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EMISSION TEST REPORT

Report Title	RESULTS FOR THE VERIFICATION OF VOLATILE ORGANIC COMPOUND CAPTURE EFFICIENCY FOR COATING PROCESSES
Report Date	June 26, 2017
Test Date	June 23, 2017

Facility Information	
Name	Pioneer Metal Finishing Industrial Hwy facility
Street Address	24600 Industrial Hwy.
City, County	Warren, Macomb
Phone	(586) 759-3559

Facility Permit Information	
Permit to Install:	MI-PTI-2-03M

Testing Contractor	
Company	Derenzo Environmental Services
Mailing Address	39395 Schoolcraft Road Livonia, Michigan 48150
Phone	(734) 464-3880
Project No.	1701068

EMISSION TEST REPORT

RESULTS FOR THE VERIFICATION OF
VOLATILE ORGANIC COMPOUND CAPTURE EFFICIENCY FOR
COATING PROCESSES

PIONEER METAL FINISHING
WARREN, MICHIGAN

1.0 INTRODUCTION

Pioneer Metal Finishing (Pioneer Metal) operates a metal parts coating facility located at 24600 Industrial Hwy., Warren, Macomb County, Michigan (Industrial Hwy facility, State Registration No. N5747). Coating is transferred metal parts using dip and spray application and dried or cured in coating ovens. The coating lines are equipped with a process air collection system that exhausts captured volatile organic compounds (VOC) to a regenerative thermal oxidizer (RTO) for VOC reduction.

Pioneer Metal received a State of Michigan Permit to Install (PTI No. 2-03M issued February 6, 2015) from the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD) that specifies capture and control system requirements for its coating lines. The PTI requires Pioneer Metal to demonstrate VOC capture efficiency of its three (3) large dip-spin coating lines using the smoke tube test method. At the same time, the facility is required to verify capture efficiency of the three chain-on-edge coating lines (COE 2 and 3) and a stand-alone batch oven.

A Test Plan for the capture efficiency demonstration was originally submitted to the MDEQ-AQD in May 2014. Following approval of the procedures specified in the Test Notification, capture efficiency testing was performed in June 2014, December 2014, June 2015, December 2015, July 2016, December 2016, and June 2017. The capture efficiency demonstration is required to be performed semi-annually and will be repeated in December 2017 by Derenzo Environmental Services (DES) representatives. The project was coordinated by Jay Cronin, Process Control Manager for Pioneer Metal. The MDEQ-AQD was notified in May 2017 of the planned capture efficiency testing of test date of June 23, 2017.

Questions regarding this emission test report should be directed to:

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Pioneer Metal Finishing
24600 Industrial Hwy.
Warren, MI 48089
(586) 480-1703

1.1 Report Certification

A Renewable Operating Permit Report Certification Form (EQP 5736) signed by the Pioneer Metal Responsible Official (or the Responsible Official's authorized representative) accompanies this report.

This test report was prepared by Derenzo Environmental Services based on the field sampling data collected by Derenzo Environmental Services. I certify that the testing was conducted in accordance with the approved test plan unless otherwise specified in this report. I believe the information provided in this report and its attachments are true, accurate, and complete.

Report Prepared By:

Tyler J. Wilson
Livonia Office Supervisor
Derenzo Environmental Services

2.0 SUMMARY OF RESULTS

VOC capture efficiency for three (3) large dip-spin coating lines was evaluated using the smoke tube test method; observation of the airflow direction of visual smoke at enclosure openings. Smoke observations were also performed for the oven associated with one chain-on-edge coating line (COE2), a stand-alone batch oven, and a small dip-spin line (Model 10).

Capture efficiency for the spray booths associated with COE2 and COE3 and a small dip-spin line (Model 10) was verified using differential pressure measurements.

The results of the capture efficiency evaluation are presented in Table 2.1 below. All enclosures are connected to the VOC collection system and exhibited inward flow as indicated by the observation of air current smoke. The average measured differential pressure for all enclosures classified as permanent total enclosures (PTE) satisfied the PTE criteria of maintaining a differential pressure (vacuum) of at least 0.007 inches of water as compared to the surrounding environment, except for the small dip-spin line (Model 10) which is no longer required to maintain a differential pressure (vacuum) of at least 0.007 inches of water.

