

AIR EMISSION TEST REPORT
FOR THE
VERIFICATION OF PARTICULATE MATTER EMISSIONS
FROM
DUST COLLECTORS

Prepared for:

Ervin Industries
Amasteel Division
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Report Certification

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FOR THE
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FROM
DUST COLLECTORS**

**Ervin Industries, Amasteel Division
Adrian, Michigan**

This document was prepared by Impact Compliance & Testing, Inc. and reviewed by Ervin Amasteel, a division of Ervin Industries, Inc., representatives and approved for submittal to the State of Michigan Department of the Environment, Great Lakes, and Energy – Air Quality Division as part of the air emissions test report.

IMPACT COMPLIANCE & TESTING, INC.



Tyler J. Wilson

Senior Project Manager

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1 Introduction

Ervin Amasteel, a division of Ervin Industries, Inc. (Ervin) operates dust collectors at the Tabor Street facility in Adrian, Lenawee County, Michigan.

The State of Michigan Department of Environment, Great Lakes, and Energy – Air Quality Division (EGLE-AQD) has issued to Ervin Permit to Install (PTI) No. 46-12A for operation of two (2) dust collectors identified as emission units EU0006 and EU0007.

Air emission compliance testing was performed pursuant to PTI No. 46-12A. Conditions of PTI No. 46-12A for EU0006 and EU0007 state:

- *Within 60 days after achieving the maximum production rate, but not later than 180 days after commencement of trial operation of EU0006, the permittee shall verify and quantify emission rates of PM, PM10 and PM2.5, from EU0006 by testing at owner's expense, in accordance with Department requirements, in order to continue operation.*
- *Upon request of the AQD District Supervisor, the permittee shall verify PM, PM10, and PM2.5 emission rates from EU0007 by testing at the owner's expense, in accordance with Department requirements.*

Emission units EU0006 and EU0007 were tested as part of this test event. The compliance testing presented in this report was performed by Impact Compliance & Testing, Inc. (ICT), a Michigan-based environmental consulting and testing company. ICT representatives Blake Beddow and Andrew Eisenberg performed the field sampling and measurements September 17-19, 2024.

The dust collector emission compliance tests consisted of triplicate, ≥60-minute sampling periods for particulate matter (PM) for each dust collector. Exhaust gas velocity, moisture, and dry molecular weight were determined for each test period to calculate pollutant mass emission rates. Section 8.6 of USEPA Method 2 allows for a dry molecular weight of 29.0 to be used without analysis. This method was used to determine dry molecular weight of the exhaust gas since the dust collector controls building air PM.

The exhaust gas sampling and analysis was performed using procedures specified in the test plan dated August 6, 2024, that was reviewed and approved by EGLE-AQD.

Questions regarding this air emission test report should be directed to:

Andrew Eisenberg
Project Manager
Impact Compliance & Testing, Inc.
37660 Hills Tech Drive
Farmington Hills, MI 48331
(734) 357-8406
Andrew.Eisenberg@ImpactCandT.com

Rick Payne
Plant Engineer
Ervin Industries – Amasteel Division
915 Tabor Street
Adrian, MI 49221
(517) 265-6118
rpayne@ervinindustries.com

2 Summary of Test Results and Operating Conditions

2.1 Purpose and Objective of the Tests

Conditions of PTI No. 46-12A require Ervin to test EU0006 and EU0007 for PM, PM10, and PM2.5 emissions.

2.2 Operating Conditions During the Compliance Tests

The testing was performed while the Ervin dust collectors were operated at normal routine operating conditions. Ervin representatives provided process operating data for each test period.

Attachment 1 provides operating records provided by Ervin representatives for the test periods.

2.3 Summary of Air Pollutant Sampling Results

The gases exhausted from the sampled dust collectors were sampled for three (3) ≥60-minute test periods per dust collector, during the compliance testing performed September 17-19, 2024.

Table 2.1 presents the average measured PM emission rates for EU0006 and EU0007 (average of the three test periods for each dust collector).

Test results for each one-hour sampling period and comparison to the permitted emission rates are presented in Section 6.0 of this report.

Table 2.1 Average measured emission rates for each dust collector (three-test average)

Emission Unit	PM	PM10	PM2.5
	(lb/1,000 lb exhaust gas)	(lb/hr)	(lb/hr)
EU0006	0.0006	0.05 ^[1]	
Permit Limit	0.01	1.35	0.27
EU0007	0.0008	0.06 ^[1]	
Permit Limit	0.01	1.2	1.2

Note [1]: The collected filterable PM is assumed to be PM10/PM2.5 (worst-case assumption without using in-stack cyclones).

