sheets (http://www.ilo.org/legacy/english/protection/safework/ctrl_banding/toolkit/main_guide.pdf)

Used model:

Consider appropriate model solutions according to good engineering practices on designing the working process, if available.

8.2. Exposure controls



Appropriate engineering controls

Substance/mixture related measures to prevent exposure during identified uses:

Technical measures to prevent exposure:

Design of appropriate work processes and engineering controls and the use of adequate materials (physical cut-off of man and machine, model solutions as certified working methods, working appliance according to the state of the art, optimization of process / spray robots, working appliance for prevention of skin contact, models of working times).

Organisational measures to prevent exposure:

Execution of collective protection measures at source and appropriate organisational measures (local exhaust ventilation, ventilation by technical means, general ventilation, measures on averting a danger at breakdowns / at emergencies / after accidents, first-aid-measures, manner related measures: operating instruction / instruction of employees, occupational medicine health precaution).

Structural measures to prevent exposure:

Execution of individual and personnel protection measures (personal protective equipment - PPE).

If technical exhaust or ventilation measures are not possible or insufficient, respiratory protection must be worn.

Technical measures and the application of suitable work processes have priority over personal protection equipment.

References for design of technical equipment:

See under section 7.1 - Precautions for safe handling.

Summary of the risk management measures for exposure scenario:

Use only the following product amount per time unit:

No information available.

Minimum room-width and room-height for handling/application:

No information available.

Minimum room ventilation rate for handling/application (air changes per hour):

No information available.

Individual protection measures, such as personal protective equipment

Eye/face protection

If required according to hazard assessment:

Suitable eye protection:

Eye glasses with side protection (EN 166)

Recommended eye protection articles:

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UVEX I-VO / UVEX I-3 / UVEX SUPER OTG
Or comparable articles from other companies.

Hand protection

Skin protection:

Preventive skin protection.:

Draw up skin protection programme.

Before starting work, apply water-resistant skincare preparations.

e.g. saniwip®, dualin® (PETER GREVEN PHYSIODERM)

Wash hands before breaks and after work.

e.g. ecosan®, topscrub® soft / topscrub® extra / topscrub® nature (PETER GREVEN PHYSIODERM)

After cleaning apply high-fat content skin care cream.

e.g. physioderm® creme, cura soft® / cUrea soft® (PETER GREVEN PHYSIODERM)

Apply skin care products after work.

If required according to hazard assessment:

When handling with chemical substances, protective gloves must be worn with the CE-label including the four control digits.

The quality of the protective gloves resistant to chemicals must be chosen as a function of the specific working place concentration and quantity of hazardous substances.

Decrease wearing protection gloves to an inevitable degree to avoid skin rash.

Technical and organizational protective actions have to be preferred.

Breakthrough times and swelling properties of the material must be taken into consideration.

Check leak tightness/impermeability prior to use.

Wear cotton undermitten if possible.

Change preventive gloves once by hour or use special skin-protective preparations for protective gloves carrier,

e.g. physioderm® proGlove (PETER GREVEN PHYSIODERM)

Take recovery periods for skin regeneration.

Do not wear gloves near rotary machines and tools.

Dispose preventive gloves after defect or expiry of wearing time. Replace when worn.

In the case of wanting to use the gloves again, clean them before taking off and air them well.

Wearing time with permanent contact:

Suitable gloves type

Gloves with long cuffs

Recommended glove articles:

Suitable materials at long term, direct contact (Recommended: Preventive index 6, accordingly > 480 min. permeation time in accordance to EN 374):

Nitrile rubber / NBR (KCL-CAMATRIL VELOURS® - Art. No. 730) - Layer thickness: 0,4 mm

Or comparable articles from other companies.

Unsuitable material:

NR (natural rubber, Natural latex)

Wearing time with occasional contact (splashes):

Suitable gloves type

Disposable gloves

Recommended glove articles:

Suitable materials at short term contact or splash (Recommended: Preventive index 3, accordingly > 60 min. permeation time in accordance to EN 374):

Disposable gloves of special nitrile rubber / NBR (KCL-DERMATRIL® P - Art. No. 743) - Layer thickness: 0,2 mm

Or comparable articles from other companies.

The statements are based on self-tests, literary reference and information of glove manufacturers or have been derived from similar substances by analogy.

Source: CHEMIKALIEN-MANAGER - KCL software for hand protection.

It has to be noticed, that daily time of use of chemical protective gloves may be quite shorter in practice because of many factors of influence (e.g. thermal and mechanical stress as well as special conditions on the floor) than the permeation time determined in accordance to EN 374.

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The respective permeation time doubles/halves at about 1,5 times larger/lower layer thickness.
Declared permeation times according to EN 374 are not carried out under practical conditions. Therefore a maximum wearing time up to 50 % of breakthrough time is recommended.
They relate to the pure solvent as mean component.

Barrier creams are not substitutes for body protection.

Skin protection

If required according to hazard assessment:

Suitable protective clothing:

Overall, Natural fibres (e.g. cotton) (EN 340)

For the protection against direct skin contact, body protective clothing is essential (in addition to the usual working clothes).

When handling with chemical substances, protective clothing with CE-labels including the four control digits must be worn.

DIN-/EN-Norms EN 468

Chemical protection clothing (Disposable suit antistatic)

type 6 limited splash-tight

type 5 particle-tight (method B)

type 4 spray-tight

Recommended protective clothing articles:

TYVEK CLASSIC PLUS (DU PONT)

Or comparable articles from other companies.

Chemical resistant safety shoes with conductible sole (EN ISO 20345)

Wash contaminated clothing prior to re-use.

Used working clothes should not be worn outside the work area.

Street clothing should be stored separately from work clothing.

Thermal hazards:

No thermal hazards during use of this product.

Respiratory protection

If required according to hazard assessment:

Respiratory protection necessary at:

aerosol or mist formation + exceeding exposure limit values +

high concentrations / prolonged exposure / insufficient ventilation / insufficient exhaust

Use only respiratory protection equipment with CE-symbol including four digit test number.

Filter types: A, B, E, K. Class 1: Maximum permitted contaminant concentration in inhaled air = 1000 mL/m³ (0.1 % by vol.); class 2: maximum permitted contaminant concentration in inhaled air = 5000 mL/m³ (0.5 % by vol.); class 3: maximum permitted contaminant concentration in inhaled air = 10000 mL/m³ (1.0 % by vol.)

The filter class must be suitable for the maximum contaminant concentration (gas/vapour/aerosol/particulates) that may arise when handling the product. If the concentration is exceeded, self-contained breathing apparatus must be used.

Observe the wear time limits according GefStoffV in combination with the rules for using respiratory protection apparatus (BGR 190).

The use of filter equipment requires a minimum oxygen content of 17 Vol-% in the surrounding atmosphere and that the maximum permitted gas concentration - normally 0,5 Vol-% - is not exceeded.

Suitable respiratory protection apparatus:

Half-face mask or quarter facepiece: maximum use concentration for substances with exposure limits: P1 filter: up to a max. of 4 times the exposure limit. P2 filter: up to a max. of 10 times the exposure limit. P3 filter: up to a max. of 30 times the expo.

Recommended respiratory protection articles:

Half mask or quarter mask with combination filter A1P1/A2P2 for gases, vapors and particles. (EN 140, EN 14387)

Filtering half mask or quarter mask with combination filter FFA1 P1/FFA2P2 for gases, vapors and particles. (EN 405)

Gas filtrating Half-face mask FFA (EN 405)

Model 4251 (FFA1P1 - 1000 ml/m³) / 4255 (FFA2P2SL - 5000 ml/m³) (3M)

Half-face mask or Quarter-face mask with gas filter (EN 140, EN 14387)

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Filter type 6051 (A1 - 1000 ml/m³) / 6055 (A2 - 5000 ml/m³) (3M)

Full-face mask with gas filter (EN 136, EN 14387)

Gas filter type: A, Indication colour: brown

Or comparable articles from other companies.

Environmental exposure controls

Environmental exposure controls:

Technical measures to prevent exposure:

Discharge exhaust air only with suitable separators to atmosphere.

Organisational measures to prevent exposure:

Should not be released into the environment.

Structural measures to prevent exposure:

Use the following recovery and/or abatement technique for cleaning waste gases:

Exhaust air scrubber

Adsorption

Further information see under section 6.2 - Environmental precautions.

SECTION 9: Physical and chemical properties**9.1. Information on basic physical and chemical properties**

Physical state:	liquid	
Colour:	white	
Odour:	characteristic	
		Test method
Melting point/freezing point:	< 0 °C	literature value
Boiling point or initial boiling point and boiling range:	> 100 °C	literature value
Flammability		
Solid/liquid:	not applicable (Liquid)	
Gas:	not applicable (Liquid)	
Lower explosion limits:	not relevant	
Upper explosion limits:	not relevant	
Flash point:	not applicable	
Auto-ignition temperature:	not relevant	
Decomposition temperature:	not relevant	
pH-Value:	6	DIN 19268
Viscosity / kinematic: (at 40 °C)	43,7 mm ² /s	DIN 53015
Water solubility: (at 20 °C)	emulsifiable	
Solubility in other solvents miscible with most organic solvents (Alcohols, aldehydes, Ketone)		
Partition coefficient n-octanol/water:	not applicable (Mixtures)	
Vapour pressure: (at 20 °C)	Corresponds to the vapour pressure of water. < 23 hPa	literature value
Vapour pressure: (at 50 °C)	Corresponds to the vapour pressure of water. < 123 hPa	literature value
Density (at 20 °C):	1 g/cm ³	DIN 51757
Bulk density:	not applicable (Liquid)	
Relative vapour density:	not determined	

9.2. Other information**Information with regard to physical hazard classes**

Explosive properties

No flash point up to 100 °C.

Self-ignition temperature

Solid:

Not pyrophoric.

Gas:

Not pyrophoric.

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Oxidizing properties
not relevant

Other safety characteristics

Evaporation rate:	not determined
Solvent separation test:	not applicable
Solvent content:	not determined
Solid content:	not determined
Sublimation point:	not applicable
Softening point:	not applicable
Pour point:	not applicable
Viscosity / dynamic:	not determined
Flow time: (at 23 °C)	> 30 s 3 DIN EN ISO 2431

Further Information

Odour threshold: No data available

Surface tension: No data available

Fat solubility: No data available

Calculated oxidation potential of the mixture (OP): not relevant

Substance group relevant properties:

Data relevant with regard to physical hazard classes (supplemental):

Explosives

not applicable

Flammable gases

Non-flammable. / not applicable (Liquid)

Aerosols

Non-flammable. / not applicable (Liquid)

Oxidising gas

Not oxidising. / not applicable (Liquid)

Gases under pressure

not applicable (Liquid)

Flammable liquids

Non-flammable.

flammable solids

Non-flammable. / not applicable (Liquid)

Self-reactive substances and mixtures

not applicable

Pyrophoric liquids

Not pyrophoric.

Pyrophoric solids

Not pyrophoric. / not applicable (Liquid)

self-heating substances and mixtures

not applicable

Substances or mixtures which, in contact with water, emit flammable gases

not applicable

Oxidising liquids

Not oxidising.

Oxidising solids

Not oxidising. / not applicable (Liquid)

Organic peroxides

not applicable

Corrosive to metals.

Not corrosive to metals.

SECTION 10: Stability and reactivity**10.1. Reactivity**

The product is chemically stable under recommended conditions of storage, use and temperature.

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10.2. Chemical stability

The product is chemically stable under recommended conditions of storage, use and temperature.

10.3. Possibility of hazardous reactions

No hazardous reaction when handled and stored according to provisions.

10.4. Conditions to avoid

Further information see under section 7.2 - Conditions for safe storage, including any incompatibilities.

Further information see under section 10.5 - Incompatible materials.

10.5. Incompatible materials

Violent reaction with:

Hazardous substances that release flammable gases when in contact with water

Further information see under section 7.1 - Precautions for safe handling.

10.6. Hazardous decomposition products

Does not decompose when used for intended uses.

No known hazardous decomposition products.

Under fire conditions: See under section 5.2 - Special hazards arising from the substance or mixture.

SECTION 11: Toxicological information**11.1. Information on hazard classes as defined in GB CLP Regulation****Toxicokinetics, metabolism and distribution**

There are no data available on the preparation/mixture itself.

The product has not been tested.

Information on likely routes of exposure /

Symptoms related to the physical, chemical and toxicological characteristics:

See under section 4.2 - Most important symptoms and effects, both acute and delayed.

Exposure route:

In case of ingestion:

Ingestion causes nausea, weakness and central nervous system effects.

In case of skin contact:

May cause skin irritation in susceptible persons.

Prolonged or repeated skin contact may cause removal of natural fat from the skin resulting in dermatitis (skin inflammation).

In case of inhalation:

slightly irritant but not relevant for classification.

In case of eye contact:

irritant.

Conjunctival redness.

Delayed and immediate effects as well as chronic effects from short and long-term exposure:

Not relevant

Interactive effects:

Not relevant

Absence of specific data:

No data is available on the product itself. Description of possible hazardous to health effects is based on experience and/or toxicological characteristics of several components.

However, some data are not complete regarding particular main components. Nevertheless according to the experience of the manufacturer there are no other hazards expected than those which are already mentioned on the label.

Mixture versus substance information:

Not relevant

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Acute toxicity

Based on available data, the classification criteria are not met.

CAS No	Chemical name				
	Exposure route	Dose	Species	Source	Method
124-30-1	octadecylamine				
	oral	LD50 > 2000 mg/kg	Rat	ECHA	OECD 401
	dermal	LD50 > 2000 mg/kg	Rat	ECHA	OECD 402
	inhalation (1 h) dust/mist	LC50 > 0,099 mg/l	Rat	ECHA	OECD 403
90622-57-4	hydrocarbons, C11-C12, isoalkanes, <2% aromatics				
	oral	LD50 > 5000 mg/kg	Rat	Supplier / ECHA	OECD 401
	dermal	LD50 > 5000 mg/kg	Rabbit	Supplier / ECHA	OECD 402
	inhalation (4 h) dust/mist	LC50 > 5,6 mg/l	Rat	ECHA	OECD 403
1185-81-5	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))				
	oral	LD50 > 2000 mg/kg	Rat	Supplier / ECHA	OECD 423
	dermal	LD50 1000 - 2000 mg/kg	Rabbit [female]	Supplier / ECHA	OECD 402
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate				
	oral	LD50 1490 mg/kg	Rat	Supplier / ECHA	OECD 401
	dermal	LD50 > 3170 mg/kg	Rat	Supplier / ECHA	OECD 402
	inhalation (4 h) dust/mist	LC50 > 0,46 mg/l	Rat	Supplier / ECHA	OECD 403
90640-32-7	amines, C16-18-alkyl				
	oral	LD50 > 5000 mg/kg	Rat	Supplier / ECHA	OECD 401
	dermal	LD50 > 2000 mg/kg	Rat	ECHA	OECD 402
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)				
	oral	LD50 64 - 66 mg/kg	Rat	ECHA / Supplier	OECD 401
	dermal	LD50 > 87 mg/kg	Rat	ECHA	OECD 402
	inhalation vapour	ATE 0,5 mg/l			
	inhalation (4 h) dust/mist	LC50 > 0,33 mg/l	Rat	ECHA	OECD 403

Irritation and corrosivity

Causes serious eye irritation.

Skin corrosion/irritation: Based on available data, the classification criteria are not met.

Sensitising effects

Contains stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide)); reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1). May produce an allergic reaction.

Carcinogenic/mutagenic/toxic effects for reproduction

Based on available data, the classification criteria are not met.

STOT-single exposure

Based on available data, the classification criteria are not met.

STOT-repeated exposure

Based on available data, the classification criteria are not met.

Aspiration hazard

Based on available data, the classification criteria are not met.

11.2. Information on other hazards

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Endocrine disrupting properties

Endocrine disrupting potential (Health):

not relevant

SECTION 12: Ecological information**12.1. Toxicity**

Aquatic toxicity:

Acute (short-term) fish toxicity:

There are no data available on the preparation/mixture itself. The product has not been tested.

Acute (short-term) toxicity to crustacea:

There are no data available on the preparation/mixture itself. The product has not been tested.

Acute (short-term) toxicity to algae and cyanobacteria:

There are no data available on the preparation/mixture itself. The product has not been tested.

Chronic (long-term) toxicity to aquatic invertebrate:

There are no data available on the preparation/mixture itself. The product has not been tested.

Chronic (long-term) fish toxicity:

There are no data available on the preparation/mixture itself. The product has not been tested.

Toxicity to other aquatic plants/organisms:

No data available (Substances/Ingredient)

Terrestrial toxicity:

Acute and subchronic bird toxicity:

No data available (Substances/Ingredient)

Bird reproduction toxicity:

No data available (Substances/Ingredient)

Acute earthworm toxicity:

No data available (Substances/Ingredient)

Chronical earthworm toxicity (reproduction):

No data available (Substances/Ingredient)

Useful insect toxicity:

No data available (Substances/Ingredient)

Acute plant toxicity:

No data available (Substances/Ingredient)

Chronic plant toxicity:

No data available (Substances/Ingredient)

Toxicity to soil macroorganisms except of arthropods:

No data available (Substances/Ingredient)

Effects on soil microorganisms:

No data available (Substances/Ingredient)

Behaviour in waste water treatment plants:

No data available

Observe local regulations concerning effluent treatment.



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CAS No	Chemical name					
	Aquatic toxicity	Dose	[h] [d]	Species	Source	Method
124-30-1	octadecylamine					
	Acute fish toxicity	LC50 > 0,01 - 0,1 mg/l	96 h	Pimephales promelas	Supplier	EPA OPPTS 850.1085
	Acute algae toxicity	ErC50 > 0,01 - 0,1 mg/l	72 h	Scenedesmus subspicatus	Supplier	OECD 201
	Acute crustacea toxicity	EC50 > 0,01 - 0,1 mg/l	48 h	Daphnia magna	Supplier	OECD 202
	Algae toxicity	NOEC 0,01 mg/l	3 d	Desmodesmus subspicatus	ECHA	OECD 201
	Crustacea toxicity	NOEC 0,001 mg/l	21 d	Daphnia magna	ECHA	OECD 211
	Acute bacteria toxicity	(EC50 14 mg/l)	3 h	Activated sludge	ECHA	OECD 209
90622-57-4	hydrocarbons, C11-C12, isoalkanes, <2% aromatics					
	Acute fish toxicity	LC50 > 1000 mg/l	96 h	Oncorhynchus mykiss	Supplier / ECHA	OECD 203
	Acute algae toxicity	ErC50 > 1000 mg/l	72 h	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Acute crustacea toxicity	EC50 > 1000 mg/l	48 h	Daphnia magna	Supplier / ECHA	OECD 202
	Fish toxicity	NOEC 0,209 mg/l	28 d	Oncorhynchus mykiss	ECHA	[growth rate]
	Algae toxicity	NOEC 1000 mg/l	3 d	Pseudokirchneriella subcapitata	Supplier / ECHA	OECD 201
	Crustacea toxicity	NOEC > 1 mg/l	21 d	Daphnia magna	Supplier / ECHA	OECD 211
	Acute bacteria toxicity	(EC50 > 1,5 mg/l)	0 h	Pseudomonas putida	ECHA	[5h]
1185-81-5	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))					
	Acute algae toxicity	ErC50 > 1,6 mg/l	72 h	Desmodesmus subspicatus	ECHA	OECD 201
	Acute crustacea toxicity	EC50 0,11 mg/l	48 h	Daphnia magna	Supplier / ECHA	OECD 202
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate					
	Acute fish toxicity	LC50 > 100 mg/l	96 h	Danio rerio	Supplier / ECHA	OECD 203
	Acute algae toxicity	ErC50 61 mg/l	72 h	Desmodesmus subspicatus	Supplier / ECHA	[biomass]
	Acute crustacea toxicity	EC50 69 mg/l	48 h	Daphnia magna	Supplier	OECD 202 [24h]
	Algae toxicity	NOEC < 1,23 mg/l	3 d	Desmodesmus subspicatus	ECHA	87/302/EEC
	Crustacea toxicity	NOEC 0,002 mg/l	21 d	Daphnia magna	Supplier / ECHA	OECD 211
	Acute bacteria toxicity	(EC50 > 100 mg/l)	3 h	Activated sludge	Supplier / ECHA	OECD 209
90640-32-7	amines, C16-18-alkyl					
	Acute fish toxicity	LC50 (0,84) mg/l	96 h	Danio rerio	Supplier	OECD 203
	Acute algae toxicity	ErC50 (0,12) mg/l	72 h	Desmodesmus subspicatus	ECHA	OECD 201
	Acute crustacea toxicity	EC50 (0,32) mg/l	48 h	Daphnia magna	Supplier	OECD 202
	Algae toxicity	NOEC 0,01 mg/l	3 d	Desmodesmus subspicatus	ECHA	OECD 201
	Crustacea toxicity	NOEC 0,01 mg/l	21 d	Daphnia magna	Supplier	OECD 211
	Acute bacteria toxicity	(EC50 490,1 mg/l)	3 h	Activated sludge	ECHA	OECD 209
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)					
	Acute fish toxicity	LC50 0,19 mg/l	96 h	Oncorhynchus mykiss	ECHA	EPA OPP 72-1

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	Acute algae toxicity	ErC50	0,037 mg/l	72 h	Skeletonema costatum	ECHA	OECD 201
	Acute crustacea toxicity	EC50	0,16 mg/l	48 h	Daphnia magna	ECHA	EPA OPP 72-2
	Fish toxicity	NOEC mg/l	0,0464	35 d	Danio rerio	ECHA	OECD 210
	Algae toxicity	NOEC	0,004 mg/l	3 d	Skeletonema costatum	ECHA	OECD 201
	Crustacea toxicity	NOEC mg/l	0,0111	21 d	Daphnia magna	ECHA	OECD 211
	Acute bacteria toxicity	(EC50	4,5 mg/l)	3 h	Activated sludge	ECHA	OECD 209

12.2. Persistence and degradability

Abiotic degradation:

Physicochemical elimination:

Oxidation:

not applicable (Mixtures)

No data available (Substances/Ingredient)

Hydrolysis:

not applicable (Mixtures)

No data available (Substances/Ingredient)

Photochemical elimination:

Photolysis:

not applicable (Mixtures)

No data available (Substances/Ingredient)

Ozonolysis:

not applicable (Mixtures)

No data available (Substances/Ingredient)

Biodegradation:

not applicable (Mixtures)

CAS No	Chemical name			
	Method	Value	d	Source
	Evaluation			
124-30-1	octadecylamine			
	OECD 301 F	70 %	28	ECHA
	readily biodegradable			
90622-57-4	hydrocarbons, C11-C12, isoalkanes, <2% aromatics			
	OECD 301 F	31,3-41,7 %	28	Supplier / ECHA
	inherently biodegradable			
1185-81-5	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))			
	OECD 301 F	0 %	28	ECHA
	under test conditions no biodegradation observed			
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate			
	OECD 301 B	1 %	28	Supplier / ECHA
	not readily biodegradable			
90640-32-7	amines, C16-18-alkyl			
	OECD 301 D	75 %	28	ECHA
	readily biodegradable			
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)			
	OECD 301 B (CO2 Evolution Test)	> 38%	29	ECHA
	readily biodegradable, but failing 10-day window			
	OECD 303 A (Activated sludge Units)	> 80%		Supplier
	readily biodegradable			
	OECD 302 B (Zahn-Wellns Test)	100%		Supplier
	readily biodegradable			

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12.3. Bioaccumulative potential

not applicable (Mixtures)

Partition coefficient n-octanol/water

CAS No	Chemical name	Log Pow
124-30-1	octadecylamine	8,35
1185-81-5	stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide))	3,11
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate	10,03
90640-32-7	amines, C16-18-alkyl	4,33
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)	0,401

BCF

CAS No	Chemical name	BCF	Species	Source
124-30-1	octadecylamine	> 500		Supplier
63843-89-0	bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)4-hydroxyphenyl]methyl]butylmalonate	49,3-437,1	Cyprinus carpio	Supplier / ECHA
90640-32-7	amines, C16-18-alkyl	173		ECHA
55965-84-9	reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1)	54	Lepomis macrochirus	ECHA

12.4. Mobility in soil

Surface tension:

See under section 9.1 - Information on basic physical and chemical properties.

Distribution:

Water-air (volatility rate, Henry-constant):

not applicable (Mixtures)

No data available (Substances/Ingredient)

Soil-Water (Adsorption coefficient):

not applicable (Mixtures)

No data available (Substances/Ingredient)

Soil-Air (volatility rate):

not applicable (Mixtures)

No data available (Substances/Ingredient)

12.5. Results of PBT and vPvB assessment

The substances in the mixture do not meet the PBT/vPvB criteria according to UK REACH.

The substances in the mixture do not meet the PBT/vPvB criteria according to REACH, annex XIII.

12.6. Endocrine disrupting properties

This product does not contain a substance that has endocrine disrupting properties with respect to non-target organisms as no components meets the criteria.

Endocrine disrupting potential (Environment):

not relevant

12.7. Other adverse effects

Ozone depletion potential (ODP):

No data available (Substances/Ingredient)

Photochemical ozone creation potential (POCP):

No data available (Substances/Ingredient)

Global warming potential (GWP):

No data available (Substances/Ingredient)

Endocrine disrupting potential

No data available

AOX: The product contains organic halogens.

SECTION 13: Disposal considerations

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13.1. Waste treatment methods**Disposal recommendations**

Waste treatment options:

Transfer to an emulsion fission reactor or an emulsion evaporation system, observing official regulations.

Dispose of waste according to applicable legislation.

Waste disposal according to directive 2008/98/EC, covering waste and dangerous waste.

Properties of waste which render it hazardous:

Irritant — skin irritation and eye damage

Ecotoxic

Evidence for disposal must be provided.

Consult the appropriate local waste disposal expert about waste disposal.

Waste for recycling is to be classified and labelled.

For recycling, contact recycling exchanges.

May not be disposed or deposited together with domestic garbage.

Do not mix with other wastes.

Do not flush into surface water or sanitary sewer system.

Do not dispose of waste into sewer.

Before discharge in public drains (e.g. residues of washing- and rinsing liquids) please observe the relevant regulations. In case of further questions please contact your waste- or environmental representative or the responsible authority.

Clean IBCs or drums at approved facility only.

The waste producer is responsible for correct coding and designation of his wastes.

The allocation of waste identity numbers/waste descriptions must be carried out according to the EEC, specific to the industry and process.

List of proposed waste codes/waste designations in accordance with EWC:

List of Wastes Code - residues/unused products

070201 WASTES FROM ORGANIC CHEMICAL PROCESSES; wastes from the MFSU of plastics, synthetic rubber and man-made fibres; aqueous washing liquids and mother liquors; hazardous waste

List of Wastes Code - used product

070201 WASTES FROM ORGANIC CHEMICAL PROCESSES; wastes from the MFSU of plastics, synthetic rubber and man-made fibres; aqueous washing liquids and mother liquors; hazardous waste

List of Wastes Code - contaminated packaging

150110 WASTE PACKAGING; ABSORBENTS, WIPING CLOTHS, FILTER MATERIALS AND PROTECTIVE CLOTHING NOT OTHERWISE SPECIFIED; packaging (including separately collected municipal packaging waste); packaging containing residues of or contaminated by hazardous substances; hazardous waste

Contaminated packaging

Other disposal recommendations:

Contaminated packages must be completely emptied and can be re-used following proper cleaning.

Cleaning by recycling company.

Recommended cleansing agent:

Clean with detergents. Avoid solvent cleaners.

Handle contaminated packages in the same way as the substance itself.

Non-contaminated packages may be recycled.

Packing which cannot be properly cleaned must be disposed of.

As well uncleaned (empty) containers remain contaminated by product residues and may be hazardous by vapours.

They have to be disposed by specialists or have to be supplied to a licensed reconditioning.

The conditions of the regional reconditioning companies have to be observed.

SECTION 14: Transport information

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Land transport (ADR/RID)

14.1. UN number or ID number: UN3082
14.2. UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Alkyl amines)
14.3. Transport hazard class(es): 9
14.4. Packing group: III
 Hazard label: 9



Classification code: M6
 Special Provisions: 274 335 375 601
 Limited quantity: 5 L
 Excepted quantity: E1
 Transport category: 3
 Hazard No: 90
 Tunnel restriction code: -

Other applicable information (land transport)

Provision(s), multilateral agreement(s): Not applicable

Maximum permissible total quantity per unit of carriage according to subsection 1.1.3.6 ADR/RID: 1000 L.

Factor out of category of carriage (= 3) to calculate the quantity per unit of carriage: 1.

Inland waterways transport (ADN)

Other applicable information (inland waterways transport)

Not classified for this transport carrier.

Marine transport (IMDG)

14.1. UN number or ID number: UN3082
14.2. UN proper shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Alkyl amines)
14.3. Transport hazard class(es): 9
14.4. Packing group: III
 Hazard label: 9



Marine pollutant: P
 Special Provisions: 274, 335, 969
 Limited quantity: 5 L
 Excepted quantity: E1
 EmS: F-A, S-F
 Segregation group: IMDG-Code segregation group not applicable

Other applicable information (marine transport)

Exception(s): Not applicable

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Air transport (ICAO-TI/IATA-DGR)**14.1. UN number or ID number:**

UN3082

14.2. UN proper shipping name:

ENVIRONMENTALLY HAZARDOUS SUBSTANCE, LIQUID, N.O.S. (Alkyl amines)

14.3. Transport hazard class(es):

9

14.4. Packing group:

III

Hazard label:

9



Special Provisions:

A97 A158 A197

Limited quantity Passenger:

30 kg G

Passenger LQ:

Y964

Excepted quantity:

E1

IATA-packing instructions - Passenger:

964

IATA-max. quantity - Passenger:

450 L

IATA-packing instructions - Cargo:

964

IATA-max. quantity - Cargo:

450 L

Other applicable information (air transport)

ERG Kodex: 9L

The state variations in chapter 2.8.1 and the operator variations in chapter 2.8.3 for shipping of dangerous goods in limited quantities according to chapter 2.7 of the valid ICAO/IATA Dangerous Goods Regulations have to be observed.

