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FG-RTO Destruction Efficiency Emissions Report

N 2908

Prepared for:

TAC Manufacturing, Inc.

4111 County Farm Road
Jackson, Michigan

Project No. 049AS-484519
January 29, 2019

Montrose Air Quality Services
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EXECUTIVE SUMMARY

Montrose Air Quality Services (MAQS) was retained by TAC Manufacturing, Inc. (TAC) to conduct emissions testing at the TAC facility in Jackson, Michigan. The test program consisted of sampling and analysis of volatile organic compounds (VOC) concentrations and emission rates at the FG-RTO (RTO) inlet and outlet sampling locations to determine RTO destruction efficiency (DE).

Testing consisted of triplicate 60-minute test runs for VOC with sampling at the inlet and outlet locations conducted simultaneously. Sampling was performed utilizing United States Environmental Protection Agency (USEPA) reference test methods. The emissions test program was completed on December 11, 2018. The results of the emissions test program will be used to demonstrate compliance with Permit No. 254-02D and are summarized by Table I.

Table I
Turbine 1 Overall Emission Summary
Test Date: December 11, 2018

Source	Pollutant	Average Test Result
FG-RTO	VOC DE	97%

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1. Introduction

Montrose Air Quality Services (MAQS) was retained by TAC Manufacturing, Inc. (TAC) to conduct emissions testing at the TAC facility in Jackson, Michigan. The test program consisted of sampling and analysis of volatile organic compounds (VOC) concentrations and emission rates at the FG-RTO (RTO) inlet and outlet sampling locations to determine RTO destruction efficiency (DE).

Testing consisted of triplicate 60-minute test runs for VOC with sampling at the inlet and outlet locations conducted simultaneously. Sampling was performed utilizing United States Environmental Protection Agency (USEPA) reference test methods. The emissions test program was completed on December 11, 2018. All testing was performed in accordance with the MAQS Test Plan dated November 8 2018 (Project No. 049AS-484519).

1.a Identification, Location, and Dates of Test

Sampling and analysis for the emissions test program was conducted on December 11, 2018 at the TAC facility in Jackson, MI. The testing consisted of simultaneous VOC emissions analysis at the inlet and outlet of the RTO.

1.b Purpose of Testing

Testing was done to show compliance with respect to Permit No. 254-02D. This permit limits emissions from the RTO as summarized by Table 1.

Table 1
VOC Emission Limitations

Permit No.	Lower DE Limit	VOC Emission Limits
254-02D	95%	11.2 tons/yr

1.c Source Description

FG-RTO is a regenerative thermal oxidizer that controls VOC emissions from EU-APSLine and EU-MirrorLine as follows:

EU-APS Line - Plastic automotive parts automatic paint system including one robotic booth, one flash-off area, and one electric curing oven. VOC emissions from each booth, flash-off area, and an oven are captured by using a Permanent Total Enclosure (PTE) and abated via a Regenerative Thermal Oxidizer (RTO). Each paint booth is equipped with a water curtain system to control particulate matter.

EU-MirrorLine - Plastic automotive parts automatic paint system including two robotic booths and one electric curing oven. VOC emissions from each booth and oven are captured by using a Permanent Total Enclosure (PTE) and abated via a Regenerative Thermal Oxidizer (RTO). Each paint booth is equipped with a water curtain system to control particulate matter.

1.d Test Program Contacts

The contact for the source and test report is:

Tiffany McCann
TAC Manufacturing, Inc.
HR Generalist (Safety and Environmental)
4111 County Farm Road
Jackson, Michigan 49201
(517)789-7000 ext. 3379

Mr. Randal J. Tysar
Montrose Air Quality Services, LLC
4949 Fernlee Avenue
Royal Oak, Michigan 48073
(248) 548-8070

Names and affiliations for personnel who were present during the testing program are summarized by Table 2.

Table 2
Test Personnel

Name and Title	Affiliation	Telephone
Tiffany McCann HR Generalist (Safety and Environmental)	TAC Manufacturing, Inc. 4111 County Farm Rd. Jackson, MI 49201	(517)789-7000 ext. 3379
Mr. Randal Tysar District Manager	MAQS 4949 Fernlee Royal Oak, MI 48073	(248) 548-8070
Mr. Mason Sakshaug Field Technician	MAQS 4949 Fernlee Royal Oak, MI 48073	(989) 323-0355
Mr. Tom Gasloli MDEQ	MDEQ Air Quality Division	(517) 284-6778

2. Summary of Results

Sections 2.a through 2.d summarize the results of the emissions compliance test program.