3 Source and Sampling Location Description

3.1 General Process Description

Ervin manufactures cast steel shot using a 30-megawatt (MW) electric arc furnace and heat-treating furnaces. Steel shot is cast in "off-peak" hours and is then screened to be separated by size. A portion of the shot is transferred to a grit forming process, where the shot is further screened to be separated by size and crushed by rollers to give it an angular shape to be sold as an abrasive. The emission units that were tested (EU0006 and EU0007) are emission controls for the grit forming process. Both EU0006 and EU0007 consist of process equipment that used for the production and sizing of abrasive material for sale.

3.2 Rated Capacities and Air Emission Controls

The maximum rated capacity for the EU0006 emission collection system is 60,000 standard cubic feet per minute (scfm). The maximum rated capacity for the EU0007 emission collection system is 26,420 scfm.

3.3 Sampling Locations

The EU0006 exhaust gas is released to the atmosphere through a dedicated vertical exhaust stack with a vertical release point. The EU0007 exhaust gas is released to the atmosphere through a dedicated vertical exhaust stack with a vertical release point.

The exhaust stack sampling ports for EU0006 are located in the round, vertical exhaust duct with an inner diameter of 55.5 inches. The stack is equipped with two (2) sample ports, opposed 90°, that provide a sampling location 35.0 inches (0.63 duct diameters) upstream and 115.0 inches (2.07 duct diameters) downstream from any flow disturbance.

The exhaust stack sampling ports for EU0007 are located in the square, vertical exhaust duct with an inner area of 22.5 inches x 33.5 inches (calculated square duct diameter: 26.9 inches). The stack is equipped with four (4) sample ports, that provide a sampling location 22.0 inches (0.82 duct diameters) upstream and >62.0 inches (>2.30 duct diameters) downstream from any flow disturbance.

All sample port locations satisfy the USEPA Method 1 criteria for a representative sample location. Individual traverse points were determined in accordance with USEPA Method 1.

Attachment 2 provides diagrams of the emission test sampling locations.

4 Sampling and Analytical Procedures

A test plan for the air emission testing was reviewed and approved by EGLE-AQD. This section provides a summary of the sampling and analytical procedures that were used during the testing periods.

4.1 Summary of Sampling Methods

USEPA Method 1	Exhaust gas velocity measurement locations were determined based on the physical stack arrangement and requirements in USEPA Method 1
USEPA Method 2	Exhaust gas velocity pressure was determined using a Type-S Pitot tube connected to a red oil incline manometer; temperature was measured using a K-type thermocouple connected to the Pitot tube. Exhaust gas dry molecular weight was determined as specified in Section 8.6 of Method 2.
USEPA Method 4	Exhaust gas moisture content was determined by gravimetric analysis of moisture gain in chilled impingers
USEPA Method 5	Exhaust gas filterable PM was determined using an isokinetic sample train.

4.2 Exhaust Gas Velocity Determination (USEPA Method 2)

Exhaust gas velocity was measured using USEPA Method 2 throughout each test period as part of the isokinetic sampling procedures. Velocity pressure measurements were performed at each stack traverse point using an S-type Pitot tube and red-oil manometer. Temperature measurements were performed at each traverse point using a K-type thermocouple and a calibrated digital thermometer.

Prior to performing the initial velocity traverse for each emission unit, the S-type Pitot tube and manometer lines were leak-checked at the test site. These checks were made by blowing into the impact opening of the Pitot tube until 3 or more inches of water were recorded on the manometer, then capping the impact opening and holding it closed for 15 seconds to ensure that it was leak free. The static pressure side of the Pitot tube was leak-checked using the same procedure.

The absence of significant cyclonic flow at each sampling location was verified using an S-type Pitot tube and oil manometer. The Pitot tube was positioned at each velocity traverse point 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).

Attachment 3 provides isokinetic data and field data sheets.

4.3 Exhaust Gas Molecular Weight Determination (USEPA Method 2)

Gases exhausted from the emission units are primarily captured process air and are expected to have ambient air concentrations of CO₂ and O₂. CO₂ and O₂ content for the exhaust gas streams were determined using a dry molecular weight of 29.0 per Section 8.6 in USEPA Method 2.

4.4 Exhaust Gas Moisture Content (USEPA Method 4)

Moisture content of the exhaust gas streams were determined in accordance with USEPA Method 4 using a chilled impinger sampling train (as part of the USEPA Method 5 PM sampling train). A sample of the exhaust gas was extracted at an isokinetic rate and moisture in the sample gas was collected in a chilled impinger train. At the conclusion of each sampling period the moisture gain in the impingers was determined gravimetrically by weighing each impinger to determine net weight gain. Moisture content was determined as a component of the sampling procedures for PM (i.e., not as a separate measurement train).

4.5 Measurement of PM in Exhaust Gas (USEPA Method 5)

A USEPA Method 5 sample train was used to measure PM for each exhaust gas. Exhaust gas was withdrawn at an isokinetic rate through a properly sized sampling nozzle, heated probe, and heated glass fiber particulate filter. The sampling nozzles were constructed of stainless steel. The probe liner was constructed of borosilicate glass. Following the particulate filter, moisture was removed from the sample gas using chilled impingers and sample gas rate was measured using a calibrated dry gas meter.