The rulings for dangerous goods by air mail according to chapter 2.4 of the valid ICAO/IATA Dangerous Goods Regulations and the conventions of the Universal Postal Union (UPU) as well as the clauses of the relevant National Postal Administration have to be observed. Airmail: prohibited.

14.5. Environmental hazards

ENVIRONMENTALLY HAZARDOUS:

Yes



Danger releasing substance:

Alkyl amines

14.6. Special precautions for user

Further information see under section 6, 7, 8.

14.7. Maritime transport in bulk according to IMO instruments

No bulk transport in accordance with IBC code.

It is sold exclusively in traffic legally authorized and appropriate packaging.

Other applicable information

Postal, express and courier services:

Postal service (national):

Refer to your National Postal Administration.

Express freight / special delivery:

Refer to your National Postal Administration.

Courier service (national):

The general conditions of business of the particular courier service have to be observed.

SECTION 15: Regulatory information**15.1. Safety, health and environmental regulations/legislation specific for the substance or mixture****EU regulatory information**

Restrictions on use (REACH, annex XVII):

Entry 3, Entry 20, Entry 75

2010/75/EU (VOC):

3 % (32 g/l)

Additional information

Authorisations and/or restrictions on use:

Authorisations:

Authorisation of Chemicals (REACH) as regards Annex XIV:

not relevant

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Restrictions on use:

Restriction of chemicals (REACH) as regards annex XVII:

No. 20 - organo-tin compounds

Informations on Regulation (EC) No. 1272/2008 - Annex VI, Part 1:

Note P is valid: The harmonised classification as a carcinogen or mutagen applies unless it can be shown that the substance contains less than 0,1 % w/w benzene (Einecs No 200-753-7), in which case a classification in accordance with Title II of this Regulation shall be performed also for those hazard classes. Where the substance is not classified as a carcinogen or mutagen, at least the precautionary statements (P102-)P260-P262-P301 + P310-P331 shall apply.

Other regulations (EU):

Regulation (EC) No. 1005/2009 - Substances that deplete the ozone layer:

not relevant

Regulation (EC) No. 648/2004 and No 907/2006 - Detergents:

not relevant

Regulation (EC) No. 649/2012 - Export and import of dangerous chemicals:

not relevant

Regulation (EU) 2019/1021 - Persistent organic pollutants:

not relevant

Regulation (EC) No. 428/2009 and No. 388/2012 and No. 1382/2014 - Control of exports, or transfer, brokering and transit of dual-use goods (Dual-Use Regulation):

not relevant

Regulation (EC) No. 273/2004 - Drug precursors:

not relevant

Regulation (EC) No. 111/2005 - Definition of rules for the monitoring of trade in drug precursors between the Union and third countries:

not relevant

Directive 2012/18/EC - Control of major accident hazards involving dangerous substances (Seveso III):

ANNEX I, PART 1 (Categories of dangerous substances):

E2 (ENVIRONMENTAL HAZARDS) - Hazardous to the Aquatic Environment in Category Chronic 2 (Column 1)

Quantities: > 200.000 kg (Column 2) / > 500.000 kg (Column 3)

Directive 2004/42/EC - Use of organic solvents in certain paints and lacquers:

not relevant

Directive 2010/75/EU - Industrial Emissions Directive (Directive IE) - succession to Directive 1999/13/EC - Limitation of emissions of volatile organic compounds (VOC-Directive):

When using this substance / mixture it has to be checked whether the activities are subject to the requirements of IE-RL, Chapter V (installations and activities with the use of organic solvents - VOC).

Aerosol Directive (75/324/):

not relevant

Biocide directive (98/8/EC):

not relevant

Regulation (EU) No. 528/2012 on biocides:

In accordance with Regulation (EU) No. 528/2012 on biocides

This product is a with biocidal products treated article.

Observe in addition any national regulations!

EC-Chemical inventories: All ingredients are listed in EINECS / ELINCS or excepted from listing.

National regulatory information

Employment restrictions:

Observe restrictions to employment for juveniles according to the 'juvenile work protection guideline' (94/33/EC). Observe employment restrictions under the Maternity Protection Directive (92/85/EEC) for expectant or nursing mothers.

Additional information

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Other regulations, restrictions and prohibition regulations:

European product inventories (Registration status on mixtures):

Kemikalieinspektionen / Produktregistret / Swedish Chemicals Inspectorate - Keml (<http://www.kemi.se>):

This product was not registered.

Schweizerische Eidgenossenschaft - Bundesamt für Gesundheit - BAG (<http://www.bag.admin.ch>) / Anmeldestelle

Chemikalien (<http://www.cheminfo.ch>) / Informationssystem für gefährliche und umweltrelevante Stoffe - IGS

(<http://igs.naz.ch/index.html>):

This product was not registered.

International chemical inventories (Registration status on substances): No data available

A downstream user chemical safety assessment according to REACH (article 37.4) was performed for the following substance(s):

amines, C16-18-alkyl, EC-No.: 292-550-5

octadecylamine, EC-No.: 204-695-3

Links to the annexed exposure scenarios (ES) according to REACH (article 31.7):

Short title: Manufacture of plastics products, including compounding and conversation (industrial application).

PFA-DU-ES2

ODA-DU-ES2

Short title: Manufacture of plastics products, including compounding and conversation (professional application).

PFA-DU-ES4

ODA-DU-ES4

15.2. Chemical safety assessment

For the following substances of this mixture a chemical safety assessment has been carried out:

octadecylamine

hydrocarbons, C11-C12, isoalkanes, <2% aromatics

bis(1,2,2,6,6-pentamethyl-4-piperidyl) [[3,5-bis(1,1-dimethylethyl)-4-hydroxyphenyl]methyl]butylmalonate

amines, C16-18-alkyl

SECTION 16: Other information**Changes**

This version replaces all former issues.

Changes made in this revision see section: 3, 11, 12, 15, 16.

Abbreviations and acronyms

ADN: European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways.

ADR: European Agreement concerning the International Carriage of Dangerous Goods by Road.

ATE: Acute Toxicity Estimate.

CAS: Chemical Abstracts Service.

CEN: Comité Européen de Normalisation (European Committee for Standardisation).

CLP: Classification Labelling Packaging Regulation; Regulation (EC) No 1272/2008.

CSA: Chemical Safety Assessment.

CSR: Chemical Safety Report.

C&L: Classification & Labeling.

DNEL: Derived No-Effect Level.

EAK: European Waste Catalogue (replaced by LoW – see below).

EC50: Effective concentration, 50 percent.

ECHA: European Chemicals Agency.

EC: European community.

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EINECS: European Inventory of Existing Commercial Chemical Substances.
ELINCS: European List of Notified Chemical Substances.
EN: European standard.
EWC: European Economic Community.
EEA: European Economic Area (EU + Iceland, Liechtenstein and Norway).
EU: European Union.
GHS: Globally Harmonized System of Classification and Labelling of Chemicals.
HSPA: Hydrocarbon Solvents Producers Association.
IATA-DGR: International Air Transport Association Dangerous Goods Regulations.
IBC-Code: International Code for the Construction and Equipment of Ships carrying Dangerous Chemicals in Bulk (International Bulk Chemical Code).
IC50 / ErC50: Inhibitory concentration, 50 percent.
ICAO-TI: International Civil Aviation Organization Technical Instruction.
IMDG: International Maritime Dangerous Goods.
ISO: A standard of International Standards Organisation.
IUPAC: International Union for Pure and Applied Chemistry.
LC50: Lethal concentration, 50 percent.
LD50: Lethal Dose, 50 percent.
log Kow (Pow): octanol-water partition coefficient.
LoW: List of Wastes (see <http://ec.europa.eu/environment/waste/framework/list.htm>).
LQ: Limited Quantities.
MARPOL: Maritime Pollution Convention (Convention for the Prevention of Pollution from Ships).
OC: Operational Conditions.
OECD: Organisation for Economic Co-operation and Development.
OSHA: Occupational Safety and Health Agency.
PBT: Persistent, bioaccumulabe and toxic.
PEC: Predicted Effect Concentration.
PNEC: Predicted No-Effect Concentration.
PPE: Personal Protection Equipment.
(Q)SAR: Quantitative-Structure-Activity-Relationship.
REACH: Registration, Evaluation, Authorisation and Restriction of Chemicals; Regulation (EC) No 1907/2006.
RID: Regulations concerning the International Carriage of Dangerous Goods by Rail.
RMM: Risk Management Measure.
SVHC: Substances of Very High Concern.
STOT - RE: Specific Target Organ Toxicity - Repeated Exposure.
STOT - SE: Specific Target Organ Toxicity - Single Exposure.
UN: United Nations.
UVCB: Substances of Unknown or Variable composition, Complex reaction products or Biological materials.
vPvB: Very persistent and very bioaccumulable.
WoE: Weight of Evidence.

For abbreviations and acronyms, see table at <http://abbrev.esdscom.eu>**Classification for mixtures and used evaluation method according to GB CLP Regulation**

Classification	Classification procedure
Eye Irrit. 2; H319	Calculation method
Aquatic Chronic 2; H411	Calculation method

Relevant H and EUH statements (number and full text)

H301	Toxic if swallowed.
H302	Harmful if swallowed.
H304	May be fatal if swallowed and enters airways.
H310	Fatal in contact with skin.
H312	Harmful in contact with skin.
H314	Causes severe skin burns and eye damage.
H315	Causes skin irritation.
H317	May cause an allergic skin reaction.
H318	Causes serious eye damage.
H319	Causes serious eye irritation.

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H330	Fatal if inhaled.
H341	Suspected of causing genetic defects.
H360FD	May damage fertility. May damage the unborn child.
H372	Causes damage to organs through prolonged or repeated exposure.
H373	May cause damage to organs through prolonged or repeated exposure.
H400	Very toxic to aquatic life.
H410	Very toxic to aquatic life with long lasting effects.
H411	Toxic to aquatic life with long lasting effects.
H413	May cause long lasting harmful effects to aquatic life.
EUH066	Repeated exposure may cause skin dryness or cracking.
EUH071	Corrosive to the respiratory tract.
EUH208	Contains stannane, dibutylbis(dodecylthio)- (dibutyltin bis(lauryl mercaptide)); reaction mass of 5-chloro-2-methyl-2H-isothiazol-3-one and 2-methyl-2H-isothiazol-3-one (3:1). May produce an allergic reaction.

Further Information

Full text of all R-, H-, EUH-phrases which are referred to in section 2 and 3 of this safety data sheet - see previous list.
These (this) R-, H-, EUH-phrases/R-, H-, EUH-phrase apply/applies to the substance(s) of content, however, it does not necessarily show the classification of the product.

Key literature references and sources for data:

The classification corresponds to current EC-lists, but is completed by statements of technical literature and company data.

Other public accessible sources:

Regulation (EC) No. 1907/2006 (REACH) in the valid version in each case

Regulation (EC) No. 1272/2008 (CLP) in the valid version in each case

Further information and practical guides on the internet:

European Chemicals Agency - ECHA (<http://echa.europa.eu>)

ECHA - Information on Chemicals (<http://echa.europa.eu/information-on-chemicals>)

ECHA - Candidate List of Substances of Very High Concern for Authorisation

(<http://echa.europa.eu/de/candidate-list-table>)

ECHA - List of restrictions table

(<http://echa.europa.eu/de/addressing-chemicals-of-concern/restrictions/list-of-restrictions/list-of-restrictions-table>)

ECHA - Authorisation List

(<http://echa.europa.eu/hr/addressing-chemicals-of-concern/authorisation/recommendation-for-inclusion-in-the-authorisation-list/authorisation-list>)

ECHA - C&L Inventory (<http://echa.europa.eu/en/web/guest/regulations/clp/cl-inventory>)

eChemPortal (<http://www.echemportal.org>)

The access to European Union law - EUR-Lex (<http://eur-lex.europa.eu>)

Health and Safety Executive (<http://www.hse.gov.uk>) / Control of Substances Hazardous to Health Regulations - COSHH

(<http://www.coshh-essentials.org.uk/Home.asp>)

Pollution Prevention and Control Act and Pollution Prevention and Control Regulations

Recommended restriction of application:

See under section 1.2 - Uses advised against.

Use this product only for intended purpose in accordance with our product informations.

Please refer to our internet website for more information (<http://www.acmos.com>).

Training advice:

Yearly briefing and instruction of employees by means of operating instructions according to article 8 of EC-directive 98/24/EC.

Inquiry office: Laboratory (Division: Occupational- /Product security)

Contact person: Mr. Dryhaus (Telephone: +49-421-5189-0, Telefax: +49-421-5189-871)

Office hours: Mo - Th from 7.30 - 16.15 h and Fr from 7.30 - 13.30 h. Out of office hours no call diversion.

Disclaimer:

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The information is based on the present level of our knowledge. It does not, however, give assurance of product properties and establishes no contract legal rights. The information contained herein are, to our knowledge at the time of their creation to be correct and been taken from sources deemed to be reliable. The information given is designed only as a guidance for safe handling, use, processing, storage, transportation, disposal and release. The receiver of our product is singularly responsible for adhering to existing laws and regulations. All descriptions are approximate values, they are not specified for construction of specifications. This safety data sheet does not represent any operating instruction according to national chemical regulations. It may be used for creation, but must not replace it. The employer is not relieved from his duties. All technical information to occupational protection are directed predominately to experts first (safety engineers, occupational medicines).

Identified uses

No	Short title	LCS	SU	PC	PROC	ERC	AC	TF	Specification
1	Manufacture of plastics products, including compounding and conversion (industrial application)	IS	12	24	7, 9, 10	4	-	-	PFA-DU-ES2
2	Manufacture of plastics products, including compounding and conversion (professional application)	PW	-	-	9, 10, 11	4	-	-	PFA-DU-ES4
3	Manufacture of plastics products, including compounding and conversion (industrial application)	IS	12	24	7, 9, 10	4	-	-	ODA-DU-ES2
4	Manufacture of plastics products, including compounding and conversion (professional application)	PW	-	-	9, 10, 11	4	-	-	ODA-DU-ES4

LCS: Life cycle stages

PC: Product categories

ERC: Environmental release categories

TF: Technical functions

SU: Sectors of use

PROC: Process categories

AC: Article categories

APPENDIX V

EMISSION MONITORING REPORT (2023 – 2024)



2499

EMISSIONS MONITORING SURVEY

Prepared for:

Adler Pelzer Group
CAB Automotive Limited
Vaughan Trading Estate
Sedgley Road East
Tipton
West Midlands
Dy4 7UJ

Permit Number	: PPC 92935
Variation Number	: V1
Installation	: Spraybooths
Visit Details	: Compliance - November 2023
Job Number	: P5617
Report Number	: R001
Report Issue Date	: 8 th February 2024
Survey Dates	: 9 th – 10 th November 2023, 18 th December 2023 & 22 nd January 2024

Prepared by:

Environmental Compliance Limited

Unit G1
Main Avenue
Treforest Industrial Estate
Pontypridd
CF37 5BF.
Tel: 01443 801215

Report Issue:		FINAL	
Report Prepared by:		Report Reviewed & Approved by MCERTS Level Two Technical Endorsements TE1, TE2, TE3 & TE4	
Name:	Scott Hackett	Name:	Andy Barnes
		MCERTS No:	MM 03 235
		Signature:	
Date:	7 th February 2024	Date:	8 th February 2024

This report is not to be used for contractual or engineering purposes unless this approval sheet is signed where indicated by the approver and the report is designated "FINAL".

Environmental Compliance Limited

Adler Pelzer Group		Installation Name	: Spraybooths
Permit No	: PPC 92935	Visit Details	: Compliance - November 2023
Variation No	: V1	Survey Dates	: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
Report Ref	: P5617 : Root	Report Issue Date	: 8th February 2024

This report has been prepared by Environmental Compliance Limited (ECL) in their professional capacity as Environmental Consultants. The contents of the report reflect the conditions that prevailed and the information available or supplied at the time of its preparation. The report, and the information contained therein, is provided by ECL solely for use and reliance by the Client in performance of ECLs duties and liabilities under its contract with the Client. Until ECL has received payment in full as detailed in the quotation or contract the contents of this report remain the legal property of ECL. The contents of the report do not, in any way, purport to include any manner of legal advice or opinion.

Any operating information and CEMS data used in this report has been supplied by the client.

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Should the Client wish to release this report to a Third Party for the party's reliance, Environmental Compliance Ltd may, at its discretion, agree to such release provided that:

- Environmental Compliance Ltd gives written agreement prior to such release and ECL has received payment in full for all works/services undertaken;
- By release of the report to the Third Party, that Third Party does not acquire any rights, contractual or otherwise, whatsoever against Environmental Compliance Ltd and, accordingly, Environmental Compliance Ltd assume no duties, liabilities or obligations to that Third Party;
- Environmental Compliance Ltd accepts no responsibility for any loss or damage incurred by the Client or for any conflict of Environmental Compliance Ltd interests arising out of the Clients' release of this report to the Third Party.

In the event that a report is revised and re-issued, the client shall ensure that any earlier versions of the report, and any copies thereof, are void and such copies should be marked with the words "superseded and revised".

Opinions and Interpretation expressed within this report are outside the scope of the UKAS accreditation.

MCERTS requirements mean that comparison of results with emissions limit values is not permitted within this report.

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Root

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

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PART 1 - EXECUTIVE SUMMARY

1 Monitoring Objectives

Environmental Compliance Ltd (ECL) was commissioned by **Adler Pelzer Group** to undertake an emission monitoring survey at their **Tipton site**. This report presents the findings of the study.

The monitoring at this installation was carried out in accordance with our quotation reference **AM/P5617/Q001**, for compliance check monitoring of emissions to air. The substances requested for monitoring at each emissions point are listed below:

Substances to be monitored	Emission Point Identification	
	EX 1	EX 2
	Spraybooth (Mini) No.2	Spraybooth (Mini) No.1
Velocity / Flowrate	● U	● U
Particulates	● U	● U

Substances to be monitored	Emission Point Identification	
	EX 3	EX 4
	Spraybooth No.3	Spraybooth (McLaren) No.8
Velocity / Flowrate	● U	● U
Particulates	● U	● U
Total Organic Carbon (TVOC)	● U	
Speciated VOCs (Dichloromethane)	● U	

Substances to be monitored	Emission Point Identification	
	EX 5	SB5
	Spraybooth (McLaren) No.9	Bentley Spraybooth
Velocity / Flowrate	● U	● U
Particulates	● U	● U

Environmental Compliance Limited

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5617 : R001

Installation Name : Spraybooths
Visit Details : Compliance - November 2023
Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
Report Issue Date : 8th February 2024

Substances to be monitored	Emission Point Identification	
	SB7	X 152
	Bentley Spraybooth	Jaguar Spraybooth
Velocity / Flowrate	● U	● U
Particulates	● U	● U

- Denotes the substances to be monitored.
- U Denotes UKAS accreditation is held for monitoring that substance, but does not mean that it has been claimed which will depend on whether the testing could be completed in accordance with the Standard Reference Method.

Special Requirements: “During Normal Operation.”

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

1.1 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
EX 1 Spraybooth No.2 (Mini)	Volumetric Flowrate	...	3.00050	m³/sec	...	4	Stack Conditions	09/11/2023	10:24 – 10:44	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	2.75767	m³/sec	...	5	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates §	50	1.63	mg/m³	16.16	>100	& Wet Gas		11:55 – 12:25	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
EX 2 Spraybooth (Mini) No.1	Volumetric Flowrate	...	3.02626	m³/sec	...	5	Stack Conditions	09/11/2023	10:00 – 10:20	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	2.76710	m³/sec	...	6	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates §	50	1.94	mg/m³	19.08	>100	& Wet Gas		11:55 – 12:25	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
EX 4 Spraybooth (McLaren) No.8	Volumetric Flowrate	...	3.39808	m³/sec	...	7	Stack Conditions	09/11/2023	13:00 – 13:20	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	3.11554	m³/sec	...	8	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates §	50	1.64	mg/m³	17.97	>100	& Wet Gas		13:50 – 14:20	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

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Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
EX 5 Spraybooth (McLaren) No.9	Volumetric Flowrate	...	1.90033	m³/sec	...	7	Stack Conditions	09/11/2023	13:24 – 13:44	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	1.73246	m³/sec	...	8	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates \$	50	1.89	mg/m³	11.90	46	& Wet Gas		13:50 – 14:20	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
SB5 Bentley Spraybooth	Volumetric Flowrate	...	0.32126	m³/sec	...	41	Stack Conditions	22/01/2024	10:00 – 10:20	BS EN 16911-1:2013 & MID	NU	✓	Normal
	Volumetric Flowrate	...	0.29874	m³/sec	...	42	& Wet Gas			BS EN 16911-1:2013 & MID	NU	✓	Normal
	Particulates \$	50	1.53	mg/m³	1.58	>100	& Wet Gas		10:27 – 10:57	BS EN 13284-1:2017 & MID	NU	✓	Normal

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
SB7 Bentley Spraybooth	Volumetric Flowrate	...	3.72957	m³/sec	...	6	Stack Conditions	22/01/2024	11:24 – 11:50	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	3.47069	m³/sec	...	7	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates \$	50	0.82	mg/m³	10.20	93	& Wet Gas		12:28 – 12:58	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

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Report Issue Date : 8th February 2024

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
X 152 Jaguar Spraybooth	Volumetric Flowrate	...	1.38806	m³/sec	...	5	Stack Conditions	18/12/2023	10:15 – 10:35	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	1.32324	m³/sec	...	6	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates \$	50	1.23	mg/m³	5.80	77	& Wet Gas		10:43 – 11:13	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

: Spraybooths

Visit Details

: Compliance - November 2023

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Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
EX 3 Spraybooth No.3	Volumetric Flowrate	...	1.95125	m³/sec	...	5	Stack Conditions	18/12/2023	12:00 – 12:20	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	1.85323	m³/sec	...	6	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	
	Particulates §	50	1.12	mg/m³	7.44	>100	& Wet Gas		13:00 – 13:30	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	
	TVOC as Carbon – Test 1	20*	1.59	mgC/m³	10.61	2	& Wet Gas		13:00 – 13:30	BS EN 12619:2013	UKAS / MCERTS		
	TVOC as Carbon – Test 2	20*	1.08	mgC/m³	7.21	2	& Wet Gas		13:45 – 14:15	BS EN 12619:2013	UKAS / MCERTS		
	TVOC as Carbon – Test 3	20*	0.82	mgC/m³	5.47	2	& Wet Gas		14:30 – 15:00	BS EN 12619:2013	UKAS / MCERTS		
	TVOC as Carbon – Average	20*	1.16	mgC/m³	7.76	2	& Wet Gas		...	BS EN 12619:2013	UKAS / MCERTS		
	Dichloromethane – Test 1 §	...*	0.90	g/hr	6.00	>100	& Wet Gas		13:00 – 13:30	CEN/TS 13649:2014	UKAS / MCERTS		
	Dichloromethane – Test 2 §	...*	0.90	g/hr	6.00	>100	& Wet Gas		13:45 – 14:15	CEN/TS 13649:2014	UKAS / MCERTS		
	Dichloromethane – Test 3 §	...*	0.90	g/hr	6.00	>100	& Wet Gas		14:30 – 15:00	CEN/TS 13649:2014	UKAS / MCERTS		
	Dichloromethane – Average §	...*	0.90	g/hr	6.00	>100	& Wet Gas		...	CEN/TS 13649:2014	UKAS / MCERTS		

* The permit states that the 20mg/m³ limit for TVOC as carbon applies, only if the mass emission of R40 risk phrase materials exceeds 100 g/hr.

Notes

The volumetric flowrate shown above is that from the initial pitot traverse.

Any other flow measurements made during isokinetic sampling and/or repeat traverses are shown later in the tables section.

The uncertainty figures presented in Table 1.1 for TVOC are “measurement uncertainty” figures, which do not take into account the variability of the measured sample values.

The “uncertainty of measurement results” figures, which do include this contribution, are presented in the appendices of the report for these determinands.

Emission Limit Value

The emission limit value is that stated in the permit and will be expressed as a concentration or a mass emission.

Periodic Monitoring Result

The result given is expressed in the same terms and units as the emission limit value.

Uncertainty

The uncertainty associated with the quoted result is at the 95% confidence interval. The Uncertainty results **DO NOT** take into account the effect of the sample location limitations.

Reference Conditions

All results are expressed at 273 K and 101.3kPa. The oxygen and moisture corrections are stated.

Monitoring Method Reference

The method stated is in accordance with the Environment Agency Technical Guidance Note M2, or other method approved by the Environment Agency.

Accreditation for use of Method

The details indicate the accreditation for the use of the complete monitoring method, e.g. MCERTs, UKAS. If use of the method is not accredited " NA" is stated.

Operating Status

The details indicate the feedstock and the loading rate of the plant during monitoring.

§

Chemical Analysis on sample reagents was performed by an External Laboratory as detailed in Section 4

NU

UKAS Accreditation Held but UKAS Accreditation cannot be claimed for the test as sampling did not comply with the Standard Reference Method (SRM), see section 2 & 5

NA

Method is NOT UKAS Accredited.

Adler Pelzer Group

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Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

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1.2 Operating Information

Any operating information and CEMS data below has been supplied by the client.

Emission Point Reference	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results					
							Parameter	Date	Time	CEMS Results	Periodic Monitoring Results	Units
All	Batch	As Required	N/A	N/A	Dry Filter	Normal	...	...	...	NP	...	...

Notes:

Process Type

Process Duration

Fuel

Feedstock

Abatement

Load

CEMS Data

State whether the process is a continuous or batch process.

If a batch process, state the duration, frequency and details of the portion of the batch sampled. If continuous state "NA"

If applicable, state the fuel type If not applicable state "NA"

State the feedstock type

State the type and whether operational during monitoring. If not applicable state "NA"

State the normal load, throughput or rating of the plant

Enter this data for each CEM installed if it is has been provided by operator otherwise state “NP” (NOT PROVIDED)

2

Monitoring Deviations

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in Section 1. This survey meets the requirements of the site's **PPC Permit Number: PPC 92935** where UKAS and MCERTS accreditation has and could be claimed for the testing in the monitoring results table.

There were modifications to the sampling procedures (TPDs) listed in section 4, these are as follows.

EX1, EX 2, EX4, X152 & SB7 - Due to high duct gas velocity, in order to maintain isokinetic sampling, it was necessary to use a nozzle with diameter smaller than the recommended minimum of 8mm minimum stated in BS EN 13284-1:2017. Note that there is no absolute minimum nozzle size stated in the standard, as long as the uncertainty of the nozzle area is <5%. **So this does not need to be described as a non-conforming test.**

There were substance deviations from the original and agreed emissions monitoring schedule, as follows. In between issue of the quote and the sampling date, the client has re-numbered some of the extraction points and so the references in the SSP do not match the references in the report.

Non-conforming tests are as follows.

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

For all stacks, Flowrate and particulate tests are non-conforming, as there is only one sampling port available in each case, rather than two as required by the sampling standards. In order to maintain the UKAS/MCERTS accreditation status of the tests, extra sample points were used on the one available sample line.

For SB5 Bentley Spraybooth, Volumetric Flowrate tests are non-conforming, (and cannot hold accreditation) as the velocity pressure was below the 5 Pascal (0.5mmH₂O) limit of detection for the method. Consequently, the **particulate** sample is also therefore not accredited.

Homogeneity tests have not been completed for pollutants at any of the sampling locations. Such tests are not applicable to these locations (as the duct area is <1m²) and were not requested by the client.

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : R001

Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
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PART 2 – SUPPORTING INFORMATION

3 SAMPLING STAFF DETAILS

Site Sampling Team

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Lee Harper	9 th – 10 th November 2023	MM 17 1423	2	TE1, TE2, TE4
Thomas Ralph		MM 22 1706	1	...

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Lee Harper	18 th December 2023	MM 17 1423	2	TE1, TE2, TE4
Thomas Ralph		MM 22 1706	1	...

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Lee Harper	22 nd January 2024	MM 17 1423	2	TE1, TE2, TE4
Thomas Ralph		MM 22 1706	1	...

Report Reviewer

Name	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	MM 03 235	2	TE1, TE2, TE3, TE4

Technical Endorsement Key:-

TE1 – Isokinetic Particulates, Temperature & Velocity Profiles, Oxygen.

TE2 – Isokinetic Extractive Pollutants:- Metals, Dioxin & Furans, PAHs, PCBs, HCl, HF.

TE3 – Non-Isokinetic Extractive Pollutants:- Speciated VOCs, HF, HCl, Cyanide.

TE4 – Continuous Analysers (Combustion Gases):- TVOC, CO, NOx, SO₂.

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4

SAMPLING PROTOCOLS / METHODOLOGIES

Details of the substances monitored, the standard methods used and the Environmental Compliance Limited Technical Procedures used during this survey are shown in the table below. Detailed sampling protocols are included in a separate document which will be sent with the report.

In all cases, where analysis of collected samples was required, the analysis was by a subcontract laboratory. Details of the sub-contract laboratory are shown on the analysis certificates in this report. The UKAS/MCERTs accreditation status of the analysis is also indicated on the certificates.

Any required modifications to the Technical Procedure Documents (TPDs) specified below will be detailed in section 2 of this report.