2.a Operating Data

Process data monitored during the emissions test program included RTO combustion zone temperature and permanent total enclosure static pressure differential.

2.b Applicable Permit

The applicable permit for this emissions test program is Permit No. 254-02D.

2.c Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). The DE was 97%.

3. Source Description

Sections 3.a through 3.e provide a detailed description of the process.

3.a Process Description

FG-RTO is a regenerative thermal oxidizer that controls VOC emissions from EU-APSLine and EU-MirrorLine as follows:

EU-APS Line - Plastic automotive parts automatic paint system including one robotic booth, one flash-off area, and one electric curing oven. VOC emissions from each booth, flash-off area, and an oven are captured by using a Permanent Total Enclosure (PTE) and abated via a Regenerative Thermal Oxidizer (RTO). Each paint booth is equipped with a water curtain system to control particulate matter.

EU-MirrorLine - Plastic automotive parts automatic paint system including two robotic booths and one electric curing oven. VOC emissions from each booth and an oven are captured by using a Permanent Total Enclosure (PTE) and abated via a Regenerative Thermal Oxidizer (RTO). Each paint booth is equipped with a water curtain system to control particulate matter.

3.b Process Flow Diagram

A process flow diagram for the RTO system is not applicable.

3.c Raw and Finished Materials

The raw material used in the APS Line and the Mirror Line is paint. It is estimated that the APS Line applies paint at a rate of approximately 1.5 gallons per hour with an average

VOC content of 7.0 pounds per gallon and that the Mirror Line applies paint at a rate of approximately 3 gallons per hour with an average VOC content of 7.0 pounds per gallon.

3.d Process Capacity

The APS Line typically processes parts at a rate of approximately 50 parts per hour and the Mirror Line typically processes parts at a rate of approximately 50 parts per hour.

3.e Process Instrumentation

Process data monitored during the emissions test program included RTO combustion zone temperature and permanent total enclosure static pressure differential.

4. Sampling and Analytical Procedures

Sections 4.a through 4.d provide a summary of the sampling and analytical procedures used.

4.a Sampling Train and Field Procedures

Measurement of exhaust gas velocity, molecular weight, and moisture content were conducted using the following reference test methods codified at 40 CFR 60, Appendix A:

•Method 1 - *"Sample and Velocity Traverses for Stationary Sources"*
•Method 2 - *"Determination of Stack Gas Velocity and Volumetric Flow rate"*
•Method 3 - *"Determination of Molecular Weight of Dry Stack Gas" (Fyrite)*
•Method 4 - *"Determination of Moisture Content in Stack Gases"*

Stack gas velocity traverses were conducted in accordance with the procedures outlined in Methods 1 and 2. An S-type pitot tube with a thermocouple assembly, calibrated in accordance with Method 2, Section 4.1.1, was used to measure exhaust gas velocity pressures (using a manometer) and temperatures during testing. The S-type pitot tube dimensions were within specified limits, therefore, a baseline pitot tube coefficient of 0.84 (dimensionless) was assigned.

A cyclonic flow check was performed at the sampling locations. The existence of cyclonic flow is determined by measuring the flow angle at each sample point. The flow angle is the angle between the direction of flow and the axis of the stack. If the average of the absolute values of the flow angles is greater than 20 degrees, cyclonic flow exists. The average null angle was determined to be less than 20 degrees at both locations.

Molecular weight was determined according to USEPA Method 3, "Gas Analysis for the Determination of Dry Molecular Weight." The equipment used for this evaluation consisted of a one-way squeeze bulb with connecting tubing and a set of Fyrite® combustion gas analyzers. Carbon dioxide and oxygen content were analyzed using the Fyrite® procedure.

Exhaust gas moisture content at the RTO outlet was evaluated using Method 4 at the RTO outlet and using a single 30-minute test run. Exhaust gas was extracted as part of the moisture sampling (see Section 3.2) and passed through (i) two impingers, each with 100 ml deionized water, (ii) an empty impinger, and (iii) an impinger filled with silica gel. Exhaust gas moisture content is then determined gravimetrically. Because of the low exhaust gas temperature at the inlet location, the saturated moisture value of 1.8% was assumed.