At the end of each test period, the PM collected in the front half of the USEPA method 5 sample train (from the sampling nozzle to the heated glass fiber particulate filter) was recovered in accordance with the acetone rinse and brush procedures (6 rinses/brushes for metallic components; 3 rinses/brushes for borosilicate glass components) specified in USEPA Method 5. The impinger solutions were weighed gravimetrically for moisture content determination.

Prior to testing, the sampling nozzles, probe liner, and the front half of the filter housing were cleaned in accordance with the pretest preparation procedures specified in USEPA Method 5.

Solvent rinse samples were stored in appropriate containers (amber glass bottles with Teflon® screw cap liners), with the liquid level marked. Each sample bottle was clearly labeled with a unique identification number.

The laboratory PM analysis was conducted by ICT (Holt, Michigan) according to the appropriate QA/QC procedures specified in USEPA Method 5.

Attachment 4 provides PM calculations. Attachment 5 provides a copy of the PM laboratory report.

5 QA/QC Activities

5.1 Flow Measurement Equipment

Prior to arriving onsite (or onsite prior to beginning compliance testing), the instruments used during the source test to measure exhaust gas properties and velocity (Pitot tube and scale) were calibrated to specifications in the sampling methods.

5.2 Particulate Matter Recovery and Analysis

All recovered PM samples were stored and transported in certified trace clean amber glass sample bottles with Teflon® lined caps. The liquid level on each bottle was marked with a permanent marker and the caps were secured closed with tape, prior to transporting. Acetone with a residue after evaporation of $\leq 0.001\%$ was used for the analysis. Based on the very low PM catches (for all emission units), and no need for blank correction, a blank sample was not used for this test event.

5.3 Laboratory QA/QC Procedures

The PM analyses were conducted by ICT according to the appropriate QA/QC procedures specified in USEPA Method 5. Laboratory data sheets and PM catch weights are presented in the Laboratory Report in Attachment 5.

5.4 Isokinetic Sampling and Meter Box Calibrations

The dry gas meter sampling console used for PM and moisture testing 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 rate for all test periods was within the allowable isokinetic variation (i.e. within 10% of the calculated isokinetic sampling rate required by USEPA Method 5).

Calibrations of the probes, pitot tubes, and nozzles satisfied USEPA Method 5 criteria.

Attachment 6 presents test equipment quality assurance data (calibration records for the meter box, pitot tubes, probes, nozzles, and scale).

6 Results

6.1 Test Results and Allowable Emission Limits

Dust collector operating data and PM emission measurement results for each test period are presented in Tables 6.1 and 6.2.

The following allowable emission limits are specified in PTI No. 46-12A:

EU0006

- 1.35 lb/hr for PM10;
- 0.27 lb/hr for PM2.5; and
- 0.01 lb/1,000 lb exhaust gas for PM.

EU0007

- 1.2 lb/hr for PM10;
- 1.2 lb/hr for PM2.5; and
- 0.01 lb/1,000 lb exhaust gas for PM.

The measured PM emission rates for EU0006 and EU0007 are less than the allowable limits specified in PTI No. 46-12A.

6.2 Variations from Normal Sampling Procedures or Operating Conditions

The testing for all pollutants was performed in accordance with USEPA methods and the approved test plan. The dust collectors operated at routine operating parameters and no variations from normal operating conditions occurred during the test periods.

The filterable PM collected during the test periods presented in this air emission test report is assumed to be PM10/PM2.5 (worst-case assumption without using in-stack cyclones). The filterable PM results (three-test average for each emission unit) are compared to the PM, PM10, and PM2.5 permit limits in Tables 2.1, 6.1, and 6.2.

Attachment 7 provides a flowrate study that was performed for EU0006 on July 29, 2024.

Table 6.1 Measured exhaust gas conditions and PM emission rates for EU0006

Test No.	1	2	3	
Test date	9/17/2024	9/17/2024	9/18/2024	Three Test
Test period (24-hr clock)	1937-2118	2155-2333	0000-1333	Average
<u>Exhaust Gas Composition</u>				
CO ₂ content (% vol)	0.0	0.0	0.0	0.0
O ₂ content (% vol)	21.0	21.0	21.0	21.0
Moisture (% vol)	2.0	1.8	2.1	2.0
Exhaust gas temperature (°F)	85.3	82.0	82.3	83.2
Exhaust gas flowrate (dscfm)	18,310	17,679	16,990	17,660
<u>Particulate Matter</u>				
Sample volume (dscf @ STP)	85.2	76.9	74.4	78.8
Filter catch (mg)	1.06	0.45	0.39	0.63
Acetone rinse catch (mg)	1.90	1.10	0.30	1.10
Total PM catch (mg)	2.96	1.55	0.69	1.73
PM emissions (lb/hr)	0.08	0.05	0.02	0.05
Permit limit (lb/hr)	-	-	-	1.35 (PM ₁₀) / 0.27 (PM _{2.5})
PM emissions (lb/1,000 lb exhaust gas)	0.0010	0.0006	0.0003	0.0006
Permit limit (lb/1,000 lb exhaust gas)	-	-	-	0.01 (PM)