Table 2.1 Summary of capture efficiency test results for each coating line

Emission Unit Coating Process	Smoke Tube Verified Inward Flow (Y/N)	Differential Pressure (inches w.c.)
EU-LINE1-MODEL24	Y	NA
EU-LINE4-COE2 (Primer Booth)	Y	-0.035
EU-LINE4-COE2 (Topcoat Booth)	Y	-0.016
EU-LINE4-COE2 (Oven)	Y	NA
EU-LINE5-COE3	Y	-0.020
EU-LINE6-MODEL10	Y	-0.005
EU-LINE7-MODEL25	Y	NA
EULINE13-MODEL26	Y	NA
EUBATCHOVEN	Y	NA

NA These systems are classified as non-fugitive enclosures. Differential pressure measurements not required.

3.0 SOURCE DESCRIPTION

3.1 Coating Line Processes

Pioneer Metal operates a number of spay and dip coating processes:

- Three (3) large dip-spin coating lines that are identified as EU-LINE1-MODEL24, EU-LINE7-MODEL25, and EU-LINE13-MODEL26 in the PTI.
- A small dip-spin coating line (EU-LINE6-MODEL) that operates as a permanent total enclosure (PTE).
- One (1) chain-on-edge (COE) coating line, identified as EU-LINE4-COE2 in the PTI, that consist of a continuously moving chain, two spray booths and a curing oven. The booths operate as PTEs; the curing oven operates as a non-fugitive enclosure.
- A Sprimag COE spray coating line, identified as EU-LINE5-COE3 in the PTI. The Sprimag line is an enclosed conveyorized coating line used for coating the interior surface of metal parts. The line is operated as a PTE from the coating section through the attached curing oven.
- A batch oven (identified as EUBATCHOVEN in the PTI) that is a stand-alone enclosed oven. Parts are loaded into the oven in bulk on carts, containers, or pallets and the oven is sealed (door secured closed) while in operation.
- Four (4) Tumble Spray coating lines. In these lines the parts are tumbled within a sealed drum while the coating is spray applied with an HVLP applicator. During operation the tumble spray cover is in the closed position and the opening is sealed by the vacuum caused by the evacuation fan. There are no natural draft openings while the unit is in operation.

3.2 Type of Raw Materials Used

The coatings applied by the processes are either for corrosion resistance, adhesion, or surface priming. The high performance coatings are primarily solvent based, though some waterborne formulations are used. These coatings are received from the manufacturer and diluted (reduced) with organic solvents or water prior to their application.

3.3 Emission Control System Description

Solvent laden air from the individual processes is combined in a mixing plenum near the center of the facility and exhausted to the RTO emissions control system.

The RTO system consists of a variable frequency drive (VFD) fan, three (3) energy recovery columns packed with ceramic heat exchange media and a high-temperature combustion chamber containing natural gas-fired burners. The VFD fan maintains an appropriate vacuum within the process air collection system and directs the collected air to the RTO unit where it is oxidized (combusted) at high temperatures.

The RTO effluent gas is released to atmosphere via a rectangular vertical exhaust stack.

3.4 Process Operating Conditions During the Compliance Testing

During the capture efficiency evaluation, the coating processes operated normally. Tumble Spray No. 4 was not operating during the observations of the tumble spray lines because it was shut down for maintenance. All other lines applied solvent-based coating at typical application rates.

The RTO inlet fan was operated normally to maintain an appropriate vacuum within the main air collection header. The fan operated at 60.0 Hertz (Hz) as indicated by the VFD output display, which resulted in a captured gas volumetric flowrate was 20,019 actual cubic feet per minute (acfm) based on airflow measurements performed at the inlet to the RTO fan.

The RTO combustion chamber temperature was set at 1,500°F and ranged between 1,500°F and 1,511°F during the testing as observed by the test crew (based on intermittent observations, not continuous monitoring records).

A summary of the VOC capture and emission control system operating parameters during the test event is presented in Table 3.1 below.

Attachment 1 provides RTO operating records and flowrate measurements for the capture efficiency evaluation period.