Determinand	External Reference Method	ECL Technical Procedure Number
Velocity and Flowrate	BS EN 16911-1:2013 & MID	ECL/ TPD/ 022A
Particulates (Stackmite)	BS EN 13284-1:2017 & MID	ECL / TPD / 027A
TVOC (Sick F3006)	BS EN 12619: 2013	ECL / TPD / 032B
Speciated VOC (Dichloromethane)	CEN/TS 13649:2014	ECL / TPD / 084

5 SAMPLE POINT DESCRIPTIONS

The homogeneity test is applicable to combustion processes, but may also be requested by the regulator for non-combustion processes.

Homogeneity testing has not been completed at these locations.

The test is not usually required for stacks with sampling plane areas of <1m² (below 1.13m in diameter for circular ducts).

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

The sample locations that were monitored are detailed below:

EX 1

The stack diameter is 0.62m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP.

EX 2

The stack diameter is 0.62m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP.

EX 3

The stack diameter is 0.62m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a diagonal section of ducting.

Access to the sample location / sample port was via MEWP.

EX 4

The stack diameter is 0.72m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP.

EX 5

The stack diameter is 0.62m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP.

SB5 Bentley

The stack diameter is 0.50m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP.

SB7 Bentley

The stack diameter is 0.70m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP

X152

The stack diameter is 0.48m and the sample platform width back MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting.

Access to the sample location / sample port was via MEWP

Environmental Compliance Limited

Adler Pelzer Group

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Report Ref : P5617 : R001

Installation Name

Visit Details

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Report Issue Date

: Spraybooths

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EQUIPMENT IDs
(Pre site checklist from SSP)

Adler Pelzer Group
 Permit No : PPC 92935
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PRE SITE EQUIPMENT CHECKLIST/ EQUIPMENT USED

(Completed before departure to site and when on site in full)

Equipment	Equip. Type	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:
MST console/pump	E001								
MST Nozzle set									
MST “S” Type Pitot									
MST Probe									
MST Probe Thermocouple									
MST Hot Box									
MST Impinger Arm									
Barometer		351	1321						
Site Balance									
Site Check weights									
Horiba	E002								
Heated Probe / Filter									
Chiller									
MFC									
Heated Line									
FID	E003								
Heated Line									
Heated Probe / Filter									
Testo	E004								
FTIR	E005								
Heated Probe / Filter									
Heated Line									
Stackmite	E006	1283	366	1308					
“L” Type Pitot		488	1096	487	603				
Digital Manometer		1007	1250	1249	1203				
Stack Thermocouple		1248	1245	1247	246				
Thermocouple Reader		1100	1252	1251	1111				
Nozzle Set		1216	801	1217					
Workhorse / Vapex Pumps	E007	162							
Stack Thermocouple		1248							
Tube Thermocouple		1037							
Meter Thermocouple		1032							
High Vac Gauge									
Dioxin Thermocouple									

Quantity of Ice Required / Used for Survey	Zero	Bags (2kg bags)
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Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

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FIGURES

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : R001

Installation Name : Spraybooths
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Figure 1 – TVOC – Test 1

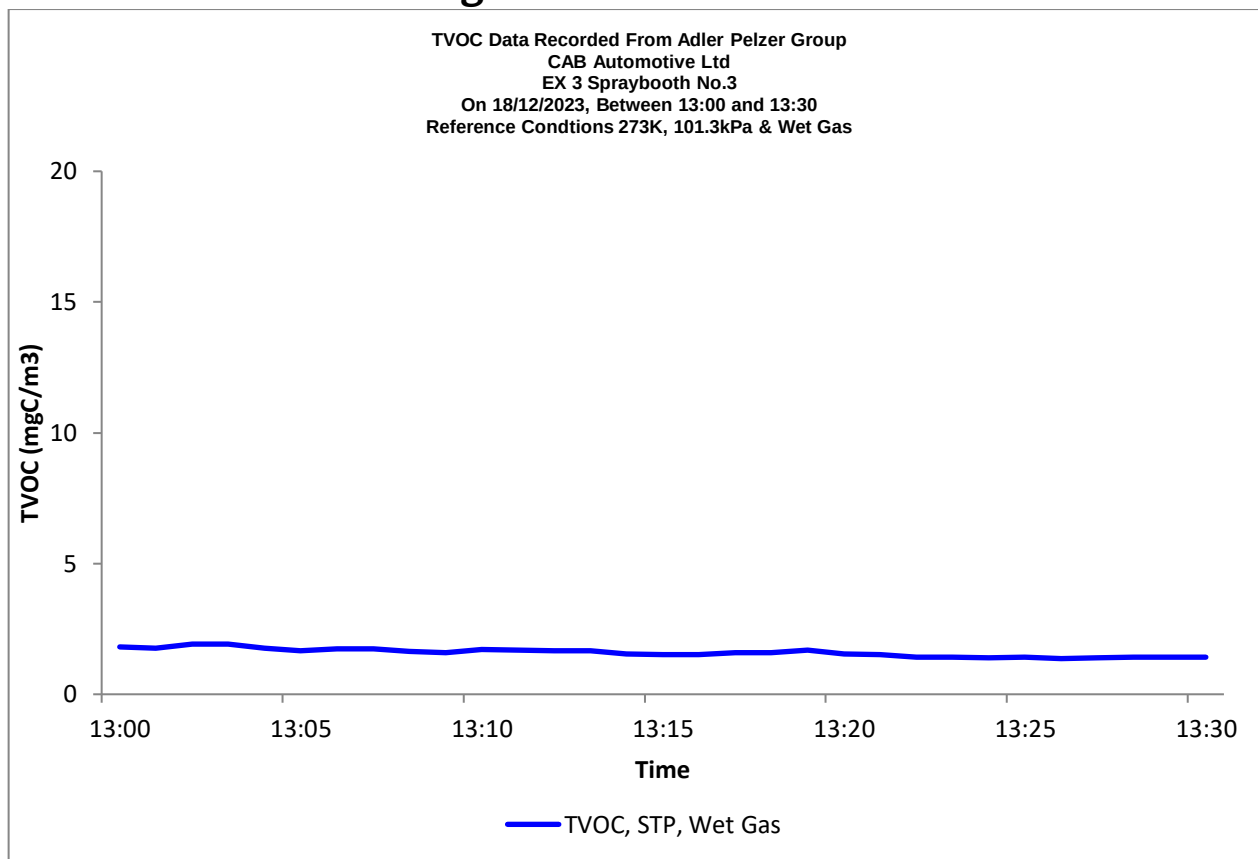
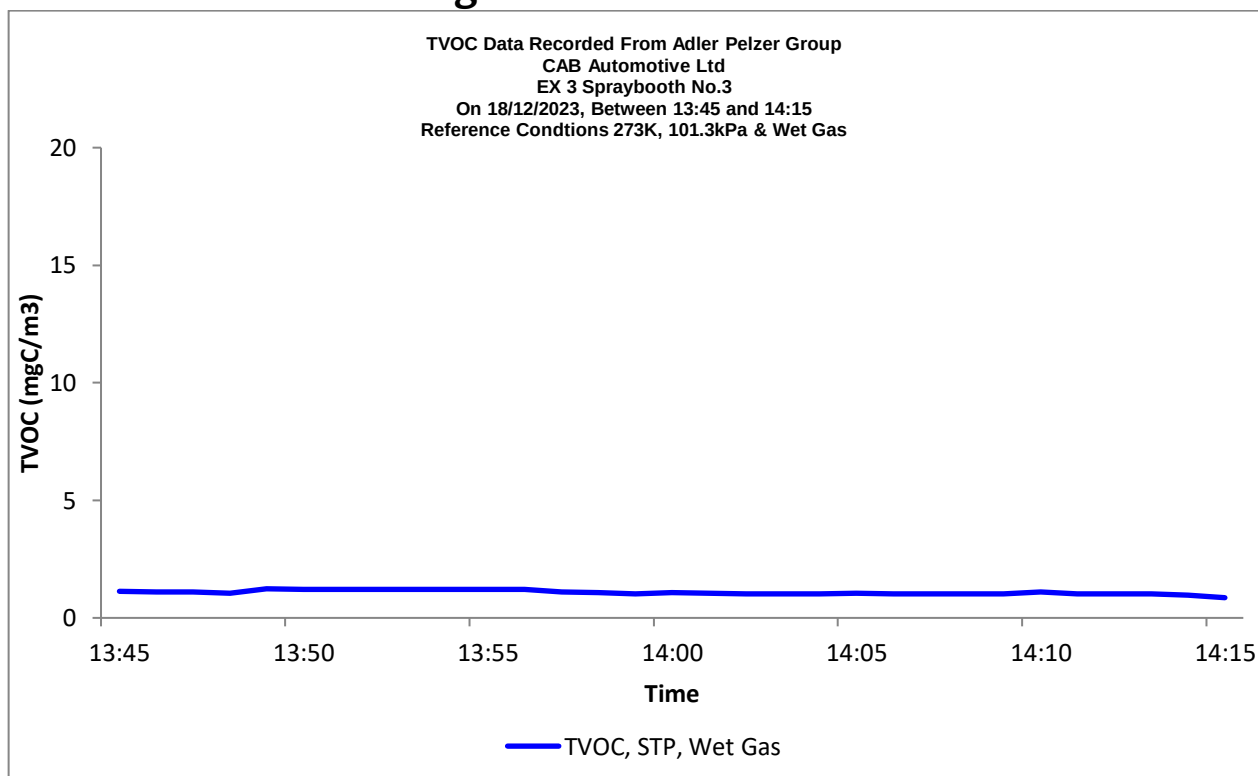


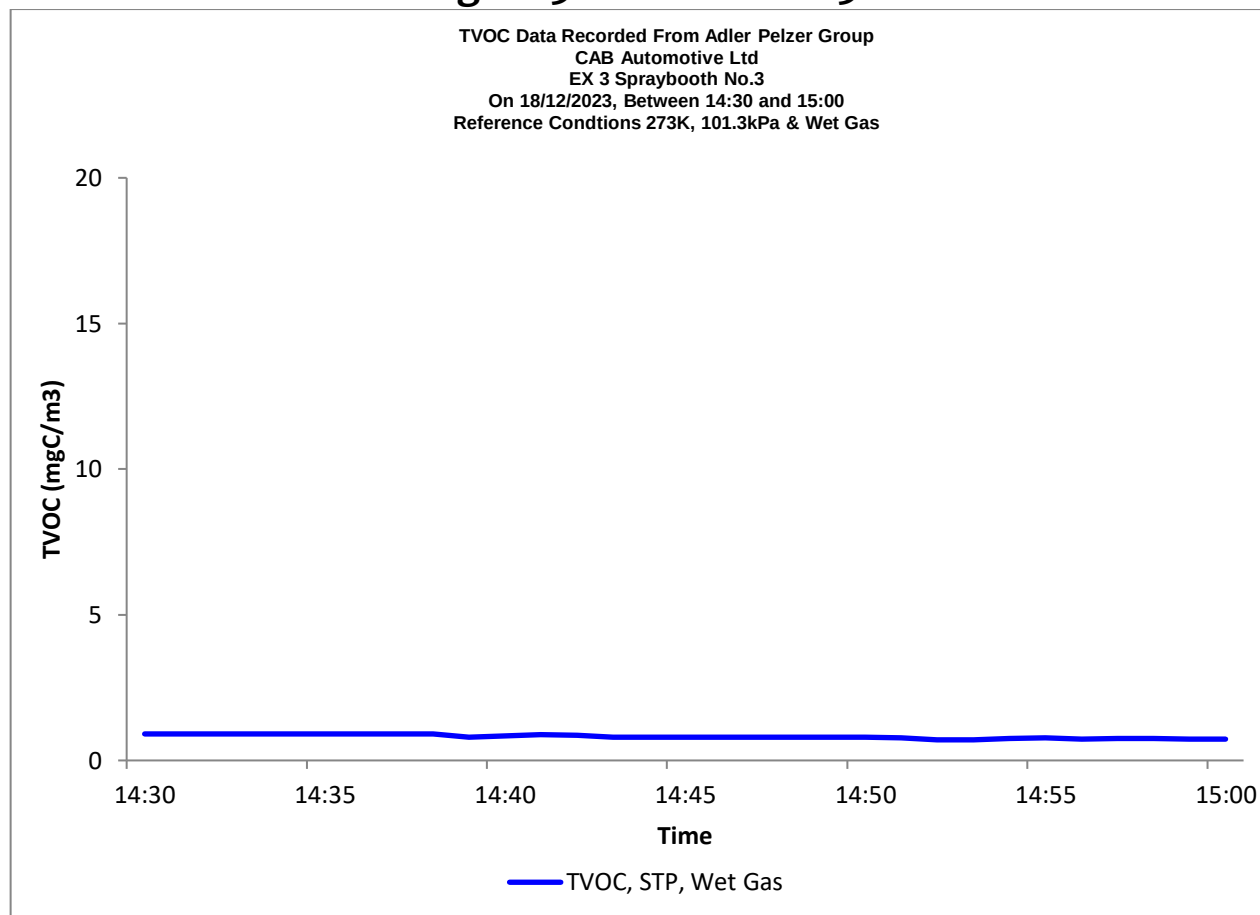
Figure 2 – TVOC – Test 2



Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
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Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
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Figure 3 – TVOC – Test 3



Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

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TABLES

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : R001

Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
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Table 1 – Particulates
Data Recorded from Tipton - EX 1 - Spraybooth (Mini) No.2

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.62	...
			...
Area of Sample Plane	m ²	0.302	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	21	...
Gas Velocity (at Stack Conditions)	m/sec	10.0111	...
Gas Velocity (Reference Conditions)	m/sec*	9.1343	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	3.0224	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	2.7577	...
Sample Date	...	09/11/2023	...
Sample Period	...	11:55 - 12:25	...
Sample Volume (at Stack)	m ³	0.75	...
Sample Volume (reference Conditions)	m ³ *	0.69	0.69
Isokinetic Sampling Rate	%	106.3	...
Sample Reference (ECL ID)	ECL/23/	6476 & 6477	6478 & 6479
Mass of Particulate Matter Collected	mg	0.54	1.12
Concentration of Particulate Matter	mg/m ³ *	1.63	1.63
Emission Rate of Particulate Matter	g/hr	16.16	...
Expanded Uncertainty (% Relative)	%	> 100%	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	3.26

*** Reference Conditions (273K, 101.3kPa, Wet Gas)**

Final concentration for sample ref: 6476 & 6477 < Blank! Blank Concentration reported @ >100% Uncertainty!

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

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Table 2 – Particulates

Data Recorded from Tipton - EX 2 - Spraybooth (Mini) No.1

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.62	...
			...
Area of Sample Plane	m ²	0.302	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	21	...
Gas Velocity (at Stack Conditions)	m/sec	9.9101	...
Gas Velocity (Reference Conditions)	m/sec*	9.0383	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	2.9919	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	2.7287	...
Sample Date	...	09/11/2023	...
Sample Period	...	11:55 - 12:25	...
Sample Volume (at Stack)	m ³	0.55	...
Sample Volume (reference Conditions)	m ³ *	0.50	0.50
Isokinetic Sampling Rate	%	105.1	...
Sample Reference (ECL ID)	ECL/23/	6480 & 6481	6482 & 6483
Mass of Particulate Matter Collected	mg	0.84	0.97
Concentration of Particulate Matter	mg/m ³ *	1.94	1.94
Emission Rate of Particulate Matter	g/hr	19.08	...
Expanded Uncertainty (% Relative)	%	>100%	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	3.89

***Reference Conditions (273K, 101.3kPa, Wet Gas)**

Final concentration for sample ref: 6480 & 6481<Blank! Blank Concentration reported @ >100% Uncertainty!

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

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Table 3 – Particulates

Data Recorded from Tipton - EX 4 - Spraybooth (McLaren) No.8

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.72	...
			...
Area of Sample Plane	m ²	0.407	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	21	...
Gas Velocity (at Stack Conditions)	m/sec	8.2061	...
Gas Velocity (Reference Conditions)	m/sec*	7.4833	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	3.3411	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	3.0468	...
Sample Date	...	09/11/2023	...
Sample Period	...	13:50 - 14:20	...
Sample Volume (at Stack)	m ³	0.66	...
Sample Volume (reference Conditions)	m ³ *	0.60	0.60
Isokinetic Sampling Rate	%	112.2	...
Sample Reference (ECL ID)	ECL/23/	6488 & 6489	6490 & 6491
Mass of Particulate Matter Collected	mg	0.80	0.99
Concentration of Particulate Matter	mg/m ³ *	1.64	1.64
Emission Rate of Particulate Matter	g/hr	17.97	...
Expanded Uncertainty (% Relative)	%	> 100%	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	3.28

* Reference Conditions (273K, 101.3kPa, Wet Gas)

Final concentration for sample ref: 6488 & 6489 < Blank! Blank Concentration reported @ >100% Uncertainty!

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 4 – Particulates

Data Recorded from Tipton - EX 5 Spraybooth (McLaren) No.9

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.62	...
			...
Area of Sample Plane	m ²	0.302	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	21	...
Gas Velocity (at Stack Conditions)	m/sec	6.3424	...
Gas Velocity (Reference Conditions)	m/sec*	5.7822	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	1.9148	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	1.7457	...
Sample Date	...	09/11/2023	...
Sample Period	...	13:50 - 14:20	...
Sample Volume (at Stack)	m ³	0.65	...
Sample Volume (reference Conditions)	m ³ *	0.59	0.59
Isokinetic Sampling Rate	%	110.6	...
Sample Reference (ECL ID)	ECL/23/	6492 & 6493	6494 & 6495
Mass of Particulate Matter Collected	mg	1.12	1.00
Concentration of Particulate Matter	mg/m ³ *	1.89	1.69
Emission Rate of Particulate Matter	g/hr	11.90	...
Expanded Uncertainty (% Relative)	%	46	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	3.38

* Reference Conditions (273K, 101.3kPa, Wet Gas)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 5 – Particulates
Data Recorded from Tipton - SB5 Bentley

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.50	...
			...
Area of Sample Plane	m ²	0.196	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	18	...
Gas Velocity (at Stack Conditions)	m/sec	1.5701	...
Gas Velocity (Reference Conditions)	m/sec*	1.4601	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	0.3083	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	0.2867	...
Sample Date	...	22/01/2024	...
Sample Period	...	10:27 - 10:57	...
Sample Volume (at Stack)	m ³	0.38	...
Sample Volume (reference Conditions)	m ³ *	0.35	0.35
Isokinetic Sampling Rate	%	114.2	...
Sample Reference (ECL ID)	ECL/23/	0210 & 0211	0212 & 0213
Mass of Particulate Matter Collected	mg	0.54	0.54
Concentration of Particulate Matter	mg/m ³ *	1.53	1.53
Emission Rate of Particulate Matter	g/hr	1.58	...
Expanded Uncertainty (% Relative)	%	>100%	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	3.06

*Reference Conditions (273K, 101.3kPa, Wet Gas)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 6 – Particulates
Data Recorded from Tipton - SB7 Bentley

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.70	...
			...
Area of Sample Plane	m ²	0.385	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	18	...
Gas Velocity (at Stack Conditions)	m/sec	9.6244	...
Gas Velocity (Reference Conditions)	m/sec*	8.9563	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	3.7039	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	3.4468	...
Sample Date	...	22/01/2024	...
Sample Period	...	12:28 - 12:58	...
Sample Volume (at Stack)	m ³	0.72	...
Sample Volume (reference Conditions)	m ³ *	0.67	0.67
Isokinetic Sampling Rate	%	105.5	...
Sample Reference (ECL ID)	ECL/23/	0214 & 0215	0216 & 0217
Mass of Particulate Matter Collected	mg	0.55	0.54
Concentration of Particulate Matter	mg/m ³ *	0.82	0.81
Emission Rate of Particulate Matter	g/hr	10.20	...
Expanded Uncertainty (% Relative)	%	93	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	1.61

*Reference Conditions (273K, 101.3kPa, Wet Gas)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 7 – Particulates
Data Recorded from Tipton - X152 Jaguar Spraybooth

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.48	...
			...
Area of Sample Plane	m ²	0.181	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	16	...
Gas Velocity (at Stack Conditions)	m/sec	7.6030	...
Gas Velocity (Reference Conditions)	m/sec*	7.2636	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	1.3758	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	1.3144	...
Sample Date	...	18/12/2023	...
Sample Period	...	10:43 - 11:13	...
Sample Volume (at Stack)	m ³	0.56	...
Sample Volume (reference Conditions)	m ³ *	0.54	0.54
Isokinetic Sampling Rate	%	104.6	...
Sample Reference (ECL ID)	ECL/23/	6500 & 6501	6502 & 6503
Mass of Particulate Matter Collected	mg	0.66	0.60
Concentration of Particulate Matter	mg/m ³ *	1.23	1.12
Emission Rate of Particulate Matter	g/hr	5.80	...
Expanded Uncertainty (% Relative)	%	77	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	2.23

* Reference Conditions (273K, 101.3kPa, Wet Gas)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 8 – Particulates
Data Recorded from Tipton - EX 3 Spraybooth No.3

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.62	...
			...
Area of Sample Plane	m ²	0.302	...
Moisture Content	%	0.10	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	18	...
Gas Velocity (at Stack Conditions)	m/sec	6.4563	...
Gas Velocity (Reference Conditions)	m/sec*	6.1320	...
Volumetric Flowrate (Stack Conditions)	m ³ /sec	1.9492	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	1.8513	...
Sample Date	...	18/12/2023	...
Sample Period	...	13:00 - 13:30	...
Sample Volume (at Stack)	m ³	0.57	...
Sample Volume (reference Conditions)	m ³ *	0.54	0.54
Isokinetic Sampling Rate	%	95.2	...
Sample Reference (ECL ID)	ECL/23/	6484 & 6485	6486 & 6487
Mass of Particulate Matter Collected	mg	0.54	0.60
Concentration of Particulate Matter	mg/m ³ *	1.12	1.12
Emission Rate of Particulate Matter	g/hr	7.44	...
Expanded Uncertainty (% Relative)	%	> 100%	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	2.23

* Reference Conditions (273K, 101.3kPa, Wet Gas)

Final concentration for sample ref: 6484 & 6485<Blank! Blank Concentration reported @ >100% Uncertainty!

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : R001

Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
 Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
 Report Issue Date : 8th February 2024

Table 9 – Dichloromethane (Test 1)

Adler Pelzer Group
 Cab Automotive Ltd Tipton EX 3 Spraybooth No.3

Emission Parameter	Units	Value		
Stack Diameter	mm	620		
Area of Sample Plane	m ²	0.302		
Measured Oxygen (Dry)	%Vol	20.90		
Meter Temperature	°C	17.50		
Stack Temperature	°C	18.00		
Sample Date	...	18/12/2023		
Sample Period	...	13:00 - 13:30		
Sample Volume (as Measured)	m ³	0.0047		
Sample Volume (reference Conditions)	m ³ *	0.0044		
Sample Tube Results		Dichloromethane Test 1		Blank
Sample Reference ECL/23/6979	Units	Concentration*	Uncertainty	Concentration
Concentration of Dichloromethane	mg/m ³	0.90	100.06%	0.90

*Reference Conditions: 273 K, 101.3 kPa, Wet Gas

Table 10 – Dichloromethane (Test 2)

Adler Pelzer Group
 Cab Automotive Ltd Tipton EX 3 Spraybooth No.3

Emission Parameter	Units	Value		
Stack Diameter	mm	620		
Area of Sample Plane	m ²	0.302		
Measured Oxygen (Dry)	%Vol	20.90		
Meter Temperature	°C	17.50		
Stack Temperature	°C	18.00		
Sample Date	...	18/12/2023		
Sample Period	...	13:45 - 14:15		
Sample Volume (as Measured)	m ³	0.0047		
Sample Volume (reference Conditions)	m ³ *	0.0045		
Sample Tube Results		Dichloromethane Test 2		Blank
Sample Reference ECL/23/6980	Units	Concentration*	Uncertainty	Concentration
Concentration of Dichloromethane	mg/m ³	0.90	100.06%	0.90

*Reference Conditions: 273 K, 101.3 kPa, Wet Gas

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Table 11 – Dichloromethane (Test 3)**Adler Pelzer Group****Cab Automotive Ltd Tipton EX 3 Spraybooth No.3**

Emission Parameter	Units	Value		
Stack Diameter	mm	620		
Area of Sample Plane	m ²	0.302		
Measured Oxygen (Dry)	%Vol	20.90		
Meter Temperature	°C	17.50		
Stack Temperature	°C	18.00		
Sample Date	...	18/12/2023		
Sample Period	...	14:30 - 15:00		
Sample Volume (as Measured)	m ³	0.0047		
Sample Volume (reference Conditions)	m ³ *	0.0044		
Sample Tube Results		Dichloromethane Test 3		Blank
Sample Reference ECL/23/6981	Units	Concentration*	Uncertainty	Concentration
Concentration of Dichloromethane	mg/m ³	0.90	100.06%	0.90

*Reference Conditions: 273 K, 101.3 kPa, Wet Gas

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

VELOCITY TRAVERSE PROFILES

Environmental Compliance Limited

Adler Pelzer Group		Installation Name	: Spraybooths
Permit No	: PPC 92935	Visit Details	: Compliance - November 2023
Variation No	: V1	Survey Dates	: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
Report Ref	: P5617	Report Issue Date	: 8th February 2024
	: R001		

FIELD CALIBRATION AND SAMPLING DATA

Environmental Compliance Limited

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5617

: R001

Installation Name : Spraybooths
Visit Details : Compliance - November 2023
Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
Report Issue Date : 8th February 2024

TVOC Calibration Site Log

TVOC - FIELD DATA SHEET

Client	Adler Pelzer Group			Barometric Pressure mb	1025	
Site	Cab Automotive Ltd - Tipon			Barometer ID	ECL/ID/ 351	
Date	18/12/2023			Analyser ID	ECL/ID/ 997	
Location	Spraybooths			Sonimix/ MFC ID	ECL/ID/ n/a	
Stack ID	EX 3 - Spraybooth No.3			Heated Line/ Controller ID	ECL/ID/ 1009 & 1010	
Stack Temp °C	18			Heated Line Set Temp °C	180	YES
Ambient Temp (sampling)	1= 17	2= 17	3= 17	Heated Line Length	10	m
Ambient Temp (sampling)	4= 17	5= 17	6= 17	Heated Probe Filter ID	ECL/ID/ 919	
Job No	P5617			Heated Filter Set Temp °C	180	YES
Operators	LH & TR			Logger ID	928	

Calibration Gas Details

Calibration Gas	Gas Bottle ID	Gas Value	Uncertainty of Gas (k=2)	Analyser Range	Span Gas value used
Zero Gas (Synthetic Air)	Gas/ 2879	...	...	Propane	100 ppm
Hydrogen Fuel	Gas/ 2989	...	...		91.38 ppm
Propane (In Air)	Gas/ 2902	91.38 ppm	1%		

Analyser Range should be not less than the expected peak emissions.

Span Gas Values should be either approximately the half-hourly ELV OR 50% to 90% of the Selected Analyser Range.

Direct Calibration (Rear of Analyser)					
	Zero Cal		Span Gas Cal		Zero Check
	Start Time	End Time	Start Time	End Time	Start Time End Time
ZERO /SPAN/ ZERO	12:07	12:12	12:17	12:22	12:23 12:28

NOTE: RESPONSE TIME

Response Time to be carried out at the same time as "Span Check" on system verification (via the sample probe)
Start Time = when gas turned on. 90% Time = when analyser displays 90% of span gas value used. Response must be within 200 seconds.

Pre-Cal Ambient Temp °C		PRE System Verification Check (Down Line)				Response Time		
Max	Min	Zero Check		Span Check		SYSTEM Span Gas Cal		
17	17	Start Time	End Time	Start Time	End Time	Start Time	90% Time	less than 200s (Y/N)
ZERO / SPAN		12:30	12:35	12:36	12:45	12:35:30	12:36:00	Y

	Start Time	End Time	Location	Production Details	
Sample Period	13:00	13:30	EX 3 Spraybooth No.3	Normal	
Sample Period	13:45	14:15	EX 3 Spraybooth No.3	Normal	
Sample Period	14:30	15:00	EX 3 Spraybooth No.3	Normal	
Sample Period					
Sample Period					
Sample Period					

Post-Cal Ambient Temp °C		POST System Verification Check (Down Line)			
Max	Min	Zero Check		Span Check	
17	17	Start Time	End Time	Start Time	End Time
ZERO / SPAN		15:02	15:05	15:07	15:10

Process Details / Comments

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617

: R001

Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
 Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
 Report Issue Date : 8th February 2024

TVOC Calibration Summary

TVOC
ppm

Analyser Range		100
Repeatability at Zero		2
Span Gas Concentration Applied		91.38
Zero Gas Concentration Applied		0
Direct Cal	Zero	0.00
	Span	91.4
	Zero	-0.04
Difference (Zero)		0.0393
< 2× Repeatability @ Zero?		YES
Pre Test (System)	Zero	0.29
	Span	90.8
Difference (Zero)		0.2946
< 2% Relative to Direct Span		YES
Difference (Span)		0.5892
< 2% Relative to Direct Span		YES
Post Test (System)	Zero	0.12
	Span	90.6
Difference (Zero)		0.1794
Zero Drift < 2% of Applied Span?		YES
Difference (Span)		0.2278
Span Drift < 2% of Applied Span?		YES
Zero and Span Drift < 5% of Applied Span?		YES

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates – EX 1

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		09/11/2023	
ECL/TPD/		27a		Time taken to change Ports?		0	
				Start Time		11:55	
				End Time		12:25	
				Duration (mins)		30	
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	487	Stack Thermocouple ID	1247
Site	Cab Automotive Ltd	Stack Area (m ²)	0.30	Manometer ID	1249	Stack Temp Reader ID	1251
Location	Tipton	Barometric Pressure (mb)	994	Barometer ID	1321	Meter Thermocouple ID	1311
Stack ID	EX 1 - Spraybooth (Mini) No.2	Stat Pres. (mm H ² O) (Pa/9.807)	1.111	DGM Yd	0.9672	Meter Temp Reader ID	1311
Test No.	TPM	Pitot coefficient	1.00	Nozzle ID	1217	Dry Gas Meter ID	1309
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	7.06	Timer ID	1313
ECL Site Staff	LH & TR	Console ID	1308	Filter ID	256402-4368	Rotameter ID	1310

Sample Volume		Note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume	696011.0			Expected Sample Volume	646.55		
Final Volume	696788.0			Actual Sample Volume	687.22		
Total Volume	778.0			Isokinetic Percentage	106.29		

Leak Check		Pre Sample		* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.		Maximum allowed leak rate is 2% of the set rate		Measured O ₂		20.90		Moisture		0.10	
Measured Leak Rate* l/min	0							Measured CO ₂ %	0.10			Ref O ₂	n/a		
Set Sampling Rate* (l/min)	28							Measured CO ppm	0			Dry Gas Molecular Weight	28.85		
Time Of Leak Check	11:45							Smooth Walls							
Leak % of set rate	0.0														

TPD/27A is carried out with an unheated sampling system only.

Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X	A4X	Total
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25	26.25 - 30	
AP (Pa)	31.20	29.80	51.20	50.60	75.30	74.60	90.10	91.50	61.8
Velocity at Stack (m/s)	7.28	7.11	9.33	9.29	11.33	11.28	12.39	12.49	
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	16.7	16.3	21.5	21.3	26.1	26.0	28.6	28.9	23.2
Meter (Tm)	19	19	20	20	21	21	22	22	20.5
Stack Temp (Ts)	20	20	20	21	21	21	21	21	20.6

Traverse Point									Total
Time Interval (mins)									
Time/Point (mins)									
AP (Pa)									
Velocity at Stack (m/s)									
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas									
Meter (Tm)									
Stack Temp (Ts)									

Traverse Point									Total
Time Interval (mins)									
Time/Point (mins)									
AP (Pa)									
Velocity at Stack (m/s)									
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas									
Meter (Tm)									
Stack Temp (Ts)									

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights MUST be included to produce a nominal 0.1% moisture value.

DI Water SOL	4992
Acetone SOL	4963

Original Flowrate Settings	
Tm	30
Ts	20
% moisture	0.1
Pitot Quality Control Checks	
PRE-Sample PITOT Visual Inspection	
Time	10:42
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	10:44
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	12:33
Reading (Pa)	32.1
Pass (< 5%) ?	2.9

POST-Sample PITOT Visual Inspection	
Time	12:35
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	12:37
Pass ? (Y/N)	Y

Particulates – EX 2

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		09/11/2023	
ECL/TPD/		27a		Time taken to change Ports?		0	
				Start Time		11:55	
				End Time		12:25	
				Duration (mins)		30	
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	1096	Stack Thermocouple ID	1245
Site	Cab Automotive Ltd	Stack Area (m ²)	0.30	Manometer ID	1250	Stack Temp Reader ID	1252
Location	Tipton	Barometric Pressure (mb)	994	Barometer ID	1321	Meter Thermocouple ID	366
Stack ID	EX 2 - Spraybooth (Mini) No.2	Stat Pres. (mm H ² O) (Pa/9.807)	1.071	DGM Yd	0.9766	Meter Temp Reader ID	366
Test No.	TPM	Pitot coefficient	0.99	Nozzle ID	801	Dry Gas Meter ID	366
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	6.08	Timer ID	366
ECL Site Staff	LH & TR	Console ID	366	Filter ID	256401-4368	Rotameter ID	366

Sample Volume		note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume	153423.0			Expected Sample Volume	474.56		
Final Volume	153987.0			Actual Sample Volume	498.79		
Total Volume	564.0			Isokinetic Percentage	105.10		

Leak Check		Pre Sample		* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.		Maximum allowed leak rate is 2% of the set rate		Measured O ₂		20.90		Moisture		0.10	
Measured Leak Rate* l/min	0							Measured CO ₂ %	0.10			Ref O ₂	n/a		
Set Sampling Rate* (l/min)	28							Measured CO ppm	0			Dry Gas Molecular Weight	28.85		
Time Of Leak Check	11:40							Smooth Walls							
Leak % of set rate	0.0														

TPD/27A is carried out with an unheated sampling system only.

Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X	A4X	Total
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75	
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25	26.25 - 30	
AP (Pa)	30.20	29.00	50.60	51.20	77.30	76.50	90.50	89.60	61.9
Velocity at Stack (m/s)	7.09	6.95	9.19	9.25	11.36	11.30	12.30	12.23	
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	12.2	11.9	15.8	15.9	19.5	19.5	21.3	21.2	17.2
Meter (Tm)	21	21	22	23	23	24	25	25	23.0
Stack Temp (Ts)	20	20	21	21	21	21	21	21	20.8

Traverse Point									Total
Time Interval (mins)									
Time/Point (mins)									
AP (Pa)									
Velocity at Stack (m/s)									
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas									
Meter (Tm)									
Stack Temp (Ts)									

Traverse Point									Total
Time Interval (mins)									
Time/Point (mins)									
AP (Pa)									
Velocity at Stack (m/s)									
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas									
Meter (Tm)									
Stack Temp (Ts)									

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights MUST be included to produce a nominal 0.1% moisture value.

DI Water SOL	4992
Acetone SOL	4963

Original Flowrate Settings	
Tm	30
Ts	20
% moisture	0.1
Pitot Quality Control Checks	
PRE-Sample PITOT Visual Inspection	
Time	10:18
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	10:20
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	12:29
Reading (Pa)	29.8
Pass (<5%) ?	-1.3

POST-Sample PITOT Visual Inspection	
Time	12:29
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	12:31
Pass ? (Y/N)	Y

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates – EX 4

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		09/11/2023	
ECL/TPD/		27a		Time taken to change Ports?		0	
				Start Time		13:50	
				End Time		14:20	
				Duration (mins)		30	
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	1096	Stack Thermocouple ID	1246
Site	Cab Automotive Ltd	Stack Area (m ²)	0.41	Manometer ID	1250	Stack Temp Reader ID	1252
Location	Tipton	Barometric Pressure (mb)	994	Barometer ID	1321	Meter Thermocouple ID	366
Stack ID	EX 4 - Spraybooth (McLaren) No.8	Stat Pres. (mm H ² O) (Pa/9.807)	8.484	DGM Yd	0.9766	Meter Temp Reader ID	366
Test No.	TPM	Pitot coefficient	0.99	Nozzle ID	801	Dry Gas Meter ID	366
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	7.12	Timer ID	366
ECL Site Staff	LH & TR	Console ID	366	Filter ID	256430-4368	Rotameter ID	366
Sample Volume		Note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume	155057.0			Expected Sample Volume		538.35	
Final Volume	155741.0			Actual Sample Volume		603.76	
Total Volume	684.0			Isokinetic Percentage		112.15	
Leak Check		* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.		Measured O ₂		Moisture	
Measured Leak Rate* l/min	0			Measured CO ₂ %		Ref O ₂	
Set Sampling Rate* (l/min)	28			Measured CO ppm		Dry Gas Molecular Weight	
Time Of Leak Check	13:46			Smooth Walls			
Leak % of set rate	0.0						
TPD/27A is carried out with an unheated sampling system only.							
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25
AP (Pa)	46.50	45.20	44.00	43.80	37.80	39.50	34.90
Velocity at Stack (m/s)	8.81	8.69	8.57	8.55	7.94	8.12	7.63
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	20.7	20.4	20.2	20.2	18.8	19.2	18.1
Meter (Tm)	22	22	23	23	24	24	25
Stack Temp (Ts)	21	21	21	21	21	21	21
Total							
Traverse Point							
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Total							
Traverse Point							
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Total							

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights MUST be included to produce a nominal 0.1% moisture value.

DI Water SOL	4992
Acetone SOL	4963

Original Flowrate Settings	
Tm	30
Ts	21
% moisture	0.1

Pitot Quality Control Checks	
PRE-Sample PITOT Visual Inspection	
Time	13:18
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	13:20
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	14:30
Reading (Pa)	45.5
Pass (< 5%) ?	-2.2

POST-Sample PITOT Visual Inspection	
Time	14:32
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	14:34
Pass ? (Y/N)	Y

Particulates – EX 5

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		09/11/2023	
ECL/TPD/		27a		Time taken to change Ports?		0	
				Start Time		13:50	
				End Time		14:20	
				Duration (mins)		30	
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	487	Stack Thermocouple ID	1247
Site	Cab Automotive Ltd	Stack Area (m ²)	0.30	Manometer ID	1249	Stack Temp Reader ID	1251
Location	Tipton	Barometric Pressure (mb)	994	Barometer ID	1321	Meter Thermocouple ID	1311
Stack ID	EX 5 Spraybooth (McLaren) No.9	Stat Pres. (mm H ² O) (Pa/9.807)	5.659	DGM Yd	0.9672	Meter Temp Reader ID	1311
Test No.	TPM	Pitot coefficient	0.99	Nozzle ID	1217	Dry Gas Meter ID	1309
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	8.07	Timer ID	1313
ECL Site Staff	LH & TR	Console ID	1308	Filter ID	257834-4426	Rotameter ID	1310
Sample Volume		note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume	697609.0			Expected Sample Volume		534.33	
Final Volume	698282.0			Actual Sample Volume		590.98	
Total Volume	673.0			Isokinetic Percentage		110.60	
Leak Check		* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.		Measured O ₂		Moisture	
Measured Leak Rate* l/min	0			Measured CO ₂ %		Ref O ₂	
Set Sampling Rate* (l/min)	28			Measured CO ppm		Dry Gas Molecular Weight	
Time Of Leak Check	13:48			Smooth Walls			
Leak % of set rate	0.0						
TPD/27A is carried out with an unheated sampling system only.							
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25
AP (Pa)	38.20	31.30	28.60	27.80	22.50	21.90	16.90
Velocity at Stack (m/s)	7.10	7.23	6.91	6.81	6.13	6.05	5.45
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	21.4	21.8	20.9	20.6	18.5	18.3	16.5
Meter (Tm)	21	21	22	22	23	23	22.1
Stack Temp (Ts)	21	21	21	21	21	21	21
Total							
Traverse Point							
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Total							
Traverse Point							
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Total							

If moisture was not measured and gas was dried before entering the gas meter, impinger weights must be included to produce the moisture concentration used in the isokinetic calculations. If the gas was not dried before it entered the gas meter then impinger weights MUST be included to produce a nominal 0.1% moisture value.

DI Water SOL	4992
Acetone SOL	4963

Original Flowrate Settings	
Tm	30
Ts	20
% moisture	0.1

Pitot Quality Control Checks	
PRE-Sample PITOT Visual Inspection	
Time	13:42
Pass ? (Y/N)	Y

PRE-Sample PITOT Leak Check	
Time	13:44
Pass ? (Y/N)	Y

Post-Sample Blockage Check (L-type)	
Time	14:22
Reading (Pa)	31.1
Pass (<5%) ?	3.0

POST-Sample PITOT Visual Inspection	
Time	14:24
Pass ? (Y/N)	Y

POST-Sample PITOT Leak Check	
Time	14:26
Pass ? (Y/N)	Y

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates – SB5

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		22/01/2024	
ECL/TPD/		27a		Time taken to change Ports?		0	
		Start Time		10:27		End Time	
		10:27		10:57		Duration (mins)	
		30					
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	603	Stack Thermocouple ID	246
Site	Cab Automotive Ltd	Stack Area (m ²)	0.20	Manometer ID	1203	Stack Temp Reader ID	1111
Location	Tipton	Barometric Pressure (mb)	1004	Barometer ID	1321	Meter Thermocouple ID	1286
Stack ID	SBS Bentley	Stat Pres. (mm H ² O) (Pa/9.807)	1.305	DGM Yd	0.9528	Meter Temp Reader ID	1287
Test No.	TPM	Pitot coefficient	0.97	Nozzle ID	1217	Dry Gas Meter ID	1284
Job No	P5617	Balance ID	N/A	Nozzle Size (mm)	12.21	Timer ID	1288
ECL Site Staff	LH & TR	Console ID	1283	Filter ID	4274 254281	Rotameter ID	1285
Sample Volume		Note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume				Expected Sample Volume		308.96	
Final Volume				Actual Sample Volume		352.88	
Total Volume		399.0		Isokinetic Percentage		114.21	
Leak Check		Pre Sample		Measured O ₂		20.90	
Measured Leak Rate* (l/min)		0		Measured CO ₂ %		0.01	
Set Sampling Rate* (l/min)		25		Measured CO ₂ ppm		0	
Time Of Leak Check		10:25		Moisture		0.10	
Leak % of set rate		0.0		Ref O ₂		n/a	
				Dry Gas Molecular Weight		28.84	
				Smooth Walls			
TPD/27A is carried out with an unheated sampling system only.							
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25
AP (Pa)	2.10	1.90	1.10	1.40	1.00	1.40	2.20
Velocity at Stack (m/s)	1.82	1.73	1.32	1.48	1.25	1.48	1.86
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	12.6	12.0	9.1	10.3	8.8	10.4	11.7
Meter (Tm)	18	18	18	18	19	19	19
Stack Temp (Ts)	18	18	18	18	18	18	18
Traverse Point							Total
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Traverse Point							Total
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							

Particulates – SB7

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		22/01/2024	
ECL/TPD/		27a		Time taken to change Ports?		0	
		Start Time		12:28		End Time	
		12:28		12:58		Duration (mins)	
		30					
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	603	Stack Thermocouple ID	246
Site	Cab Automotive Ltd	Stack Area (m ²)	0.20	Manometer ID	1203	Stack Temp Reader ID	1111
Location	Tipton	Barometric Pressure (mb)	1004	Barometer ID	1321	Meter Thermocouple ID	1286
Stack ID	SBS Bentley	Stat Pres. (mm H ² O) (Pa/9.807)	8.565	DGM Yd	0.9528	Meter Temp Reader ID	1287
Test No.	TPM	Pitot coefficient	0.99	Nozzle ID	1217	Dry Gas Meter ID	1284
Job No	P5617	Balance ID	N/A	Nozzle Size (mm)	7.06	Timer ID	1288
ECL Site Staff	LH & TR	Console ID	1283	Filter ID	4274 254273	Rotameter ID	1285
Sample Volume		Note that once the sample has started, no further SAMPLE TRAIN leak checks are allowed, neither when changing ports (even if disconnections are required) nor at the end of the test.		Total		Volume (litres) @ STP Dry	
Start Volume		746054.0		Expected Sample Volume		633.67	
Final Volume		746815.0		Actual Sample Volume		668.26	
Total Volume		761.0		Isokinetic Percentage		105.46	
Leak Check		Pre Sample		Measured O ₂		20.90	
Measured Leak Rate* (l/min)		0		Measured CO ₂ %		0.01	
Set Sampling Rate* (l/min)		25		Measured CO ₂ ppm		0	
Time Of Leak Check		12:25		Moisture		0.10	
Leak % of set rate		0.0		Ref O ₂		n/a	
				Dry Gas Molecular Weight		28.84	
				Smooth Walls			
TPD/27A is carried out with an unheated sampling system only.							
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25
AP (Pa)	50.60	50.40	56.20	58.30	66.90	62.30	54.90
Velocity at Stack (m/s)	9.10	9.08	9.59	9.77	10.46	10.10	9.48
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	21.3	21.3	22.5	23.0	24.6	23.7	22.3
Meter (Tm)	20	20	20	21	21	21	22
Stack Temp (Ts)	18	18	18	18	18	18	18
Traverse Point							Total
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							
Traverse Point							Total
Time Interval (mins)							
Time/Point (mins)							
AP (Pa)							
Velocity at Stack (m/s)							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas							
Meter (Tm)							
Stack Temp (Ts)							

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

: Spraybooths

Visit Details

: Compliance - November 2023

Survey Dates

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date

: 8th February 2024

X152

Environmental Compliance Limited				PARTICULATE DATA SAMPLING PROFORMA				Date of Measurement				18/12/2023			
ECL/TPD/				27a				Time taken to change Ports				0			
				Start Time				10:43				End Time			
				11:13				Duration (mins)				30			
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	488	Stack Thermocouple ID	1248	Impingers	None Used						
Site	Cab Automotive Ltd	Stack Area (m ²)	0.18	Manometer ID	1007	Stack Temp Reader ID	1100	SOL							
Location	Tipton	Barometric Pressure (mb)	1025	Barometer ID	351	Meter Thermocouple ID	1311	Start Weight (g)	0.00						
Stack ID	X152 Jaguar Spraybooth	Stat Pres. (mm H ² O) (Pa/9.807)	8.463	DGM Yd	0.9672	Meter Temp Reader ID	1311	End Weight (g)	0.45						
Test No.	TPM	Pitot coefficient	0.98	Nozzle ID	1216	Dry Gas Meter ID	1309	Total weight (g)	0.45						
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	7.06	Timer ID	1313								
ECL Site Staff	LH & TR	Console ID	1308	Filter ID	256000-4387	Rotameter ID	1310								
Sample Volume				Total				Volume (litres) @ STP Dry							
Start Volume				Expected Sample Volume				513.87							
Final Volume				Actual Sample Volume				537.51							
Total Volume				Isokinetic Percentage				104.60							
Leak Check				Measured O ₂				20.90				Moisture			
Measured Leak Rate* l/min				Measured CO ₂ %				0.10				Ref O ₂			
Set Sampling Rate* (l/min)				Measured CO ppm				0				Dry Gas Molecular Weight			
Time Of Leak Check															
Leak % of set rate															
* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.												Smooth Walls			
TPD/27A is carried out with an unheated sampling system only.															
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X	A4X	Total						
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75							
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25	26.25 - 30							
AP (Pa)	40.60	39.80	37.90	36.50	37.80	37.00	35.60	34.20	37.4						
Velocity at Stack (m/s)	7.97	7.89	7.70	7.57	7.62	7.48	7.33								
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	18.9	18.8	18.4	18.0	18.8	18.2	17.9	17.6	18.3						
Meter (Tm)	17	18	19	19	20	20	21	21	19.4						
Stack Temp (Ts)	27	27	17	18	8	18	18	18	16.4						
Traverse Point									Total						
Time Interval (mins)															
Time/Point (mins)															
AP (Pa)															
Velocity at Stack (m/s)															
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas															
Meter (Tm)															
Stack Temp (Ts)															
Traverse Point									Total						
Time Interval (mins)															
Time/Point (mins)															
AP (Pa)															
Velocity at Stack (m/s)															
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas															
Meter (Tm)															
Stack Temp (Ts)															
Traverse Point									Total						
Time Interval (mins)															
Time/Point (mins)															
AP (Pa)															
Velocity at Stack (m/s)															
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas															
Meter (Tm)															
Stack Temp (Ts)															

Particulates – EX 3

Environmental Compliance Limited				PARTICULATE DATA SAMPLING PROFORMA				Date of Measurement				18/12/2023			
ECL/TPD/				27a				Time taken to change Ports				0			
				Start Time				13:00				End Time			
				13:30				Duration (mins)				30			
Client	Adler Pelzer Group	Stack Profile	Circular	Pitot ID	488	Stack Thermocouple ID	1248	Impingers	None Used						
Site	Cab Automotive Ltd	Stack Area (m ²)	0.30	Manometer ID	1007	Stack Temp Reader ID	1100	SOL							
Location	Tipton	Barometric Pressure (mb)	1025	Barometer ID	351	Meter Thermocouple ID	1286	Start Weight (g)	0.00						
Stack ID	EX 3 Spraybooth No.3	Stat Pres. (mm H ² O) (Pa/9.807)	5.578	DGM Yd	0.9528	Meter Temp Reader ID	1287	End Weight (g)	0.45						
Test No.	TPM	Pitot coefficient	0.98	Nozzle ID	1216	Dry Gas Meter ID	1284	Total weight (g)	0.45						
Job No	P5617	Balance ID	n/a	Nozzle Size (mm)	8.05	Timer ID	1288								
ECL Site Staff	LH & TR	Console ID	1283	Filter ID	256018-4387	Rotameter ID	1285								
Sample Volume				Total				Volume (litres) @ STP Dry							
Start Volume				Expected Sample Volume				564.18							
Final Volume				Actual Sample Volume				537.20							
Total Volume				Isokinetic Percentage				95.22							
Leak Check				Measured O ₂				20.90				Moisture			
Measured Leak Rate* l/min				Measured CO ₂ %				0.10				Ref O ₂			
Set Sampling Rate* (l/min)				Measured CO ppm				0				Dry Gas Molecular Weight			
Time Of Leak Check															
Leak % of set rate															
* During sample train leak check, set the sample flowrate above the maximum EXPECTED sampling flowrate.												Smooth Walls			
TPD/27A is carried out with an unheated sampling system only.															
Traverse Point	A1X	A1X	A2	A2	A3	A3	A4X	A4X	Total						
Time Interval (mins)	3.75	3.75	3.75	3.75	3.75	3.75	3.75	3.75							
Time/Point (mins)	0 - 3.75	3.75 - 7.5	7.5 - 11.25	11.25 - 15	15 - 18.75	18.75 - 22.5	22.5 - 26.25	26.25 - 30							
AP (Pa)	21.00	20.90	24.50	23.70	31.20	30.90	32.00	31.90	27.0						
Velocity at Stack (m/s)	5.74	5.73	6.20	6.10	7.00	6.97	7.09	7.08							
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas	17.9	17.9	19.4	19.2	22.0	22.0	22.3	22.4	20.4						
Meter (Tm)	21	22	22	23	23	24	24	25	23.0						
Stack Temp (Ts)	18	18	18	18	18	18	18	18	18.0						
Traverse Point									Total						
Time Interval (mins)															
Time/Point (mins)															
AP (Pa)															
Velocity at Stack (m/s)															
Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas															
Meter (Tm)															
Stack Temp (Ts)															
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Time/Point (mins)															
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Sample Rate (l/min) 101.3 mbar, Tm, Dry Gas															
Meter (Tm)															
Stack Temp (Ts)															

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

: Spraybooths

Visit Details

: Compliance - November 2023

Survey Dates

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date

: 8th February 2024

Dichloromethane – EX 3 (Test 1)

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (Workhorse or MST)																																																																					
Client	Adler Pelzer Group	☒ Circular ☐ Rectangular ☐ Blipse	Pump ID	162	Date of Test	18/12/2023																																																																			
Site	Cab Automotive Ltd	Stack Diameter (mm)	620	Meter ID	...	Sample Start Time	13:00																																																																		
Location	Tipton	Stack Area (m ²)	0.302	MST Probe ID	...	Sample End Time	13:30																																																																		
Stack ID	EX 3 Spraybooth No.3	Barometric Pressure (mb)	1025	MST Probe Heating Temp (C)	...	Duration	30																																																																		
Test No	Dichloromethane Test 1	Stack Thermocouple ID	1248	DGM Yd or ml/count	0.5	Measured O2	20.90																																																																		
Job No	P5235	Tube Thermocouple ID	1037	MST Hot Box ID	...	O2 Uncertainty %Vol	1.25																																																																		
ECL Site Staff	LH & TR	Meter Thermocouple ID	1032	MST Hot Box Heating Temp (C)	...																																																																				
Barometer ID	351	In-Stack Sinter Used (Y/N)	Y	Workhorse Set Sample Rate (%)	40																																																																				
				MST Delta H Sampling Rate	...																																																																				
Meter Units ☒ ml ☐ litres <table><thead><tr><th>Sample</th><th>Leak 1</th><th>Time (start and minimum 1 minute)</th><th>Leak 2</th><th>Time (start and minimum 1 minute)</th><th>Total</th></tr></thead><tbody><tr><td>Start Volume</td><td>981812.0</td><td>12:46:00</td><td>991195.0</td><td>13:32:00</td><td></td></tr><tr><td>Final Volume</td><td>991166.0</td><td>12:47:00</td><td>991195.0</td><td>13:33:00</td><td></td></tr><tr><td>Total Volume</td><td>9342.8</td><td>0.0</td><td>0.0</td><td></td><td>9342.8</td></tr><tr><td>Sample Train Internal Volume</td><td>11.2364</td><td>ml / Litres</td><td colspan="3">Pre and post test leak checks are mandatory - in order to pass, the meter must stop fully for 1 minute. (Total volume in leak check is therefore zero)</td></tr><tr><td>Sample Point</td><td>A2</td><td>A2</td><td>A2</td><td></td><td></td></tr><tr><td>Time/ point (mins)</td><td>0-10</td><td>10-20</td><td>20-30</td><td></td><td></td></tr><tr><td>Tube Temp °C</td><td>17</td><td>18</td><td>18</td><td></td><td></td></tr><tr><td>Stack Temp °C</td><td>18</td><td>18</td><td>18</td><td></td><td></td></tr><tr><td>Meter Temp In °C</td><td>18</td><td>18</td><td>18</td><td></td><td></td></tr><tr><td>Meter Temp Out °C</td><td>17</td><td>17</td><td>17</td><td></td><td></td></tr></tbody></table> Impinger 1 None Used Start Weight (g) End Weight (g) Total weight (g) 0								Sample	Leak 1	Time (start and minimum 1 minute)	Leak 2	Time (start and minimum 1 minute)	Total	Start Volume	981812.0	12:46:00	991195.0	13:32:00		Final Volume	991166.0	12:47:00	991195.0	13:33:00		Total Volume	9342.8	0.0	0.0		9342.8	Sample Train Internal Volume	11.2364	ml / Litres	Pre and post test leak checks are mandatory - in order to pass, the meter must stop fully for 1 minute. (Total volume in leak check is therefore zero)			Sample Point	A2	A2	A2			Time/ point (mins)	0-10	10-20	20-30			Tube Temp °C	17	18	18			Stack Temp °C	18	18	18			Meter Temp In °C	18	18	18			Meter Temp Out °C	17	17	17		
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Meter Temp Out °C	17	17	17																																																																						
Impinger 2 Start Weight (g) End Weight (g) Total weight (g) 0																																																																									

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Dichloromethane – EX 3 (Test 3)

Environmental Compliance Limited				SAMPLE TUBE DATA SAMPLING PROFORMA (Workhorse or MST)																																	
Client	Adler Pelzer Group	☒ Circular ☐ Rectangular ☐ Blipse	Pump ID	162	Date of Test	18/12/2023																															
Site	Cab Automotive Ltd	Stack Diameter (mm)	620	Meter ID	...	Sample Start Time	14:30																														
Location	Tipton	Stack Area (m²)	0.302	MST Probe ID	...	Sample End Time	15:00																														
Stack ID	EX 3 Spraybooth No.3	Barometric Pressure (mb)	1025	MST Probe Heating Temp (C)	...	Duration	30																														
Test No	Dichloromethane Test 3	Stack Thermocouple ID	1248	DGM Yd or ml/count	0.5	Measured O2	20.90																														
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☐ Meter Units ☒ ml ☐ litres <table border="1"> <thead> <tr> <th>Sample</th> <th>Leak 1</th> <th>Time (start and end) (minimum 1 minute)</th> <th>Leak 2</th> <th>Time (start and end) (minimum 1 minute)</th> <th>Total</th> </tr> </thead> <tbody> <tr> <td>Start Volume</td> <td>1713.0</td> <td>14:26:00</td> <td>11059.0</td> <td>15:02:00</td> <td></td> </tr> <tr> <td>Final Volume</td> <td>11053.0</td> <td>14:27:00</td> <td>11059.0</td> <td>15:03:00</td> <td></td> </tr> <tr> <td>Total Volume</td> <td>9328.8</td> <td>0.0</td> <td>0.0</td> <td></td> <td>9328.8</td> </tr> <tr> <td>Sample Train Internal Volume</td> <td>11.2364</td> <td>ml / Litres</td> <td colspan="3">Pre and post test leak checks are mandatory - in order to pass, the meter must stop fully for 1 minute. (Total volume in leak check is therefore zero)</td> </tr> </tbody> </table>								Sample	Leak 1	Time (start and end) (minimum 1 minute)	Leak 2	Time (start and end) (minimum 1 minute)	Total	Start Volume	1713.0	14:26:00	11059.0	15:02:00		Final Volume	11053.0	14:27:00	11059.0	15:03:00		Total Volume	9328.8	0.0	0.0		9328.8	Sample Train Internal Volume	11.2364	ml / Litres	Pre and post test leak checks are mandatory - in order to pass, the meter must stop fully for 1 minute. (Total volume in leak check is therefore zero)		
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Sample Train Internal Volume	11.2364	ml / Litres	Pre and post test leak checks are mandatory - in order to pass, the meter must stop fully for 1 minute. (Total volume in leak check is therefore zero)																																		
Sample Point	A2	A2	A2			Impinger 1	None Used																														
Time/ point (mins)	0-10	10-20	20-30			Start Weight (g)																															
Tube Temp °C	18	18	18			End Weight (g)																															
Stack Temp °C	18	18	18			Total weight (g)	0																														
Meter Temp In °C	18	18	18																																		
Meter Temp Out °C	17	17	17																																		
Sample Point						Impinger 2																															
Time/ point (mins)						Start Weight (g)																															
Tube Temp °C						End Weight (g)																															
Stack Temp °C						Total weight (g)	0																														
Meter Temp In °C																																					
Meter Temp Out °C																																					
Sample Point						Impinger 3																															
Time/ point (mins)						Start Weight (g)																															
Tube Temp °C						End Weight (g)																															
Stack Temp °C						Total weight (g)	0																														
Meter Temp In °C																																					
Meter Temp Out °C																																					
Sample Point						Silica	(IF USED)																														
Time/ point (mins)						< 50% Spent at end VIN?	Yes																														
Tube Temp °C						Sample train upstream of solvent tube condensation free for entire sample (VIN)	Yes																														
Stack Temp °C																																					
Meter Temp In °C																																					
Meter Temp Out °C																																					

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5617 : R001

Installation Name : Spraybooths
Visit Details : Compliance - November 2023
Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
Report Issue Date : 8th February 2024

LABORATORY ANALYSIS RESULTS

Laboratory analysis for Particulates & Dichloromethane was subcontracted to RPS laboratories, a UKAS Accredited Testing Laboratory, Number 0605.

