IMPACT COMPLIANCE & TESTING

EMISSION TEST REPORT
FOR THE
VERIFICATION OF TOTAL CHROMIUM EMISSIONS
FROM ELECTROPLATING OPERATIONS
AT
ADEPT PLASTIC FINISHING, INC. PLANT 4

TEST DATES: APRIL 23-24, 2019

Report Date: June 19, 2019

Facility Information	
Name: Street Address: City, County: SRN:	Adept Plastic Finishing, Inc. - Plant 4 30540 Beck Road Wixom, Oakland N7809

Facility Permit Information	
Permit No.:	115-07B
Emission Units	FGCHROME (EUSYSTEM5, EUCHROME1)

Testing Contractor	
Company Mailing Address	Impact Compliance & Testing, Inc. 4180 Keller Road, Suite B Holt, MI 48842
Phone	(517) 268-0043
Project No.	1900071

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EMISSION TEST REPORT
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ADEPT PLASTIC FINISHING, INC.- PLANT 4
WIXOM, MICHIGAN

1.0 INTRODUCTION

Adept Plastic Finishing, Inc. (Adept, owned by Tribar Manufacturing) located in Wixom, Oakland County, Michigan operates a chrome plating line under State of Michigan Permit to Install (air permit) No. 115-07B issued November 1, 2018 by the Michigan Department of Environmental Quality, Air Quality Division (MDEQ-AQD).

The chrome plating line is divided into separate systems, or emission units. Each emission unit is connected to an emission control device. EUSYSTEM5, a chromic acid etching process, consists of Tanks 3, 5, 6, and 7, and a porous pot tank and evaporator. Emissions from EUSYSTEM5 are controlled using a composite mesh pad / chrome separator system. EUCHROME1, a decorative chrome electroplating process, consists of Tank 50 which is connected to a composite mesh pad / chrome separator system. The exhaust streams of both systems are routed to a shared stack identified as SVCHROME.

Conditions of Permit No. 115-07B require Adept to perform compliance testing within 180 days of permit issuance to verify compliance with the emission rate limitations that are specified in the permit for each emission unit, and to establish control device operating parameters.

In addition, provisions of 40 CFR Part 63, Subpart N, the National Emission Standards for Hazardous Air Pollutants (NESHAP) for Chromium Emissions from Hard and Decorative Chromium Electroplating and Chromium Anodizing Tanks, specifies applicable chromium emission limits and testing requirements for EUCHROME1 (EUSYSTEM5 is not subject to the NESHAP).

The testing was performed April 23 – 24, 2019 by Impact Compliance & Testing, Inc. (ICT) representatives Clay Gaffey and Brad Thome. Ms. Regina Angelotti and Mr. Joe Forth of the Michigan Department of Environment, Great Lakes and Energy (EGLE) AQD were on-site to observe portions of the compliance testing. The project was coordinated by Mr. Ed Barriager and Mr. Ben Matteson of Adept.

The sampling and analysis were performed using procedures specified in the test protocol documents dated February 22, 2018 and approved by the MDEQ-AQD.

Appendix 1 contains a copy of the test protocol approval letter.

Questions concerning the source and test report should be addressed to:

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Report Certification

This test report was prepared by Impact Compliance & Testing, Inc. based on field sampling data collected by ICT. Facility process data were collected and provided by Adept employees or representatives. This test report has been reviewed by Adept representatives and approved for submittal to the EGLE-AQD.

Test data for EUCHROME1 is also being submitted to the USEPA using the Compliance and Emissions Data Reporting Interface (CEDRI) system.

I certify that the testing was conducted in accordance approved methods 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:

For Brad Thome
Environmental Consultant
Impact Compliance & Testing, Inc.

Reviewed By:

Robert L. Harvey, P.E.
General Manager
Impact Compliance & Testing, Inc.

2.0 SUMMARY OF RESULTS

Exhaust gases from the decorative chrome plating processes were sampled to determine the total chromium exhaust gas concentration. Three (3) two-hour test periods were performed. Exhaust gas velocity measurements were performed during each test period to determine volumetric flowrate and pollutant mass emission rate. The average measured total chromium mass emission rates were less than the limits specified in PTI No. 115-07B and the Decorative Chrome Plating NESHAP (Subpart N).

Table No. 2.1 presents a summary of the operating parameters measured during the test periods.

Table No. 2.2 presents a summary of the total chromium emission test results.