Table 6.2 Measured exhaust gas conditions and PM emission rates for EU0007

Test No.	1	2	3	
Test date	9/18/2024	9/18/2024	9/18/2024-9/19/2024	Three Test
Test period (24-hr clock)	2022-2128	2156-2302	2326-0032	Average
<u>Exhaust Gas Composition</u>				
CO ₂ content (% vol)	0.0	0.0	0.0	0.0
O ₂ content (% vol)	21.0	21.0	21.0	21.0
Moisture (% vol)	2.0	2.1	2.3	2.1
Exhaust gas temperature (°F)	106	103	102	104
Exhaust gas flowrate (dscfm)	15,602	15,145	15,295	15,347
<u>Particulate Matter</u>				
Sample volume (dscf @ STP)	59.2	58.0	58.7	58.6
Filter catch (mg)	1.22	0.71	0.96	0.96
Acetone rinse catch (mg)	0.80	1.20	0.20	0.73
Total PM catch (mg)	2.02	1.91	1.16	1.70
PM emissions (lb/hr)	0.07	0.07	0.04	0.06
Permit limit (lb/hr)	-	-	-	1.2 (PM ₁₀) / 1.2 (PM _{2.5})
PM emissions (lb/1,000 lb exhaust gas)	0.0010	0.0010	0.0006	0.0008
Permit limit (lb/1,000 lb exhaust gas)	-	-	-	0.01 (PM)

Attachment 1

Facility Operating Records

EU0006

00.07 Sep 18 2024

Play

-1h

-2h

-4h

Options

Close

-8h

-12h

-24h

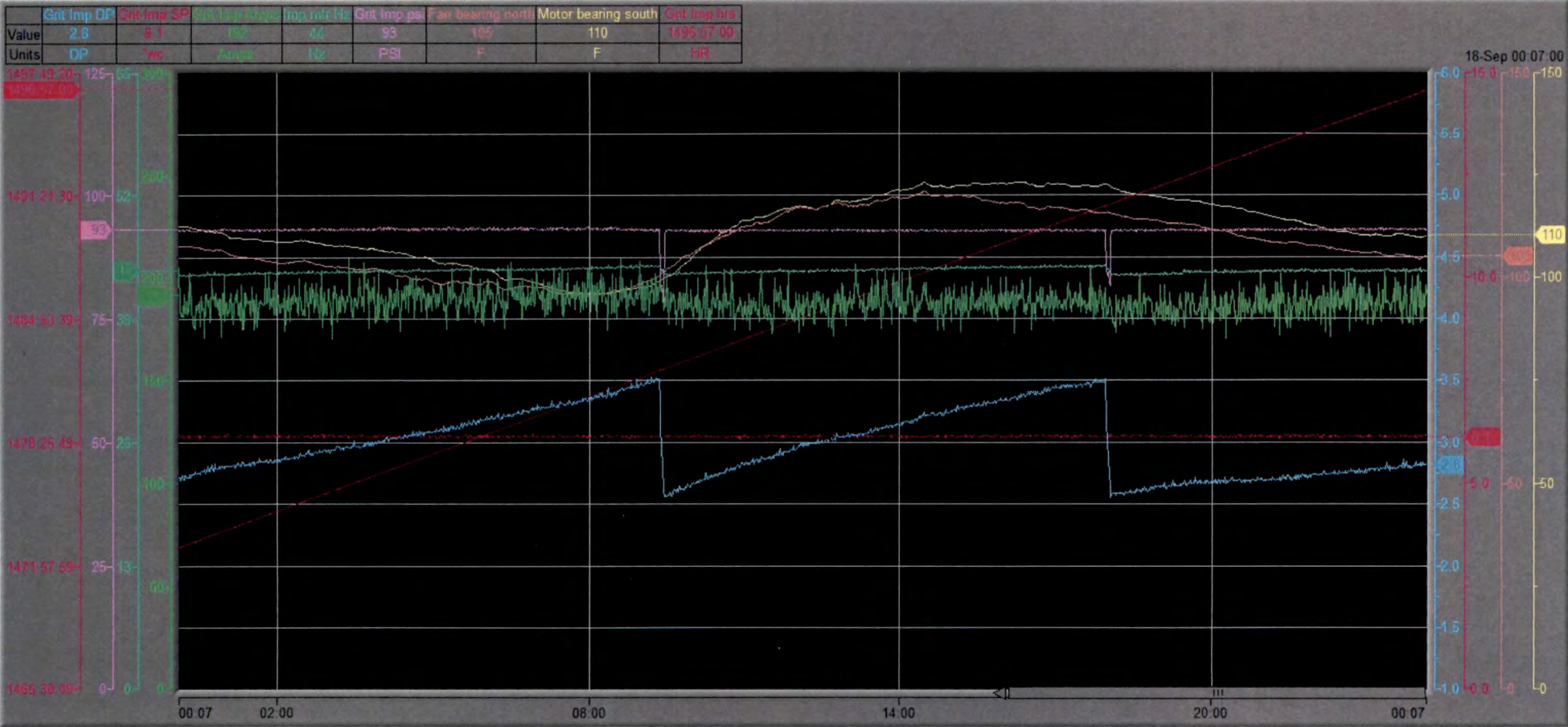
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Grit DC Imperial