Volatile Organic compound (VOC) concentrations were measured according to 40 CFR 60, Appendix A, Method 25A. A sample of the gas stream was drawn through a stainless-steel probe with an in-line glass fiber filter to remove any particulate, and a heated Teflon® sample line to prevent the condensation of any moisture from the sample before it enters the analyzer. Data was recorded at 4-second intervals on a PC equipped with data acquisition software. MAQS used a JUM Model 30 THC hydrocarbon analyzer to determine the VOC concentration.

The JUM THC hydrocarbon analyzer channels a fraction of the gas sample through a capillary tube that directs the sample to the flame ionization detector (FID), where the hydrocarbons present in the sample are ionized into carbon. The carbon concentration is then determined by the detector in parts per million (ppm). This concentration is transmitted to the data acquisition system (DAS) at 4-second intervals in the form of an analog signal, specifically voltage, to produce data that can be averaged over the duration of the testing program. This data is then used to determine the average ppm for total hydrocarbons (THC) using the equivalent units of propane (calibration gas).

In accordance with Method 25A, a 4-point (zero, low, mid, and high) calibration check was performed on the THC analyzer. Calibration drift checks were performed at the completion of each run. Outlet methane analysis was conducted during the first test run but discontinued because of the very low methane concentrations.

4.b Sampling Ports

Diagram of the sampling locations showing sampling ports in relation to upstream and downstream disturbances are included as Figures 3 and 4.

4.c Traverse Points

Diagrams of the stack indicating traverse point locations and stack dimensions are included as Figures 3 and 4.

5. Test Results and Discussion

Sections 5.a through 5.k provide a summary of the test results.

5.a Results Tabulation

The overall results of the emissions test program are summarized by Table 3. Detailed results for the emissions test program are summarized by Table 4.

Table 3
RTO Overall Emission Summary
Test Date: December 11, 2018

Source	Pollutant	Average Test Result
FG-RTO	VOC DE	97%

5.b Discussion of Results

The overall results of the emission test program are summarized by Table 3 (see Section 5.a). The DE was 97%.

5.c Sampling Procedure Variations

Due to the cyclical pattern of the temperatures at the RTO outlet, a maximum and minimum temperature was observed and the average was used for the outlet flowrates during each run. Periodically, the outlet exhaust gas temperature would rapidly spike to a maximum value and then slowly decrease to a minimum value. The temperature was was observed for a period to of time during each test run and the average of the maximum and minimum value was used to calculation exhaust gas flowrates.

5.d Process or Control Device Upsets

No upset conditions occurred during testing.

5.e Control Device Maintenance

The abatement system is new. Consequently, no maintenance has been performed within the last three months.

5.f Re-Test

The emissions test program was not a re-test.

5.g Audit Sample Analyses

No audit samples were collected as part of the test program.

5.h Calibration Sheets

Relevant equipment calibration documents are provided in Appendix B.

5.i Sample Calculations

Sample calculations are provided in Appendix C.

5.j Field Data Sheets

Field documents relevant to the emissions test program are presented in Appendix A.

5.k Laboratory Data

There are no laboratory results for this test program. Raw CEM data is provided electronically in Appendix D.

MEASUREMENT UNCERTAINTY STATEMENT

Both qualitative and quantitative factors contribute to field measurement uncertainty and should be taken into consideration when interpreting the results contained within this report. Whenever possible, Montrose Air Quality Services, LLC, (MAQS) personnel reduce the impact of these uncertainty factors through the use of approved and validated test methods. In addition, MAQS personnel perform routine instrument and equipment calibrations and ensure that the calibration standards, instruments, and equipment used during test events meet, at a minimum, test method specifications as well as the specifications of our Quality Manual and ASTM D 7036-04. The limitations of the various methods, instruments, equipment, and materials utilized during this test have been reasonably considered, but the ultimate impact of the cumulative uncertainty of this project is not fully identified within the results of this report.

Limitations

All testing performed was done in conformance to the ASTM D7036-04 standard. The information and opinions rendered in this report are exclusively for use by TAC Manufacturing. MAQS will not distribute or publish this report without TAC Manufacturing's consent except as required by law or court order. MAQS accepts responsibility for the competent performance of its duties in executing the assignment and preparing reports in accordance with the normal standards of the profession, but disclaims any responsibility for consequential damages.

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