The data presented in the tables below are the average for three (3) two-hour test periods. Data and measurements for each test period are presented at the end of this report in Section 6.0

Table 2.1 Summary of decorative chrome plating line operating parameters

Operating Parameter	Avg. Measured Value[1]
EUSYSTEM5 process rate (sq. feet per two hours)	1,200
EUSYSTEM5 Tank No. 5 pressure drop (inH_2O)	2.8
EUSYSTEM5 Tank No. 6 pressure drop (inH_2O)	3.6
EUCHROME1 process rate (sq. feet per two hours)	1,200
EUCHROME1 Tank No. 50 pressure drop (inH_2O)	3.7

Table 2.2 Summary of decorative chrome plating process test results

Analyte	FGCHROME	EUCHROME1*
Total Chromium (mg/dscm)	7.21E-04	--
Total Chromium (lb/hr)	6.24E-05	--
Permitted Limit	*6.51E-05*	--
Total Chromium (mg/hr)	28	28
NESHAP standard (mg/hr)	--	*184*

* Chromium emission rate for EUCHROME1 assumed to be the same as FGCHROME. Allowable emission rate for EUCHROME1 is based on the NESHAP standard 0.006 mg/dscm and ratio of affected and non-affected exhausts.

3.0 SOURCE DESCRIPTION

3.1 General Process Description

Adept operates a decorative chrome plating line that contains two (2) chromium-containing systems; EUSYSTEM5 and EUCHROME1. Decorative chrome plating the surface of plastic parts requires the parts to be chromic acid etched, dipped in various metal solutions, and put into the chromium plating bath. Once the parts are placed into the chromium plating system tanks, chrome is electrolytically deposited onto the coated plastic part in varying thicknesses depending on the application.

Process air from the decorative chrome plating processes is captured and exhausted to two (2) independent chrome separator / composite mesh pad scrubber control devices, which are used to reduce chromium emissions to the atmosphere in a shared duct.

3.2 Emission Control System Description

Each decorative chrome plating process described above is equipped with mist collection system and vertical composite mesh pad (CMP) control device and a mist eliminator.

Chromic acid etching process tanks 3, 5, 6, and 7 are connected to a CMP / chrome separator system and exhausted to atmosphere via SVCHROME. Decorative chrome plating process tank 50 is connected to a CMP / chrome separator system and exhausted to atmosphere via SVCHROME.

Appendix 2 provides sampling location drawings for the scrubber exhausts.

3.3 Process Operating Conditions During the Compliance Testing

EUSYSTEM5 processed an average of 72 pieces or 1,200 square feet for each two (2) hour test period. The local scrubbers for the chromium-containing process tanks (Tank Nos. 5 and 6) had an average pressure drop of 2.8 and 3.6 inH_2O, respectively.

EUCHROME1 also processed 1,200 square feet for each two-hour period. The local scrubber for the decorative chrome plating tank (Tank No. 50) had an average pressure drop of 3.7 inH_2O.

Appendix 3 provides plating process and control device operating data for the test periods.

4.0 SAMPLING AND ANALYTICAL PROCEDURES

A test protocol was prepared by ICT and submitted to the MDEQ-AQD (now EGLE-AQD) prior to performing the compliance test. This section provides a summary of the sampling and analytical procedures that were used during the tests and presented in the protocol.

4.1 Exhaust Gas Velocity and Flowrate (USEPA Methods 1 and 2)

Exhaust gas sampling was performed using stack sampling ports that satisfied USEPA Method 1 criteria. For FGCHROME, these ports are located in the 40-inch diameter exhaust stack prior to the roof exhaust fan and are >120 inches (>3.00 duct diameters) downstream of the nearest flow disturbance and 59 inches (1.48 duct diameters) upstream from the nearest flow disturbance.

To determine pollutant mass flow emission rates, the stack gas velocity was measured using procedures specified in USEPA Method 2 throughout each test period using the isokinetic sampling probe. Gas velocity (pressure) measurements were performed at each traverse point with an S-type Pitot tube and red-oil manometer. Temperature measurements were conducted at each traverse point using a K-type thermocouple and a calibrated digital thermometer.

Appendix 4 provides copies of exhaust gas velocity field data sheets and flowrate calculations.

4.2 Exhaust Gas Molecular Weight

The exhaust gas is captured building air that has been drawn through the CMP system. A dry molecular weight of 29.0 was used as specified in Section 8.6 of USEPA Method 2.

4.3 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content of the scrubber exhaust gas was determined in accordance with the USEPA Method 4 chilled impinger method as part of the isokinetic sampling procedures for chromium (i.e., not as a separate measurement train). The amount of moisture removed from the sample stream by the chilled impingers was determined gravimetrically by weighing the impinger contents before and after the test period to determine net weight gain.