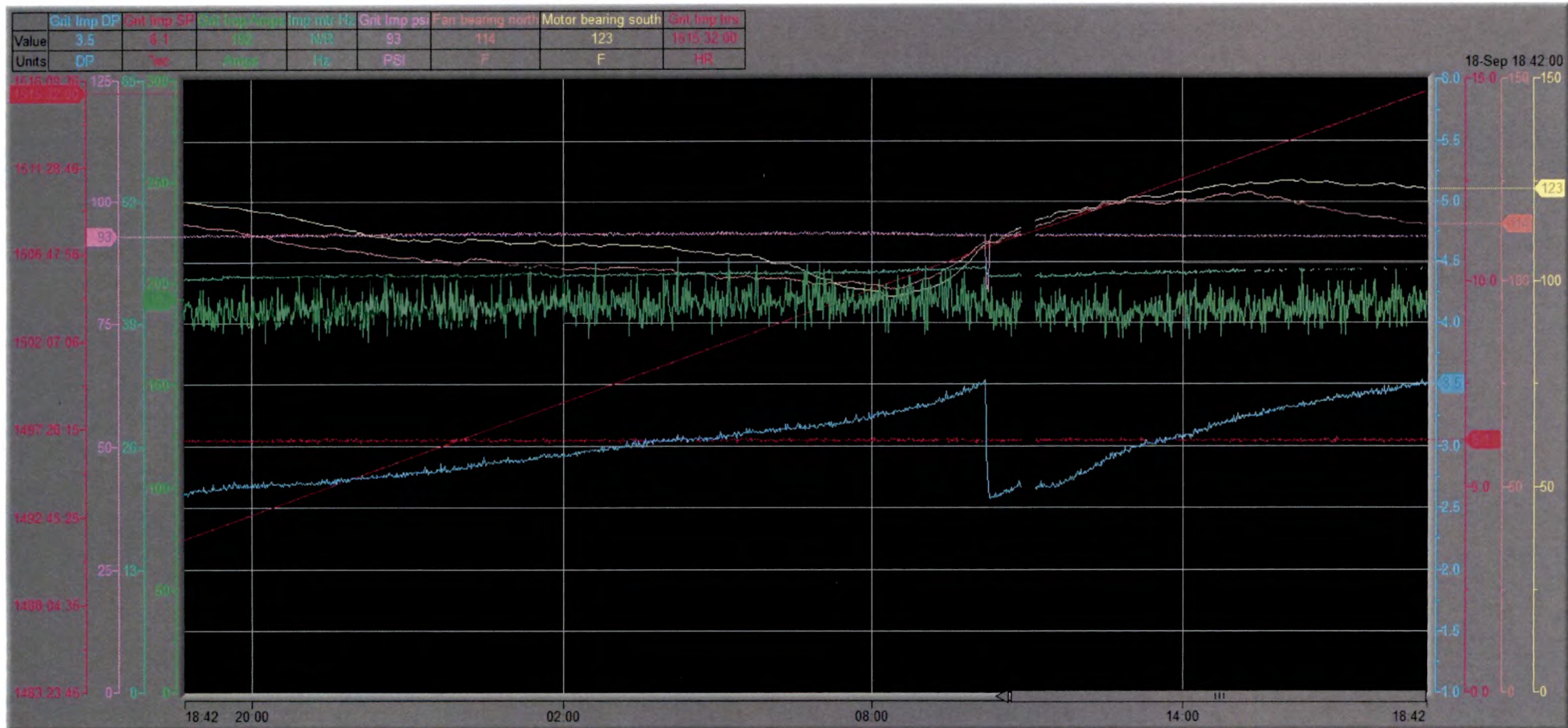
Main Page

HISTORY

test



EU0006



EU0007

00:01 Sep 19 2024

Play

-1h

-2h

-4h

Options