RPS DO hold UKAS & MCERTS accreditation for this analysis.

As required by the MCERTS Performance Standard for Organisations, the analysis results are shown below.

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

Results Summary

Report No.: 23-12128-1

Customer Reference: 2023 Stack Preferential Rates

Customer Order No: E1073 P5617

Customer Sample No	ECL/23/6476	ECL/23/6477	ECL/23/6478	ECL/23/6479	ECL/23/6480	ECL/23/6481	ECL/23/6482	ECL/23/6483	ECL/23/6488
RPS Sample No	214317	214318	214319	214320	214321	214322	214323	214324	214325
Sample Matrix	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER
Sampling Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023

Determinand	CAS No	Codes	SOP	RL	Units									
particulates		UM	D9	0.04	mg	< 0.04		0.62		0.34		0.47		0.30
particulates		UM	D9	0.5	mg		< 0.5		< 0.5		< 0.5		< 0.5	

Results Summary

Report No.: 23-12128-1

Customer Reference: 2023 Stack Preferential Rates

Customer Order No: E1073 P5617

Customer Sample No	ECL/23/6489	ECL/23/6490	ECL/23/6491	ECL/23/6492	ECL/23/6493	ECL/23/6494	ECL/23/6495	ECL/23/6496	ECL/23/6497
RPS Sample No	214326	214327	214328	214329	214330	214331	214332	214333	214334
Sample Matrix	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION
Sampling Date	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023	09/11/2023

Determinand	CAS No	Codes	SOP	RL	Units									
particulates		UM	D9	0.04	mg		0.49		0.62		0.50		0.07	
particulates		UM	D9	0.5	mg	< 0.5		< 0.5		< 0.5		< 0.5		< 0.5

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

Results Summary

Report No.: 24-00014-1

Customer Reference: 2023 Stack Preferential Rates

Customer Order No: E1073 P5617

Customer Sample No						ECL/23/6979	ECL/23/6980	ECL/23/6981	ECL/23/6982
RPS Sample No						221813	221814	221815	221816
Sample Matrix						TUBE	TUBE	TUBE	TUBE
Sampling Date						18/12/2023	18/12/2023	18/12/2023	18/12/2023
Determinand	CAS No	Codes	SOP	RL	Units				
dichloromethane (DCM) FRONT	75-09-2	UM	O8	4	ug	< 4	< 4	< 4	< 4
dichloromethane (DCM) BACK	75-09-2	UM	O8	4	ug	< 4	< 4	< 4	< 4

Results Summary

Report No.: 24-00015-1

Customer Reference: 2023 Stack Preferential Rates

Customer Order No: E1073 P5617

Customer Sample No						ECL/6484 - 4387 256918	ECL/6485	ECL/6486 - 4387 265917	ECL/6487	ECL/6500 - 4387 256900	ECL/6501	ECL/6502 - 4387 256899	ECL/6503
RPS Sample No						221817	221818	221819	221820	221821	221822	221823	221824
Sample Matrix						FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION
Sampling Date						18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024	18/12/2024
Determinand	CAS No	Codes	SOP	RL	Units								
particulates		UM	D9	0.04	mg	< 0.04		0.10		0.16		0.10	
particulates		UM	D9	0.5	mg		< 0.5		< 0.5		< 0.5		< 0.5

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

Results Summary

Report No.: 24-00696-1

Customer Reference: 2023 Stack Preferential Rates

Customer Order No: E1222 P5617

Customer Sample No	ECL/24/0210 - 254281	ECL/24/0211	ECL/24/0212 - 254272	ECL/24/0213	ECL/24/0214 - 254273	ECL/24/0215	ECL/24/0216 - 254271	ECL/24/0217
RPS Sample No	224966	224967	224968	224969	224970	224971	224972	224973
Sample Matrix	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION
Sampling Date	22/01/2024	22/01/2024	22/01/2024	22/01/2024	22/01/2024	22/01/2024	22/01/2024	22/01/2024

Determinand	CAS No	Codes	SOP	RL	Units								
particulates		UM	D9	0.04	mg	< 0.04		< 0.04		0.05		< 0.04	
particulates		UM	D9	0.5	mg		< 0.5		< 0.5		< 0.5		< 0.5

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

: Spraybooths

Visit Details

: Compliance - November 2023

Survey Dates

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

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UNCERTAINTY CALCULATIONS

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name : Spraybooths

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

TVOC Measurement Uncertainty

EX 3 - Spraybooth No.3 - TVOC - Measurement Uncertainty - Uncertainty Calculations Table 1

Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Min Certified Ranges
			TVOC 0 - 15 mgC/m ³
Lack of fit ⁽¹⁾	U_{lof}	Rectangular (Divisor = $\sqrt{3}$)	2.00
Span drift ⁽²⁾	$U_{d,s}$	Rectangular (Divisor = $\sqrt{3}$)	0.54
Repeatability Standard Deviation (span) ⁽³⁾	U_r	Normal (Divisor = 1)	3.57
Losses / leakage in the sample system ⁽⁴⁾	U_{loss}	Rectangular (Divisor = $\sqrt{3}$)	3.93
Temperature dependant span drift ⁽⁵⁾	U_t	Rectangular (Divisor = $\sqrt{3}$)	2.40
Interferents ⁽¹⁾	U_i	Rectangular (Divisor = $\sqrt{3}$)	2.50
Uncertainty of Reference Gas ⁽⁶⁾	U_{ref}	Rectangular (Divisor = $\sqrt{3}$)	2.54
Effect of Voltage Fluctuation ⁽⁷⁾	U_v	Rectangular (Divisor = $\sqrt{3}$)	0.50
Effect of Oxygen Synergism ⁽⁷⁾	U_{syn}	Rectangular (Divisor = $\sqrt{3}$)	4.73

Note:

$$\text{when } |(x_{i,max} - x_{i,adj})| = |(x_{i,min} - x_{i,adj})|, \text{ then } u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$$

1 Expressed as a percentage of the certified range

2 Expressed as maximum drift per 24hr period as percentage of the certified range

3 Expressed as a percentage of the certified range

4 Expressed as a percentage of the certified range

5 Expressed as a percentage of the certified range per one degree centigrade

6 Expressed as standard uncertainty in units of measurement i.e. mg/m³ / %Vol taking account of an additional uncertainty of 2% for gas blending

7 Expressed as a percentage of the certified range

EX 3 - Spraybooth No.3 - TVOC - Measurement Uncertainty - Uncertainty Calculations Table 2

Performance Characteristics	Uncertainty	Value of Standard Uncertainty	*TVOC 0 - 15 mgC/m ³
Lack of fit	U_{lof}	$u(x_i) = \frac{u_{lof} \times R_i}{\sqrt{3}} =$	0.17
Span drift	$U_{d,s}$	$u(x_i) = \frac{u_{d,s} \times R_i}{\sqrt{3}} =$	0.047
Repeatability Standard Deviation (span)	U_r	$\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}} =$	0.53
Losses / leakage in the sample system	U_{loss}	$u(x_i) = \frac{u_{loss} \times R_i}{\sqrt{3}} =$	0.34
Temperature dependant span drift	U_t	$u(x_i) = \frac{u_t}{100} \times R_i \times \sqrt{\frac{(x_{i,max} - x_{adj})^2 + (x_{i,min} - x_{adj})(x_{i,max} - x_{adj}) + (x_{i,min} - x_{adj})^2}{3}}$	0.00
Interferents	U_i	$u(x_i) = \frac{u_i \times R_i}{\sqrt{3}} =$	0.22
Uncertainty of Reference Gas	U_{ref}	$u(x_i) = \frac{u_{ref}}{\sqrt{3}} =$	1.47
Effect of Voltage Fluctuation	U_v		0.043
Effect of Oxygen Synergism	U_{syn}		0.41
Combined Standard Uncertainty		$u_c = \sqrt{u_{lof}^2 + u_{d,s}^2 + u_r^2 + u_{loss}^2 + u_t^2 + u_i^2 + u_{ref}^2}$	1.68
Expanded measurement uncertainty (at 95% confidence)		$U_{EXP} = 2 \times u_c$	3.35
Applied Span Concentration			146.85
Measured Span Concentration, STP Dry Gas			146.06
Expanded measurement uncertainty as % of Applied Span			2 %

* Sick F3006 FD

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

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: Spraybooths

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: 8th February 2024

TVOC Uncertainty of Measurement Results – Test 1

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 1

Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Min Certified Range
				TVOC 0 - 15 mgC/m ³
Lack of fit ⁽¹⁾	u_{lof}	Rectangular	$\sqrt{3}$	2.00
Span drift ⁽²⁾	$u_{d,s}$			0.54
Losses / leakage in the sample system ⁽⁴⁾	u_{loss}			0.64
Temperature dependant span drift ⁽⁵⁾	u_t			2.40
Interferents ⁽³⁾	u_i			16.67
Effect of Voltage Fluctuation ⁽⁷⁾	u_v			0.50
Effect of Oxygen Synergism ⁽⁷⁾	u_{syn}			4.73

Notes

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})^2}{3}}$, when $(x_{i,max} - x_{i,adj}) = (x_{i,min} - x_{i,adj})$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$

Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	TVOC 0 - 15 mgC/m ³
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.17
Span drift	$u_{d,s}$			0.047
Temperature dependant span drift	u_t			0.00
Interferents	u_i			1.44
Effect of Voltage Fluctuation (See Note)	u_v			0.043
Effect of Oxygen Synergism (See Note)	u_{syn}			0.41

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 2

Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	TVOC 0 - 15 mgC/m ³
Losses / leakage in the sample system	u_{loss}	18/12/23 13:00 - 13:30	0.010
Standard Error of Measured Value	u_{SE}	18/12/23 13:00 - 13:30	0.029

Effect on Uncertainty Caused by Oxygen

$$u_{Corr_{O_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})(20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Meas} =$$

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.0000$$

$$uf_{O_2} = \frac{u_{Corr_{O_2}}}{f_{O_2}} \times 100 = 0.00 \%$$

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$$\therefore u(x_i) = C_i u_i \text{ where } C_i = \frac{\partial f}{\partial x_i}$$

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 3

Uncertainty	Date & Time	* TVOC 0 - 15 mgC/m ³
Measured Concentration	18/12/23 13:00 - 13:30	1.59

Combined Standard Uncertainty

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

- Expressed as a percentage of the certified range
- Expressed as a percentage of the certified range as maximum drift per 24hr period
- Expressed as a percentage of the certified range
- Expressed as a percentage of the applied span concentration
- Expressed as a percentage of the certified range per one degree centigrade
- Where the uncertainty of moisture is taken from the manual extract test calculations.
- Expressed as a percentage of the certified range
- Where no uncertainty is presented above, the uncertainty is > 100%

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

TVOC Uncertainty of Measurement Results – Test 2

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 1

Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Min Certified Range
				TVOC 0 - 15 mgC/m ³
Lack of fit ⁽¹⁾	u_{lof}	Rectangular	$\sqrt{3}$	2.00
Span drift ⁽²⁾	$u_{d,s}$			0.54
Losses / leakage in the sample system ⁽⁴⁾	u_{loss}			0.64
Temperature dependant span drift ⁽⁵⁾	u_t			2.40
Interferents ⁽¹⁾	u_i			16.67
Effect of Voltage Fluctuation ⁽⁷⁾	u_v			0.50
Effect of Oxygen Synergism ⁽⁷⁾	u_{syn}			4.73

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})^2}{3}}$, when $|x_{i,max} - x_{i,adj}| = |x_{i,min} - x_{i,adj}|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$

Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	TVOC 0 - 15 mgC/m ³
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.17
Span drift	$u_{d,s}$			0.047
Temperature dependant span drift	u_t			0.00
Interferents	u_i			1.44
Effect of Voltage Fluctuation (See Note)	u_v			0.043
Effect of Oxygen Synergism (See Note)	u_{syn}			0.41

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 2

Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	TVOC 0 - 15 mgC/m ³
Losses / leakage in the sample system	u_{loss}	18/12/23 13:45 - 14:15	0.007
Standard Error of Measured Value	u_{SE}	18/12/23 13:45 - 14:15	0.017

Effect on Uncertainty Caused by Oxygen

$$u_{Corr_{O_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})(20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Meas} =$$

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.0000$$

$$u_{f_{O_2}} = \frac{u_{Corr_{O_2}}}{f_{O_2}} \times 100 = 0.00 \%$$

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$$u_{combined} = \sqrt{\sum (u_{f_{O_2}})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C,

$$\therefore u(x_i) = C_i u_i \text{ where } C_i = \frac{\partial f}{\partial x_i}$$

EX3 - TVOC - Uncertainty of Measurement Results - Calculations Part 3

Uncertainty	Date & Time	* TVOC 0 - 15 mgC/m ³
Measured Concentration	18/12/23 13:45 - 14:15	1.08

Combined Standard Uncertainty

$$\text{Expanded uncertainty (at 95\% confidence)} \quad U_{Exp} = 2 \times u_c$$

- Expressed as a percentage of the certified range
- Expressed as a percentage of the certified range as maximum drift per 24hr period
- Expressed as a percentage of the certified range
- Expressed as a percentage of the applied span concentration
- Expressed as a percentage of the certified range per one degree centigrade
- Where the uncertainty of moisture is taken from the manual extract test calculations
- Expressed as a percentage of the certified range
- Where no uncertainty is presented above, the uncertainty is > 100%

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

TVOC Uncertainty of Measurement Results – Test 3

EX 3 - Spraybooth No.3 - TVOC - Uncertainty of Measurement Results - Calculations Part 1

Performance Characteristics	Standard Uncertainty (% of Range)	Distribution	Divisor	Min Certified Range
				TVOC 0 - 15 mgC/m ³
Lack of fit ⁽¹⁾	u_{lof}	Rectangular	$\sqrt{3}$	2.00
Span drift ⁽²⁾	$u_{d,s}$			0.54
Losses / leakage in the sample system ⁽⁴⁾	u_{loss}			0.64
Temperature dependant span drift ⁽⁵⁾	u_t			2.40
Interferents ⁽³⁾	u_i			16.67
Effect of Voltage Fluctuation ⁽⁷⁾	u_v			0.50
Effect of Oxygen Synergism ⁽⁷⁾	u_{syn}			4.73

Notes:

For rectangular distributions, $u(x_i) = \frac{u \times R_i}{\sqrt{3}}$

For $u(x_i) = \Delta x_i \sqrt{\frac{(x_{i,max} - x_{i,adj})^2 + (x_{i,min} - x_{i,adj})^2 + (x_{i,max} - x_{i,min})^2}{3}}$, when $|x_{i,max} - x_{i,adj}| = |x_{i,min} - x_{i,adj}|$, then $u(x_i) = \frac{\Delta x_i}{\sqrt{3}}$

Where $u(x_i) = \frac{\sigma}{\sqrt{n}}$ (See note 6 below), $\sigma = \sqrt{\frac{\sum_{i=1}^n (x_i - \bar{x})^2}{n-1}}$

Performance Characteristics	Uncertainty (Units of final measurement)	Distribution	Divisor	TVOC 0 - 15 mgC/m ³
Lack of fit	u_{lof}	Rectangular	$\sqrt{3}$	0.17
Span drift	$u_{d,s}$			0.047
Temperature dependant span drift	u_t			0.00
Interferents	u_i			1.44
Effect of Voltage Fluctuation (See Note)	u_v			0.043
Effect of Oxygen Synergism (See Note)	u_{syn}			0.41

EX 3 - Spraybooth No.3 - TVOC - Uncertainty of Measurement Results - Calculations Part 2

Performance Characteristics	Uncertainty (Units of final measurement)	Date & Time	TVOC 0 - 15 mgC/m ³
Losses / leakage in the sample system	u_{loss}	18/12/23 14:30 - 15:00	0.005
Standard Error of Measured Value	u_{SE}	18/12/23 14:30 - 15:00	0.012

Effect on Uncertainty Caused by Oxygen

$$uCorr_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured})(20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Meas} = 1.00$$

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.0000$$

$$uf_{O_2} = \frac{uCorr_{O_2} \times 100}{f_{O_2}} = 0.00 \%$$

The effect of oxygen on the overall uncertainties (below) is incorporated using the following equation:-

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Where oxygen or moisture correction is required, uncertainty based on the standard error of the measured peripheral value is converted to units of final measurement using a sensitivity coefficient C_i ,

$$\therefore u(x_i) = C_i u_i \text{ where } C_i = \frac{\partial f}{\partial x_i}$$

EX 3 - Spraybooth No.3 - TVOC - Uncertainty of Measurement Results - Calculations Part 3

Uncertainty	Date & Time	*TVOC 0 - 15 mgC/m ³
Measured Concentration	18/12/23 14:30 - 15:00	0.82

Combined Standard Uncertainty

Expanded uncertainty (at 95% confidence) $U_{Exp} = 2 \times u_c$

- Expressed as a percentage of the certified range
- Expressed as a percentage of the certified range as maximum drift per 24hr period
- Expressed as a percentage of the certified range
- Expressed as a percentage of the applied span concentration
- Expressed as a percentage of the certified range per one degree centigrade
- Where the uncertainty of moisture is taken from the manual extract test calculations.
- Expressed as a percentage of the certified range
- Where no uncertainty is presented above, the uncertainty is > 100%

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

Particulates Uncertainty – EX 1

Site: Adler Pelzer Group, Cab Automotive Ltd

Location: Tipton , Stack ID: EX 1 - Spraybooth (Mini) No.2

$$u_{mass} = \sqrt{(u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K= 2	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg																																																																																										
Particulates	0.0400	0.50	0.54	TPM	0.10	0.50	0.0500	0.25																																																																																										
<table> <tr> <td colspan="3">TPM</td><td colspan="6">Standard Uncertainty @ 95%</td></tr> <tr> <td>Sampled Volume (V_m)</td><td>0.78</td><td colspan="2">m³</td><td>uV_m</td><td>0.001</td><td colspan="3">m³</td></tr> <tr> <td>Meter Correction Factor (Y_d)</td><td>0.97</td><td colspan="2">...</td><td>...</td><td>...</td><td colspan="3">...</td></tr> <tr> <td>Meter Temperature (T_m)</td><td>293.65</td><td colspan="2">k</td><td>uT_m</td><td>1.5</td><td colspan="3">k</td></tr> <tr> <td>Static Pressure of Stack P_{static}</td><td>1.11</td><td colspan="2">mmH₂O</td><td>uP_{static}</td><td>0.25</td><td colspan="3">mmH₂O</td></tr> <tr> <td>Absolute Stack Pressure p_a</td><td>745.56</td><td colspan="2">mmHg</td><td>uP_a</td><td>0.8</td><td colspan="3">mmHg</td></tr> <tr> <td>Barometric Pressure p_b</td><td>745.75</td><td colspan="2">mmHg</td><td>uP_b</td><td>3.8</td><td colspan="3">mmHg</td></tr> <tr> <td>Average Differential Pressure (ΔP) + ρs</td><td>100.24</td><td colspan="2">mmH₂O</td><td>uΔH</td><td>0.25</td><td colspan="3">mmH₂O</td></tr> <tr> <td>Oxygen content (O_{2,m})</td><td>20.90</td><td colspan="2">% by volume</td><td>uO_{2,m} = σ/√n</td><td>0.00</td><td colspan="3">% by volume</td></tr> <tr> <td>Moisture Content (H₂O)</td><td>0.0991</td><td colspan="2">% by volume</td><td>uH₂O</td><td>0.22</td><td colspan="3">% by volume</td></tr> </table>									TPM			Standard Uncertainty @ 95%						Sampled Volume (V _m)	0.78	m ³		uV _m	0.001	m ³			Meter Correction Factor (Y _d)	0.97	...		...	...	...			Meter Temperature (T _m)	293.65	k		uT _m	1.5	k			Static Pressure of Stack P _{static}	1.11	mmH ₂ O		uP _{static}	0.25	mmH ₂ O			Absolute Stack Pressure p _a	745.56	mmHg		uP _a	0.8	mmHg			Barometric Pressure p _b	745.75	mmHg		uP _b	3.8	mmHg			Average Differential Pressure (ΔP) + ρs	100.24	mmH ₂ O		uΔH	0.25	mmH ₂ O			Oxygen content (O _{2,m})	20.90	% by volume		uO _{2,m} = σ/√n	0.00	% by volume			Moisture Content (H ₂ O)	0.0991	% by volume		uH ₂ O	0.22	% by volume		
TPM			Standard Uncertainty @ 95%																																																																																															
Sampled Volume (V _m)	0.78	m ³		uV _m	0.001	m ³																																																																																												
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Oxygen content (O _{2,m})	20.90	% by volume		uO _{2,m} = σ/√n	0.00	% by volume																																																																																												
Moisture Content (H ₂ O)	0.0991	% by volume		uH ₂ O	0.22	% by volume																																																																																												

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP_b), measured static pressure uncertainty component (uP_{static}) & measured temperature of dry gas uncertainty component (uT_m)

$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.892$					Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV _{std}) & volume uncertainty component (uV _m)				
	Maximum	Minimum	Sensitivity	uf _{stp}		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)
uΔH	0.46	0.46	0.0000451	0.0000113					
uP _b	0.46	0.46	0.000614	0.00230		Effect of uV _{std}	0.70	0.69	0.78
uT _m	0.46	0.46	0.000816	0.00122		Effect of uV _m	0.69	0.69	0.89
H ₂ O	0.46	0.46	0.00463	0.00102					0.000892
$\frac{uf_k}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100-H_2O))}\right)^2} = 0.00248$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00170$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (u_{o2}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$					Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf _{o2}) and STP volume uncertainty component (uV _{stp})				
$uCorr_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$					$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{o_2}} = 0.78$				
	Maximum	Minimum	Sensitivity	u		Maximum	Minimum	Sensitivity	u
	mg/Nm ³	mg/Nm ³		mg/Nm ³		mg/Nm ³	mg/Nm ³		mg/Nm ³
uM	1.15	0.41	1.44	0.37					
uV _{stp}	0.78	0.78	1.12	0.00191					

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.37	0.73	0.78	94.4%	1.5%

Measurement Uncertainty of Determinand (including correction for oxygen)

Particulate concentration < Blank! Uncertainty will be reported @ > 100%!

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc. O ₂ Corr ⁿ factor (Ucombined) %
Particulates	94.4	0.0	94.4

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates Uncertainty – EX 2

Site: Adler Plezer Group, Cab Automotive Ltd
Location: Tipton , Stack ID: EX 2 - Spraybooth (Mini) No.1

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K= 2	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
TPM								
Particulates	0.34	0.50	0.84	0.10	0.50	0.0500	0.25	0.25

		TPM			Standard Uncertainty @ 95%			
Sampled Volume (V _m)		0.56	m ³		uV _m	0.001	m ³	
Meter Correction Factor (Y _d)		0.98	...		...	...	...	
Meter Temperature (T _m)		296.15	k		uT _m	1.5	k	
Static Pressure of Stack P _{static}		1.07	mmH ₂ O		uP _{static}	0.25	mmH ₂ O	
Absolute Stack Pressure p _s		745.56	mmHg		uP _s	0.8	mmHg	
Barometric Pressure p _b		745.75	mmHg		uP _b	3.8	mmHg	
Average Differential Pressure (ΔP) + p _s		100.24	mmH ₂ O		uΔH	0.25	mmH ₂ O	
Oxygen content (O _{2,m})		20.90	% by volume	uO _{2,m} = σ/√n	0.00	% by volume		
Moisture Content (H ₂ O)		0.10	% by volume		uH ₂ O	0.30	% by volume	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP _b), measured static pressure uncertainty component (uP _{static}) & measured temperature of dry gas uncertainty component (uT _m)					Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV _{std}) & volume uncertainty component (uV _m)				
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.893$					$V_{std} = V_{measured} \times f_s = 0.5037$				
	Maximum	Minimum	Sensitivity	uf _{stp}		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)
uΔH	0.46	0.46	0.0000454	0.0000113	Effect of uV _{std}	0.51	0.50	0.56	0.00149
uP _b	0.47	0.46	0.000617	0.00231	Effect of uV _m	0.50	0.50	0.89	0.000893
uP _{static}	0.47	0.46	0.000816	0.00122					
H ₂ O	0.47	0.46	0.00465	0.00142					
$u_{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100-H_2O))}\right)^2} = 0.00264$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00116$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf _{O₂}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)					Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf _{O₂}) and STP volume uncertainty component (uV _{stp})				
$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$					$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}} = 1.67$				
$u_{Corr_{O_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$						Maximum	Minimum	Sensitivity	u
					uM	mg/Nm ³	mg/Nm ³		mg/Nm ³
$uf_{O_2} = \frac{u_{Corr_{O_2}}}{f_{O_2}} \times 100 = 0.00$						2.17	1.16	1.99	0.51
					uV _{stp}	1.67	1.66	3.31	0.00384

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.51	1.01	1.67	60.7%	2.0%

Measurement Uncertainty of Determinand (including correction for oxygen)

Particulate concentration < Blank! Uncertainty will be reported @ > 100%!

$$u_{combined} = \sqrt{\sum (uf_{O_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ^o Factor	Overall Measurement Uncertainty inc O ₂ Corr ^o factor (Ucombined) %
Particulates	60.7	0.0	60.7

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details : Compliance - November 2023

Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

Report Issue Date : 8th February 2024

Particulates Uncertainty – EX 4

Site: Adler Pelzer Group, Cab Automotive Ltd

Location: Tipton , Stack ID: EX 4 - Spraybooth (McLaren) No.8

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K= 2		Standard Uncertainty		Combined Uncertainty mg
				Filter mg	Solution mg	Filter mg	Solution mg	
Particulates	0.30	0.50	0.80	TPM	0.10	0.50	0.0500	0.25
		TPM				Standard Uncertainty @ 95%		
Sampled Volume (V _m)	0.68		m ³		uV _m	0.001	m ³	
Meter Correction Factor (Y _d)	0.98		...		...	...	...	
Meter Temperature (T _m)	296.65		k		uT _m	1.5	k	
Static Pressure of Stack P _{static}	8.48		mmH ₂ O		uP _{static}	0.25	mmH ₂ O	
Absolute Stack Pressure p _s	745.56		mmHg		uP _s	0.8	mmHg	
Barometric Pressure p _b	745.75		mmHg		uP _b	3.8	mmHg	
Average Differential Pressure (ΔP) + p _s	99.96		mmH ₂ O		uΔH	0.25	mmH ₂ O	
Oxygen content (O _{2,m})	20.90		% by volume		uO _{2,m} = σ/√n	0.00	% by volume	
Moisture Content (H ₂ O)	0.10		% by volume		uH ₂ O	0.25	% by volume	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP _b), measured static pressure uncertainty component (uP _{static}) & measured temperature of dry gas uncertainty component (uT _m)					Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV _{std}) & volume uncertainty component (uV _m)				
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.891$					$V_{std} = V_{measured} \times f_s = 0.6098$				
	Maximum	Minimum	Sensitivity	uf _{stp}		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)
uΔH	0.46	0.46	0.0000453	0.0000113	Effect of uV _{std}	0.61	0.61	0.68	0.00174
uP _b	0.47	0.46	0.000616	0.00231	Effect of uV _m	0.61	0.61	0.89	0.000891
uT _m	0.47	0.46	0.000815	0.00122					
H ₂ O	0.47	0.46	0.00465	0.00117					
$\frac{uf_k}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100-H_2O))}\right)^2} = 0.00254$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00143$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf _{o2}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)					Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf _{o2}) and STP volume uncertainty component (uV _{stp})				
$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$					$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{o_2}} = 1.31$				
$uCorr_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$						Maximum	Minimum	Sensitivity	u
					uM	mg/Nm ³	mg/Nm ³		mg/Nm ³
$uf_{o_2} = \frac{uCorr_{o_2}}{f_{o_2}} \times 100 = 0.00$						1.73	0.89	1.64	0.42
					uV _{stp}	1.32	1.31	2.15	0.00308

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.42	0.84	1.31	63.7%	1.7%

Measurement Uncertainty of Determinand (including correction for oxygen)

Particulate concentration < Blank! Uncertainty will be reported @ > 100%!