Appendix 4 provides moisture train sampling data and calculations.

4.4 Total Chromium Emission Rate (USEPA Method 306)

USEPA Method 306, *Determination of Chromium Emissions from Decorative and Hard Chrome Electroplating and Chromium Anodizing Operations*, was used to determine total chromium concentration in the scrubber exhaust gas. Process gas was withdrawn from the

scrubber exhaust stack at an isokinetic sampling rate using a glass sampling nozzle, glass-lined probe and an impinger train containing 0.1N sodium hydroxide (NaOH) solution. Pursuant to USEPA Method 306, the sample probe was not heated, and the filter was omitted. Therefore, the glass probe liner was connected to a clean flexible Teflon line connected directly to the first impinger.

Stack gas temperature and velocity pressure at each traverse point were monitored and recorded throughout each two-hour test period to determine volumetric flowrate.

At the conclusion of each two-hour test period the weight of each impinger was measured. The moisture gain was determined gravimetrically, and the stack gas total moisture was determined based on the total weight gain of the impingers and silica gel. The sample nozzle, probe liner, first three impingers and connective glassware were rinsed using 0.1N NaOH solution. The rinse and impinger solutions were combined and shipped to Element One, Inc. (Wilmington, North Carolina) for analysis. Prior to shipment, the pH of the recovered solutions was checked using litmus paper to verify that the pH exceeded 8.5.

The total chrome content in the recovered solutions was determined by Element One, Inc. using inductively coupled plasma mass spectrometry (ICP-MS).

Appendix 5 contains a copy of the Element One laboratory report.

The total chromium concentration was determined using the laboratory reported chromium mass and the following equation:

$C_{Cr} = M_{Cr} / V_m / (1{,}000\ \mu g/mg)$

C_{Cr} = Concentration of total Cr (mg/dscm)
M_{Cr} = Mass Cr in recovered solutions (µg)
V_m = Sample gas volume for test period (dscm)

The total chromium mass emission rate was determined using calculated total chromium concentration and the volumetric flowrate, using the following equation

$E_{Cr} = M_{Cr} / V_m * Q_d * (60\ min/hr) / (454E\text{-}06\ \mu g/lb)$

E_{Cr} = Emission rate of total chrome (lb/hr)
Q_d = Exhaust gas volumetric flowrate (dscfm)

4.5 EUCHROME1 Emission Rate (40 CFR 63 Subpart N)

EUCHROME1 consists of a decorative chromium electroplating tank (Tank 50) which is an affected source under 40 CFR Part 63 Subpart N (Chrome NESHAP).

Because the sampling was performed in a shared duct which includes emissions from an affected source (EUCHROME1) and a non-affected source (EUSYSTEM5), calculations were performed to determine whether the emission rate for EUCHROME1 is below the limits specified in the Chrome NESHAP.

The total chromium allowable emission rate for EUCHROME1, in milligrams per hour, was determined using the following equation:

$AER_{Cr} = (Q_t * (A_{Cr1} / A_t)) * 0.006$ mg/dscm * 60 min/hr

AER_{Cr} = Allowable emission rate of total chrome (mg/hr)
Q_t = Total ventilation rate in shared duct (dscfm)
A_{Cr1} = Area of the EUCHROME1 exhaust duct (ft^2)
A_t = Total area of inlet exhaust ducts (ft^2)

The total chromium emission rate for FGCHROME, in milligrams per hour, was compared to the calculated allowable emission rate to determine compliance with the emission limitation in the Chrome NESHAP for EUCHROME1.

Allowable emission rate calculations are included in Table 6.1 and Appendix 4.

5.0 QA/QC ACTIVITIES

5.1 Exhaust Gas Flow Measurement

Prior to arriving onsite, the instruments used during the source test to measure exhaust gas properties and velocity (barometer, pyrometer, and Pitot tube) were calibrated to specifications in the sampling methods.

The absence of cyclonic flow for each sampling location was verified using an S-type Pitot tube and oil manometer. The Pitot tube was positioned at each of the velocity traverse points with the planes of the face openings of the Pitot tube perpendicular to the stack cross-sectional plane. The Pitot tube was then rotated to determine the null angle (rotational angle as measured from the perpendicular, or reference, position at which the differential pressure is equal to zero).