Close

-8h

-12h

-24h

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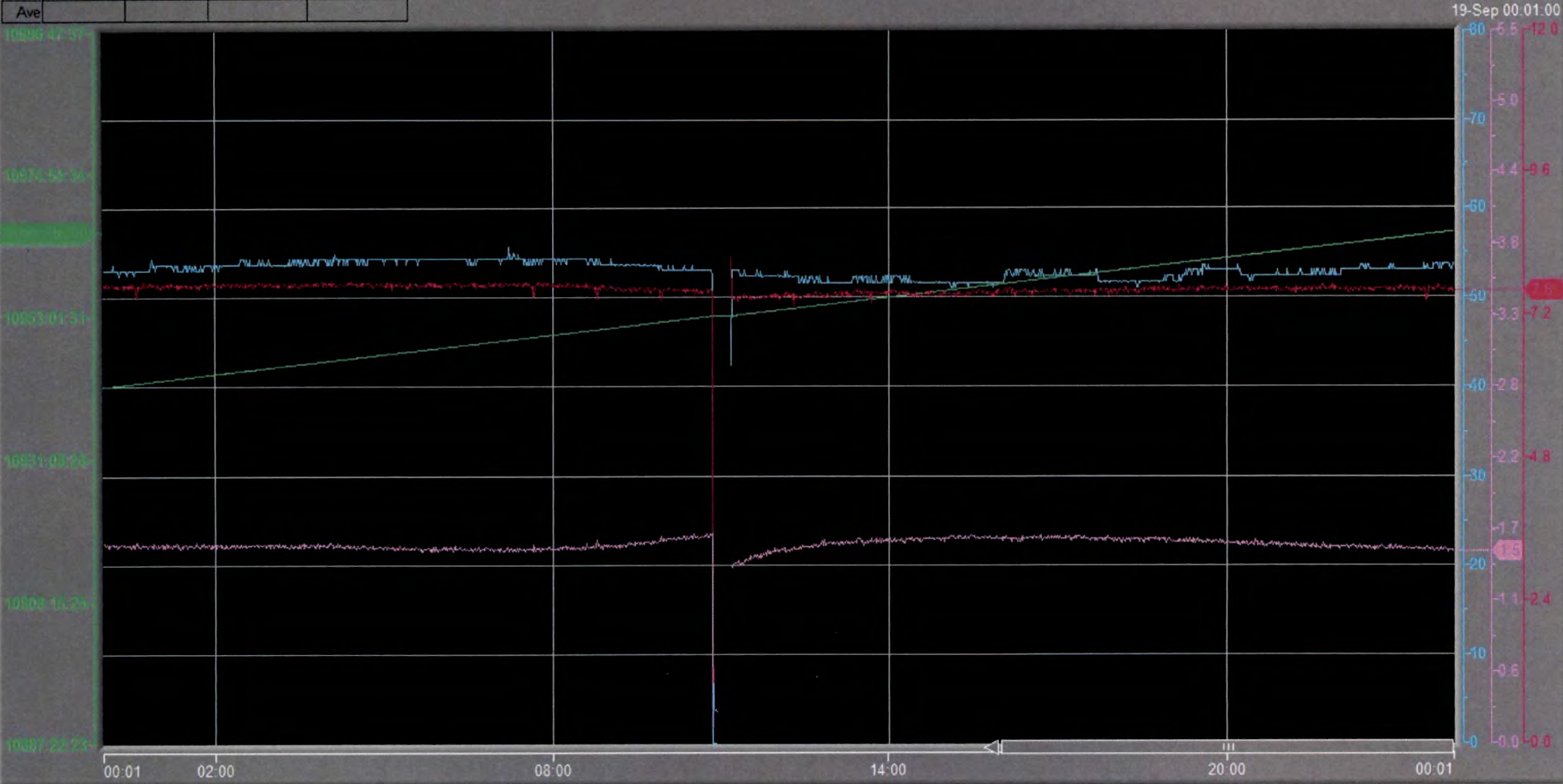
Grit Dust Coll. Cox