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc. O ₂ Corr ⁿ factor (U _{combined}) %
Particulates	63.7	0.0	63.7

Environmental Compliance Limited

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : R001

Installation Name : Spraybooths
 Visit Details : Compliance - November 2023
 Survey Dates : 9th – 10th November 2023, 18th December 2023 & 22nd January 2024
 Report Issue Date : 8th February 2024

Particulates Uncertainty – EX 5

Site: Adler Pelzer Group, Cab Automotive Ltd
 Location: Tipton , Stack ID: EX 5 Spraybooth (McLaren) No.9

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered	LAB Method Uncert (%) K= 2		Standard Uncertainty		Combined Uncertainty mg
			Mass mg	Filter mg	Solution mg	Filter mg	Solution mg	
TPM								
Particulates	0.62	0.50	1.12	0.10	0.50	0.0500	0.25	0.25
		TPM	Standard Uncertainty @ 95%					
Sampled Volume (V _m)	0.67		m ³		uV _m	0.001	m ³	
Meter Correction Factor (Y _d)	0.97		...		...	...	...	
Meter Temperature (T _m)	295.28		k		uT _m	1.5	k	
Static Pressure of Stack P _{static}	5.66		mmH ₂ O		uP _{static}	0.25	mmH ₂ O	
Absolute Stack Pressure p _s	745.56		mmHg		u _{p_s}	0.8	mmHg	
Barometric Pressure p _b	745.75		mmHg		u _{p_b}	3.8	mmHg	
Average Differential Pressure (ΔP) + ρs	99.73		mmH ₂ O		uΔH	0.25	mmH ₂ O	
Oxygen content (O _{2,m})	20.90		% by volume	$u_{O_{2,m}} = \sigma / \sqrt{n}$		0.00	% by volume	
Moisture Content (H ₂ O)	0.10		% by volume		uH ₂ O	0.26	% by volume	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (u _b), measured static pressure uncertainty component (u _{Pstatic}) & measured temperature of dry gas uncertainty component (u _{T_m})	Uncertainty in volume @ STP due to volume correction factor uncertainty component (u _{Vstd}) & volume uncertainty component (u _{Vm})																																													
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.887$	$V_{std} = V_{measured} \times f_s = 0.5970$																																													
<table><tr><td></td><td>Maximum</td><td>Minimum</td><td>Sensitivity</td><td>u_{f_s}</td></tr><tr><td>uΔH</td><td>0.46</td><td>0.46</td><td>0.0000450</td><td>0.0000113</td></tr><tr><td>u_{P_b}</td><td>0.46</td><td>0.46</td><td>0.000612</td><td>0.00230</td></tr><tr><td>u_{T_m}</td><td>0.46</td><td>0.46</td><td>0.000811</td><td>0.00122</td></tr><tr><td>H₂O</td><td>0.46</td><td>0.46</td><td>0.00461</td><td>0.00118</td></tr></table>		Maximum	Minimum	Sensitivity	u _{f_s}	uΔH	0.46	0.46	0.0000450	0.0000113	u _{P_b}	0.46	0.46	0.000612	0.00230	u _{T_m}	0.46	0.46	0.000811	0.00122	H ₂ O	0.46	0.46	0.00461	0.00118	<table><tr><td></td><td>Maximum</td><td>Minimum</td><td>Sensitivity</td><td>Standard Uncertainty (m³)</td></tr><tr><td></td><td>m³</td><td>m³</td><td></td><td></td></tr><tr><td>Effect of u_{Vstd}</td><td>0.60</td><td>0.60</td><td>0.67</td><td>0.00170</td></tr><tr><td>Effect of u_{V_m}</td><td>0.60</td><td>0.60</td><td>0.89</td><td>0.000887</td></tr></table>		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)		m ³	m ³			Effect of u _{Vstd}	0.60	0.60	0.67	0.00170	Effect of u _{V_m}	0.60	0.60	0.89	0.000887
	Maximum	Minimum	Sensitivity	u _{f_s}																																										
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$\frac{u_{f_s}}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{100/(100-H_2O)}\right)^2} = 0.00252$	$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00139$																																													

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf_{o_2}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (u_L)	Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf_{o_2}) and STP volume uncertainty component (uV_{stp})			
$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$	$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{o_2}} = 1.88$			
$u_{Corr_{o_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	u mg/Nm ³
$uf_{o_2} = \frac{u_{Corr_{o_2}}}{f_{o_2}} \times 100 = 0.00$	uM 2.30	1.45	1.68	0.43
	uV_{stp} 1.88	1.87	3.14	0.00436

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty	Expanded Uncertainty	Measured Concentration	Percent of Measured Concentration	Uncertainty as Percent of ELV
mg/Nm ³	mg/Nm ³	mg/Nm ³		
0.43	0.85	1.88	45.5%	1.7%

Measurement Uncertainty of Determinand (including correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_{f_{o_2}})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ^o Factor	Overall Measurement Uncertainty inc O ₂ Corr ^o factor (Ucombined) %
Particulates	45.5	0.0	45.5

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Roo1

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates Uncertainty – SB5

Site: Adler Pelzer Group , Cab Automotive Ltd
Location: Tipton , Stack ID: SB5 Bentley

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%)	K=2	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg																																																																																										
TPM																																																																																																		
Particulates	0.0400	0.50	0.54	0.10	0.50	0.0500	0.25	0.25																																																																																										
<table> <tr> <td colspan="3">TPM</td><td colspan="6">Standard Uncertainty @ 95%</td></tr> <tr> <td>Sampled Volume (V_m)</td><td>0.40</td><td></td><td>m³</td><td>uV_m</td><td>0.001</td><td>m³</td><td></td><td></td></tr> <tr> <td>Meter Correction Factor (Y_d)</td><td>0.95</td><td></td><td>...</td><td>...</td><td>...</td><td>...</td><td></td><td></td></tr> <tr> <td>Meter Temperature (T_m)</td><td>291.65</td><td></td><td>k</td><td>uT_m</td><td>1.5</td><td>k</td><td></td><td></td></tr> <tr> <td>Static Pressure of Stack P_{static}</td><td>1.31</td><td></td><td>mmH₂O</td><td>uP_{static}</td><td>0.25</td><td>mmH₂O</td><td></td><td></td></tr> <tr> <td>Absolute Stack Pressure p_s</td><td>753.06</td><td></td><td>mmHg</td><td>up_s</td><td>0.8</td><td>mmHg</td><td></td><td></td></tr> <tr> <td>Barometric Pressure p_b</td><td>753.25</td><td></td><td>mmHg</td><td>up_b</td><td>3.8</td><td>mmHg</td><td></td><td></td></tr> <tr> <td>Average Differential Pressure (ΔP) + ps</td><td>100.42</td><td></td><td>mmH₂O</td><td>uΔH</td><td>0.25</td><td>mmH₂O</td><td></td><td></td></tr> <tr> <td>Oxygen content (O_{2,m})</td><td>20.90</td><td></td><td>% by volume</td><td>uO_{2,m} = σ/√n</td><td>0.00</td><td>% by volume</td><td></td><td></td></tr> <tr> <td>Moisture Content (H₂O)</td><td>0.0983</td><td></td><td>% by volume</td><td>uH₂O</td><td>0.43</td><td>% by volume</td><td></td><td></td></tr> </table>									TPM			Standard Uncertainty @ 95%						Sampled Volume (V _m)	0.40		m ³	uV _m	0.001	m ³			Meter Correction Factor (Y _d)	0.95		...	...	...	...			Meter Temperature (T _m)	291.65		k	uT _m	1.5	k			Static Pressure of Stack P _{static}	1.31		mmH ₂ O	uP _{static}	0.25	mmH ₂ O			Absolute Stack Pressure p _s	753.06		mmHg	up _s	0.8	mmHg			Barometric Pressure p _b	753.25		mmHg	up _b	3.8	mmHg			Average Differential Pressure (ΔP) + ps	100.42		mmH ₂ O	uΔH	0.25	mmH ₂ O			Oxygen content (O _{2,m})	20.90		% by volume	uO _{2,m} = σ/√n	0.00	% by volume			Moisture Content (H ₂ O)	0.0983		% by volume	uH ₂ O	0.43	% by volume		
TPM			Standard Uncertainty @ 95%																																																																																															
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Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by $C_i u_i$ where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. $i = uV_m, uT_m$ etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured static pressure uncertainty component (uPstatic) & measured temperature of dry gas uncertainty component (uTm)					Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)				
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.893$					$V_{std} = V_{measured} \times f_s = 0.3565$				
	Maximum	Minimum	Sensitivity	ufstp		Maximum	Minimum	Sensitivity	Standard
uΔH	0.46	0.46	0.0000446	0.0000112		m ³	m ³		Uncertainty (m ³)
up _b	0.46	0.46	0.000607	0.00228	Effect of uVstd	0.36	0.36	0.40	0.00116
uT _m	0.46	0.46	0.000817	0.00123	Effect of uVm	0.36	0.36	0.89	0.000893
H ₂ O	0.46	0.46	0.00462	0.00199					
$\frac{u f_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u \Delta H)^2 + (u P)^2}}{(P_m / 101.3)}\right)^2 + \left(\frac{u T_m}{(T_m / 273.15)}\right)^2 + \left(\frac{u H_2 O}{100 / (100 - H_2 O)}\right)^2} = 0.00290$					$\frac{u V_{std}}{V_{std}} = \sqrt{\left(\frac{u V_{std}}{f_s}\right)^2 + \left(\frac{u V_m}{V_m}\right)^2} = 0.000922$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf_{o_2}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)		Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf_{o_2}) and STP volume uncertainty component (uVstp)				
$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$		$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{o_2}} = 1.51$				
$u_{Corr_{o_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$		Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	u mg/Nm ³	
$uf_{o_2} = \frac{u_{Corr_{o_2}} \times O_{2,ref}}{f_{o_2}} \times 100 = 0.00$		uM	2.23	0.80	2.81	0.72
		uV _{stp}	1.52	1.51	4.25	0.00392

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.72	1.43	1.51	94.4%	2.9%

Measurement Uncertainty of Determinand (including correction for oxygen)

$$u_{combined} = \sqrt{(u f_{o_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc O ₂ Corr ⁿ factor (Ucombined) %
Particulates	94.4	0.0	94.4

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Ro01

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates Uncertainty – SB7

Site: Adler Pelzer Group , Cab Automotive Ltd
Location: Tipton , Stack ID: SB7 Bentley

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2 Filter mg	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
TPM								
Particulates	0.0500	0.50	0.55	0.10	0.50	0.0500	0.25	0.25

TPM		Standard Uncertainty @ 95%						
Sampled Volume (V _m)	0.76	m ³	uV _m	0.001	m ³			
Meter Correction Factor (Y _d)	0.95	...	...	...	...			
Meter Temperature (T _m)	293.90	k	uT _m	1.5	k			
Static Pressure of Stack P _{sstatic}	8.57	mmH ₂ O	uP _{sstatic}	0.25	mmH ₂ O			
Absolute Stack Pressure p _s	753.06	mmHg	up _s	0.8	mmHg			
Barometric Pressure p _b	753.25	mmHg	up _b	3.8	mmHg			
Average Differential Pressure (ΔP) + ps	101.18	mmH ₂ O	uΔH	0.25	mmH ₂ O			
Oxygen content (O _{2,m})	20.90	% by volume	uO _{2,m} = σ/√n	0.00	% by volume			
Moisture Content (H ₂ O)	0.10	% by volume	uH ₂ O	0.23	% by volume			

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (upb), measured static pressure uncertainty component (uPstatic) & measured temperature of dry gas uncertainty component (uT _m)					Uncertainty in volume @ STP due to volume correction factor uncertainty component (uVstd) & volume uncertainty component (uVm)				
$f_s = \frac{273}{760} \times \frac{P_b + \Delta H}{T_m} \times Y_d = 0.887$					$V_{std} = V_{measured} \times f_s = 0.6748$				
	Maximum	Minimum	Sensitivity	ufstp		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)
uΔH	0.46	0.46	0.0000444	0.0000111	Effect of uVstd	0.68	0.67	0.76	0.00185
up _b	0.46	0.46	0.000604	0.00227	Effect of uVm	0.68	0.67	0.89	0.000887
uT _m	0.46	0.46	0.000811	0.00122					
H ₂ O	0.46	0.46	0.00460	0.00105					
$\frac{uf_s}{f_s} = \frac{\sqrt{\left(\frac{(u\Delta H)^2 + (uP_s)^2}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100-H_2O))}\right)^2}}{f_s} = 0.00243$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00161$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf _{o2}) & uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)					Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM), oxygen correction uncertainty component (uf _{o2}) and STP volume uncertainty component (uVstp)				
$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$					$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{o_2}} = 0.82$				
$u_{Corr_{o_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$						Maximum	Minimum	Sensitivity	u
					uM	1.19	0.44	1.48	0.38
$uf_{o_2} = \frac{u_{Corr_{o_2}} \times f_{o_2}}{f_{o_2}} \times 100 = 0.00$					uVstp	0.82	0.81	1.21	0.00195

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.38	0.76	0.82	92.7%	1.5%

Measurement Uncertainty of Determinand (including correction for oxygen)

$$u_{combined} = \sqrt{\sum (uf_{o_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc O ₂ Corr ⁿ factor (Ucombined) %
Particulates	92.7	0.0	92.7

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

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: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates Uncertainty – X152

Site: Adler Pelzer Group, Cab Automotive Ltd
Location: Tipton , Stack ID: X152 Jaguar Spraybooth

$$u_{\text{mass}} = \sqrt{\sum (u_{\text{filter}})^2 + (u_{\text{solution}})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K= 2	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg																																																																																	
Particulates	0.16	0.50	0.66	TPM	0.10	0.50	0.0500	0.25																																																																																	
<table> <tr> <td>Sampled Volume (V_m)</td><td>TPM</td><td>0.59</td><td>m³</td><td colspan="5">Standard Uncertainty @ 95%</td></tr> <tr> <td>Meter Correction Factor (Y_d)</td><td>0.97</td><td>...</td><td>...</td><td>u_{V_m}</td><td>0.001</td><td>m³</td><td>...</td><td>...</td></tr> <tr> <td>Meter Temperature (T_m)</td><td>292.53</td><td>k</td><td>...</td><td>u_{T_m}</td><td>1.5</td><td>k</td><td>...</td><td>...</td></tr> <tr> <td>Static Pressure of Stack P_sstatic</td><td>8.46</td><td>mmH₂O</td><td>...</td><td>u_{P_sstatic}</td><td>0.25</td><td>mmH₂O</td><td>...</td><td>...</td></tr> <tr> <td>Absolute Stack Pressure p_s</td><td>768.81</td><td>mmHg</td><td>...</td><td>u_{p_s}</td><td>0.8</td><td>mmHg</td><td>...</td><td>...</td></tr> <tr> <td>Barometric Pressure p_b</td><td>769.00</td><td>mmHg</td><td>...</td><td>u_{p_b}</td><td>3.8</td><td>mmHg</td><td>...</td><td>...</td></tr> <tr> <td>Average Differential Pressure (ΔP) + p_s</td><td>103.01</td><td>mmH₂O</td><td>...</td><td>u_{ΔH}</td><td>0.25</td><td>mmH₂O</td><td>...</td><td>...</td></tr> <tr> <td>Oxygen content (O_{2,m})</td><td>20.90</td><td>% by volume</td><td>...</td><td>u_{O_{2,m}} = σ/√n</td><td>0.00</td><td>% by volume</td><td>...</td><td>...</td></tr> <tr> <td>Moisture Content (H₂O)</td><td>0.10</td><td>% by volume</td><td>...</td><td>u_{H₂O}</td><td>0.28</td><td>% by volume</td><td>...</td><td>...</td></tr> </table>									Sampled Volume (V _m)	TPM	0.59	m ³	Standard Uncertainty @ 95%					Meter Correction Factor (Y _d)	0.97	...	...	u _{V_m}	0.001	m ³	...	...	Meter Temperature (T _m)	292.53	k	...	u _{T_m}	1.5	k	...	...	Static Pressure of Stack P _s static	8.46	mmH ₂ O	...	u _{P_sstatic}	0.25	mmH ₂ O	...	...	Absolute Stack Pressure p _s	768.81	mmHg	...	u _{p_s}	0.8	mmHg	...	...	Barometric Pressure p _b	769.00	mmHg	...	u _{p_b}	3.8	mmHg	...	...	Average Differential Pressure (ΔP) + p _s	103.01	mmH ₂ O	...	u _{ΔH}	0.25	mmH ₂ O	...	...	Oxygen content (O _{2,m})	20.90	% by volume	...	u _{O_{2,m}} = σ/√n	0.00	% by volume	...	...	Moisture Content (H ₂ O)	0.10	% by volume	...	u _{H₂O}	0.28	% by volume	...	...
Sampled Volume (V _m)	TPM	0.59	m ³	Standard Uncertainty @ 95%																																																																																					
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Moisture Content (H ₂ O)	0.10	% by volume	...	u _{H₂O}	0.28	% by volume	...	...																																																																																	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i where C_i is the sensitivity coefficient, u_i is the standard uncertainty and i is the index identifying the contributing factor e.g. i = u_{V_m}, u_{T_m} etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s, \text{wet}} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (u _{p_b}), measured static pressure uncertainty component (u _{Pstatic}) & measured temperature of dry gas uncertainty component (u _{T_m})					Uncertainty in volume @ STP due to volume correction factor uncertainty component (u _{Vstd}) & volume uncertainty component (u _{Vm})				
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.923$					$V_{std} = V_{measured} \times f_s = 0.5429$				
	Maximum	Minimum	Sensitivity	uf _{STP}		Maximum m³	Minimum m³	Sensitivity	Standard Uncertainty (m³)
u _{ΔH}	0.48	0.48	0.0000452	0.0000113	Effect of u _{Vstd}	0.54	0.54	0.59	0.00157
u _{p_b}	0.48	0.48	0.000615	0.00231	Effect of u _{V_m}	0.54	0.54	0.92	0.000923
u _{T_m}	0.48	0.48	0.000845	0.00127					
H ₂ O	0.48	0.48	0.00478	0.00135					
$\frac{uf_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u_{\Delta H})^2 + (u_{P_s})^2}}{(P_m/101.3)}\right)^2 + \left(\frac{u_{T_m}}{(T_m/273.15)}\right)^2 + \left(\frac{u_{H_2O}}{(100/(100-H_2O))}\right)^2} = 0.00267$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00126$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (uf_{O_2}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (u_L)	Uncertainty in final measurement @ reference conditions due to mass uncertainty component (u_M), oxygen correction uncertainty component (uf_{O_2}) and STP volume uncertainty component (uV_{STP})															
$f_{O_2} = \frac{20.9\% - O_{2, \text{ref}}}{20.9\% - O_{2, \text{measured}}} = 1.00$ $u_{\text{Corr } O_2} = \frac{20.9\% - O_{2, \text{ref}}}{(20.9\% - O_{2, \text{measured}}) \times (20.9\% - O_{2, \text{measured}})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$ $uf_{O_2} = \frac{u_{\text{Corr } O_2}}{f_{O_2}} \times 100 = 0.00$	$\text{Conc} = \frac{M_{\text{Recovered}}}{V_m \times f_s \times f_{O_2}} = 1.22$ <table><thead><tr><th></th><th>Maximum mg/Nm³</th><th>Minimum mg/Nm³</th><th>Sensitivity</th><th>u mg/Nm³</th></tr></thead><tbody><tr><td>u_M</td><td>1.69</td><td>0.75</td><td>1.84</td><td>0.47</td></tr><tr><td>uV_{STP}</td><td>1.22</td><td>1.21</td><td>2.24</td><td>0.00281</td></tr></tbody></table>		Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	u mg/Nm ³	u_M	1.69	0.75	1.84	0.47	uV_{STP}	1.22	1.21	2.24	0.00281
	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	u mg/Nm ³												
u_M	1.69	0.75	1.84	0.47												
uV_{STP}	1.22	1.21	2.24	0.00281												

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{\text{combined}} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{STP})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.47	0.94	1.22	77.3%	1.9%

Measurement Uncertainty of Determinand (including correction for oxygen)

$$u_{\text{combined}} = \sqrt{\sum (uf_{O_2})^2 + (\text{Uncertainty of Measurement of Determinand})^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc. O ₂ Corr ⁿ factor (U _{combined}) %
Particulates	77.3	0.0	77.3

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

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: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Particulates Uncertainty – EX 3

Site: Adler Pelzer Group , Cab Automotive Ltd
Location: Tipton , Stack ID: EX 3 Spraybooth No.3

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K= 2	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
TPM								
Particulates	0.0400	0.50	0.54	0.10	0.50	0.0500	0.25	0.25

		TPM			Standard Uncertainty @ 95%			
Sampled Volume (V _m)		0.60	m ³		uV _m	0.001	m ³	
Meter Correction Factor (Y _d)		0.95	...		...	...	...	
Meter Temperature (T _m)		296.15	k		uT _m	1.5	k	
Static Pressure of Stack P _{sstatic}		5.58	mmH ₂ O		uP _{sstatic}	0.25	mmH ₂ O	
Absolute Stack Pressure p _s		768.81	mmHg		uP _s	0.8	mmHg	
Barometric Pressure p _b		769.00	mmHg		uP _b	3.8	mmHg	
Average Differential Pressure (ΔP) + p _s		102.87	mmH ₂ O		uΔH	0.25	mmH ₂ O	
Oxygen content (O _{2,m})		20.90	% by volume		uO _{2,m} = σ/√n	0.00	% by volume	
Moisture Content (H ₂ O)		0.10	% by volume		uH ₂ O	0.28	% by volume	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using:

$$C_i = \frac{\partial f}{\partial x_i}$$

For each factor, uncertainty is then calculated by C_iu_i, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (u _{Pb}), measured static pressure uncertainty component (u _{Pstatic}) & measured temperature of dry gas uncertainty component (u _{Tm})					Uncertainty in volume @ STP due to volume correction factor uncertainty component (u _{Vstd}) & volume uncertainty component (u _{Vm})				
$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{T_m}}{13.6} \times Y_d = 0.898$					$V_{std} = V_{measured} \times f_s = 0.5426$				
	Maximum	Minimum	Sensitivity	uf _{stp}		Maximum	Minimum	Sensitivity	Standard Uncertainty (m ³)
uΔH	0.47	0.47	0.0000443	0.0000111	Effect of u _{Vstd}	0.54	0.54	0.60	0.00153
uP _b	0.47	0.47	0.000602	0.00226	Effect of u _{Vm}	0.54	0.54	0.90	0.000898
uT _m	0.47	0.47	0.000821	0.00123					
H ₂ O	0.47	0.47	0.00468	0.00132					
$\frac{u_{f_s}}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_s)^2}}{(P_m/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100-H_2O))}\right)^2} = 0.00254$					$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.00123$				

Uncertainty of correction factor to reference oxygen due to measured oxygen uncertainty component (u _{f_{O2}}) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (u _L)					Uncertainty in final measurement @ reference conditions due to mass uncertainty component (u _M), oxygen correction uncertainty component (u _{f_{O2}}) and STP volume uncertainty component (u _{Vstp})				
$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$					$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}} = 1.00$				
$u_{Corr_{O_2}} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (Uncertainty\ of\ O_2\ Measurement)} = 1.00$						Maximum	Minimum	Sensitivity	u
$u_{f_{O_2}} = \frac{u_{Corr_{O_2}}}{f_{O_2}} \times 100 = 0.00$					u _M	1.46	0.53	1.84	0.47
					u _{Vstp}	1.00	0.99	1.83	0.00225

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Combined Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	Uncertainty as Percent of ELV
0.47	0.94	1.00	94.4%	1.9%

Measurement Uncertainty of Determinand (including correction for oxygen)

Particulate concentration < Blank! Uncertainty will be reported @ > 100%!

$$u_{combined} = \sqrt{\sum (u_{f_{O_2}})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc O ₂ Corr ⁿ factor (Ucombined) %
Particulates	94.4	0.0	94.4

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

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: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Dichloromethane Uncertainty – EX 3 Spraybooth No.3 (Test 1)

Note:

Results based on Charcoal Tubes Only!

Site: Adler Pelzer Group, Cab Automotive Ltd

Location: Tipton, Stack ID: EX 3 Spraybooth No.3

Sampled Volume				Standard Uncertainty @ 95%			
	V_m	0.00934	m ³	uV_m	0.000	m ³	
Meter Correction Factor or ml/count							
	Y_d	0.5	...	...	...	...	
Meter Temperature							
	T_m	290.50	K	uT_m	1.5	K	
Barometric Pressure							
	P_b	1025.00	mBar		10.0	mBar	
Oxygen content							
	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol	
Moisture							
	H_2O	0.00	%Vol	uH_2O		%Vol	

Tubes			
Determinand	Recovered Mass	Standard Uncertainty	
Dichloromethane	4.00 µg	uM	2.00 µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial X_i}$

For each factor, uncertainty is then calculated by C_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m , uT_m , etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O) where required

$f_s = \frac{273}{T_m} \times \frac{P}{101.3} = 0.95$				
	Maximum	Minimum	Sensitivity	ufstp
uP_b	0.49	0.49	0.000478	0.00478
uT_m	0.96	0.95	0.00327	0.00491
uH_2O	...	...	...	...
$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100 - H_2O))}\right)^2} = 0.00628$				

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$V_{std} = V_{measured} \times f_s = 0.00444$				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
	m ³	m ³		m ³
Effect of uf_s	0.00447	0.00441	0.00467	0.0000293
Effect of uV_m	0.00455	0.00433	0.48	0.000111
$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000567$				

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$			
	Tubes	Condensate	
	uL	uL	
	mg/Nm ³	mg/Nm ³	
Dichloromethane	0.0104	...	

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results			
	Maximum	Minimum	Standard Uncertainty
	mg/Nm ³	mg/Nm ³	mg/Nm ³
Dichloromethane	1.35	0.45	225.12
			0.45
Condensate Results			
	Maximum	Minimum	Standard Uncertainty
	mg/Nm ³	mg/Nm ³	mg/Nm ³
Dichloromethane			

Uncertainty in final measurement @ Reference Conditions due to uV_{std}

Charcoal Tube Results			
	Maximum	Minimum	Standard Uncertainty
	mg/Nm ³	mg/Nm ³	mg/Nm ³
Dichloromethane	0.91	0.89	202.76
			0.0115

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{std})^2}$$

Charcoal Tubes	Combined Uncertainty	Expanded Uncertainty	Measured Concentration	Percent of Measured Concentration
Determinand	mg/Nm ³	mg/Nm ³	mg/Nm ³	
Dichloromethane	0.45	0.90	0.90	100.06

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

Visit Details

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: Spraybooths

: Compliance - November 2023

: 9th – 10th November 2023, 18th December 2023 & 22nd January 2024

: 8th February 2024

Dichloromethane Uncertainty – EX 3 Spraybooth No.3 (Test 2)

Note:

Results based on Charcoal Tubes Only!

Site: Adler Pelzer Group, Cab Automotive Ltd

Location: Tipton, Stack ID: EX 3 Spraybooth No.3

Standard Uncertainty @ 95%			
Sampled Volume	V_m	0.00937	m ³
Meter Correction Factor or ml/count	Y_d	0.5	...
Meter Temperature	T_m	290.50	K
Barometric Pressure	P_b	1025.00	mBar
Oxygen content	$O_{2,m}$	20.90	%Vol
Moisture	H_2O	0.00	%Vol
uV_m	0.000	m ³	
uY_d	...	...	...
uT_m	1.5	K	
uP_b	10.0	mBar	
$uO_{2,m}$	1.25	%Vol	
uH_2O	...	%Vol	

Tubes		
Determinand	Recovered Mass	Standard Uncertainty
Dichloromethane	4.00 µg	2.00 µg

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial X_i}$

For each factor, uncertainty is then calculated by C_i where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m , uT_m , etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s, wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O) where required

$$f_s = \frac{273}{T_m} \times \frac{P}{101.3} = 0.95$$

	Maximum	Minimum	Sensitivity	uf_{stp}
uP_b	0.49	0.49	0.000478	0.00478
uT_m	0.96	0.95	0.00327	0.00491
uH_2O	...	...	...	...

$$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100 - H_2O))}\right)^2} = 0.00628$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$$V_{std} = V_{measured} \times f_s = 0.00446$$

	Maximum	Minimum	Sensitivity	Standard Uncertainty
Effect of uf_s	0.00449	0.00443	0.00469	0.0000294
Effect of uV_m	0.00457	0.00435	0.48	0.000111

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000569$$

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

$$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$$

Tubes	Condensate
uL	uL
mg/Nm ³	mg/Nm ³
0.0104	...

Dichloromethane

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
Dichloromethane	mg/Nm ³	mg/Nm ³		mg/Nm ³
	1.35	0.45	224.38	0.45
Condensate Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
Dichloromethane	mg/Nm ³	mg/Nm ³		mg/Nm ³

Uncertainty in final measurement @ Reference Conditions due to uV_{std}

Charcoal Tube Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
Dichloromethane	mg/Nm ³	mg/Nm ³		mg/Nm ³
	0.91	0.89	201.42	0.0115

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{(u_M)^2 + (u_L)^2 + (uV_{std})^2}$$

Charcoal Tubes:	Combined	Expanded	Measured	Percent of
Determinand	Uncertainty	Uncertainty	Concentration	Measured
	mg/Nm ³	mg/Nm ³	mg/Nm ³	Concentration
Dichloromethane	0.45	0.90	0.90	100.06

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

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Dichloromethane Uncertainty – EX 3 Spraybooth No.3 (Test 3)

Note:

Results based on Charcoal Tubes Only!