5.2 Meter Box and Isokinetic Rate

The dry gas metering console, which was used for the isokinetic sampling, was calibrated prior to and after the testing program. This calibration uses the critical orifice calibration technique

presented in USEPA Method 5. The metering console calibration exhibited no data outside the acceptable ranges presented in USEPA Method 5.

The digital pyrometer in the metering console was calibrated using a NIST traceable Omega® Model CL 23A temperature calibrator.

The sampling nozzle diameter was determined using the three-point calibration technique.

The sampling rate for all test periods was within 10% of the calculated isokinetic sampling rate required by USEPA Methods 306 and 5.

5.3 Total Chromium Recovery and Analysis

All recovered total chromium samples were stored and shipped in pre-rinsed polyethylene sample bottles with Teflon® lined caps. The liquid level on each bottle was marked with a permanent marker prior to shipment and the caps were secured closed with tape. Samples of the reagent used in the test event (500 milliliters of 0.1N sodium hydroxide) was sent to the laboratory for analysis to verify that the reagent used to recover the samples has low total chromium content.

The glassware and Teflon line used in the total chromium train was washed and rinsed prior to use in accordance with the procedures of USEPA Method 306. The glass sample nozzle and probe liner were washed, rinsed and soaked in acid prior to use in accordance with USEPA Method 306. Analysis of the reagent blank indicated that its chromium content was less than the method detection limit (i.e., ND, or no chromium detected).

5.4 Laboratory QA/QC Procedures

The laboratory total chromium analyses were conducted by a qualified third-party laboratory according to the appropriate QA/QC procedures specified in the associated USEPA test methods and are included in the final report provided by Element One (Wilmington, NC).

Appendix 6 presents test equipment quality assurance data (instrument calibration records, meter box calibration records, cyclonic flow determinations sheets, Pitot tube, nozzle and probe assembly calibration records).

6.0 TEST RESULTS AND DISCUSSION

6.1 Test Results and Allowable Emission Limits

Operating data and air pollutant emission measurement results for each two-hour test period are presented in Tables 6.1 and 6.2.

The measured total chromium concentrations and emission rates for FGCHROME and EUCHROME1 are less than the allowable limits specified in PTI No. 115-07B and the NESHAP (Subpart N) for the operation of the individual processes:

- 0.0000651 lb/hr (6.51E-05 lb/hr) for FGCHROME
- 184 mg/hr for EUCHROME1

6.2 Variations from Normal Sampling Procedures or Operating Conditions

There were no variations from normal sampling procedures or operating conditions during the duration of the testing program.

Table 6.1 Measured exhaust gas conditions and total chromium emission rates for FGCHROME; calculated allowable emission rate for EUCHROME1