Table 3.1 VOC capture and emission control system operating parameters

Operating parameter	Value	
Average fan speed	60.0	Hz
Average RTO inlet vacuum	-1.6	in wc
Avg RTO inlet flowrate, actual	20,019	acfm
Avg RTO inlet flowrate, standard	17,755	scfm
Chamber temperature setpoint	1,500	°F
Chamber temp (min.)	1,500	°F
Chamber temp (max.)	1,511	°F

4.0 SAMPLING AND ANALYTICAL PROCEDURES

A description of the sampling and analytical procedures is provided in the previous Test Plan dated May 21, 2014, which was approved by the MDEQ-AQD. Following approval of the procedures specified in the Test Plan, a Test Notification was sent to the MDEQ-AQD for this test event and capture efficiency testing was performed on June 23, 2017. The capture efficiency demonstration is required to be performed semi-annually and will be repeated in December 2017.

This section provides a summary of the capture efficiency verification procedures.

4.1 Smoke Tube Air Current Observations for Non-Fugitive Enclosures

Ventilation or air current smoke tubes were used to observe the direction of air flow for the air collection systems associated with the three (3) large dip-spin lines (Model 24, 25 and 26), chain on edge oven (COE2), batch oven, and small dip-spin (Model 10).

The smoke tube was placed in front of each natural draft opening, an adequate amount of smoke was generated manually using the squeeze bulb, and the direction of air flow (into or out of the natural draft opening) was noted. All natural draft openings for each process were tested and recorded on a data sheet.

Attachment 2 provides field data sheets that were used to identify natural draft openings and record the direction of airflow.

4.2 Differential Pressure Measurements for Permanent Total Enclosures

Enclosure differential pressure measurements for the chain-on-edge coating booths (COE2), Sprimag Booth/Oven and the Model#10 dip-spin line was performed using a Heise® PTE-1 Handheld Pressure Calibrator.

Prior to use, the pressure measurement instrument performs a self zero and calibration procedure. To measure enclosure differential pressure, the low-pressure side of the differential pressure measurement cell was connected by flexible tubing to a port installed on the enclosure wall (or inserted into the enclosure if a measurement port doesn't exist) and the high-pressure side of the measurement cell was open to the surrounding environment. Five (5) individual differential pressure (inches water column) readings were recorded using the 'hold' function on the instrument. The average recorded differential pressure was calculated for each enclosure.

Attachment 3 provides field data sheets that were used to record differential pressure readings.

4.3 Captured Gas Flowrate to the RTO

The captured gas volumetric flowrate was measured at the inlet to the RTO near the beginning and end of the capture efficiency evaluation period. The sampling location for the combined coating line exhaust (RTO inlet) is in the 30-inch diameter duct exterior to the facility wall.

Velocity traverse locations for the sampling points were determined in accordance with USEPA Method 1. The exhaust gas velocity pressure and temperature were measured at each sampling location in accordance with USEPA Method 2. An S-type Pitot tube connected to a red-oil manometer was used to determine velocity pressure and a K-type thermocouple mounted to the Pitot tube was used for temperature measurements. The Pitot tube and connective tubing were leak-checked to verify the integrity of the measurement system. The gas molecular weight was verified using a Fyrite® combustion gas analyzer. A summary of the volumetric airflow measurement methods is summarized below:

Method 1	Velocity and sampling locations were selected based on physical duct measurements in accordance with USEPA Method 1.
Method 2	Gas velocity pressure were determined using a Type-S Pitot tube connected to a red oil incline manometer. Exhaust gas temperature will be measured using a K-type thermocouple connected to the Pitot tube.
Method 3	RTO inlet gas O_2 and CO_2 content were determined by Fyrite® combustion gas analyzer.
Method 4	RTO inlet gas moisture was determined by wet bulb/dry bulb temperature measurements.

The velocity measurement field data sheets and flowrate calculations are provided in Attachment 1 with the RTO operating data.

5.0 TEST RESULTS AND DISCUSSION

5.1 Evaluation of Test Results

The results of the capture efficiency evaluation are presented in Table 2.1. All enclosures are connected to the VOC collection system and exhibited inward flow as indicated by the observation of air current smoke.

The average measured differential pressure for all enclosures classified as permanent total enclosures exceeded -0.007 inches of water (the PTE criteria), except for the small dip-spin line (Model 10), which is no longer required to meet this criteria.

The captured gas (RTO inlet) flowrate measured on June 23, 2017 was comparable to that measured on December 20, 2016 (17,755 scfm compared to 15,703 scfm).

5.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing was performed in accordance with the Test Notification dated November 21, 2016. During the testing program the coating lines were operated at normal operating conditions, at or near maximum capacity and satisfied the parameters specified in the MDEQ-AQD test plan approval letter.