Site: Adler Pelzer Group, Cab Automotive Ltd

Location: Tipton, Stack ID: EX 3 Spraybooth No.3

				Standard Uncertainty @ 95%			
Sampled Volume	V_m	0.00933	m ³	uV_m	0.000	m ³	
Meter Correction Factor or ml/count	Y_d	0.5	...	...	...	...	
Meter Temperature	T_m	290.50	K	uT_m	1.5	K	
Barometric Pressure	P_b	1025.00	mBar		10.0	mBar	
Oxygen content	$O_{2,m}$	20.90	%Vol	$uO_{2,m}$	1.25	%Vol	
Moisture	H_2O	0.00	%Vol	uH_2O		%Vol	

Tubes							
Determinand	Recovered Mass			Standard Uncertainty			
Dichloromethane	4.00	µg		uM	2.00	µg	

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial X_i}$

For each factor, uncertainty is then calculated by $C_i u_i$ where C_i is the sensitivity coefficient, u_i is the standard uncertainty and i is the index identifying the contributing factor e.g. $i = uV_m, uT_m$, etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured barometric pressure uncertainty component (uP_b), measured temperature of dry gas uncertainty component (uT_m) & measured moisture (uH_2O) where required

$f_s = \frac{273}{T_m} \times \frac{P}{101.3} = 0.95$				
	Maximum	Minimum	Sensitivity	uf_{stp}
uP_b	0.49	0.49	0.000478	0.00478
uT_m	0.96	0.95	0.00327	0.00491
uH_2O	...	...	...	...
$\frac{uf_s}{f_s} = \sqrt{\left(\frac{uP_b}{(P_b/101.3)}\right)^2 + \left(\frac{uT_m}{(T_m/273.15)}\right)^2 + \left(\frac{uH_2O}{(100/(100 - H_2O))}\right)^2} = 0.00628$				

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

$V_{std} = V_{measured} \times f_s = 0.00444$				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
	m ³	m ³		m ³
Effect of uf_s	0.00446	0.00441	0.00466	0.0000293
Effect of uV_m	0.00455	0.00432	0.48	0.000111
$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uf_s}{f_s}\right)^2 + \left(\frac{uV_m}{V_m}\right)^2} = 0.0000566$				

Uncertainty of correction factor to reference conditions (excluding oxygen contribution) & Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

$uL = \frac{Conc \times \frac{2}{100}}{\sqrt{3}}$			
	Tubes	Condensate	
	mg/Nm ³	mg/Nm ³	
Dichloromethane	0.0104	...	

$$Conc = \frac{M_{Recovered}}{V_m \times f_s \times f_{O_2}}$$

Uncertainty in final measurement @ Reference Conditions due to $uM_{Recovered}$

Charcoal Tube Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
	mg/Nm ³	mg/Nm ³		mg/Nm ³
Dichloromethane	1.35	0.45	225.46	0.45
Condensate Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
	mg/Nm ³	mg/Nm ³		mg/Nm ³
Dichloromethane				

Uncertainty in final measurement @ Reference Conditions due to uV_{std}

Charcoal Tube Results				
	Maximum	Minimum	Sensitivity	Standard Uncertainty
	mg/Nm ³	mg/Nm ³		mg/Nm ³
Dichloromethane	0.91	0.89	203.37	0.0115

Combined Uncertainty (excluding Oxygen contribution)

$$u_{combined} = \sqrt{(u_M)^2 + (u_L)^2 + (uV_{std})^2}$$

Charcoal Tubes:	Combined	Expanded	Measured	Percent of
Determinand	Uncertainty	Uncertainty	Concentration	Measured
	mg/Nm ³	mg/Nm ³	mg/Nm ³	Concentration
Dichloromethane	0.45	0.90	0.90	100.06

Adler Pelzer Group

Permit No : PPC 92935

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Report Ref : P5617 : Roo1

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Stack Reference**EX 1 - Spraybooth (Mini) No.2****Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.31	A
Manometer Calibration Uncertainty Contribution	0.306208333	B
Variation in Actual Pitot reading at sample points	0.43	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.35	
Expanded Uncertainty of Flow Measurements Pa	0.70	
	Standard u/c (K)	
Temperature Calibration (K)	1.46	D
Variation in Actual Temp reading at sample points	2.25	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	1.55	
Expanded Uncertainty of Temp Measurements (K)	3.10	
Measured Average Velocity (m/s) at Stack Conds	9.99	
Maximum Average Velocity (m/s) at Stack Conds	10.10	
Standard Uncertainty Velocity at Stack Conditions (%)	1.10	
Expanded Uncertainty Velocity (at Stack Conditions)	2.21 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00302
Measured Average Flowrate (m ³ /s) at Stack Conds	3.02
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.08
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.11
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	4.23 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	2.77
Maximum Average Flowrate (m ³ /s) at STP Wet	2.84
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	2.59
Expanded Uncertainty Flowrate (m³/s) at STP Wet	5.18 (%)

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5617 : Roo1

Installation Name : Spraybooths
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Stack Reference EX 2 - Spraybooth (Mini) No.1

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.32	A
Manometer Calibration Uncertainty Contribution	0.317083333	B
Variation in Actual Pitot reading at sample points	1.03	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.65	
Expanded Uncertainty of Flow Measurements Pa	1.29	
	Standard u/c (K)	
Temperature Calibration (K)	1.47	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.85	
Expanded Uncertainty of Temp Measurements (K)	1.69	
Measured Average Velocity (m/s) at Stack Conds	10.07	
Maximum Average Velocity (m/s) at Stack Conds	10.21	
Standard Uncertainty Velocity at Stack Conditions (%)	1.30	
Expanded Uncertainty Velocity (at Stack Conditions)	2.61 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00302
Measured Average Flowrate (m ³ /s) at Stack Conds	3.04
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.11
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.32
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	4.64 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	2.78
Maximum Average Flowrate (m ³ /s) at STP Wet	2.86
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	2.79
Expanded Uncertainty Flowrate (m³/s) at STP Wet	5.59 (%)

Adler Pelzer Group

Permit No : PPC 92935

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Stack Reference EX 4 - Spraybooth (McLaren) I**Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.21	A
Manometer Calibration Uncertainty Contribution	0.212208333	B
Variation in Actual Pitot reading at sample points	1.34	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.79	
Expanded Uncertainty of Flow Measurements Pa	1.58	
	Standard u/c (K)	
Temperature Calibration (K)	1.46	D
Variation in Actual Temp reading at sample points	2.38	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	1.61	
Expanded Uncertainty of Temp Measurements (K)	3.22	
Measured Average Velocity (m/s) at Stack Conds	8.39	
Maximum Average Velocity (m/s) at Stack Conds	8.59	
Standard Uncertainty Velocity at Stack Conditions (%)	2.41	
Expanded Uncertainty Velocity (at Stack Conditions)	4.81 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00407
Measured Average Flowrate (m ³ /s) at Stack Conds	3.42
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.53
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	3.43
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	6.86 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	3.13
Maximum Average Flowrate (m ³ /s) at STP Wet	3.25
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	3.91
Expanded Uncertainty Flowrate (m³/s) at STP Wet	7.83 (%)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : R001

Installation Name

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Stack Reference**EX 5 - Spraybooth (McLaren) N****Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.12	A
Manometer Calibration Uncertainty Contribution	0.121916667	B
Variation in Actual Pitot reading at sample points	0.82	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.49	
Expanded Uncertainty of Flow Measurements Pa	0.97	
	Standard u/c (K)	
Temperature Calibration (K)	1.47	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.85	
Expanded Uncertainty of Temp Measurements (K)	1.70	
Measured Average Velocity (m/s) at Stack Conds	6.33	
Maximum Average Velocity (m/s) at Stack Conds	6.47	
Standard Uncertainty Velocity at Stack Conditions (%)	2.27	
Expanded Uncertainty Velocity (at Stack Conditions)	4.54 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00302
Measured Average Flowrate (m ³ /s) at Stack Conds	1.91
Maximum Average Flowrate (m ³ /s) at Stack Conds	1.97
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	3.29
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	6.59 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	1.74
Maximum Average Flowrate (m ³ /s) at STP Wet	1.81
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	3.77
Expanded Uncertainty Flowrate (m³/s) at STP Wet	7.54 (%)

Adler Pelzer Group

Permit No : PPC 92935

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Stack Reference SB5 Bentley**Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.01	A
Manometer Calibration Uncertainty Contribution	0.008666667	B
Variation in Actual Pitot reading at sample points	0.63	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.36	
Expanded Uncertainty of Flow Measurements Pa	0.72	
	Standard u/c (K)	
Temperature Calibration (K)	1.46	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.84	
Expanded Uncertainty of Temp Measurements (K)	1.68	
Measured Average Velocity (m/s) at Stack Conds	1.64	
Maximum Average Velocity (m/s) at Stack Conds	1.96	
Standard Uncertainty Velocity at Stack Conditions (%)	19.36	
Expanded Uncertainty Velocity (at Stack Conditions)	38.71 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00196
Measured Average Flowrate (m ³ /s) at Stack Conds	0.32
Maximum Average Flowrate (m ³ /s) at Stack Conds	0.39
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	20.55
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	41.10 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	0.30
Maximum Average Flowrate (m ³ /s) at STP Wet	0.36
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	21.12
Expanded Uncertainty Flowrate (m³/s) at STP Wet	42.23 (%)

Adler Pelzer Group

Permit No : PPC 92935

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Stack Reference SB7 Bentley**Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.29	A
Manometer Calibration Uncertainty Contribution	0.290541667	B
Variation in Actual Pitot reading at sample points	1.71	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	1.02	
Expanded Uncertainty of Flow Measurements Pa	2.03	
	Standard u/c (K)	
Temperature Calibration (K)	1.46	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.84	
Expanded Uncertainty of Temp Measurements (K)	1.68	
Measured Average Velocity (m/s) at Stack Conds	9.74	
Maximum Average Velocity (m/s) at Stack Conds	9.94	
Standard Uncertainty Velocity at Stack Conditions (%)	2.03	
Expanded Uncertainty Velocity (at Stack Conditions)	4.06 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00385
Measured Average Flowrate (m ³ /s) at Stack Conds	3.75
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.86
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	3.05
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	6.10 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	3.49
Maximum Average Flowrate (m ³ /s) at STP Wet	3.61
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	3.53
Expanded Uncertainty Flowrate (m³/s) at STP Wet	7.06 (%)

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5617 : Roo1

Installation Name

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Stack Reference X152 Jaguar Spraybooth**Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.19	A
Manometer Calibration Uncertainty Contribution	0.189916667	B
Variation in Actual Pitot reading at sample points	0.69	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.43	
Expanded Uncertainty of Flow Measurements Pa	0.85	
	Standard u/c (K)	
Temperature Calibration (K)	1.45	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.84	
Expanded Uncertainty of Temp Measurements (K)	1.67	
Measured Average Velocity (m/s) at Stack Conds	7.71	
Maximum Average Velocity (m/s) at Stack Conds	7.82	
Standard Uncertainty Velocity at Stack Conditions (%)	1.41	
Expanded Uncertainty Velocity (at Stack Conditions)	2.81 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00181
Measured Average Flowrate (m ³ /s) at Stack Conds	1.40
Maximum Average Flowrate (m ³ /s) at Stack Conds	1.43
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.42
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	4.84 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	1.33
Maximum Average Flowrate (m ³ /s) at STP Wet	1.37
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	2.90
Expanded Uncertainty Flowrate (m³/s) at STP Wet	5.81 (%)

Stack Reference**EX 3 Spraybooth No.3****Measurement Uncertainty Calculations - Velocity at Stack Conditions**

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.14	A
Manometer Calibration Uncertainty Contribution	0.135208333	B
Variation in Actual Pitot reading at sample points	0.62	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.38	
Expanded Uncertainty of Flow Measurements Pa	0.75	
	Standard u/c (K)	
Temperature Calibration (K)	1.46	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.84	
Expanded Uncertainty of Temp Measurements (K)	1.68	
Measured Average Velocity (m/s) at Stack Conds	6.49	
Maximum Average Velocity (m/s) at Stack Conds	6.60	
Standard Uncertainty Velocity at Stack Conditions (%)	1.68	
Expanded Uncertainty Velocity (at Stack Conditions)	3.36 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00302
Measured Average Flowrate (m ³ /s) at Stack Conds	1.96
Maximum Average Flowrate (m ³ /s) at Stack Conds	2.01
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.69
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	5.39 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	1.86
Maximum Average Flowrate (m ³ /s) at STP Wet	1.92
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	3.18
Expanded Uncertainty Flowrate (m³/s) at STP Wet	6.35 (%)

APPENDIX VI

EMISSION MONITORING REPORT (NOVEMBER 2024)



2499

EMISSIONS MONITORING SURVEY

Prepared for:

Adler Pelzer Group
CAB Automotive Limited
Vaughan Trading Estate
Sedgley Road East
Tipton
West Midlands
Dy4 7UJ

Permit Number	: PPC 92935
Variation Number	: V1
Installation	: Spraybooths
Visit Details	: Compliance – November 2024
Job Number	: P5910
Report Number	: R001
Report Issue Date	: 11th December 2024
Survey Dates	: 13th November 2024

Prepared by:

Environmental Compliance Limited
Unit G1
Main Avenue
Treforest Industrial Estate
Pontypridd
CF37 5BF.
Tel: 01443 801215

Report Issue:		FINAL	
Report Prepared by:		Report Reviewed & Approved by MCERTS Level Two Technical Endorsements TE1, TE2, TE3 & TE4	
Name:	Scott Hackett	Name:	Andy Barnes
		MCERTS No:	MM 03 235
		Signature:	
Date:	11 th December 2024	Date:	11 th December 2024

This report is not to be used for contractual or engineering purposes unless this approval sheet is signed where indicated by the approver and the report is designated "FINAL".

Environmental Compliance Limited

Adler Pelzer Group		Installation Name	: Spraybooths
Permit No	: PPC 92935	Visit Details	: Compliance – November 2024
Variation No	: V1	Survey Dates	: 13th November 2024
Report Ref	: P5910 : Root	Report Issue Date	: 11th December 2024

This report has been prepared by Environmental Compliance Limited (ECL) in their professional capacity as Environmental Consultants. The contents of the report reflect the conditions that prevailed and the information available or supplied at the time of its preparation. The report, and the information contained therein, is provided by ECL solely for use and reliance by the Client in performance of ECLs duties and liabilities under its contract with the Client. Until ECL has received payment in full as detailed in the quotation or contract the contents of this report remain the legal property of ECL. The contents of the report do not, in any way, purport to include any manner of legal advice or opinion.

Any operating information and CEMS data used in this report has been supplied by the client.

This report should not be reproduced, (except in full) without the written approval of the laboratory.

Should the Client wish to release this report to a Third Party for the party's reliance, Environmental Compliance Ltd may, at its discretion, agree to such release provided that:

- Environmental Compliance Ltd gives written agreement prior to such release and ECL has received payment in full for all works/services undertaken;
- By release of the report to the Third Party, that Third Party does not acquire any rights, contractual or otherwise, whatsoever against Environmental Compliance Ltd and, accordingly, Environmental Compliance Ltd assume no duties, liabilities or obligations to that Third Party;
- Environmental Compliance Ltd accepts no responsibility for any loss or damage incurred by the Client or for any conflict of Environmental Compliance Ltd interests arising out of the Clients' release of this report to the Third Party.

In the event that a report is revised and re-issued, the client shall ensure that any earlier versions of the report, and any copies thereof, are void and such copies should be marked with the words "superseded and revised".

Opinions and Interpretation expressed within this report are outside the scope of the UKAS accreditation.

MCERTS requirements mean that comparison of results with emissions limit values is not permitted within this report.

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance – November 2024

: 13th November 2024

: 11th December 2024

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PART 1 - EXECUTIVE SUMMARY

1 Monitoring Objectives

Environmental Compliance Ltd (ECL) was commissioned by **Adler Pelzer Group** to undertake an emission monitoring survey at their **Tipton site**. This report presents the findings of the study.

The monitoring at this installation was carried out in accordance with our quotation reference **AM/P5910/Q001**, for compliance check monitoring of emissions to air. The substances requested for monitoring at each emissions point are listed below:

Substances to be monitored	Emission Point Identification	
	EX 3	SB2
	Spraybooth (Aftersales)	Spraybooth (Bentley)
Velocity / Flowrate	● U	● U
Particulates	● U	● U

Substances to be monitored	Emission Point Identification	
	SB 8	TBC
	Spraybooth (McLaren)	Spraybooth (Undesignated)
Velocity / Flowrate	● U	● U
Particulates	● U	● U

- Denotes the substances to be monitored.
- U Denotes UKAS accreditation is held for monitoring that substance, but does not mean that it has been claimed which will depend on whether the testing could be completed in accordance with the Standard Reference Method.

Special Requirements: “During Normal Operation.”

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name : Spraybooths

Visit Details : Compliance – November 2024

Survey Dates : 13th November 2024

Report Issue Date : 11th December 2024

1.1 Monitoring Results

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
SB2 Spraybooth (Bentley)	Volumetric Flowrate	...	3.07943	m³/sec	...	4	Stack Conditions	13/11/2024	09:30 – 09:50	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	3.00421	m³/sec	...	5	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates §	50	0.59	mg/m³	6.25	65	& Wet Gas		10:20 – 11:20	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Emission Point Reference	Substance to be Monitored	Emission Limit Value	Periodic Monitoring Result	Units	Mass Emission (g/hr)	Uncertainty %	Reference Conditions 273 K, 101.3 kPa	Date of Sampling	Start and End Times	Monitoring Method Reference	Accreditation Claimed For Test Result	Tick if non-conforming test (see Section 2)	Operating Status
SB7 Spraybooth (McLaren)	Volumetric Flowrate	...	3.48251	m³/sec	...	5	Stack Conditions	13/11/2024	11:30 – 11:50	BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Volumetric Flowrate	...	3.36007	m³/sec	...	6	& Wet Gas			BS EN 16911-1:2013 & MID	UKAS / MCERTS	✓	Normal
	Particulates §	50	0.43	mg/m³	5.07	77	& Wet Gas		12:30 – 13:30	BS EN 13284-1:2017 & MID	UKAS / MCERTS	✓	Normal

Notes

The volumetric flowrate shown above is that from the initial pitot traverse.

Any other flow measurements made during isokinetic sampling and/ or repeat traverses are shown later in the tables section.

Emission Limit Value

The emission limit value is that stated in the permit and will be expressed as a concentration or a mass emission.

Periodic Monitoring Result

The result given is expressed in the same terms and units as the emission limit value.

Uncertainty

The uncertainty associated with the quoted result is at the 95% confidence interval. The Uncertainty results **DO NOT** take into account the effect of the sample location limitations.

Reference Conditions

All results are expressed at 273 K and 101.3kPa. The oxygen and moisture corrections are stated.

Monitoring Method Reference

The method stated is in accordance with the Environment Agency Technical Guidance Note M2, or other method approved by the Environment Agency.

Accreditation for use of Method

The details indicate the accreditation for the use of the complete monitoring method, e.g. MCERTs, UKAS. If use of the method is not accredited "NA" is stated.

Operating Status

The details indicate the feedstock and the loading rate of the plant during monitoring.

§

Chemical Analysis on sample reagents was performed by an External Laboratory as detailed in Section 4

NU

UKAS Accreditation Held but UKAS Accreditation cannot be claimed for the test as sampling did not comply with the Standard Reference Method (SRM), see section 2 & 5

NA

Method is NOT UKAS Accredited.

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name : Spraybooths

Visit Details : Compliance – November 2024

Survey Dates : 13th November 2024

Report Issue Date : 11th December 2024

1.2 Operating Information

Any operating information and CEMS data below has been supplied by the client.

Emission Point Reference	Process Type	Process Duration	Fuel	Feedstock	Abatement	Load	Comparison of Operator CEMS and Periodic Monitoring Results					
							Parameter	Date	Time	CEMS Results	Periodic Monitoring Results	Units
All	Batch	As Required	N/A	N/A	Dry Filter	Normal	...	...	...	NP	...	...

Notes:

- Process Type
- Process Duration
- Fuel
- Feedstock
- Abatement
- Load
- CEMS Data
- State whether the process is a continuous or batch process.
- If a batch process, state the duration, frequency and details of the portion of the batch sampled. If continuous state "NA"
- If applicable, state the fuel type If not applicable state "NA"
- State the feedstock type
- State the type and whether operational during monitoring. If not applicable state "NA"
- State the normal load, throughput or rating of the plant
- Enter this data for each CEM installed if it is has been provided by operator otherwise state “NP” (NOT PROVIDED)

2

Monitoring Deviations

The objective of the survey was to measure the concentrations of pollutants from the processes / locations as detailed in Section 1. This survey meets the requirements of the site's **PPC Permit Number: PPC 92935** where UKAS and MCERTS accreditation has and could be claimed for the testing in the monitoring results table.

There were no modifications to the sampling procedures (TPDs) listed in section 4.

There were substance deviations from the original and agreed emissions monitoring schedule, as follows. **EX3 – Spraybooth (Aftersales)** has been decommissioned and so testing is no longer required. **TBC Extraction (Press 1)** was not operational on the test date and so could not be tested. Although stated on the quote as SB8, the designation for the McLaren booth was found to be SB7 on the sampling date.

Non-conforming tests are as follows.

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

For SB2 (Bentley) & SB7 (McClaren), Flowrate and particulate tests are non-conforming, as there is only one sampling port available in each case, rather than two as required by the sampling standards. In order to maintain the UKAS/MCERTS accreditation status of the tests, extra sample points were used on the one available sample line.

Homogeneity tests have not been completed for pollutants at any of the sampling locations. Such tests are not applicable to these locations (as the duct area is <1m²) and were not requested by the client.

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : R001

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

PART 2 – SUPPORTING INFORMATION

3 SAMPLING STAFF DETAILS

Site Sampling Team

Names of Site Team	Dates on Site	MCERTS No.	LEVEL	Technical Endorsements
Lee Harper	13 th November 2024	MM 17 1423	2	TE1, TE2, TE4
Zachery Holden		MM 23 1778	1	...

Report Reviewer

Name	MCERTS No.	LEVEL	Technical Endorsements
Andy Barnes	MM 03 235	2	TE1, TE2, TE3, TE4

Technical Endorsement Key:-

TE1 – Isokinetic Particulates, Temperature & Velocity Profiles, Oxygen.
TE2 – Isokinetic Extractive Pollutants:- Metals, Dioxin & Furans, PAHs, PCBs, HCl, HF.
TE3 – Non-Isokinetic Extractive Pollutants:- Speciated VOCs, HF, HCl, Cyanide.
TE4 – Continuous Analysers (Combustion Gases):- TVOC, CO, NOx, SO₂.

4

SAMPLING PROTOCOLS / METHODOLOGIES

Details of the substances monitored, the standard methods used and the Environmental Compliance Limited Technical Procedures used during this survey are shown in the table below. Detailed sampling protocols are included in a separate document which will be sent with the report.

In all cases, where analysis of collected samples was required, the analysis was by a subcontract laboratory. Details of the sub-contract laboratory are shown on the analysis certificates in this report. The UKAS/MCERTs accreditation status of the analysis is also indicated on the certificates.

Any required modifications to the Technical Procedure Documents (TPDs) specified below will be detailed in section 2 of this report.

Determinand	External Reference Method	ECL Technical Procedure Number
Velocity and Flowrate	BS EN 16911-1:2013 & MID	ECL/ TPD/ 022A
Particulates (MST)	BS EN 13284-1:2017 & MID	ECL / TPD / 027

5

SAMPLE POINT DESCRIPTIONS

The homogeneity test is applicable to combustion processes, but may also be requested by the regulator for non-combustion processes.

Homogeneity testing has not been completed at these locations.

The test is not usually required for stacks with sampling plane areas of $<1\text{m}^2$ (below 1.13m in diameter for circular ducts).

The Uncertainty of the reported concentrations for these pollutant results DOES NOT take into account the effect of non-conformities or sample location limitations.

The sample locations that were monitored are detailed below:

SB 2 (Bentley Spraybooth)

The stack diameter is 0.705m and the sample platform width back to the MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting. Access to the sample location / sample port was via MEWP with heavy sampling equipment left at ground level.

SB 7 (McLaren Spraybooth)

The stack diameter is 0.705m and the sample platform width back to the MEWP handrail is 1.0m.

A single sample port is located at the sample location in a horizontal section of ducting. Access to the sample location / sample port was via MEWP with heavy sampling equipment left at ground level.

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance – November 2024

: 13th November 2024

: 11th December 2024

EQUIPMENT IDs
(Pre site checklist from SSP)

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5910 : R001

Installation Name : Spraybooths
 Visit Details : Compliance – November 2024
 Survey Dates : 13th November 2024
 Report Issue Date : 11th December 2024

PRE SITE EQUIPMENT CHECKLIST/ EQUIPMENT USED

(Completed before departure to site and when on site in full)

Equipment	Equip. Type	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:	ID No:
MST console/pump	E001	U003							
MST Nozzle set									
MST "S" Type Pitot									
MST Probe									
MST Probe Thermocouple									
MST Hot Box									
MST Impinger Arm									
Barometer		1321							
Site Balance									
Site Check weights									
Horiba	E002								
Heated Probe / Filter									
Chiller									
MFC									
Heated Line									
FID	E003								
Heated Line									
Heated Probe / Filter									
Testo	E004								
FTIR	E005								
Heated Probe / Filter									
Heated Line									
Stackmite	E006								
"L" Type Pitot		1342							
Digital Manometer		1250							
Stack Thermocouple		1245							
Thermocouple Reader		1252							
Nozzle Set		802							
Workhorse / Vapex Pumps	E007								
Stack Thermocouple									
Tube Thermocouple									
Meter Thermocouple									
High Vac Gauge									
Dioxin Thermocouple									

Quantity of Ice Required / Used for Survey	Zero	Bags (2kg bags)
--	------	-----------------

Environmental Compliance Limited

Adler Pelzer Group			Installation Name	: Spraybooths
Permit No	: PPC 92935		Visit Details	: Compliance – November 2024
Variation No	: V1		Survey Dates	: 13th November 2024
Report Ref	: P5910	: R001	Report Issue Date	: 11th December 2024

TABLES

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5910 : R001

Installation Name : Spraybooths
 Visit Details : Compliance – November 2024
 Survey Dates : 13th November 2024
 Report Issue Date : 11th December 2024

Table 1 – Particulates

Data Recorded from SB2 Bentley - Spray Booths

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.71	...
Area of Sample Plane	m ²	0.390	...
Moisture Content	%	0.00	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	14	...
Gas Velocity (as Measured. Adjusted for Smooth Walls)	m/sec	7.7409	...
Gas Velocity (Reference Conditions)	m/sec*	7.5456	...
Volumetric Flowrate (as Measured)	m ³ /sec	3.0218	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	2.9455	...
Dry Gas Molecular Weight	g/gmole	28.8520	
Sample Date	...	13/11/2024	...
Sample Period	...	10:20 - 11:20	...
Sample Volume (reference Conditions)	m ³ *	1.341	1.341
Isokinetic Sampling Rate	%	95.78	...
Sample Reference (ECL ID)	ECL/24/	6067 & 6068	6069 & 6070
Mass of Particulate Matter Collected	mg	0.79	0.66
Concentration of Particulate Matter	mg/m ³ *	0.59	0.49
Emission Rate of Particulate Matter	g/hr	6.25	...
Expanded Uncertainty (% Relative)	%	65	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	<1.00%

*Reference Conditions (273K, 101.3kPa, Wet Gas)

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5910 : R001

Installation Name : Spraybooths
 Visit Details : Compliance – November 2024
 Survey Dates : 13th November 2024
 Report Issue Date : 11th December 2024

Table 2 – Particulates

Data Recorded from SB7 McLaren - Spray Booths

Emission Parameter	Units	TPM	Blank
Stack Diameter	metres	0.71	...
Area of Sample Plane	m ²	0.390	...
Moisture Content	%	0.00	...
Oxygen Content	%	20.90	...
Stack Temperature	°C	17	...
Gas Velocity (as Measured. Adjusted for Smooth Walls)	m/sec	8.7281	...
Gas Velocity (Reference Conditions)	m/sec*	8.4191	...
Volumetric Flowrate (as Measured)	m ³ /sec	3.4071	...
Volumetric Flowrate (Reference Conditions)	m ³ /sec*	3.2865	...
Dry Gas Molecular Weight	g/gmole	28.8520	
Sample Date	...	13/11/2024	...
Sample Period	...	12:30 - 13:30	...
Sample Volume (reference Conditions)	m ³ *	1.541	1.541
Isokinetic Sampling Rate	%	98.68	...
Sample Reference (ECL ID)	ECL/24/	6071 & 6072	6073 & 6074
Mass of Particulate Matter Collected	mg	0.66	0.65
Concentration of Particulate Matter	mg/m ³ *	0.43	0.42
Emission Rate of Particulate Matter	g/hr	5.07	...
Expanded Uncertainty (% Relative)	%	77	...
Emission Limit Value (ELV)	mg/m ³ *	50	...
Blank Concentration as Percentage of ELV	%	...	<1.00%

*Reference Conditions (273K, 101.3kPa, Wet Gas)

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance – November 2024

: 13th November 2024

: 11th December 2024

VELOCITY TRAVERSE PROFILES

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : R001

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

Company	Adler Pelzer group	Stack Diameter Port A (mm)	705	Average Stack Diameter (mm)	705	Pitot tube coefficient	1.00
Site	Tipton	Stack Diameter Port B (mm)		Port Length (mm)	100	Pitot Id	1342
Location	Spray Booths	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1245
Stack	SB2 Bentley	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1252
Job No	P5910	Duct Length Port C (mm)		Barometric Pressure. (mb)	1037	Manometer ID	1250
Operators	LH & ZH	Duct Length Port D (mm)		Ave Static Press. (mm H ₂ O)	19.78	Barometer ID	1321

Smooth Walls

Static Pressure Readings (Pascals)			
Port A	Port B	Port C	Port D
194.00			

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (Pa)		
Static Pressure Via Negative Leg (Pa)		
Difference (Pa) < 10Pa ?		

Average temp (K)	287.000
--------------------	---------

Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.43:1
Maximum deviation of flow from axis <15°?	2
X-sectional area for stacks= πr^2	0.39 m ²
X-sectional area for ducts = L X B	m ²
Suitability of Position for Sampling	OK

Stack Moisture	0.1	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	7.83446	m/sec
Measured Oxygen	20.9	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	7.64311	m/sec*
Measured Carbon Dioxide	0	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	3.05828	m ³ /sec
Dry Gas Molecular Weight	28.83600	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	2.98358	m ³ /sec*

*Reference Conditions: 273K, 101.3kPa, Wet Gas

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

A diagram of a rectangular frame. It consists of a horizontal bar at the top and a vertical bar on the left. A small circle is positioned on the horizontal bar, slightly to the right of the vertical bar. The frame is open on the right and bottom sides.

Notes
Including expected or actual deviations from procedures / non-conformities

Compliance With Positional Requirements?