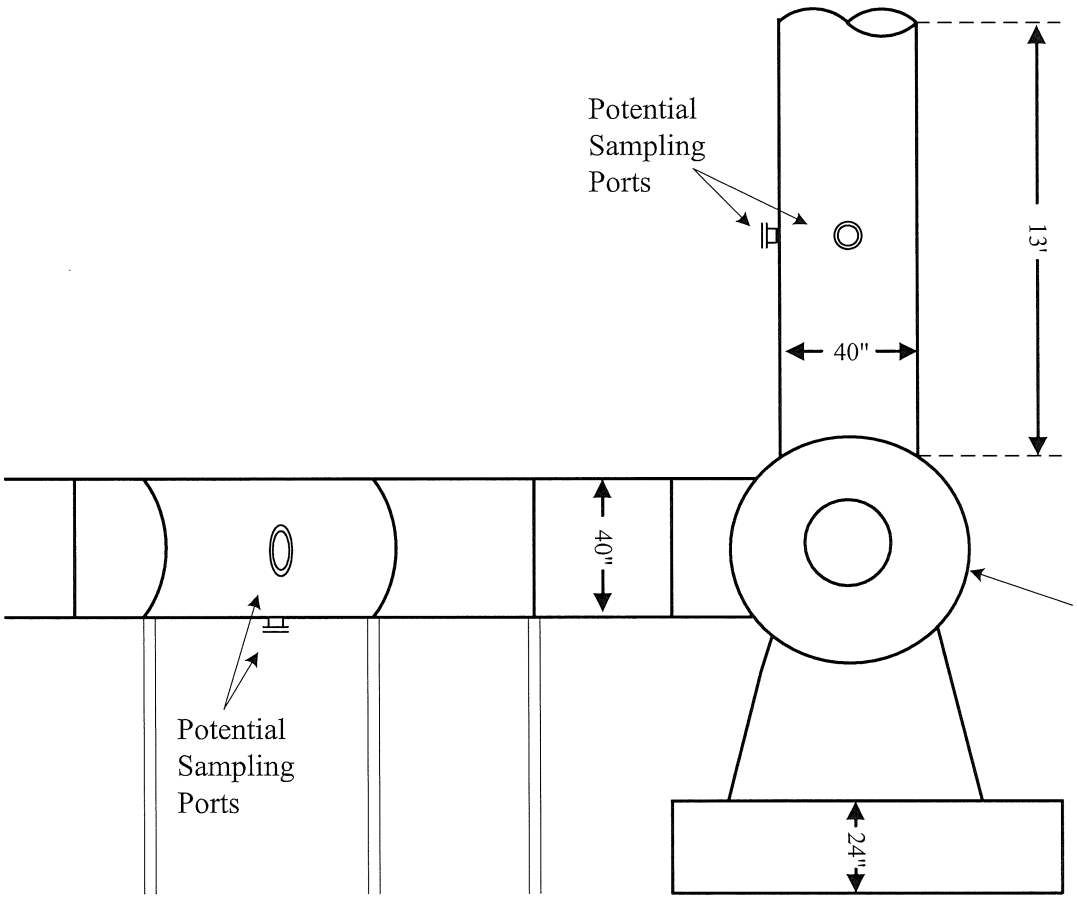
Date Test No.	4/23/19 1	4/23/19 2	4/24/19 3	Three Test Average
FGCHROME process rate (sq.ft. / 2hrs)	1,200	1,200	1,200	1,200
Tank No. 5 scrubber dP (inH_2O)	2.8	2.8	2.8	2.8
Tank No. 6 scrubber dP (inH_2O)	3.6	3.6	3.6	3.6
Tank No. 50 scrubber dP (inH_2O)	3.7	3.7	3.8	3.7
Exhaust gas flowrate (dscfm)	23,358	23,170	22,667	23,065
Exhaust gas flowrate (dscmm)	661	656	642	653
Sample volume (dscm)	3.06	3.04	2.95	3.02
Total chromium catch weight (µg)	3.70	0.63	2.20	2.18
FGCHROME Total Cr Emissions				
Total chromium conc. (mg/dscm)	1.21E-03	2.08E-04	7.46E-04	7.21E-04
Total chromium emission rate (lb/hr) *Permitted limit (lb/hr)*	1.06E-04	1.81E-05	6.33E-05	6.24E-05 *6.51E-05*
Total chromium emission rate[1] (mg/hr)	48.0	8.21	28.7	28.3
EUCHROME1 Allowable Emission Rate				
Total ventilation rate (FGCHROME, dscmm)	661	656	642	653
Area of EUCHROME1 inlet duct (ft^2)	6.31	6.31	6.31	6.31
Total area of inlet ducts (ft^2)	8.07	8.07	8.07	8.07
Ventilation rate[2] (EUCHROME1, dscmm)	517	512	501	510
Allowable emission rate for Cr[1] (mg/hr)	186	184	180	184

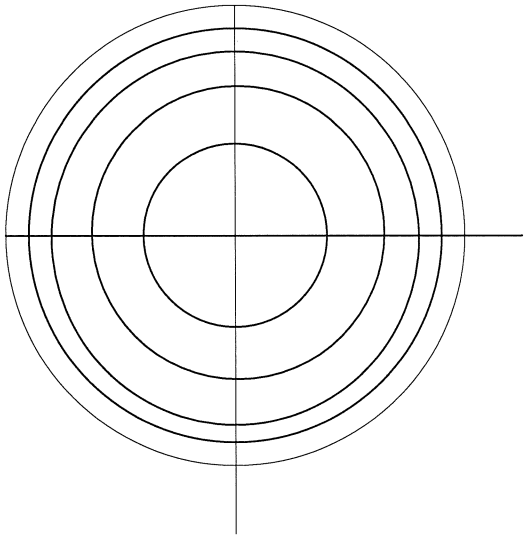
1. If the total chromium emission rate (mg/hr) for FGCHROME is less than the allowable emission rate calculated for EUCHROME1, then the EUCHROME1 affected source is in compliance with the emission limitation in the Chrome NESHAP.

2. Assumed ventilation rate for EUCHROME1 based on ratio of EUCHROME1 inlet duct to total area of all inlet ducts.

APPENDIX 2

- SAMPLE LOCATION DRAWING





Velocity locations as measured from stack wall

Pt	inch
TBD	TBD

Adept Plastics Plant #4 – SVCHROME

Scale	Sheet	
None	1 of 1	Impact Compliance & Testing, Inc