Main Page

Grits Main Page

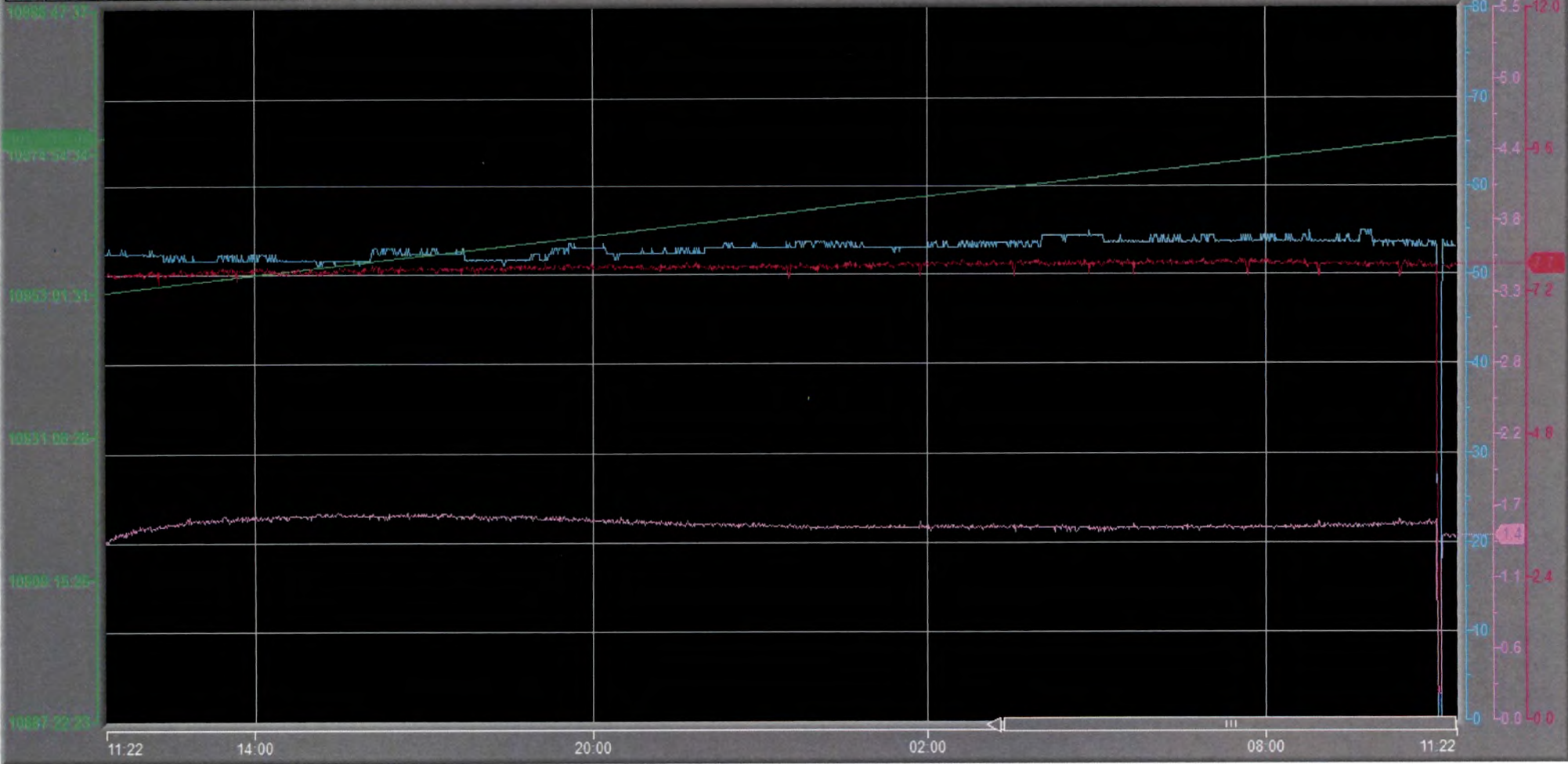
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Ave				