Height of sample ports from Platform	Number of sample ports	Width of platform (port back to handrail)
1.0m	1	1.0m
1.2m	2	1.2m
1.4m	3	1.4m
1.6m	4	1.6m
1.8m	5	1.8m
2.0m	6	2.0m
2.2m	7	2.2m
2.4m	8	2.4m
2.6m	9	2.6m
2.8m	10	2.8m
3.0m	11	3.0m
3.2m	12	3.2m
3.4m	13	3.4m
3.6m	14	3.6m
3.8m	15	3.8m
4.0m	16	4.0m
4.2m	17	4.2m
4.4m	18	4.4m
4.6m	19	4.6m
4.8m	20	4.8m
5.0m	21	5.0m
5.2m	22	5.2m
5.4m	23	5.4m
5.6m	24	5.6m
5.8m	25	5.8m
6.0m	26	6.0m
6.2m	27	6.2m
6.4m	28	6.4m
6.6m	29	6.6m
6.8m	30	6.8m
7.0m	31	7.0m
7.2m	32	7.2m
7.4m	33	7.4m
7.6m	34	7.6m
7.8m	35	7.8m
8.0m	36	8.0m
8.2m	37	8.2m
8.4m	38	8.4m
8.6m	39	8.6m
8.8m	40	8.8m
9.0m	41	9.0m
9.2m	42	9.2m
9.4m	43	9.4m
9.6m	44	9.6m
9.8m	45	9.8m
10.0m	46	10.0m
10.2m	47	10.2m
10.4m	48	10.4m
10.6m	49	10.6m
10.8m	50	10.8m
11.0m	51	11.0m
11.2m	52	11.2m
11.4m	53	11.4m
11.6m	54	11.6m
11.8m	55	11.8m
12.0m	56	12.0m
12.2m	57	12.2m
12.4m	58	12.4m
12.6m	59	12.6m
12.8m	60	12.8m
13.0m	61	13.0m
13.2m	62	13.2m
13.4m	63	13.4m
13.6m	64	13.6m
13.8m	65	13.8m
14.0m	66	14.0m
14.2m	67	14.2m
14.4m	68	14.4m
14.6m	69	14.6m
14.8m	70	14.8m
15.0m	71	15.0m
15.2m	72	15.2m
15.4m	73	15.4m
15.6m	74	15.6m
15.8m	75	15.8m
16.0m	76	16.0m
16.2m	77	16.2m
16.4m	78	16.4m
16.6m	79	16.6m
16.8m	80	16.8m
17.0m	81	17.0m
17.2m	82	17.2m
17.4m	83	17.4m
17.6m	84	17.6m
17.8m	85	17.8m
18.0m	86	18.0m
18.2m	87	18.2m
18.4m	88	18.4m
18.6m	89	18.6m
18.8m	90	18.8m
19.0m	91	19.0m
19.2m	92	19.2m
19.4m	93	19.4m
19.6m	94	19.6m
19.8m	95	19.8m
20.0m	96	20.0m
20.2m	97	20.2m
20.4m	98	20.4m
20.6m	99	20.6m
20.8m	100	20.8m
21.0m	101	21.0m
21.2m	102	21.2m
21.4m	103	21.4m
21.6m	104	21.6m
21.8m	105	21.8m
22.0m	106	22.0m
22.2m	107	22.2m
22.4m	108	22.4m
22.6m	109	22.6m
22.8m	110	22.8m
23.0m	111	23.0m
23.2m		

Nearest downstream disturbance	Bend	0.5m
Nearest upstream disturbance	Bend	8m
Disturbances are classed as bends, fans or diameter variations		

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : R001

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

Company	Adler Pelzer group	Stack Diameter Port A (mm)	705	Average Stack Diameter (mm)	705	Pitot tube coefficient	1.00
Site	Tipton	Stack Diameter Port B (mm)		Port Length (mm)	100	Pitot Id	1342
Location	Spray Booths	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1245
Stack	SB7 McLaren	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1252
Job No	P5910	Duct Length Port C (mm)		Barometric Pressure. (mb)	1037	Manometer ID	1250
Operators	LH & ZH	Duct Length Port D (mm)		Ave Static Press. (mm H ₂ O)	12.74	Barometer ID	1321

Smooth Walls

Static Pressure Readings (Pascals)			
Port A	Port B	Port C	Port D
125.00			

Stagnation Check (S-type Pitot Only)	Time	Reading
Static Pressure Via Positive Leg (Pa)		
Static Pressure Via Negative Leg (Pa)		
Difference (Pa) < 10Pa ?		

Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.53:1
Maximum deviation of flow from axis <15°?	6
X-sectional area for stacks= πr^2	0.39 m ²
X-sectional area for ducts = L x B	m ²
Suitability of Position for Sampling	OK

Stack Moisture	0.1	%	Gas Velocity (as Measured) Adjusted for Smooth Walls	8.92121	m/sec
Measured Oxygen	20.9	%	Gas Velocity (Reference Conditions) Adjusted for Smooth Walls	8.60757	m/sec*
Measured Carbon Dioxide	0	%	Volumetric Flowrate (as Measured) Adjusted for Smooth Walls	3.48251	m ³ /sec
Dry Gas Molecular Weight	28.83600	g/g mole	Volumetric Flowrate (Ref Cond) Adjusted for Smooth Walls	3.36007	m ³ /sec*

*Reference Conditions: 273K, 101.3kPa, Wet Gas

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl $>15^\circ$

A diagram of a rectangular frame with a small circle in the center. The frame is composed of four rectangular sections: a top section, a bottom section, a left section, and a right section. The top and bottom sections are wider than the left and right sections. A small circle is located in the center of the right section.

Compliance With Positional Requirements?

Height of sample ports from Platform	Number of sample ports	Width of platform (port back to handrail)
1.0m	1	1.0m
1.2m	2	1.2m
1.4m	3	1.4m
1.6m	4	1.6m
1.8m	5	1.8m
2.0m	6	2.0m
2.2m	7	2.2m
2.4m	8	2.4m
2.6m	9	2.6m
2.8m	10	2.8m
3.0m	11	3.0m
3.2m	12	3.2m
3.4m	13	3.4m
3.6m	14	3.6m
3.8m	15	3.8m
4.0m	16	4.0m
4.2m	17	4.2m
4.4m	18	4.4m
4.6m	19	4.6m
4.8m	20	4.8m
5.0m	21	5.0m
5.2m	22	5.2m
5.4m	23	5.4m
5.6m	24	5.6m
5.8m	25	5.8m
6.0m	26	6.0m
6.2m	27	6.2m
6.4m	28	6.4m
6.6m	29	6.6m
6.8m	30	6.8m
7.0m	31	7.0m
7.2m	32	7.2m
7.4m	33	7.4m
7.6m	34	7.6m
7.8m	35	7.8m
8.0m	36	8.0m
8.2m	37	8.2m
8.4m	38	8.4m
8.6m	39	8.6m
8.8m	40	8.8m
9.0m	41	9.0m
9.2m	42	9.2m
9.4m	43	9.4m
9.6m	44	9.6m
9.8m	45	9.8m
10.0m	46	10.0m
10.2m	47	10.2m
10.4m	48	10.4m
10.6m	49	10.6m
10.8m	50	10.8m
11.0m	51	11.0m
11.2m	52	11.2m
11.4m	53	11.4m
11.6m	54	11.6m
11.8m	55	11.8m
12.0m	56	12.0m
12.2m	57	12.2m
12.4m	58	12.4m
12.6m	59	12.6m
12.8m	60	12.8m
13.0m	61	13.0m
13.2m	62	13.2m
13.4m	63	13.4m
13.6m	64	13.6m
13.8m	65	13.8m
14.0m	66	14.0m
14.2m	67	14.2m
14.4m	68	14.4m
14.6m	69	14.6m
14.8m	70	14.8m
15.0m	71	15.0m
15.2m	72	15.2m
15.4m	73	15.4m
15.6m	74	15.6m
15.8m	75	15.8m
16.0m	76	16.0m
16.2m	77	16.2m
16.4m	78	16.4m
16.6m	79	16.6m
16.8m	80	16.8m
17.0m	81	17.0m
17.2m	82	17.2m
17.4m	83	17.4m
17.6m	84	17.6m
17.8m	85	17.8m
18.0m	86	18.0m
18.2m	87	18.2m
18.4m	88	18.4m
18.6m	89	18.6m
18.8m	90	18.8m
19.0m	91	19.0m
19.2m	92	19.2m
19.4m	93	19.4m
19.6m	94	19.6m
19.8m	95	19.8m
20.0m	96	20.0m
20.2m	97	20.2m
20.4m	98	20.4m
20.6m	99	20.6m
20.8m	100	20.8m
21.0m	101	21.0m
21.2m	102	21.2m
21.4m	103	21.4m
21.6m	104	21.6m
21.8m	105	21.8m
22.0m	106	22.0m
22.2m	107	22.2m
22.4m	108	22.4m
22.6m	109	22.6m
22.8m	110	22.8m
23.0m	111	23.0m
23.2m		

Nearest downstream disturbance	Bend	0.5m
Nearest upstream disturbance	Bend	8m
Disturbances are classed as bends, fans or diameter variations		

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : R001

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

Company	Adler Pelzer group	Stack Diameter Port A (mm)	705	Average Stack Diameter (mm)	705	Pitot tube coefficient	1.00
Site	Tipton	Stack Diameter Port B (mm)		Port Length (mm)	100	Pitot Id	1342
Location	Spray Booths	Duct Length Port A (mm)		Average Duct Length (mm) L		Stack Thermocouple ID	1245
Stack	SB7 McLaren	Duct Length Port B (mm)		Duct width (mm) B		Stack Temp Reader ID	1252
Job No	P5910	Duct Length Port C (mm)		Barometric Pressure. (mb)	1037	Manometer ID	1250
Operators	LH & ZH	Duct Length Port D (mm)		Ave Static Press. (mm H ₂ O)	12.74	Barometer ID	1321

Smooth Walls

Diagram/ Description of Cross Section of Stack/Duct

A diagram of a rectangular frame with a small circle inside, representing a cross-section of a beam.

Suitability of Sampling Position	Actual Stack Conditions
Highest:lowest flow pressure ratio < 9:1?	1.4:1
Maximum deviation of flow from axis <15°?	3
X-sectional area for stacks= πr^2	0.39 m ²
X-sectional area for ducts = L x B	m ²
Suitability of Position for Sampling	OK

Notes
Including expected or actual deviations from procedures / non-conformities

Height of sample ports from Platform	MEWP
Number of sample ports	1
Width of platform (port back to handrail)	MEWP

Nearest downstream disturbance	Bend	0.5m
Nearest upstream disturbance	Bend	8m

NOTE: Velocity / volume flowrate calculations exclude contributions from the measurement point(s) where swirl >15°

Adler Pelzer Group		Installation Name	: Spraybooths
Permit No	: PPC 92935	Visit Details	: Compliance – November 2024
Variation No	: V1	Survey Dates	: 13th November 2024
Report Ref	: P5910	Report Issue Date	: 11th December 2024
	: R001		

FIELD SAMPLING DATA

Environmental Compliance Limited

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : Ro01

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

Particulates – SB2 (Bentley)

Environmental Compliance Limited		PARTICULATE DATA SAMPLING PROFORMA		Date of Measurement		19/11/2024	
ECL/TPDI		27a		Time taken to change Ports?		0	
				Start Time		10:20	
				End Time		11:20	
Client	Adler Pelzer Group	Stack Profile	Circular	Console id	U003	Barometer id	1321
Site	Tipton	Stack Area (m ²)	0.39	Pump id	U003	Nozzle size	8.08
Location	Spray Booths	Barometric Pressure (mb)	1037	Probe id	Unheated	Nozzle size	8.08
Stack ID	SB2 Bentley	Static Pres. (mm H ₂ O)	19.76	DGM Yd	0.9945	Filter id	263242-4720
Test No.	TPM	Pilot coefficient	1	AHP	39.26	Pilot ID	1342
Job No.	P5910	Probe Heater Setting (°C)	n/a	Impinger id	n/a	Hot Box ID	n/a
ECL Site Staff	LH & ZH	Hot Box Setting (°C)	n/a	Balance id	n/a		
IF SAMPLING FOR PARTICULATES NO LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (NOT EVEN IF TRAIN IS BROKEN DOWN) OR OTHER SAMPLING (WITHOUT PARTICULATES) LEAK CHECKS ARE ALLOWED AFTER SAMPLING HAS STARTED (BUT ARE NOT MANDATORY)							
Start Volume	979874.0	Leak 1		Leak 2		Leak 3	
Final Volume	981285.0	Leak 4		Leak 5		Leak 6	
Total Volume	1411.0	0.0	0.0	0.0	0.0	0.0	1411.0
Leak Check	First	Second	Third	Fourth	Fifth		
Leak rate l/min	0					Dry O ₂ (% Atmospheric)	20.90
Vacuum "Hg	-5					Dry Carbon Dioxide %	0.10
Time of Check	10:18					Reference Oxygen Percentage	n/a
Set Rate l/min	30						
Leak <2%?	YES						
Traverse Point	A1X	A1X	A1X	A2	A2	A2	A3
TimePoint (mins)	0 - 5	5 - 10	10 - 15	15 - 20	20 - 25	25 - 30	30 - 35
AP (mm H2O)	4.50	4.50	4.50	4.50	4.50	4.50	3.50
K factor	14.90	14.90	14.90	14.90	14.90	14.90	14.90
AH (Orifice)	67.05	67.05	67.05	67.05	67.05	67.05	52.15
Meter (Tm in)	17.00	18.00	19.00	20.00	22.00	23.00	24.00
Meter (Tm out)	14.00	16.00	17.00	18.00	19.00	20.00	21.00
Stack Temp (Ts)	14.00	14.00	14.00	14.00	14.00	14.00	14.00
Impinger T Outlet	n/a	n/a	n/a	n/a	n/a	n/a	n/a
Vacuum (" Hg)	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00	-1.00
Traverse Point	A3	A4X	A4X	A4X			
TimePoint(mins)	40 - 45	45 - 50	50 - 55	55 - 60			
AP (mm H2O)	3.50	3.00	3.00	3.00			
K factor	14.90	14.90	14.90	14.90			
AH (Orifice)	52.15	44.70	44.70	44.70			
Meter (Tm in)	26.00	26.00	26.00	27.00			
Meter (Tm out)	21.00	21.00	22.00	22.00			
Stack Temp (Ts)	14.00	14.00	15.00	15.00			
Impinger T Outlet	n/a	n/a	n/a	n/a			
Vacuum (" Hg)	-1.00	-1.00	-1.00	-1.00			
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							
K factor							
AH (Orifice)							
Meter (Tm in)							
Meter (Tm out)							
Stack Temp (Ts)							
Impinger T Outlet							
Vacuum (" Hg)							
Traverse Point							
TimePoint(mins)							
AP (mm H2O)							

Adler Pelzer Group		Installation Name	: Spraybooths
Permit No	: PPC 92935	Visit Details	: Compliance – November 2024
Variation No	: V1	Survey Dates	: 13th November 2024
Report Ref	: P5910 : R001	Report Issue Date	: 11th December 2024

LABORATORY ANALYSIS RESULTS

Laboratory analysis for Particulates was subcontracted to RPS laboratories, a UKAS Accredited Testing Laboratory, Number 0605.

RPS DO hold UKAS & MCERTS accreditation for this analysis.

As required by the MCERTS Performance Standard for Organisations, the analysis results are shown below.

Environmental Compliance Limited

Adler Pelzer Group
Permit No : PPC 92935
Variation No : V1
Report Ref : P5910 : R001

Installation Name : Spraybooths
Visit Details : Compliance – November 2024
Survey Dates : 13th November 2024
Report Issue Date : 11th December 2024

Customer Sample No	ECL/24/6067 - 263242	ECL/24/6068	ECL/24/6069 - 263247	ECL/24/6070	ECL/24/6071 - 263241	ECL/24/6072	ECL/24/6073 - 263240	ECL/24/6074
RPS Sample No	276500	276501	276502	276503	276504	276505	276506	276507
Sample Matrix	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION	FILTER	SOLUTION
Sampling Date	13/11/2024	13/11/2024	13/11/2024	13/11/2024	13/11/2024	13/11/2024	13/11/2024	13/11/2024

Determinand	CAS No	Codes	SOP	RL	Units								
particulates		UM	D9	0.04	mg	0.29		0.16		0.16		0.15	
particulates		UM	D9	0.5	mg		< 0.5		< 0.5		< 0.5		< 0.5

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance – November 2024

: 13th November 2024

: 11th December 2024

UNCERTAINTY CALCULATIONS

Environmental Compliance Limited

Adler Pelzer Group

Permit No : PPC 92935

Variation No : V1

Report Ref : P5910 : R001

Installation Name

Visit Details

Survey Dates

Report Issue Date

: Spraybooths

: Compliance – November 2024

: 13th November 2024

: 11th December 2024

Particulates Uncertainty – SB2 (Bentley)

Site: Tipton
Location: SB2 Bentley

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
TPM								
Particulates	0.29	0.50	0.79	0.10	0.50	0.0500	0.25	0.25
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...

TPM		Standard Uncertainty @ 95%	
Sampled Volume (V _m)	1.41	uV _m	0.001 m ³
Meter Correction Factor (Y _d)	0.99	...	...
Meter Temperature (T _m)	294.00	uT _m	1.5 k
Average Differential Pressure (ΔH)	57.74	uΔH	0.25 mmH ₂ O
Barometric Pressure (p _b)	777.81	up _b	3.8 mmHg
ΔH + ps (p _m)	104.27	...	...
Oxygen content (O _{2,m})	20.90	% by volume uO _{2,m} = σ/√n	0.00 % by volume
Moisture Content (H ₂ O)	0.00	% by volume uH ₂ O	#DIV/0! % by volume

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by C_iu_i, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i = uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

TPM :

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (up_s) & measured temperature of dry gas uncertainty component (uT_{m Dry})

TPM :

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.950$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.95	0.95	0.0000893	0.0000223
up _b	0.95	0.95	0.00122	0.00456
uT _m	0.96	0.95	0.00323	0.00485
H ₂ O	...	...	...	...

$$uf_s = \frac{1}{f_s} \sqrt{\left(\frac{(u\Delta H)^2 + (uP_b)^2}{(P_m/101.3)^2} \right) + \left(\frac{uT_m}{(T_m/273.15)} \right)^2 + \left(\frac{uH_2O}{100/(100 - H_2O)} \right)^2} = 0.00600$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

TPM :

$$V_{std} = V_{measured} \times f_s = 1.341$$

	Maximum m ³	Minimum m ³	Sensitivity	Standard Uncertainty (m ³)
Effect of uV _{std}	1.35	1.33	1.41	0.00847
Effect of uV _m	1.34	1.34	0.95	0.000950

Combined Standard Uncertainty

$$\frac{uV_{std}}{V_{std}} = \sqrt{\left(\frac{uV_{std}}{f_s} \right)^2 + \left(\frac{uV_m}{V_m} \right)^2} = 0.0120$$

Uncertainty of Oxygen Correction Factor (%):-

TPM :

$$f_{o_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$$

$$uCorr_{o_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times (20.9\% - O_{2,measured})} \times \text{Uncertainty of } O_2 \text{ Measurement} = 1.00$$

$$uf_{o_2} = \frac{uCorr_{o_2}}{f_{o_2}} \times 100 = 0.00 \%$$

Environmental Compliance Limited

Adler Pelzer Group
 Permit No : PPC 92935
 Variation No : V1
 Report Ref : P5910 : R001

Installation Name : Spraybooths
 Visit Details : Compliance – November 2024
 Survey Dates : 13th November 2024
 Report Issue Date : 11th December 2024

Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	TPM :			
	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	uM mg/Nm ³
Particulates	0.78	0.40	0.75	0.19
Hydrogen Chloride	...	...	...	...
Sulphur Dioxide	...	...	...	...
Ammonia	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	TPM :
	uL mg/Nm ³
Particulates	0.00680
Hydrogen Chloride	...
Sulphur Dioxide	...
Ammonia	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	TPM :			
	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	uVstp mg/Nm ³
Particulates	0.59	0.58	0.44	0.00527
Hydrogen Chloride	...	...	...	...
Sulphur Dioxide	...	...	...	...
Ammonia	...	...	...	...

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	TPM :				Uncertainty as Percentage of ELV
	Measurement Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	
Particulates	0.19	0.38	0.59	64.61	0.76
Hydrogen Chloride	...	...	...	...	...
Sulphur Dioxide	...	...	...	...	...
Ammonia	...	...	...	...	...

$$u_{combined} = \sqrt{\sum (u_{f_{O_2}})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	TPM :		
	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc O ₂ Corr ⁿ factor (U _{combined})
Particulates	64.61	0.00	64.61
Hydrogen Chloride	...	...	...
Sulphur Dioxide	...	...	...
Ammonia	...	...	...

Environmental Compliance Limited

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Particulates Uncertainty – SB7 (McLaren)

Site: Tipton
Location: SB7 McLaren

$$u_{mass} = \sqrt{\sum (u_{filter})^2 + (u_{solution})^2}$$

Determinand	Filter mg	Solution mg	Recovered Mass mg	LAB Method Uncert (%) K=2	Filter mg	Solution mg	Standard Uncertainty Filter mg	Solution mg	Combined Uncertainty mg
TPM									
Particulates	0.16	0.50	0.66	0.10	0.50	0.0500	0.25	0.25	
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...
...	...	...	...	...	...	...	...	...	...

	TPM		Standard Uncertainty @ 95%		
Sampled Volume (V _m)	1.64	m ³	uV _m	0.001	m ³
Meter Correction Factor (Y _d)	0.99	...	...	...	...
Meter Temperature (T _m)	297.33	k	uT _m	1.5	k
Average Differential Pressure (ΔH)	72.64	mmH ₂ O	uΔH	0.25	mmH ₂ O
Barometric Pressure (p _b)	777.81	mmHg	uP _b	3.8	mmHg
ΔH + p _s (p _m)	104.41	kPa	...	...	...
Oxygen content (O _{2,m})	20.90	% by volume	uO _{2,m} = σ/√n	0.00	% by volume
Moisture Content (H ₂ O)	0.00	% by volume	uH ₂ O	#DIV/0!	% by volume

Note: In the following calculations, the sensitivity coefficient (C) is estimated using: $C_i = \frac{\partial f}{\partial x_i}$

For each factor, uncertainty is then calculated by $C_i u_i$, where C is the sensitivity coefficient, u is the standard uncertainty and i is the index identifying the contributing factor e.g. i=uV_m, uT_m etc.

Where results are required at wet conditions, the following correction factor is used to convert the data from the dry gas meter:

TPM :

$$f_{s,wet} = \frac{100}{(100 - H_2O)} = 1.00$$

Uncertainty in correction factor to STP due to measured ΔH uncertainty component (uΔH), measured stack pressure uncertainty component (uP_b) & measured temperature of dry gas uncertainty component (uT_{m Dry})

TPM :

$$f_s = \frac{273}{760} \times \frac{P_b + \frac{\Delta H}{13.6}}{T_m} \times Y_d = 0.941$$

	Maximum	Minimum	Sensitivity	ufstp
uΔH	0.94	0.94	0.0000883	0.0000221
uP _b	0.95	0.94	0.00120	0.00451
uT _m	0.95	0.94	0.00316	0.00475
H ₂ O	...	...	...	...

$$\frac{u f_s}{f_s} = \sqrt{\left(\frac{\sqrt{(u\Delta H)^2 + (uP_b)^2}}{(P_b/101.3)} \right)^2 + \left(\frac{uT_m}{(T_m/273.15)} \right)^2 + \left(\frac{uH_2O}{100/(100-H_2O)} \right)^2} = 0.00581$$

Uncertainty in volume @ STP due to volume correction factor uncertainty component (uV_{std}) & volume uncertainty component (uV_m)

TPM :

$$V_{std} = V_{measured} \times f_s = 1.541$$

	Maximum m ³	Minimum m ³	Sensitivity	Standard Uncertainty (m ³)
Effect of uV _{std}	1.55	1.53	1.64	0.00952
Effect of uV _m	1.54	1.54	0.94	0.000941

Combined Standard Uncertainty

$$\frac{u V_{std}}{V_{std}} = \sqrt{\left(\frac{u V_{std}}{f_s} \right)^2 + \left(\frac{u V_m}{V_m} \right)^2} = 0.0156$$

Uncertainty of Oxygen Correction Factor (%):-

TPM :

$$f_{O_2} = \frac{20.9\% - O_{2,ref}}{20.9\% - O_{2,measured}} = 1.00$$

$$uCorr_{O_2} = \frac{20.9\% - O_{2,ref}}{(20.9\% - O_{2,measured}) \times \text{Uncertainty of } O_2 \text{ Measurement}} = 1.00$$

$$uf_{O_2} = \frac{uCorr_{O_2}}{f_{O_2}} \times 100 = 0.00\%$$

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Uncertainty in final measurement @ reference conditions due to mass uncertainty component (uM)

Determinand	TPM :			
	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	uM mg/Nm ³
Particulates	0.59	0.26	0.65	0.17
Hydrogen Chloride	...	...	...	...
Sulphur Dioxide	...	...	...	...
Ammonia	...	...	...	...

Uncertainty in final measurement @ reference conditions due to uncertainty component arising from leak and/or loss (assumed 2% max) in the sample system (uL)

Determinand	TPM :
	uL mg/Nm ³
Particulates	0.00494
Hydrogen Chloride	...
Sulphur Dioxide	...
Ammonia	...

Uncertainty in final measurement @ Reference Conditions due to uVstp

Determinand	TPM :			
	Maximum mg/Nm ³	Minimum mg/Nm ³	Sensitivity	uVstp mg/Nm ³
Particulates	0.43	0.42	0.28	0.00434
Hydrogen Chloride	...	...	...	...
Sulphur Dioxide	...	...	...	...
Ammonia	...	...	...	...

Measurement Uncertainty of Determinand (excluding correction for oxygen)

$$u_{combined} = \sqrt{\sum (u_M)^2 + (u_L)^2 + (uV_{stp})^2}$$

Determinand	TPM :				Uncertainty as Percentage of ELV
	Measurement Uncertainty mg/Nm ³	Expanded Uncertainty mg/Nm ³	Measured Concentration mg/Nm ³	Percent of Measured Concentration	
Particulates	0.17	0.33	0.43	77.32	0.66
Hydrogen Chloride	...	...	...	...	...
Sulphur Dioxide	...	...	...	...	...
Ammonia	...	...	...	...	...

$$u_{combined} = \sqrt{\sum (u_{f_{O_2}})^2 + (Uncertainty\ of\ Measurement\ of\ Determinand)^2}$$

Determinand	TPM :		
	Measurement Uncertainty of Determinand	Measurement Uncertainty of Oxygen Corr ⁿ Factor	Overall Measurement Uncertainty inc O ₂ Corr ⁿ factor (U _{combined})
Particulates	77.32	0.00	77.32
Hydrogen Chloride	...	...	...
Sulphur Dioxide	...	...	...
Ammonia	...	...	...

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Stack Reference SB2 Bentley

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.20	A
Manometer Calibration Uncertainty Contribution	0.198166667	B
Variation in Actual Pitot reading at sample points	0.54	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.35	
Expanded Uncertainty of Flow Measurements Pa	0.70	
	Standard u/c (K)	
Temperature Calibration (K)	1.44	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.83	
Expanded Uncertainty of Temp Measurements (K)	1.66	
Measured Average Velocity (m/s) at Stack Conds	7.93	
Maximum Average Velocity (m/s) at Stack Conds	8.02	
Standard Uncertainty Velocity at Stack Conditions (%)	1.17	
Expanded Uncertainty Velocity (at Stack Conditions)	2.34 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00390
Measured Average Flowrate (m ³ /s) at Stack Conds	3.09
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.16
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.18
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	4.36 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	3.01
Maximum Average Flowrate (m ³ /s) at STP Wet	3.09
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	2.67
Expanded Uncertainty Flowrate (m³/s) at STP Wet	5.34 (%)

Adler Pelzer Group
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Stack Reference SB7 McLaren

Measurement Uncertainty Calculations - Velocity at Stack Conditions

Contribution From	Standard u/c (Pa)	
Pitot Calibration Uncertainty Contribution	0.25	A
Manometer Calibration Uncertainty Contribution	0.251	B
Variation in Actual Pitot reading at sample points	0.80	C
Combined u/c (Pa) =	Combined u/c (Pa)	
$\text{SQRT } (A/\sqrt{3})^2 + (B/\sqrt{3})^2 + (C/\sqrt{3})^2$	0.51	
Expanded Uncertainty of Flow Measurements Pa	1.01	
	Standard u/c (K)	
Temperature Calibration (K)	1.45	D
Variation in Actual Temp reading at sample points	0.00	E
Combined u/c of Temp (K)	Combined u/c (K)	
$\text{SQRT } ((D/\sqrt{3})^2 + (E/\sqrt{3})^2)$	0.84	
Expanded Uncertainty of Temp Measurements (K)	1.67	
Measured Average Velocity (m/s) at Stack Conds	8.97	
Maximum Average Velocity (m/s) at Stack Conds	9.08	
Standard Uncertainty Velocity at Stack Conditions (%)	1.29	
Expanded Uncertainty Velocity (at Stack Conditions)	2.59 (%)	

Measurement Uncertainty Calculations - Flowrate at Stack Conditions

Contribution From	Standard u/c (m ²)
Area (m ²)	0.00390
Measured Average Flowrate (m ³ /s) at Stack Conds	3.50
Maximum Average Flowrate (m ³ /s) at Stack Conds	3.58
Standard Uncertainty Flowrate (m ³ /s) at Stack Conditions (%)	2.31
Expanded Uncertainty Flowrate (m³/s) at Stack Conditions	4.61 (%)

Measurement Uncertainty Calculations - Flowrate at STP & Wet Gas

Contribution From	Standard u/c (%)
Temperature Calibration (K)	0.5
Barometer Calibration	0.5
Measured Average Flowrate (m ³ /s) at STP Wet	3.37
Maximum Average Flowrate (m ³ /s) at STP Wet	3.47
Standard Uncertainty Flowrate (m ³ /s) at STP Wet	2.79
Expanded Uncertainty Flowrate (m³/s) at STP Wet	5.57 (%)