EU0007

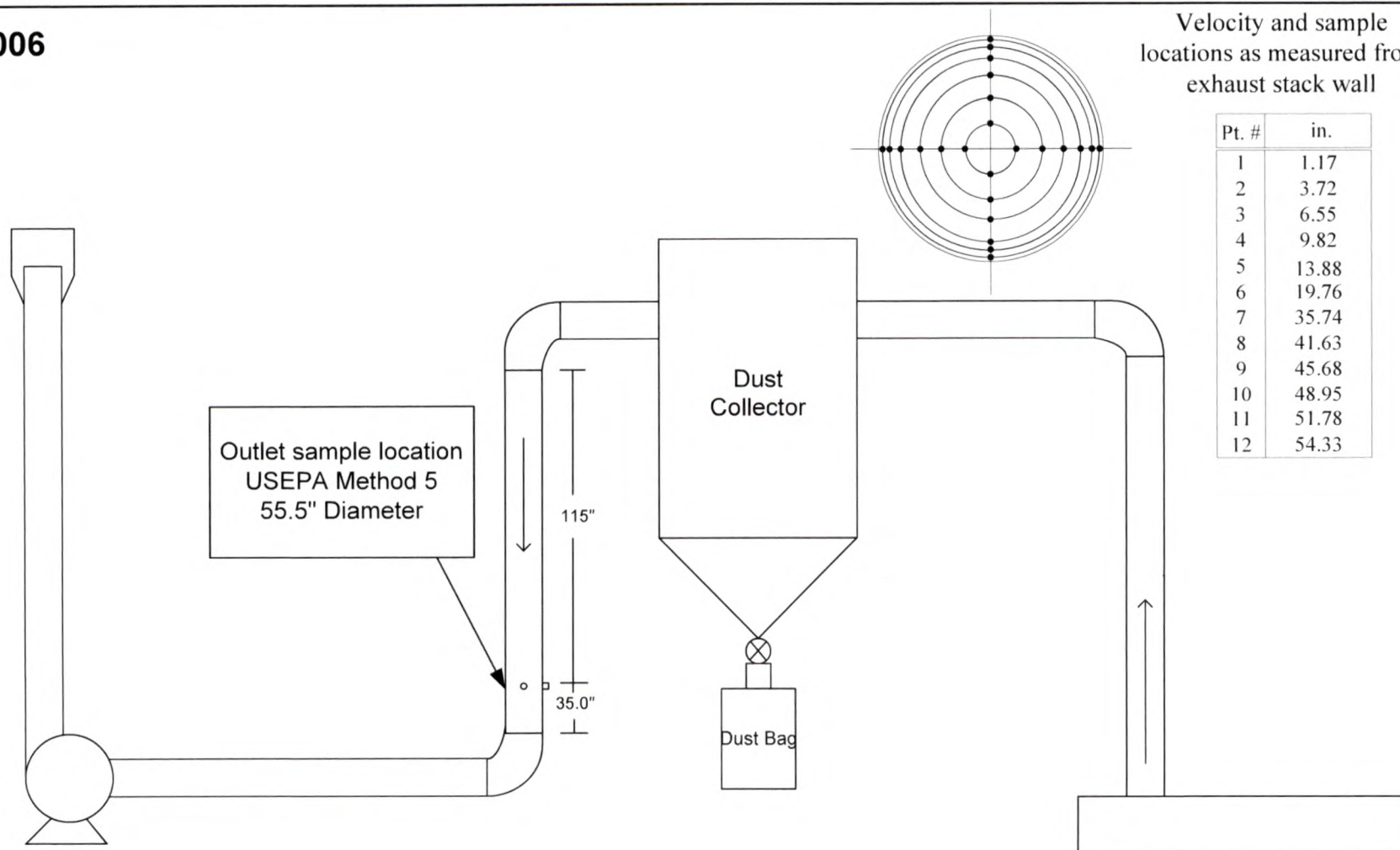
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Attachment 2

Dust Collector Sample Port Diagrams

EU0006



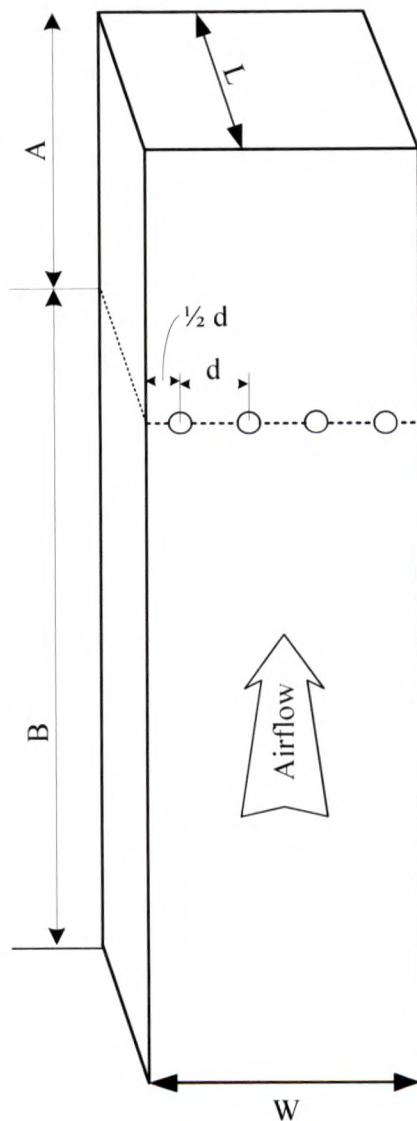
**Ervin Amasteel - Dust Collector
Emission Test Sampling Locations**

Scale
None

Sheet
1 of 1



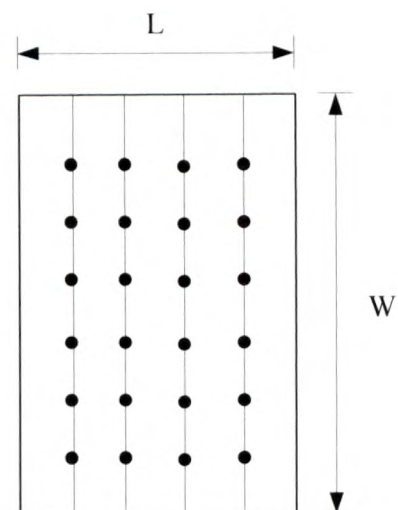
EU0007



Velocity and sample
locations as measured from
exhaust stack wall

Pt. #	in.
1	1.48
2	4.89
3	9.92
4	23.58
5	28.61
6	32.03

L	W	A	B	d
22.5"	33.5"	22.0"	>62.0"	8.375"



**Ervin Amasteel - Dust Collector
Emission Test Sampling Locations**

Scale
None

Sheet
1 of 1

